FORAMINIFERAL GENERA AND THEIR CLASSIFICATION

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PREFACE

The purpose of these volumes is to make available to those working with the Foraminiferida a systematic summary that includes the description and illustration of every validly described foraminiferal genus. Although we hope that this will be useful to foraminiferal workers at all levels, it is not intended as an introductory textbook, hence we have not included extensive separate discussions of foraminiferal morphology, ecology, life cycles, biostratigraphy, evolution, or economic use, topics that are addressed by many excellent current publications. The systematic arrangement of genera is alphabetical within the various subfamily or family categories, and the family group taxa within the suborders are arranged in order of presumed evolutionary sequence or increasing complexity. Descriptions are generally focused on test morphology, both external and internal, but some information concerning the living organism is summarized for the few that are known. Geologic range is given to the level of the geologic series or epoch, and known geographic occurrence and a limited amount of ecologic information is included. In view of the very large number of taxa considered, morphologic descriptions are as concise as possible, consistent with the inclusion of the available information. Morphologic terms used are defined in the Glossary, in which reference also is given to other terms proposed by various writers. The plates of illustrations and the plate explanations are bound separately from the text, for greater convenience in comparing descriptions and figures.

Much of the primary taxonomic literature on the foraminifers is widely scattered, in publications of limited availability (some in editions of only 125 copies), and that of the past two decades has appeared in an increasingly wide variety of languages. Yet a quarter century has elapsed since completion of the last comprehensive compilation of described genera. The purpose of the present volumes is to address this deficiency.

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Repository of Types

All newly illustrated specimens from our collections and those given to us for the present revision are deposited in the U.S. National Museum of Natural History, Washington, D.C.

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Foraminiferal Genera and Their Classification

Introduction

The Foraminiferida, because of their small size, great abundance, and readily preserved and highly diagnostic shells, are unsurpassed as stratigraphic and paleoecologic tools and as subjects for statistical analysis. They are thus the most widely used fossil organisms for biostratigraphy, age-dating and correlation of sediments, and paleoenvironmental interpretation, both as organisms whose living representatives provide ecologic data and as mineralized shells that are a geochemical record of paleotemperatures, extent of glaciation, and other paleogeographic features.

Perhaps some six thousand extant foraminiferal species have been described, but a far larger number are known only as fossils. Like the fossil representatives, however, most living species are known only or largely on the basis of their shells, whereas the cytology, life cycles, behavior, and similar features of the living organisms are known for probably less than fifty species. Thus the suprageneric classification and descriptions of most genera and species have been based on characteristics of the shell or test, including general morphology, developmental changes, internal modifications, apertural structures, wall composition, crystal form, lamellar character, perforations and canaliculi, and ultrastructure. Because of their preeminent utility for geology and stratigraphy, much of the systematic description of these organisms has been by paleontologists, and major changes in foraminiferal classification invariably have resulted from new interpretations of their shells, commonly based on the development of new or refined techniques for study.

As information accumulates about a group of organisms, new taxa are proposed with greater detail in their delimitation. Classification also becomes more detailed and complex, both as a means of summarizing and ordering this information and for making predictions concerning related taxa. Thus, when only a few species were known in the early nineteenth century, about two hundred genera had been proposed for them, and the early classification of d'Orbigny (1826, ***2303**) included five families. Both the number of described genera and families had doubled by the mid-1800s, and the families were further subdivided into subfamilies. By the time five hundred genera had been proposed, Brady's classification (1884, ***344**) used nearly forty suprageneric categories.

Compilations of foraminiferal genera with an accompanying systematic classification have appeared with regularity during the twentieth century. Among these have been the publications by Chapman, 1902, (***534**); Cushman, 1927 (***742**), 1933 (***767**), 1940 (***787**), 1948 (***801**); Galloway, 1933, (***1205**); Glaessner, 1945 (***1250**); Haynes, 1981 (***1437**); Loeblich and Tappan, 1964 (***1910**); Neagu, 1979 (***2237**); Pokorný, 1954 (***2443**), 1958 (***2447**); Rauzer-Chernousova and Fursenko, 1959 (***2531**); and Sigal, in Piveteau, 1952 (***2413**). Although numerous other publications in recent years have emphasized planktonic genera and their classification, agglutinated taxa, or other selected groups from limited geographic regions or geologic periods, the most recent compilation of all described genera was that of Loeblich and Tappan, 1964 (***1910**).

The *Treatise on Invertebrate Paleontology* (Loeblich and Tappan, 1964, ***1910**) reflected the state of the art of over two decades past, after over twenty-four hundred genera had been proposed. Loeblich and Tappan recognized 244 suprageneric categories and 1,192 foraminiferal genera, with 1,267 other described genera regarded as synonyms. For 3,000 genera that had been described by 1981, Saidova's classification (1981, *2696) had 517 suprageneric taxa for Cenozoic foraminifers.

During the two decades following publication of the *Treatise*, additional foraminiferal genera and suprageneric categories have been described, and the absence of an up-to-date compilation, together with the relative inaccessibility of much of the primary literature, has hindered progress. A single foraminiferal species currently may be referred to by three or four different generic names by different workers, and as many as three genera inadvertently have been proposed for the same type species. These problems complicate communication between specialists and the transfer and utilization of scientific knowledge. On the other hand, some taxonomic revisions have allowed subdivision of formerly too inclusive taxa, thereby greatly enhancing their stratigraphic utility, while also better reflecting phylogenetic relationships. More realistic geologic ranges also are necessary prerequisites for discussions of modes or rates of evolution or the timing and pervasiveness of extinction of these abundant organisms.

Furthermore, ultrastructural studies of the wall and detailed morphologic revisions made with the aid of transmission microscopy of carbon replicas and scanning electron microscopy have changed the importance assigned to various morphologic and structural characteristics and have shown that some taxa previously placed in synonymy should be regarded as distinct. Increased scientific activity in previously neglected regions, geologic periods (Cambrian, Triassic), and facies (coastal marshes, the deep sea) has also resulted in the description of new taxa.

Biological classification requires the consideration of available information concerning every aspect of the organism. For the Foraminiferida, this includes the nature of the test, its composition and ultrastructure, including presence or absence of pores, canaliculi, or alveoles, form and number of openings and position of the aperture, and presence and nature or absence of subepidermal partitions, exoskeletal beams and rafters, endoskeletal pillars, toothplates, and entosolenian tubes, as well as the mode of chamber addition, and such information as is available concerning the living organism and its life history.

In foraminiferal classification, we regard as most important in denoting relationships the genetically controlled test composition, mineralogy, ultrastructure, and method of test formation; hence these characteristics delimit the suborders. The unilocular, bilocular, or multilocular character of the test, presence or absence of wall perforations, canaliculi, alveoli or canal systems, and major apertural features rank next in importance and separate superfamilies. The free or attached nature of the foraminifer, mode of chamber addition, simple or undivided chamber interior, and apertural modifications separate families. Subfamilies are also recognized in some but not all families. Wall composition and ultrastructural modifications appear more fundamental than number and arrangement of chambers, both of which may change during ontogeny; hence evolutionary relationships appear to be best indicated by such a hierarchical classification. Although individual species are not discussed in this book, even surface ornamentation may show phyletic importance at the species level.

Foraminifers are protozoans that generally construct a test by incremental additions, commonly a separate chamber each time, and each new chamber covering a preceding aperture to allow cytoplasmic continuity through the test and contact with the external environment. The limited number of ways in which this can be done are repeated many times by unrelated genera in different geologic periods. Thus uniserial, biserial, or triserial arrangements of chambers, planispiral, trochospiral, or streptospiral coiling, discrete or enveloping chambers, and all combinations of these are repeated, although differences appear in the wall composition and structure and various internal and external morphologic details.

All foraminiferal generic and suprageneric categories proposed to date are discussed herein on the basis of original descriptions and such subsequent data as is available. In order to determine possible synonymy or to supplement information concerning some incompletely defined taxa, much new information was obtained during our own studies by electron microscopy, thin sectioning, and other techniques, for both many older taxa and some newly proposed.

From the total of 3,620 validly proposed generic taxa of Foraminiferida considered in this book, 2,455 foraminiferal genera are recognized, described and illustrated, 960 are regarded as objective or subjective synonyms, 208 proposed genera are considered as systematically unrecognizable on the basis of present information, and 16 appeared too late for inclusion other than by name and reference. These genera are placed in 12 suborders, 74 superfamilies, 296 families, and 302 subfamilies. In determining validity or availability of the foraminiferal taxa, we have adhered strictly to the *International Code of Zoological Nomenclature*, Third Edition, 1985, and have indicated the appropriate article in all citations of nonavailability.

In the following Systematic Descriptions, the synonymy for suprageneric categories generally includes only those names of the same rank; if names of other ranks are included, the rank concerned is indicated in parentheses. Within a family (or subfamily, when these are included), genera are arranged alphabetically.

We have not utilized subgenera either based on morphologic characteristics or as an indication of lineages, as a separate category herein. Recognition and use of subgenera results in a very unwieldy taxonomy, and lineage concepts change as additional evidence is obtained. Previously described subgenera have been elevated to generic status or are regarded as synonyms of other genera.

Although we have tried to minimize the number of taxa described as new, it has not been feasible to publish some of these before now. New family group taxa proposed herein are the superfamily Annulopatellinacea, families Labyrinthidomatidae, Heleninidae and Bisacciidae, and the subfamily Pallaimorphininae; newly proposed genera are *Antarcticella*, *Hansenisca*, *Lacustrinella*, and *Pavlovecina*; *Astrolepidina* is validated by the indication of a type species; new species names are proposed for some homonyms, including *Gaudryinopsis plotnikovae* nom. nov. pro *Gaudryina neocomica* var. *robusta* Tairov, 1956 (non *Gaudryina robusta* Cushman, 1913), the variety having been incorrectly indicated as the type species for *Trochogaudryina* Plotnikova, 1973; *Textularia valeriae*, nom. nov. pro *Textilina pseudorugosa* Lacroix subsp. *fistulosa* Mikhalevich, 1973 (non *Textularia sagittula* Defrance var. *fistulosa* Brady, 1884), type species of *Norvanganina* Mikhalevich, 1981; *Spinoendothyra oldalipinae* nom. nov. is proposed for *Endothyra inflata* Lipina in Lebedeva, 1954 (non *Endothyra inflata* Morozova, 1949), type species of *Endothyra (Inflatoendothyra)* Brazhnikova and Vdovenko, 1972; *Lenticulina suleymanovi* nom. nov. is proposed for *Robidzhonia prima* Melnikova and Suleymanov, 1969 (non *Cristellaria prima* d'Orbigny, 1850), type species of *Robidzhonia*; and *Sphincterules anaglyptus* nom. nov. is proposed for *Nautilus costatus* Fichtel and Moll, 1798 (non *Nautilus (Orthoceras) costatus* Batsch), type species of *Sphincterules* de Montfort, 1808; and a new species *Dolosella dorsetensis* is described in the family Fischerinidae. Although many family and genus group names have been given changed rank, this does not affect their authorship and date.

Information as to geologic range is given in greater detail than previously and, when possible, is indicated to the level of geologic stage. Obviously, we have not restudied every described species, and some of these ranges may prove to be more extensive after generic reallocation of additional species. For some genera, a discontinuous geologic range may be recorded, as it is based on the presently known occurrence. Additional information eventually will allow determination of a continuous range or will show that two or more discrete but isomorphic taxa were included.

During this study, some foraminiferal taxa were considered to be unrecognizable on the basis of presently available information. These are alphabetically discussed and illustrated as Genera Inquierenda, following the Systematic Descriptions, in the hope that restudy will allow them to be better understood. Eight additional genera are listed for which we have seen reference but have been unable to obtain the original publication. For the sake of completeness, these are listed together with their respective type species and the appropriate reference when known in the hope that they will eventually become available. Various nomenclaturally unavailable generic and suprageneric names or nomina nuda that have been published are listed in another section.

Finally, many taxa that originally or previously were included among the foraminiferans are now placed elsewhere, and these also are listed separately, together with an indication of their correct affinity. Some are now assigned to radiolarians, tintinnids, sponges, echinoderms, annelids, fungal spores, red algae, charophytes, dinoflagellates, and acritarchs, among other groups.

A Glossary follows the Systematic Descriptions and includes definitions of terms used in the descriptions, both older classic ones and many that have been proposed in recent years.

Although lengthy, References include only those books and articles cited in this book, either for original descriptions of taxa and subsequent taxonomic changes or those providing illustrations used herein. These are given a reference number preceded by an asterisk, and references are identified by author, date, and this reference number when cited in the text or plate explanations.

Finally, for greater ease in use, the plates form a separate volume, rather than being interspersed throughout the text. We have tried to illustrate the type species of all genera, including illustrations of the holotype or lectotype for many. In addition, the type species have been illustrated for most genera here regarded as subjective synonyms, inasmuch as not all specialists will agree with these subjective decisions.

Illustrations

Many illustrations have been copied from original publications or other sources and are reproduced with permission of the authors and publishers and with our deep gratitude. These are acknowledged in the plate captions by reference to the author, date, and reference number assigned in References.

Abbreviations and Latin Terms Used

art., article, generally with reference to the *International Code of Zoological Nomenclature*

BMNH, British Museum (Natural History), London

DSDP, Deep Sea Drilling Project

E., East, eastern

err. cit., erroneous citation, including typographic errors and other forms of intentional or unintentional misspelling

err. emend., erroneous emendation, contrary to the rules of the ICZN

fide, according to

ICBN, *International Code of Botanical Nomenclature*

ICZN, *International Code of Zoological Nomenclature*

L., Lower

M., Middle

MNHN, Museum National d'Histoire Naturelle, Paris

Ms., manuscript

N., North, northern

nec, nor

nom. conserv., conserved name, by action of the International Commission on Zoological Nomenclature

nom. corr., corrected name [for..]

nom. imperf., imperfectly formed name, automatically correctable according to the ICZN

nom. nud., nomen nudum, nude name, without description or otherwise unavailable

nom. nov., nomen novum, new name
nom. prov., provisional name, unavailable according to the ICZN
nom. reject., rejected name, by action of the International Commission on Zoological Nomenclature
nom. subst., nomen substitutum, name proposed to replace that of a junior homonym
nom. superfl., superfluous name; invalidly including a previously proposed name
nom. transl., nomen translatum, name transferred to a different rank in the classification, as from genus to subgenus, or subfamily to family
nom. vernac., vernacular name, not Latinized, hence not available
non, not
obj., objective synonym; genus proposed with the same type species as that of an earlier described genus
OD, original designation, fixation of type species of genus by original citation
OD(M), original designation (monotypy): fixation of type species of genus by monotypy but not explicitly so stated
Op., opinion, with reference to Decisions and Opinions of the International Commission on Zoological Nomenclature
opp., opposite
partim, part; term used with restricted meaning
pers. comm., personal communication
pro, for
ref., reference
S., South, southern
SD, subsequent designation, fixation of type species of genus by later author, when not fixed in the original description
SD(SM), subsequent designation (subsequent monotypy), fixation of type species of genus by monotypy in later paper, when no species were originally included
SEM, scanning electron microscope (or photograph)
subj., subjective
syn., synonym
TEM, transmission electron microscope (or photograph)
U., Upper
USNM, United States National Museum, Washington
W., West, western

Systematic Descriptions

Order FORAMINIFERIDA Eichwald, 1830

Foraminiferida T. L. Jahn and F. L. Jahn, 1949 (*1598), p. 128, nom. corr. pro order Foraminifera.
Foraminifera Eichwald, 1830 (*1083), p. 21.
Foraminifera Claparède and Lachmann, 1859 (*613), p. 432.
Foraminiferiae Delage and Hérouard, 1896 (*926), p. 107 (subclass).
Foraminifera Calkins, 1909 (*477A), p. 38 (subclass).
Foraminiferae Chatton, 1925 (*547), p. 76 (order).
Rhizopodophycidae Rothmaler, 1951 (*2652), p. 260 (subclass).
Foraminifera Marks, 1951 (*2043), p. 377 (suborder).
Arforaminiferia Rhumbler, 1913 (*2621), p. 341 (suborder).
Scytinascia Deák, 1964 (*905), p. 97, 103 (group).
Foraminifereda Bovee, 1970 (*321), p. 179 (superorder).
Foraminifera Margulis, 1974 (*2029A), fig. 4 on p. 61, p. 70 (phylum).
Foraminifera Mikhalevich, 1980 (*2108), p. 53 (subphylum).
Calcifera Mikhalevich, 1980 (*2108), p. 55 (superclass).
Rotalioida Mikhalevich, 1980 (*2108), p. 58 (superorder).

Cytoplasmic body enclosed in test or shell of one or more interconnected chambers; wall may be homogeneous or of similar or unlike layers or laminae, may be imperforate or finely to coarsely perforate, basically proteinaceous but may have agglutinated particles, or may deposit the mineral calcite, aragonite, or rarely silica on the organic base, calcareous wall may be porcelaneous, microgranular, or hyaline and optically or ultrastructurally radiate or granular; canal or stolon systems of varied complexity may be present; commonly test has one or more main apertures through which pseudopodia protrude. Sexual and asexual generations alternate, or one generation may be suppressed; gametes biflagellate, triflagellate, or amoeboid. Free-living or rarely parasitic; benthic and attached or motile, or pelagic, in marine to brackish water, rare in fresh water. Cambrian to Holocene.

Suborder ALLOGROMIINA Loeblich and Tappan, 1961

Allogromiina Loeblich and Tappan, 1961 (*1902), p. 217.
Allogromidiaceae Hartog, in Harmer and Shipley, 1906 (*1424), p. 58 (order).
Microcometides Poche, 1913 (*2433), p. 175 (superfamily).
Allogromiida De Saedeleer, 1934 (*947), p. 7, 52 (legio).
Allogromioidea Chapman and Parr, 1936 (*542), p. 141 (superfamily).
Lagynidea Sigal, in Piveteau, 1952 (*2413), p. 154 (superfamily).
Allogromiidea Pokorný, 1958 (*2447), p. 158.
Allogromiida Fursenko, 1958 (*1199), p. 22 (order).
Lagynacea Loeblich and Tappan, 1961 (*1902), p. 274 (superfamily).
Lagynea Mikhalevich, 1980 (*2108), p. 54 (class).
Lagynata Mikhalevich, 1980 (*2108), p. 54 (subclass).
Lagynida Mikhalevich, 1980 (*2108), p. 54 (order).

Test unilocular or may tend to become multilocular; test wall membranaceous or proteinaceous, may have ferruginous encrustations or small quantity of agglutinated particles. Upper Cambrian to Holocene.

Family LAGYNIDAE Schultze, 1854

Lagynidae Carpenter, 1861 (*486), p. 458, nom. corr. pro family Lagynida.
Lagynida Schultze, 1854 (*2824), p. 52.
Plagiophryiinae Vejdovský, 1881 (*3284), p. 138 (subfamily).
Diplophryidae Tarànek, 1882 (*3129), p. 235.
Myxothecinae Rhumbler, 1895 (*2616), p. 79 (subfamily).
Microcometidae Poche, 1913 (*2433), p. 175.
Armyxothecnia Rhumbler, 1913 (*2621), p. 343 (subfamily; err. emend.).
Lagyninae Galloway, 1933 (*1205), p. 41 (subfamily).
Belariini De Saedeleer, 1934 (*947), p. 7, 79 (tribe).
Mikrogromiidae De Saedeleer, 1934 (*947), p. 7, 68.
Mikrogromiini De Saedeleer, 1934 (*947), p. 7, 68 (tribe).
Heterogromiini De Saedeleer, 1934 (*947), p. 7, 82 (tribe).
Microgromiidae Doflein and Reichenow, 1952 (*965), p. 730 (err. emend.).
Microcometesidae Grospietsch, 1958 (*1315), p. 35, 57 (err. emend.).

Test small, membranous to firm, proteinaceous, and may have ferruginous surface crust, rarely includes agglutinated matter; aperture single or with numerous apertures that are not localized; may form colonies; biflagellate gametes. Holocene.

APOGROMIA De Saedeleer, 1934

Plate 1, fig. 1

Type species: Microgromia mucicola Archer, 1877 (***62**), p. 121 = *Mikrogromia mucicola* Archer, nom. corr. De Saedeleer, 1934 (***947**), p. 76; OD.

Apogromia De Saedeleer, 1934 (***947**), p. 76.

Test globular, 8 μm to 15 μm in length, with short cylindrical neck, without internal septum, wall membranous, with ferruginous coating. Fresh water. Holocene; Europe.

BELARIA De Saedeleer, 1934

Plate 1, fig. 5

Type species: Belaria bicorpor De Saedeleer, 1934; OD(M).

Belaria De Saedeleer, 1934 (***947**), p. 79.

Test globular to pyriform, with produced neck, symmetrical internal septum at base of neck, centrally perforated for extrusion of pseudopodial trunk; one contractile vacuole. Fresh water. Holocene; Europe.

BODERIA T. S. Wright, 1867

Plate 1, fig. 12

Type species: Boderia turneri T. S. Wright, 1867; OD.

Boderia T. S. Wright, 1867 (***3398**), p. 335.
Arboderium Rhumbler, 1913 (***2621**), p. 343 (err. emend.).

Test conical to flattened, membranous, colorless, 1.5 mm to 6.0 mm in length; openings at the angles of the test; cytoplasm brown to orange, with strong protoplasmic streaming; one to ten nuclei, pseudopodia few, protruding in bundles from the apertures. Marine. Holocene; North Sea.

CYSTOPHRYS Archer, 1869

Plate 1, figs. 7-9

Type species: Cystophrys haeckeliana Archer, 1869 (syn.: *Gromia socialis* Archer, 1869 (***59**), p. 322; 1869 (***60**), p. 390; fide De Saedeleer, 1934 (***947**), p. 69); OD.

Cystophrys Archer, 1869 (***58**), p. 259.
Mikrogromia Hertwig, 1874 (***1481**), p. 33; type species: *Gromia socialis* Archer = *C. haeckeliana*; OD(M).
Microgromia Archer, 1876 (***61**), p. 343 (err. emend.).

Test small, globular to pyriform, 25 μm to 35 μm in length; aperture terminal on short neck, asymmetrical internal septum at one side at base of neck, constricting the protruding pseudopodial trunk; granular cytoplasm only partially filling the test; one contractile vacuole; elongate bifurcating or anastomosing pseudopodia arise from pseudopodial trunk or stomostyle; reproduction by longitudinal or transverse fission, and by production of biflagellate zoospores. Commonly in groups or colonies; in fresh water. Holocene; Europe.

Remarks: Archer originally included two species, *C. haeckeliana* and *C. oculea* in *Cystophrys*, citing the former on plate XVII as "gen. et sp. nov." and the latter merely as "sp. nov.," thereby indicating *C. haeckeliana* as type species, as discussed by Loeblich and Tappan (1964, ***1910**, p. C166). Thus, De Saedeleer (1934, ***947**, p. 69) was in error in recognizing *Cystophrys* for *C. oculea* and transferring *C. haeckeliana* to *Mikrogromia*.

DIPLOPHRYS Barker, 1868

Plate 1, figs. 2-4

Type species: Diplophrys archeri Barker, 1868; OD(M).

Diplophrys Barker, 1868 (***134**), p. 123.

Test globular, 8 μm to 20 μm in diameter; simple circular aperture at each pole; wall thin, hyaline, homogeneous; cytoplasm colorless, granular and transparent; single nucleus; always with several contractile vacuoles and oil globules, pseudopodia elongate, radiating, straight or bifurcating, protruding from apertures at both ends of test; reproduction by binary fission or division into four zoospores. May form colonies up to 60 μm in diameter that have amoeboid movement. Fresh water. Holocene; Europe.

HETEROGROMIA De Saedeleer, 1934

Plate 1, fig. 6

Type species: Heterogromia intermedia De Saedeleer, 1934; OD.

Heterogromia De Saedeleer, 1934 (*947), p. 82.

Test globular to pyriform. 9 μm to 11 μm in length; with many peripheral contractile vacuoles. Fresh water. Holocene; Europe.

KIBISIDYTES Jepps, 1934

Plate 1, figs. 10-11

Type species: Kibisidytes marinus Jepps, 1934; OD(M).

Kibisidytes Jepps, 1934 (*1612), p. 125.

Test small, ovoid to pyriform, 10 μm to 14 μm in length; wall proteinaceous, brown, commonly with ferruginous surface encrustation; aperture single, rounded; opaque cytoplasm only partially filling the test, uninucleate, no contractile vacuole; pseudopodia short, delicate, granular and may branch; asexual reproduction by binary fission. Marine, in surface film of water, or attached to floating objects. Holocene; Europe.

LAGYNIS Schultze, 1854

Plate 2, figs. 3, 4, and 7

Type species: Lagynis baltica Schultze, 1854; OD.

Lagynis Schultze, 1854 (*2824), p. 56.

Difflugia (Exassula) Ehrenberg, 1872 (*1077), p. 245; type species: obj.; SD Loeblich and Tappan, 1964 (*1910), p. C166.

Platoum Schulze, 1875 (*2826), p. 115; type species: *Platoum parvum* Schulze, 1875; OD(M).

Test elongate, ovate, or slightly compressed, about 0.05 mm in length, wall transparent, membranous, hyaline, flexible; aperture small, rounded, terminal to slightly excentric, bordered by narrow lip; granular cytoplasm does not completely fill test, central part with numerous dark granules, lighter colored near aperture, one or two small contractile vacuoles; pseudopodia thin and elongate, granular, branching; nucleus large, spherical, aborally located. Marine. Holocene; Baltic Sea, Europe.

MICROCOMETES Cienkowski, 1876

Plate 2, figs. 1 and 2

Type species: Microcometes paludosa Cienkowski, 1876; OD.

Microcometes Cienkowski, 1876 (*601), p. 46.

Test small, globular to subangular, 7 μm to 22 μm in diameter; wall transparent, membranous, and flexible, may have irregular, brownish ferruginous coating; aperture multiple, three to five openings; cytoplasm opaque, filling about half the test interior, nucleus central in position, one to six contractile vacuoles; granular pseudopodia, long, delicate and branching. Fresh water. Holocene; Europe.

MYXOTHECA Schaudinn, 1893

Plate 2, figs. 8-10

Type species: Myxotheca arenilega Schaudinn, 1893; OD.

Myxotheca Schaudinn, 1893 (*2746), p. 18.

Armyxothecum Rhumbler, 1913 (*2621), p. 343 (err. emend.).

Test spherical to hemispherical, 0.16 mm to 0.56 mm in diameter, wall gelatinous, with loosely agglutinated foreign particles; granular, reddish cytoplasm not differentiated as ecto- and endoplasm, single large nucleus (35 μm to 79 μm in diameter, elongate granular pseudopodia that exhibit streaming, up to 5 cm long. Marine. Holocene; Europe.

OPHIOTUBA Rhumbler, 1894

Plate 3, fig. 7

Type species: Ophiotuba gelatinosa Rhumbler, 1894; OD.

Ophiotuba Rhumbler, 1894 (*2615), p. 604.

Arophiotubum Rhumbler, 1913 (*2621), p. 350 (err. emend.).

Test elongate, tubular, convoluted, living within empty tests of other foraminifers and suspended within by threadlike cytoplasmic filaments, the end of the tube protruding from the apertural opening of the host test and furcating into many radiating and irregularly convoluted branches covered by a firm membrane; wall firm, proteinaceous, no agglutinated matter; cytoplasm reticulate under high magnification, many small nuclei. Marine. Holocene; North Sea, North Atlantic.

PILALLA Rhumbler, 1935

Plate 2, figs. 5 and 6

Type species: Pilalla exigua Rhumbler, 1935; OD.

Pilalla Rhumbler, 1935 (*2622), p. 150.

Test free, a single globular to ellipsoidal chamber; wall proteinaceous, impregnated with very fine mineral particles; no distinct aperture. Holocene; Baltic Sea; Germany: Kieler Bucht.

PLAGIOPHRYS Claparède and Lachmann, 1859

Plate 3, fig. 8

Type species: Plagiophrys cylindrica Claparède and Lachmann, 1859; SD Rhumbler, 1904 (*2617), p. 200.

Plagiophrys Claparède and Lachmann, 1859 (*613), p. 453.
Arplagiophrum Rhumbler, 1913 (*2621), p. 343 (err. emend.).

Test elongate, subcylindrical, 0.13 mm in length, rounded at base, sides subparallel; wall membranous, flexible; aperture terminal, large, rounded, with scalloped margin; nucleus or contractile vacuole unknown; numerous, filose granular pseudopodia. ?Fresh water. Holocene; Europe (?Germany, described from a bottle of water and algae of unknown provenance).

PSEUDODITREMA Deflandre, 1953

Plate 3, figs. 5 and 6

Type species: Ditrema mikrous De Saedeleer, 1934 (*947), p. 89; OD.

Pseudoditrema Deflandre in Grassé, 1953 (*1287), p. 143.

Test elongate ovate, 9 μm to 25 μm in length, resembling *Microcometes* but with only two apertures at opposite ends of the ovate test and elevated on short cylindrical necks; wall membranous, with ferruginous coating; granular cytoplasm only partly filling test, with numerous granules and contractile vacuoles, pseudopodia very thin, elongate, bifurcating, and anastomosing. Fresh water. Holocene: England; Belgium.

RHUMBLERINELLA Schmidt, 1929

Plate 3, figs. 1-3

Type species: Rhumblerinella bacillifera Schmidt, 1929; OD.

Rhumblerinella Schmidt, 1929 (*2783), p. 353.

Test irregular, spherical to ovoid, 0.7 mm in length; outer layer of cytoplasm with numerous densely packed but uncemented small elongate calcite spicules about 5 μm in length, produced by the protozoan, may also have some foreign matter external to the spicular layer; no definite aperture; nucleus large, round; fine and elongate pseudopodia with pronounced granular streaming may arise anywhere on surface but are most numerous at lateral margins. Marine. Holocene; North Sea.

SCHULTZELLA Rhumbler, 1904

Plate 3, fig. 4

Type species: Lieberkuehnia diffluens Gruber, 1884 (*1323), p. 484; OD.

Schultzella Rhumbler, 1904 (*2617), p. 197 (nom. subst. pro *Schultzia* Gruber, 1888).
Schultzia Gruber, 1888 (*1324), p. 36 (non *Schultzia* Grimm, 1876, nec Graff, 1882); obj.
Arschultzellum Rhumbler, 1913 (*2621), p. 343 (err. emend.).

Test globular to hemispherical, 0.22 mm in diameter; wall gelatinous, without foreign particles; cytoplasm colorless and finely granular, with several vacuoles and oil globules, numerous small nuclei; pseudopodia may protrude through irregular holes at any position in the gelatinous cover. Marine. Holocene; Europe.

Family MAYLISORIIDAE E. V. Bykova, 1961

Maylisoriidae E. V. Bykova, 1961 (*467), p. 20.
Alexandrellidae E. V. Bykova, 1958 (*466), p. 881 (nom. nud.).

Test free or attached, with branching tube terminating in saclike chambers; wall proteinaceous. U. Cambrian to Silurian.

CHITINODENDRON Eisenack, 1938

Plate 4, fig. 1

Type species: Chitinodendron bacciferum Eisenack, 1938; OD.

Chitinodendron Eisenack, 1938 (*1090), p. 236.

Test consisting of branching tubes that terminate in elongate saclike tapering chambers; wall proteinaceous (obtained from acid residues). U. Cambrian to Silurian; USA; Esthonia; Germany.

MAYLISORIA E. V. Bykova, 1961

Plate 4, figs. 2-4

Type species: Maylisoria pseudoscheda E. V. Bykova, 1961; OD.

Maylisoria E. V. Bykova, 1961 (*467), p. 31.
Alexandrella E. V. Bykova, 1958 (*466), p. 880 (non *Alexandrella* Chevreux, 1911, nec Tonnoir, 1926); (nom. nud.).

Test free, ovate, with somewhat produced ends; wall thick, yellow to brownish-gray, proteinaceous; no recognizable aperture other than perforations. U. Ordovician (Caradocian); USSR: Kazakhstan.

Family ALLOGROMIIDAE Rhumbler, 1904

Allogromiidae Schouteden, 1906 (*2788), p. 374, nom. corr. pro family Allogromida.
Allogromida Averintsev, 1906 (*99), p. 324, nom. transl. ex subfamily Allogromiinae.
Allogromiida Copeland, 1956 (*680), p. 183 (err. emend.).

Test proteinaceous or may have agglutinated matter on a proteinaceous base that in Allogromia is produced by endoplasm on the plasma membrane and not by the ectoplasm or pseudopodia (Césana, 1981, *517); those shown to have alternating generations produce amoeboid gametes. U. Ordovician to Holocene.

Subfamily ALLOGROMIINAE Rhumbler, 1904

Allogromiinae Rhumbler, 1904 (*2617), p. 202.
Craterininae Rhumbler, 1904 (*2617), p. 196.
Arrogromnia Rhumbler, 1913 (*2621), p. 343 (err. emend.).
Lieberkuehniinae De Saedeleer, 1934 (*947), p. 7, 64.
Lieberkuehniini De Saedeleer, 1934 (*947), p. 7, 64 (tribe).
Pleurophryini De Saedeleer, 1934 (*947), p. 7, 60 (tribe).
Allelogromiini De Saedeleer, 1934 (*947), p. 7, 67 (tribe).

Test globular, ovate, or elongate, wall proteinaceous; aperture terminal, living taxa commonly with entosolenian tube and pseudopodial trunk. U. Ordovician to Holocene.

ALLOGROMIA Rhumbler, 1904

Plate 4, figs. 5-8

Type species: Craterina mollis Gruber, 1884 (***1323**), p. 488; OD.

Allogromia Rhumbler, 1904 (*2617), p. 203.
Craterina Gruber, 1884 (*1323), p. 488 (non *Craterina* Curtis, 1826, nec Bory de St. Vincent, 1827); obj.
Arrogromium Rhumbler, 1913 (*2621), p. 343 (err. emend.).

Test free, ovate to spherical, 0.08 mm to 0.5 mm in length; wall thin, proteinaceous, with fibrillar ultrastructure, produced by endoplasm and not by the ectoplasmic pseudopodia, may have some agglutinated matter; aperture terminal, rounded, with entosolenian tube projecting into the interior and serving as a sheath for the pseudopodial trunk; granular pseudopodia elongate and anastomosing, with prominent streaming; reproduction by asexual schizogony, and sexual production of amoeboid gametes, haploid gamont, and diploid schizont generations morphologically similar. Marine and fresh water. Holocene; Europe; North America.

ARCHAEOCHITINIA Eisenack, 1954

Plate 4, figs. 11 and 12

Type species: Archaeochitinia gotlandica Eisenack, 1954; OD.

Archaeochitinia Eisenack, 1954 (*1091), p. 54.

Test free, unilocular, ovoid; wall proteinaceous (obtained from acid residues); aperture consisting of small openings elevated on short tubular projections. L. Silurian (Llandoverian); Sweden: Gotland.

ARCHAEOCHITOSA Eisenack, 1959

Plate 4, fig. 10

Type species: Archaeochitosa lobosa Eisenack, 1959; OD.

Archaeochitosa Eisenack, 1959 (*1092), p. 91.

Test a single irregularly shaped chamber; wall proteinaceous (obtained from acid residues); aperture consists of one or more rounded openings at the ends of tubular extensions from the central portion. Ordovician to Jurassic; Europe.

CHITINOLAGENA E. V. Bykova, 1961

Plate 4, fig. 13

Type species: Chitinolagena gutta E. V. Bykova; OD.

Chitinolagena E. V. Bykova, 1961 (*467), p. 30.

Test a single elongate chamber with inflated base and terminally enlarging elongate neck; wall proteinaceous, dark brown in color, with labyrinthine microstructure (specimen obtained in thin section of limestone); aperture terminal. U. Ordovician (Caradocian); USSR: Kazakhstan.

CHITINOSACCUS Smitter, 1956

Plate 5, figs. 1-3

Type species: Chitinosaccus zuluensis Smitter, 1956; OD.

Chitinosaccus Smitter, 1956 (*3007), p. 285.

Test an elongate saclike chamber, 0.65 mm in length; wall proteinaceous, flexible, colorless to reddish-brown, with sparse foreign particles attached to the exterior; aperture terminal, rounded; cytoplasm completely filling test; pseudopodia branching and anastomosing. Brackish water, sublittoral marine. Holocene; South Africa.

CYLINDROGULLMIA Nyholm, 1974

Plate 5, figs. 10-12

Type species: Cylindrogullmia alba Nyholm, 1974; OD(M).

Cylindrogullma Nyholm, 1974 (*2285), p. 117.

Test a single subcylindrical chamber, from 0.4 mm to 2.1 mm in length and 0.1 mm to 0.35 mm in breadth, may have a series of constrictions at the aboral end; wall thin, transparent, hyaline, proteinaceous, no material agglutinated to the test membrane but may have a soft cover of detritus around the test; aperture single; cytoplasm white, dense, that of pseudopodia clear and sharply differentiated; one vegetative nucleus. Marine, to depth of 200 m. Holocene; Sweden: Gullmar Fjord.

DIPLOGROMIA Rhumbler, 1904

Plate 4, fig. 9

Type species: Gromia brunneri Blanc, 1886 (*251), p. 362; SD Cushman, 1928 (*747), p. 60.

Diplogromia Rhumbler, 1904 (*2617), p. 214.

Ardiplogromium Rhumbler, 1913 (*2621), p. 344 (err. emend.).

Allelogromia De Saedeleer, 1934 (*947), p. 67; type species: obj., OD.

Test free, ovoid to pyriform, 0.06 mm to 0.25 mm in length; wall up to 0.02 mm thick, of small siliceous and other foreign particles held in a gelatinous base; aperture terminal, rounded; yellowish cytoplasm protrudes from aperture as an asymmetrical pseudopodial trunk, cytoplasm within the test covered by thick mucilaginous layer that may have been incorrectly regarded as an inner hyaline wall layer; numerous small vacuoles, large spherical nucleus or many smaller nuclei, pseudopodia numerous, long, anastomosing. Fresh water. Holocene; Switzerland.

GLOIOGULLMIA Nyholm, 1974

Plate 5, figs. 4 and 5

Type species: Gloiogullmia eurystoma Nyholm, 1974; OD(M).

Gloiogullmia Nyholm, 1974 (*2285), p. 117.

Test elongate ovate or sausage-shaped, 0.6 mm to 2 mm in length, 0.09 mm to 0.5 mm in breadth; wall of two more or less separated semitransparent proteinaceous membranes, outer membrane may be partly separated from the cytoplasm as a sticky coat to which detrital particles adhere to give an uneven surface; single wide aperture; cytoplasm with numerous inclusions, pseudopodial cytoplasm differentiated from that of main body; one to three nuclei; asexual reproduction by multiple fission, sexual reproduction unknown. Marine, on soft muddy bottom at 100 to 118 m; Holocene. Sweden: Gullmar Fjord.

GUANDUELLA Brönnimann and Zaninetti, 1984

Plate 5, figs. 8 and 9

Type species: Guanduella cribrata Brönnimann and Zaninetti, 1984; OD.

Guanduella Brönnimann and Zaninetti, 1984 (*412), p. 65.

Test unilocular, elongate conical, with narrow rounded base, enlarging gradually toward the apertural end; wall proteinaceous, flexible, the narrow base without agglutinated covering but later part with loosely agglutinated foreign particles, both mineral and organic, and without mineral cement, surface rough; aperture at the wide end of the test, with irregularly rounded openings in a large and nonagglutinated sieve plate, or this may be an attached holothurian plate. Holocene; Brazil.

LABYRINTHOCHITINIA E. V. Bykova, 1961

Plate 5, figs. 6 and 7

Type species: Labyrinthochitinia tastikoliensis E. V. Bykova, 1961; OD.

Labyrinthochitinia E. V. Bykova, 1961 (*467), p. 58.

Test free or attached; subglobular to ellipsoidal, inner partitions resulting in indistinct chamberlets that intercommunicate through labyrinthine canals; wall thin, dark brown, organic, labyrinthine in microstructure; no apparent aperture. U. Ordovician (Caradocian): USSR: N. Kazakhstan.

LIEBERKUEHNIA Claparède and Lachmann, 1859

Plate 6, fig. 1

Type species: Lieberkuehnia wagneri Claparède and Lachmann, 1859; OD(M).

Lieberkuehnia Claparède and Lachmann, 1859 (*613), p. 464.

Arlieberkuehnium Rhumbler, 1913 (*2621), p. 343 (err. emend.).

Test oval to spherical, 60 μm to 350 μm in length; wall membranous, smooth or lightly covered with foreign matter; aperture single, lateral or subterminal, may be a narrow slit; cytoplasm clear, yellowish, distinctly granular, with pseudopodial trunk extending through aperture to give rise to pseudopodia or to layer of cytoplasm that nearly completely envelops test; 1 to 150 spherical nuclei, many contractile vacuoles, elongate anastomosing pseudopodia with pronounced granular streaming; asexual reproduction by multiple fission. Fresh water and marine. Holocene; Europe (type species from bottle of water of unknown source).

MARSUPULINA Rhumbler, 1904

Plate 6, fig. 4

Type species: Marsupulina schultzei Rhumbler, 1904; OD(M).

Marsupulina Rhumbler, 1904 (*2617), p. 249.

Armarsupium Rhumbler, 1913 (*2621), p. 349 (err. emend.).

Test ovate, ellipsoid, or reniform; 0.2 mm in length; wall proteinaceous, may be partly covered by amorphous granular calcite; aperture rounded, excentric; single nucleus, pseudopodia granulose. Marine. Holocene; Mediterannean.

PARALIEBERKUEHNIA De Saedeleer, 1934

Plate 6, fig. 2

Type species: Microgromia elegantula Penard, 1904 (*2380), p. 416; OD.

Paralieberkuehnia De Saedeleer, 1934 (*947), p. 52.

Paralieberkuehnia De Saedeleer, 1932 (*946), p. 619 (err. cit.; nom. nud).

Test flask shaped, 20 μm to 25 μm in length, wall thin, hyaline, proteinaceous; cytoplasm a globular mass that only partly fills test interior, constricted toward the aperture into a pseudopodial trunk, very large contractile vacuole near base of pseudopodial trunk, nucleus subcentral; fine, straight granular pseudopodia show slow granular streaming. Fresh water. Holocene: Belgium; Switzerland.

PENARDOGROMIA Deflandre, 1953

Plate 6, fig. 3

Type species: Gromia linearis Penard, 1902 (*2379), p. 567; OD(M).

Penardogromia Deflandre, in Grassé, 1953 (*1287), p. 140.

Test elongate, 0.22 mm to 0.23 mm in length, tubular to fusiform, straight to slightly arcuate; wall thin, delicate, translucent, yellowish, with extremely small platelets in clear groundmass, suggesting longitudinal striations; aperture terminal; yellowish cytoplasm constricted toward aperture into distinct pseudopodial trunk; 1 to 20 spherical nuclei, small contractile vacuole; filamentous and anastomosing pseudopodia extend from the pseudopodial trunk. Fresh water. Holocene; Switzerland.

PERIPTYGMA Arnold, 1978

Plate 6, figs. 6-9

Type species: Periptygma lunothalamia Arnold, 1978; OD.

Periptygma Arnold, 1978 (*75), p. 94.

Test small, 0.1 mm to 0.2 mm across, early stage spherical, ovoid, or flasklike, 0.08 mm to 0.1 mm in diameter, later with an embracing crescentic second chamber that extends from one-half to three-fourths the circumference of the proloculus, the two-chambered stage being persistant; rarely a few additional crescentic chambers may be added, but the multilocular stage may be transient as these later chambers may detach to form new individuals in an asexual budding process; wall a thin, flexible, transparent, colorless membrane, without agglutinated particles; flasklike stage with single aperture produced on collar, entosolenian tube surrounding pseudopodial trunk, crescentic chambers have a simple round opening with neither collar nor entosolenian tube. Marine. Holocene: Mediterranean: S. France.

PLEUROPHRYS Claparède and Lachmann, 1859

Plate 7, figs. 1 and 2

Type species: Pleurophrys sphaerica Claparède and Lachmann, 1859; OD(M).

Pleurophrys Claparède and Lachmann, 1859 (***613**), p. 454.

Test ovate, 32 μm to 72 μm in length; wall of organic matter with embedded quartz grains and other foreign matter; aperture rounded; cytoplasm filling test, pseudopodia granular and reticulose. Fresh water and marine. Holocene; Germany.

RHYNCHOGROMIA Rhumbler, 1894

Plate 6, fig. 5

Type species: Rhynchogromia variabilis Rhumbler, 1894; OD.

Rhynchogromia Rhumbler, 1894 (***2615**), p. 590.
Arrhynchogromium Rhumbler, 1913 (***2621**), p. 344 (err. emend.).

Test elongate, ovate, 0.28 mm to 0.92 mm in length, commonly occurring in empty tests of other foraminifers; wall proteinaceous, single layered, containing numerous platelike or elongate secreted bodies and some foreign particles; aperture at one end of the test, rarely with a second aperture at the opposite end; one to three globular nuclei. Marine. Holocene: North Sea; N. Atlantic.

RHYNCHOSACCUS Rhumbler, 1894

Plate 7, figs. 8-10

Type species: Rhynchosaccus immigrans Rhumbler, 1894; OD.

Rhynchosaccus Rhumbler, 1894 (***2615**), p. 595.
Arrhynchosaccum Rhumbler, 1913 (***2621**), p. 344 (err. emend.).

Test ovate to elongate, 0.24 mm to 0.9 mm in length, occurring in empty tests of other foraminifers or may be parasitic in larger foraminifers; rounded at base, may be somewhat inflated at apertural end; wall thin, flexible, homogeneous, thickened toward aperture; aperture provided with entosolenian tube and may have similar opening at opposite end; globular nucleus. Marine. Holocene: North Sea; N. Atlantic.

SAEDELEERIA Loeblich and Tappan, 1960

Plate 7, figs. 6 and 7

Type species: Gromia gemma Penard, 1899 (***2378**), p. 86; OD.

Saedeleeria Loeblich and Tappan, 1960 (***1899**), p. 196.

Test ovate to pyriform, 0.2 mm to 0.6 mm in length; wall thick, white, double layered, inner hyaline homogeneous layer thickens toward the aperture, outer layer with cemented granular siliceous inclusions; aperture rounded, terminal, asymmetrical, with entosolenian tube; cytoplasm yellowish, becoming clear and colorless toward the aperture, pseudopodial trunk giving rise to numerous long and anastomosing pseudopodia; single large spherical nucleus, up to 50 μm in diameter, more rarely multinucleate. Fresh water. Holocene; Switzerland.

SPHAIROGULLMIA Nyholm, 1974

Plate 7, figs. 4 and 5

Type species: Sphairogullmia aurea Nyholm, 1974; OD(M).

Sphairogullmia Nyholm, 1974 (***2285**), p. 119.

Test a single globular to ovoid chamber, 0.25 mm to 1.0 mm in length, breadth 0.3 mm to 0.5 mm, and globular specimens may attain a diameter of 0.5 mm; wall proteinaceous, flexible, yellowish, glossy, semitransparent, appearing granular due to the presence of dense particles, including mica flakes, but lacking harder foreign bodies such as quartz grains; aperture circular, produced on a tubular neck, somewhat excentric in position; one or two nuclei; asexual reproduction by multiple fission; sexual reproduction not known. Marine, on soft muddy bottoms at 100 m to 118 m. Holocene; Sweden: Gullmar Fjord.

XENOTHEKELLA Saidova, 1970

Plate 7, fig. 3

Type species: Xenothekella elongata Saidova, 1970; OD.

Xenothekella Saidova, 1970 (***2693**), p. 145.

Test free, elongate, 1.25 mm to 1.5 mm in length and 0.05 mm to 0.1 mm in breadth, rounded or ovate proloculus and elongate tubular second chamber; wall thin, proteinaceous, with transverse growth constrictions; aperture terminal at the end of the tubular chamber. Holocene; ultraabyssal zone of Pacific Ocean: Kurile-Kamchatka Trench.

Subfamily SHEPHEARDELLINAE Loeblich and Tappan, 1984

Shepheardellinae Loeblich and Tappan, 1984 (*1918), p. 3.

Test free, narrow, tubular, and elongate; wall firm, flexible, proteinaceous; apertures at both ends through which pseudopodia may protrude. Holocene.

NEMOGULLMIA Nyholm, 1953

Plate 8, figs. 7 and 8

Type species: Nemogullmia longevariabilis Nyholm, 1953; OD.

Nemogullmia Nyholm, 1953 (*2280), p. 105.

Test free or may inhabit empty foraminiferal tests or worm tubes, elongate, straight, or convoluted, 1.6 mm to 19.0 mm in length; wall smooth, transparent, whitish to pale red, may have some agglutinated material, intermittant constrictions may occur; temporary small apertures at ends of test; cytoplasm opaque, containing oil droplets, one or more nuclei, pseudopodia reticulose; sexual reproduction with biflagellate gametes that develop within test of uninucleate gamont following temporary closure of apertures; schizont multinucleate, reproducing by fission. Marine. Holocene; Europe.

PHAINOGULLMIA Nyholm, 1955

Plate 8, figs. 5 and 6

Type species: Phainogullmia aurata Nyholm, 1955; OD.

Phainogullmia Nyholm, 1955 (*2282), p. 466.

Test cylindrical, 0.2 mm to 1.4 mm in length, tapering at both ends; wall yellowish-brown, glossy, opaque, consisting of proteinaceous lamellae; aperture at each end of test; cytoplasm contains food vacuoles, single nucleus; reticulose pseudopodia project from both apertures; asexual reproduction by multiple fission; sexual reproduction not observed. Marine. Holocene; Sweden: Gullmar Fjord.

SHEPHEARDELLA Siddall, 1880

Plate 8, figs. 1 and 2

Type species: Shepheardella taeniformis Siddall, 1880; OD.

Shepheardella Siddall, 1880 (*2907), p. 131 (also as *Shepheardia*, pl. 15).

Arshepheardellum Rhumbler, 1913 (*2621), p. 343 (err. emend.).

Test elongate, 1.0 mm to 7.5 mm in length, tubular, straight to slightly arcuate, tapering at both ends; wall proteinaceous, firm, flexible, transparent, colorless; small aperture at each end of test; yellowish, coarsely granular cytoplasm with pronounced streaming, accumulating in small lump at each end and also coating the test exterior, pseudopodia extend in a net from both apertures and show rapid streaming; large central body reported as a nucleus by Siddall but may be a vacuole. Marine. Holocene; England; USA: California.

TINOGULLMIA Nyholm, 1954

Plate 8, figs. 3 and 4

Type species: Tinogullmia hyalina Nyholm, 1954; OD.

Tinogullmia Nyholm, 1954 (*2281), p. 36.

Test elongate, tubular, tapering at both ends; wall hyaline, imperforate, proteinaceous; equal sized apertures on narrowed tubular necks present at both ends of test and may be used simultaneously; cytoplasm generally free of detrital particles, protruding from the apertures, but does not form a sheath over the test exterior as in Shepheardella, pseudopodia straight, delicate and highly fragile; nucleus single, large, rounded; life position horizontal on the muddy bottom sediments. Marine, at 30 m to 70 m. Holocene; Sweden: Gullmar Fjord.

Subfamily ARGILLOTUBINAE Avnimelech, 1952

Argillotubinae Avnimelech, 1952 (*97), p. 64.

Micatubinae Avnimelech, 1952 (*97), p. 65.

Test with proteinaceous wall or with argillaceous particles on an organic lining, commonly flexible and wrinkled: aperture at the constricted end or ends of the test. Holocene.

ARGILLOTUBA Avnimelech, 1952

Plate 9, figs. 1 and 2

Type species: Astrorhiza vermiformis Goës, 1896 (*1258), p. 20; OD.

Argillotuba Avnimelech, 1952 (*97), p. 64.

Test large, 10 mm to 13 mm in length, cylindrical in form, straight to variously bent; wall of mud or silt on an inner organic lining, flexible in life, surface generally with many transverse constrictions or crevices; aperture at the somewhat constricted open end (or both ends?) of the tube. Holocene, from 1,460 m to 1,880 m depth; Caribbean Sea.

BAHIANOFUSUS

Brönnimann, Zaninetti, and Moura, 1979

Plate 9, fig. 4

Type species: Bahianofusus pontei Brönnimann et al., 1979; OD.

Bahianofusus Brönnimann, Zaninetti, and Moura, 1979 (*416), p. 30.

Bahianofusus Brönnimann, Zaninetti, and Moura, in Zaninetti et al., 1979 (*3436), p. 7, 8 (nom. nud.).

Test free or attached to vegetable matter, a single elongate to fusiform chamber tapering at both ends; wall proteinaceous, imperforate, thin, flexible, small amount of fine agglutinated material on the organic lining giving a granular appearance, grayish in color; apertures rounded, terminal at each end and may be somewhat produced. Brackish mangrove swamps. Holocene; Brazil.

BAHIANOTUBUS

Brönnimann, Zaninetti, and Moura, 1979

Plate 9, fig. 3

Type species: Bahianotubus salvadorensis Brönnimann et al., 1979; OD.

Bahianotubus Brönnimann, Zaninetti, and Moura, 1979 (*416), p. 31.

Bahianotubus Brönnimann, Zaninetti, and Moura, in Zaninetti et al., 1979 (*3436), p. 7, 8 (nom. nud.).

Test free or attached to vegetable matter, elongate, tubular or slightly compressed laterally, about 0.7 mm in length and 0.2 mm in maximum thickness; wall organic, thick and somewhat flexible, with a small quantity of finely granular agglutinated material on a thin but dense inner organic lining, surface with irregular growth lines encircling the test; aperture consists of the unrestricted openings at both ends of the tube. Brackish mangrove swamps. Holocene; Brazil.

DACTYLOSACCUS Rhumbler, 1894

Plate 9, fig. 13

Type species: Dactylosaccus vermiformis Rhumbler, 1894; OD.

Dactylosaccus Rhumbler, 1894 (*2615), p. 606.

Ardactylosaccum Rhumbler, 1913 (*2621), p. 343 (err. emend.).

Elongate, thick tubular sausagelike to convoluted undivided chamber, up to 4 mm in length, somewhat enlarged toward apertural end; free-living or inhabiting empty foraminiferal tests; wall hyaline, proteinaceous; lobose protrusions from aperture give rise to pseudopodia; cytoplasm vacuolate, one or two globular nuclei. Marine, at 40 m to 250 m; Holocene; N. Atlantic; North Sea.

DENDROTUBA Rhumbler, 1894

Plate 9, fig. 8

Type species: Dendrotuba nodulosa Rhumbler, 1894; OD.

Dendrotuba Rhumbler, 1894 (*2615), p. 606.

Ardendrotubum Rhumbler, 1913 (*2621), p. 350 (err. emend.).

Test an elongate, convoluted branching tube, 0.7 mm to 5.0 mm in length, may have occasional knotlike swellings, tapering or clavate at the ends, attached by tough and rigid filaments to the interior of empty foraminiferal tests; wall a resistant proteinaceous sheath with concentric constrictions; single large nucleus, about 87 μm to 138 μm in diameter. Marine, cold water, living within empty foraminiferal tests. Holocene; N. Atlantic.

MICATUBA Avnimelech, 1952

Plate 9, figs. 5-7

Type species: Bathysiphon flexilis Höglund, 1947 (*1487), p. 42; OD.

Micatuba Avnimelech, 1952 (*97), p. 65.

Rhabdogromia Valkanova, 1964 (*3251), p. 260; type species: obj.; OD.

Test very narrow and elongate, length about

25 times the breadth and from 0.6 mm to 2.1 mm, tapering gradually toward the base, then somewhat inflated and clavate, inflated portion commonly broken free and giving the appearance of two apertures, although close examination shows a secondarily formed partition closing the open end; wall with organic base, strengthened by imbricated layers of mica flakes of 5 μm to 15 μm diameter, the layers curving outward toward the base of the test, allowing the test to remain flexible; aperture at the opposite end of the tube that constricts to about half its previous diameter when the cytoplasm is retracted but that may expand and flare as the pseudopodia are extended, aperture surrounded by a neck with thickened wall lacking mineral particles; granular cytoplasm completely fills the test, distinct pseudopodial trunk gives rise to long, thin, rarely anastomosing pseudopodia, cytoplasmic streaming at about 3 μm to 4 μm per second, during life the movement of the animal commonly leaves an accumulation of detritus around the aperture but this is absent from dead specimens, nucleus central in position. Holocene: Bulgaria: shallow water, from interstitial sands on the beach to 12 m depth on Black Sea coast; Sweden: 7 m to 109 m depth.

MICROMETULA Nyholm, 1952

Plate 9, figs. 9 and 10

Type species: Micrometula hyalostriata Nyholm, 1952; OD.

Micrometula Nyholm, 1952 (*2279), p. 15.

Test elongate, tapering gradually at both ends, 0.7 mm to 1.2 mm in length; wall proteinaceous, hyaline, imperforate, with fine longitudinal surface striations; aperture rounded at the larger end, a small temporary opening may be present at the opposite end; one nucleus. Marine. Holocene; Sweden: Gullmar Fjord.

NODELLUM Rhumbler, 1913

Plate 10, figs. 1 and 2

Type species: Reophax membranacea Brady, 1879 (*337), p. 53; OD.

Nodellum Rhumbler, 1913 (*2621), p. 443, 473.

Arnodellum Rhumbler, 1913 (*2621), p. 443 (err. emend.).

Chitinosiphon Thalmann and Bermúdez, 1954 (*3176), p. 53; type species: *Chitinosiphon rufescens* Thalmann and Bermúdez, 1954 = *Reophax membranacea* Brady, 1879; OD.

Test free, ovoid proloculus followed by elongate, slightly curved tubular chamber, 1.4 mm to 2.9 mm in length, gradually enlarging, and with irregularly spaced transverse constrictions; wall, thin, translucent, brownish, proteinaceous; aperture rounded, at slightly constricted end of the tube. Holocene, deep water; Atlantic.

RESIGELLA Loeblich and Tappan, 1984

Plate 9, figs. 11 and 12

Type species: Nodellum moniliforme Resig, 1982 (*2567), p. 977; OD.

Resigella Loeblich and Tappan, 1984 (*1920), p. 1158.

Oval proloculus followed by arcuate, gradually enlarging tube with regular stolon-like constrictions resulting in a moniliform appearance; wall proteinaceous, smooth, light brown in color; aperture terminal, circular, on a slight neck, eccentric in position. Holocene; eastern N. and S. Pacific, at 2,876 m to 6,109 m.

Remarks: Differs from *Nodellum* in the more regular constrictions that produce a moniliform test and differs from the morphologically similar *Hormosinella* in having an organic wall rather than an agglutinated one.

Family HOSPITELLIDAE Loeblich and Tappan, 1984

Hospitellidae Loeblich and Tappan, 1984 (*1918), p. 3.

Test attached, multilocular, numerous chambers in irregular growth arrangement, attached to inner or outer wall of other foraminiferal tests or may excavate or burrow within their wall; wall proteinaceous, imperforate, commonly brownish in color. Eocene; Holocene.

Remarks: Differs from the Allogromiidae in being attached and multilocular.

HOSPITELLA Rhumbler, 1911

Plate 10, fig. 3

Type species: Hospitella fulva Rhumbler, 1911; OD(M).

Hospitella Rhumbler, 1911 (*2620), p. 92, 227.

Arhospitellum Rhumbler, 1913 (*2621), p. 440 (err. emend.).

Hospitellum Rhumbler, 1913 (*2621), p. 468 (err. emend.).

Test attached, occupying the empty tests of other foraminifers: globular to ovate or flask-shaped chambers with stoloniferous necks, uniserial or irregularly branching or closely piled upon adjacent chambers, depending on the available space; wall brownish, proteinaceous, imperforate; neck and aperture of final chamber may pierce the host shell. Holocene; Atlantic.

PLACOPSILINELLA Earland, 1934

Plate 10, fig. 4

Type species: Placopsilinella aurantiaca Earland, 1934; OD.

Placopsilinella Earland, 1934 (***1041**), p. 95.

Test tiny, commonly attached to other foraminifers, numerous rounded to hemispherical chambers arranged in single or double rows, or less commonly in rows of three chambers abreast, but showing no regularity in arrangement or in mode of increase or decrease; wall proteinaceous, with some ferruginous cement; no aperture or intercameral communication apparent. Holocene; Atlantic.

THALAMOPHAGA Rhumbler, 1911

Plate 10, figs. 5 and 6

Type species: Thalamophaga ramosa Rhumbler, 1911; SD Loeblich and Tappan, 1964 (***1910**), p. C183.

Thalamophaga Rhumbler, 1911 (***2620**), p. 229.

Orbitophage Schlumberger, 1903 (***2774**), p. 276 (nom. prov.).

Orbitophaga Rhumbler, 1911 (***2620**), p. 230; type species: obj.; SD Loeblich and Tappan, 1964 (***1910**), p. C183.

Marsupophaga Rhumbler, 1911 (***2620**), p. 231; type species: obj.; SD Loeblich and Tappan, 1964 (***1910**), p. C183.

Tubophaga Rhumbler, 1911 (***2620**), p. 232; type species: obj.; SD Loeblich and Tappan, 1964 (***1910**), p. C183.

Nummophaga Rhumbler, 1911 (***2620**), p. 232; type species: obj.; SD Loeblich and Tappan, 1964 (***1910**), p. C183.

Arthalamophagum Rhumbler, 1913 (***2621**), p. 440 (err. emend.).

Test attached and burrowing in the tests of other foraminifers, irregular inflated chambers 2 μm to 8 μm in diameter, with stolon-like connections that may branch; resorption of the calcite of the host shell leaves the very thin proteinaceous wall of the parasitic *Thalamophaga* lining the excavation. Eocene; France. Holocene; Atlantic.

Remarks: The names *Orbitophaga, Nummophaga, Marsupophaga,* and *Tubophaga* were originally used to indicate that the burrowing organisms parasitized particular genera, such as *Orbitolites, Nummulites,* and so forth, rather than indicating differences in the burrowers. However, other burrowing foraminifers may have been included with these.

Family PHTHANOTROCHIDAE Arnold, 1978

Phthanotrochidae Arnold, 1978 (***76**), p. 161.

Test with single chamber in early stage, later may be biloculine or multilocular, with chamber arrangement irregular, coiled or uncoiling; wall colorless, transparent, and proteinaceous, without secreted or agglutinated mineral particles; aperture initially with prominent stomostyle and collar, but later may have more than one aperture, and the aperture may become a simple tubular opening. Holocene.

PHTHANOTROCHUS Arnold, 1978

Plate 10, figs. 7-9

Type species: Phthanotrochus arcanus Arnold, 1978; OD.

Phthanotrochus Arnold, 1978 (***76**), p. 161.

Test small, commonly 100 μm to 120 μm in diameter, with rounded to ovoid proloculus, later may become biloculine or multilocular, and chambers may be trochospirally enrolled or uncoiling or irregularly arranged; wall colorless, membranous, transparent, proteinaceous; aperture terminal, rounded, may have pronounced neck and prominent entosolenian tube; pseudopodia granular, filose and reticulose; multinucleate, nuclei about 6 μm in diameter; both unilocular and multilocular individuals may produce abundant amoeboid gametes and undergo sexual reproduction. Living specimens may be deeply buried in accretionary mass of debris and food particles. Holocene; intertidal region; USA: Monterey Bay, California.

Suborder TEXTULARIINA Delage and Hérouard, 1896

Textulariina Loeblich and Tappan, 1961 (***1904**), p. 217, nom. corr. pro suborder Textularidae.

Textularidae Delage and Hérouard, 1896 (*926), p. 139.
Astrorhizidea Lankester, 1885 (*1790), p. 846 (order).
Lituolidea Lankester, 1885 (*1790), p. 847 (order).
Textularidea Lankester, 1885 (*1790), p. 847 (order).
Astrorhizidaceae Hartog, in Harmer and Shipley, 1906 (*1424), p. 59 (order).
Lituolidaceae Hartog, in Harmer and Shipley, 1906 (*1424), p. 59 (order).
Textulariaceae Hartog, in Harmer and Shipley, 1906 (*1424), p. 59 (order).
Astrorhizida Calkins, 1909 (*477A), p. 38 (order).
Lituolida Calkins, 1909 (*477A), p. 39 (order).
Textularida Calkins, 1909 (*477A), p. 39 (order).
Textulinida Calkins, 1926 (*478), p. 356 (order)
Textularidia Kühn, 1926 (*1751), p. 150 (order).
Textulariacea Wedekind, 1937 (*3355), p. 84.
Haplophragmiacea Wedekind, 1937 (*3355), p. 111.
Astrorhizidea Jírovec, 1953 (*1613), p. 334.
Textulariidea Jírovec, 1953 (*1613), p. 335.
Ammodiscida Rauzer-Chernousova and Reytlinger, 1957 (*2534), fig. 1 on p. 105 (order; nom. nud.).
Textulariida Fursenko, 1958 (*1199), p. 23 (order).
Ammodiscida Fursenko, 1958 (*1199), p. 23 (order).
Ataxophragmiida Fursenko, 1958 (*1199), p. 23 (order).
Calcinifera Vyalov, 1966 (*3325), p. 5, 10 (group).
Silicinifera Vyalov, 1966 (*3325), p. 5, 10 (group).
Tectinifera Vyalov, 1966 (*3325), p. 5, 6, 10 (group).
Tectinifera Mikhalevich, 1980 (*2108), p. 54 (superclass).
Ammodiscata Mikhalevich, 1980 (*2108), p. 55 (subclass).
Ammodiscoidida Mikhalevich, 1980 (*2108), p. 56 (order).
Ammoscalariata Mikhalevich, 1980 (*2108), p. 54 (subclass).
Ammoscalariida Mikhalevich, 1980 (*2108), p. 54 (order).
Silicinifera Mikhalevich, 1980 (*2108), p. 54, 55 (superclass).
Silicotubida Mikhalevich, 1980 (*2108), p. 55 (order).
Miliamminea Mikhalevich, 1980 (*2108), p. 55 (class).
Miliamminata Mikhalevich, 1980 (*2108), p. 55 (subclass).
Miliamminida Mikhalevich, 1980 (*2108), p. 55 (order).
Nouriida Mikhalevich, 1980 (*2108), p. 56 (order).
Textulariata Mikhalevich, 1980 (*2108), p. 55 (subclass).
Astrorhizicae Saidova, 1981 (*2696), p. 10 (subclass).
Textulariicea Saidova, 1981 (*2696), p. 10 (class).
Hippocrepinida Saidova, 1981 (*2696), p. 13 (order).
Hormosinida Saidova, 1981 (*2696), p. 14 (order).
Trochamminida Saidova, 1981 (*2696), p. 22 (order).
Rzehakinacae Saidova, 1981 (*2696), p. 27 (subclass).
Rzehakinida Saidova, 1981 (*2696), p. 27 (order).
Asanospirida Mikhalevich, 1984 (*2112), p. 16 (order).

Test agglutinated, foreign particles held in organic or mineralized ground mass. L. Cambrian to Holocene.

Superfamily ASTRORHIZACEA Brady, 1881

Astrorhizacea Bulatova, in Subbotina et al., 1981 (*3083), p. 17, nom. corr. pro superfamily Astrorhizidea.
Astrorhizidea Glaessner, 1945 (*1250), p. 88, nom. transl. ex family Astrorhizidae.
Astrorhizina Delage and Hérouard, 1896 (*926), p. 128 (tribe).
Astrorhizidae Eimer and Fickert, 1899 (*1088), p. 593 (family group).
Astrorhizicae Easton, 1960 (*1044), p. 65.
Astrorhizoidea Souaya, 1965 (*3043), p. 303.
Botellinidea Saidova, 1981 (*2696), p. 14.
Schizamminidea Saidova, 1981 (*2696), p. 12.
Diffusilinidea Saidova, 1981 (*2696), p. 13.

Test irregular, rounded, tubular, or branching, nonseptate or with interior only partially subdivided; wall agglutinated. L. Cambrian to Holocene.

Family ASTRORHIZIDAE Brady, 1881

Astrorhizidae Brady, 1881 (*339), p. 41, 43.
Astrorhizina Lankester, 1885 (*1790), p. 846.
Astrorhizida Haeckel, 1894 (*1355), p. 185.
Dendrophryida Haeckel, 1894 (*1355), p. 185.
Astrorhizinae Delage and Hérouard, 1896 (*926), p. 129.
Dendrophryidae Eimer and Fickert, 1899 (*1088), p. 597.

Test free or attached, generally large, with two or more branches from a central area; agglutinated wall showing little selectivity and commonly poorly cemented, with a proteinaceous organic lining; apertures at the ends of the arms. M. Ordovician to Holocene.

Subfamily ASTRORHIZINAE Brady, 1881

Astrorhizinae Brady, 1884 (*344), p. 61, nom. transl. ex family Astrorhizidae.
Arastrorhiznia Rhumbler, 1913 (*2621), p. 344 (err. emend.).
Pelosininae Cushman, 1927 (*742), p. 12.
Radiculinae Saidova, 1981 (*2696), p. 11.

Test free, with central inflated region, from which extend arms or projections in two to many directions; arms generally tapering and bifurcated or multifurcated terminally, although these terminations may be broken from specimens in preservation. M. Ordovician to Holocene.

ASTRORHIZA Sandahl, 1858

Plate 11, fig. 1

Type species: Astrorhiza limnicola Sandahl, 1858; OD(M).

Astrorhiza Sandahl, 1858 (*2729), p. 301.
Arenistella Fischer, in de Folin and Perier, 1875 (*1148), p. 52; type species: *Arenistella agglutinans* Fischer, 1875; OD(M).
Astrodiscus Schulze, 1875 (*2825), p. 113 (non *Astrodiscus* Ludwig, 1866); type species: *Astrodiscus arenaceus* Schulze, 1875; OD(M).

Haeckelina Bessels, 1875 (*227), p. 265; type species: *Haeckelina gigantea* Bessels, 1875; OD(M).
Astrorhiza Eimer and Fickert, 1899 (*1088), p. 594; type species: *Astrorhiza limnicola* Sandahl, 1858; SD Loeblich and Tappan, 1964 (*1910), p. C184, obj.
Arastrorhizum Rhumbler, 1913 (*2621), p. 345 (err. emend.).

Test free, large, up to 15 mm in diameter, lenticular, with several stolonlike arms (4 to 15) radiating in the plane of the disc and tapering and branching terminally; wall consists of many layers of agglutinated material, ranging from fine mud to relatively coarse sandy particles, sponge spicules, or smaller foraminifers, inner organic layer reported in some species; apertures at the ends of the radiating arms. M. Ordovician to Holocene; cosmopolitan.

ASTRORHIZOIDES Shchedrina, 1969

Plate 11, fig. 2

Type species: Astrorhiza cornuta Brady, 1879 (*337), p. 43; OD.

Astrorhiza (Astrorhizoides) Shchedrina, 1969 (*2892), p. 167.

Test free, consisting of thick tube that branches at irregular intervals, not radiating from a central area as in *Astrorhiza;* wall of firmly cemented coarse sand grains, with rough exterior, thick inner organic lining protrudes either as simple or furcating tubes from the ends of the agglutinated branches, the large amount of organic material allowing the arms to be somewhat flexible; apertures at the ends of the branches. Holocene; N. and S. Atlantic; N. and S. Pacific; Arctic Ocean.

Remarks. Originally defined as a subgenus of *Astrorhiza,* this taxon is here elevated to generic rank, as it lacks the central disk from which radiate the arms of *Astrorhiza.*

PELOSINA Brady, 1879

Plate 11, figs. 3-8

Type species: Pelosina variabilis Brady, 1879; SD Cushman, 1910 (*701), p. 45.

Pelosina Brady, 1879 (*337), p. 30.
Arpelosum Rhumbler, 1913 (*2621), p. 348 (err. emend.).
Pelosinella Parr, 1950 (*2363), p. 261; type species: *Pelosinella bicaudata* Parr, 1950; OD.
Globosiphon Avnimelech, 1952 (*97), p. 65; type species: *Pelosina variabilis* Brady var. *sphaeriloculum* Höglund, 1947 (*1487), p. 61; OD.
?*Millettina* Avnimelech, 1952 (*97), p. 64; type species: *Pelosina distoma* Millett, 1904 (*2148), p. 608; OD.

Test free, elongate fusiform to subcylindrical, tapering to the aperture; wall thick, fine grained but containing some transversely aligned larger grains or tests of smaller foraminifers, inner organic lining may protrude from the aperture as dendritic branches, and may also project from a second opening at the base where it similarly is much divided into a rhizomelike structure that may serve for attachment to the substrate; aperture terminal but may have an opening at each end. Holocene; cosmopolitan.

RADICULA Christiansen, 1958

Plate 11, fig. 12

Type species: Radicula limosa Christiansen, 1958; OD.

Radicula Christiansen, 1958 (*592), p. 51.

Test free, large, up to 15 mm in length, with elongate tubular branching arms, up to 0.8 mm in diameter, radiating in every direction and tapering gradually to the extremities; no enlarged central area or chamber present; wall with thin proteinaceous inner lining covered with fine mud, inner cavity about one-half the outer diameter of the test; apertures at the tips of the arms. Holocene; Norway.

SACCODENDRON Rhumbler, 1935

Plate 11, figs. 9-11

Type species: Saccodendron heronalleni Rhumbler; OD.

Saccodendron Rhumbler, 1935 (*2622), p. 173.

Test free or attached, ovoid or subglobular central chamber up to 2 mm in diameter, from which radiate in every direction as many as ten long tubular dendritic arms, arms up to 10 mm long and about 0.2 mm in diameter; wall grayish-brown, tough and flexible, that of central chamber thin, of loosely cemented sand grains and mud on a thin organic inner lining, wall of arms very thin, largely of mud attached to organic lining, the tips consisting only of the organic material; apertures at the branching ends of the tubular arms. Holocene; N. Germany; Sweden; Norway.

Subfamily VANHOEFFENELLINAE Saidova, 1981

Vanhoeffenellinae Loeblich and Tappan, 1982 (*1917), p. 26, nom. corr. pro subfamily Vanhoeffenella.
Vanhoeffenella Saidova, 1981 (*2696), p. 10 (nom. imperf.).

Test free, large, discoidal, fusiform or caplike, with agglutinated tubular outer framework surrounding nonagglutinated proteinaceous organic central area on both sides of test. ?L. to M. Devonian, Holocene.

AMPHIFENESTRELLA Rhumbler, 1935

Plate 12, fig. 4

Type species: Amphifenestrella wiesneri Rhumbler, 1935: OD(M).

Amphifenestrella Rhumbler, 1935 (*2622), p. 169.

Test free, 0.86 mm in diameter; discoidal, with flat transparent proteinaceous sides surrounded at periphery by an agglutinated layer of quartz grains; no distinct apertures. Holocene; off Germany.

Remarks: This genus and type species were based on a single specimen and have not been recorded elsewhere.

CAUSIA Rhumbler, 1938

Plate 12, figs. 1-3

Type species: Causia injudicata Rhumbler; OD.

Causia Rhumbler, 1938 (*2624), p. 171.

Test free, 0.14 mm to 0.24 mm in diameter, discoidal and concavo-convex, with convex surface upward, marginal flange at the periphery; wall proteinaceous, with small quantity of agglutinated material; small round apertural opening in the center of the concave ventral surface visible through the semitransparent wall. Holocene; North Sea: Germany.

INAURIS J. E. Conkin, B. M. Conkin, and Thurman, 1979

Plate 12, figs. 9 and 10

Type species: Inauris tubulata J. E. Conkin et al., 1979; OD.

Inauris J. E. Conkin, B. M. Conkin, and Thurman, 1979 (*675), p. 4.

Test free, 0.42 mm to 0.79 mm in height; with ringlike undivided tubular chamber; wall agglutinated, a single layer of well-cemented siliceous grains; aperture rounded, produced on a neck that lies in the plane of the ringlike chamber. L. to M. Devonian; USA: Indiana, Ohio, Kentucky.

Remarks: Originally placed in the Saccamminidae, *Inauris* is here transferred to the Vanhoeffenellinae. The ringlike chamber could result from the disintegration of a membranous central area of a previously undivided chamber as in *Vanhoeffenella*, allowing collapse of the agglutinated margins to the ringlike form of the fossilized specimens. The wall was described as having siliceous cement, but because the specimens were obtained from acid residues of limestones, secondary silicification or other diagenetic changes may be involved.

VANHOEFFENELLA Rhumbler, 1905

Plate 12, figs. 5-8

Type species: Vanhoeffenella gaussi Rhumbler, 1905; OD.

Vanhoeffenella Rhumbler, 1905 (*2618), p. 105.
Arvanhoeffenum Rhumbler, 1913 (*2621), p. 345 (err. emend.).

Test lenticular and may be fusiform, triangular, or polygonal in plan, 0.4 mm to 2.6 mm in length; organic lamella on the flattened and nonagglutinated sides, periphery covered by a single layer of sand grains to produce an agglutinated hemitubular margin; apertures at the ends of two to six or more short tubular necks that project from the test angles. Holocene; Antarctic at 70 m to 385 m; Indian Ocean; N. Atlantic: Iceland, at 1,889 m to 1,996 m depth; S. Atlantic at 3,705 m; off Germany at 40 m; Norway: Oslo Fjord.

Family BATHYSIPHONIDAE Avnimelech, 1952

Bathysiphonidae Loeblich and Tappan, 1984 (*1918), p. 4, nom. transl. ex subfamily Bathysiphoninae.
Bathysiphoninae Avnimelech, 1952 (*97), p. 66 (subfamily).
Psammosiphonellinae Avnimelech, 1952 (*97), p. 64 (subfamily).
Flagrinidae Vyalov, 1966 (*3326), p. 33.
Astrorhizinullinae Saidova, 1981 (*2696), p. 10.

Test a straight, unbranched, or sparsely branched nonseptate tube that may show growth constrictions; wall thick, agglutinated, well cemented, growth occurring at one end.

opposite end may be packed with debris and periodically discarded; aperture at the open end of the tube. L. Cambrian to Holocene; cosmopolitan.

ASTRORHIZINULLA Saidova, 1975

Plate 13, fig. 11

Type species: *Psammosiphonella aetheria* Saidova, 1970 (*2693), p. 139; OD.

Astrorhizinulla Saidova, 1975 (*2695), p. 13.

Test tubular, fusiform, or stellate, 4 mm to 6 mm in length; narrow undivided chamber cavity occupying about one-fifth the test diameter; wall agglutinated, very thick, of loosely aggregated sand, exterior friable, interior surface smooth and compact; from two to five simple rounded apertures at the test extremities. Holocene, at 1,260 m to 2,000 m, lower bathyal and abyssal depths; cosmopolitan.

BATHYSIPHON M. Sars, 1872

Plate 13, figs. 1, 2, 5-7, 9, 10, 12-14; plate 14, fig. 1

Type species: Bathysiphon filiformis M. Sars, 1872; OD.

Bathysiphon M. Sars, in G. O. Sars, 1872 (*2733), p. 251.

Arbathysiphum Rhumbler, 1913 (*2621), p. 352 (err. emend.).

Psammosiphonella Avnimelech, 1952 (*97), p. 64; type species: *Bathysiphon arenaceus* Cushman, 1927 (*738), p. 129; OD.

Flagrina Vyalov, 1966 (*3325), p. 9 (name not available, type species not described, and not stated to be n.g., n.sp., ICZN Art. 13 (c)); type species: *Flagrina staminea* Vyalov, 1966 (nom. nud.); OD.

Bathysiphon (Silicobathysiphon) Myatlyuk, 1966 (*2218), p. 260; type species: *Bathysiphon (Silicobathysiphon) gerochi* Myatlyuk, 1966; OD.

Bogdanowiczia Pishvanova and Vyalov, in Vyalov and Pishvanova, 1967 (*3329), p. 575; type species: *Bogdanowiczia pocutica* Pishvanova, in Vyalov and Pishvanova, 1967; OD(M).

Flagrina Vyalov, 1968 (*3327), p. 3, 5 (validated by description of type species and reference to earlier generic description); type species: *Flagrina staminea* Vyalov, 1968; OD.

Yokoia Hatai and Noda, 1975 (*1429), p. 211; type species: *Terebellina kattoi* Hatai and Saito, 1962 (*1430), p. 246; OD.

Test a straight unbranched elongate tube, open at both ends, nonseptate but may have slight annular constrictions resulting from periodic growth; growth generally occurs only at one end of the tube from which pseudopodia protrude, opposite end packed with waste and food debris and periodically sealed off from the remainder of the test by production of a discoid plug, such filled sections eventually are detached and discarded; wall agglutinated, thick, of sponge spicules, sand grains, and other foreign particles; aperture at the open end of the tube; cytoplasmic movement sluggish; multinucleate. U. Triassic (Carnian) to Holocene; cosmopolitan.

Remarks: *Yokoia* was described from the Miocene of Japan as a serpulid worm, with wall of randomly oriented siliceous spicules. Specimens range from about 2 mm in diameter to collapsed specimens of about 3 mm breadth, the largest observed being 54.5 mm in length, although all specimens apparently are broken at each end. We tentatively regard *Yokoia* as a synonym of *Bathysiphon*, also frequently found as isolated tubular fragments, and commonly constructed of sponge spicules as well as other agglutinated particles.

NOTHIA Pflaumann, 1964

Plate 13, figs. 3, 4, and 8

Type species: Rhizammina grilli Noth, 1951 (*2271), p. 21; OD.

Nothia Pflaumann, 1964 (*2398), p. 70.

Dendrophryopsis Pflaumann, 1964 (*2398), p. 63; type species: *Dendrophryopsis subalpina* Pflaumann, 1964; OD.

Test elongate, tubular, may branch sparsely and irregularly; commonly compressed in preservation, so that the inner cavity is completely flattened; wall agglutinated and may have more than one layer, constructed of particles of different composition; aperture at the open end. U. Cretaceous (Senonian to Maastrichtian); Austria, Germany.

PLATYSOLENITES Eichwald, 1860

Plate 14, figs. 4-8

Type species: Platysolenites antiquissimus Eichwald, 1860; OD(M).

Platysolenites Eichwald, 1860 (*1086), p. 677.

Platysoleniten Pander, 1856 (*2332), explan. of plate 3, fig. 17 on p. 84 (nom. vernac.).

Yanichevskyites Sokolov, 1965 (*3016), p. 82, 84 (name available, ICZN Art. 13 (ii), not described, but reference given to previous description); type species: *Serpulites? petropolitanus* Yanishevskiy, 1926 (*3415), p. 112; OD(M).

Elongate, straight, cylindrical tubes that may be flattened in preservation, 1 mm to 3 mm in breadth and up to 30 mm or more in length; wall thick, up to 0.9 mm in thickness, of agglutinated small quartz grains, surface with widely spaced transverse grooves or wrinkles; aperture at the open ends of the tube. L. Cambrian; USSR; Poland; Norway; USA: California.

Remarks: *Platysolenites* has been variously placed with the annelids or echinoderms but was redescribed as a foraminifer by Føyn and Glaessner (1979, ***1168**, p. 30). They credited the genus to Pander (1851), but we are unable to locate a validation of this name by Pander. Eichwald (1860, ***1086**, p. 677) described the genus and species, citing "*Platysolenites* Pand.," giving the reference "Pander die Fische des silurischen Systems l. c." Pander's "Monographie der fossilen Fische des silurischen Systems der Russisch-Baltischen Gouvernements" was published in 1856 rather than 1851; his plate 3, fig. 17 refers to Platysoleniten only in the vernacular, hence has no standing in zoological nomenclature.

RHABDAMMINELLA de Folin, 1887

Plate 14, figs. 2 and 3

Type species: Rhabdamminella prismaeginosa de Folin, 1887 = *Marsipella cylindrica* Brady, in Tizard and Murray, 1882 (***3198**), p. 714; OD(M).

Rhabdamminella de Folin, 1887 (***1144**), p. 115.

Rhabdamminella de Folin, 1881 (***1142**), p. 140 (nom. nud.).

Pseudomarsipella Saidova, 1975 (***2695**), p. 23; type species: *Marsipella cylindrica* Brady, in Tizard and Murray, 1882; OD.

Test an elongate slender tube of constant diameter, may be slightly arcuate, up to 6 mm or 7 mm in length; wall constructed of firmly cemented acicular sponge spicules, aligned parallel to the sides of the test in more or less irregular overlapping tiers; aperture at the open ends of the tube. Holocene, from 278 m to 3,750 m depth; N. and S. Atlantic; North Sea; Caribbean; S. Pacific.

Family RHABDAMMINIDAE Brady, 1884

Rhabdamminidae Loeblich and Tappan, nom. corr. herein pro family Rhabdamminina.

Rhabdamminina Lankester, 1885 (***1790**), p. 846, nom. transl. ex subfamily Rhabdammininae.

Rhabdamminae Delage and Hérouard, 1896 (***926**), p. 130.

Arrhabdammidia Rhumbler, 1913 (***2621**), p. 342 (err. emend.).

Rhizamminidae Wiesner, 1931 (***3375**), p. 79, nom. transl.

Dendrophrynidae Vyalov, 1966 (***3326**), p. 29.

Test free or attached, simple or branching, tubular to slightly inflated and conical, interior nonseptate; wall of agglutinated sponge spicules, radiolarians, other foraminiferal tests, and silt particles in a fine-grained ground mass, commonly slightly flexible; apertures terminal, at ends of branches or chamber. Cretaceous to Holocene.

Subfamily RHABDAMMININAE Brady, 1884

Rhabdammininae Brady, 1884 (***344**), p. 64.

Rhizammininae Rhumbler, 1895 (***2616**), p. 82.

Arrhizamnia Rhumbler, 1913 (***2621**), p. 350 (err. emend.).

Testulosiphoninae Avnimelech, 1952 (***97**), p. 66.

Marsipellinae Hofker, 1972 (***1521**), p. 80.

Test consisting of an elongate, narrow, simple or branching tube; apertures at open end of tubes. Holocene.

MARSIPELLA Norman, 1878

Plate 15, fig. 2

Type species: Marsipella elongata Norman, 1878; OD(M).

Marsipella Norman, 1878 (***2264**), p. 281.

Armarsipellum Rhumbler, 1913 (***2621**), p. 351 (err. emend.).

Test large, up to 6 mm in length, elongate, fusiform, tubular, cylindrical, or tapering and undivided, may be slightly twisted; wall thin, of agglutinated sand, sponge spicules or tests of other foraminifers, firmly cemented; apertures at the open ends of the tube. Holocene; cosmopolitan, from 108 m to 3,216 m.

OCULOSIPHON Avnimelech, 1952

Plate 15, fig. 1

Type species: Rhabdammina linearis Brady, 1879 (***337**), p. 37; OD.

Oculosiphon Avnimelech, 1952 (*97), p. 65.
Rhabdammina Eimer and Fickert, 1899 (*1088), p. 595 (non *Rhabdammina* M. Sars, 1869); type species: *Rhabdammina linearis* Brady, 1879; SD Loeblich and Tappan, 1964 (*1910), p. C185.

Test free, elongate, with narrower tubular portion extending in both directions from an inflated central area; wall thin, agglutinated, consisting of a single layer of grains or very few grains; aperture at the open ends of the tube. Holocene; N. and S. Atlantic; S. Pacific.

RHABDAMMINA M. Sars, 1869

Plate 15, fig. 3

Type species: Rhabdammina abyssorum M. Sars, in Carpenter, 1869; OD.

Rhabdammina M. Sars, in Carpenter, 1869 (*488), p. 61.
Rhabdammina M. Sars, 1869 (*2734), p. 248 (nom. nud.); M. Sars, in Carpenter, 1868 (*487), p. 171, 172 (nom. nud.).
Arrhabdammum Rhumbler, 1913 (*2621), p. 351 (err. emend.).

Test with three, or less commonly four to five, radiating tubes of nearly constant diameter, cavity in central area globular, that of branches narrow, about one-third the diameter of the branches; wall thick, of firmly cemented coarse sand grains, exterior rough but cavity interior smooth; apertures at the open ends of the tubular rays. Holocene, in deep water, from 700 m to 4,800 m; cosmopolitan.

RHIZAMMINA Brady, 1879

Plate 15, figs. 6-8

Type species: Rhizammina algaeformis Brady, 1879; OD(M).

Rhizammina Brady, 1879 (*337), p. 39.
Rhizammina Eimer and Fickert, 1899 (*1088), p. 595; type species: *Rhizammina algaeformis* Brady, 1879; SD Loeblich and Tappan, 1964 (*1910), p. C186.
Arrhizammum Rhumbler, 1913 (*2621), p. 350 (err. emend.).
Testulosiphon Avnimelech, 1952 (*97), p. 66; type species: *Rhizammina indivisa* Brady, 1884 (*344), p. 277; OD.

Test elongate, tubular, branching dichotomously but sparsely; wall thin and flexible, with large amount of organic material and with embedded sand grains, tests of other foraminifers, or radiolarians; aperture at the ends of the tubes. Holocene, in deep water, 1,260 m to 5,800 m; N. and S. Atlantic; N. and S. Pacific.

TESTULORHIZA Avnimelech, 1952

Plate 16, fig. 7

Type species: Rhizammina globigerinifera Hofker, 1930 (*1492), p. 117; OD.

Testulorhiza Avnimelech, 1952 (*97), p. 66.

Test elongate, tubular, up to 25 mm in length, rarely may branch dichotomously, commonly with short lateral branches arising at irregular intervals and open terminally; wall organic, flexible, main tube with agglutinated tests of other foraminifera on the surface, but lateral branchlets have almost no agglutinated material, hence in dried material are collapsed or almost entirely destroyed; apertures at the open ends of the lateral branches. Holocene; S. Pacific: Ceram Sea, at 2,081 m.

Subfamily DENDROPHRYINAE Haeckel, 1894

Dendrophryinae Cushman, 1927 (*742), p. 14, nom. transl. ex family Dendrophryida.

Test attached, with very elongate, erect, nonseptate tubular portion that bifurcates frequently and may be spreading. U. Cretaceous (Campanian); Pleistocene to Holocene.

DENDROPHRYA T. S. Wright, 1861

Plate 15, fig. 4

Type species: Dendrophrya erecta T. S. Wright, 1861; SD Cushman, 1928 (*747), p. 85.

Dendrophrya T. S. Wright, 1861 (*3397), p. 122.
Ardendrophyrum Rhumbler, 1913 (*2621), p. 345 (err. emend.).

Test attached, about 3.5 mm to 6 mm in height; early stage may consist of a hemispherical to caplike expansion that may attach to a hard substrate or be buried in a softer one, or less commonly may lack a basal expansion and be directly attached to the substrate; an irregularly branching, dendritic nonseptate tube arises either from the center or margin of the convex surface of the basal chamber or directly from the attachment, successive branchlets of decreased diameter; wall with organic lining more or less thickly coated with fine-grained agglutinated material, may have ferruginous cement; apertures at the open ends of the branches. Pleistocene to Holocene: N. Atlantic: off Scotland: Norway.

PSAMMATODENDRON Norman, 1881

Plate 15, fig. 5; plate 16, figs. 5 and 6

Type species: Psammatodendron arborescens Norman, in Brady, 1881; OD(M).

Psammatodendron Norman, in Brady, 1881 (*341), p. 98.
Dendrophryna Vyalov, 1966 (*3325), p. 9; type species: *Psammatodendron dichotomicum* Neagu, 1964 (*2233), p. 580; OD.

Test attached, length about 5 mm, early chamber rounded and inflated as in *Lagenammina* but giving rise to an erect stage with repeatedly bifurcating tubular portion of constant diameter; wall agglutinated, of compactly cemented fine sand, brownish in color; apertures consist of irregular openings at the slightly constricted ends of the tubular branches, bordered by slightly thickened lip. U. Cretaceous (Campanian): Romania; Holocene, at 60 m to 700 m: N. and S. Atlantic.

Subfamily HALYPHYSEMINAE Loeblich and Tappan, 1984

Halyphyseminae Loeblich and Tappan, 1984 (*1918), p. 4.

Test attached, basal attachment may be expanded and discoidal, giving rise to an erect tubular to conical chamber; wall of agglutinated sponge spicules or other foreign particles; aperture terminal and rounded, commonly surrounded by a tuft of spicules. Holocene.

Remarks: The Halyphyseminae differ from the Rhabdammininae in being shorter and broader, in having an expanded basal attachment, and in commonly having a tuft of spicules agglutinated to the apertural region.

HALYPHYSEMA Bowerbank, 1862

Plate 16, figs. 8 and 9

Type species: Halyphysema tumanowiczii Bowerbank, 1862; OD(M).

Halyphysema Bowerbank, 1862 (*322), p. 1105.
Gastrophysema Haeckel, 1877 (*1354), p. 4, 8, 24; type species: *Squamulina scopula* Carter, 1870 (*500), p. 311 (err. nom. subst. pro *Halyphysema tumanowiczii*); SD Loeblich and Tappan, 1964 (*1910), p. C192.
Arhaliphysemum Rhumbler, 1913 (*2621), p. 352 (err. emend.).

Test attached, with spreading and internally subdivided basal expansion, and later erect conical, clavate, tubular, or branching chamber; wall agglutinated, that of basal expansion of finest particles, and may include fragments of sponge spicules, erect portion with sand, tests of other foraminifers, or sponge spicules that are oriented in the direction of test growth; aperture terminal, rounded, may be obscured by a cluster of sponge spicules surrounding the opening; pseudopodial network with pronounced granular streaming; multinucleate. Holocene: Atlantic: Caribbean; Pacific.

DENDRONINA Heron-Allen and Earland, 1922

Plate 16, figs. 1 and 2

Type species: Dendronina arborescens Heron-Allen and Earland, 1922; SD Cushman, 1918 (*710), p. 85.

Dendronina Heron-Allen and Earland, 1922 (*1473), p. 78.

Test attached, expanded basal area containing ramifying passages that converge to a central cavity, or may grow free from a bulbous early portion, later stage may branch dichotomously, occasionally more than one tubular portion may arise from a single basal expansion; wall fragile, of fine sand and sponge spicules that are oriented parallel to the sides of the tube and agglutinated on an organic base; apertures are simple terminal openings on the slightly constricted ends of the branches and may be bordered by projecting spicules. Holocene; S. Pacific.

NUBECULARIELLA Averintsev, 1911

Plate 16, fig. 4

Type species: Nubeculariella birulai Averintsev, 1911; OD.

Nubeculariella Averintsev, 1911 (*100), p. 8.

Test attached, a short undivided tube; wall organic with sparsely and coarsely agglutinated coating, with some very large grains to which the test apparently was attached, terminal part of the tube with fine or no agglutinated material; aperture rounded at the flared open end. Holocene: Arctic Ocean.

Family DRYORHIZOPSIDAE Loeblich and Tappan, 1984

Dryorhizopsidae Loeblich and Tappan, 1984 (*1918), p. 5.

Test attached to the substrate, consisting of a series of irregularly or dichotomously branching tubes that may radiate from a central trunklike region; wall agglutinated. Pennsylvanian to Holocene.

Remarks: The Dendrophryinae differ in growing erect from the substrate, rather than being attached throughout the length of the tubular portion.

DRYORHIZOPSIS Henbest, 1963

Plate 16, fig. 3

Type species: Dryorhizopsis cadyi Henbest, 1963; OD.

Dryorhizopsis Henbest, 1963 (*1457), p. 23.

Test with proloculus giving rise to many radiating tubular extensions, attached throughout their length and of greatest breadth against the attachment, the tubular extensions at least partly enclosing the cytoplasm, rather than being open to the substrate beneath; wall agglutinated, of very fine silt or clay; apertures at the ends of the tubular extensions. U. Carboniferous, U. Pennsylvanian; USA: Texas.

SAGENINA Chapman, 1900

Plate 16, fig. 14

Type species: Sagenella frondescens Brady, 1879 (*337), p. 41; OD(M).

Sagenina Chapman, 1900 (*529), p. 4 (nom. subst. pro *Sagenella* Brady, 1879).

Sagenella Brady, 1879 (*337), p. 41 (non *Sagenella* Hall, 1851); obj.

Arsagenum Rhumbler, 1913 (*2621), p. 345 (err. emend.).

Test attached throughout, consisting of dichotomously or irregularly branching and occasionally anastomosing tubes lying against the substrate, tubular chamber may decrease in diameter with successive bifurcations; wall finely agglutinated; apertures rounded at the tips of each of the tubular branches. Eocene; Holocene; N. and S. Pacific.

Family SILICOTUBIDAE Vyalov, 1968

Silicotubidae Vyalov, 1968 (*3327), p. 3.

Test elongate, tubular, with regular constrictions giving an appearance of chambers but lacking distinct septa. U. Cretaceous (Senonian).

SILICOTUBA Vyalov, 1966

Plate 16, figs. 10-13

Type species: Hyperammina grzybowskii Dylażanka, 1923 (*1029), p. 65; OD.

Silicotuba Vyalov, 1966 (*3325), p. 9.

Test with proloculus followed by a tubular part with irregularly spaced constrictions; wall finely agglutinated, aperture terminal. U. Cretaceous (Senonian); Poland; Germany; Czechoslovakia.

Remarks: Described from Cretaceous flysch deposits, most specimens are crushed and flattened short fragments, and the exact nature of the complete test is uncertain.

Family HIPPOCREPINELLIDAE Loeblich and Tappan, 1984

Hippocrepinellidae Loeblich and Tappan, 1984 (*1918), p. 5.

Test elongate, tubular to fusiform, open at both ends, nonseptate but commonly with transverse growth constrictions; wall very finely agglutinated, surface smoothly finished; openings small, rounded, terminal, larger at one extremity. L. Pennsylvanian, Permian, Oligocene, Miocene, Holocene.

Remarks: Differs from the Bathysiphonidae in the thin, more flexible, and finer grained wall and restricted apertural openings. Differs from the Hippocrepininae of the family Hyperamminidae in being open at both ends and in the less rigid and less firmly cemented wall.

HIPPOCREPINELLA Heron-Allen and Earland, 1932

Plate 17, figs. 1-5

Type species: Hippocrepinella hirudinea Heron-Allen and Earland, 1932; SD Cushman, 1933 (*766), p. 71.

Hippocrepinella Heron-Allen and Earland, 1932 (*1479), p. 294.

Hirudina Vyalov, 1966 (*3325), p. 9; type species: *Hippocrepinella hirudiformis*, Suzin, in Bogdanovich, 1963 (*270), p. 152; OD.

Test free, up to 2 mm in length, irregularly cylindrical, straight to arcuate; wall thin, agglutinated, of very fine sand and mud, poorly cemented and flexible in life, although dried specimens become rigid and fragile, white to dark gray in color, smoothly finished, or may be transversely wrinkled; may have apertures at both ends of the test, one being much smaller than the other, the much constricted openings possibly expand temporarily for the ingestion of food particles but are closed at gametogenesis, and the tiny inequally biflagellate gametes escape from secondarily formed small pores of 15 μm to 20 μm diameter that are scattered over the test surface and then become free swimnming. ?L. Pennsylvanian: Permian; Oligocene; Miocene; Holocene, at 100 m to 346 m; S. Atlantic.

Remarks: Differs from *Bathysiphon* in the wall being thin and flexible, rather than thick, firm, and rigid.

Family SCHIZAMMINIDAE Nørvang, 1961

Schizamminidae Nørvang, 1961 (*2269), p. 171.

Test free, nonseptate, tubular to flaring, dichotomously branching or spreading fanlike in a single plane; wall thick and agglutinated, labyrinthic, canaliculate, exterior smoothly finished. Holocene.

JULLIENELLA Schlumberger, 1890

Plate 17, figs. 6-8

Type species: Jullienella foetida Schlumberger, 1890; OD(M).

Jullienella Schlumberger, 1890 (*2763), p. 213.

Test large, flabelliform or with large fanlike portion extending in two directions from central attachment, outer margin produced into tubules; wall firm, finely agglutinated with considerable ferruginous cement, reddish in color, interior labyrinthic, irregularly subdivided by intermittant radiating ridges not reflected at the exterior, surface with transverse wrinkles; many large pores open into the interior but are constricted within the wall into smaller openings at the exterior; apertures numerous, small rounded openings at the ends of tubular extensions at the periphery. Holocene; S. Atlantic: off Liberia; Indian Ocean; S. Pacific: New Zealand.

SCHIZAMMINA Heron-Allen and Earland, 1929

Plate 17, figs. 9 and 10

Type species: Schizammina labyrinthica Heron-Allen and Earland, 1929; SD Cushman, 1930 (*756), p. 73.

Schizammina Heron-Allen and Earland, 1929 (*1476), p. 103.

Test free, a nonseptate dichotomously branching tube; wall thick, finely agglutinated, interior labyrinthic but with both exterior and interior surface smoothly finished between openings of the labyrinth cavities, exterior with occasional transverse wrinkles; aperture at the open ends of the tube. Holocene; Atlantic: off French Equatorial Africa.

Family PSAMMOSPHAERIDAE Haeckel, 1894

Psammosphaeridae Eimer and Fickert, 1899 (*1088), p. 598, nom. corr. pro family Psammosphaerida.
Psammosphaerida Haeckel, 1894 (*1355), p. 185.
Stegnamminidae Moreman, 1930 (*2181), p. 48.

Test free, globular to irregular or with several loosely joined chambers; wall coarsely agglutinated. Ordovician to Holocene.

Subfamily PSAMMOSPHAERINAE Haeckel, 1894

Psammosphaerinae Cushman, 1927 (*742), p. 11, nom. transl. ex family Psammosphaerida.

Test globular to irregular; wall finely to coarsely agglutinated; no recognizable aperture, but interstitial pores may occur between grains. Ordovician to Holocene.

ANICTOSPHAERA McClellan, 1973

Plate 18, figs. 1 and 2

Type species: Anictosphaera progressa McClellan, 1973; OD.

Anictosphaera McClellan, 1973 (*1959), p. 283.

Test free, an irregular chamber or possibly a group of chambers without definite arrangement; wall agglutinated, a single layer of well-cemented sand grains; no definite aperture. M. Silurian (Ludlovian) to L. Devonian; USA: Nevada.

BYKOVAEINA Suleymanov, 1969

Plate 18, figs. 3 and 4

Type species: Bykovaeina divulgata Suleymanov, 1969; OD.

Bykovaeina Suleymanov, 1969 (*3100), p. 36.

Test free, a single lenticular chamber, approximately 0.65 mm in diameter and 0.40 mm in thickness, periphery angular to carinate; wall agglutinated; no visible aperture. U. Cretaceous (Santonian to Campanian); USSR: Kazakhstan.

CELLONINA Kristan-Tollmann, 1971

Plate 19, figs. 8-10

Type species: Cellonina mostleri Kristan-Tollmann, 1971; OD.

Cellonina Kristan-Tollmann, 1971 (*1742), p. 265.

Test free, consisting of a few loosely joined chambers that are broadly connected in an irregular manner from a central region; wall agglutinated; no definite aperture, but deep pits are aligned regularly at the margin of the vesiclelike chambers and may serve as apertures. U. Ordovician (Ashgillian) or L. Silurian (Valentian); Austria.

Remarks: The deep pits bordering the chambers were said to serve as outlets for the protoplasm, hence apparently connect to the chamber interior.

PSAMMOPHAX Rhumbler, 1931

Plate 19, figs. 4-6

Type species: Psammophax consociata Rhumbler, in Wiesner, 1931; OD(M).

Psammophax Rhumbler, in Wiesner, 1931 (*3375), p. 80.

Test free, a few globular chambers arranged in a rectilinear or curved series; wall agglutinated, surface roughly finished; no visible aperture. L. to M. Devonian: USA: Oklahoma, Ohio; L. Jurassic: Germany; Holocene, Antarctic, S. Pacific: E. coast Tasmania, from 122 m to 385 m.

PSAMMOSPHAERA Schulze, 1875

Plate 18, figs. 10-13; plate 19, figs. 2 and 3

Type species: Psammosphaera fusca Schulze, 1875; OD.

Psammosphaera Schulze, 1875 (*2825), p. 113.

Arpsammosphaerum Rhumbler, 1913 (*2621), p. 347 (err. emend.).

Psammella Rhumbler, 1935 (*2622), p. 167; type species: *Psammella frankei* Rhumbler, 1935 (non Lendenfeld, 1887; nom. nud.); OD(M).

Arenosphaera Shchedrina, 1939 (*2885), p. 95; type species: *Arenosphaera perforata* Shchedrina, 1939; OD(M).

Test free, large, up to 6 mm across, consisting of one to several loosely joined spherical chambers; wall agglutinated, of a single layer of coarse sand grains, no inner organic layer present; the loosely agglutinated sand grains separated by large pores that serve as apertures. M. Ordovician to Holocene; cosmopolitan; Arctic Ocean: Kara Sea, Greenland Sea, from 670 m to 700 m.; N. Atlantic, from 90 m to 5,500 m, S. Atlantic, at 300 m to 5,600 m; Antarctic, at 3,350 m; N. Pacific, from 370 m to 3,864 m., and S. Pacific, from 4,670 m to 4,750 m.

PSEUDASTRORHIZA Eisenack, 1932

Plate 18, figs. 8 and 9

Type species: Pseudastrorhiza silurica Eisenack, 1932; OD.

Pseudastrorhiza Eisenack, 1932 (*1089), p. 259.

Parvistellites O. Wetzel, 1951 (*3361), p. 113; type species: *Parvistellites hospitalis* O. Wetzel, 1951; OD(M).

Test free, with three to seven short, thick radiating arms that are closed and bluntly rounded at the ends; wall agglutinated of a single layer of fine quartz grains; apertural opening not observed. Ordovician: Esthonia; L. Carboniferous (Tournaisian), Mississippian (Osagian): USA: Utah; Paleocene (Danian) glacial pebble: Germany.

SOROSPHAERA Brady, 1879

Plate 19, fig. 1

Type species: Sorosphaera confusa Brady, 1879; OD(M).

Sorosphaera Brady, 1879 (*337), p. 28.

Arsorophaerum Rhumbler, 1913 (*2621), p. 347 (err. emend.).

Test free, a series of subglobular chambers without definite arrangement; wall agglutinated, of loosely cemented coarse particles; no distinct aperture, but interstitial pores probably allow communication with the exterior. Silurian to Holocene; cosmopolitan.

SPICULOSIPHON Christiansen, 1964

Plate 20, figs. 1-3

Type species: Spiculosiphon radiata Christiansen, 1964; OD.

Spiculosiphon Christiansen, 1964 (*593), p. 1.

Test spherical, 0.4 mm to 4 mm in diameter; wall of loosely agglutinated sponge spicules that may protrude from the sphere and commonly with included tests of calcareous foraminifers, numerous thin organic threads extend about twice the diameter of the sphere and most specimens also have a long rod or tube of agglutinated sponge spicules on which it stands upright, rod two to ten times the diameter of the sphere and total length of the individual, with rod up to 20 mm; no distinct aperture; asexual reproduction by budding or by fission, sexual reproduction not observed. Holocene; N. Norway, at 100 m.

STORTHOSPHAERA Schulze, 1875

Plate 18, figs. 5-7

Type species: Storthosphaera albida Schulze, 1875; OD.

Storthosphaera Schulze, 1875 (*2825), p. 113.
?*Titanopsis* de Folin, 1881 (*1142), p. 138 (nom. nud.); de Folin, 1887 (*1144), p. 114; (type species: *Titanopsis irregularis* de Folin, 1887, OD(M)).
Arstorthosphaerum Rhumbler, 1913 (*2621), p. 347 (err. emend.).

Test free, large, up to 3 mm in diameter, subglobular, with irregular protuberances, ridges, and projections from the surface; wall thick, soft, of poorly cemented fine sand, light gray to grayish-brown in color; no recognizable aperture, but the loosely cemented sand grains may possibly leave spaces for passage of cytoplasm. L. Carboniferous (Tournaisian), L. Mississippian: USA: Texas; Holocene; N. Atlantic, from 360 m to 3,262 m; Gulf of Mexico, at 392 m to 1,460 m.

THURAMMINOIDES Plummer, 1945

Plate 19, fig. 7

Type species: Thuramminoides sphaeroidalis Plummer, 1945; OD.

Thuramminoides Plummer, 1945 (*2429), p. 218.

Test free, subglobular to discoidal with broadly rounded periphery; wall agglutinated of fine quartz grains, both inner and outer wall surfaces smoothly finished; no distinct aperture. U. Carboniferous, L. to M. Pennsylvanian; USA: Texas.

Remarks: As more than one species were represented among the type specimens of the type species, varied interpretations of this genus have resulted. The above description is based on the holotype and on similar topotypes in our collection, and excludes coexisting specimens with labyrinthic interior, surface protuberances or convolutions, or with internal tubules that open as pores at the surface. The latter had been regarded as representing the type species by Conkin (1961, *671), who reported it in rocks from Silurian to Permian in age; he further placed in synonymy the Australian species *Thuramminoides teicherti* (Parr) Crespin (1958, *689, p. 41) = *Crithionina teicherti* Parr (1942, *2359, p. 107), although if conspecific, the latter would have priority over Plummer's species by three years. Conkin and Conkin (1979, *673, p. 15) later transferred both Plummer's species and genus to the radiolarians. Although possibly the Mississippian form studied by Conkin is a radiolarian, the holotype of Plummer's species (and hence the genus based on it) is an agglutinated foraminifer. The Permian species of Parr and Crespin is neither conspecific nor congeneric but is also an agglutinated foraminifer with thick, coarsely perforate wall and simple interior, lacking an aperture.

THURAMMINOPSIS Haeusler, 1883

Plate 18, figs. 14-16

Type species: Thuramminopsis canaliculata Haeusler, 1883; OD(M).

Thuramminopsis Haeusler, 1883 (*1356), p. 69.
Danubica Frentzen, 1944 (*1180), p. 325; type species: *Danubica gracilis* Frentzen, 1944, SD Thalmann, 1947 (*3167), p. 391.

Test an irregular chamber with numerous subglobular to conical protrusions from the surface; wall agglutinated; no definite aperture but large pores present in the grooves between adjacent papillae. U. Jurassic (Malm α); Switzerland; Germany.

Subfamily STEGNAMMININAE Moreman, 1930

Stegnammininae Moreman, 1930 (*2181), p. 48.
Thekammininae Dunn, 1942 (*1023), p. 326.

Test free, irregular in form to subcylindrical, straight to curved; no definite aperture. M. Ordovician to Devonian.

BLASTAMMINA Eisenack, 1932

Plate 20, figs. 8-10

Type species: Blastammina polymorpha Eisenack, 1932; OD.

Blastammina Eisenack, 1932 (*1089), p. 261.

Test free, a rounded to hemispherical or subangular chamber; wall with brown proteinaceous layer sparsely covered by quartz particles; no distinct aperture. Silurian; Sweden: Gotland.

CERATAMMINA Ireland, 1939

Plate 20, fig. 11

Type species: Ceratammina cornucopia Ireland, 1939; OD.

Ceratammina Ireland, 1939 (*1584), p. 194.

Test free, unilocular, conical and slightly arcuate; wall agglutinated, of fine, well-cemented sand grains; no visible aperture. L. Devonian; USA: Oklahoma.

RAIBOSAMMINA Moreman, 1930

Plate 20, figs. 6 and 7

Type species: Raibosammina mica Moreman, 1930; OD.

Raibosammina Moreman, 1930 (*2181), p. 50.

Test elongate, up to 0.76 mm in length, subcylindrical, twisted, or irregularly branched; wall agglutinated, with various sized particles, roughly finished; no apparent aperture. M. Ordovician; USA: Oklahoma.

STEGNAMMINA Moreman, 1930

Plate 20, fig. 4

Type species: Stegnammina cylindrica Moreman, 1930; OD.

Stegnammina Moreman, 1930 (*2181), p. 49.

Test free, subcylindrical to prismatic in shape; wall agglutinated, of fine to medium sized grains, well cemented, surface rough; aperture indefinite. L. to M. Silurian; USA: Oklahoma.

THEKAMMINA Dunn, 1942

Plate 20, fig. 5

Type species: Thekammina quadrangularis Dunn, 1942; OD.

Thekammina Dunn, 1942 (*1023), p. 326.

Test free, subangular, ranging from flattened triangular to rectangular in outline; wall agglutinated, thin, of poorly cemented fine to coarse quartz particles; no definite aperture. L. Silurian; USA: Illinois.

Family SACCAMMINIDAE Brady, 1884

Saccamminidae Eimer and Fickert, 1899 (*1088), p. 599, nom. corr. pro family Saccamminina.
Saccamminina Lankester, 1885 (*1790), p. 846, nom. transl. ex subfamily Saccammininae.
Pilulinina Lankester, 1885 (*1790), p. 846.
Pilulinida Haeckel, 1894 (*1355), p. 190.
Saccamminae Delage and Hérouard, 1896 (*926), p. 130.
Pilulinidae Lister, in Lankester, 1903 (*1791), p. 141.
Silicamminidae Vyalov, 1968 (*3327), p. 4.

Test free or attached, globular to elongate; wall agglutinated; aperture single to multiple, rounded to slitlike. Ordovician to Holocene.

Subfamily SACCAMMININAE Brady, 1884

Saccammininae Brady, 1884 (*344), p. 64.
Arsaccamnia Rhumbler, 1913 (*2621), p. 347 (err. emend.).

Test free, globular, flasklike or elongate; wall agglutinated; aperture terminal, rounded, and in living specimens commonly provided with distinctive organic oral apparatus consisting of inward projecting tube enclosing a gel-like capsule. Ordovician to Holocene.

AMPHITREMOIDA Eisenack, 1938

Plate 21, figs. 1 and 2

Type species: Amphitremoida citroniforma Eisenack, 1938; OD(M).

Amphitremoida Eisenack, 1938 (*1090), p. 235.

Test free, lenticular in outline, up to 0.36 mm in length; wall thick, smooth, agglutinated, of very fine quartz particles, yellowish in color; two apertural openings, one at each of the acuminate ends. Ordovician; Baltic region, glacial pebble.

BRACHYSIPHON Chapman, 1906

Plate 23, figs. 1 and 2

Type species: Brachysiphon corbuliformis Chapman, 1906; OD.

Brachysiphon Chapman, 1906 (*535), p. 83.
Arbrachysiphum Rhumbler, 1913 (*2621), p. 351 (err. emend.).

Test free, subcylindrical; wall with a distinct proteinaceous inner layer, and an outer layer of coarse particles including tests of other foraminifers, agglutinated in a finer ground mass; aperture terminal, rounded, bordered by a thickened extension of the organic lining. Holocene, at 220 m: S. Pacific: off New Zealand, North Island.

CRONEISELLA Dunn, 1942

Plate 21, figs. 4 and 5

Type species: Croneisella typa Dunn, 1942; OD.

Croneisella Dunn, 1942 (*1023), p. 334.
Shideleréella Dunn, 1942 (*1023), p. 328; type species: *Shidelerella bicuspidata* Dunn, 1942; OD.

Test elongate, fusiform, with subparallel sides; wall thin, agglutinated, of fine to large grains; apertures terminal on one or more slight necklike protrusions at one or both ends of the test. Silurian; USA: Missouri, Illinois.

HYPERAMMINITA Crespin, 1958

Plate 23, fig. 5

Type species: Hyperammina(?) *rudis* Parr, 1942 (*2359), p. 105; OD.

Hyperamminita Crespin, 1958 (*689), p. 54.

Similar to *Brachysiphon* but with roughly finished agglutinated wall of coarse quartz particles and wide aperture at the open end of the tubular chamber; length up to 2.75 mm. Permian; Western Australia.

LAGENAMMINA Rhumbler, 1911

Plate 21, figs. 7-9

Type species: Lagenammina laguncula Rhumbler, 1911; OD(M).

Lagenammina Rhumbler, 1911 (*2620), p. 92, 111.
Arlagenammum Rhumbler, 1913 (*2621), p. 348 (err. emend.).
Proteonella Lukina, 1969 (*1942), p. 175; type species: *Reophax* difflugiformis Brady, 1879 (*337), p. 51; OD.

Test flask shaped, with elongate neck; wall with proteinaceous organic layer densely covered by agglutinated material; aperture terminal, produced on an elongate neck. Silurian to Holocene; USA; USSR; Germany; Western Australia; Atlantic Ocean, at 1,500 m to 5,480 m.

OVAMMINA Dahlgren, 1962

Plate 22, figs. 7-11

Type species: Ovammina opaca Dahlgren, 1962; OD(M).

Ovammina Dahlgren, 1962 (*871), p. 196.

Dahlgrenia Lena, 1974 (*1822), p. 10 (non *Dahlgrenia* Bondar, 1942); type species: *Dahlgrenia patagoniensis* Lena, 1974; OD.
Dahlgreniella Lena and D. Haman, 1980 (*1823), p. 178 (nom. subst. pro *Dahlgrenia* Lena, 1974).

Test free, ovoid to fusiform, about 0.13 mm to 0.7 mm in length and 0.23 mm to 0.5 mm in breadth, ovoid to circular in transverse section; wall with inner hyaline layer and outer opaque layer of fine agglutinated mica flakes and diatom frustules, resulting in a granular surface; aperture terminal, with entosolenian apparatus of a diameter about one-fourth to one-sixth of the test diameter, connected to the inner wall layer by thin lateral lamellae, during gametogenesis the main aperture constricts and closes, and a ring of accessory apertures forms around it to provide egress for the gametes; gamont uninucleate, schizont multinucleate, with up to 16 nuclei of 12 μm to 86 μm in diameter; cytoplasm gray to colorless. Holocene; Sweden: Gullmar Fjord, to about 1 m; Argentina: Puerto Deseada.

PILULINELLA Saidova, 1975

Plate 23, fig. 15

Type species: Pilulinella sphaerica Saidova, 1975; OD.

Pilulinella Saidova, 1975 (*2695), p. 49.

Test free, large, 1 mm to 2 mm in diameter, spherical, unilocular; wall of fine clay agglutinated on an organic base; aperture terminal, rounded, and said to be constricted within by an inner wall layer that surrounds a smaller opening. Holocene; subtropical Pacific.

Remarks: The genus was described as having a double aperture, with smaller opening formed by a second wall layer inside a larger one. The apertural modification may indicate an oral apparatus, such as occurs in the aperture of *Saccammina* and others. *Pilulinella* differs from *Pilulina* in the circular rather than slitlike aperture and from *Saccammina* in the very fine-grained wall.

PLACENTAMMINA Thalmann, 1947

Plate 21, figs. 12-19

Type species: Reophax placenta Grzybowski, 1898 (*1327), p. 276; OD.

Placentammina Thalmann, 1947 (*3167), p. 394.

Placentammina Majzon, 1943 (*1982), p. 62, 151 (name not available, ICZN Art. 13 (b), type species not designated).

Silicammina Vyalov, 1966 (*3325), p. 9, 10; type species: *Saccammina vulgaris* Bogdanovich, 1963 (*270), p. 155; OD.

Bogdanovicziella Myatlyuk, 1970 (*2220), p. 51; type species: *Pelosina complanata* Franke, 1912 (*1170), p. 107; OD.

Test circular to ovoid in outline, up to 1.0 mm in diameter, commonly collapsed and flattened in preservation; wall finely agglutinated, surface smooth to somewhat rough where occasional grains protrude; aperture rounded or may appear ovate to slitlike, depending on degree of compression, may be slightly elevated on a short neck or surrounded by a thickened rim, generally terminal, although secondary compression may result in a somewhat eccentric position. Cretaceous to Miocene, typically in flysch deposits; cosmopolitan.

PSAMMOPHAGA Arnold, 1982

Plate 22, figs. 3-6

Type species: Psammophaga simplora Arnold, 1982; OD.

Psammophaga Arnold, 1982 (*78), p. 76.

Test small, 0.25 mm in length, pyriform to ovoid; wall of thick transparent flexible matrix with a thinner outer agglutinated covering; aperture terminal, simple, at the pointed end of the test, or may be slightly produced on a neck, without peduncular sheath or entosolenian collar; granuloreticulose pseudopodia, cytoplasm containing large quantities of ingested mineral particles, gamont with single large polygenomic nucleus (up to 100 μm) that divides to produce abundant gametes, schizont unknown. Holocene, shallow water; USA: California, Monterey Bay.

SACCAMMINA Carpenter, 1869

Plate 23, fig. 8

Type species: Saccammina sphaerica Brady, 1871 (*329), p. 183; SD Cushman, 1928 (*747), p. 72.

Saccammina Carpenter, 1869 (*488), p. 61 (also err. cit. as *Saccamina*, p. 61).

Saccammina M. Sars, 1869 (*2734), p. 248 (nom. nud.).

Arsaccammum Rhumbler, 1913 (*2621), p. 347 (err. emend.).

Test free, a single globular chamber up to 3.5 mm in diameter; wall firm, with inner proteinaceous layer covered by fine agglutinated quartz particles held in an organic cement; aperture rounded, may be nearly flush or produced on a short neck, inner organic wall layer modified in living specimens to an oral apparatus or entosolenian tube around the opening. M. Silurian; USA: Ohio, Oklahoma; to Holocene: N. Atlantic, at 346 m to 2,886 m, off Norway; Ireland; Arctic Ocean, at 178 m to 290 m; N. Pacific, at 4,100 m; Antarctic, at 2,600 m.

Remarks: Commonly credited to Sars or to Sars in Carpenter, the authorship of this genus should be credited to Carpenter, as discussed by Loeblich and Tappan (1961, ***1903**, pp. 79-80).

SACCULINELLA Crespin, 1958

Plate 23, fig. 9

Type species: Sacculinella australis Crespin, 1958; OD.

Sacculinella Crespin, 1958 (*689), p. 43.

Short, sacklike test, up to 1.3 mm in length and 1.1 mm in breadth, ovoid in plan, with rounded base and broad, open apertural end; wall agglutinated, of very fine quartz particles, surface smoothly to moderately roughly finished; aperture large, rounded, terminal, bordered by thickened lip. Permian; Western Australia.

STOMASPHAERA Mound, 1961

Plate 21, fig. 11

Type species: Stomasphaera brassfieldensis Mound, 1961; OD.

Stomasphaera Mound, 1961 (*2200), p. 28.

Test free, subspherical to subangular; wall agglutinated, of medium to coarse grains, surface roughly finished; aperture a small central rounded opening. L. Silurian; USA: Indiana.

TECHNITELLA Norman, 1878

Plate 23, figs. 3 and 4

Type species: Technitella legumen Norman, 1878; SD Cushman, 1910 (*701), p. 47.

Technitella Norman, 1878 (*2264), p. 279, 281.
Hyperamminella de Folin, 1881 (*1142), p. 140 (nom. nud.); de Folin, 1887 (*1144), p. 114 (nom. nud.; non *Hyperamminella* Cushman and Waters, 1928).
Artechnitum Rhumbler, 1913 (*2621), p. 350 (err. emend.).

Test free, elongate, oval, fusiform or cylindrical, up to 3 mm in length; wall thin, of agglutinated longitudinally aligned sponge spicules and some quartz grains; aperture terminal, rounded, may be slightly produced on a neck or have a thickened border. Oligocene to Holocene; N. and S. Atlantic; Pacific; Antarctic; Europe; South America; Australia.

Subfamily PILULININAE Brady, 1884

Pilulininae Brady, 1884 (*344), p. 63.

Test free, globular; wall finely agglutinated, thick, but poorly cemented; aperture an elongate slit, slightly produced. Holocene.

PILULINA Carpenter, 1870

Plate 21, figs. 20 and 21

Type species: Pilulina jeffreysii Carpenter, 1875 (*490), p. 532; SD(SM).

Pilulina Carpenter, 1870 (*489), p. 5.
Arpilum Rhumbler, 1913 (*2621), p. 349 (err. emend.).

Test free, globular, up to 3.5 mm in diameter; wall relatively thick but flexible, agglutinated of loosely aggregated sand and long sponge spicules felted together in a ground mass of finer sand and broken spicules, surface smoothly finished; aperture an elongate narrow curved or sigmoid slit, elevated on a low ridge. Holocene; N. Atlantic.

Subfamily THURAMMININAE A. D. Miklukho-Maklay, 1963

Thuramminınae A. D. Miklukho-Maklay, 1963 (*2130), p. 153 (also err. cit as Thuramminae, p. 146.

Test free or rarely attached, globular, or with a few to many subconical or tubular projections from the surface; wall agglutinated; numerous apertures, flush with the surface or at the ends of the projections. Ordovician to Holocene.

ASTRAMMINA Rhumbler, 1931

Plate 22, figs. 1 and 2; plate 23, figs. 10-14

Type species: Astrammina rara Rhumbler, 1931; OD(M).

Astrammina Rhumbler, in Wiesner, 1931 (*3375), p. 77 (syn. *Armorella sphaerica* Heron-Allen and Earland, 1932 and *Pelosphaera cornuta* Heron-Allen and Earland, 1932).
Armorella Heron-Allen and Earland, 1932 (*1479), p. 256; type species: *Armorella sphaerica* Heron-Allen and Earland, 1932 = *Astrammina rara* Rhumbler; OD(M).
Pelosphaera Heron-Allen and Earland, 1932 (*1479), p. 255; type species: *Pelosphaera cornuta* Heron-Allen and Earland, 1932 - *Astrammina rara* Rhumbler; OD(M).

Test free, large, up to 6.5 mm in diameter, a single spherical chamber with one to five narrow stolonlike arms radiating in various directions but usually in nearly the same plane and the longest ones commonly very flexible, may also have fragile conical projections, and may produce rounded buds (probably in asexual reproduction); protoplasmic body enclosed in a thick imperforate organic membrane with a single oral region; outside and slightly separated from this organic cover is a thin but very firm agglutinated wall incorporating coarse and fine sand and sponge spicules, commonly with a single layer of grains but may be up to 3 grains in thickness, with considerable brown to gray, acid mucopolysaccharide organic cement; pseudopodia projecting through the gelatinous capsule in the oral region of the organic shell occupy the space between it and the agglutinated test, and then project through openings at the ends of the tubular arms. Holocene, at 78 m to 2,258 m depth; S. Atlantic: South Georgia; Antarctic; S. Pacific: New Zealand, North Island.

Remarks. The synonymy of *Armorella sphaerica*, *Astrammina rara*, and *Pelosphaera cornuta* was demonstrated on living specimens from the Antarctic (DeLaca, 1986, *924).

GASTROAMMINA Dunn, 1942

Plate 21, fig. 6

Type species: Gastroammina williamsae Dunn, 1942; OD.

Gastroammina Dunn, 1942 (*1023), p. 335.

Test irregularly saclike with a few large conical protuberances; wall thin, agglutinated, loosely cemented, surface rough; aperture not seen. L. or M. Silurian; USA: Missouri.

Remarks: Although originally described as two-chambered, the only described specimen appears to be irregularly saclike and probably is internally undivided. *Gastroammina* may be congeneric with *Ordovicina*, but the latter was described as having a wholly organic wall. As *Ordovicina* was isolated by palynological preparation, any mineral matter would have been dissolved, and it might originally have been agglutinated.

ORBULINELLOIDES Saidova, 1975

Plate 21, fig. 10

Type species: Orbulinoides agglutinatus Saidova, 1970; OD.

Orbulinelloides Saidova, 1975 (*2695), p. 41 (nom. subst. pro *Orbulinoides* Saidova, 1970).

Orbulinoides Saidova, 1970 (*2694), p. 164 (non *Orbulinoides* Cordey, 1968); obj.

Test free, spherical; wall coarsely agglutinated with organic cement, porous; apertures numerous, rounded, and scattered over the entire surface but not elevated on projections. Holocene; boreal Pacific Ocean: Kurile-Kamchatka Trench.

ORDOVICINA Eisenack, 1938

Plate 21, fig. 3

Type species: Ordovicina oligostoma Eisenack, 1938; OD(M).

Ordovicina Eisenack, 1938 (*1090), p. 234.

Test free, broadly ovate to irregularly polygonal in outline, with numerous conical projections; wall organic, but described from palynological preparations and originally may have been agglutinated; aperture uncertain, probably multiple at the ends of the projections. Ordovician to Silurian; Baltic glacial pebbles.

PSEUDOTHURAMMINA D. B. Scott, Medioli, and M. A. Williamson, 1981

Plate 23, figs. 6 and 7

Type species: Thurammina? limnetis D. B. Scott, and Medioli, 1980 (*2834), p. 43; OD.

Pseudothurammina D. B. Scott, Medioli, and M. A. Williamson, in D. B. Scott et al., 1981 (*2835), p. 126.

"*Pseudothurammina*" D. B. Scott and Medioli, 1980 (*2834), p. 44 (invalid, ICZN Art. 15).

Test free or less commonly attached, subglobular, 0.3 mm to 1.6 mm in diameter, with up to five irregular mamillae or projections from the surface; wall agglutinated, flexible, thin, with mineral grains cemented to a transparent organic lining that remains visible in living specimens where no foreign particles are present in the area of attachment but that rapidly disintegrates at death, hence is not preserved in the sediments; apertures at the open ends of the tubular projections. Holocene, in marshes: W. Atlantic, USA: Massachusetts, Maine, Virginia; Canada: Prince Edward Island; Brazil: State of Rio de Janeiro; Germany: Kieler Bucht.

THURAMMINA Brady, 1879

Plate 21, fig. 22

Type species: Thurammina papillata Brady, 1879; SD Cushman, 1910 (*701), p. 571.

Thurammina Brady, 1879 (*337), p. 45.

Arthyrammum Rhumbler, 1913 (*2621), p. 347 (err. emend.).

Psammosphaera (Thurammina) Hofker, 1972 (*1521), p. 31, 33 (nom. transl.).

Test globular to subglobular, with many short conical protuberances; wall agglutinated, very thin, of a single layer of fine quartz grains, dark brown in color; aperture a small opening at the summit of each protuberance, the apertural rim of cement only, without included grains. M. Silurian to Pennsylvanian: USA; Czechoslovakia; Holocene; N. and S. Atlantic, from 218 m to 3,800 m; North Sea; N. and S. Pacific, from 48 m to 6,250 m; Antarctic, to 5,200 m.

Family POLYSACCAMMINIDAE Loeblich and Tappan, 1984

Polysaccamminidae Loeblich and Tappan, 1984 (*1918), p. 5.

Test consisting of a linear series of irregular, rounded chambers; wall agglutinated, with considerable cement and with organic inner layer, may have a few large sand grains attached to the surface; aperture terminal and border may be slightly elevated. Holocene; in nearshore or brackish water.

Remarks: Differs from the Saccamminidae in the linear series of irregular chambers and from the Hormosinidae in the irregular chambers and greater amount of organic matter that results in a more flexible test.

GOATAPITIGBA Narchi, 1962

Plate 24, figs. 5-9

Type species: Goatapitigba jurara Narchi, 1962; OD.

Goatapitigba Narchi, 1962 (***2230**), p. 277.

Test attached, globular proloculus followed by a few somewhat inflated subpyriform chambers; wall agglutinated, with organic inner layer, and a few large grains held in considerable cement; aperture terminal, against the attachment. Holocene; Brazil: Cabo Frio.

POLYSACCAMMINA D. B. Scott, 1976

Plate 24, figs. 1-4

Type species: Polysaccammina ipohalina D. B. Scott, 1976; OD.

Polysaccammina D. B. Scott, 1976 (***2833**), p. 316.

Test free, with irregularly globular chambers that increase in size with growth, aligned in a roughly uniserial, biserial, or wholly irregular series; wall with very thin inner organic layer and an outer homogeneous imperforate agglutinated layer of fine sand with rare larger grains, held in an organic cement; aperture terminal, rounded, bordered by an extension of the inner organic wall layer that projects over the apertural edge, apertural opening also may be closed within by a thin cover consisting of the inner organic layer. Holocene; USA: S. California; Canada: Prince Edward Island; Brazil: W. of Rio de Janeiro.

Family HEMISPHAERAMMINIDAE Loeblich and Tappan, 1961

Hemisphaeramminidae Loeblich and Tappan, 1982 (***1917**), p. 26, nom. transl. ex subfamily Hemisphaeramminínae.
Oryctodermidae Saidova, 1981 (***2696**), p. 12.

Test free or attached, consisting of one or more subglobular to discoidal chambers; wall agglutinated; aperture single or may be unrecognizable. Ordovician to Holocene.

Subfamily HEMISPHAERAMMININAE Loeblich and Tappan, 1961

Hemisphaeramminínae Loeblich and Tappan, 1961 (***1902**), p. 277.
Tholosininae Bermúdez and Rivero, 1963 (***211**), p. 75.
Saccamminisinae Saidova, 1981 (***2696**), p. 15.

Test attached or rarely free, wall agglutinated, with considerable cement, interior not subdivided. Ordovician to Holocene.

AMMOPEMPHIX Loeblich, 1952

Plate 26, figs. 9-11

Type species: Urnula quadrupla Wiesner, 1931 (***3375**), p. 82; OD.

Ammopemphix Loeblich, 1952 (***1877**), p. 82 (nom. subst. pro *Urnula* Wiesner, 1931).
Urnula Wiesner, 1931 (***3375**), p. 82 (non *Urnula* Claparède and Lachmann, 1857); obj.

Test attached, consisting of up to four nearly equal sized hemispherical chambers, commonly symmetrically arranged, each nearly circular in outline; wall finely agglutinated, white to yellowish in color, smoothly finished, attachment wall very thin, delicate, and translucent and may break when loosened from the attachment so that chambers appear open ventrally; a single small, rounded aperture at the apex of each chamber. Holocene; Antarctic; Arctic.

AMPHICERVICIS Mound, 1961

Plate 24, figs. 15-17

Type species: Amphicervicis elliptica Mound, 1961; OD.

Amphicervicis Mound, 1961 (***2200**), p. 29.

Test attached, elliptical to circular in outline, consisting of three rapidly enlarging chambers that are completely enveloped dorsally by the final depressed hemispherical chamber, base flattened to concave; wall agglutinated, of well-cemented fine- to medium-sized grains, surface smooth; two apertures, at opposite ends of the test, somewhat produced. L. Silurian; USA: Indiana.

ATELIKAMARA McClellan, 1973

Plate 25, figs. 15 and 16

Type species: Atelikamara incomposita McClellan, 1973; OD.

Atelikamara McClellan, 1973 (***1959**), p. 305.

Test attached, irregular in outline, free surface convex, interior partially subdivided by incomplete septa; wall agglutinated, of poorly sorted quartz particles, well cemented; aperture indefinite. M. Silurian; USA: Nevada.

COLONAMMINA Moreman, 1930

Plate 26, figs. 1 and 2

Type species: Colonammina verruca Moreman, 1930; OD.

Colonammina Moreman, 1930 (***2181**), p. 55.

Test a single hemispherical attached chamber, may have surrounding flange; wall agglutinated; a single aperture at the center of the upper surface may be slightly elevated. Silurian; USA: Oklahoma.

HEMISPHAERAMMINA Loeblich and Tappan, 1957

Plate 25, figs. 1-8

Type species: Hemisphaerammina batalleri Loeblich and Tappan, 1957, OD.

Hemisphaerammina Loeblich and Tappan, 1957 (***1897**), p. 223.

Fairliella Summerson, 1958 (***3105**), p. 555; type species: *Fairliella dicantha* Summerson, 1858; OD.

Iridiella Shchedrina, 1962 (***2889**), p. 57; type species: *Iridiella marisalbi* Shchedrina, 1962; OD.

Metamorphina Browne, in Browne and Schott, 1963 (***439**), p. 223; type species: *Webbinella tholus* Moreman, 1933 (***2182**), p. 395 (err. cit. as "*tholsus*" by Browne, in Browne and Schott, 1963, p. 223); OD.

Test attached, a single hemispherical chamber that may have a bordering flange; wall agglutinated, with considerable cement; no apparent aperture, hence communication with the exterior probably through interstitial pores. M. Silurian to Holocene; cosmopolitan.

Remarks: The simple rounded agglutinated test may at times be misidentified; as noted by Adegoke et al. (1969, ***14**, p. 102) the egg capsules of *Neritina*, a prosobranch gastropod common in lagoons and estuaries, may be of similar shape, size, and gross morphology. The nucleus, cytoplasmic nature, and even the process of gamogony have been studied for living *Hemisphaerammina*, under the earlier designation *Webbinella hemisphaerica* (J. Le Calvez, 1938, ***1799**), hence there is no question as to the foraminiferal affinity of this species.

IRIDIA Heron-Allen and Earland, 1914

Plate 27, figs. 1-9

Type species: Iridia diaphana Heron-Allen and Earland, 1914; OD.

Iridia Heron-Allen and Earland, 1914 (***1471**), p. 371.

Test attached, a hemispherical or irregular chamber with short tubular to branching projections; wall proteinaceous, consisting of a fibrillar lamina propria, formed by endoplasm, and an outer perilamina produced by the ectoplasm and pseudopodia, may include agglutinated particles; apertures at ends of tubular projections; pseudopodia elongate, bifurcating, and arising from a stomostyle or pseudopodial trunk; during asexual reproduction young embryos become temporarily pelagic and have radiating, nonanastomosing pseudopodia, later the pseudopodia are withdrawn, the embryo attaches to the substrate and forms a test; during sexual reproduction gametes with two laterally attached unequal flagella unite to form a diploid schizont that is morphologically like the gamont. Holocene; Africa: Kerimba Archipelago; Caribbean; Mediterranean.

JASCOTTELLA Huddleston and Haman, 1982

Plate 25, figs. 11-14

Type species: Mamilla hemispherica J. A. B. Scott, 1974; OD.

Jascottella Huddleston and Haman, 1982 (***1574**), p. 421 (nom. subst. pro *Mamilla* J. A. B. Scott, 1974).

Mamilla J. A. B. Scott, 1974 (***2836**), p. 171 (non *Mamilla* Fabricius, 1823; nec Wagner, 1907); obj., OD(M).

Test attached, hemispherical, up to 1.8 mm in diameter, commonly with complete wall against the attachment, although this may be incomplete in rare specimens; wall coarsely agglutinated, with considerable cement; aperture at the center of the upper convex surface, at the end of a calcareous tubular projection that is continuous with the inner cement-rich layer of the agglutinated wall. U. Cretaceous (Santonian to L. Campanian); Canada: British Columbia.

LACUSTRINELLA Loeblich and Tappan, n. gen.

Plate 26, figs. 12-14

Type species: Ammopemphix lacustris Haman and Marolt, 1985 (***1377**), p. 157; here designated.

Test attached, diameter up to 0.58 mm, consisting of a few subglobular chambers of approximately equal size and closely appressed, upper surface rounded to centrally subconical and produced to the central aperture, lower surface flattened, periphery rounded; wall agglutinated, thin, consisting of randomly arranged siliceous sponge spicules with small amount of fine sand, that of lower surface membranous, translucent, and with less agglutinated material, commonly torn when specimens are freed from the substrate; apertures rounded, terminal on a slight projection at the center of each chamber. Holocene, brackish lakes, at 2 m depth; USA: Louisiana.

Remarks: Differs from *Ammopemphix* in the more coarsely agglutinated wall, inflated chambers, prominent and elevated apertures, and less delicate and partially agglutinated lower wall against the substrate, in contrast to the flattened test of *Ammopemphix*, with wholly organic lower wall. *Lacustrinella* represents an entirely different environment, being associated with numerous arcellaceans, as well as a few brackish water subtropical foraminifers, whereas *Ammopemphix* occurs in normal marine water at depths of 14 m to 385 m, in both the Arctic and Antarctic.

MESAMMINA Pichler, 1971

Plate 26, figs. 15 and 16

Type species: Mesammina annika Pichler, 1971; OD.

Mesammina Pichler, 1971 (*2405), p. 319.

Test attached, rounded to oval in outline; wall agglutinated, of quartz grains held in organic cement, the organic material red to brown in color; aperture consists of a series of regularly spaced openings against the attachment on the periphery. L. to M. Devonian (Emsian, Eifelian); Germany.

SACCAMMINIS Ireland, 1960

Plate 24, figs. 10 and 11

Type species: Saccamminoides multicellus Ireland, 1956 (*1585), p. 841; OD.

Saccamminis Ireland, 1960 (*1586), p. 1217 (nom. subst. pro *Saccamminoides* Ireland, 1956).

Saccamminoides Ireland, 1956 (*1585), p. 841 (non *Saccamminoides* Geroch, 1955); type species: obj., OD.

Test attached, consisting of a series of hemispherical to ovoid chambers arranged in a linear series; wall agglutinated; aperture against the attachment at the end of the series of chambers, and may be slightly produced on a neck. U. Carboniferous, U. Pennsylvanian; USA: Kansas.

SCYPHOCODON Kristan-Tollmann, 1971

Plate 24, figs. 12-14

Type species: Scyphocodon verrucosus Kristan-Tollmann, 1971; OD.

Scyphocodon Kristan-Tollmann, 1971 (*1742), p. 261.

Test a single hemispherical to polygonal inflated chamber, with broad open side that may be the position of attachment, but if so, no chamber floor was present against the substrate; wall agglutinated, of a single layer of grains, no organic layer evident, apparently constructed in a series of bands (possibly growth rings); aperture probably against the attachment (the periphery is generally damaged in the specimens obtained from acid residues), or if a free-living form, which appears unlikely, the entire open side would represent the aperture. U. Silurian (Ludlovian); Austria.

SOROSPHAERELLA J. E. Conkin, B. M. Conkin, and Thurman, 1979

Plate 24, figs. 18 and 19

Type species: Sorosphaera? cooperensis J. E. Conkin, B. M. Conkin, and Canis, 1968 (*674), p. 151; OD.

Sorosphaerella J. E. Conkin, B. M. Conkin, and Thurman, 1979 (*675), p. 6; OD.

Test attached to various objects, such as calcareous sponge spicules, or possibly algae, a single subglobular chamber or possibly two to four chambers although the appearance of septa may result from indentations of the attachment; wall agglutinated, of medium to coarse particles, with little cement; no aperture other than interstitial openings. U. Devonian to L. Carboniferous, L. Mississippian; USA: Alabama, Illinois, Indiana, Missouri, Montana.

SOROSTOMASPHAERA McClellan, 1966

Plate 26, figs. 5-8

Type species: Sorostomasphaera waldronensis McClellan, 1966; OD.

Sorostomasphaera McClellan, 1966 (*1958), p. 478.

Test free, with one to a few loosely attached to slightly appressed globular chambers; wall finely agglutinated, well cemented; aperture a single round opening at the surface of each chamber, no intercameral connections. M. Silurian (Niagaran); USA: Indiana.

THOLOSINA Rhumbler, 1895

Plate 26, figs. 3 and 4

Type species: Placopsilina bulla Brady, 1881 (***339**), p. 51; SD Cushman, 1918 (***710**), p. 63.

Tholosina Rhumbler, 1895 (***2616**), p. 82.

Pseudoplacopsilina Eimer and Fickert, 1899 (***1088**), p. 672; type species: obj.; OD(M).

Artholosum Rhumbler, 1913 (***2621**), p. 346 (err. emend.).

Test attached, globular, much inflated; wall agglutinated, surface smoothly finished; two or more apertures flush with the attachment or at the ends of irregular protuberances arising just above the attachment. Ordovician to Holocene; Atlantic; Antarctic; North America; Europe.

WEBBINELLOIDEA G. A. Stewart and Lampe, 1947

Plate 25, figs. 9 and 10

Type species: Webbinelloidea similis G. A. Stewart and Lampe, 1947; OD.

Webbinelloidea G. A. Stewart and Lampe, 1947 (***3067**), p. 534.

Sorosphaeroidea G. A. Stewart and Lampe, 1947 (***3067**), p. 534; type species: *Sorosphaeroidea polygonia* G. A. Stewart and Lampe, 1947; OD.

Test attached, with a few subglobular, subangular to hemispherical chambers in a linear or spreading arrangement; wall agglutinated, surface rough; no visible aperture. M. Devonian; USA: Ohio; Poland.

Subfamily CRITHIONININAE Hofker, 1972

Crithionininae Hofker, 1972 (***1521**), p. 66.

Marsonellinae Saidova, 1981 (***2696**), p. 13 (nom. imperf.; recte Masonellinae).

Test free or attached, interior subdivided by one or more partial septa. U. Ordovician or L. Silurian, Holocene.

CRITHIONINA Goës, 1894

Plate 28, figs. 1-4

Type species: Crithionina mamilla Goës, 1894; SD Rhumbler, 1904 (***2617**), p. 229.

Crithionina Goës, 1894 (***1257**), p. 14.

Arcrithionum Rhumbler, 1913 (***2621**), p. 346 (err. emend.).

Test attached, commonly to other foraminifers, a single subspherical to hemispherical chamber that may be incompletely divided internally by an inward growing partial septum; wall thick, of agglutinated fine sand, sponge spicules, and foraminiferal tests, surface roughly finished, in part as the result of dislodgement of some of the larger particles; no apparent aperture in globular individuals, but a few may have a rounded aperture at the end of a tubular projection from one side, perhaps as a temporary development in ontogeny. Holocene: Atlantic; North Sea; Caribbean; Pacific.

DAITRONA Loeblich and Tappan, 1961

Plate 28, figs. 9-13

Type species: Crithionina lens Goës, 1896 (***1258**), p. 24; OD.

Daitrona Loeblich and Tappan, 1961 (***1904**), p. 218.

Test free, 2 mm to 4 mm in diameter, discoidal to lenticular in section, circular to ovoid in plan, a single chamber that is partially to nearly completely subdivided internally by radial semisepta or incomplete partitions that project inward from the outer wall; wall thin, consisting of a single finely agglutinated layer, loosely cemented, without inner organic layer (Césana, 1981, ***517**, p. 197); no recognizable aperture. Holocene; Pacific.

Remarks: The species with internal radial subdivisions, described by Y. Le Calvez and Césana (1980, ***1807**, p. 215) as *Hemisphaerammina bradyi*, is in fact a representative of *Daitrona*, which does possess internal partitions, whereas true *H. bradyi*, described from 60 m depth off Durham, England, has none. They also incorrectly consider *H. bradyi* as the type species of *Hemisphaerammina*, whereas the Cretaceous *H. batalleri* was originally designated as type for that genus. As there appears to be no gradation between species with radial inner partitions and those with undivided interior, both genera are recognized herein.

MASONELLA Brady, 1889

Plate 28, figs. 19 and 20

Type species: Masonella planulata Brady, 1889; SD Cushman, 1927 (***746**), p. 188.

Masonella Brady, 1889 (***345**), p. 295.

Armasonellum Rhumbler, 1913 (***2621**), p. 345 (err. emend.).

Test discoidal, compressed, up to 10 mm in diameter; central cavity reflected externally by a swollen area and leads into fine radiating tubules that may bifurcate near the periphery; wall of light colored quartz sand and sponge spicules, agglutinated in little cement; aperture at the open ends of the radial tubules. Holocene, at 500 m to 530 m; Indian Ocean: Bay of Bengal.

NEPHROSPHAERA Kristan-Tollmann, 1971

Plate 28, figs. 5-8

Type species: Nephrosphaera fissurata Kristan-Tollmann, 1971; OD.

Nephrosphaera Kristan-Tollmann, 1971 (***1742**), p. 269.

Test free, ovoid, with an elongate groove at one side that probably represents the aperture; interior with regular vertical partitions subdividing the chamber interior and may also have transverse partitions, resulting in an alveolar appearance; wall very finely agglutinated, with little cement; aperture consists of the elongate groove, although possibly this may include more than one linearly aligned small opening, interior partitions also may be pierced by a hole. U. Ordovician (Ashgillian) or L. Silurian (Valentian); Austria.

PSEUDOWEBBINELLA Shchedrina, 1962

Plate 28, figs. 14-18

Type species: Crithionina goesi Höglund, 1947 (***1487**), p. 36; OD.

Pseudowebbinella Shchedrina, 1962 (***2889**), p. 54.

Test attached, hemispherical, nearly circular in outline, up to 3 mm in diameter; interior partially subdivided by short radial partitions that project inward from the peripheral margin; wall finely agglutinated, varied in thickness, surface smoothly finished, color chalky white; no apparent aperture. Holocene, at 35 m to 515 m depth; North Sea; Sweden: Gullmar Fjord, Skagerak; Arctic Ocean; USSR: Kandalaksha Gulf, White Sea.

VERRUCINA Goës, 1896

Plate 28, figs. 21 and 22

Type species: Verrucina rudis Goës, 1896; OD(M).

Verrucina Goës, 1896 (***1258**), p. 25.

Arverrucum Rhumbler, 1913 (***2621**), p. 346 (err. emend.).

Test attached, hemispherical to ovoid, interior subdivided into a few more or less regular chambers; wall agglutinated, surface rough; aperture irregular in the center of the somewhat depressed surface. Holocene; E. Pacific Ocean: off Mexico, at 1,544 m.

Remarks: Known only from a few specimens from the type locality, the interior has not been described in detail; *Verrucina* may prove synonymous with *Crithionina* or *Pseudowebbinella* if additional material can be obtained for study.

Subfamily ORYCTODERMINAE Saidova, 1981

Oryctoderminae Saidova, 1981 (***2696**), p. 13.

Test free or attached, globular to discoidal; wall agglutinated, labyrinthic. Permian to Holocene.

DISCOBOTELLINA Collins, 1958

Plate 29, figs. 3-7

Type species: Discobotellina biperforata Collins, 1958; OD.

Discobotellina Collins, 1958 (***646**), p. 342.

Test discoidal to ellipsoidal, up to 2.3 cm in diameter, with two different forms that may represent alternate generations, one discoidal with inflated center, the other of more elliptical outline and with two eccentric slotlike perforations through the test that appear to migrate outward with test growth by resorption and regrowth at the margins of the holes; wall agglutinated, with thick coarse-grained and poorly cemented inner layer and thinner, fine-grained and well cemented outer layer, imperforate except at periphery; aperture consists of interstitial spaces at the disk periphery that communicate with the chamber interior. Holocene, at 8 m to 74 m; Australia: Moreton Bay, S. Queensland, and Great Barrier Reef off E. Queensland.

ORYCTODERMA Loeblich and Tappan, 1961

Plate 29, figs. 1 and 2

Type species: Crithionina rotundata Cushman, 1910 (***701**), p. 56; OD.

Oryctoderma Loeblich and Tappan, 1961 (***1904**), p. 217.

Test free, large, globular, central cavity small and simple; wall agglutinated, very thick, and loosely cemented, with numerous ramifying canals leading from the central cavity to the exterior, margins of the canals firmly cemented; aperture consists of numerous circular to polygonal openings on the surface that lead into the canals. Permian (Artinskian): Western Australia; Holocene, at 526 m to 3,758 m: E. Pacific; USA: California; Mexico; Ecuador; Galapagos Islands; Gulf of Mexico.

Family DIFFUSILINIDAE Loeblich and Tappan, 1961

Diffusilinidae Saidova, 1981 (*2696), p. 13, nom. transl. ex subfamily Diffusilininae.
Diffusilininae Loeblich and Tappan, 1961 (*1904), p. 217 (subfamily).

Test attached, irregular in outline, consisting of a mass of branching tubes, wall finely agglutinated; apertures at top of small surface pustules. Ordovician, Holocene.

DIFFUSILINA Heron-Allen and Earland, 1924

Plate 29, figs. 8 and 9

Type species: Diffusilina humilis Heron-Allen and Earland, 1924; OD.

Diffusilina Heron-Allen and Earland, 1924 (*1474), p. 614.

Test attached, irregular in outline, up to 3 mm or more in diameter, flattened, interior with nonseptate ramifying cavity, producing a labyrinthic structure; wall agglutinated, with a floor against the attachment, outer surface smoothly finished; upper surface with a few scattered pustules constructed of quartz sand and mud particles similar to the rest of the wall but lacking cement, so that the interstitial pores could serve as an aperture. Holocene, intertidal: South Pacific: Lord Howe Island.

KERIONAMMINA Moreman, 1933

Plate 29, figs. 10 and 11

Type species: Kerionammina favus Moreman, 1933; OD.

Kerionammina Moreman, 1933 (*2182), p. 397.

Test attached, flattened and irregular in outline, with a few tubular extensions from the periphery; wall thick, agglutinated, with moderate amount of cement, internal partitions forming small subquadrate to irregular chamberlets; apertures at the ends of the peripheral tubular extensions. M. Ordovician (Trenton): USA: Oklahoma.

Superfamily KOMOKIACEA Tendal and Hessler, 1977

Komokiacea Tendal and Hessler, 1977 (*3133), p. 177.
Komokioidea Tappan and Loeblich, 1982 (*3128), p. 531.

Test consists of a complex system of fine branching tubules of even diameter; wall agglutinated, of argillaceous particles in organic cement, covering a thin laminated inner organic layer; stercomata (fecal pellets) accumulate within the tubules; no recognizable aperture other than simple perforations in the wall. Holocene; in abyssal and hadal regions of the oceans.

Family KOMOKIIDAE Tendal and Hessler, 1977

Komokiidae Tendal and Hessler, 1977 (*3133), p. 178.

Test bushy or arborescent, constructed of widely spaced branching cylindrical tubules that may be of equal diameter throughout or have clublike terminations, commonly nonseptate, although a few may have variably spaced septa. Holocene.

IPOA Tendal and Hessler, 1977

Plate 30, fig. 3

Type species: Ipoa fragila Tendal and Hessler, 1977; OD.

Ipoa Tendal and Hessler, 1977 (*3133), p. 180.

Test arborescent, with basal trunk that may show irregular growth constrictions but is nonseptate, followed by a rapid expansion of tightly spaced nonseptate branchlets that repeatedly divide dichotomously, each successive division resulting in a marked decrease in tube diameter, tips of the branchlets rounded or knoblike; wall agglutinated of fine grained or clay particles and with a very thin inner organic layer. Holocene; N. Pacific, 5,899 m to 6,079 m; E. Atlantic, 4,706 m; Caribbean, 5,220 m to 7,950 m; W. Indian Ocean, 4,900 m.

KOMOKIA Tendal and Hessler, 1977

Plate 31, fig. 1

Type species: Komokia multiramosa Tendal and Hessler, 1977; OD.

Komokia Tendal and Hessler, 1977 (*3133), p. 178.

Test arborescent, up to 2 mm across, dichotomously branching at irregular intervals, the branching increasingly rapid toward the periphery, commonly with four to six orders of branching, all branchlets of approximately equal diameter, somewhat crooked but basically radiating; wall with thin inner organic layer and thicker outer agglutinated layer of clay particles, grayish in color, flexible. Holocene; central N. Pacific at 5,588 m to 6,079 m; Caribbean, at 5,220 m to 5,650 m.

LANA Tendal and Hessler, 1977

Plate 30, fig. 6

Type species: Lana neglecta Tendal and Hessler, 1977; OD.

Lana Tendal and Hessler, 1977 (*3133), p. 185.

Test consisting of a loose clump of branching and anastomosing nonseptate tubules, lacking growth constrictions and without symmetry or directional growth, extremities rounded, intertubule region not sediment filled; wall stiff but flexible, with thin inner organic layer and thicker outer layer of agglutinated clay particles. Holocene; N. Pacific at 180 m to 7,298 m; equatorial Pacific at 3,270 m to 4,438 m; S. Pacific at 3,768 m to 3,804 m; E. Atlantic, at 610 m to 5,300 m; W. Atlantic at 2,200 m to 2,400 m; equatorial Atlantic at 2,610 m; Caribbean at 1,100 m to 5,656 m; and W. Indian Ocean at 3,960 m to 4,900 m.

NORMANINA Cushman, 1928

Plate 30, figs. 4 and 5

Type species: Haliphysema confertum Norman, 1878 (***2264**), p. 279; OD.

Normanina Cushman, 1928 (*748), p. 7.

Test an irregular mass of tightly branching tubules, radiating outward to terminate in globular to clublike swellings that may be internally subdivided by septa; sediment may fill the space between the tubules. Holocene; N. Pacific, at 5,588 m to 6,079 m; S. Pacific, off Chile, at 3,950 m; N. Atlantic at 3,203 m; E. Atlantic at 4,706 to 5,300 m; Caribbean at 2,920 m to 5,650 m.

SEPTUMA Tendal and Hessler, 1977

Plate 30, figs. 1 and 2

Type species: Septuma ocotillo Tendal and Hessler, 1977; OD.

Septuma Tendal and Hessler, 1977 (*3133), p. 179.

Test arborescent to bushy, up to 3 mm across, with sparse, nonanastomosing dichotomously branching tubules of nearly constant diameter throughout, branching primarily occurs near base, interior of tubules with regularly spaced transverse septa, each with a simple circular foramen, terminations rounded; wall flexible but stiff, with thin inner organic layer, and thicker outer layer of agglutinated clay- to silt-sized particles, surface may appear wrinkled, color tan. Holocene; N. Pacific, at 4,360 m to 6,079 m; E. Atlantic, at 3,250 m to 5,300 m; Caribbean at 1,067 m to 5,650 m; W. Indian Ocean, at 4,900 m.

Family BACULELLIDAE Tendal and Hessler, 1977

Baculellidae Tendal and Hessler, 1977 (*3133), p. 187.

Rodlike or sparsely branching arborescent test or clump of branching tubules; short lateral branches with frequent constrictions, giving a beaded appearance, intertubule interstices may be mud filled, resulting in the appearance of a mud ball. Holocene.

BACULELLA Tendal and Hessler, 1977

Plate 31, figs. 4–6

Type species: Baculella globofera Tendal and Hessler, 1977; OD.

Baculella Tendal and Hessler, 1977 (*3133), p. 187.

Test a simple or less commonly a dichotomously branched straight or zigzag tubule, nonseptate but may show growth constrictions, giving rise to numerous short simple side branches that may be only beadlike lobes and between which the central stalk is readily visible, no sediment present in the interstices between branches; flexible and elastic wall with thin inner organic layer and outer agglutinated layer of clay particles. Holocene; N. Pacific, at 2,340 m to 6,079 m; equatorial Pacific, at 3,570 m; E. Atlantic, at 4,706 m to 5,300 m; equatorial Atlantic, at 2,550 m; Caribbean, at 5,650 m to 8,150 m; W. Indian Ocean, at 4,900 m.

EDGERTONIA Tendal and Hessler, 1977

Plate 31, figs. 2 and 3

Type species: Edgertonia tolerans Tendal and Hessler, 1977; OD.

Edgertonia Tendal and Hessler, 1977 (*3133), p. 190.

Test up to 4.5 mm in diameter, a dense,

rounded clump of branching and tangled nonseptate tubules, 25 μm to 40 μm in diameter, with numerous very short side branches or beads, the meshwork of tubules open, without sediment filling; wall with inner organic layer and outer agglutinated layer of clay particles, color tan. Holocene: N. Pacific, at 3,450 m to 6,079 m; equatorial Pacific, at 3,570 m; E. Atlantic, at 4,706 m; W. Atlantic, at 4,270 m; Caribbean, at 5,650 m to 8,150 m.

Superfamily HIPPOCREPINACEA Rhumbler, 1895

Hippocrepinacea Loeblich and Tappan, 1984 (***1920**), p. 1159, nom. corr. pro superfamily Hippocrepinidae.
Hippocrepinidae Saidova, 1981 (***2696**), p. 13 (nom. imperf.).
Hyperamminacea Loeblich and Tappan, 1984 (***1918**), p. 6, nom. transl. ex family Hyperamminidae.

Proloculus followed by rectilinear nonseptate tubular or flaring second chamber; wall agglutinated; aperture terminal, rounded or ovate. M. Ordovician (Caradocian) to Holocene.

Family HIPPOCREPINIDAE Rhumbler, 1895

Hippocrepinidae Vyalov, 1968 (***3327**), p. 4, nom. transl. ex subfamily Hippocrepininae.
Hyperamminidae Eimer and Fickert, 1899 (***1088**), p. 602.
Saccorhizidae Eimer and Fickert, 1899 (***1088**), p. 598.
Botellinidae Loeblich and Tappan, 1961 (***1902**), p. 277.

Test free, elongate, tubular to slightly flaring, rarely may bifurcate, somewhat constricted at the aperture; wall coarsely agglutinated, of irregular quartz grains and sponge spicules, held in little cement. M. Ordovician (Caradocian) to Holocene.

Subfamily HYPERAMMININAE Eimer and Fickert, 1899

Hyperammininae Cushman, 1910 (***701**), p. 59, nom. transl. ex family Hyperamminidae.
Botellininae Chapman and Parr, 1936 (***542**), p. 146.

Test a large, elongate, tubular chamber arising from the bulbous proloculus. M. Silurian (Wenlockian) to Holocene.

ARENICONULUS Eisenack, 1969

Plate 32, figs. 1-3

Type species: Areniconulus bykovae Eisenack, 1969; OD.

Areniconulus Eisenack, 1969 (***1094**), p. 200.

Test free, with bulbous proloculus followed by rapidly expanding and somewhat irregular tubular to conical second chamber; wall thin, coarsely agglutinated, with particles held in an organic base, surface roughly finished; aperture at the open end of the tube. M. Silurian (Wenlockian, L. Ludlovian); glacial pebble, Baltic area.

BOTELLINA Carpenter, Jeffreys, and Thomson, 1870

Plate 32, figs. 4-6

Type species: Botellina labyrinthica Brady, 1881 (***339**), p. 48; SD(SM).

Botellina Carpenter, Jeffreys, and Thomson, 1870 (***493**), p. 443.
Arbotellum Rhumbler, 1913 (***2621**), p. 351 (err. emend.).

Test free, large, 3 mm in breadth, broken specimens suggesting a total length of up to 25 mm, rounded proloculus followed by elongate tubular, nearly parallel-sided undivided chamber that may be of less diameter than the proloculus; wall agglutinated, compact, and firmly cemented, of quartz grains and commonly with sponge spicules that may protrude into the chamber cavity; aperture terminal, rounded; may be somewhat constricted. Holocene; N. Atlantic, from 835 m to 913 m depth.

Remarks: As shown by Hofker (1972, ***1521**, p. 4), the wall of *Botellina* is not labyrinthic as originally described; sponge spicules projecting into the central cavity from the wall and quartz grains loosened within the cavity in the process of sectioning may give the erroneous impression of a labyrinthic interior.

HYPERAMMINA Brady, 1878

Plate 32, figs. 7-9

Type species: Hyperammina elongata Brady, 1878; OD(M).

Hyperammina Brady, 1878 (***336**), p. 433.
Hyperammina Eimer and Fickert, 1899 (***1088**), p. 603; type species: *Hyperammina friabilis* Brady, 1884 (***344**), p. 258; SD Loeblich and Tappan, 1964 (***1910**), p. C190.
Bactrammina Eimer and Fickert, 1899 (***1088**), p. 673; type species: *Hyperammina elongata* Brady, 1878, obj.; OD(M).
Arhyperammum Rhumbler, 1913 (***2621**), p. 351 (err. emend.).

Test free, elongate, reaching a maximum length of about 16 mm, large proloculus followed by undivided tubular chamber of constant diameter but tapering slightly at the end to the rounded aperture; wall of agglutinated medium-sized quartz particles that may be firmly to loosely cemented, interior cavity with smoothly finished surface. Holocene; cosmopolitan, from 160 m to 6,248 m.

SACCARENA Chernykh, 1969

Plate 32, figs. 16–18

Type species: Saccarena bitubulifera Chernykh, 1969; OD.

Saccarena Chernykh, 1969 (***579**), p. 138.

Globular proloculus followed by tubular undivided chamber that rapidly expands to have a broad triangular outline, with tubular projections from the angles, length of test about 0.5 mm from base of proloculus to top of expanded area; wall thick, of agglutinated quartz grains; apertures at the open ends of the tubular projections. U. Silurian (Ludlovian); E. slope Ural Mountains, USSR.

SACCORHIZA Eimer and Fickert, 1899

Plate 32, figs. 10–15

Type species: Hyperammina ramosa Brady, 1879 (***337**), p. 33; OD(M).

Saccorhiza Eimer and Fickert, 1899 (***1088**), p. 670.

?*Pseudoschizammina* Saidova, 1975 (***2695**), p. 24; type species: *Pseudoschizammina edita* Saidova, 1975; OD.

Hyperammina (Saccorhiza) Hofker, 1972 (***1521**), p. 53 (nom. transl.).

Test large, up to 8 mm in length, proloculus followed by tubular chamber that may branch dichotomously or show very irregular growth, with terminal stoloniferous projections; wall of agglutinated quartz grains and other minerals held in an organic inner layer, commonly with a large component of outwardly projecting sponge spicules that give the surface a hirsute to feltlike appearance, dark gray to yellowish in color; aperture rounded, at the open ends of the stolonlike branches. Holocene; N. Pacific, at 4,100 m, N. Atlantic, at 120 m to 6,000 m; Caribbean.

Remarks: Hofker (1972, ***1521**, p. 53) suggested restricting *Saccorhiza* to those with surface covered with matted sponge spicules, stating that Brady's specimen figured from the North Pacific did not belong to the same taxon. However, the latter specimen earlier had been designated as the lectotype for this species (Loeblich and Tappan, 1964, ***1910**, p. C190), hence cannot be excluded from the taxon bearing this name.

Subfamily HIPPOCREPININAE Rhumbler, 1895

Hippocrepininae Rhumbler, 1895 (***2616**), p. 83.

Arhippocrepnia Rhumbler, 1913 (***2621**), p. 352 (err. emend.).

Test large, elongate, tubular or flaring, closed basally, nonseptate; wall finely to coarsely agglutinated; aperture rounded at the slightly constricted open end. M. Ordovician (Caradocian) to Holocene.

ACICULELLA Vyalov, 1968

Plate 33, fig. 1

Type species: Aciculina parva Vyalov, 1966 (***3326**), p. 34; OD.

Aciculella Vyalov, 1968 (***3327**), p. 3 (nom. subst. pro *Aciculina* Vyalov, 1966).

Aciculina Vyalov, 1966 (***3326**), p. 34 (non *Aciculina* Adams, 1853, nec Deshayes, 1862, nec Meek, 1871, nec Westerlund, 1887); type species: obj.; OD.

Test very narrow and elongate, up to 3 cm in length and 0.5 mm to 1 mm in breadth, tapering to a needlelike base; wall agglutinated, surface smoothly finished, with a vitreous appearance; aperture at the open end of the test. U. Cretaceous (U. Senonian); European USSR.

ARENOSIPHON Grubbs, 1939

Plate 33, fig. 9

Type species: Arenosiphon giganteus Grubbs, 1939; OD.

Arenosiphon Grubbs, 1939 (***1322**), p. 544.

Test free, tubular, elongate, tapering, up to 14 mm in length and 1.0 mm in diameter, straight to slightly curved; wall of agglutinated medium to fine quartz grains, firmly cemented, surface roughly finished. U. Ordovician (Caradocian); glacial pebble, Baltic area; M. Silurian: USA: Illinois.

HIPPOCREPINA Parker, 1870

Plate 33, figs. 7 and 8

Type species: Hippocrepina indivisa Parker, in G. M. Dawson, 1870; OD.

Hippocrepina Parker, in G. M. Dawson, 1870 (***903**), p. 177.

Arhippocrepum Rhumbler, 1913 (*2621), p. 351 (err. emend.).

Test free, large, up to 1.0 mm in length, elongate and tubular, tapering to the base, apertural end contracted and broadly rounded; wall finely agglutinated, reddish to yellowish in color, smoothly finished, surface with occasional slight transverse constrictions; aperture relatively small, central, circular, and may be surrounded by a slight lip. Holocene: N. Atlantic, off Canada, at 65 m; off eastern USA at 1,576 m; Arctic Ocean: Alaska, at 223 m.

JACULELLA Brady, 1879

Plate 33, figs. 5 and 6

Type species: Jaculella acuta Brady, 1879; OD(M).

Jaculella Brady, 1879 (*337), p. 35.
Arjaculum Rhumbler, 1913 (*2621), p. 352 (err. emend.).

Test free, large, elongate, conical, tapering, up to 12 mm in length; wall coarsely agglutinated, thick, firmly cemented, both exterior and interior surfaces roughly finished; aperture rounded, at slightly constricted open end of tube. Holocene: cosmopolitan, from 120 m to 5,800 m depth.

PROTOBOTELLINA Heron-Allen and Earland, 1929

Plate 33, figs. 2-4

Type species: Protobotellina cylindrica Heron-Allen and Earland; OD.

Protobotellina Heron-Allen and Earland, 1929 (*1477), p. 326.

Test free, large, tubular or cylindrical, open only at one end, aboral end truncate; wall thick, agglutinated, of fine sand and broken sponge spicules with little cement, exterior smoothly finished but interior rough, with sponge spicules protruding into the cavity; aperture terminal, irregular in outline, and may be partially obstructed by sponge spicules and other agglutinated particles. Holocene; S. Atlantic, from 150 m to 300 m.

TASMANAMMINA Gutschick and Wuellner, 1983

Plate 33, figs. 10 and 11

Type species: Tasmanammina circumpeniformis Gutschick and Wuellner, 1983; OD.

Tasmanammina Gutschick and Wuellner, 1983 (*1348), p. 312.

Test free, large, tubular, up to 8 mm in length and up to 0.34 mm in diameter, open at one end only; wall relatively thick, approximately equal to the internal cavity diameter, of fine to coarse silt-sized quartz grains forming several agglutinated layers, with a single large tasmanitid prasinophyte algal cyst attached at the proximal end of the test, weakly to firmly cemented particles forming a porous to compact wall, surface roughly finished, commonly with pyrite particles in the vicinity of the tasmanitid; aperture at the open end of the test, irregular in outline. U. Devonian (Fammenian); USA: Ohio.

Family HYPERAMMINOIDIDAE Loeblich and Tappan, 1984

Hyperamminoididae Loeblich and Tappan, 1984 (*1918), p. 6.
Hyperamminoididae Loeblich and Tappan, 1982 (*1917), p. 26 (nom. nud.).

Test elongate, flaring, with constrictions at irregular growth intervals, but without true septa; wall finely agglutinated. U. Devonian to L. Cretaceous (Neocomian).

Remarks: The late Paleozoic and early Mesozoic species here included superficially resemble the living *Hippocrepina* and *Hyperammina* but are probably not closely related. They have a very fine-grained arenaceous wall with polished surface that probably was somewhat flexible in life, as fossil specimens are almost invariably crushed, whereas other foraminifers in the same material are not compressed.

GIRALIARELLA Crespin, 1958

Plate 34, figs. 1 and 2

Type species: Giraliarella angulata Crespin, 1958; OD.

Giraliarella Crespin, 1958 (*689), p. 56.

Test free, proloculus not sharply defined, second chamber elongate and slightly tapering, commonly quadrate in section, less frequently triangular, with sides slightly to deeply excavated and angles acute; wall very finely agglutinated, with large quantity of cement, surface smoothly finished but with fine transverse growth constrictions; aperture terminal, rounded. Permian; W. Australia.

HYPERAMMINOIDES Cushman and Waters, 1928

Plate 34, figs. 14 and 15

Type species: Hyperamminella elegans Cushman and Waters, 1928 (***857**), p. 36; OD.

Hyperamminoides Cushman and Waters, 1928 (***859**), p. 112 (nom. subst. pro *Hyperamminella* Cushman and Waters, 1928).

Hyperamminella Cushman and Waters, 1928 (***857**), p. 36 (non *Hyperamminella* de Folin, 1881; 1887).

Test free, elongate, rounded proloculus followed by undivided second chamber that increases rapidly in breadth in the early stage, then may have nearly parallel sides, but with numerous deeply constricted transverse growth lines; wall very finely agglutinated, milky white to yellowish in color, surface smoothly finished; aperture a small rounded terminal opening. U. Carboniferous, U. Pennsylvanian; USA: Texas.

KECHENOTISKE Loeblich and Tappan, 1984

Plate 34, figs. 3-7

Type species: Hyperamminoides expansus Plummer, 1945 (***2429**), p. 223; OD.

Kechenotiske Loeblich and Tappan, 1984 (***1920**), p. 1158.

Test free, up to about 1.1 mm in length, proloculus at broadly rounded initial end not distinctly differentiated from the rapidly expanding and broadly flaring second chamber, may have prominent transverse growth constrictions; wall thin, finely agglutinated, with sugary appearance, surface smoothly finished, probably weak and flexible in life, as fossil specimens invariably are crushed; aperture at the broad open end of the test. U. Carboniferous, Pennsylvanian; USA: Texas. Permian: Australia. U. Triassic (Rhaetian); Austria. L. Cretaceous (Neocomian); USSR: W. Siberian depression.

Remarks: Differs from *Hyperamminoides* in the rapidly flaring test and very broad open aperture.

PSEUDOHYPERAMMINA Crespin, 1958

Plate 34, fig. 8

Type species: Pseudohyperammina radiostoma Crespin, 1958; OD.

Pseudohyperammina Crespin, 1958 (***689**), p. 55.

Test free, elongate to ovate in plan; wall thick, very finely agglutinated with considerable cement, test commonly collapsed, probably during fossilization, surface smoothly finished, but with irregular transverse growth wrinkles; aperture terminal, ovate, with thickened rim, and surrounded by radial slits or grooves. Permian; W. Australia.

SACCHARARENA Loeblich and Tappan, 1984

Plate 34, figs. 9 and 10

Type species: Hyperammina spinescens Cushman and Waters, 1928 (***857**), p. 35; OD.

Sacchararena Loeblich and Tappan, 1984 (***1920**), p. 1159.

Test large, up to several mm, inflated or rounded proloculus followed by tubular second chamber of equal or lesser diameter; wall finely agglutinated, with sugary appearance, white in color, thin and probably flexible in life, as most are crushed in preservation; aperture at the open end of the tubular chamber. U. Carboniferous, Pennsylvanian to Permian; USA: Texas; Australia; Germany.

Remarks: *Sacchararena* differs from *Hyperamminoides* in the large rounded proloculus and tubular chamber of more constant diameter and in lacking a much restricted aperture and strong transverse growth constrictions.

SANSABAINA Loeblich and Tappan, 1984

Plate 34, figs. 11-13

Type species: Hyperammina elegantissima Plummer, 1945 (***2429**), p. 222; OD.

Sansabaina Loeblich and Tappan, 1984 (***1920**), p. 1159.

Test elongate, tapering, up to about 2 mm in length; proloculus may be recognizable as a distinct chamber in the megalospheric generation, but the test of the microspheric generation may taper gradually to a point; wall finely agglutinated with considerable cement, sugary in appearance, smoothly finished; aperture terminal, circular, slightly constricted. U. Devonian to L. Carboniferous (Tournaisian, Visean), L. Mississippian (Kinderhookian, Osagian, Chesterian); USA: Indiana, Ohio, Kentucky, Oklahoma, Montana. U. Carboniferous, Pennsylvanian; USA: Texas. U. Permian; Germany; Australia.

Remarks: *Sansabaina* differs from the agglutinated *Hyperammina* and the microgranular calcareous *Earlandia* in having a fine-grained and sugary appearing agglutinated test; *Hyperamminoides* differs by its broader test and prominent growth constrictions.

Family NOTODENDRODIDAE DeLaca, Lipps, and Hessler, 1980

Notodendrodidae DeLaca et al., 1980 (*925), p. 210.

Test large, with bulbous central region from which arises an erect arborescent portion and a lower, finely branched holdfast; wall agglutinated, central bulbous region double layered, elsewhere single layered; no distinct aperture. Holocene.

NOTODENDRODES DeLaca, Lipps, and Hessler, 1980

Plate 34, figs. 16 and 17

Type species: Notodendrodes antarctikos DeLaca et al., 1980; OD.

Notodendrodes DeLaca, Lipps, and Hessler, 1980 (*925), p. 210.

Test large, the adult consisting of a bulbous central area, up to 2.6 mm in diameter, that gives rise to a repeatedly branching system of rapidly tapering holdfasts, both bulb and holdfasts being buried in the mud, with a vertical tubular stalklike portion, or rarely two such stalks, from 5 mm to 19 mm in length, projecting above the substrate and bifurcating repeatedly, up to five orders of branching, resulting in an arborescent and flexible superstructure; wall agglutinated, that of the bulbous central portion double, with fine and coarse particles of sand, diatom frustules, and sponge spicules on a fibrous organic base, wall of finer sand particles in the holdfast area and branches; no aperture present at the end of the branches, but in life pseudopodia extend from very small pores in the branches. Holocene; Antarctica, McMurdo Sound.

Superfamily AMMODISCACEA Reuss, 1862

Ammodiscacea Loeblich and Tappan, 1961 (*1902), p. 275, nom. corr. pro superfamily Ammodiscoidea.

Ammodiscoidea Chapman, Parr, and Collins, 1934 (*543), p. 556, nom. transl. ex family Ammodiscinea.

Ammodiscidea Dain, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 180.

Test consisting of proloculus followed by enrolled, nonseptate tubular second chamber; aperture at the open end of the tube; wall agglutinated. L. Cambrian to Holocene.

Family AMMODISCIDAE Reuss, 1862

Ammodiscidae Rhumbler, 1895 (*2616), p. 83, nom. corr. pro family Ammodiscinea.

Ammodiscinea Reuss, 1862 (*2586), p. 365 (nom. imperf.).

Ammodiscida Haeckel, 1894 (*1355), p. 185.

Ammodisculinidae Rhumbler, 1913 (*2621), p. 339 (err. emend.).

Arammodisclidia Rhumbler, 1913 (*2621), p. 341 (err. emend.).

Tolypamminidae Loeblich and Tappan, 1954 (*1889), p. 308.

Usbekistaniidae Vyalov, 1968 (*3327), p. 5.

Ammovolumminidae Povarkov, 1979 (*2466), p. 63.

Ammodiscoididae Mikhalevich, 1980 (*2108), p. 56.

Ammovertellinidae Saidova, 1981 (*2696), p. 15.

Turritellellidae Saidova, 1981 (*2696), p. 16.

Globular proloculus followed by coiled or uncoiled nonseptate tubular second chamber that may show irregular growth constrictions; wall agglutinated; aperture at the open end of the tube. L. Cambrian to Holocene.

Subfamily AMMOVOLUMMININAE Chernykh, 1967

Ammovolummininae Chernykh, 1967 (*578), p. 38.

Tubular chamber loosely coiled or arcuate. M. Silurian to L. Devonian, Holocene.

AMMOVOLUMMINA Chernykh, 1967

Plate 35, figs. 1 and 2

Type species: Ammovolummina saumensis Chernykh, 1967; OD.

Ammovolummina Chernykh, 1967 (*578), p. 39.

Test loosely coiled, ovoid proloculus followed by rapidly enlarging tubular second chamber that may be slightly curved to trochospirally coiled, circular in section; wall of agglutinated quartz particles; aperture a large, irregular rounded opening at the open end of the tube. M. Silurian (Ludlovian); USSR: E. and W. slope of N. and central Urals.

HYPERBATHOIDES Ireland, 1966

Plate 35, figs. 7-10

Type species: Hyperbathoides schwalmi Ireland, 1966; OD.

Hyperbathoides Ireland, 1966 (*1587), p. 224.

Bulbous and inflated proloculus followed by hooked or slightly coiled tubular second chamber that increases rapidly in diameter in early stage, later becoming rectilinear and of nearly constant diameter; wall of uniform, fine silt particles, well cemented, surface smooth but may show transverse growth constrictions; aperture rounded and may be slightly constricted at the open end of the tube. M. Silurian; USA: Kansas.

PSAMMONYX Döderlein, 1892

Plate 35, figs. 3-6

Type species: Psammonyx vulcanicus Döderlein, 1892; OD.

Psammonyx Döderlein, 1892 (***964**), p. 145.

Arpsammonyxum Rhumbler, 1913 (***2621**), p. 386 (err. emend.).

Test with rounded proloculus followed by rapidly expanding tubular second chamber that may be arcuate or loosely planispirally coiled and tending to uncoil, strongly compressed laterally; wall of agglutinated sponge spicule fragments, quartz grains and volcanic ash; aperture a slit at the open end of the tubular chamber. Holocene; Pacific Ocean, Japan: Sagami Bay, at 200 m to 400 m.

SERPENULINA Chernykh, 1967

Plate 35, figs. 11-17; plate 829, figs. 1-5

Type species: Serpenulina uralica Chernykh, 1967; OD.

Serpenulina Chernykh, 1967 (***578**), p. 42.

Tolypammina (Tolypamminoides) Chernykh, 1969 (***580**); type species: *Tolypammina (Tolypamminoides) aspera* Chernykh, 1969; OD.

Tubacera Chernykh, in Poyarkov, 1979 (***2466**), p. 62; type species: *Ammovolummina sphaerica* Chernykh, 1967 (***578**), p. 42; OD.

Test free, arcuate, small proloculus followed by tubular to conical second chamber; wall agglutinated; aperture irregular or rounded at the expanded end of the test. M. Silurian (Ludlovian) to L. Devonian; USSR: Urals.

Remarks: Although recognized herein, *Serpenulina* and the synonymous *Tubacera* and *Tolypammina (Tolypamminoides)* occur with *Ammovolummina*, and the four types may represent only ecologic variations, the loose coiling of *Ammovolummina* being due to growth around an attachment.

Subfamily AMMODISCINAE Reuss, 1862

Ammodiscinae Rhumbler, 1904 (***2617**), p. 275, nom. transl. ex family Ammodiscinea.

Proloculus followed by tubular chamber, tightly enrolled in a single plane or early stage may be slightly trochospiral. L. Cambrian to Holocene.

AGATHAMMINOIDES Vangerow, 1964

Plate 35, figs. 24 and 25

Type species: Agathamminoides gracilis Vangerow, 1964; OD.

Agathamminoides Vangerow, 1964 (***3253**), p. 12 (non *Agathamminoides* Zaninetti, 1969).

Test flattened, ovate in outline, proloculus followed by undivided tubular second chamber with a milioline coil about a longitudinal axis but without division into separate chambers; wall finely agglutinated; aperture at the open end of the tube. L. Carboniferous, Mississippian to U. Carboniferous, Pennsylvanian; Germany; England; USA: Texas, Kentucky, Ohio.

AMMODISCOIDES Cushman, 1909

Plate 36, figs. 10-12

Type species: Ammodiscoides turbinatus Cushman, 1909; OD.

Ammodiscoides Cushman, 1909 (***699**), p. 424.

Arammodiscodum Rhumbler, 1913 (***2621**), p. 387 (err. emend.).

Proloculus followed by undivided enrolled tubular second chamber that may be tightly appressed against the previous whorl, early coiling trochospiral with open cone, later changing abruptly to a planispiral enrollment; wall of agglutinated fine quartz particles in insoluble cement; aperture a low arch forming the open end of the tube. Pennsylvanian: Texas. Paleogene: Japan. Holocene; 392 m to 2,362 m, Gulf of Mexico; S. Atlantic, off Bahia, Brazil.

AMMODISCUS Reuss, 1862

Plate 36, figs. 1-9

Type species: Ammodiscus infimus L. G. Bornemann, 1874 (***307**), p. 725 (non *Orbis infimus* Strickland, 1846) = *Involutina silicea* Terquem, 1862 (***3137**), p. 450; SD Loeblich and Tappan, 1954 (***1889**), p. 306; Gerke, 1960

(*1224), p. 7; Loeblich and Tappan, 1961 (*1900), p. 191.

Ammodiscus Reuss, 1862 (*2586), p. 365.

Arammodiscum Rhumbler, 1913 (*2621), p. 387 (err. emend.).

Grzybowskiella Myatlyuk, 1970 (*2220), p. 70; type species: *Cornuspira angusta* Friedberg, 1901 (*1184), p. 637; OD.

Globular proloculus followed by planispirally enrolled, undivided tubular second chamber, tightly appressed against the preceding whorl that serves as a floor for the chamber, surface with occasional transverse growth constrictions but no internal subdivisions; wall agglutinated; aperture an arch at the open end of the tubular chamber. Silurian to Holocene; cosmopolitan.

ARENOTURRISPIRILLINA Tairov, 1956

Plate 35, figs. 21-23

Type species: Arenoturrispirillina aptica Tairov, 1956; OD.

Arenoturrispirillina Tairov, 1956 (*3110), p. 115.

Proloculus followed by enrolled tubular second chamber as in *Ammodiscus* but with low trochospiral coiling throughout; wall agglutinated; aperture at the open end of the tubular chamber. M.-U. Jurassic (Callovian to Kimmeridgian); Egypt. Jurassic; Germany. U. Cretaceous (Maastrichtian); USA: California. U. Paleocene; S. USSR. Miocene; Japan. Holocene; Sweden, Gullmar Fjord, 67 m to 200 m.

BIFURCAMMINA Ireland, 1939

Plate 35, figs. 19 and 20

Type species: Bifurcammina bifurca Ireland, 1939; OD.

Bifurcammina Ireland, 1939 (*1584), p. 201.

Ovoid proloculus followed by planispirally enrolled undivided tubular second chamber as in *Ammodiscus*, in final whorl the tubular chamber bifurcates to form two parallel and closely appressed tubes, one or both of which may be uncoiled and rectilinear for a short distance; wall of agglutinated fine quartz particles; apertures at the ends of the tubes, or rarely a single aperture at the end of the tubes that have rejoined terminally. M. Silurian; USA: Oklahoma, Missouri, Illinois.

HEMIDISCUS Schellwien, 1898

Plate 35, figs. 26-28

Type species: Ammodiscus (Hemidiscus) carnicus Schellwien, 1898; OD.

Ammodiscus (Hemidiscus) Schellwien, 1898 (*2751), p. 265.

Cornuspira (Hemidiscus) Schubert, 1908 (*2815), p. 381 (nom. transl.).

Hemidiscus Rhumbler, 1913 (*2621), p. 387 (nom. transl.).

Arhemidiscum Rhumbler, 1913 (*2621), p. 387 (err. emend.).

Proloculus followed by planispirally enrolled tubular second chamber, later coiling irregularly overlapping on one side of the test; wall finely agglutinated; aperture rounded at the end of the tubular chamber. U. Carboniferous to Permian; Italy; USSR.

SPIRILLINOIDES Rhumbler, 1938

Plate 35, fig. 18

Type species: Spirillinoides circumcinctus Rhumbler, 1938; OD.

Spirillinoides Rhumbler, 1938 (*2624), p. 174.

Test with planispiral and evolute to slightly trochospiral enrolled undivided tubular chamber; wall imperforate and proteinaceous, outermost whorl with a peripheral agglutinated layer; aperture at the open end of the tube. Holocene; Germany; Helgoland.

SPIROSOLENITES Glaessner, 1979

Plate 36, figs. 13-15

Type species: Spirosolenites spiralis Glaessner, in Føyn and Glaessner, 1979; OD(M).

Spirosolenites Glaessner, in Føyn and Glaessner, 1979 (*1168), p. 33.

Test free, large, from 2.25 mm to nearly 6 mm in diameter, consisting of planispiral to low trochospiral enrolled siliceous tubes, the coiling somewhat overlapping on the umbilical side but not completely involute, initial whorl and proloculus not preserved, possibly because the early stage was wholly organic and lacked agglutinated particles as does *Spirillinoides*, tubular chamber up to 1 mm in diameter in final whorl; wall agglutinated, of fine detrital quartz grains, fused by deposits of secondary silica, but probably flexible and readily deformed in life, surface with faint transverse growth lines; aperture at the open end of the tube. L. Cambrian; Norway: Finmark.

Subfamily TOLYPAMMININAE Cushman, 1928

Tolypammininae Cushman, 1928 (*747), p. 103.
Ammodiscellinae Saidova, 1981 (*2696), p. 16.

Test attached, proloculus followed by tubular chamber that may be nearly straight, or with early coil followed by uncoiled and straight tubular chamber, or by a zigzag or irregularly growing tubular chamber. U. Devonian (Frasnian) to Holocene.

AMMODISCELLA Ireland, 1956

Plate 37, figs. 7-9

Type species: Ammodiscella virgilensis Ireland, 1956; OD.

Ammodiscella Ireland, 1956 (*1585), p. 845.

Test attached, proloculus followed by planispirally enrolled tubular undivided second chamber, final whorls becoming irregular and overlapping the earlier part of the test, tubular chamber incompletely developed against the attachment that is used as the chamber floor; wall agglutinated, of uniformly fine-grained quartz particles, surface smooth; aperture at the open end of the chamber. U. Pennsylvanian (Virgilian); USA: Kansas.

AMMOLAGENA Eimer and Fickert, 1899

Plate 36, fig. 16

Type species: Trochammina irregularis (d'Orbigny) var. *clavata* Jones and Parker, 1860 (*1618), p. 304; OD(M).

Ammolagena Eimer and Fickert, 1899 (*1088), p. 673.
Arammlagenum Rhumbler, 1913 (*2621), p. 346 (err. emend.)

Test commonly attached to shell fragments or to other foraminifers, up to 1 mm in length, large ovoid proloculus followed by narrower tubular rectilinear chamber; wall finely agglutinated on an inner proteinaceous layer, reddish-brown in color, surface smoothly finished and glossy; aperture terminal, rounded. Holocene, from 180 m to 3,400 m; N. and S. Atlantic; Mediterranean; S. Pacific.

AMMOVERTELLA Cushman, 1928

Plate 37, fig. 10

Type species: Ammodiscus (Psammophis) inversus Schellwien, 1898 (*2751), p. 266; OD.

Ammovertella Cushman, 1928 (*748), p. 8 (nom. nov. pro *Ammodiscus (Psammophis)* Schellwien, 1898).
Ammodiscus (Psammophis) Schellwien, 1898 (*2751), p. 265 (non *Psammophis* Fitzinger, 1826); obj.: OD.
Arpsammophoum Rhumbler, 1913 (*2621), p. 387 (err. emend.).

Test attached, proloculus followed by undivided elongate tubular second chamber that grows in zigzag fashion, turning closely back on itself at regular but increasingly larger intervals with growth; wall finely agglutinated, with considerable cement; aperture at the open end of the tube. L. to U. Pennsylvanian (Atoka to Virgilian); USA: Kansas; Oklahoma. M. and U. Carboniferous to Permian; European USSR.

HEMIDISCELLA Bock, 1968

Plate 37, figs. 1-3

Type species: Hemidiscella palabunda Bock, 1968; OD.

Hemidiscella Bock, 1968 (*265), p. 27.

Test attached, proloculus followed by tubular undivided enrolled chamber that later grows irregularly over the earlier whorls as in *Ammodiscella* or grows irregularly about the attachment but with tubular chamber having a complete floor rather than utilizing the attachment as a chamber floor; wall finely agglutinated, of fine calcareous grains held in fine white cement; aperture at the open end of the tube. Holocene; USA: Florida, down to about 2 m depth, attached to *Thalassia testudinum*.

SERPULOPSIS Girty, 1911

Plate 37, figs. 4-6

Type species: Serpula insita C. A. White, 1878 (*3366), p. 37; OD.

Serpulopsis Girty, 1911 (*1240), p. 124 (non *Serpulopsis* Kittl, 1913).
Minammodytes Henbest, 1963 (*1457), p. 26; type species: *Minammodytes girtyi* Henbest, 1963 = *Serpula insita* C. A. White = *Serpulopsis insita* (C. A. White) Girty, 1911; OD.

Test free or more commonly attached, proloculus followed by slowly enlarging close-coiled tubular second chamber of one or two volutions, then becoming irregular in growth: wall agglutinated: aperture at the open end of the tube. U. Devonian (Frasnian); Australia; Germany. L. Carboniferous, L. Mississippian (Kinderhookian); USA: Indiana; to U. Carboniferous, U. Pennsylvanian: USA: Oklahoma, Indiana, Texas.

TOLYPAMMINA Rhumbler, 1895

Plate 37, figs. 11 and 12

Type species: Hyperammina vagans Brady, 1879 (*337), p. 33; OD(M).

Tolypammina Rhumbler, 1895 (*2616), p. 83.
Serpulella Eimer and Fickert, 1899 (*1088), p. 674; obj., OD(M).
Hyperammina (Tolypammina) Hofker, 1972 (*1521), p. 55 (nom. transl.).

Test attached, with proloculus followed by elongate undivided tubular second chamber that may wind irregularly over the attachment surface; wall agglutinated, with considerable cement; aperture at the open end of the tube. U. Devonian (Frasnian) to U. Carboniferous (Stephanian), U. Pennsylvanian (Virgilian); Australia; USA: Missouri, Illinois, Montana, Indiana, Oklahoma, Texas, Kansas.

Subfamily AMMOVERTELLININAE Saidova, 1981

Ammovertellininae Saidova, 1981 (*2696), p. 16.
Glomospirellinae Ciarapica and Zaninetti, 1985 (*599), p. 307.

Proloculus followed by streptospirally wound tubular chamber, at least in the early stage of coiling, later may become planispiral. L. Carboniferous (L. Visean), U. Mississippian to Holocene.

AMMOVERTELLINA Suleymanov, 1959

Plate 39, figs. 1-7

Type species: Ammovertellina prima Suleymanov, 1959; OD.

Ammovertellina Suleymanov, 1959 (*3089), p. 19.
Hemigordiellina Marie, in Deleau and Marie, 1961 (*927), p. 76; type species: *Glomospira diversa* Cushman and Waters, 1930 (*860), p. 42; OD.

Proloculus followed by streptospirally wound tubular second chamber as in *Glomospira*, later becoming planispiral as in *Glomospirella*, final stage uncoiling and with zigzag or irregular growth; wall agglutinated, of angular quartz grains in insoluble cement; aperture at the open end of the tube. U. Carboniferous (Westphalian to Stephanian); Paleocene; ?Holocene: USSR: Uzbek, Kyzyl Kum; Algeria; USA: Texas.

ANNECTINA Suleymanov, 1963

Plate 39, figs. 8-10

Type species: Annectina paleocenica Suleymanov, 1963; OD.

Annectina Suleymanov, 1963 (*3093), p. 41.

Proloculus followed by undivided enrolled tubular second chamber, early coils in various planes about a longitudinal axis as in the miliolines, resulting in a fusiform inflated central area, later with regularly planispiral coiling; wall agglutinated, of fine quartz silt particles in insoluble cement; aperture a simple opening at the end of the tube. Paleocene; central Asiatic USSR: Uzbek, Kyzyl Kum. Holocene; Australia.

GANDINELLA Ciarapica and Zaninetti, 1985

Plate 61, figs. 4-6

Type species: Gandinella apenninica Ciarapica and Zaninetti, 1985; OD.

Gandinella Ciarapica and Zaninetti, 1985 (*599), p. 307.
Gandinella Poisson, Ciarapica, Cirilli, and Zaninetti, 1985 (*2440), p. 133 (name not available, ICZN Art. 13 (a)(i), (b), (c), no description, no type species).

Test small, up to 0.35 mm in diameter, proloculus followed by enrolled tubular second chamber, early stage streptospiral, followed by a sigmoidal stage of three to five whorls, and final planispiral stage of one to one and a half whorls; wall microgranular, opaque in transmitted light but may be recrystallized: aperture simple, terminal. U. Triassic (Carnian?, Norian to Rhaetian); Italy.

GLOMOSPIRA Rzehak, 1885

Plate 38, figs. 5 and 6

Type species: Trochammina squamata Jones and Parker var. *gordialis* Jones and Parker, 1860 (*1618), p. 304; OD(M).

Glomospira Rzehak, 1885 (*2677), p. 126.
Gordiammina Rhumbler, 1895 (*2616), p. 84; type species: obj., SD Schellwien, 1898 (*2751), p. 265.
Ammodiscus (Gordiammina) Schellwien, 1898 (*2751), p. 265 (nom. transl.).

Arglomospirum Rhumbler, 1913 (*2621), p. 387 (err. emend.).

Proloculus followed by undivided tubular second chamber that is streptospirally coiled to somewhat irregular; wall finely agglutinated; aperture at the open end of the tube. L. Carboniferous (Visean), U. Mississippian (Chesterian) to Holocene; cosmopolitan.

GLOMOSPIRELLA Plummer, 1945

Plate 38, figs. 1–4

Type species: Glomospira umbilicata Cushman and Waters, 1927 (*854), p. 148; OD.

Glomospirella Plummer, 1945 (*2429), p. 233 (non *Glomospirella* Reytlinger, 1950).

Mjatliukaeina Suleymanov, 1969 (*3099); type species: *Ammodiscus gaultinus* Berthelin, 1880 (*221), p. 19; OD.

Proloculus followed by streptospirally enrolled undivided tubular second chamber, tubular chamber later becomes planispirally coiled and test discoidal; wall very finely agglutinated, smoothly finished; aperture at the open end of the tube. U. Carboniferous, Pennsylvanian to Miocene; cosmopolitan.

PILAMMINA Pantić, 1965

Plate 38, figs. 8 and 9

Type species: Pilammina densa Pantić, 1965; OD.

Pilammina Pantić, 1965 (*2334), p. 190.

Pila Pantić, in Herak, 1963 (*1463), p. 359; type species: *Pila densa* Pantić, in Herak, 1963; OD(M) (name not available, ICZN Art. 13 (a) (i), no description).

Test large, spherical, attaining more than 1 mm in diameter, globular proloculus followed by narrow elongate tubular and undivided enrolled second chamber, early whorls tightly coiled and streptospiral, with plane of coiling changing slowly, adult with very large number of whorls, up to about sixty; wall imperforate, calcareous, with small amount of incorporated foreign material; aperture not observed, probably at the open end of the tube. M. Triassic (Anisian); Yugoslavia: Montenegro.

PILAMMINELLA Salaj, 1978

Plate 38, fig. 7

Type species: Pilammina grandis Salaj, in Salaj et al., 1967 (*2710), p. 123; OD.

Pilamminella Salaj, 1978 (*2706), p. 107.

Pilamminella Salaj, 1974 (*2705), p. 189 (name not available, ICZN Art. 13 (a) (i), no description).

Test small to moderate in size, up to about 1 mm in diameter, spherical proloculus followed by tubular undivided second chamber, with early coiling as in *Pilammina*, then with 90° change in plane of coiling, followed by two to three oscillating coils, and then with planispiral stage of two to five whorls with tubular chamber becoming broad and low; wall agglutinated; aperture rounded, simple, at the open end of the tube. M. Triassic (U. Anisian) to U. Triassic (Carnian); Yugoslavia: Switzerland; Austria: Bulgaria; Poland; Czechoslovakia.

RECTOGLOMOSPIRA Trifonova, 1978

Plate 39, figs. 11-13

Type species: Rectoglomospira senecta Trifonova, 1978; OD.

Rectoglomospira Trifonova, 1978 (*3224), p. 1151.

Test free, proloculus followed by streptospirally enrolled tubular undivided second chamber, in the later stage coiling continues in a single direction in a high trochospiral coil; wall finely agglutinated, surface smooth; aperture at the open end of the tube. L. Triassic (Scythian) to M. Triassic (Anisian); Bulgaria.

VOSTOKOVELLA Pronina, 1972

Plate 39, figs. 14–16

Type species: Vostokovella neivaensis Pronina, 1972; OD.

Vostokovella Pronina, 1972 (*2479), p. 10.

Test free or attached, large spherical proloculus followed by irregularly or streptospirally coiled tubular second chamber of three to four whorls; wall agglutinated, very thick, with large fragments of calcite and other foraminiferal tests; aperture at the open end of the tube. L. Carboniferous (L. Visean); USSR: E. slope of Urals.

Subfamily USBEKISTANIINAE Vyalov, 1968

Usbekistaniinae Loeblich and Tappan, 1982 (*1917), p. 26, nom. transl. ex family Usbekistaniidae.

Turritellellinae Saidova, 1981 (*2696), p. 16.

Proloculus followed by trochospirally enrolled tubular second chamber, with coiling about a vertical axis, at least in the early stage. Silurian to Holocene.

FLAGROSPIRA Vyalov, 1977

Plate 39, fig. 21

Type species: Flagrospira versaria Vyalov, 1977; OD.

Flagrospira Vyalov, 1977 (*3328), p. 8.

Test large, up to 3.5 mm in diameter, with slightly irregularly coiled thin tube of closely appressed whorls, gradually enlarging in the later whorls; wall siliceous, lacking recognizable agglutinated particles. U. Triassic (Carnian); USSR: Chukotka.

Remarks: Differs from *Ammovertellina* in the larger size and in the absence of the final zigzag growth stage and agglutinated particles.

REPMANINA Suleymanov, 1966

Plate 39, figs. 24-26

Type species: Trochammina squamata Jones and Parker var. *charoides* Jones and Parker, 1860 (***1618**), p. 304; OD.

Repmanina Suleymanov, in Arapova and Suleymanov, 1966 (*57), p. 122.

Test free, proloculus followed by elongate tubular undivided second chamber that is trochospirally coiled about a straight axis; wall finely agglutinated; aperture at the open end of the tubular chamber. Jurassic; USA: Alaska. Cretaceous; Canada; European USSR: Ukraine. Cenozoic to Holocene; Iran; Ukraine; Italy.

TURRITELLELLA Rhumbler, 1904

Plate 39, figs. 22 and 23

Type species: Trochammina shoneana Siddall, 1878 (***2906**), p. 48; SD Schellwien, 1898 (***2751**), p. 265.

Turritellella Rhumbler, 1904 (*2617), p. 283 (nom. subst. pro *Turritellopsis* Rhumbler, 1895).

Turritellopsis Rhumbler, 1904 (*2617), p. 289 (nom. corr. pro *Turitellopsis* Rhumbler, 1895) (non *Turritellopsis* Sars, 1878); obj.

Turitellopsis Rhumbler 1895 (*2616), p. 84 (nom. imperf.).

Arturritellum Rhumbler, 1913 (*2621), p. 387 (err. emend.).

Test free, elongate, proloculus followed by elongate tubular enrolled and high-spired second chamber; wall finely agglutinated with quartz particles in organic cement although proloculus may have little or no agglutinated particles, readily deformed in life, reddish or yellowish in color, more deeply colored near the proloculus; aperture at open end of the tube; in life may produce a flexible, agglutinated organic cocoonlike feeding structure that attaches to the substrate and rises erect above it, the individual foraminifer being oriented within the cocoon with aperture and pseudopodial net upward. Silurian to Holocene; intertidal and shallow water of England, Ireland, coastal N. Europe; USA: California; China; Antarctica; N. Pacific to 7,900 m.

USBEKISTANIA Suleymanov, 1960

Plate 39, figs. 17-20, 27-29

Type species: Glomospirella (Usbekistania) mubarekensis Suleymanov, 1960; OD.

Glomospirella (Usbekistania) Suleymanov, 1960 (*3090), p. 18.

Usbekistania Loeblich and Tappan, 1964 (*1910), p. C212 (nom. transl.).

Discospirella Fuchs, 1967 (*1189), p. 260; type species: *Discospirella obscura* Fuchs, 1967; OD.

Test free, proloculus followed by trochospirally enrolled, undivided tubular second chamber in the early stage, as in *Repmanina*, final whorls planispiral with sharp change in direction so that axis of coiling is nearly perpendicular to that of earlier whorls; wall agglutinated, of minute quartz particles in insoluble cement; aperture at open end of the tube. ?Silurian; USA: Oklahoma. L. Cretaceous (Barremian) to Holocene; Canada; Trinidad; Netherlands; Italy; Hungary; Poland; USSR: Ukraine, Uzbek.

Superfamily RZEHAKINACEA Cushman, 1933

Rzehakinacea Loeblich and Tappan, 1982 (*1917), p. 26, nom. corr. pro superfamily Rzehakinidea.

Rzehakinidea Saidova, 1981 (*2696), p. 27, nom. transl. ex subfamily Rzehakininae.

Test planispirally enrolled, with two or less commonly three chambers per whorl or with successive chambers added in varied planes as in the miliolines; wall finely agglutinated on an organic base, not perforate. Cretaceous to Holocene.

Family RZEHAKINIDAE Cushman, 1933

Rzehakinidae Tappan, 1957 (*3124), p. 210, nom. transl. ex subfamily Rzehakininae.

Rzehakininae Cushman, 1933 (*766), p. 144 (subfamily).

Paramiliolidae Sigal, in Piveteau, 1952 (*2413), p. 208 (family; not available, ICZN Art. 29, not based on available genus).
Spirolocamminidae Saidova, 1981 (*2696), p. 27.
Spirolocammininae Saidova, 1981 (*2696), p. 27 (subfamily).
Miliammininae Saidova, 1981 (*2696), p. 28 (subfamily).

As in the superfamily. Cretaceous to Holocene.

AMMOFLINTINA Earland, 1934

Plate 40, figs. 1-3

Type species: Ammoflintina trihedra Earland, 1934; OD.

Ammoflintina Earland, 1934 (*1041), p. 98.

Test free, roughly triangular in outline, somewhat irregularly planispiral with one or two whorls, each with three somewhat wedge-shaped chambers; wall thin and fragile, of fine agglutinated sand with much cement, pale brown in color; aperture large, simple, at the somewhat narrowed end of the final chamber, without a tooth. Holocene; Antarctic.

BIRSTEINIOLLA Mayer, 1974

Plate 42, figs. 2-11

Type species: Birsteiniolla macrostoma Yankovskaya and Mikhalevich, 1972 (*3416), p. 1005 (as *Birsteniolla*); OD.

Birsteiniolla Mayer, 1974 (*2065), p. 140.

Test small, up to 0.4 mm in length, ovate in outline, with large globular proloculus and tubular planispiral second chamber followed by chambers a half coil in length, early ones in quinqueloculine arrangement, later tending to become planispiral; wall finely agglutinated; aperture circular, at the somewhat produced open end of the final chamber, without a tooth. Holocene; USSR: Caspian and Aral Seas and saline lake in cave in E. Turkmenia, Kirgiz SSR: Lake Issyk-Kul'; N. Africa.

Remarks: Although the genus and type species were described as new by Mayer in 1974, the species had already been described from a different locality by Yankovskaya and Mikhalevich (1972). The 1972 article credited both genus and species to Mayer, but the genus was not described therein. Furthermore, the specific description given by Yankovskaya and Mikhalevich was based on material from a different locality from that of Mayer. Thus the species must be credited to the two earlier authors and the genus to Mayer, who first described it. Neither description indicated a holotype for the species, hence that figured by Yankovskaya and Mikhalevich, 1972 (*3416), fig. 1 (1a-c) from Lake Issyk-Kul' is here designated as the lectotype.

MILIAMMINA Heron-Allen and Earland, 1930

Plate 40, figs. 4-7

Type species: Miliolina oblonga (Montagu) var. *arenacea* Chapman, 1916 (*536), p. 59, non *Miliolina arenacea* Rhumbler, 1906 (*2619) = *Miliammina oblonga* Heron-Allen and Earland, in Earland, 1933 (*1040), p. 92, non *Vermiculum oblongum* Montagu = *Miliammina earlandi* Loeblich and Tappan, 1955 (*1890), p. 13; SD Cockerell, 1930 (*616), p. 975.

Miliammina Heron-Allen and Earland, 1930 (*1478), p. 41.

Test elongate ovate, with narrow chambers a half coil in length in quinqueloculine arrangement; wall relatively thick, very finely agglutinated on an organic base and insoluble in acid; aperture at the end of the chamber, rounded to semilunate, depending on the degree of compression against the previous whorl, may be produced on a short neck. L. Cretaceous to Holocene; cosmopolitan.

Remarks: As noted previously (Loeblich and Tappan, 1955, *1890, p. 12), we were unable to locate the original type of Chapman's *M. oblonga arenacea* in the British Museum. Chapman's species was erroneously cited by Heron-Allen and Earland as *Miliammina oblonga* (Chapman) when defining the genus, although Chapman did not describe the species *oblonga*, only a variety *arenacea* of Montagu's species. Later the specimens from South Georgia, which had earlier been recorded as *M. oblonga* (Chapman) by Heron-Allen and Earland, were regarded by them as a separate species, now termed *Miliammina oblonga* Heron-Allen and Earland (Earland, 1933, *1040, p. 92). As this is not conspecific with *Miliolina oblonga* (Montagu), Heron-Allen and Earland's species was renamed as

Miliammina earlandi Loeblich and Tappan, the specimen from South Georgia (BMNH No. ZF3406) being designated as the lectotype of the species. However, the type species of *Miliammina*, *Miliammina arenacea* (Chapman), was a homonym of *M. arenacea* Rhumbler, hence would require a new name if the species were distinct from that of Heron-Allen and Earland. Examination of additional material from the Antarctic suggests that Chapman's specimens are conspecific with the lectotype of *M. oblonga* Heron-Allen and Earland = *M. earlandi*, hence the latter is regarded as the correct name for the type species of this genus.

PSAMMINOPELTA Tappan, 1957

Plate 40, fig. 12

Type species: Psamminopelta bowsheri Tappan, 1957; OD.

Psamminopelta Tappan, 1957 (*3124), p. 211.

Test free, ovoid in outline, broad and flattened, proloculus followed by tubular, planispirally enrolled and wholly evolute chambers a half coil in length; wall finely agglutinated, probably on an organic base, insoluble in acid, surface roughly finished, differing from *Rzehakina* in having flat sides and in the absence of any wall thickening over the flat sides of the test; aperture a small rounded opening at the end of the final chamber, without a tooth. Cretaceous; North America; USSR.

ROTHINA Hanzlíková, 1966

Plate 40, figs. 13-18

Type species: Rothina silesica Hanzlíková, 1966; OD.

Rothina Hanzlíková, 1966 (*1414), p. 104.

Test flasklike, tapering somewhat toward the produced apertural neck, rounded base may have a short blunt tubular projection, three chambers recognizable in transmitted light, the small ovate proloculus being laterally enveloped by the succeeding two chambers; wall thick, siliceous, very finely agglutinated, surface smoothly finished; aperture circular, at the end of the produced neck, those of successive chambers apparently at opposite ends of the test. L. Cretaceous (Albian); Czechoslovakia (Carpathians).

Remarks: Although *Rothina* was regarded by Hanzlíková (1966, ***1414**, p. 104) as congeneric with *Nodophthalmidium pyriformis* (Tappan), the latter has a porcelaneous wall with external agglutinated coating and a globular proloculus, followed by an undivided tubular enrolled second chamber prior to adding uniserial pyriform flasklike chambers with undivided interior. *Rothina* appears to be restricted to the Carpathian flysch deposits.

RZEHAKINA Cushman, 1927

Plate 41, figs. 7-11

Type species: Silicina epigona Rzehak, 1895 (***2682**), p. 214; OD.

Rzehakina Cushman, 1927 (*742), p. 31.

Test flattened ovate, planispirally coiled, with narrow elongate chambers a half coil in length, commonly partially overlapping earlier coils to result in a much thickened wall at the center of the sides, as is readily visible in transverse section; wall finely agglutinated on an organic base, insoluble in acid; aperture terminal, rounded, without a tooth. Cretaceous to Paleocene; cosmopolitan.

SILICOMASSILINA Serova, 1966

Plate 41, figs. 12 and 13; plate 42, fig. 1

Type species: Silicomassilina sinegorica Serova, 1966; OD.

Silicomassilina Serova, 1966 (*2880), p. 282.

Chambers enrolled, two per whorl, early chambers quinqueloculine in arrangement, later in a single plane as in the porcelaneous *Massilina*; wall agglutinated, relatively thick, of fine grains of chalcedony; aperture rounded to oval, slightly produced, stated to be with or without a tooth. Paleocene (Danian); Asiatic USSR: Sakhalin Island.

SILICOSIGMOILINA Cushman and Church, 1929

Plate 41, figs. 1-6

Type species: Silicosigmoilina californica Cushman and Church, 1929; OD.

Silicosigmoilina Cushman and Church, 1929 (*817), p. 502.

Silicosigmoilina (Bramletteia) Israelsky, 1951 (*1593), p. 10; type species: *Silicosigmoilina (Bramletteia) perplexa* Israelsky, 1951; OD.

Test ovoid in outline, proloculus followed by long narrow chambers a half coil in length, added slightly less than 180° apart, so that in transverse section the chambers form a sigmoid series; wall finely agglutinated, surface smoothly finished; aperture rounded to ovate, with a small simple tooth projecting from one margin. U. Cretaceous to Paleocene; cosmopolitan.

SPIROLOCAMMINA Earland, 1934

Plate 40, figs. 8 and 9

Type species: Spirolocammina tenuis Earland, 1934; OD (M).

Spirolocammina Earland, 1934 (*1041), p. 109.

Test free, minute, elongate, flattened, coiling nearly planispiral, two chambers per whorl, but with a slight sigmoiline curve in the long axis; wall thin, very finely agglutinated in an organic matrix, insoluble in acid, surface smoothly finished; aperture produced slightly on a neck, without a tooth. Holocene, from 3,264 m to 4,517 m; Antarctic.

SPIROSIGMOILINELLA Matsunaga, 1955

Plate 40, figs. 10 and 11

Type species: Spirosigmoilinella compressa Matsunaga, 1955; OD.

Spirosigmoilinella Matsunaga, 1955 (*2063), p. 49.

Chambers nearly planispirally enrolled, two per whorl, plane of coiling in early stage changing slightly to show a sigmoid curve in cross section, later with coiling in a single plane; wall finely agglutinated, insoluble in acid; aperture rounded, at the end of a short neck, without a tooth. L. to M. Miocene; Japan.

TRILOCULARENA Loeblich and Tappan, 1955

Plate 41, figs. 14–16

Type species: Miliammina circularis Heron-Allen and Earland, 1930 (*1478), p. 44; OD.

Trilocularena Loeblich and Tappan, 1955 (*1890), p. 13.

Test ovate in outline, elongate tubular chambers a half coil in length added in triloculine arrangement, only the final three visible at the exterior; wall finely agglutinated; aperture ovate or lunate, at the end of the final chamber, with a broad tooth formed by infolding of the margin that lies against the previous whorls. Holocene; Antarctic.

Superfamily HORMOSINACEA Haeckel, 1894

Hormosinacea Loeblich and Tappan, 1982 (*1917), p. 26, nom. corr. pro superfamily Hormosinidea.

Hormosinidea Saidova, 1981 (*2696), p. 14, nom. transl. ex family Hormosinida.

Cribratinidea Saidova, 1981 (*2696), p. 15.

Pseudonodosinellidea Saidova, 1981 (*2696), p. 15.

Hormosinellacea Rauzer-Chernousova and Reytlinger, 1986 (*2534A), p. 18.

Test multilocular, chambers in uniserial arrangement; wall agglutinated. M. Ordovician to Holocene.

Family ASCHEMOCELLIDAE Vyalov, 1966

Aschemocellidae Vyalov, 1966 (*3326), p. 31.

Aschemocellinae Loeblich and Tappan, 1974 (*1913), p. 43, nom. transl. ex family Aschemocellidae.

Test free, uniserial, of ovoid to tubular chambers; wall thin, agglutinated, firmly cemented; apertures at ends of tubular necks. U. Cretaceous (Campanian); Holocene.

ASCHEMOCELLA Vyalov, 1966

Plate 42, figs. 14–16

Type species: Aschemocella carpathica Neagu, 1964 (*2233), p. 582; OD.

Aschemocella Vyalov, 1966 (*3326), p. 31.

Irregularly ovoid chambers in a linear or dichotomously branching series, increasing very slowly in size; wall of agglutinated quartz, mica, and sponge spicules in abundant cement; may have more than one rounded aperture, terminal, or may be at side of chamber, probably just before a new branch arises. U. Cretaceous (Campanian); Romania; USSR.

KALAMOPSIS de Folin, 1883

Plate 42, figs. 12 and 13

Type species: Kalamopsis vaillanti de Folin, 1883; OD(M).

Kalamopsis de Folin, 1883 (*1143), p. 320.

Arkalamopsum Rhumbler, 1913 (*2621), p. 352 (err. emend.).

Rounded proloculus followed by elongate tubular chambers in a rectilinear series, septa may be incomplete and may not be readily visible externally; wall vitreous, opaque, with scattered agglutinated large grains; aperture simple, terminal. Holocene; N. Atlantic, off France: Gulf of Gascony.

Family TELAMMINIDAE Loeblich and Tappan, 1985

Telamminidae Loeblich and Tappan, 1985 (*1923), p. 91.

Test attached in the early stage only or throughout growth, consisting of a series of chambers that may be closely appressed or connected by stolonlike tubes; wall agglutinated; no obvious aperture other than the ends of the stolons. Holocene.

Remarks. Resembles the Aschemocellidae in the loosely arranged series of chambers interconnected by stolonlike necks but differs in being attached to a substrate.

AGGEROSTRAMEN Loeblich and Tappan, 1985

Plate 43, figs. 1-7

Type species: Psammosphaera rustica Heron-Allen and Earland, 1912 (***1468**), p. 383; OD.

Aggerostramen Loeblich and Tappan, 1985 (*1923), p. 91.

Test in the early stage with a few angular, tetrahedral, or conical chambers attached to other foraminifers, later chambers are less angular and may be rounded or fusiform, and the test may lie free on the substrate, early chambers may be closely appressed and form a straight uniserial series but later are somewhat irregular in arrangement and interconnected by distinct tubular stolons, up to five such stolons may project from an individual chamber and result in an irregularly branching test; wall consisting largely of a pavement of sponge spicules aligned in parallel groups or with smaller grains of quartz in the interstices, commonly with some long spicules that project beyond the chamber itself and may connect to adjacent chambers or to the substrate; aperture in the early stage a simple opening, in the later chambers at the end of the stolonlike necks. Holocene; Atlantic; Caribbean.

Remarks: Originally regarded as consisting of isolated chambers, the larger tests of stolon-connected chambers were well described by Hofker (1972, ***1521**, p. 82-83) as *Marsipella rustica*. *Aggerostramen* differs from *Psammosphaera* in being multilocular, in being attached in the early stage, and in the wall constructed of groups of sponge spicules in parallel alignment. It differs from *Telammina* in the much larger chambers, spicular test wall, and in being attached only in the juvenile stage, with later chambers growing away from the substrate.

TELAMMINA Gooday and Haynes, 1983

Plate 43, figs. 8-11

Type species: Telammina fragilis Gooday and Haynes, 1983; OD.

Telammina Gooday and Haynes, 1983 (***1266**), p. 611.

Test attached, consisting of a series of minute chambers, 0.02 mm to 0.11 mm in diameter, connected by stolonlike tubes, as many as four stolons arising from a single chamber and variously forming a single row of chambers or an extensive meshwork over the substrate; wall very finely agglutinated, of a single layer of grains; no apparent aperture. Holocene; NE Atlantic.

TUMIDOTUBUS Gooday and Haynes, 1983

Plate 43, figs. 12-14

Type species: Tumidotubus albus Gooday and Haynes, 1983; OD.

Tumidotubus Gooday and Haynes, 1983 (***1266**), p. 610.

Test attached, irregular in growth, a series of poorly defined oval to elongate chambers separated by constrictions of the wall that may branch; wall agglutinated, of several layers of grains; no apparent aperture. Holocene; NE Atlantic.

Family HORMOSINIDAE Haeckel, 1894

Hormosinidae Loeblich and Tappan, 1964 (***1910**), p. C214, nom. corr. pro family Hormosinida.
Hormosinida Haeckel, 1894 (***1355**), p. 185.
Reophacidae Cushman, 1927 (***742**), p. 15.
Silicinidae Cushman, 1927 (***742**), p. 29.
Reophacida Copeland, 1956 (***680**), p. 186 (err. emend.).
Pseudonodosinellidae Saidova, 1981 (***2696**), p. 15.
Hormosinellidae Rauzer-Chernousova and Reytlinger, 1986 (***2534A**), p. 18.

Test free, chambers arranged in rectilinear to arcuate series; wall agglutinated, interior simple; aperture terminal, single or multiple. M. Ordovician to Holocene.

Subfamily REOPHACINAE Cushman, 1910

Reophacinae Cushman, 1910 (*701), p. 81.
Arreophaxnia Rhumbler, 1913 (*2621), p. 440 (err. emend.).
Proteonininae Galloway, 1933 (*1205), p. 65.
Silicininae Cushman, 1933 (*766), p. 143.
Reophacidinae Silvestri, 1950 (*2972), p. 44 (err. emend.).
Pseudoreophacinae Suleymanov, 1963 (*3094), p. 88 (invalid, ICZN Art. 39; based on *Pseudoreophax* Suleymanov, 1963, non *Pseudoreophax* Geroch, 1961).

Test uniserial, chambers commonly asymmetrical in form and in slightly arcuate arrangement; wall agglutinated, of a single layer of quartz grains, spicules, or foraminiferal tests held in small amount of cement; aperture terminal, rounded, on a distinct neck. M. Ordovician to Holocene.

ADELUNGIA Suleymanov, 1966

Plate 44, figs. 12-14

Type species: Pseudoreophax marginulinaeformis Suleymanov, 1963; OD.

Adelungia Suleymanov, in Arapova and Suleymanov, 1966 (*57), p. 124 (nom. subst. pro *Pseudoreophax* Suleymanov, 1963).
Pseudoreophax Suleymanov, 1963 (*3094), p. 88 (non *Pseudoreophax* Geroch, 1961); obj., OD.

Test small, ovoid but slightly compressed chambers in an arcuate series or straightening from an initially hooked portion, increasing gradually in size, sutures strongly oblique, extending distally toward the outer margin of the test and extending back toward the proloculus at the inside of the arc; wall simple, agglutinated of a single layer of mineral particles and shell fragments; aperture a simple terminal opening, slightly offset toward the dorsal or outer margin of the arcuate test. Jurassic to L. Cretaceous (Albian); Asiatic USSR: Kyzyl Kum.

Remarks: The genus is here restricted from the original definition, which included numerous species of true *Reophax*, as well as the type species of *Nodulina* and other species that are referable to *Ammotium*. It differs from *Reophax* in the gradually enlarging and more regular chambers, strongly oblique sutures, distinctly arcuate test, and fine-grained agglutinated wall.

HORMOSINELLA Shchedrina, 1969

Plate 44, figs. 6-9

Type species: Reophax distans Brady, 1881 (*339), p. 50; OD.

Hormosinella Shchedrina, 1969 (*2892), p. 170.
Cadminus Saidova, 1970 (*2694), p. 148; obj.; OD.

Test free, large, uniserial, and rectilinear to slightly arcuate; ovate to fusiform chambers separated by very elongate, delicate, and stolonlike necks, hence commonly broken, although a three-chambered test may attain a length of 5 mm; wall agglutinated, very thin, of a single layer of well-cemented grains; aperture terminal on the elongate neck, rounded. U. Eocene; USSR. Holocene; N. Pacific at 4,100 m to 5,550 m; S. Pacific at 2,140 m to 4,320 m; N. Atlantic at 710 m to 3,500 m; S. Atlantic at 1,800 m; Antarctic from 3,140 m to 5,200 m.

HORMOSINOIDES Saidova, 1975

Plate 44, figs. 4 and 5

Type species: Hormosinoides perpastus Saidova, 1975; OD.

Hormosinoides Saidova, 1975 (*2695), p. 63.

Test free, stout, up to 3 mm in length, few uniserial, rectilinear, strongly overlapping globular to ovate chambers; sutures depressed; wall agglutinated of relatively coarse grains but thin, simple, and with roughly finished surface; aperture terminal, central, and not elevated on a neck. Holocene; tropical Pacific from 1,235 m to 6,070 m.

Remarks: Differs from *Reophax* in the straight axis and symmetrical aperture, from *Hormosinella* in lacking the elongate neck and stoloniferous chamber connections, and from *Pseudonodosinella* in the globular and closely appressed chambers and stouter and less tapering test.

LEPTOHALYSIS Loeblich and Tappan, 1984

Plate 44, fig. 21

Type species: Reophax catella Höglund, 1947 (*1487), p. 97; OD.

Leptohalysis Loeblich and Tappan, 1984 (*1920), p. 1160.

Test uniserial and rectilinear, globular proloculus followed by an elongate series of gradually enlarging and distally tapering flask-shaped chambers with blunt lower margin; wall very thin, delicate, and flexible, consisting of a single layer of minute quartz and mica grains agglutinated on a proteinaceous base, early stage may have foreign particles widely spaced, later with adjacent grains abutting; aperture a simple terminal opening, may be flush with the surface or slightly produced with a phialine neck, and may have more than one layer of grains immediately around the opening. Holocene; N. Atlantic: England at 20 m to 46 m; Norway from 150 m to 200 m; Sweden from 20 m to 515 m.

Remarks: *Leptohalysis* differs from *Reophax* in the very elongate and delicate test, slowly enlarging flasklike chambers in nearly straight series, and flexible wall with distinct organic component and sparse agglutinated material in early stage.

NODULINA Rhumbler, 1895

Plate 44, figs. 10 and 11

Type species: Reophax dentaliniformis Brady, 1881 (***339**), p. 49; SD Loeblich and Tappan, 1964 (***1910**), p. C216.

Nodulina Rhumbler, 1895 (***2616**), p. 82, 85.

Test similar to *Reophax* but with more symmetrical, regular, and gradually enlarging chambers, horizontal sutures and straighter axis; wall agglutinated of a single layer of grains; rounded aperture at the end of a short tubular neck. Holocene; E. Pacific; N. Atlantic.

Remarks: Previously regarded as a synonym of *Reophax*, the type species later was transferred to *Pseudoreophax* Suleymanov, 1963 (non Geroch, 1961) = *Adelungia* Suleymanov, 1966. Because of the distinctive neck and radially symmetrical chambers in rectilinear alignment, it was placed in *Hormosina* by Brönnimann and Whittaker (1980, ***403**, p. 265), who selected a lectotype for the type species from the Brady collection in the British Museum. It is here regarded as distinct from *Hormosina* because of the thin wall of a single layer of grains, whereas *Hormosina* has a thick wall of many grains, more globular and rapidly enlarging chambers, and is much larger overall.

REOPHAX de Montfort, 1808

Plate 44, figs. 1-3; plate 829, fig. 6.

Type species: Reophax scorpiurus de Montfort, 1808; OD(M).

Reophax de Montfort, 1808 (***2176**), p. 331.
Reophagus Agassiz, 1844 (***15**), p. 22 (err. emend.).
Proteonina Williamson, 1858 (***3379**), p. 1; type species: *Proteonina fusiformis* Williamson, 1858; SD Rhumbler, 1904 (***2617**), p. 244.
Lituolina Goës, 1881 (***1254**), p. 33; obj., OD(M).
Arproteonum Rhumbler, 1913 (***2621**), p. 348 (err. emend.).
Arreophaxum Rhumbler, 1913 (***2621**), p. 441 (err. emend.).

Test free, elongate, with few rounded to pyriform chambers in slightly irregular or arcuate series, each succeeding chamber attached near the base of the apertural neck of the preceding chamber; wall thin, of a single layer of agglutinated grains of quartz, mica, sponge spicules, or foraminiferal tests held in a minimum of organic cement but without a true organic inner layer; aperture terminal, rounded, produced on a slight neck. M. Ordovician to Holocene; cosmopolitan.

Remarks: The absence of type material for de Montfort's species previously led to the inclusion within *Reophax* of many uniserial agglutinated taxa that otherwise differ. The genus is now firmly based, as a neotype for *R. scorpiurus* was designated (Brönnimann and Whittaker, 1980, ***403**, p. 261) from the SE Adriatic.

SCHEROCHORELLA Loeblich and Tappan, 1984

Plate 44, figs. 15 and 16

Type species: Reophax minuta Tappan, 1940 (***3120**), p. 94; OD.

Scherochorella Loeblich and Tappan, 1984 (***1920**), p. 1160.

Test tiny, subglobular proloculus followed by relatively broad and low closely appressed chambers, gradually increasing in breadth as added and forming a rectilinear to slightly curved series; sutures distinct, depressed, horizontal; wall agglutinated, thin, of fine quartz grains, the test commonly flattened or collapsed in preservation; aperture terminal, rounded, not produced on a neck. L. Carboniferous (Mississippian) to Holocene; cosmopolitan.

Remarks: Differs from *Reophax* in the broad, low, and more regularly enlarging chambers and horizontal sutures and in lacking a distinct neck. The type species was originally described as having a slitlike aperture, but examination of many additional specimens from the Texas Cretaceous shows the aperture to be rounded, although compression of the test may result in its distortion.

SUBREOPHAX Saidova, 1975

Plate 44, figs. 17-20

Type species: Reophax aduncus Brady, in Tizard and Murray, 1882 (*3198), p. 715; OD.

Subreophax Saidova, 1975 (*2695), p. 57.

Test large, up to 2.5 mm in length, consisting of an irregular series of very slowly enlarging ovoid to subpyriform chambers, separated solely by constrictions of the wall but without distinct internal septa: wall thin, agglutinated with larger grains in a single layer and held in little cement; aperture terminal. Holocene: N. and S. Atlantic from 800 m to 4,400 m; Indian Ocean from 3,140 m; Antarctic at 5,400 m; N. Pacific at 4,100 m to 5,800 m.

Subfamily CUNEATINAE Loeblich and Tappan, 1984

Cuneatinae Loeblich and Tappan, 1984 (*1918), p. 8.

Cuneatinae Loeblich and Tappan, 1982 (*1917), p. 27 (nom. nud.).

Test elongate, uniserial, rarely bifurcating, chambers ovate in section; wall agglutinated, single layered, nonperforate; aperture terminal, rounded, slitlike, or with a row of slits, not produced on a neck. L. Cretaceous (U. Albian) to U. Cretaceous (L. Senonian), Miocene (Tortonian) to Holocene.

Remarks: Differs from the Reophacinae and Hormosininae in the slitlike aperture and from the latter in the single layer of grains in the wall.

BIREOPHAX Bolli, 1961

Plate 45, figs. 1 and 2

Type species: Bireophax guaricoensis Bolli, 1961; OD.

Bireophax Bolli, 1961 (*289), p. 494.

Large proloculus followed by uniserial row of broad and low chambers, later branching dichotomously after development of a much broader chamber than usual, each branch then consisting of a single row of chambers; wall coarsely agglutinated, thick, simple, and noncanaliculate in structure; aperture terminal, rounded, at the end of each uniserial series. L. Cretaceous (Albian) to U. Cretaceous (Senonian): Venezuela.

Remarks: Although previously regarded as a synonym of *Thomasinella*, thin sections of topotypes lack the canaliculate structure that characterizes *Thomasinella*.

CUNEATA K. V. Fursenko, 1979

Plate 45, figs. 7-9

Type species: Reophax arctica Brady, 1881 (*341), p. 11; 1881 (*340), p. 405; OD.

Cuneata K. V. Fursenko, in Gudina, 1979 (*1330), p. 21.

Oblidolina Brönnimann and Whittaker, 1980 (*403), p. 266; type species: obj., OD.

Test small, elongate, uniserial, rectilinear, laterally compressed so that the test is ovoid in section, early chambers increasing rapidly in breadth but slowly in height, later increasing more rapidly in height and more slowly in breadth and with nearly parallel margins; wall finely agglutinated, with occasional larger grains forming a single layer, imperforate, white to gray in color, smoothly finished; aperture terminal, an elongate slit with lenticular outline and slightly produced margins. Holocene: Arctic Ocean: Chukchi Sea from 22 m to 144 m: Frobisher Bay, Baffin Island from 31 m to 143 m; Greenland from 13 m to 201 m; Labrador from 55 m to 82 m; Novaya Zemlya at 130 m; Ungava Bay off N. Quebec, Canada at 66 m to 73 m; N. Pacific: Okhotsk Sea, from 18 m to 137 m; Sea of Japan from 35 m to 72 m; Tatarskie Strait, at 6 m to 100 m; NE Pacific at 415 m.

POLYCHASMINA Loeblich and Tappan, 1946

Plate 45, figs. 15-17

Type species: Polychasmina pawpawensis Loeblich and Tappan, 1946; OD.

Polychasmina Loeblich and Tappan, 1946 (*1879), p. 242.

Test free, elongate, flattened, small rounded proloculus followed by a rectilinear series of broad and low chambers, that less commonly may bifurcate, sutures nearly horizontal to broadly arched in the middle of the flat sides of the test; wall thin, agglutinated, commonly only a single grain in thickness but with coarse quartz and other mineral particles in a fine grained ground mass; aperture terminal, a single row of elongate slits that parallel the flat sides of the test. L. Cretaceous (U. Albian); USA: Texas.

Remarks: The wall is coarsely arenaceous but not labyrinthic as it was originally described, and it does not have the coarse wall perforations of *Thomasinella*, with which it might otherwise be confused.

PSAMMOLINGULINA A. Silvestri, 1904

Plate 45, figs. 3 and 4

Type species: Lingulina papillosa Neugeboren, 1856 (***2242**), p. 97: OD.

Psammolingulina A. Silvestri, 1904 (***2933**), p. 247.

Test elongate, flattened, uniserial and rectilinear, lenticular in section, rounded proloculus followed by a few large chambers of nearly equal height and breadth, sutures constricted; wall of agglutinated quartz particles, surface roughened and warty in appearance; aperture terminal, slightly produced, an arcuate slit. Miocene (Tortonian); Romania.

SULCOPHAX Rhumbler, 1931

Plate 45, figs. 5 and 6

Type species: Sulcophax claviformis Rhumbler, 1931; OD(M).

Sulcophax Rhumbler, in Wiesner, 1931 (***3375**), p. 93.

Test uniserial and nearly rectilinear, slightly compressed laterally; wall agglutinated; aperture terminal, a short slit lying in a slight depression that crosses the terminal face. Holocene; Antarctic, at 3,410 m.

WARRENITA Loeblich and Tappan, 1984

Plate 45, figs. 10-12

Type species: Sulcophax palustris Warren, 1957 (***3351**), p. 31: OD.

Warrenita Loeblich and Tappan, 1984 (***1920**), p. 1160.

Test free, elongate, arcuate, with numerous gradually enlarging and laterally slightly compressed chambers that are strongly overlapping, covering about one-half the length of the preceding chamber so that all chambers but the final one appear broader than high; wall very thin and delicate, finely agglutinated, smoothly finished; aperture a terminal arcuate slit, extending about one-third the breadth of the test. Holocene; at less than 2 m depth, in saline and polyhaline marshes; USA: Louisiana, Georgia: Sapelo Island.

Remarks: Differs from *Sulcophax* Rhumbler, 1931 in the smaller and more slender arcuate test, very thin and delicate wall, more elongate and curved slit aperture that does not occur in a slitlike depression, and in its marsh habitat, rather than being from the deep Antarctic.

Subfamily HORMOSININAE Haeckel, 1894

Hormosininae Loeblich and Tappan, 1964 (***1910**), p. C215, nom. transl. ex family Hormosinida.

Pseudonodosinellinae Saidova, 1981 (***2696**), p. 15.

Test with symmetrical and subglobular rectilinear chambers that may be loosely separated or closely appressed; wall thick, of agglutinated quartz grains, sponge spicules, or other particles; aperture terminal, rounded, at the end of a tubular neck. Holocene.

ARCHIMERISMUS Loeblich and Tappan, 1984

Plate 46, figs. 7-9

Type species: Hyperammina subnodosa Brady, 1884 (***344**), p. 259; OD.

Archimerismus Loeblich and Tappan, 1984 (***1920**), p. 1161.

Test large, elongate, with globular proloculus followed by elongate tubular chambers, with somewhat irregular size increase, separated only by constrictions of the wall that do not form true septa; wall agglutinated, thin at the base of the proloculus, becoming thicker toward the aperture, and many grains thick in the remainder of the test, of coarse quartz grains firmly held in a small amount of cement, with inner proteinaceous layer; aperture terminal, rounded, at the somewhat constricted end of the final chamber. Holocene; N. Atlantic from 40 m to 900 m; S. Atlantic at 700 m; S. Pacific at 2,850 m to 5,200 m; N. Pacific from 4,600 m.

Remarks: Differs from *Hormosina* in the subcylindrical test and incompletely separated chambers and differs from *Hyperammina* in the partial subdivision of the test to form chambers.

GINESINA Bermúdez and Key, 1952

Plate 45, figs. 13 and 14

Type species: Ginesina delicatula Bermúdez and Key, 1952; OD.

Ginesina Bermúdez and Key, 1952 (***210**), p. 72.

Test free, elongate, rectilinear, subcylindrical, chambers strongly overlapping, the large rounded proloculus completely enclosed by the second chamber, resulting in an apparent double wall, although no later chambers are doubled, sutures horizontal, obscure; wall delicate, agglutinated, formed of a mat of loosely cemented siliceous sponge spicules, surface smoothly finished; aperture rounded, produced on a long cylindrical neck, the successive chambers added closely, so that the distal interior wall of the new chamber rests against the preceding neck, successive tubular necks forming a continuous connection between succeeding chambers. Holocene; Caribbean, off W. Cuba at about 1,140 m. depth.

Remarks: *Ginesina* differs from *Reophax* in the rectilinear rather than curved axis, regularly cylindrical chambers and thicker wall and differs from *Reophax* and *Hormosina* in the elongate neck, those of earlier chambers forming a continuous internal series connecting successive chambers.

HORMOSINA Brady, 1879

Plate 45, figs. 18-20

Type species: Hormosina globulifera Brady, 1879; SD Cushman, 1910 (***701**), p. 93.

Hormosina Brady, 1879 (***337**), p. 56.

Arhomosum Rhumbler, 1913 (***2621**), p. 441 (err. emend.).

Test uniserial and rectilinear to slightly arcuate, large globular chambers increasing rapidly in size; wall agglutinated, of several layers, with abundant cement, outer coarser material restricted to the chambers and not continuing onto the neck, which thus shows a sharply decreased grain size; aperture terminal at the end of a distinct tubular neck, later chambers overlapping the previous ones to enclose the neck. Holocene; N. Pacific, from 3,750 m to 5,800 m; tropical Pacific, at 1,776 m to 3,758 m; N. Atlantic at 2,700 m to 3,229 m.

LOEBLICHOPSIS Hofker, 1967

Plate 46, figs. 1-4

Type species: Reophax cylindrica Brady, 1884 (***344**), p. 299; OD.

Loeblichopsis Hofker, 1969 (***1518**), p. 19 (also err. cit. as *Loeblichella*, p. 15, non *Loeblichella* Pessagno, 1967).

Test uniserial and rectilinear, may be up to 10 mm in length, chambers somewhat pyriform, with successive chambers overlapping previous ones so that sutures are obscure externally and the test is nearly cylindrical; wall thick, agglutinated of more than a single layer of fine quartz grains and tests of small foraminifers, may be only partially cemented, thickest where the new chamber overlaps that preceding, with an inner proteinaceous lining; aperture terminal, central, round. Holocene; N. Atlantic from 100 m to 4,066 m; Indian Ocean at 3,140 m.

PSEUDONODOSINELLA Saidova, 1970

Plate 46, figs. 5 and 6

Type species: Reophax nodulosa Brady, 1879 (***337**), p. 52; OD.

Pseudonodosinella Saidova, 1970 (***2694**), p. 148.

Pseudonodosinella Saidova, 1966 (***2692**), p. 283 (name not available, ICZN Art. 13 (a) (i), no description).

Test elongate, uniserial, chambers ovate to subpyriform, each successive chamber overlapping the aperture and much of the breadth of that preceding; wall firmly agglutinated, thin but of many grains, both exterior and interior smoothly finished; aperture terminal, at the center of the somewhat thickened wall of the produced terminal face. Holocene; S. Atlantic, N. and S. Pacific, from 2,800 m to 4,000 m; Gulf of Mexico at 694 m to 1,460 m.

Remarks: In addition to the typical delicate and tapering specimens of *Reophax nodulosa*, some as small as 0.5 mm in length, the original description also included very large deep water specimens of relatively few chambers and up to 25 mm in length. In order to stabilize the genus, as based on its type species, the specimen figured by Brady (1879, ***337**, pl. 4, fig. 7) is here designated as lectotype of *Reophax nodulosa*. The larger specimens, first figured in 1884 (***344**), belong to *Nodosinum gaussicum*.

REOPHANUS Saidova, 1970

Plate 46, fig. 10

Type species: Hormosina ovicula Brady, 1879 (***337**), p. 61; OD.

Reophanus Saidova, 1970 (***2694**), p. 148.

Test large, up to 4 mm in length, uniserial, rectilinear, moniliform in appearance because the elongate ovate chambers are separated by their respective necks, each new chamber attaching to the upper margin of the previous apertural lip, so that the test is fragile and rarely preserved entire; wall agglutinated, thin, but with several layers of very fine quartz grains and some sponge spicules, yellowish to brownish in color, without organic lining; aperture rounded, terminal on a distinct neck, with somewhat flared lip. Holocene; N. Atlantic, rare at 180 m to 2,700 m; S. Atlantic at 3,800 m to 4,400 m; Antarctic at 3,900 m to 5,200 m; Pacific at 2,150 m to 7,900 m; Caribbean Sea at 800 m to 1,932 m; Gulf of Mexico, at 420 m to 2,660 m.

Remarks: The type species of this genus was included in the genus *Hormosinella* by Shchedrina (1969, ***2892**), but the two genera are here differentiated by their wall character, as *Hormosinella* has a single layer of grains in the wall, whereas that of *Reophanus* is finer grained but many grains in thickness.

SILICONODOSARINA Colom, 1963

Plate 46, figs. 11-13

Type species: Siliconodosarina delicatula Colom, 1963; OD(M).

Siliconodosarina Colom, 1963 (***651**), p. 79.

Test minute, up to 0.09 mm in length, uniserial, rectilinear to slightly arcuate, chambers hemispherical in shape, increasing regularly in size as added, successive chambers protruding laterally beyond those preceding, resulting in a serrate margin; wall agglutinated, of quartz and mica fragments, insoluble in acid; aperture small, terminal and central, without a neck. Holocene; Ría de Vigo, NW Spain.

Subfamily NODOSININAE Saidova, 1981

Nodosininae Loeblich and Tappan, 1982 (***1917**), p. 27, nom. corr. pro subfamily Nodosinidae.

Nodosinidae Saidova, 1981 (***2696**), p. 15 (subfamily; nom. imperf.).

Test as in the Hormosininae but with slitlike to stellate aperture, the latter resulting from longitudinal ribs projecting inward from the wall in the vicinity of the aperture. Holocene.

CRIBRATINOIDES Saidova, 1975

Plate 46, figs. 18-20

Type species: Sulcophax battelinus Saidova, 1961 (***2691**), p. 22; OD.

Cribratinoides Saidova, 1975 (***2695**), p. 68.

Test large, 2 mm to 4 mm in length, uniserial and rectilinear, with closely appressed chambers; wall coarsely agglutinated, outer layer of tightly packed grains, inner layer less firmly cemented and friable, with carbonate cement; aperture terminal, an elongate oval slit, nearly flush with the surface and lacking a distinct neck. Holocene; NW Pacific, region of Kamchatka Peninsula and the Kurile Islands, from 283 m to 2,133 m.

Remarks: Although originally the type species was referred to *Sulcophax*, the present genus is large and has a thick, coarsely agglutinated wall, whereas *Sulcophax* is a small, delicate form with a single layer of grains in the wall and an aperture recessed in a terminal furrow.

NODOSINUM Hofker, 1930

Plate 46, figs. 14-17

Type species: Nodosinella gaussica Rhumbler, 1913 (***2621**), p. 453, 459, 460, 461 (syn.: *Arnodosinum py-gaussicum*, p. 452, 453, 459, 460, 461, err. emend.); OD.

Nodosinum Hofker, 1930 (***1492**), p. 121.

Test large, elongate, uniserial and rectilinear, chambers elongate, subpyriform, expanding sharply in width just above the basal suture; wall coarsely agglutinated, of quartz and other particles in fine organic material, surface roughly finished; aperture terminal, radiate, reflecting the ribs that line the upper part of the chamber interior in the vicinity of the aperture and project into the opening. Holocene; Antarctic at 2,600 m to 3,950 m; Banda Sea, Indonesia at 2,798 m to 4,391 m.

Remarks: *Nodosinum gaussicum* has commonly been confused in the past with *Reophax nodulosa* Brady, the type species of *Pseudonodosinella*, as they are superficially similar in general chamber shape. In fact, the large specimens in the Challenger Report (Brady, 1884, ***344**, pl. 31, figs. 1, 2, and possibly fig. 5) are referable to *N. gaussicum*, differing from the typically smaller *R. nodulosa* and its lectotype. *Nodosinum* has a coarsely agglutinated and roughly finished wall that is largely unaffected by acid treatment and a radiate aperture due to internal ribs near the aperture.

Family DUSENBURYINIDAE Loeblich and Tappan, 1984

Dusenburyinidae Loeblich and Tappan, 1984 (*1918), p. 8.

Test elongate, straight to arcuate, chambers numerous, uniserial; wall thick and agglutinated; aperture terminal, elevated on a short neck, with a distinct tooth projecting from the margin representing the outside of the curve of the arcuate test. Holocene.

Remarks: Differs from the Hormosinidae in having an apertural tooth.

DUSENBURYINA Bermúdez and Key, 1952

Plate 46, figs. 21-23

Type species: Clavulina procera Goës, 1889 (*1256), p. 9; OD.

Dusenburyina Bermúdez and Key, 1952 (*210), p. 73.

Test elongate, uniserial, rectilinear to slightly arcuate, chambers numerous, increasing slowly in size as added; wall thick, coarsely agglutinated, commonly of calcareous particles; aperture terminal, semicircular in the early stage, later with a distinct tooth projecting from the flattened margin of the aperture, which always represents the outer curve of the test. Holocene; Atlantic; Caribbean; ?N. Pacific: Philippines.

Remarks: The genus previously was placed in the Valvulininae because of the apertural tooth; however Hofker (1969, *1518, p. 18) noted that the absence of an early triserial or trochoid stage; the invariable position of the apertural tooth at the same side of the test, rather than being oriented differently in successive uniserial chambers as a reflection of its multilocular ancestry, precluded assignment to the Valvulininae. Uniserial agglutinated taxa are assigned to the Hormosinacea, but *Dusenburyina* differs in having a tooth in the aperture, hence is placed in a separate family.

Family THOMASINELLIDAE Loeblich and Tappan, 1984

Thomasinellidae Loeblich and Tappan, 1984 (*1918), p. 8.

Test uniserial in early stage, later bifurcating to produce two or more linear series of chambers; aperture terminal at the ends of the linearseries, commonly a single ovate slit but may have two such openings just prior to bifurcation; wall coarsely agglutinated, thick, pierced by coarse tubuli. U. Cretaceous (Cenomanian) to Holocene.

Remarks: Differs from the Hormosinidae in the perforate wall and bifurcating test.

PROTOSCHISTA Eimer and Fickert, 1899

Plate 47, figs. 7-10

Type species: Lituola findens Parker, in Dawson, 1870 (*903), p. 176; OD(M).

Protoschista Eimer and Fickert, 1899 (*1088), p. 605, 677.

Test free, may exceed 1 mm in length, branching from the proloculus to form two or three uniserial series growing in opposite directions, chambers slightly inflated, of nearly constant size, with chambers of smaller diameter commonly in parallel series and opposed in direction to the larger chambered series, in the later stage growth continues only from the series of larger diameter; wall coarsely agglutinated with little cement, surface rough; aperture circular to ovoid, terminal on each series of chambers in the early stage but in the adult only on the series of larger chambers. Holocene; N. Atlantic, off Greenland from 12 m to 201 m, and off Ireland; Canada, Gulf of St. Lawrence at 30 m to 40 m; Arctic Ocean off Alaska, from 64 m to 223 m.

THOMASINELLA Schlumberger, 1893

Plate 47, figs. 1-6

Type species: Thomasinella punica Schlumberger, 1893; SD Schlumberger, in Peron, 1893 (*2384), explanation pl. 14.

Thomasinella Schlumberger, in Thomas, 1893 (*3179), p. 5.

Thomasinella Schlumberger, 1889 (*2762), p. 425 (name not available, no description).

Test large, arborescent, large globular proloculus followed by uniserial broad and low cylindrical chambers in rectilinear or dichotomously branching series; wall thick, canaliculate, coarsely agglutinated, of quartz particles and occasional large shell fragments; aperture simple, rounded to ovoid, terminal at the end of the rows of chambers, commonly single but less frequently with two openings, possibly just prior to bifurcation. U.

Cretaceous (Cenomanian); Algeria, Tunisia, Egypt; India.

Family CRIBRATINIDAE Loeblich and Tappan, 1964

Cribratinidae Saidova, 1981 (*2696), p. 15, nom. transl. ex subfamily Cribratininae.

Cribratininae Loeblich and Tappan, 1964 (*1910), p. C220 (subfamily).

Test free, chambers in rectilinear series as in the Hormosininae; wall agglutinated, thick, with subepidermal alveolar layer; aperture terminal, single or multiple. L. Cretaceous (Albian) to U. Cretaceous (L. Cenomanian).

CRIBRATINA Sample, 1932

Plate 47, figs. 11-15

Type species: Nodosaria texana Conrad, in Emory, 1857 (***1109**), p. 159; OD.

Cribratina Sample, 1932 (*2722), p. 319.

Test free, large, up to 10 mm in length, elongate, uniserial and rectilinear, chambers closely appressed, sutures straight, horizontal and constricted; wall thick, agglutinated, of medium- to coarse-grained quartz and other mineral particles, with subepidermal alveolar layer; aperture terminal, cribrate, with many irregular and subangular openings on a produced area of the final chamber face. L. Cretaceous (Albian) to U. Cretaceous (L. Cenomanian); USA: Texas, Oklahoma.

Superfamily LITUOLACEA de Blainville, 1827

Lituolacea Loeblich and Tappan, 1961 (*1902), p. 277, nom. corr. pro superfamily Lituolidea.

Lituolidea Glaessner, 1945 (*1250), p. 93, nom. transl. ex family Lituacea.

Lituolina Delage and Hérouard, 1896 (*926), p. 132 (tribe).

Lituolicae Brönnimann, 1958 (*384), p. 176.

Lituoloidea Ayala-Castañares, 1963 (*101), p. 47.

Lituolaceae Hamaoui and Saint-Marc, 1970 (*1386), p. 336.

Test free or attached, multilocular, planispirally enrolled in early stage, later may uncoil; wall agglutinated, nonperforate. U. Devonian to Holocene.

Family OXINOXISIDAE Vyalov, 1968

Oxinoxisidae Vyalov, 1968 (*3327), p. 5.

Test large, early stage attached, later may grow free of the attachment, ovate proloculus followed by loosely enrolled subglobular chambers, later rectilinear; wall agglutinated; aperture terminal, rounded, on short thick neck. U. Devonian (Famennian) to L. Carboniferous, L. Mississippian (Kinderhookian).

OXINOXIS Gutschick, 1962

Plate 48, fig. 1

Type species: Oxinoxis botrys Gutschick, 1962; OD.

Oxinoxis Gutschick, 1962 (*1347), p. 1299.

Test large, up to 1.5 mm in length, ovate proloculus followed by slightly coiled subglobular chambers, attached in the early stage, with the attachment serving as a basal wall, later uncoiled and rectilinear, growing free of the attachment and with wall completely developed; wall of agglutinated quartz and calcareous grains on a chitinous base; aperture rounded, terminal, in the later uncoiled chambers occurring at the end of a distinct tubular neck. U. Devonian (Famennian) to L. Carboniferous, L. Mississippian (Kinderhookian); USA: Montana, Illinois, Missouri.

Remarks: Conkin and Conkin (1964, ***672**, p. 87) regard the type species of *Oxinoxis* as synonymous with *Saccammina ligula* Gutschick, Weiner, and Young, 1961, the latter being regarded as single-chambered specimens. However, the proloculus of *O. botrys* is elongate ovate rather than globular, and its tubular neck is only developed in later chambers, hence we recognize the two as distinct.

Family HAPLOPHRAGMOIDIDAE Maync, 1952

Haplophragmoididae Podobina, 1975 (*2434), p. 25, nom. transl. ex subfamily Haplophragmoidinae.

Haplophragmoidinae Maync, 1952 (*2067), p. 43 (subfamily).

Asanospiridae Vyalov, 1968 (*3327), p. 5.

Pseudohaplophragmidinae Saidova, 1981 (*2696), p. 17 (subfamily; nom. imperf.).

Test planispirally enrolled and involute to partially evolute with septa formed by continuation of outer wall; wall agglutinated, simple, not alveolar; aperture single or multiple, equatorial in position, basal to areal. U. Triassic to Holocene.

AMMOSIPHONIA He, 1977

Plate 49, figs. 6-9

Type species: Ammosiphonia vulgaris He, 1977; OD.

Ammosiphonia He, in He and Hu, 1977 (*1447), p. 8.

Test planispiral, symmetrical, and nearly completely involute but with depressed central umbilicus on each side, chambers somewhat inflated near the umbilicus, periphery subangular; wall finely agglutinated, simple; aperture a single rounded areal opening somewhat elevated on a short tubular neck that is formed solely of the cementing material without foreign particles. U. Triassic; China: Yunnan Province.

ASANOSPIRA Takayanagi, 1960

Plate 49, figs. 17 and 18

Type species: Lenticulina? teshioensis Asano, 1950 (*85), p. 21; OD.

Asanospira Takayanagi, 1960 (*3112), p. 74.

Asanoina Loeblich and Tappan, 1964 (*1910), p. C225 (err. cit. pro *Asanospira*, non *Asanoina* Finlay, 1939).

Test free, compressed, planispiral, involute and may have slight umbilicus; sutures nearly radial, not deeply depressed; wall finely agglutinated; aperture a simple low opening at the base of the apertural face. Cretaceous: Japan, to U. Oligocene; Venezuela.

Remarks: Differs from *Haplophragmoides* in the lenticular form, subangular periphery, and rounded rather than lobulate margin.

BUZASINA Loeblich and Tappan, 1985

Plate 48, figs. 2-7

Type species: Trochammina ringens Brady, 1879 (*337), p. 57; OD.

Buzasina Loeblich and Tappan, 1985 (*1923), p. 92.

Cystamminella Lukina, 1980 (*1943), p. 33 (non *Cystamminella* Myatlyuk, 1966); type species: *Trochammina galeata* Brady, 1881 (*337), p. 52; OD.

Test free, small, planispirally enrolled, three to four strongly overlapping and rapidly enlarging chambers in two to three whorls, final chamber comprising more than one-half the test; wall thin, finely agglutinated with considerable cement; aperture areal, equatorial, and slitlike, completely bordered by a narrow lip. U. Cretaceous (Santonian-Campanian) of NW Pacific; Holocene; N. and S. Pacific; N. and S. Atlantic; Gulf of Mexico; Antarctic from 1,500 m to 5,965 m.

Remarks: *Buzasina* differs from *Trochammina* and *Cystammina* in being planispiral, from *Haplophragmoides* in the areal aperture, and from *Labrospira* in the very fine-grained wall, few chambers per whorl that increase rapidly in size as added, and in the deep water habitat.

CRIBROSTOMELLUS Saidova, 1970

Plate 48, figs. 8-10

Type species: Cribrostomellus apertus Saidova, 1970; OD.

Cribrostomellus Saidova, 1970 (*2693), p. 151.

Test free, planispiral, and biumbilicate but asymmetrical, with broad subglobular chambers that result in a lobulate margin; wall agglutinated with carbonate cement; aperture areal, near the base of the apertural face, one or a series of large and irregular openings. Holocene; Pacific, abyssal depths of the Kurile-Kamchatka Trench, from 8,185 m to 9,530 m.

Remarks: Differs from *Cribrostomoides* in the more asymmetrical test, inflated chambers, and expanded and irregular apertural openings. The external appearance suggests that the coiling may be somewhat streptospiral, but no sections have been published that allow its recognition as such.

CRIBROSTOMOIDES Cushman, 1910

Plate 49, figs. 1-3

Type species: Cribrostomoides bradyi Cushman, 1910; OD.

Cribrostomoides Cushman, 1910 (*701), p. 108.

Test free, enrolled and involute, few chambers per whorl, early stage slightly streptospiral in growth, later becoming planispiral and symmetrical; wall agglutinated, thin, and simple in structure, surface smoothly finished; aperture equatorial, just above the base of the final chamber face, with a narrow lip of finer sand present on both margins, a simple slit in the early chambers, later becoming irregular with fine projections from both margins that may divide the primary aperture into a linear series of irregular to rounded openings near the base of the chamber face.

Holocene: Atlantic and Pacific from 186 m to 4,738 m.

DEBARINA Fourcade, Raoult, and Vila, 1972

Plate 50, figs. 9-12

Type species: Debarina hahounerensis Fourcade et al., 1972; OD.

Debarina Fourcade, Raoult, and Vila, 1972 (*1163), p. 191.

Test free, planispirally enrolled, partially to completely involute, chambers numerous, ten to fourteen per whorl, enlarging very slowly as added; wall microgranular, calcareous, probably agglutinated, structure simple; aperture a row of pores at the base of the apertural face. L. Cretaceous (Aptian); Algeria; Spain; Italy; Yugoslavia.

Remarks: *Debarina* differs from *Cribrostomoides* in having a row of apertures at the base of the face, whereas *Cribrostomoides* has an areal slit that later is subdivided into a row of areal pores.

EVOLUTINELLA Myatlyuk, 1971

Plate 48, figs. 11-21

Type species: Evolutinella subevoluta Nikitina and Myatlyuk, in Myatlyuk, 1971; OD.

Evolutinella Myatlyuk, 1971 (*2221), p. 23 (also err. cit. as *Evolitinella* on expl. fig. 1, p. 24).

Schleiferella Bulynnikova, 1971 (*449), p. 14; type species: *Haplophragmoides? schleiferi* Sharovskaya, 1966 (*2883), p. 61; OD.

Loculorbis Alekseychik-Mitskevich, 1973 (*21), p. 32, 33; type species: *Haplophragmoides darwini* Dain, 1961 (*873), p. 18; OD.

Test free, planispiral, almost to completely evolute and biumbilicate; wall agglutinated, fine grained, and smoothly finished; aperture equatorial, at the base of the final chamber. Jurassic to U. Cretaceous; cosmopolitan.

GOBBETTIA Dhillon, 1968

Plate 50, figs. 1 and 2

Type species: Gobbettia wilfordi Dhillon, 1968; OD.

Gobbettia Dhillon, 1968 (*952), p. 140.

Test coiled, planispiral, umbilicate, with chambers increasing rapidly in height; wall proteinaceous and flexible, hence test commonly is somewhat flattened, smooth, and translucent; aperture equatorial, areal, a single arched opening or two symmetrical openings low in the apertural face, surrounded by a raised margin. Holocene, brackish estuary; Malaysia.

Remarks: The original description indicated a low basal primary aperture in addition to the low areal opening or openings that are bordered by a lip; the type figures show only an areal aperture, and the presence of an additional interiomarginal opening is doubtful.

HAPLOPHRAGMOIDES Cushman, 1910

Plate 49, figs. 4, 5, 12-16, and 19-23

Type species: Nonionina canariensis d'Orbigny, 1839 (*2305), p. 128; OD.

Haplophragmoides Cushman, 1910 (*701), p. 99.

Recurvoidella Uchio, 1960 (*3238), p. 53; type species: *Recurvoidella parkerae* Uchio, 1960; OD.

Linguaferina Alekseychik-Mitskevich, 1973 (*21), p. 34; type species: *Haplophragmoides subsphaeroides* Subbotina, 1950 (*3077), p. 80; OD.

Pauciloculina Alekseychik-Mitskevich, 1973 (*21), p. 35; type species: *Haplophragmoides kirki* Wickenden, 1932 (*3371), p. 85; OD.

Subtilina Alekseychik-Mitskevich, 1973 (*21), p. 35; type species: *Haplophragmoides tenuis* Cushman, 1927 (*738), p. 135; OD.

Pseudohaplophragmoides Saidova, 1981 (*2696), p. 17; type species: *Haplophragmoides ultimus* Saidova, 1975 (*2695), p. 73; OD.

Test planispirally enrolled, involute to slightly evolute, biumbilicate, sides somewhat flattened, chambers inflated and margin lobulate; wall thin, finely to coarsely agglutinated, exterior smoothly finished; aperture an elongate equatorial slit at the base of the apertural face. Cretaceous to Holocene; cosmopolitan.

LABROSPIRA Höglund, 1947

Plate 49, figs. 10 and 11

Type species: Haplophragmium crassimargo Norman, 1892 (*2265), p. 17; OD.

Labrospira Höglund, 1947 (*1487), p. 141, 145.

Test free, large, up to 2.75 mm in breadth, discoid, planispirally enrolled, and partially evolute; wall thick, coarsely agglutinated, and firmly cemented with organic material; aperture an oval to slitlike areal opening slightly above the base of the apertural face, both margins bordered by well-developed lips. Holocene; N. Atlantic; Arctic Ocean.

Remarks: Although previously regarded as a synonym of *Cribrostomoides*, *Labrospira* has a more planispiral and partially evolute coil, flattened sides rather than inflated chambers, coarsely agglutinated wall, and a single aperture, rather than a row of openings in the adult. Norman did not originally illustrate the species but referred in the text to a figure by Brady in the Challenger Report. However, Norman's types are extant and the lectotype (BMNH ZF 3640) and paratypes (BMNH 15.4.1.1503) are from Bog Fjord, East Finmark, N. Norway, at 100-110 fathoms.

TROCHAMMINITA Cushman and Brönnimann, 1948

Plate 51, figs. 1-6

Type species: Trochamminita irregularis Cushman and Brönnimann, 1948; OD.

Trochamminita Cushman and Brönnimann, 1948 (*814), p. 17.

Test free, planispirally enrolled at least in the early stage, later chambers irregular in form and arrangement, sutures radial in early part, slightly depressed, periphery rounded, peripheral outline lobulate; wall thin, brownish, with fine to coarse quartz grains on a proteinaceous base; aperture areal, one or more rounded to irregular openings in the lower part of the apertural face, each surrounded by a distinct lip. Holocene, brackish water; Trinidad, West Indies; USA: Louisiana.

UNITENDINA Alekseychik-Mitskevich, 1973

Plate 50, figs. 3-6

Type species: Haplophragmoides oblongus Voloshinova, in Voloshinova and Budasheva, 1961 (*3317), p. 186; OD.

Unitendina Alekseychik-Mitskevich, 1973 (*21), p. 32, 34.

Test enrolled, biumbilicate, partially evolute, chambers increasing rapidly in height in the later stage, suggesting a tendency to uncoil; wall coarsely agglutinated; aperture equatorial, a small arched opening at the base of the final chamber. Jurassic to Miocene; USSR.

VELERONINOIDES Saidova, 1981

Plate 50, figs. 7, 8

Type species: Haplophragmoides veleronis Cushman and McCulloch, 1939 (*830), p. 82; OD.

Veleroninoides Saidova, 1981 (*2696), p. 17.

Test planispiral, evolute, biumbilicate, with numerous low chambers in about two and a half whorls, increasing very little in size as added, periphery broadly rounded, margins slightly lobulate, with chambers much wider than high as seen from the periphery; later sutures slightly depressed, nearly radial; wall finely agglutinated, surface smoothly finished; aperture areal, a low oval to elliptical opening near the base of the apertural face, bordered by a slight lip. Holocene; E. Pacific, off Guadalupe Island, Mexico, at 150 m.

Remarks: The original description of the genus indicated the type species but stated only "test planispiral, evolute." The type species was described from a single locality off Mexico and has not been reported elsewhere. No sections have been illustrated for this genus, hence whether coiling of the earliest whorls is planispiral or streptospiral remains uncertain. *Veleroninoides* differs from *Evolutinella* and *Haplophragmoides* in the areal aperture and differs from the latter and *Labrospira* in the wholly evolute coiling. It differs from all in the very low and slowly enlarging chambers.

Family DISCAMMINIDAE Mikhalevich, 1980

Discamminidae Loeblich and Tappan, 1984 (*1918), p. 9, nom. transl. ex subfamily.

Discammininae Mikhalevich, 1980 (*2109), p. 6 (subfamily).

Test enrolled, early stage planispiral and evolute, later may be uncoiled and rectilinear; wall coarsely agglutinated of quartz grains and sponge spicules on an inner organic layer; septa lack agglutinated material but are very thin, straight, wholly organic internal partitions; aperture a low interiomarginal equatorial opening in enrolled stage, becoming terminal and central in the rectilinear stage, seen in section as slightly produced foramina in the septa of earlier chambers. U. Cretaceous to Holocene.

AMMOSCALARIA Höglund, 1947

Plate 51, figs. 11-13

Type species: Haplophragmium tenuimargo Brady, in Tizard and Murray, 1882 (***3198**), p. 715; OD.

Ammoscalaria Höglund, 1947 (***1487**), p. 151.

Test free, elongate, flattened, early portion with one to two planispiral whorls, later uncoiling and rectilinear, with short and broad chambers separated by the very thin, straight, and horizontal partitions comprised only of organic material and pierced centrally by an intercameral foramen that has a short tubular neck; outer wall thick and coarsely agglutinated on an organic lining, surface rough, that of the region near the aperture much thinner and more fine grained; aperture terminal and rounded, slightly produced. U. Cretaceous (Campanian) to Eocene, Holocene; Asiatic USSR: Omsk, Tomsk, Tyumen; N. and S. Atlantic and Gulf of Mexico from 161 m to 5,011 m; S. Pacific from 2,012 m to 3,109 m; N. Pacific at 7,224 m.

DISCAMMINA Lacroix, 1932

Plate 52, figs. 1-4

Type species: Discammina fallax Lacroix, 1932 = *Lituolina irregularis* var. *compressa* Goës, 1882 (***1255**), p. 141; OD(M).

Discammina Lacroix, 1932 (***1764**), p. 2.

Test planispirally enrolled, slightly evolute, strongly compressed, interior divided by thin straight organic partitions, not corresponding to the original apertural face and not always reflected at the surface; wall agglutinated, commonly of quartz grains and sponge spicules on a proteinaceous base; aperture a broad low interiomarginal equatorial opening. Holocene; Mediterranean; Atlantic; Caribbean.

GLAPHYRAMMINA Loeblich and Tappan, 1984

Plate 51, figs. 7-10

Type species: Ammobaculites americanus Cushman, 1910 (***701**), p. 117; OD.

Glaphyrammina Loeblich and Tappan, 1984 (***1920**), p. 1161.

Test free, broad and flattened, early portion planispirally enrolled and partially to completely evolute, sutures radial to oblique and curving back at the periphery, later portion uncoiled and may have a few rectilinear chambers with straight and horizontal sutures, sutures merely represent external indication of periodic growth, as interior is hollow and undivided by septa, but possibly has organic partitions in life as does Ammoscalaria; wall coarsely agglutinated, surface roughened; aperture an elongate narrow opening, extending the breadth of the chamber, not produced. ?Pleistocene: India; Holocene: S. Atlantic at 3,800 m; N. Pacific from 1,544 m; S. Pacific at 80 m to 2,750 m.

Remarks: *Glaphyrammina* differs from *Ammobaculites* in the hollow interior and absence of septa; it differs from *Ammoscalaria* in the large enrolled portion, much flattened test, and very elongate and narrow slitlike aperture.

Family SPHAERAMMINIDAE Cushman, 1933

Sphaeramminidae Loeblich and Tappan, 1982 (***1917**), p. 27, nom. transl. ex subfamily.

Sphaerammininae Cushman, 1933 (***766**), p. 87 (subfamily).

Ammosphaerulininae Saidova, 1981 (***2696**), p. 14 (subfamily).

Test planispiral and involute, later chambers almost completely enclosing earlier ones; wall finely agglutinated; aperture areal, rounded to slitlike, with a simple projecting tooth. Holocene.

AMMOSPHAERULINA Cushman, 1912

Plate 52, fig. 13

Type species: Ammosphaerulina adhaerens Cushman, 1912; OD.

Ammosphaerulina Cushman, 1912 (***703**), p. 228.

Test attached, about 0.75 mm in diameter, chambers few, globular and embracing, in an enrolled series as in *Sphaerammina*; wall agglutinated; aperture small and without visible tooth. Holocene; S. Pacific, Malaysia at 1,280 m.

CANEPAIA Boltovskoy, 1961

Plate 52, figs. 5-7

Type species: Canepaia brasiliensis Boltovskoy, 1961; OD.

Canepaia Boltovskoy, 1961 (*293), p. 74.

Test free, subspherical, globular proloculus followed by strongly overlapping enrolled chambers as in *Sphaerammina*, only the last one or two chambers visible externally; wall coarsely agglutinated with finer-grained ground mass, early chambers finer grained; aperture small, rounded to slightly elongate, bordered by short inward projecting entosolenian neck, but without an external tooth. Holocene; S. Atlantic at 80 m to 155 m.

SPHAERAMMINA Cushman, 1910

Plate 52, figs. 8-12

Type species: Sphaerammina ovalis Cushman, 1910; OD.

Sphaerammina Cushman, 1910 (*700), p. 439.

Test large, up to 2 mm in length, planispirally enrolled, about four strongly overlapping chambers per whorl, with the final embracing chamber overlapping more than one-half the test; wall finely agglutinated; aperture areal, oval in outline, containing a simple to elongate projecting tooth. Holocene; Pacific: Philippine Islands, at 596 m to 1,400 m.

Remarks: Originally described as having rectilinear but overlapping chambers, dissection of a topotype (Loeblich and Tappan, 1964, ***1910**) demonstrated the enrolled nature of *Sphaerammina*.

Family LITUOTUBIDAE Loeblich and Tappan, 1984

Lituotubidae Loeblich and Tappan, 1984 (*1918), p. 9.

Lituiforminoidinae Saidova, 1981 (*2696), p. 16 (subfamily; name not available, ICZN Art. 13(a) (i), no description).

Test free, proloculus followed by enrolled nonseptate portion and later elongate and irregularly septate chambers, may uncoil and become elongate and rectilinear in the adult; aperture simple, interiomarginal to terminal. M. Triassic (U. Ladinian) to Holocene.

Remarks: No definition was given by Saidova (1981, ***2696**) for the subfamily Lituiforminoidinae of the Tolypamminidae, although it was stated to include two genera, hence the subfamily is invalid. Because the type species of *Lituotuba* is multilocular, rather than consisting solely of proloculus and undivided tubular chamber, it cannot be included in the Tolypamminidae and therefore is placed in a separate family. It differs from the Lituolidae in having fewer and more irregular chambers.

LITUOTUBA Rhumbler, 1895

Plate 53, fig. 3

Type species: Trochammina lituiformis Brady, 1879 (***337**), p. 59; SD Cushman, 1910 (***701**), p. 113.

Lituotuba Rhumbler, 1895 (*2616), p. 83.

Arlituotubum Rhumbler, 1913 (*2621), p. 386 (err. emend.).

Lituiforminoides Saidova, 1981 (*2696), p. 16; type species: obj., OD.

Test free, early portion with irregular to planispirally coiled tubular chamber following a globular proloculus, later with distinct but elongate and tubular chambers, few per whorl, resulting from slight constriction after periodic growth, the subsequent test addition smoothing the exterior surface but leaving apparent septa at the constrictions, finally becoming uncoiled and irregularly rectilinear; wall finely agglutinated, of quartz grains in a yellowish-brown cement, surface smoothly finished, chamber floor of enrolled portion formed by the outer wall of the previous whorl, the chambers becoming wholly tubular only in the uncoiled stage; aperture rounded at the open end of the tubular chamber. Holocene; Atlantic, Gulf of Mexico, and Caribbean, from 454 m to 3,270 m; N. Pacific at 208 m to 3,802 m.

Remarks: As noted by Ireland (1966, ***1587**, p. 229), the discussion of *Lituotuba* by Schellwien (1898, ***2751**, p. 265) did not constitute a valid designation of *Serpula filum* Schmid, 1867 as the type species of *Lituotuba* (as erroneously was stated by Loeblich and Tappan, 1964, ***1910**, p. C214), and Cushman's (1910, ***701**) designation of *Trochammina lituiformis* as type species is valid. *Lituiforminoides* thus is an objective synonym of *Lituotuba*. Paleozoic taxa previously placed in *Lituotuba* are not congeneric.

Trochamminoides proteus (Karrer) has been confused with *Lituotuba lituiformis* in the literature, but the former has numerous subglobular chambers per whorl and does not uncoil in the later stage. The two can be readily separated on the basis of chamber number and dimensions when they occur together.

PARATROCHAMMINOIDES Soliman, 1972

Plate 53, figs. 4-6

Type species: Trochamminoides korosmezoensis Majzon, 1943 (***1982**), p. 11; OD.

Paratrochamminoides Soliman, 1972 (***3019**), p. 37.

Test enrolled, proloculus followed by streptospirally coiled and undivided tubular second chamber, later with numerous ovate to globular chambers per whorl and an abrupt change in coiling, to a planispiral final whorl; wall agglutinated, of firmly cemented quartz grains; aperture rounded. U. Cretaceous (Turonian) to Paleocene; Czechoslovakia; Romania; Poland; USSR; Mexico.

PLAGIORAPHE Kristan-Tollmann, 1973

Plate 53, figs. 7-11

Type species: Plagioraphe tornata Kristan-Tollmann, 1973; OD.

Plagioraphe Kristan-Tollmann, 1973 (***1744**), p. 419.

Sectoreophax Trifonova, in Budurov and Trifonova, 1974 (***446**), p. 58, 62 (name not available, ICZN Art. 13 (a) (i), no description).

Globular proloculus followed by a linear to slightly arcuate series of twelve to fifteen spirally formed chambers, each chamber comprising an entire whorl or more, coiling may be either dextral or sinistral, intercameral sutures strongly oblique, incised; wall agglutinated, insoluble in acid; aperture large, at the open end of the enrolled chamber. M. to U. Triassic (U. Ladinian to Norian); N. Alps; Germany; Bulgaria.

Remarks: The systematic position of this genus is uncertain. The oblique sutures separating spirally wound tubular chambers is quite unlike any other agglutinated uniserial foraminifers; the nature of the chambers is suggestive of *Lituotuba*, although the test is not truly enrolled. It is tentatively placed in the Lituotubidae.

TROCHAMMINOIDES Cushman, 1910

Plate 53, figs. 1 and 2

Type species: Trochammina proteus Karrer, 1866 (***1652**), p. 494; OD.

Trochamminoides Cushman, 1910 (***701**), p. 97.

Test enrolled, discoidal, proloculus followed by irregularly coiled and undivided tubular chamber in early whorls, later whorls divided into a few to many chambers as a result of periodic growth and becoming planispiral and evolute; wall agglutinated, of fine quartz sand in a yellowish-brown to reddish-brown ground mass; aperture large, rounded, equatorial, lying against the previous whorl, and may have a somewhat thickened lip. Cretaceous to Holocene, from 700 m to 2,960 m; Atlantic, Pacific, Gulf of Mexico and Caribbean.

Remarks: As noted by Cushman (1920, ***716**, p. 37, 59), the type species has at times been confused with the early stage of *Lituotuba lituiformis* (Brady), as for example by Goës (1896, ***1258**, p. 33) and Hofker, (1972, ***1521**, p. 58). Karrer (1866, ***1652**) illustrated a variety of genera and species under this name in the original description, including *Ammodiscus*, *Glomospira*, and *Trochammina*. Brady (1884, ***344**, p. 341) restricted the species to specimens such as Karrer's figure 8, however, which is a distinctly segmented form with numerous chambers in the later whorls. Even in the few locations where both occur, *Trochamminoides* is larger, more regular in growth, and has many more chambers per whorl than does the early coiled portion of *Lituotuba lituiformis*. Although described originally as typically planispiral, the early stage is irregular, and only the later whorls are completely planispiral. Typically planispiral species previously placed in *Trochamminoides* are better referred to *Evolutinella*.

Family NAUTILOCULINIDAE Loeblich and Tappan, 1985

Nautiloculinidae Loeblich and Tappan, 1985 (***1923**), p. 92.

Test free, lenticular, planispiral, and involute, umbonate test resulting from secondary thickening in the umbilical region; wall microgranular calcareous, agglutinated, simple, and without exoskeletal or endoskeletal structures, single layered except for secondarily doubled septa; aperture interiomarginal, equatorial, single. U. Jurassic (L. Malm) to U. Cretaceous (Senonian).

Remarks: Differs from the Haplophragmoididae in the microgranular agglutinated wall, from the Lituolidae in showing no tendency to uncoil, from the Mayncinidae in the more nautiloid coil, and from all in the strong secondary umbilical thickening and the secondarily doubled septa.

MURGEINA Bilotte and Decrouez, 1979

Plate 54, figs. 1-6

Type species: Nummofallotia apula Luperto Sinni, 1968 (***1947**), p. 97; OD.

Murgeina Bilotte and Decrouez, 1979 (***241**), p. 38.

Test lenticular, biumbonate, small, up to about 0.36 mm in diameter, large globular proloculus followed by about three planispiral whorls, increasing in number per whorl as added, with sixteen to twenty chambers in the final whorl, septa radial, slightly curved backward at the periphery; wall calcareous, finely granular, with radial calcite forming a thickened umbonal region on both sides of the test; aperture equatorial in position, at the base of the apertural face. U. Cretaceous (U. Cenomanian to Senonian); Italy; Greece; Yugoslavia; Lebanon.

NAUTILOCULINA Mohler, 1938

Plate 54, figs. 10-12

Type species: Nautiloculina oolithica Mohler, 1938; OD.

Nautiloculina Mohler, 1938 (***2164**), p. 18.

Test free, lenticular in form, planispirally enrolled and involute, globular proloculus followed by numerous small chambers per whorl that increase gradually in size, interior simple, sutures radial to very slightly arched; wall microgranular calcareous, agglutinated, commonly diagenetically altered, foreign material more abundant in outer whorls of some species, structure simple, no subepidermal network or other exoskeletal or endoskeletal structures present, wall single layered, but septa secondarily doubled by addition of a second wall layer over the previous apertural face as a new chamber is added, umbonal region also progressively thickened as chambers are added; aperture equatorial, a low interiomarginal arch. U. Jurassic (L. Malm) to L. Cretaceous (Bedoulian); Switzerland; France; Yugoslavia; USSR: N. Caucasus; Egypt; Israel.

Family MAYNCINIDAE Loeblich and Tappan, 1985

Mayncinidae Loeblich and Tappan, 1985 (***1923**), p. 92.

Test free, flattened to lenticular, planispirally enrolled, numerous broad and low chambers per whorl that may increase rapidly in breadth and may uncoil in the later stage; wall agglutinated, granular, and homogeneous in appearance, without perforations or alveoles; aperture interiomarginal to areal, single or multiple. U. Jurassic (Kimmeridgian) to U. Cretaceous (Santonian); commonly in a carbonate shelf facies.

Remarks: Differs from the Haplophragmoididae in the flattened test with numerous chambers per whorl, rapid increase in height of the whorl, tendency to uncoil in the later stage, and the commonly multiple aperture. Differs from the Lituolidae in the large, lenticular to flattened planispiral coil, and reduced, flattened uniserial stage and differs from the Charentiidae in the simple rather than canaliculate wall.

BICONCAVA Hamaoui, 1965

Plate 55, figs. 1-4

Type species: Biconcava bentori Hamaoui, 1965 (***1381**), p. 14; OD(M).

Biconcava Hamaoui, 1965 (***1381**), p. 14 (available, ICZN Art. 13 (c)); see also Hamaoui and Saint-Marc, 1970 (***1386**), p. 298.

Biconcava Hamaoui, in Arkin and Braun, 1965 (***69**), p. 7, 9. (name not available, ICZN Art. 13 (a) (i), no description).

Test free, planispirally enrolled, partially evolute, biumbilicate, periphery subacute, up to twenty-four chambers in the final whorl, about three and a half whorls in the adult, sutures elevated, slightly curved; wall calcareous, microgranular, imperforate; aperture in the early stage an interiomarginal arch with extension up the apertural face, later areal in a median groove that extends up the apertural face. U. Cretaceous (Cenomanian); Israel; Lebanon; Iran; Italy.

Remarks: In placing *Biconcava* in the Nezzazatidae, Hamaoui and Saint-Marc (1970, *1386, p. 301) refer to a rudimentary internal toothplate; this structure does not appear evident in the illustrated sections, hence the genus is here transferred to the Mayncinidae. It is closest in appearance to *Daxia* but differs in being more evolute and in the aperture located in a vertical groove in the apertural face.

COMALIAMMA Loeblich and Tappan, 1985

Plate 54, figs. 13-16

Type species: Comaliamma charentiiformis Loeblich and Tappan, 1985; OD.

Comaliamma Loeblich and Tappan, 1985 (*1923), p. 93.

Test free, early stage lenticular, of numerous close-coiled chambers, later uncoiling, with one or two nearly rectilinear chambers that are flattened to ovate in section; wall simple and nonalveolar, of finely agglutinated quartz grains, surface smoothly finished; aperture areal in the early coiled stage, piercing the septa as seen in thin section, a short terminal slit in a slight depression in the uncoiled chambers. L. Cretaceous (Albian); USA: Texas.

Remarks: Superficially similar to *Charentia* in the discoid early stage and tendency to uncoil but differs in the nature of the aperture and simple rather than canaliculate walls and septa.

DAXIA Cuvillier and Szakall, 1949

Plate 55, figs. 5-9

Type species: Daxia cenomana Cuvillier and Szakall, 1949; OD.

Daxia Cuvillier and Szakall, 1949 (*865), p. 8.

Test lenticular and biumbonate to flattened, planispirally enrolled and involute, with numerous broad, low chambers per whorl, sutures arched centrally, curving back to the peripheral angle, apertural face truncated to slightly excavated centrally for much of its height; wall finely agglutinated, simple, noncanaliculate and nonalveolar; aperture small, difficult to observe from the exterior, but thin sections show an areal opening in each septum just above the base of the apertural face, with a slightly thickened border. Cretaceous (?Neocomian, ?Aptian, Cenomanian); France.

Remarks: Various discussions of the aperture of *Daxia* have differed, probably as a result of misidentification, as other genera of this family are superficially similar in outward appearance. On the basis of specimens we have examined and sectioned from the type locality of *D. cenomana*, at Audignon, and from Île Madam, Charente Maritime, France, specimens illustrated by Neumann (1965, *2245, pl. 1, figs. 1, 2, and 5-7) are *Mayncina orbignyi* rather than *D. cenomana*. True *Daxia* is lenticular and biumbonate with a relatively acute periphery and has a single areal opening; *M. orbignyi* is thicker, distinctly biumbilicate, and somewhat inflated from the vicinity of the umbilicus for about half the distance to the periphery, and the aperture is multiple. Neumann (1965, *2245, p. 91, footnote 3) quoted a letter from Maync that indicated a probable multiple aperture in *Daxia*; this also appears due to a similar misidentification of *Mayncina* as *Daxia*. Maync (1972, *2082, p. 357) described a single areal aperture for *Daxia*.

DEUTEROSPIRA Hamaoui, 1965

Plate 57, figs. 1 and 2

Type species: Deuterospira pseudodaxia Hamaoui, 1965; OD (M).

Deuterospira Hamaoui, 1965 (*1381), p. 15 (available, ICZN Art. 13 (c)); see also Hamaoui, 1979 (*1382), p. 340.

Deuterospira Hamaoui, in Arkin and Braun, 1965 (*69), p. 9 (name not available, ICZN Art. 13 (a) (i), no description).

Test planispirally enrolled, involute, biumbilicate, periphery acutely angled, with numerous small nummulitoid chambers per whorl, spire expanding rapidly, the inner part of each whorl, where it is of maximum thickness and that was described originally as a second spire, is seen in section to be completely filled with agglutinated matter; wall agglutinated, imperforate, nonalveolar; aperture interiomarginal, in equatorial section the intercameral foramina leave a distinct gap between the inner ends of the septa and the outer part of the densely filled area. aperture suggested to become areal in the adult stage. U. Cretaceous (Cenomanian); Israel; Iraq.

FLABELLOCYCLOLINA Gendrot, 1964

Plate 57, figs. 3-6

Type species: Flabellocyclolina laevigata Gendrot, 1964; OD.

Flabellocyclolina Gendrot, 1964 (*1217), p. 529.

Test large, up to 5.0 mm in length, flattened, early stage planispiral and evolute, numerous broad low chambers in a rapidly enlarging whorl, later uncoiling and peneropliform, with strongly arched chambers that nearly form a semicircle, no internal structures, sutures distinct, arched; wall calcareous, microgranular, surface smooth; aperture a single row of openings extending across the terminal face in the median plane of the test. U. Jurassic (Oxfordian); U. Cretaceous (Santonian); Israel; France.

FREIXIALINA Ramalho, 1969

Plate 54, figs. 7-9

Type species: Freixialina planispiralis Ramalho, 1969; OD.

Freixialina Ramalho, 1969 (*2510), p. 40.

Test discoidal, biumbilicate, planispirally enrolled, and evolute, with spire increasing rapidly in height, sutures slightly curved to straight and somewhat oblique; wall finely agglutinated, simple in structure; aperture an areal slit. U. Jurassic (Kimmeridgian to Portlandian); Portugal.

Remarks: Differs from *Daxia* in the evolute whorl; as it appears earlier geologically, it may be ancestral to *Daxia* and other members of this family.

GENDROTELLA Maync, 1972

Plate 58, figs. 5 and 6

Type species: Choffatella rugoretis Gendrot, 1968 (*1218), p. 675; OD.

Gendrotella Maync, 1972 (*2082), p. 357.

Test discoidal to ovate in outline, flattened, numerous chambers per whorl in a rapidly enlarging planispiral coil, septa gently arched at the midpoint on the flattened sides; wall agglutinated, compact and homogeneous; aperture a series of areal pores aligned vertically up the apertural face and reflected in thin section by the multiple passages through the septa. U. Cretaceous (Santonian); France.

MAYNCINA Neumann, 1965

Plate 56, figs. 1-7

Type species: Daxia orbignyi Cuvillier and Szakall, 1949 (*865), p. 8 (as "*d'orbignyi*" in Neumann, 1965); OD.

Mayncina Neumann, 1965 (*2245), p. 91.

Test discoidal to lenticular, with numerous broad and low chambers planispirally enrolled, the operculinoid spire increasing slowly in height, chambers arched toward the apertural face, sutures slightly depressed; wall of finely agglutinated quartz sand, simple in structure and neither canaliculate nor alveolar; aperture cribrate, areal, with pores scattered up the apertural face and reflected in thin section by the multiple passages through the septa. U. Cretaceous (Cenomanian); France.

PHENACOPHRAGMA Applin, Loeblich, and Tappan, 1950

Plate 57, figs. 7-11; plate 58, figs. 1 and 2

Type species: Phenacophragma assurgens Applin et al., 1950; OD.

Phenacophragma Applin, Loeblich, and Tappan, 1950 (*55), p. 78.

Test discoidal to auriculate, compressed, planispirally enrolled and partially to entirely evolute, tending to uncoil in the later stage, early sutures nearly radial, later ones somewhat arched, one or two short hemisepta intercalated between each two major septa at the periphery and extend inward for only a short distance; wall finely agglutinated, simple in structure; aperture areal in the enrolled stage, as seen in thin sections, becoming terminal and slitlike in the uncoiling chambers. L. Cretaceous (Albian); USA: Texas; USSR: W. Siberia.

STOMATOSTOECHA Applin, Loeblich, and Tappan, 1950

Plate 58, figs. 7-10

Type species: Stomatostoecha plummerae Applin et al., 1950; OD.

Stomatostoecha Applin, Loeblich, and Tappan, 1950 (*55), p. 76.

Test discoidal to lenticular, numerous broad and low chambers increasing rapidly in breadth so that the spire increases rapidly in height, coilingplanispiral and incompletely involute, leaving a depressed umbilicus; wall finely agglutinated, imperforate, simple in structure; apertural face high and truncate and may be slightly depressed centrally, aperture a small areal slit in the early stage as seen in thin section, becoming terminal in the expanded and nearly uncoiled later portion. L. Cretaceous (Albian); USA: Texas.

Remarks: Although originally described as having a series of apertural pores, Maync (1972, ***2082**, p. 356) noted that the septa were compact rather than pierced. Because of the narrowness of the slit aperture, it is not intersected by every section, but a single relatively large slit in the septum is apparent in a number of places in good axial sections.

Family LITUOLIDAE de Blainville, 1827

Lituolidae Schulze, 1877 (***2827**), p. 28, nom. corr. pro family Lituacea.
Lituacea de Blainville, 1827 (***248**), p. 380.
Lituolata Crouch, 1827 (***693**), p. 40.
Lituolitidae Broderip, 1839 (***358**), p. 321.
Lituolacea Agassiz, 1844 (***15**), p. 15.
Lituolida Carpenter, 1861 (***486**), p. 470.
Lituolidea Reuss and Fritsch, 1861 (***2593**), p. 1.
Lituolideae Gümbel, 1870 (***1337**), p. 22.
Lituolidee Schwager, 1876 (***2829**), p. 482.
Lituolina Lankester, 1885 (***1790**), p. 847.
Lituoletta Haeckel, 1894 (***1355**), p. 164.
Lituolinae Delage and Hérouard, 1896 (***926**), p. 132.

Early stage enrolled, later may be uncoiled and rectilinear; wall agglutinated, interior simple; aperture terminal. L. Carboniferous, L. Mississippian (Kinderhookian) to Holocene.

Subfamily AMMOMARGINULININAE Podobina, 1978

Ammomarginulininae Podobina, 1978 (***2435**), p. 65.
Ammobaculitinae Alekseychik-Mitskevich, in Subbotina et al., 1981 (***3083**), p. 28.

Early stage coiled, later uncoiling; wall simple. L. Carboniferous, L. Mississippian (Kinderkookian) to Holocene.

AMMOBACULARIA Kristan-Tollmann, 1964

Plate 59, figs. 4 and 5

Type species: Ammobacularia triloba Kristan-Tollmann, 1964; OD.

Ammobacularia Kristan-Tollmann, 1964 (***1740**), p. 40.

Test large, elongate, rounded in section, similar to *Ammobaculites* but differing in apertural features, probably coiled to rectilinear but known from a single specimen, hence not sectioned; wall coarsely agglutinated; aperture triangular with toothlike projection from each of the three edges, giving a triradiate appearance, aperture surrounded by a finer-grained and slightly produced area. U. Triassic (Rhaetian); Austria.

AMMOBACULITES Cushman, 1910

Plate 58, figs. 3 and 4

Type species: Spirolina agglutinans d'Orbigny, 1846 (***2309**), p. 137; OD.

Ammobaculites Cushman, 1910 (***701**), p. 114.

Test free, elongate, early portion close coiled, later uncoiling and rectilinear, rounded in section; wall coarsely agglutinated, interior simple; aperture terminal, rounded. L. Mississippian (Kinderhookian) to Holocene; cosmopolitan.

Remarks: A specimen of *Spirolina agglutinans* in the d'Orbigny Collection, MNHN, Paris, was designated as lectotype of the species and illustrated (Loeblich and Tappan, 1964, ***1910**, p. C241). Thus the later designation of a specimen in the Vienna Museum (GBA 1981/03/196) as lectotype (Papp and Schmid, 1985, ***2338**) is invalid.

AMMOMARGINULINA Wiesner, 1931

Plate 60, fig. 7

Type species: Ammomarginulina ensis Wiesner, 1931; OD(M).

Ammomarginulina Wiesner, 1931 (***3375**), p. 97.

Test elongate, strongly compressed; enrolled and planispiral in early stage, later uncoiled and rectilinear with oblique sutures; wall agglutinated, roughly finished; aperture terminal, rounded, at dorsal angle of the test. Jurassic to Holocene; cosmopolitan.

AMMOTIUM Loeblich and Tappan, 1953

Plate 60, figs. 1-4

Type species: Lituola cassis Parker, in Dawson, 1870 (***903**), p. 177; OD.

Ammotium Loeblich and Tappan, 1953 (***1887**), p. 33.

Ammovaginulina Nakkady and Eissa, 1960 (*2228), p. 13; type species: *Ammovaginulina aegyptica* Nakkady and Eissa, 1960; OD.

Test free, compressed, ovate in outline, planispirally enrolled and evolute, with a tendency to uncoil, later chambers extending back toward the proloculus at the inner margin, microspheric proloculus completely surrounded by enrolled chambers, whereas the megalospheric proloculus is not overlapped by the last chambers of the early coiled portion; wall coarsely agglutinated on an organic lining that also covers the septa, imperforate, and lacking calcareous cement; aperture simple, rounded, terminal, at the dorsal angle of the final chamber, may be temporarily sealed by a plug of debris. L. Cretaceous (Neocomian) to Holocene; Atlantic; Pacific; North America; Europe; Africa.

DISCAMMINOIDES Brönnimann, 1951

Plate 60, figs. 8-11

Type species: Discamminoides tobleri Brönnimann, 1951; OD.

Discamminoides Brönnimann, 1951 (*371), p. 103.

Test free, compressed, early portion planispirally enrolled, later tending to become rectilinear, septa thin, curved; wall agglutinated, fine grained; aperture terminal in later stage. U. Oligocene to L. Miocene; Trinidad, W. Indies.

ERATIDUS Saidova, 1975

Plate 59, figs. 1-3

Type species: Haplophragmium foliaceum Brady, 1881 (*339), p. 50; OD.

Eratidus Saidova, 1975 (*2695), p. 94.

Eratidus Burmistrova, 1974 (*452), p. 134 (name not available, ICZN Art. 13 (a) (i), no description).

Test large, elongate, flattened, early portion planispirally enrolled, with numerous broad low chambers enlarging rapidly and forming about two whorls, later uncoiled and rectilinear, with broad and centrally arched chambers, rectilinear portion of the test of lesser diameter than the coil; wall agglutinated, very thin, so that the inner structure of an entire specimen mounted in balsam is visible in transmitted light; aperture terminal, elongate. Holocene, bathyal and abyssal depths from 690 m to 5,500 m; N. and S. Atlantic; N. and S. Pacific.

KUTSEVELLA Dain, 1978

Plate 59, figs. 7-12

Type species: Ammobaculites labythnangensis Dain, 1972 (*877), p. 67; OD.

Kutsevella Dain, 1978 (*878), p. 131.

Test free, flattened, ovoid in outline, globular proloculus followed by somewhat elongate early chambers that are close coiled in an evolute spire of about three whorls, later chambers of more nearly equal length and breadth, outer test margin with broad flange that separates successive whorls as added; wall agglutinated, with prominent brownish organic layer in the early stage but absent in later whorls; aperture areal, oval. U. Jurassic to Eocene; USSR: Russian Platform, Siberia.

LAMINA Voloshina, 1972

Plate 59, figs. 13-15

Type species: Orbignyna (Lamina) irreperta Voloshina, 1972; OD.

Orbignyna (Lamina) Voloshina, 1972 (*3311), p. 122.

Test free, bilaterally symmetrical, laterally compressed, planispirally enrolled in only one to two whorls, last one or two chambers may tend to uncoil, sutures strongly arched, may be elevated; wall finely agglutinated; aperture areal, an ovate slit, with an inturned thickened rim. U. Cretaceous (Campanian to U. Maastrichtian); USSR: Volyno-Podolsk area of the Russian Platform.

Remarks: Originally regarded as a subgenus of *Orbignyna*, *Lamina* was elevated to generic status, as the complex internal structure of *Orbignyna* appears to rule out a close relationship. It was transferred (Loeblich and Tappan, 1985, *1923, p. 93) to the family Lituolidae, subfamily Ammomarginulininae, because of the planispiral early coil and tendency to uncoil, as well as the simple interior. Barnard and Banner (1980, *142, p. 390) regarded *Lamina* as coiled throughout and as having a low trochospire, or being "pseudoplanispiral," but the only species yet described does not show a trochospiral development, and the sectioned paratype figured by Voloshina (1972, *3311, pl. 19, fig. 3) shows an uncoiled stage.

SCULPTOBACULITES Loeblich and Tappan, 1984

Plate 60, figs. 5, 6, and 12-16

Type species: Ammobaculites goodlandensis Cushman and Alexander, 1930 (***803**), p. 8; OD.

Sculptobaculites Loeblich and Tappan, 1984 (***1920**), p. 1161.

Evobaculites O. A. Korchagin, 1985 (*1717), p. 602; type species: *Evobaculites loshkharvicus* O. A. Korchagin, 1985; OD.

Test free, large and robust, planispirally enrolled and slightly evolute early stage may have up to three or more whorls, central area of test depressed to excavated and umbilicate, periphery sharply truncate, chambers inflated to angularly lobulate, five to ten in the prominent coil, may have a much reduced uniserial and rectilinear portion commonly of one or two, rarely three chambers; wall agglutinated, simple in structure, of coarse sand and other mineral grains, but in carbonate facies may agglutinate oolites, calcite prisms from *Inoceramus* shells, shell fragments, or other foraminifers; aperture a low arch at the base of the apertural face in the enrolled portion, becoming terminal and round in the uncoiled chambers. Jurassic to M. Cretaceous (Albian to Cenomanian); USA: Oklahoma, Texas; USSR: Gissar, Tadzhik.

Remarks: *Sculptobaculites* differs from *Ammobaculites* in the evolute to advolute coil, depressed and excavated umbilical region, and much reduced uniserial portion.

SIMOBACULITES Loeblich and Tappan, 1984

Plate 59, fig. 6

Type species: Ammobaculites cuyleri Tappan, 1940 (***3120**), p. 96; OD.

Simobaculites Loeblich and Tappan, 1984 (***1920**), p. 1162.

Test free, elongate, with broad and nearly flat sides, flattened to slightly lenticular in section, never circular and commonly even more flattened in preservation, early planispiral and evolute coil with about two whorls of six to seven chambers each, then abruptly changing to the rectilinear uniserial stage, sutures straight and radial in the coil, slightly depressed, straight and horizontal to slightly arched at the center of the flat sides in the rectilinear portion; wall agglutinated, with simple interior, constructed largely of fine quartz grains; aperture terminal, slitlike to fusiform, symmetrically located at the midpoint of the upper surface of the test. U. Pennsylvanian to L. Permian, Cretaceous (Albian, Cenomanian), Paleocene, Eocene, L. Miocene; USA: Alabama, California, Oklahoma, Texas.

Remarks: *Simobaculites* differs from *Ammobaculites* in the strongly compressed test, evolute early coil, and in the later uniserial chambers being broad and flattened to ovoid rather than rounded in section. It differs from *Ammomarginulina* in the symmetrical development of the rectilinear chambers, horizontal or symmetrically arched sutures, and aperture at the midpoint of the terminal surface, whereas *Ammomarginulina* has oblique sutures in the uniserial stage that are highest dorsally, and the aperture lies at the dorsal angle of the test.

Subfamily FLABELLAMMININAE Podobina, 1978

Flabellammininae Podobina, 1978 (*2435), p. 68.

Early stage coiled, later uncoiling and flabelliform, less commonly triangular or quadrangular in section, with broad and low uniserial chambers that may be arched centrally; wall and septa simple in structure; aperture terminal, single. Jurassic to Holocene.

AMMOPALMULA Lindenberg, 1966

Plate 63, figs. 1-8

Type species: Haplophragmium infrajurense Terquem, 1870 (***3142**), p. 337; OD.

Ammopalmula Lindenberg, 1966 (***1856**), p. 463.

Ammobaculites (Ammopalmula) Dain and Kuznetsova, 1976 (***883**), p. 41 (nom. transl.).

Early stage close coiled and evolute, followed by uncoiled, rectilinear stage with flattened or triangular to quadrangular section, chambers broad and moderately arched to distinctly equitant; wall agglutinated, with organic inner layer, thick, simple, and nonlabyrinthic in structure; aperture terminal, ovate to round, located at the midpoint of the chamber face. Jurassic; Europe.

Remarks: *Ammopalmula* differs from *Flabellammina* in the very large initial coil and less flaring and palmate test.

FLABELLAMMINA Cushman, 1928

Plate 62, figs. 10-13

Type species: Flabellammina alexanderi Cushman, 1928; OD.

Flabellammina Cushman, 1928 (***748**), p. 1.

Test elongate and narrow to palmate, compressed, early stage with planispiral or astacoline coil, later uncoiling and rectilinear, with broad, low, strongly arched to chevron-shaped chambers; walls and septa simple in structure, coarsely agglutinated; aperture terminal, rounded to ovate, at the midpoint of the apertural face. L. to U. Cretaceous; North America; Europe.

Remarks: Lindenberg (1967, ***1857**, p. 35) regarded *Flabellammina* as a synonym of *Triplasia* and considered both to have a labyrinthic wall. Specimens of many Texas Cretaceous species of *Flabellammina*, including the type species, have been sectioned by us and do not have a labyrinthic wall. Rare specimens of some species may have an incipient third angle arising from the center of one of the flat sides, but most adult specimens are distinctly flattened, with low and centrally arched chambers, hence are regarded as distinct from *Triplasia*.

PTERAMMINA Hamaoui, 1965

Plate 61, figs. 1-3

Type species: Pterammina israelensis Hamaoui, 1965; OD(M).

Pterammina Hamaoui, 1965 (***1381**) (November), p. 20.
Pterammina Hamaoui, in Arkin and Braun, 1965 (***69**) (October), p. 9, 10 (name not available, ICZN Art. 13 (a) (i), no description).

Test palmate in outline, lenticular in section, early stage with a small planispiral coil, the chambers rapidly flaring and uncoiling, later stage with numerous broad, low and arched U-shaped uniserial chambers, strongly overlapping earlier chambers both at the lateral margins and on the flattened sides of the test, to result in the axial thickening and lenticular section, septa thickened near the central aperture; wall agglutinated, imperforate; aperture terminal, single, elliptical to rounded. U. Cretaceous (U. Cenomanian); Israel.

Remarks: Differs from *Flabellammina* in the prominent early peneropline coil and in the very broad low chambers that overlap on the faces of the test to produce a lenticular section.

TRIPLASIA Reuss, 1854

Plate 61, figs. 7-12; plate 62, figs. 1-9

Type species: Triplasia murchisoni Reuss, 1854; OD(M).

Triplasia Reuss, 1854 (***2576**), p. 65.
Rhabdogonium Reuss, 1860 (***2581**), p. 198; type species: obj., SD Loeblich and Tappan, 1964 (***1910**), p. C245.
Frankeina Cushman and Alexander, 1929 (***802**), p. 61; type species: *Frankeina goodlandensis* Cushman and Alexander, 1929; OD.
Centenarina Majzon, 1948 (***1983**), p. 24; type species: *Centenarina hungarica* Majzon, 1948; OD(M).
Tetraplasia Bartenstein and Brand, 1949 (***153**), p. 672; type species: *Tetraplasia georgsdorfensis* Bartenstein and Brand, 1949; OD.

Early stage planispirally enrolled, at least in the microspheric generation, later uncoiled, rectilinear, and angular in section, commonly triangular, but most species include quadrangular individuals and occasional flattened individuals; sutures arched on the faces of the test; wall coarsely to relatively finely agglutinated, surface roughly finished, interior simple and nonlabyrinthic; aperture terminal, rounded, may be slightly produced on a neck, at the midpoint of the apertural face. Jurassic to Holocene; Europe; North America; Pacific; Caribbean.

Remarks: As previously noted, flattened, triangular and quadrangular tests may occur within a single species. Lindenberg (1967, ***1857**), indicated that *Triplasia* has a labyrinthic wall, but thin sections we have made of the Texas Cretaceous species previously referred to as *Frankeina*, as well as of the type species of *Triplasia* from Gosau, Austria, show only a simple wall; possibly species of the labyrinthic *Flabellamminopsis* were misidentified as *Triplasia*.

Subfamily LITUOLINAE de Blainville, 1827

Lituolinae Brady, 1884 (*344), p. 65, nom. transl. ex family Lituacea.

As in the Ammomarginulininae but with multiple aperture. U. Triassic to Holocene.

ATACTOLITUOLA Loeblich and Tappan, 1984

Plate 64, figs. 10-15

Type species: Reophax subgoodlandensis Vanderpool, 1933 (***3252**), p. 407 (syn.: = *Lituola edwardsensis* Ikins and Clabaugh, 1940 (***1581**), p. 7; = *Lituola inflata* Lozo, 1944 (***1937**), p. 547); OD.

Atactolituola Loeblich and Tappan, 1984 (***1920**), p. 1162.

Test free, large, elongate, early two or three chambers in an arcuate to semicoiled planispiral arrangement, later chambers enlarging rapidly, uniserial and rectilinear to slightly curved, rounded in section; wall simple in structure, very coarsely agglutinated, consisting of large grains and entire tests of smaller foraminifers separated by a minor amount of cement, surface rough; aperture terminal, cribrate. L. Cretaceous (Albian); USA: Oklahoma, Texas.

Remarks: *Atactolituola* differs from *Lituola* in having only a slightly arcuate early stage of a few chambers, rather than a true coil with multiple whorls of numerous chambers each.

BULBOBUCCICRENATA Kerdany and Eissa, 1973

Plate 64, figs. 6-9

Type species: Bulbobuccicrenata aegyptica Kerdany and Eissa, 1973; OD(M).

Bulbobuccicrenata Kerdany and Eissa, in Kerdany et al., 1973 (***1675**), p. 93.

Test free, early portion planispirally enrolled with few globular chambers per whorl, enlarging rapidly as added, the final chamber comprising more than one-half the test, tending to uncoil in the later stage; wall finely agglutinated, interior simple and nonlabyrinthic; aperture of scattered rounded to oval openings in the face of the final chamber. U. Cretaceous (Cenomanian); Egypt.

KOLCHIDINA Morozova, 1967

Plate 63, figs. 9-14

Type species: Ammobaculites manyschensis N. K. Bykova, 1953 (***470**), p. 58 (nom. subst. pro *Ammobaculites midwayensis* Cushman, 1940, ***788**, p. 52, non *A. midwayensis* Plummer, 1933) = *Ammobaculites paleocenicus* Cushman, 1947 (***800**), p. 77 (nom. subst. pro *Ammobaculites midwayensis* Cushman, 1940); OD.

Kolchidina Morozova, in Morozova et al., 1967 (***2190**), p. 176.

Kolchidina Dmitriev and Kozhevnikova, 1963 (***963**), p. 100 (name not available, ICZN Art. 13 (a) (i), no description).

Test enrolled in early stage, later may be uncoiled and rectilinear, chambers inflated, sutures straight; wall finely to coarsely agglutinated, commonly including a variety of mineral grains, fish bone fragments, or smaller foraminifers; wall and septa simple in structure, but wall against the spiral suture may be considerably thickened, so that chamber lumen is reduced in size and restricted to the outer part of the coil or to the corresponding part of the later uniserial chambers; aperture areal and arcuate to semilunate in the early coil, paralleling the axis of coiling, becoming multiple and terminal in the uncoiled stage, consisting of a ring of openings in a depression covering most of the upper surface of the final chamber. L. Paleocene (Danian); USA: Alabama, USSR: Crimea, Caucasus, Turkmenia, Russian Platform.

Remarks: The type species was originally designated as *Ammobaculites manyschensis* N. K. Bykova, 1953, a new name proposed for *A. midwayensis* Cushman, 1940, non *A. midwayensis* Plummer, 1933; however, the homonym had been earlier replaced by *A. paleocenicus* Cushman, 1947; thus the correct name for the type species is *Kolchidina paleocenica* (Cushman).

LITUOLA Lamarck, 1804

Plate 64, figs. 1-5

Type species: Lituolites nautiloidea Lamarck, 1804; SD Cushman, 1920 (***716**), p. 69.

Lituola Lamarck, 1804 (***1777**), p. 242.

Lituolites Lamarck, 1804 (*1777), p. 242: obj.
Stylolina Karrer, 1877 (*1654), p. 371: type species: *Stylolina lapugyensis* Karrer, 1877; OD(M).
Cribrospirella Marie, 1941 (*2031), p. 28; type species: *Lituola difformis* Lamarck, 1804 (*1777), p. 243; OD.

Test free, large, early portion with three or more planispirally enrolled whorls, later uncoiling and rectilinear, chambers numerous, broad and low in the enrolled portion, subcylindrical in the rectilinear stage; wall agglutinated, interior simple and nonlabyrinthic; aperture multiple, in the face of the final chamber in the coil, terminal in the rectilinear portion. U. Triassic to Holocene; cosmopolitan.

Remarks: Maync (1952, *2067, p. 46) designated as neotype of the type species the specimen he illustrated on pl. 9, figs. 1, 2 (refigured by Loeblich and Tappan, 1964, *1910, p. C239, fig. 151 (1a, b)), USNM, Cushman Coll. 64508.

Subfamily AMMOASTUTINAE Loeblich and Tappan, 1984

Ammoastutinae Loeblich and Tappan, 1984 (*1918), p. 10.

Test compressed, ovate to flabelliform in outline, early chambers in slightly arcuate uniserial series, later chambers more enrolled, increasing rapidly in length as added, and extending back toward the proloculus on the inner margin; aperture an areal opening in the center of the apertural face, and may be accompanied by multiple openings near the base of the final chamber. U. Cretaceous (Turonian) to Holocene; shallow brackish water.

Remarks: Differs from the Ammomarginulininae and Lituolinae in lacking a true initial coil and rectilinear later stage.

AMMOASTUTA Cushman and Brönnimann, 1948

Plate 64, figs. 16 and 17

Type species: Ammoastuta salsa Cushman and Brönnimann, 1948; OD.

Ammoastuta Cushman and Brönnimann, 1948 (*814), p. 17.

Test compressed, ovate to flabelliform proloculus followed by second chamber growing in opposite direction, in an incipient tight coil, then uniserial, with a few small rectilinear chambers that increase in length as added, finally followed by elongate adult chambers with a slightly curved axis that each occupy about one-half the test periphery, the bulging basal part of the chambers enclosing the corresponding part of earlier adult chambers; wall agglutinated on an organic base, surface smoothly finished; primary aperture areal, a curved transverse slit near the midpoint of the apertural face, secondary cribrate openings on the bulging proximal end of the adult chambers. U. Cretaceous (Turonian to Santonian): Nigeria; S. Chad; U. Eocene or Oligocene: Colombia; Holocene: USA: Louisiana; Caribbean mangrove swamps in Trinidad, West Indies; Panama; Ecuador, Brazil.

Remarks: The Upper Cretaceous species, *Ammoastuta nigeriana* S. W. Petters reportedly lacks the median slit of the final chamber, but this may be a matter of preservation.

PRAEAMMOASTUTA Bursch, 1952

Plate 64, figs. 18 and 19

Type species: Praeammoastuta alberdingi Bursch, 1952; OD.

Praeammoastuta Bursch, 1952 (*455), p. 915.

Test compressed, subflabelliform in outline, chambers of early stage uniserial and arcuate, lengthening as added as in *Ammoastuta*, adult chambers elongate, compressed, sigmoid, and tending to uncoil but not overlapping earlier chambers proximally; wall agglutinated, translucent, of fine siliceous and ferruginous particles on an organic base; aperture a very small opening near the midpoint of the apertural face that may be obscured by the agglutinated material. Oligocene: Venezuela; M. Miocene: USSR: Sakhalin Is.

Remarks: Differs from *Ammoastuta* in lacking the secondary cribrate openings at the proximal end of the chamber face.

Family PLACOPSILINIDAE Rhumbler, 1913

Placopsilinidae Cushman, 1927 (*742), p. 41, nom. transl. ex subfamily Placopsilininae.

Test attached, early stage coiled, arcuate, or biserial, later uncoiled: wall agglutinated, solid; aperture terminal, single or multiple. L. Jurassic to Holocene.

Subfamily PLACOPSILININAE Rhumbler, 1913

Placopsilininae Rhumbler, 1913 (*2621), p. 444.
Arplacopsinia Rhumbler, 1913 (*2621), p. 444 (err. emend.).
Ammocibicidinae Saidova, 1981 (*2696), p. 17.

Test attached, early stage coiled or arcuate, later uncoiled; wall agglutinated, solid. L. Jurassic to Holocene.

ACRULIAMMINA Loeblich and Tappan, 1946

Plate 65, figs. 1–4

Type species: *Placopsilina longa* Tappan, 1940 (*3120), p. 100; OD.

Acruliammina Loeblich and Tappan, 1946 (*1879), p. 252.

Test attached, at least for the closely enrolled early stage, later uncoiled and rectilinear, and may grow free of the attachment, with uniserial chambers then becoming cylindrical; wall agglutinated, roughly finished; aperture a low slit against the attachment in the early stage, later terminal and double, and finally cribrate. L. Cretaceous (Hauterivian) to U. Cretaceous (Campanian); USA: Texas, Oklahoma; Switzerland.

AMMOCIBICIDES Earland, 1934

Plate 65, figs. 5–7

Type species: Ammocibicides proteus Earland, 1934; OD.

Ammocibicides Earland, 1934 (*1041), p. 106.

Test attached, early chambers in an irregular planispiral series, later uncoiled, with chambers flattened against the attachment and convex on the free surface, chamber margins irregular; wall finely agglutinated, rather smoothly finished; aperture a large circular opening on the free upper surface, bordered by a slightly elevated lip. Holocene; South America: Drake Straits.

AMMOCIBICOIDES Saidova, 1975

Plate 65, figs. 9 and 10

Type species: Ammocibicoides notalnus Saidova, 1975; OD.

Ammocibicoides Saidova, 1975 (*2695), p. 117.

Test attached, trochospirally enrolled, differing from *Ammocibicides* in the absence of an uncoiled stage, spiral side flattened against the attachment, umbilical side inflated, umbilicus closed, sutures oblique on the spiral side, radial on the umbilical side: wall agglutinated, thin, and translucent on the spiral side, thick on the umbilical side; aperture interiomarginal, near the umbilical region on the free side, bordered with a lip. Holocene, upper bathyal zone; S. Pacific, near New Zealand.

Remarks: Whether the wall is solid, as in other Placopsilinidae, or canaliculate, as in the similar appearing *Ammotrochoides* and the Coscinophragmatidae, is not known.

PLACOPSILINA d'Orbigny, 1850

Plate 65, figs. 11 and 12

Type species: Placopsilina cenomana d'Orbigny, 1850; SD Cushman, 1920 (*716), p. 70.

Placopsilina d'Orbigny, 1850 (*2311), p. 259.

Test attached, early stage planispirally enrolled, later uncoiling and rectilinear; wall agglutinated, simple in structure; aperture terminal, rounded, may be bordered by a slight lip. M. Jurassic to Holocene; cosmopolitan.

SUBBDELLOIDINA Frentzen, 1944

Plate 66, figs. 1–3

Type species: Subbdelloidina haeusleri Frentzen, 1944; OD.

Subbdelloidina Frentzen, 1944 (*1180), p. 331.
Eoplacopsilina Payard, 1947 (*2374), p. 63; type species: *Eoplacopsilina mariei* Payard, 1947; OD.

Test attached, bulbous proloculus followed by irregularly arranged or rectilinear chambers that increase gradually in size as added; wall agglutinated; aperture terminal, single. L. Jurassic (U. Lias) to U. Jurassic (Malm α); France; Switzerland; Germany.

Subfamily ADHAERENTIINAE Loeblich and Tappan, 1986

Adhaerentiinae Loeblich and Tappan, 1986 (*1929), p. 334.

Test attached, chambers of early stage biserial, later rectilinear; wall agglutinated, solid. L. Paleocene (Danian).

Remarks: Differs from the Placopsilininae in lacking an early enrolled stage.

ADHAERENTIA Plummer, 1938

Plate 66, figs. 4-10

Type species: Adhaerentia midwayensis Plummer, 1938; OD.

Adhaerentia Plummer, 1938 (***2428**), p. 242.

Test elongate, proloculus attached to a substrate, usually to *Lenticulina* or another foraminiferal test, then growing free and nearly cylindrical, biserially arranged early chambers, becoming loosely biserial and finally uniserial, septa secondarily thickened as a new chamber is added, sutures slightly depressed; wall thick and coarsely agglutinated but not labyrinthic, constructed of smaller foraminiferal tests, fish bones, shell fragments, and various mineral particles, especially thick in the region of the aperture, with a massive floor of each chamber added against the previous septum, to greatly restrict the chamber lumen, interior of chamber not alveolar; aperture terminal, rounded in the early stage, later irregular in outline and finally multiple, with two to many separate openings. L. Paleocene (Danian), Midway Group; USA: Alabama, Mississippi, Texas.

Remarks: Although originally described as having a labyrinthic interior, sections show that the wall of *Adhaerentia* is solid, although extremely thick. Possibly broken specimens or the multiple aperture were mistaken as indicating a labyrinthic interior.

Superfamily HAPLOPHRAGMIACEA Eimer and Fickert, 1899

Haplophragmiacea Loeblich and Tappan, nom. corr. herein pro superfamily Haplophragmiidea.

Haplophragmiidea Podobina, 1975 (***2434**), p. 25 (nom. transl. ex family).

Acupeinacea Brönnimann and Zaninetti, 1984 (***413**), p. 220.

Test streptospirally enrolled, at least in the early stage, later may uncoil; wall agglutinated, noncanaliculate; aperture interiomarginal to areal. M. Jurassic (Callovian) to Holocene.

Remarks: Brönnimann and Zaninetti (1984, ***413**) described the new superfamily Acupeinacea as including the families Ammosphaeroidinidae, Recurvoididae, and Haplophragmiidae, all of which have priority as family group taxa (see ICZN Art. 23 (d)). Podobina (1975, ***2434**) had earlier elevated the Haplophragmiidae to superfamily status as Haplophragmiidea.

Family AMMOSPHAEROIDINIDAE Cushman, 1927

Ammosphaeroidinidae Loeblich and Tappan, 1982 (***1917**), p. 27, nom. transl. ex subfamily Ammosphaeroidininae.

Cystamminellidae Vyalov, 1968 (***3327**), p. 5.

Ammosphaeroidinini Mikhalevich, 1972 (***2103**), p. 29 (tribe).

Recurvoididae Saidova, 1981 (***2696**), p. 18.

Test streptospirally enrolled, wall agglutinated; aperture interiomarginal or areal. M. Jurassic (Callovian) to Holocene.

Subfamily AMMOSPHAEROIDININAE Cushman, 1927

Ammosphaeroidininae Cushman, 1927 (***742**), p. 40.

Test streptospirally enrolled, chambers few in number, only those of last whorl visible from exterior. U. Cretaceous (Santonian) to Holocene.

ADERCOTRYMA Loeblich and Tappan, 1952

Plate 67, figs. 1-3

Type species: Lituola glomerata Brady, 1878 (***336**), p. 433; OD.

Adercotryma Loeblich and Tappan, 1952 (***1884**), p. 141.

Test subglobular to slightly elongated along the axis of coiling, streptospirally enrolled, chambers few per whorl, low and broad in the axis of coiling, few whorls present; wall coarsely agglutinated, with considerable cement: aperture a low interiomarginal arch or slit, about one-half to two-thirds the distance from the periphery to the umbilicus. Holocene; N. Atlantic at 15 m to 700 m; N. Pacific at 5,100 m; Arctic, off Greenland at 100 m to 220 m; Antarctic.

AMMOSPHAEROIDINA Cushman, 1910

Plate 67, figs. 8-10, 13-16

Type species: Haplophragmium sphaeroidiniforme Brady, 1884 (***344**), p. 313; OD.

Ammosphaeroidina Cushman, 1910 (***701**), p. 128.

Cystamminella Myatlyuk, 1966 (***2218**), p. 263; type species: *Cystamminella pseudopauciloculata* Myatlyuk, 1966; OD.

Test globose, streptospirally enrolled, chambers globular, few in number and strongly embracing, only the three chambers of the final whorl visible externally; wall coarsely agglutinated, surface smoothly finished; aperture a low interiomarginal arch. U. Cretaceous (U. Senonian), Paleocene to L. Eocene: USSR: Carpathians; Oligocene (Balcombian): Australia: Victoria; Holocene: N. Pacific from 542 m to 2,270 m, Mediterranean at 140 m to 240 m; N. Atlantic, Gulf of Mexico and Caribbean, from 392 m to 3,562 m.

CYSTAMMINA Neumayr, 1889

Plate 68, figs. 1-6

Type species: Trochammina pauciloculata Brady, 1879 (***337**), p. 58; SD Galloway, 1933 (***1205**), p. 186.

Cystammina Neumayr, 1889 (***2253**), p. 167.

Ammochilostoma Eimer and Fickert, 1899 (***1088**), p. 620; type species: obj.; SD Cushman, 1910 (***701**), p. 126.

Test free, small, streptospirally enrolled, chambers rapidly enlarging and inflated, commonly only four to five visible externally, sutures distinct, depressed; wall thin, finely agglutinated, poorly cemented, invariably reddish-brown to yellowish in color; aperture an ovate to elongate areal slit paralleling and just above the suture of the final chamber against the oldest exposed chambers. Eocene to Holocene; Atlantic; Pacific; Antarctic.

Remarks: Originally regarded as trochospirally coiled, *Cystammina* was included in the Trochamminidae, but based on the streptospiral coiling it was transferred to the Ammosphaeroidinidae by Loeblich and Tappan (1985, ***1923**, p. 94). The small, deep water type species is very distinctive in appearance, its reddish to yellowish color standing out sharply from the dominently white planktonic assemblage. The lectotype of the type species (BMNH ZF 2508) is from Challenger Station 300, in the eastern South Pacific, at a depth of about 2,500 m.

PRAECYSTAMMINA Krasheninnikov, 1973

Plate 67, figs. 4-7

Type species: Praecystammina globigerinaeformis Krasheninnikov, 1973; OD.

Praecystammina Krasheninnikov, 1973 (***1730**), p. 211.

Test tiny, up to 0.27 mm in diameter, subglobose, streptospirally enrolled, with few chambers, commonly three per whorl, periphery broadly ovate; wall very finely agglutinated, surface smoothly finished; aperture areal, oval to slitlike, slightly above the base of the apertural face, and bordered by distinct lip. U. Cretaceous (Santonian to Campanian); NW Pacific in deep-sea cores.

SACCAMMINOIDES Geroch, 1955

Plate 67, figs. 11 and 12

Type species: Saccamminoides carpathicus Geroch, 1955; OD.

Saccamminoides Geroch, 1955 (***1229**), p. 54, 57, 60 (non *Saccamminoides* Ireland, 1956).

Test up to 1 mm in breadth, few rapidly enlarging enrolled chambers, with sharp change in direction of coiling after the first two or three, suggesting a modified trochospiral or streptospiral plan, although early chambers remain visible; wall coarsely agglutinated, surface roughly finished, and tending to obscure the sutures; aperture areal, rounded, slightly produced, those of the penultimate one or two chambers may remain open after new chambers are added. L. Eocene (Ypresian); Poland: Carpathians.

Remarks: Originally placed in the Saccamminidae, the genus was regarded as an aggregation of independent individuals, each with a distinct aperture. However, the regularity of chamber arrangement and size increase suggests a multilocular individual. The genus is here transferred to the Ammosphaeroidininae, which also have few rapidly enlarging chambers, although the areal apertures of the present genus are unique.

Subfamily RECURVOIDINAE Alekseychik-Mitskevich, 1973

Recurvoidinae Alekseychik-Mitskevich, 1973 (***21**), p. 15, 18.

Conglobatoidinae Saidova, 1981 (***2696**), p. 18 (name not available, ICZN Art. 13 (a) (i), no description).

Test streptospirally enrolled, at least in early stage, chambers numerous. M. Jurassic (Callovian) to Holocene.

BUDASHEVAELLA Loeblich and Tappan, 1964

Plate 69, figs. 13-16

Type species: Circus multicameratus Voloshinova and Budasheva, 1961 (*3317), p. 201; OD.

Budashevaella Loeblich and Tappan, 1964 (*1910), p. C262 (nom. subst. pro *Circus* Voloshinova and Budasheva, 1961).

Circus Voloshinova and Budasheva, 1961 (*3317), p. 199 (non *Circus* de Lacepède, 1799); type species: obj.; OD.

Test free, chambers numerous, early stage streptospirally enrolled, later nearly planispiral and partly evolute, sutures curved to sinuate, radial, slightly depressed; wall agglutinated, thick, with considerable cement; aperture interiomarginal. U. Eocene to Miocene; USSR: Sakhalin Island, Kamchatka.

RECURVOIDES Earland, 1934

Plate 68, figs. 7-14

Type species: Recurvoides contortus Earland, 1934; OD.

Recurvoides Earland, 1934 (*1041), p. 91.

Trochitendina Alekseychik-Mitskevich, 1973 (*21), p. 20; type species: *Recurvoides scherkalyensis* Levina, 1962 (*1835), p. 83 (as *sherkaliensis* in Alekseychik-Mitskevich, 1973, *21, p. 20); OD.

Test free, subglobular, streptospirally enrolled, with few chambers per whorl, later whorls may tend to be trochospiral to planispiral or may show an abrupt change in plane of coiling of 90° from previous whorls, earliest chambers not visible externally from either side; wall agglutinated, thin, surface may be roughly finished; aperture small, areal, with distinct bordering lip. M. Jurassic (Callovian): USSR. U. Oligocene to Holocene, from 50 m to 4,224 m depth; cosmopolitan.

THALMANNAMMINA Pokorný, 1951

Plate 69, figs. 1-12

Type species: Haplophragmium subturbinatum Grzybowski, 1898 (*1327), p. 280; OD.

Thalmannammina Pokorný, 1951 (*2441), p. 477.

Conglophragmium Bermúdez and Rivero, 1963 (*211), p. 177; type species: *Trochammina conglobata* Brady, 1884 (*344), p. 341; OD.

Martyschiella Myatlyuk, 1966 (*2218), p. 265; type species: *Martyschiella albensis* Myatlyuk, 1966; OD.

Thalmannorecurvoides Sandulescu, 1971 (*2732), p. 132; type species: *Thalmannorecurvoides simplex* Sandulescu, 1971; OD.

Conglobatoides Saidova, 1981 (*2696), p. 18 (name not available, ICZN Art. 13 (a) (i), no description); type species: *Trochammina conglobata* Brady, 1884; OD (isotypic synonym of *Conglophragmium* Bermúdez and Rivero, 1963).

Test subglobular, streptospirally enrolled, or plane of coiling may show sharp change of 90° in later whorls, relatively few chambers per whorl; wall agglutinated; aperture rounded, at the base of the apertural face. L. Cretaceous (Albian) to Holocene, from 635 m to 1,864 m; cosmopolitan.

Family AMMOBACULINIDAE Saidova, 1981

Ammobaculinidae, nom. transl. herein ex subfamily Ammobaculininae.

Ammobaculininae Saidova, 1981 (*2696), p. 18 (subfamily).

Test streptospirally coiled in the early stage, later uncoiling and rectilinear; wall agglutinated, simple; aperture single or multiple. L. Cretaceous (Valanginian) to Holocene.

AMMOBACULINUS Saidova, 1975

Plate 70, fig. 1

Type species: Ammobaculinus recurvus Saidova, 1975; OD.

Ammobaculinus Saidova, 1975 (*2695), p. 90.

Test robust, up to 1 mm in length, with few large chambers, at first in streptospiral coil as in *Recurvoides*, later with a few broad and low uncoiled and rectilinear chambers, rounded in section; wall coarsely agglutinated; aperture in the adult terminal and crescentic, surrounded by a lip. Holocene; eastern N. Pacific.

Remarks: Differs from *Bulbobaculites* in the crescentic rather than simple rounded aperture. No thin sections have been illustrated or described for the type species, hence the internal features are unknown.

BULBOBACULITES Maync, 1952

Plate 70, figs. 14-16

Type species: Ammobaculites lueckei Cushman and Hedberg, 1941 (*825), p. 83; OD.

Bulbobaculites Maync, 1952 (*2067), p. 47.

Test small, elongate, early stage with streptospirally enrolled globular and inflated chambers, later chambers uncoiled and rectilinear, sutures distinct, depressed and horizontal; wall agglutinated, smoothly finished, interior simple; aperture terminal, a single small rounded opening. L. Cretaceous (Valanginian) to U. Cretaceous; Colombia; Germany; USSR: Ukraine SSR.

Remarks: *Bulbobaculites* is here recognized as distinct from the alveolar walled *Haplophragmium*.

NAVARELLA Ciry and Rat, 1951

Plate 70, figs. 2-6

Type species: Navarella joaquini Ciry and Rat, 1951; OD.

Navarella Ciry and Rat, 1951 (*608), p. 85.

Test large, at first streptospirally enrolled, later uncoiling, with numerous, broad and low chambers overlapping the earlier ones, septa strongly arched; wall of agglutinated quartz grains in a calcareous ground mass, and both wall and septa may have a thickened outer calcareous layer; aperture a basal slit in the early coil, later has small circular areal openings in addition to the interiomarginal one, and the uncoiled stage has a terminal cribrate aperture. U. Cretaceous (Maastrichtian); Spain; Switzerland; France.

Family ACUPEINIDAE Brönnimann and Zaninetti, 1984

Acupeinidae Brönnimann and Zaninetti, 1984 (*413), p. 220.

Acupeininae Brönnimann and Zaninetti, 1984 (*413), p. 220 (subfamily).

Test streptospiral in the early stage, later uncoiling and rectilinear; wall agglutinated, thin, a single layer of grains in thickness; aperture multiple, terminal. Holocene.

Remarks: As a single genus was included in the family, description of a subfamily is superfluous.

ACUPEINA Brönnimann and Zaninetti, 1984

Plate 71, figs. 1-6

Type species: Haplophragmium salsum Cushman and Brönnimann, 1948 (*814), p. 16 = *Haplophragmium agglutinans* d'Orbigny var. *triperforata* Millett, 1899 (*2144), p. 358; OD.

Acupeina Brönnimann and Zaninetti, 1984 (*413), p. 220.

Test elongate, large, up to 1.35 mm in length, early stage with large streptospiral coil of about three whorls, chambers enlarging gradually as added, later stage uncoiled and rectilinear, sutures radial, curved and depressed in the early stage, curved to nearly straight in the adult; wall agglutinated, of a single layer of quartz grains on an inner organic lining; aperture single and interiomarginal in the enrolled stage, becoming terminal and multiple in the uncoiled stage, with from three to numerous rounded openings. Holocene in brackish water: Atlantic; Nigeria; Senegal; Caribbean; Brazil; Ecuador; Malay Peninsula; Fiji.

Family HAPLOPHRAGMIIDAE Eimer and Fickert, 1899

Haplophragmiidae Sigal, in Piveteau, 1952 (*2413), p. 162, nom. corr. pro family Haplophragmidae.

Haplophragmidae Eimer and Fickert, 1899 (*1088), p. 621 (nom. imperf.).

Haplophragmiinae Cushman, 1927 (*742), p. 19 (subfamily).

Test streptospirally enrolled in early stage, later uncoiling and rectilinear; wall agglutinated, thick, and alveolar; aperture single or multiple. M. Jurassic to L. Cretaceous (Hauterivian).

HAPLOPHRAGMIUM Reuss, 1860

Plate 70, figs. 7-13

Type species: Spirolina aequalis F. A. Roemer, 1841 (*2643), p. 98; SD Cushman, 1920 (*716), p. 67.

Haplophragmium Reuss, 1860 (*2581), p. 217.

Test elongate, early portion streptospirally enrolled, later uncoiled and rectilinear; wall agglutinated, thick, and alveolar; aperture terminal, rounded, single. M. Jurassic (Dogger) to L. Cretaceous (Hauterivian); Europe.

Remarks: Bartenstein (1952, *146, p. 325) designated a neotype for *Spirolina aequalis* from the Hauterivian of Germany. Sections of the type species illustrated by Bartenstein and by Lindenberg (1967, *1857) showed the wall to be thick and alveolar, rather than simple as previously thought. Thus *Bulbobaculites* is not congeneric with *Haplophragmium*.

Family LABYRINTHIDOMATIDAE
Loeblich and Tappan, n. fam.

Test streptospirally enrolled in early stage, later uncoiling and rectilinear, outermost part of chamber lumen subdivided by radial exoskeletal partitions; wall agglutinated; aperture terminal, multiple. U. Cretaceous (Coniacian to Campanian).

BULBOPHRAGMIUM Maync, 1952
Plate 71, figs. 7-12

Type species: Haplophragmium aequale Roemer of Reuss, 1860 (***2581**), p. 218 (non *Spirolina aequalis* Roemer, 1841) = *Bulbophragmium aequale* Maync, 1952; see Loeblich and Tappan, 1954, ***1888**, p. 33; ICZN Art. 11 (i), 70 (c); (syn.: *Lituola westfalica* Bartenstein, 1952, ***146**, p. 323): OD.

Bulbophragmium Maync, 1952 (***2067**), p. 46.

Test elongate, early chambers streptospirally enrolled, later uncoiled and rectilinear, sutures straight and depressed, interior with short and thick radiating vertical partitions; wall coarsely agglutinated, thick; aperture terminal and cribrate. U. Cretaceous (Campanian); Europe.

Remarks: A "neotype" was designated for "*Haplophragmium aequale* Reuss" (non *Spirolina aequalis* Roemer) by Bartenstein (1952, ***146**, pl. 5, figs. 1a-c), renamed as *Lituola westfalica*. As Maync (1952, ***2067**) stated *Haplophragmium aequale* Reuss to be the type species of *Bulbophragmium*, and cited Reuss's original figures, the same specimen becomes the neotype for *Bulbophragmium aequale* Maync.

The type species is still poorly known since neither Maync nor Bartenstein illustrated sections of it. However, the section originally illustrated by Reuss and later by both Maync and Bartenstein shows a thick wall with about eight short and thick radial partitions. Details of the wall are unknown, and it may be alveolar. The genus is more closely related to *Labyrinthidoma* than to *Haplophragmium*.

LABYRINTHIDOMA
Adams, Knight, and Hodgkinson, 1973
Plate 71, figs. 13-20

Type species: Labyrinthidoma dumptonense Adams et al., 1973 (as *L. dumptonensis*): OD.

Labyrinthidoma Adams, Knight, and Hodgkinson, 1973 (***13**), p. 637.

Test free, elongate, coiled in early stage, probably streptospiral, later uncoiling and rectilinear or less commonly may bifurcate, chamber interior partially divided by exoskeletal vertical partitions or beams projecting inward for a short distance from the outer wall, center of chambers also with a few irregular vertical pillars extending from chamber floor to roof; wall agglutinated, incorporating shell fragments, spicules, small foraminifers, and chalk grains, nonalveolar, but septa may be canaliculate and traversed irregularly by fine randomly oriented canals from 10 μm to 40 μm in diameter; aperture in early stage interiomarginal, areal, and multiple in the rectilinear stage. U. Cretaceous (U. Coniacian or L. Santonian); England.

Remarks: The original description of this genus stated that three of the more than three hundred specimens studied appeared to have an early high trochospiral or biserial stage, comparing these to a report of a biserial early stage in *Lituola*. Hofker (1976, ***1526**) described specimens with an early *Marssonella* stage. Probably both *Lituola* and *Labyrinthidoma* are simply coiled in the early stage, the juveniles either becoming attached to a small foraminifer on the sea floor as a substrate or incorporating these in the wall with other foreign particles, as such tests are commonly incorporated in later chambers. The "biserial" or trochospiral chambers in the interior of these tests are unrelated to the adult. Similar juvenile attachment to other organisms is shown by *Adhaerentia* and *Tasmanammina*.

As the generic name is based on the Greek *doma, -atos,* house, it is of neuter gender, hence the type species should be corrected as *L. dumptonense*, in agreement with the generic name.

Family NEZZAZATIDAE Hamaoui and Saint-Marc, 1970

Nezzazatidae Hamaoui and Saint-Marc, 1970 (*1386), p. 331.

Test trochospiral or may become planispiral; interior of each chamber with median plate that may be digitate; wall calcareous, probably agglutinated, imperforate; aperture interiomarginal or areal, single or multiple. Cretaceous (Barremian to Maastrichtian).

Subfamily NEZZAZATINAE Hamaoui and Saint-Marc, 1970

Nezzazatinae Hamaoui and Saint-Marc, 1970 (*1386), p. 331.

Test trochospiral or planispiral, later may be uncoiled; interior of each chamber with an internal plate of varied form and basally digitate; aperture an areal median slit, umbilical, or multiple. L. Cretaceous (Barremian) to U. Cretaceous (Turonian).

BIPLANATA Hamaoui and Saint-Marc, 1970

Plate 72, figs. 1-7

Type species: Biplanata peneropliformis Hamaoui and Saint-Marc, 1970; OD.

Biplanata Hamaoui and Saint-Marc, 1970 (*1386), p. 262.
Biplanata Hamaoui, 1965 (*1381), p. 15 (name not available, ICZN Art. 13 (b), type species not designated).

Test large, up to 1.6 mm in diameter, planispirally enrolled and semi-involute, numerous low and very broad chambers per whorl, increasing from about eight in the first whorl up to thirty in the final somewhat flaring whorl, interior subdivided by an endoskeletal median plate that is basally digitate, the separate portions attaching as pillars between the multiple openings of the preceding chamber, sutures distinct, depressed, slightly arched back at the periphery; wall calcareous, imperforate, microgranular; aperture consists of a row of openings along the apertural face. U. Cretaceous (Cenomanian); Israel; Lebanon.

MERLINGINA Hamaoui, 1965

Plate 73, figs. 4-9

Type species: Merlingina cretacea Hamaoui, 1965 (*1381), p. 17; OD(M).

Merlingina Hamaoui, 1965 (*1381), p. 17 (available, ICZN Art. 13 (c)); see also Hamaoui and Saint-Marc, 1970 (*1386), p. 307.
Merlingina Hamaoui, in Arkin and Braun, 1965 (*69), p. 7, 9 (name not available, ICZN Art. 13 (a) (i), no description).

Test free, with numerous broad and low chambers almost planispirally enrolled but test asymmetrical, semievolute, and planoconvex in the early stage, later more nearly bilaterally symmetrical, and finally tending to uncoil, chambers rapidly increasing in thickness so that the apertural face becomes broad, subcircular, and flattened, sutures oblique, somewhat sinuous; wall imperforate, calcareous microgranular, probably agglutinated; aperture reportedly round in early stage, U- or V-shaped in the later stage but difficult to observe externally, associated with a toothplate, visible in axial sections, that curves inward with slight undulations from the lateral borders of the apertural face to adhere to the previous septum by means of two or three basal digitations. U. Cretaceous (Cenomanian); Israel; Lebanon.

NEZZAZZATA Omara, 1956

Plate 72, figs. 8-15

Type species: Nezzazata simplex Omara, 1956; OD.

Nezzazata Omara, 1956 (*2298), p. 887.
Begia Smout, 1956 (*3010), p. 339; type species: *Begia gyra* Smout, 1956; OD.

Test trochospiral, planoconvex to unequally biconvex, umbilicus closed, chambers with a narrow internal plate extending back from one septum to the previous septum, resulting in a kink or indentation in the septal suture where it touches the latter; wall of imperforate, nonlamellar granular calcite, probably agglutinated; aperture extending from the umbilicus to the periphery, then bending sharply to parallel the peripheral margin, with an apertural tooth projecting into the aperture.

L. Cretaceous (Albian) to U. Cretaceous (Turonian): Egypt: Israel: Iraq: Iran: Yugoslavia.

NEZZAZATINELLA Darmoian, 1976

Plate 73, figs. 1-3

Type species: Nezzazatinella adhami Darmoian, 1976; OD.

Nezzazatinella Darmoian, 1976 (*893), p. 524.
Nezzazatinella Darmoian, 1975 (*892), p. 12 (name not available, ICZN Art. 13 (a) (i), no description).

Test a low trochospiral, planoconvex, with flattened spiral side, the final whorl with ten to fourteen narrow, elongate chambers and curved sutures, final chambers flaring as if tending to uncoil, opposite side convex and involute, the chambers strongly angled between the flattened apertural face and the pseudoumbilicus, sutures nearly radial, sinuate; wall calcareous, granular, imperforate; aperture a large curved slit extending from the umbilical region up the apertural face and bending sharply toward the umbilical side, may be accompanied by secondary aperture of pores, either in a curved row or scattered over the apertural face. L. Cretaceous (Barremian) to U. Cretaceous (U. Turonian); Iraq; Romania; France.

PYRENINA Peybernès, 1984

Plate 75, figs. 1-7

Type species: Pyrenina souqueti Peybernès, 1984; OD.

Pyrenina Peybernès, 1984 (*2393), p. 492.

Test free, trochospirally enrolled, whorl enlarging rapidly and tending to uncoil, chambers numerous, low, increasing rapidly in breadth, spiral side flattened and evolute, opposite side involute, convex, with a deep umbilical depression, chamber interior with incomplete or partial pillars extending backward from the chamber roof in the vicinity of the apertural pores, pillars rarely may be complete; wall calcareous, microgranular, imperforate; aperture of numerous rounded pores scattered over the apertural face, and foramina dominantly in the central part of each septum. L. Cretaceous (U. Albian); Spain.

TROCHOSPIRA Hamaoui, 1965

Plate 74, figs. 1-7

Type species: Trochospira avnimelechi Hamaoui, 1965; OD (M).

Trochospira Hamaoui, 1965 (*1381), p. 21 (name available, ICZN Art. 13 (c); see also Hamaoui and Saint-Marc, 1970 (*1386), p. 284.
Trochospira Hamaoui, in Arkin and Braun, 1965 (*69), p. 7, 9 (name not available, ICZN Art. 13 (a) (i), no description).

Test free, lenticular to inequally biconvex, numerous chambers, as many as seventeen in the final whorl, trochospirally enrolled and with a tendency to uncoil in the final stage, periphery subacute, sutures strongly oblique on spiral side, gently curved and subradial on umbilical side; wall imperforate, nonlamellar, of microgranular calcite, probably agglutinated; aperture in early stage arises near umbilicus, is elongated toward the periphery where it curves to parallel the margin as in *Nezzazata*, finally becoming an areal slit that lies in a depression of the apertural face, the depression reflecting the position of an internal apertural toothplate situated approximately in the median plane of the chamber cavity and branching before attaching to the previous septum at one or two places adjacent to the previous aperture. U. Cretaceous (Cenomanian); Lebanon; Israel; Iran.

Subfamily COXITINAE
Hamaoui and Saint-Marc, 1970

Coxitinae Hamaoui and Saint-Marc, 1970 (*1386), p. 332.

Test trochospiral to planispiral, lenticular to globular; internal structure with median plate between consecutive septa, the plates being terminally bifurcate or digitate; aperture interiomarginal, forming a row of small openings in globular tests. U. Cretaceous (L. Cenomanian to Maastrichtian).

ANTALYNA Farinacci and Köylüoğlu, 1985

Plate 75, figs. 8-11

Type species: Antalyna korayi Farinacci and Köylüoğlu, 1985; OD.

Antalyna Farinacci and Köylüoğlu, 1985 (*1117), p. 106.

Test trochospiral, bievolute, spiral side convex, umbilical side concave, with early irregular to streptospiral coil and commonly with plane of coiling changing in the later stage, two to three rapidly flaring whorls of numerous broad and low chambers, sutures depressed, chamber interior with short closely spaced partitions forming a coarse subepidermal mesh, umbilicus depressed and bordered by incised spiral suture; wall calcareous, microgranular, imperforate, septa solid and simple; aperture areal, in the face of the final chamber, with intercameral foramina nearly central in the septa, toothplate present. U. Cretaceous (U. Maastrichtian); Turkey.

COXITES Smout, 1956

Plate 76, figs. 1-8

Type species: Coxites zubairensis Smout, 1956; OD.

Coxites Smout, 1956 (*3010), p. 342.

Test trochospiral, unequally biconvex, periphery subacute, bilocular embryonal stage followed by numerous, broad, low chambers that are oblique on the spiral side and strongly arched on the umbilical side around a central depression; an incomplete partition within the chambers parallels the septa on either side, attaches to the chamber floor on the umbilical side and to a series of very regularly arranged transverse partitions that are perpendicular to the septa and attach to the inside of the apertural face or to the distal wall of the earlier chambers, and may project from either the roof or floor of the chambers, hence are reflected as a network on both the spiral and umbilical sides of the test; wall of thin imperforate and granular calcite, probably agglutinated; aperture a row of areal openings across the apertural face. U. Cretaceous (U. Cenomanian to L. Turonian); Iraq; Crete.

RABANITINA Smout, 1956

Plate 76, figs. 9-14

Type species: Rabanitina basraensis Smout, 1956; OD.

Rabanitina Smout, 1956 (*3010), p. 343.

Test subspherical, early stage trochospiral, planoconvex and umbilicate, then changing abruptly to a completely involute coil and becoming globular, a complex perforated plate within the adult chambers parallels the spiral wall but twists and is buttressed to both chamber floor and roof; wall imperforate, nonlamellar, microgranular, commonly altered in preservation, without arenaceous particles but probably originally agglutinated; aperture of the trochoid stage not observed, in the adult consists of a single or double row of pores near the base of the apertural face. U. Cretaceous (L. Cenomanian); Iraq.

Family BARKERINIDAE Smout, 1956

Barkerinidae Smout, 1956 (*3010), p. 342.

Barkerininae Loeblich and Tappan, 1961 (*1902), p. 280 (subfamily).

Test planispirally coiled and involute, chambers numerous, internally subdivided by transverse interseptal partitions; aperture interiomarginal, multiple. L. Cretaceous (Valanginian; Albian); U. Cretaceous (Senonian).

BARKERINA Frizzell and Schwartz, 1950

Plate 77, figs. 1-3

Type species: Barkerina barkerensis Frizzell and Schwartz, 1950; OD.

Barkerina Frizzell and Schwartz, 1950 (*1188), p. 5.

Test subglobular, coiling planispiral and involute, chambers numerous, low and broad, subdivided internally by transverse partitions that are visible in sections or on abraded specimens; wall agglutinated, of imperforate microgranular calcite; aperture a row of arched openings at the base of the apertural face. L. Cretaceous (L. Valanginian; Albian), U. Cretaceous (Senonian); USA: Texas; Greece; Sardinia.

Superfamily BIOKOVINACEA Gušić, 1977

Biokovinacea Loeblich and Tappan, 1985 (*1923), p. 94 (nom. transl. ex family).

Test free, early stage planispirally enrolled, later may be uncoiled; wall finely agglutinated, outer layer imperforate and inner layer in later stage coarsely perforate or canaliculate, septa homogeneous and massive; aperture basal to areal, single to multiple. L. Jurassic (L. Lias) to U. Cretaceous (Maastrichtian).

Family CHARENTIIDAE Loeblich and Tappan, 1985

Charentiidae Loeblich and Tappan, 1985 (*1923), p. 94.

Test free, early stage planispirally enrolled, later may uncoil; wall finely agglutinated, that of septa and apertural face homogeneous and solid, outer wall with an imperforate epidermis and inner part with cylindrical pseudoalveoles that do not completely reach either the inner or outer surface but are visible in thin section, appearing almost keriothecal; aperture areal, a simple arch to slit or may be multiple. Jurassic (Callovian to Oxfordian) to U. Cretaceous (Maastrichtian).

CHARENTIA Neumann, 1965

Plate 78, figs. 1-10; plate 79, figs. 1-3

Type species: Charentia cuvillieri Neumann, 1965 (syn. = *Hemicyclammina praesigali* Banner, 1966, ***120**, p. 216); OD.

Charentia Neumann, 1965 (***2245**), p. 93.
Tonasia Gorbachik, 1968 (***1268**), p. 7; type species: *Tonasia evoluta* Gorbachik, 1968; OD.

Test free, early stage planispirally enrolled, biumbonate and lenticular to subglobular, with a tendency to uncoil in the last one or two chambers, rarely as many as four, laterally compressed and rectilinear, periphery subacute to rounded; wall finely agglutinated, solid in the early stage, later with wall pierced by cylindrical canaliculi that do not reach completely to either the inner or outer wall surface but give a pseudoalveolar or almost keriothecal structure, apertural face solid and noncanaliculate, the portion just beneath the aperture and against the previous whorl being distinctly thickened, in thin section appearing as small triangular projections from the spiral septum that superficially resemble fusulinacean chomata; aperture areal, an arch near the base of the face in the early stage, later becoming triangular, the upper angle of the triangle gradually lengthening to become a narrow slit up the apertural face, and becoming a terminal slit in the uncoiled chambers. Cretaceous (U. Barremian to Cenomanian); France; Spain; USSR: E. Crimea; Egypt; USA: Texas.

Remarks: The pseudoalveolar nature of the wall of *Charentia* first was reported by Hottinger (1967, ***1546**, p. 33) as radially striate and keriothecalike; it was further discussed by Loeblich and Tappan (1985, ***1923**, p. 96), and both wall structure and the ontogenetic changes in the aperture were demonstrated.

ISMAILIA El-Dakkak, 1974

Plate 77, figs. 4-11

Type species: Ismailia neumannae El-Dakkak, 1974; OD.

Ismailia El-Dakkak, 1974 (***1097**), p. 173.
Sinainella El-Dakkak, 1975 (***1098**), p. 107; type species: *Sinainella aegyptica* El-Dakkak, 1975; OD.

Test free, planispirally enrolled and semi-involute, leaving an open umbilicus, microspheric tests tending to become evolute in the later stage, periphery subacute; wall agglutinated, microstructure not described; aperture a vertical slit in the face that may have a bifurcate basal termination. U. Cretaceous (Cenomanian); Egypt: Sinai.

Remarks: *Ismailia* may be congeneric with *Charentia*, as discussed by Loeblich and Tappan (1985, ***1923**, p. 96), but detailed thin sections are necessary to show the wall characters.

KARAISELLA Kurbatov, 1971

Plate 79, figs. 4-8

Type species: Karaisella uzbekistanica Kurbatov, 1971; OD.

Karaisella Kurbatov, 1971 (***1758**), p. 121.

Test with numerous chambers, early coiling streptospiral and later planispiral or may be planispiral throughout with plane of coiling changing sharply at about the second whorl, later planispiral stage involute and biumbilicate, sutures radial, slightly arched and moderately depressed, peripheral margin subacute to subcarinate; wall finely agglutinated, with imperforate epidermal layer, base of the septum against the previous whorl thickened and chomatalike as in *Charentia;* aperture areal, a small rounded opening near the midpoint of the apertural face. U. Jurassic (Oxfordian); USSR: Uzbek SSR.

Remarks: Published sections do not show a canaliculate wall structure such as characterizes *Charentia*. However, the illustrated sections of *Karaisella uzbekistanica* missed the axial plane of the later part of the test, and the canaliculate structure may only be evident in the later stage as is true of *Melathrokerion* and *Charentia*. However, *Karaisella* resembles *Charentia* in the chomatalike appearance of the septa in section, the areal aperture, and the slightly streptospiral nature of the early portion and is here included in the Charentiidae. It differs from *Charentia* in the streptospiral early coil and in the rounded rather than subtriangular to slitlike areal aperture.

MELATHROKERION
Brönnimann and Conrad, 1967
Plate 79, figs. 9-11

Type species: Melathrokerion valserinensis Brönnimann and Conrad, 1967; OD.

Melathrokerion Brönnimann and Conrad, 1967 (*397), p. 132.

Test free, nautiloid, coiling planispiral and involute, with a slight tendency to be streptospiral in the early stage, few chambers per whorl, sutures radial, slightly arched, periphery broadly rounded; wall micrograpular, agglutinated, solid, and simple in the early stage, later becoming pseudoalveolar with very narrow cylindrical canaliculi piercing the wall but not becoming true alveoles, hence in section appearing radially striate, pseudoalveolar structure not present in early stage or in the apertural face; aperture a crescentic areal slit across the apertural face above its base. L. Cretaceous (U. Barremian to Bedoulian); Switzerland; France; Spain; USSR: Crimea.

Remarks: *Melathrokerion* differs from *Charentia* in having a broad areal crescentic aperture, more broadly rounded test, relatively fewer chambers, and thicker septa, with coarser pseudoalveolar canaliculi.

MONCHARMONTIA De Castro, 1967
Plate 80, figs. 1-7

Type species: Neoendothyra apenninica De Castro, 1966 (*911), p. 14, 29; OD.

Moncharmontia De Castro, 1967 (*912), p. 3 (nom. subst. pro *Neoendothyra* De Castro, 1966).

Neoendothyra De Castro, 1966 (*911), p. 11, 29 (non *Neoendothyra* Reytlinger, 1965); type species: obj.; OD.

Test planispirally enrolled, involute, and biumbilicate, as many as ten chambers in the final whorl, up to two and a half whorls present, periphery broadly rounded; wall finely agglutinated, that of septa and apertural face simple in structure, outer wall with an outer imperforate layer over a canaliculate inner layer; aperture areal and multiple, a single arched row of rounded openings bordered by short necks in the early stage, later with more numerous openings irregularly distributed in a narrow arch near the base of the apertural face. U. Cretaceous (Turonian to Campanian); Italy; Yugoslavia.

PRAEKARAISELLA Kurbatov, 1972
Plate 80, figs. 8-10

Type species: Praekaraisella vandobensis Kurbatov, 1972 (as "*vondobensis*," pl. 5, figs. 7, 8); OD.

Praekaraisella Kurbatov, 1972 (*1759), p. 11.

Test may be streptospiral in the early stage and later planispiral, or may be planispiral throughout, semi-involute, biumbilicate, laterally compressed, final one or two chambers uncoiled and rectilinear, periphery subacute; wall agglutinated, and may show a "fibrous" structure in the outer part, small chomatalike septal bases present against the earlier whorl; aperture areal in the enrolled part, a small rounded terminal opening in the uncoiled chambers. M. Jurassic (Callovian) to U. Jurassic (Oxfordian); USSR: Uzbek SSR.

Remarks: Although stated to differ from *Charentia* in lacking the thickened chomatalike septal bases, these structures are clearly evident in published sections of *P. kurgantchensis* Kurbatov (1972, *1759, pl. 6, figs. 11 and 12); as the illustrated sections of *P. vandobensis* were not cut in the axial plane, the apertural foramen is not evident and the septal bases cannot be distinguished. *Praekaraisella* differs from *Charentia* in having a rounded rather than slitlike aperture in the adult.

PRAEPENEROPLIS Hofker, 1952
Plate 80, figs. 11-16

Type species: Peneroplis senoniensis Hofker, 1949 (*1494), p. 41; OD.

Praepeneroplis Hofker, 1952 (*1501), p. 463 (nom. subst. pro *Protopeneroplis* Hofker, 1950).
Protopeneroplis Hofker, 1950 (*1496), p. 393 (non *Protopeneroplis* Weynschenck, 1950); type species: obj.; OD.

Test planispiral, closely coiled, and involute in the early stage, later slightly evolute and biumbilicate, numerous narrow and cuneate chambers per whorl, sutures radial, depressed, the areal position of the aperture results in a chomatalike appearance in equatorial sections as in *Charentia:* wall agglutinated of fine calcareous particles; aperture areal, ovate to triangular. U. Cretaceous (Maastrichtian); Netherlands; France.

Remarks: The type species was originally regarded as *Peneroplis*, although poorly preserved in the Maastrichtian chalks. Based on better preserved material, Hofker (1959, *1514, p. 272) later showed the true agglutinated nature of the type species and referred it to *Lituola*. However, the highly calcareous agglutinated test, triangular areal aperture, and appearance in equatorial section suggest a closer relationship to *Charentia* and *Melathrokerion*. Whether the wall is finely pseudoalveolar is unknown as no photographs of sections have been published for the type species.

Family LITUOLIPORIDAE Gušić and Velić, 1978

Lituoliporidae Gušić and Velić, 1978 (*1345), p. 87.

Test planispirally coiled in early stage, later may change the direction of coiling or uncoil; wall agglutinated, homogeneous, microgranular, traversed by large pores that open both to exterior and interior. L. Jurassic.

LITUOLIPORA Gušić and Velić, 1978

Plate 81, figs. 1-9

Type species: Lituolipora polymorpha Gušić and Velić, 1978; OD.

Lituolipora Gušić and Velić, 1978 (*1345), p. 87.

Early stage planispiral, later may be irregularly coiled, or with a 90° change in plane of coiling, or may be uncoiled and rectilinear or peneropline; wall agglutinated, mostly of calcareous particles, thick, microgranular, inner structure simple, without differentiated exoskeleton and endoskeleton, but with large simple pores; aperture of early stage simple and basal or areal, later becoming multiple with a few large openings that appear in section as interruptions of the septa. L. Jurassic (L. Liassic); Yugoslavia: Croatia.

Family BIOKOVINIDAE Gušić, 1977

Biokovinidae Gušić, 1977 (*1344), p. 8, 22.

Test enrolled, at least in early stage, later may uncoil; wall coarsely perforate, in section appearing almost keriothecal, and honeycomblike in transverse section; aperture simple, single, or multiple. Jurassic.

BIOKOVINA Gušić, 1977

Plate 82, figs. 1-6

Type species: Biokovina gradacensis Gušić, 1977; OD.

Biokovina Gušić, 1977 (*1344), p. 9, 23.

Test planispirally enrolled in early stage, later uncoiled and rectilinear; wall thick, agglutinated, microgranular and homogeneous, perforate, with narrow pores or tubules perpendicular to the surface separated by thin microgranular lamellae, resulting in a keriothecalike structure, septa homogeneous and massive, endoskeletal interseptal pillars in the midregion of the chambers may fuse together to form partitions and are surrounded by a pillar-free marginal zone, very thin dark lines crossing the chambers approximately perpendicular to the septa appear to be phrenothecalike structures, commonly microgranular but may be perforate or even double walled; aperture a single areal opening in the early stage, later becoming cribrate. L. Jurassic (M. Lias); Yugoslavia: Croatia.

BOSNIELLA Gušić 1977

Plate 83, figs. 1-4

Type species: Bosniella oenensis Gušić, 1977; OD.

Bosniella Gušić, 1977 (*1344), p. 13.

Early stage planispirally coiled, somewhat irregularly in the microspheric generation, later may be uncoiled, megalospheric generation with bilocular embryonal stage; wall thick, agglutinated, microgranular, homogeneous, perforations separated by narrow microgranular lamellae resulting in a keriothecal structure, septa thick, no endoskeletal structures present; aperture single in the early stage, later becoming cribrate. L. Jurassic (M. Liassic); Yugoslavia: Bosnia.

CHABLAISIA Septfontaine, 1978

Plate 83, figs. 5-7

Type species: Pfenderina? chablaisensis Septfontaine, 1977 (*2873), p. 604; OD.

Chablasia Septfontaine, 1978 (*2874), p. 42.

Test free, numerous broad and low chambers coiled in a very low trochospiral, interior partially subdivided by two spiraling pillars that connect adjacent septa across the chamber lumen and are continuous from one chamber to the next, pillars also interconnected by an arched transverse plate that is continuous with the base of the septal face below the aperture and leaves a continuous spiralling septal canal against the outer wall of the previous whorl; wall agglutinated, microgranular in appearance, but incorporating fine calcareous grains, outer layer imperforate, and inner part keriothecalike; aperture an areal arch near the base of the apertural face, the portion of the septum against the preceding whorl giving the appearance of a chomatal deposit in section. M. or U. Jurassic (between U. Aalenian and M. Oxfordian); France; Switzerland.

Remarks: The type species was originally compared with the Pfenderinidae but it lacks an internal central column and has a keriothecal rather than alveolar wall structure, as can be seen in the original figures of the type species. It was later suggested to be closer to the Ataxophragmiidae, but that family has simple and solid walls, whereas the walls and endoskeletal structure of *Chablaisia* suggests placement in the Biokovinidae.

Superfamily COSCINOPHRAGMATACEA Thalmann, 1951

Coscinophragmatacea Loeblich and Tappan, 1984 (*1918), p. 11, nom. transl. ex subfamily Coscinophragminae.

Test attached, may be coiled in early stage, later uncoiled or branching; wall agglutinated, traversed by large pores. Triassic to Holocene.

Family HADDONIIDAE Saidova, 1981

Haddoniidae Loeblich and Tappan, 1982 (*1917), p. 27, nom. transl. ex subfamily.

Haddoninae Saidova, 1981 (*2696), p. 18 (subfamily; nom. imperf.; recte Haddoniinae).

Test attached, coiled to uncoiled and may be branched; wall canaliculate, interior of chambers smoothly finished, aperture terminal, simple to complex. Eocene to Holocene.

HADDONIA Chapman, 1898

Plate 84, figs. 1 and 2

Type species: Haddonia torresiensis Chapman, 1898; OD.

Haddonia Chapman, 1898 (*528), p. 453, 455.

Arhaddonium Rhumbler, 1913 (*2621), p. 448 (err. emend.).

Test large, attached, early stage coiled, later uncoiled, uniserial, and rectilinear, irregular or branching, chambers broad and low, irregular in size and shape; wall coarsely agglutinated, with considerable cement, interior smoothly finished, wall pierced by numerous large pores aligned perpendicular to the surface; aperture terminal, areal, an irregular slit. Eocene: Cuba; Germany. Holocene; Pacific: Funafuti Atoll; N. Australia: Torres Straits.

Family COSCINOPHRAGMATIDAE Thalmann, 1951

Coscinophragmatidae Loeblich and Tappan, 1982 (*1917), p. 27, nom. transl. ex subfamily Coscinophragminae.

Polyphragminae Rhumbler, 1913 (*2621), p. 446 (invalid, ICZN Art. 39; based on *Polyphragma* Reuss, 1871, non *Polyphragma* Quatrefages, 1865).

Arpolyphragmina Rhumbler, 1913 (*2621), p. 446 (subfamily; err. emend.).

Coscinophragminae Thalmann, 1951 (*3170), p. 221 (subfamily; nom. imperf.).

Coscinophragmatinae Loeblich and Tappan, 1964 (*1910), p. C248 (subfamily, nom. correct.).

Similar to the Haddoniidae but with perforate alveolar wall. U. Triassic to Holocene.

ALPINOPHRAGMIUM Flügel, 1967

Plate 85, figs. 1-6

Type species: Alpinophragmium perforatum Flügel, 1967; OD.

Alpinophragmium Flügel, 1967 (*1141), p. 382.

Test probably encrusting, irregularly cylindrical to subconical or spreading; chambers numerous, uniserial, broad, and low; wall microgranular, calcareous, probably agglutinated, pierced by many large pores (alveolar?); aperture terminal, cribrate, of many closely spaced openings that appear as perforations in the earlier septa. U. Triassic; Germany.

AMMOTROCHOIDES Janin, 1984

Plate 85, figs. 7-10

Type species: Ammotrochoides bignoti Janin, 1984; OD.

Ammotrochoides Janin, 1984 (*1600), p. 328.

Test conical, trochospirally enrolled throughout, with few chambers per whorl, attached by the spiral side; wall agglutinated, with quartz grains and calcareous grains, including coccoliths held in a calcareous matrix, wall densely perforated with fine tubular alveoles that occasionally branch but do not open to the exterior and are closed within by the organic lining of the wall; aperture oval, near the umbilicus on the free umbilical side, bordered with a distinct lip. Pleistocene to Holocene: NE Atlantic.

Remarks: *Ammotrochoides* may be a junior synonym of *Ammocibicoides*, as they are similar in growth habit, size, wall composition, and apertural character, but as the wall of *Ammocibicoides* was not described as alveolar, both are recognized until further information becomes available.

BDELLOIDINA Carter, 1877

Plate 84, figs. 3-9

Type species: Bdelloidina aggregata Carter, 1877; OD.

Bdelloidina Carter, 1877 (*502), p. 201.

Arbdelloidinum Rhumbler, 1913 (*2621), p. 448 (err. emend.).

Test attached to the substrate, numerous very broad and low uniserial chambers irregularly spreading over the attachment; wall coarsely agglutinated, with perforate alveolar structure as in *Coscinophragma;* aperture a single or double row of pores on the apertural face against the attachment. Paleocene (Landenian): USA: New Jersey; Holocene: Indian Ocean, Pacific: Bikini Atoll; Indonesia.

Remarks: Although *Coscinophragma* and *Bdelloidina* are similar in wall structure, *Bdelloidina* has low flattened chambers and the test spreads against the substrate, whereas *Coscinophragma* appears to grow erect and the chambers are cylindrical.

COSCINOPHRAGMA Thalmann, 1951

Plate 84, figs. 10-13

Type species: Lichenopora cribrosa Reuss, 1846 (*2571), p. 64; OD.

Coscinophragma Thalmann, 1951 (*3170), p. 221 (nom. subst. pro *Polyphragma* Reuss, 1871).

Polyphragma Reuss, 1871 (*2591), p. 278 (non *Polyphragma* Quatrefages, 1866); obj.; OD(M).

Arpolyphragmoum Rhumbler, 1913 (*2621), p. 447 (err. emend.).

Test large, up to a maximum of 34 mm in length, early stage of the microspheric generation trochospirally enrolled, later uncoiling and rectilinear to branching, rectilinear chambers being 1.5 mm to 3 mm wide, megalospheric tests lack the coil and are wholly uniserial; wall of early trochospiral stage alveolar, that of later uniserial stage with three layers, an outer coarsely agglutinated layer of large quartz grains held in a minimum of acid resistant cement, a median layer pierced by canaliculi that are perpendicular to the wall surface and branch outward to give rise to smaller second order canaliculi, and an inner smooth homogeneous calcareous lamella that covers the chamber cavity; aperture an interiomarginal slit in the early enrolled stage, terminal and cribrate in the later rectilinear stage. L. Cretaceous (M. Albian) to U. Cretaceous (Cenomanian to L. Turonian); Czechoslovakia; NW Germany.

Superfamily CYCLOLINACEA Loeblich and Tappan, 1964

Cyclolinacea Loeblich and Tappan, 1984 (*1918), p. 17, nom. transl. ex subfamily Cyclolininae.

Test discoidal, early stage may be coiled in microspheric form, later peneropliform or may have cyclical or annular chambers in a single layer; chambers of advanced forms may be subdivided by parallel or vertical partitions. L. Jurassic to U. Cretaceous (Campanian).

Family CYCLOLINIDAE Loeblich and Tappan, 1964

Cyclolinidae Loeblich and Tappan, 1984 (*1918), p. 17, nom. transl. ex subfamily Cyclolininae.

Test discoidal, microspheric generation may have a small early coil, adult with annular or cyclical chambers that may be subdivided by pillars or partitions. L. Cretaceous (Infravalanginian) to U. Cretaceous (Campanian).

Subfamily CYCLOLININAE Loeblich and Tappan, 1964

Cyclolininae Loeblich and Tappan, 1964 (*1910), p. C301.

Single layer of cyclical chambers not subdivided by radial partitions. L. Cretaceous (Infravalanginian) to U. Cretaceous (Cenomanian).

AMMOCYCLOLOCULINA Maync, 1958

Plate 88, figs. 1-5

Type species: Spirocyclina erratica Joukowsky and Favre, 1913 (***1625**), p. 491; OD.

Ammocycloloculina Maync, 1958 (*2075), p. 53.

Test free, discoidal, large, up to more than 14 mm in diameter and 0.71 mm thick near the periphery, with early close planispiral coil of about six chambers followed by a fanlike stage of strongly embracing chambers and finally by up to twelve wholly cyclical chambers, circular sutures slightly depressed; wall with imperforate microgranular epidermis, interior more coarsely agglutinated, including both quartz and calcareous particles and shell fragments, resulting in a very rough and irregular chamber interior, but without subepidermal network or radial partitions; aperture multiple, a series of irregularly spaced pores, piercing the septa as seen in equatorial section. L. Cretaceous (Infravalangian); France.

CYCLOLINA d'Orbigny, 1846

Plate 86, figs. 1-8

Type species: Cyclolina cretacea d'Orbigny, 1846; OD(M).

Cyclolina d'Orbigny, 1846 (*2309), p. 139.

Test free, discoidal, slightly undulating, up to 6 mm in diameter, increasing in thickness toward the periphery, early microspheric stage planispirally enrolled, megalospheric one lacking the early coil, later chambers cyclic, concentric sutures slightly depressed; wall microgranular, calcareous, finely agglutinated, chamber lumen open, with no inner partitions or subdivisions; multiple aperture of rounded pores scattered in many rows over the apertural face, also observable in equatorial section. U. Cretaceous (Cenomanian); France.

Subfamily CYCLOPSINELLINAE Loeblich and Tappan, 1984

Cyclopsinellinae Loeblich and Tappan, 1984 (*1918), p. 17.

Cyclical chambers, their median region with numerous radial pillars but no subdivisions present in external subepidermal area; radial stolon system present. U. Cretaceous (Cenomanian to Santonian).

Remarks: Differs from the Cyclolininae in having radial pillars in the central part of the chambers, differs from the Dicyclinidae and Orbitopsellidae in having only a single layer of chambers, and differs from the Ilerdorbinae in having radial stolons.

CYCLOPSINELLA Galloway, 1933

Plate 87, figs. 1-9

Type species: Cyclopsina steinmanni Munier-Chalmas, 1887 (***2208**), p. xxx; OD.

Cyclopsinella Galloway, 1933 (*1205), p. 138 (nom. subst. pro. *Cyclopsina* Munier-Chalmas, 1887); OD.

Cyclopsina Munier-Chalmas, 1887 (*2208), p. xxx (non Milne-Edwards, 1840); obj.; OD.

Test free, discoidal, large, up to 1 cm in diameter, microspheric test with early planispiral coil, rapidly becoming peneropliform, reniform, and finally with cyclic chambers, macrospheric test with protoconch and deuteroconch followed by cyclic chambers, up to fifty cyclic chambers in the adult, test up to 0.3 mm in thickness near the periphery, sutures slightly depressed, periphery broadly rounded; wall microgranular, calcareous, agglutinated, with imperforate epidermis, no exoskeletal partitions, and chamber interior undivided in early stage, later cyclic chambers with one or more endoskeletal pillars arising from a median position at the floor to extend radially from one septum to the next, pillars may bifurcate and fuse to give an irregular appearance in section (this chamber subdivision gives a superficial but erroneous appearance in section of two layers of chambers, and was so described originally; the anastomosing pillars also have been described as an undulating median partition); aperture multiple, with round openings on the peripheral surface. U. Cretaceous (Cenomanian to U. Santonian); France.

Subfamily ILERDORBINAE Hottinger and Caus, 1982

Ilerdorbinae Hottinger and Caus, 1982 (*1554), p. 813.

Test planispiral in early stage, with chambers becoming annular; outer part of chambers subdivided by secondary partitions or by more than one order of these; apertures alternating in position from chamber to chamber, producing an oblique stolon system. L. Cretaceous (Valanginian) to U. Cretaceous (Campanian).

DOHAIA Henson, 1948

Plate 88, figs. 6-8

Type species: Dohaia planata Henson, 1948; OD.

Dohaia Henson, 1948 (*1460), p. 101.

Test discoidal, early stage planispiral and evolute, chambers later completely cyclic, low; wall microgranular, agglutinated, epidermis imperforate, simple exoskeletal partitions perpendicular to the wall subdivide the peripheral part of the chambers and alternate in position from one chamber to that succeeding, although symmetrically located with respect to those on the opposite side of the test, inner part of chambers undivided, forming an annular passage; aperture multiple, in two rows, one on either side of the median plane, pores alternating in position with the radial partitions, hence also alternating from chamber to chamber to form an oblique stolon system. U. Cretaceous (Cenomanian or Turonian); Arabia: Qatar Peninsula.

ECLUSIA Septfontaine, 1971

Plate 89, figs. 1-7

Type species: Eclusia moutyi Septfontaine, 1971; OD.

Eclusia Septfontaine, 1971 (*2872), p. 289.

Test free, flattened, reniform to discoidal, juvenile stage unknown, chambers low and broad, up to forty in the adult, rapidly increasing in breadth, arched and uniserial in the early stage, later becoming cyclic, periphery bluntly rounded; wall microgranular, agglutinated, chambers subdivided by numerous exoskeletal vertical partitions arising from the wall of the flat sides of the test perpendicular to the septa, to attach to a median vertical perforated plate that bisects the test, these secondary partitions alternating in position from one chamber to the next; aperture cribrate, with two rows of pores on the apertural face, one on either side of the median line, those of successive chambers alternating in position from chamber to chamber rather than aligned, as the secondary partitions lie over the apertural openings of the previous chamber. L. Cretaceous (Valanginian); France.

Remarks: Originally, *Eclusia* was compared to *Gunteria* Cushman and Ponton, 1933, but the latter had been shown by Davies (1939, *900) to be a hyaline calcareous perforate form, and Cole and Gravell (1952, *643) transferred it to the Cymbaloporidae. The alternating arrangement of apertures, resulting in an oblique stolon system and the median plate-like structure appear closest to *Ilerdorbis*, which differs in having a second order of subdivision of the outer part of the chambers, with both horizontal and vertical short plates in addition to the main partitions. It resembles *Dohaia* in the simple nature of the chamber subdivisions and alternating apertures but differs in having the median plate.

ILERDORBIS Hottinger and Caus, 1982

Plate 90, figs. 1-7

Type species: Ilerdorbis decussatus Hottinger and Caus, 1982; OD.

Ilerdorbis Hottinger and Caus, 1982 (*1554), p. 810.

Test irregularly discoidal, megalospheric test with spherical proloculus and hemispherical deuteroconch, early stage planispiral and evolute, chambers low, increasing in breadth as added in peneropline fashion, and later becoming annular; wall finely agglutinated, microgranular, with exoskeleton of simple beams and shallow rafters, early structure not well known, but exoskeletal beams present by third chamber, lateral walls not differentiated into epidermis or choffatelloid subepidermal network, endoskeleton nearly completely divides the chamber lumen in the equatorial plane of the test and merges laterally with the exoskeletal beams, being pierced by the unique crosswise oblique stolon system; apertures oblique, aligned in a row on each side of the median plane, those of successive annular chambers alternating in position rather than being radially aligned. U. Cretaceous (Campanian): Spain.

Family ORBITOPSELLIDAE Hottinger and Caus, 1982

Orbitopsellidae Loeblich and Tappan, 1984 (*1918), p. 17, nom. transl. ex subfamily.

Orbitopsellinae Hottinger and Caus, 1982 (*1554), p. 813 (subfamily).

Labyrinthininae Septfontaine, 1986 (*2875A), p. 54 (name not available, ICZN Art. 13 (a) (i), no description).

Test planispirally coiled in early stage, later peneropliform or cyclical, chambers numerous; exoskeleton simple, without subepidermal network, stolon system radial; apertures in alternating arrangement. L. Jurassic (Lias), U. Jurassic (Kimmeridgian).

CYCLORBITOPSELLA Cherchi, Schroeder, and B. G. Zhang, 1984

Plate 91, figs. 1-5

Type species: Cyclorbitopsella tibetica Cherchi et al., 1984; OD.

Cyclorbitopsella Cherchi, Schroeder, and B. G. Zhang, 1984 (*572), p. 160.

Test discoidal, microspheric generation with initial peneropline coil, later chambers reniform and finally annular, megalospheric test with globular protoconch and surrounding subcylindrical deuteroconch followed by the annular chambers, marginal zone of chambers subdivided by vertical beams, pillars in central zone aligned from chamber to chamber, and may fuse with adjacent pillars at the septa to result in a vermiform appearance; aperture cribrate, the pores in radial rows. L. Jurassic (Lias); Tibet.

Remarks: Resembles *Orbitopsella* but differs in the wholly annular postembryonic chambers of the megalospheric generation, whereas *Orbitopsella* has early arched chambers forming an initial planispire.

LABYRINTHINA Weynschenk, 1951

Plate 92, figs. 1-5

Type species: Labyrinthina mirabilis Weynschenk, 1951; OD.

Labyrinthina Weynschenk, 1951 (*3363), p. 793.

Lituosepta Cati, 1959 (*508), p. 2; type species: *Lituosepta recoarensis* Cati, 1959; OD.

Test free, elongate, early stage planispirally enrolled and involute, later uncoiling and rectilinear, slightly compressed to peneropliform; wall agglutinated, simple in structure, microgranular, imperforate, each chamber with a row of internal exoskeletal beams extending from septum to septum, endoskeletal pillars extend from chamber floor to roof and also may be continuous from chamber to chamber; aperture simple and interiomarginal in the early enrolled stage, then areal, and in the adult stage is areal and multiple over the central part of the apertural face. L. Jurassic (Liassic) to U. Jurassic (L. Malm; Oxfordian; Kimmeridgian): Spain; Italy; Yugoslavia, USSR: N. Caucasus; Morocco.

ORBITAMMINA Berthelin, 1893

Plate 92, figs. 6-10

Type species: Orbicula elliptica d'Archiac, 1843 (*64), p. 375; OD.

Orbitammina Berthelin, 1893 (*223), p. lxxiii.

Test large, up to 22 mm in diameter, compressed, but undulating rather than flat, commonly reniform or rarely with lateral margins recurved and overlapping to appear discoidal, early stage probably planispiral but never observed, earliest known chambers are much recurved, very narrow, and elongate but not completely cyclic, rapidly increasing in breadth to produce a reniform test, peripheral margins never thickened and ringlike as in *Orbitopsella;* wall agglutinated, internal structure as in *Orbitopsella*, surface of test appears cross-hatched as a result of the secondary partitions subdividing the chamber; aperture multiple, openings in successive chambers radially aligned, with new openings intercalated as the chambers increase in breadth. U. Jurassic (Bathonian): France; Oman, SW Asia.

Remarks: Differs from *Anchispirocyclina* in lacking a subepidermal alveolar layer.

ORBITOPSELLA Munier-Chalmas, 1902

Plate 93, figs. 1-5

Type species: Orbitulites praecursor Gümbel, 1872 (*1338), p. 256 (syn.: *Orbitulites circumvulvata* Gümbel, 1872); OD.

Orbitopsella Munier-Chalmas, 1902 (*2211), p. 351.
Coskinolinopsis Henson, 1948 (*1460), p. 27; type species: *Coskinolinopsis primaevus* Henson, 1948; OD.

Test large, up to 18 mm in diameter, flabelliform to discoid, and may have much thickened outer margin due to the rapid proliferation of entire planes of pillars and intervening openings, early microspheric stage with tiny proloculus followed by reduced planispiral to peneropliform nepionic stage and then by many narrow annular chambers that form a discoid test; large and complex megalospheric embryonal apparatus with protoconch of one or more chambers and a relatively well-preserved spheroconch, followed by a peneropliform nepionic stage, and then a reniform or annular growth stage; wall agglutinated, with thick exoskeletal walls and a row of short beams aligned from chamber to chamber but that may be offset by the intercalation of additional beams to maintain equal spacing as the chambers rapidly enlarge, massive septa may equal the thickness of the chamber cavity, endoskeletal pillars arise on the distal face of the septum and cross the chamber to the proximal face of the next septum, additional pillars are intercalated as the test enlarges; septa perforated by numerous openings that are radially aligned from one chamber to the next, and occur in planes parallel both to the faces of the disc and to the endoskeletal pillars, aperture consisting of similar openings on the final chamber face. L. Jurassic (Liassic); Italy; Cyprus; Yugoslavia; Greece; Mallorca; Morocco; Iran; Oman; Arabia; China: Markam region.

Superfamily LOFTUSIACEA Brady, 1884

Loftusiacea Loeblich and Tappan, 1982 (*1917), p. 27, nom. transl. ex subfamily Loftusinae.
Alveolophragmiidea Saidova, 1981 (*2696), p. 18.

Test multilocular, coiling planispiral, streptospiral, or rarely trochospiral with axis of coiling of varied length, may uncoil in later stage and flare or become peneropliform; wall agglutinated, with differentiated outer imperforate layer and inner alveolar layer. M. Triassic to Holocene.

Family MESOENDOTHYRIDAE Voloshinova, 1958

Mesoendothyridae Voloshinova, in N. K. Bykova et al., 1958 (*475), p. 19.
Mesoendothyrinae Banner, 1966 (*120), p. 207 (subfamily).

Test streptospirally coiled, involute; wall agglutinated, outer layer imperforate, interior coarsely alveolar, septa single layered, imperforate; aperture an interiomarginal slit. M. Triassic (Ladenian) to U. Jurassic (Portlandian).

AUDIENUSINA Bernier, 1985

Plate 93, figs. 6-8

Type species: Audienusina fourcadei Bernier, 1985; OD.

Audienusina Bernier, 1985 (*214), p. 509.

Test globular to laterally slightly compressed, spherical megalospheric proloculus followed by numerous gradually enlarging chambers in three to four streptospirally enrolled and involute whorls, periphery rounded; wall agglutinated, imperforate epidermis and alveolar subepidermal layer consisting of alveoles that appear subcircular in tangential section. septa simple, thick, and massive; aperture an interiomarginal slit. U. Jurassic (U. Kimmeridgian to Portlandian); France.

MESOENDOTHYRA Dain, 1958

Plate 94, figs. 1-6

Type species: Mesoendothyra izjumiana Dain, 1958; OD.

Mesoendothyra Dain, in N. K. Bykova et al., 1958 (*475), p. 19.

Test enrolled, early stage streptospiral, later becoming nearly planispiral but asymmetrical, involute, periphery broadly rounded: wall microgranular, agglutinated of carbonate grains, with outer imperforate layer and inner alveolar layer, septa with a single imperforate layer; aperture an interiomarginal slit. M. Triassic (Ladenian) to U. Jurassic (L. Kimmeridgian): Bulgaria; Yugoslavia; USSR: Ukraine SSR.

Family HOTTINGERITIDAE Loeblich and Tappan, 1985

Hottingeritidae Loeblich and Tappan, 1985 (*1923), p. 98.

Test streptospirally coiled to planispiral, laterally compressed, numerous chambers per whorl; wall exoskeleton with subepidermal network lining the entire chamber, including the apertural face and septa; aperture single to multiple, interiomarginal to areal. U. Jurassic (Oxfordian) to L. Cretaceous (Barremian).

Remarks: Differs from the similarly streptospiral Mesoendothyridae in that the septa are alveolar continuations of the outer wall. The Cyclamminidae differ in being planispiral, with nonstructured septa that may be pierced by apertural pores.

ALVEOSEPTA Hottinger, 1967

Plate 94, figs. 7-10

Type species: Cyclammina jaccardi Schrodt, 1894 (*2789), p. 734; OD.

Alveosepta Hottinger, 1967 (*1546), p. 79, 84.

Test coiled, microspheric early stage streptospiral, megalospheric test and microspheric adult planispiral, adult may tend to uncoil: wall agglutinated, exoskeleton with subepidermal network lining apertural face and septa as well as lateral and peripheral chamber walls, some species may have an exoskeletal projection that forms a median lamella, partially or completely bisecting the chambers; aperture consists of large openings at the base of the apertural face, supplementary areal foramina may be produced by resorption of the epidermal layer of the septum, allowing the alveoles to open into the adjacent chamber. U. Jurassic (Oxfordian to Kimmeridgian); Switzerland; France; Portugal; Morocco.

HOTTINGERITA Loeblich and Tappan, 1985

Plate 95, figs. 1-7

Type species: Mesoendothyra complanata Hottinger, 1967 (*1546), p. 77; OD.

Hottingerita Loeblich and Tappan, 1985 (*1923), p. 98.

Test flattened and discoid, streptospirally or irregularly coiled in the early stage, later nearly planispiral, evolute with all whorls visible from the exterior, chambers small and numerous, increasing very little in size as added; wall agglutinated, with subepidermal network in the exoskeleton of both walls and septa; aperture an equatorial interiomarginal slit. L. Cretaceous (Urgonian, Barremian); Switzerland.

Remarks: Differs from *Alveosepta* in the single interiomarginal aperture rather than a multiple one, and differs from *Mesoendothyra* in the complex septa and smaller and more numerous chambers, and from both genera in being evolute.

Family CYCLAMMINIDAE Marie, 1941

Cyclamminidae Loeblich and Tappan, 1982 (*1917), p. 27, nom. transl. ex subfamily Cyclammininae.
Alveolophragmiidae Saidova, 1981 (*2696), p. 18.
Everticyclamminidae Septfontaine, 1986 (*2875A), p. 55 (name not available, ICZN Art. 13(a)(i), no description).

Test enrolled, involute, or rarely uncoiling; agglutinated wall with outer imperforate layer and inner alveolar layer, septal structure always differentiated from that of outer wall; aperture interiomarginal or near septal base. L. Jurassic to Holocene.

Subfamily BUCCICRENATINAE Loeblich and Tappan, 1985

Buccicrenatinae Loeblich and Tappan, 1985 (*1923), p. 98.

Test planispiral with few chambers per whorl, later may uncoil; wall agglutinated, earliest whorls may have solid wall and septa, later with thin but distinctly alveolar wall with coarse alveoles of nearly circular section, chamber cavity open, apertural face solid and nonalveolar below the slitlike opening, base of the septa thickened against the previous whorl and may form a continuous imperforate basal layer, with solid triangular chomatalike mounds against the previous whorl at the position of the septa; aperture areal, ranging from just above the base of the apertural face to terminal, an elongate straight to zigzag slit in the plane of coiling. U. Jurassic (U. Oxfordian) to U. Cretaceous (Cenomanian).

Remarks: The solid chomatalike mounds at the base of the apertural face and previous septal faces, and their coalesced bases as seen in median section, as well as the coarsely alveolar outer wall characterize the closely related members of this subfamily.

BUCCICRENATA Loeblich and Tappan, 1949

Plate 96, figs. 1-9

Type species: Ammobaculites subgoodlandensis Vanderpool, 1933 (*3252), p. 407; OD.

Buccicrenata Loeblich and Tappan, 1949 (*1881), p. 252.

Test planispirally enrolled, compressed, involute in the early stage, later with a tendency to uncoil and become rectilinear; wall agglutinated of calcareous particles mixed with quartz, imperforate epidermal layer covering a shallow alveolar layer in which the alveoles may bifurcate, septa solid, thickened septal base against the previous whorl forming a triangular mound at the position of the septum as seen in median section; aperture elongate, terminal, a straight to zigzag slit. L. Cretaceous (Aptian) to U. Cretaceous (Cenomanian); Oklahoma; Texas; Florida; Venezuela; Libya; Middle East; Persian Gulf.

Remarks: *Buccicrenata* is characterized by the planispiral early stage and later tendency to uncoil, lobulate margin, thick agglutinated and alveolar wall, chomatalike deposits at the base of the septa against the previous whorl, and elongate zigzag aperture. Sections of *Buccicrenata* may intersect areas of the alveolar outer wall at the deeply indented and incised sutures, falsely resembling alveolar septa, but the alveolar character does not extend across the whorl to separate adjacent chambers, and the septa are solid beneath the surface.

EVERTICYCLAMMINA Redmond, 1964

Plate 95, figs. 8-12

Type species: Everticyclammina hensoni Redmond, 1964 (*2537A) = *Cyclammina greigi* Henson, 1948 (*1460), p. 13; OD.

Everticyclammina Redmond, 1964 (*2537A), p. 407.

Pseudobaculites Maync, 1965 (*2081), p. 39 (non *Pseudobaculites* Cobban, 1952); type species: *Pseudocyclammina virguliana* Koechlin, 1943 (*1714), p. 195; OD.

Mayncella Banner, 1966 (*120), p. 206; type species: *Cyclammina greigi* Henson, 1948 (*1460), p. 13; OD.

Test planispirally enrolled and involute, lenticular to slightly compressed, later with a slight tendency to uncoil, chambers wedgelike, sutures radial, slightly curved; wall agglutinated, alveolar, septa short and not alveolar, the elongate areal aperture resulting in very short septa, but with the triangular to rectangular thickened base of the septal face remaining against the previous whorl as seen in median section; aperture a short vertical areal slit. U. Jurassic (U. Oxfordian) to U. Cretaceous (Cenomanian); Saudi Arabia; Qatar Peninsula; Switzerland; France.

Remarks: The aperture and wall characters, as well as the synonymy for this genus were discussed by Loeblich and Tappan (1985, *1923, p. 100). It differs from *Buccicrenata* in having a less compressed test, a simple slitlike aperture rather than an elongate zigzag slit, wedgelike rather than reniform chambers, and more extensive secondary deposits connecting the bases of successive septa against the previous whorl.

Subfamily ALVEOLOPHRAGMIINAE Saidova, 1981

Alveolophragmiinae Saidova, 1981 (*2696), p. 18.

Test planispiral, involute, may uncoil in later stage; wall agglutinated, with outer imperforate layer and inner alveolar layer; aperture a low arch at or near the base of the apertural face, later may become areal. U. Paleocene to Holocene.

ALVEOLOPHRAGMIUM Shchedrina, 1936

Plate 97, figs. 5-7

Type species: Alveolophragmium orbiculatum Shchedrina, 1936; OD.

Alveolophragmium Shchedrina, 1936 (*2884), p. 312.

Test planispirally enrolled, involute, relatively few chambers per whorl, sutures radial, periphery broadly rounded; wall coarsely agglutinated, outer wall with imperforate epidermis and alveolar subepidermal layer; aperture a low arch just above the base of the apertural face, completely bordered by a narrow lip. Holocene; New Zealand; Sea of Japan; Okhotsk Sea; Kara Sea.

POPOVIA Suleymanov, 1965

Plate 97, figs. 8-11

Type species: Alveolophragmium planum N. K. Bykova, 1939 (***468**), p. 19, 34; OD.

Popovia Suleymanov, 1965 (***3095**), p. 48.

Test free, early stage planispirally coiled and evolute, later uncoiling and rectilinear; wall agglutinated, with alveolar subepidermal layer, septa simple; aperture interiomarginal in early stage, areal and terminal in the uncoiled stage. U. Paleocene to U. Eocene; USSR: Kirgiz, Kazakh.

QUASICYCLAMMINA Belford, 1977

Plate 97, figs. 1-4

Type species: Quasicyclammina breviseptum Belford, 1977; OD.

Quasicyclammina Belford, 1977 (***179**), p. 36.

Test nautiloid in form, planispirally enrolled and involute, may be slightly asymmetrical, with only about two whorls of few chambers each, sutures nearly radial, periphery broadly rounded; wall agglutinated, with imperforate outer layer of the outer wall underlain by a coarse alveolar subepidermal layer that does not continue to the septa; aperture an asymmetrical interiomarginal slit. U. Paleocene; New Guinea.

RETICULOPHRAGMIUM Maync, 1955

Plate 98, figs. 1-3

Type species: Alveolophragmium venezuelanum Maync, 1952 (***2068**), p. 142.

Reticulophragmium Maync, 1955 (***2073**), p. 557.
Alveolophragmium (Reticulophragmium) Banner, 1966 (***120**), p. 207 (nom. transl.).

Test planispirally enrolled, subglobular to compressed, involute or very slightly evolute, biumbilicate, sutures radial; wall agglutinated, with imperforate epidermis and reticulate subepidermal layer, septa simple; aperture a low arch at the base of the apertural face against the previous whorl. U. Oligocene to Miocene; Colombia; Venezuela; Holocene: S. Atlantic.

SABELLOVOLUTA Loeblich and Tappan, 1985

Plate 97, figs. 12-15

Type species: Spirolina humboldti Reuss, 1851 (***2574**), p. 65; OD.

Sabellovoluta Loeblich and Tappan, 1985 (***1923**), p. 101.

Test free, large, early stage close coiled, with a single whorl of four to five semiarcuate chambers as seen in longitudinal section, later uncoiling and rectilinear, with two to three inflated and strongly overlapping uniserial chambers, that range from wedge shaped in transverse section and broadest toward the inside of the coil to a nearly symmetrical terminal chamber of circular section, periphery rounded; wall coarsely agglutinated with larger grains in a finer groundmass, very thick and alveolar in structure, large alveoles opening into the chamber cavity but narrowing to canaliculi and may branch toward the exterior, total wall thickness approaching that of the chamber cavity, surface grainy but even; aperture in the enrolled stage a short vertical areal slit that may be slightly off center, in the uncoiled stage becoming terminal, straight to slightly curved, and produced on a short neck. L. to M. Oligocene; Germany; Austria.

Remarks: *Sabellovoluta* differs from *Ammobaculites* in the broad, low, and curved early chambers, more produced and more strongly overlapping uniserial chambers, thick alveolar wall, and slit aperture produced on a neck and differs from *Popovia* in the involute coil, fewer chambers per whorl, greater chamber overlap, arched rather than straight sutures, very thick and complex alveolar wall, areal aperture, and produced apertural neck.

Subfamily HEMICYCLAMMININAE Banner, 1966

Hemicyclammininae Banner, 1966 (***120**), p. 206, 211.

Test planispiral, at least in early stage, later may uncoil; wall agglutinated, uniformly alveolar; aperture single, a large arch or a slit in the apertural face, or may be terminal.

M. Jurassic (Dogger) to U. Cretaceous (Cenomanian).

ALVEOCYCLAMMINA Hillebrandt, 1971

Plate 98, figs. 4-9

Type species: Alveocyclammina andina Hillebrandt, 1971; OD.

Alveocyclammina Hillebrandt, 1971 (***1484**), p. 14.

Test enrolled, planispiral, and involute, slightly flattened, with broadly rounded periphery; wall agglutinated, thin imperforate epidermal layer covers and externally obscures the thick, alveolar subepidermal layer in which the alveoles may bifurcate repeatedly, septa consist of short continuations of the outer wall, and do not form a basal layer by addition of material against the previous whorl; aperture a large single equatorial opening at the base of the apertural face. L. Cretaceous (L. Albian): Peru.

FLABELLAMMINOPSIS Małecki, 1954

Plate 99, figs. 1-6

Type species: Flabellamminopsis variabilis Małecki, 1954; OD.

Flabellamminopsis Małecki, 1954 (***1999**), p. 104, 112, 117.

Test planispirally enrolled in the early stage, uncoiled and rectilinear in the adult, later stage variously flattened, triangular or quadrate in section, septa arched upward centrally; wall agglutinated, of angular quartz grains and shell fragments, alveolar in structure; aperture terminal, rounded to elliptical. M. Jurassic (Dogger); Poland; Germany.

HEMICYCLAMMINA Maync, 1953

Plate 99, figs. 7-9

Type species: Hemicyclammina sigali Maync, 1953; OD.

Hemicyclammina Maync, 1953 (***2070**), p. 148.

Test planispiral and involute, somewhat compressed but with rounded to subacute periphery; wall agglutinated, outer layer imperforate and subepidermal layer uniformly alveolar, septal structure differentiated from remainder of wall, in later stage the lower part of the septa coalesce as an imperforate basal layer against the previous whorl, in median section appearing very short (hence originally termed semisepta) because of the high median aperture; aperture an elongate slit, extending up from the base of the apertural face for nearly its total height. L. to U. Cretaceous (Aptian to Cenomanian); Algeria; Qatar, Persian Gulf.

Subfamily CHOFFATELLINAE Maync, 1958

Choffatellinae Maync, 1958 (***2074**), p. 1.

Test planispirally enrolled, with short axis of coiling, later stage may uncoil, become reniform or peneropliform; wall agglutinated, with solid outer epidermis and continuous inner alveolar hypodermis, septa massive; aperture multiple and cribrate in septa and apertural face. L. Jurassic (Pliensbachian) to U. Cretaceous (Coniacian).

AMIJIELLA Loeblich and Tappan, 1985

Plate 100, figs. 1-3

Type species: Haurania amiji Henson, 1948 (***1460**), p. 12; OD.

Amijiella Loeblich and Tappan, 1985 (***1923**), p. 101.

Iranica Gollesstaneh, 1974 (***1262**), p. 187 (nom. nud.).

Test elongate, adult subcylindrical, very early stage planispirally enrolled, followed by uniserial and rectilinear chambers with inconspicuous horizontal sutures and circular section; wall microgranular calcareous, with imperforate outer layer and exoskeleton of elongate radial beams extending into the chamber cavity, endoskeletal pillars lacking; aperture cribrate in the central part of the terminal face. L. Jurassic (Pliensbachian) to M. Jurassic (Bathonian); Iraq; Turkey; Italy; France; Switzerland; Yugoslavia.

Remarks: Differs from *Haurania* in lacking central pillars.

BRAMKAMPELLA Redmond, 1964

Plate 100, figs. 14-18

Type species: Bramkampella arabica Redmond, 1964; OD.

Bramkampella Redmond, 1964 (***2537A**), p. 409.

Test free, subconical, early stage with small planispiral and involute coil, later evolute and finally uncoiled, rectilinear and circular in section, chambers low, increasing rapidly in breadth in the early stage, then somewhat more slowly so that the sides of the test flare less rapidly, septa strongly arched; wall microgranular calcareous, agglutinated, with imperforate outer layer and reticulate subepidermal network of beams and rafters forming an alveolar layer, exceptionally elongate radially arranged beams project inward as septula and attach to the previous septum near the margin of the perforate central region; aperture terminal, multiple, a series of pores restricted to the central area of the terminal face. U. Jurassic to L. Cretaceous; Saudia Arabia.

CHOFFATELLA Schlumberger, 1905

Plate 101, figs. 1 and 2; plate 102, figs. 1-3

Type species: Choffatella decipiens Schlumberger, 1905; OD.

Choffatella Schlumberger, 1905 (*2776), p. 763.

Test planispirally enrolled, compressed, partially evolute, whorls enlarging rapidly, chambers numerous, chamber lumen restricted to the peripheral area of the whorl so that in section it appears evolute, although the outer wall may somewhat overlap previous whorls, later chambers with a tendency to uncoil; wall exoskeleton with well-developed subepidermal network, endoskeleton consists of thick and massive septa pierced by the large apertures in the median plane of the test, no pillars present; aperture a single areal row of large openings extending up the apertural face in the plane of coiling, those of successive chambers aligned in radial series as seen in axial section, with new series of apertures intercalated between these as the spire enlarges. U. Jurassic (Oxfordian) to U. Cretaceous (Cenomanian); Mediterranean region; N. Africa; Mexico; Central America; Venezuela; Caribbean.

FEURTILLIA Maync, 1958

Plate 100, figs. 4-9

Type species: Feurtillia frequens Maync, 1958; OD.

Feurtillia Maync, 1958 (*2074), p. 1.

Test planispiral, laterally compressed, close-coiled and involute in early stage, later uncoiling, at least in the microspheric form; wall agglutinated, with distinct subepidermal network of shallow alveoles that appear polygonal in tangential section, septa thick, recurved; aperture a single terminal, elongate opening in the median plane of the test, in the adult stage occupying over half the length of the apertural face. U. Jurassic (U. Purbeckian), L. Cretaceous (Berriasian to U. Valanginian); Switzerland.

PARACYCLAMMINA Yabe, 1946

Plate 99, figs. 10-13

Type species: Loftusia bemmeleni A. Silvestri, 1932 (*2963), p. 89; OD.

Paracyclammina Yabe, 1946 (*3403), p. 259.

Test large, up to 10 mm in diameter, nautiloid with broadly rounded periphery, planispirally coiled and involute, whorls increasing slowly in height, septa oblique, thick, strongly perforate; wall agglutinated, with thick alveolar subepidermal layer, cylindrical alveoli coalescing toward the chamber interior and leaving a very shallow chamber lumen, no endoskeletal pillars present; external aperture not described as specimens known only from sections of limestone, probably cribrate as septa are perforated with many broad round pores. U. Jurassic; Indonesia: Sumatra.

Remarks: Banner (1970, *121, p. 258, 265) regarded *Paracyclammina* "as an early, extreme form of a 'proto-Loftusioid' Pseudocyclamminid trend which had no known descendents." We regard it as sufficiently distinct to warrant separate generic status.

PSEUDOCYCLAMMINA Yabe and Hanzawa, 1926

Plate 102, figs. 4-6

Type species: Cyclammina lituus Yokoyama, 1890 (*3418), p. 26; OD.

Pseudocyclammina Yabe and Hanzawa, 1926 (*3408), p. 10.

Test planispirally enrolled or rarely streptospiral in the early microspheric stage, subspherical to flattened, involute at least in early stage, later uncoiling, sutures strongly oblique in coiled stage; wall coarsely agglutinated, with coarse subepidermal network, exoskeleton may have a few irregular pillars in a narrow zone in the median plane of the test;

endoskeleton consisting of thick and massive septa, perforated by large openings; aperture areal, cribrate, covering the apertural face. L. Jurassic (Domerian) to U. Cretaceous (Coniacian); Morocco; Libya; France; Italy; Poland; Yugoslavia; USSR: Ukraine.

RECTOCYCLAMMINA Hottinger, 1967

Plate 100, figs. 10-13

Type species: Rectocyclammina chouberti Hottinger, 1967; OD.

Rectocyclammina Hottinger, 1967 (***1546**), p. 56.

Test elongate, subcylindrical to subconical, early stage of microspheric form planispiral and involute, later uncoiling and rectilinear, and megalospheric test may be entirely rectilinear, chambers inflated, rectilinear ones circular in section, increasing steadily in height, strongly overlapping; wall agglutinated, with imperforate outer layer and subepidermal choffatelloid network, septa thick; aperture terminal, circular, in the center of the apertural face. U. Jurassic (Kimmeridgian); Morocco.

TORINOSUELLA Maync, 1959

Plate 101, figs. 3-7

Type species: Choffatella peneropliformis Yabe and Hanzawa, 1926 (***3408**), p. 11; OD.

Torinosuella Maync, 1959 (***2079**), p. 6.

Choffatella (Torinosuella) Banner, 1966 (***120**), p. 205.

Test planispirally enrolled as in *Choffatella* in the early stage, later flaring and peneropliform or uncoiling, chambers broad and low, increasing rapidly in breadth; wall finely agglutinated, with imperforate epidermis and inner alveolar subepidermal meshwork; aperture terminal, cribrate, those of previous chambers reflected as numerous perforations in the septa. U. Jurassic (Kimmeridgian to Portlandian); Japan; Switzerland; Yugoslavia.

Subfamily PSEUDOCHOFFATELLINAE Loeblich and Tappan, 1985

Pseudochoffatellinae Loeblich and Tappan, 1985 (***1923**), p. 101.

Test large, flattened, early microspheric stage planispiral and evolute, later uncoiling, peneropliform, reniform, or with cyclic chambers, megalospheric early stage may be planispiral or reduced to protoconch and deuteroconch; wall microgranular, agglutinated, with imperforate epidermis and subepidermal network; aperture terminal, multiple. M. Jurassic (Bathonian) to M. Paleocene.

Remarks: Differs from the Choffatellinae in the evolute planispiral coil and open central area of the chambers, without septula or pillars.

ALZONELLA Bernier and Neumann, 1970

Plate 103, figs. 1-9

Type species: Alzonella cuvillieri Bernier and Neumann, 1970; OD.

Alzonella Bernier and Neumann, 1970 (***215**), p. 6.

Test with microspheric initial stage planispiral and evolute, later flabelliform or less commonly reniform to irregularly discoidal, megalospheric test also planispiral at first but adult test narrow and rectilinear to subtriangular; wall imperforate, microgranular, imperforate epidermis covering reticulate subepidermal network of short partitions projecting inward from the wall and aligned both parallel to and perpendicular to the septa; aperture a row of pores on the terminal face. M. Jurassic (Bathonian); France.

BALKHANIA Mamontova, 1966

Plate 104, figs. 1-8

Type species: Balkhania balkhanica Mamontova, 1966 (syn.: *Pseudochoffatella gigantica* Kaever, 1967, ***1628**, p. 205); OD.

Balkhania Mamontova, 1966 (***2018**), p. 145.

Test free, large, up to 15 mm in diameter, discoidal, megalospheric test with large ellipsoid proloculus nearly surrounded by the next three narrow and arcuate rectilinear chambers, nature of microspheric stage uncertain, up to thirty completely annular postembryonal chambers; wall calcareous, with imperforate outer layer and choffatelloid subepidermal network; aperture cribrate, a row of pores in the face in the young stage, with more than one row in the adult. L. Cretaceous (Barremian to U. Aptian); USSR: Turkmen; Afghanistan.

BROECKINELLA Henson, 1948

Plate 104, figs. 9-11

Type species: Broeckinella arabica Henson, 1948; OD.

Broeckinella Henson, 1948 (*1460), p. 92.

Test free, large, up to 3.1 mm in diameter, undivided globular proloculus followed by planispiral and evolute early stage, chambers rapidly increasing in breadth to become arcuate but not completely cyclical, so that test is successively flabelliform, complanate, and finally reniform; wall agglutinated, microgranular, exoskeleton consisting of imperforate outer layer, subepidermal vertical partitions and two sets of transverse partitions, those of successive chambers aligned, outermost part of the marginal zone subdivided by very short secondary partitions, resulting in a polygonal meshwork; aperture multiple in the median plane, leading into the open part of the chamber lumen between the vertical partitions. U. Cretaceous (Santonian to Maastrichtian) to M. Paleocene; Arabia: Qatar Peninsula; Italy; France; Spain; Yugoslavia.

Remarks: Much of the above description is based on a restudy of the holotype by Cherchi and Schroeder (1978, *566); this specimen from the subsurface may actually be of Paleocene age. Specimens referred to the type species from other localities do not appear to be conspecific, although they do extend the range of the genus.

DHRUMELLA Redmond, 1965

Plate 105, figs. 1-4

Type species: Dhrumella evoluta Redmond, 1965; OD.

Dhrumella Redmond, 1965 (*2538), p. 140.

Test free, large, flattened, early stage planispirally enrolled and evolute, later uncoiled and rectilinear, with broad, low and centrally arched uniserial chambers, interior subdivided by vertical exoskeletal beams that project from the outer wall a short distance into the chamber cavity, those of successive chambers not aligned, vertical beams interconnected by few horizontal rafters, probably only one horizontal partition per chamber, leaving the lower half of the chamber lumen open in the interior; wall calcareous, microgranular, agglutinated, a few large globular particles incorporated in the septa; aperture apparently multiple, a row of small pores in the terminal face. M. Jurassic (Bathonian, and possibly U. Bajocian); Saudi Arabia.

Remarks: *Dhrumella* was originally described as belonging to the Rotaliacea and as having a calcareous perforate test. Restudy of the types (Loeblich and Tappan, 1986, *1929), showed the coiling to be planispiral rather than trochospiral, the wall to be finely agglutinated with occasional large particles, and the interior to have exoskeletal beams and rafters similar to those of *Alzonella*, from which it differs in having a somewhat simpler structure, beams of successive chambers not aligned, and a simple coiled to uncoiled flattened test, without development of the peneropline, flabelliform, and cyclical modifications of *Alzonella*.

MONTSECHIANA Aubert, Coustau, and Gendrot, 1963

Plate 107, figs. 7-13

Type species: Montsechiana martiguae Aubert et al., 1963; OD.

Montsechiana Aubert, Coustau, and Gendrot, 1963 (*94), p. 169.

Test free, large, flattened, early stage planispiral and evolute, later chambers flaring to result in a peneropliform and then reniform test, finally becoming cyclic, periphery broadly rounded; wall microgranular, agglutinated, imperforate epidermal layer and subepidermal network restricted to the lateral walls, leaving chamber interior undivided; aperture multiple, cribrate, with openings scattered on the apertural face, not in a single row. U. Cretaceous (U. Santonian); France.

Remarks: Specimens from the Coniacian-Santonian of northern Spain referred to this species in the original description were noted by Hottinger (1967, *1546, p. 70) to belong elsewhere, as they have a complex endoskeletal structure of irregularly alternating pillars.

PSEUDOCHOFFATELLA Deloffre, 1961

Plate 106, figs. 1-6; plate 107, fig. 1

Type species: Pseudochoffatella cuvillieri Deloffre, 1961; OD.

Pseudochoffatella Deloffre, 1961 (*929), p. 105.

Test large, discoidal with nearly parallel sides, microspheric test up to 12 mm in diameter and about 1.2 mm in maximum thickness, early planispiral stage of about two whorls followed by peneropliform stage of about seven chambers, and then by up to eighteen or more cyclic or annular chambers, smaller megalospheric test up to 6 mm in diameter, with large subspherical initial chamber constricted in two unequal parts, followed by a peneropliform stage, adult flabelliform but not attaining either a reniform or cyclic stage; wall agglutinated, thin imperforate epidermal layer of microgranular calcite with included quartz grains, and subepidermal polygonal meshwork of beams, rafters and joists or second order beams; aperture multiple, a series of irregularly arranged openings on the apertural face. L. Cretaceous (U. Aptian to L. Albian); France; Spain; Yugoslavia.

TORREMIROELLA Brun and Canérot, 1979

Plate 105, figs. 5-7

Type species: Torremiroella hispanica Brun and Canérot, 1979; OD.

Torremiroella Brun and Canérot, 1979 (*443), p. 316.

Test free, elongate, early stage planispirally enrolled, later uncoiling; wall microgranular, agglutinated, with imperforate epidermis and very coarse subepidermal network, endoskeleton of large and irregular projections from the septa that may partially fill the chamber lumen; aperture an arched interiomarginal slit in the early planispiral stage, irregularly cribrate and terminal in the uncoiled part, remaining as perforations in the earlier septa. L. Cretaceous (Barremian); Spain.

Subfamily CYCLAMMININAE Marie, 1941

Cyclammininae Marie, 1941 (*2031), p. 257.

Similar to the Choffatellinae but does not uncoil and septal structure is always differentiated from that of the alveolar hypodermis; aperture single or multiple. Paleocene to Holocene.

CYCLAMMINA Brady, 1879

Plate 107, figs. 2-6

Type species: Cyclammina cancellata Brady, 1879; OD.

Cyclammina Brady, 1879 (*337), p. 62.

Cyclammina Brady, in Norman, in Jeffreys, 1876 (*1603), p. 214 (nom. nud.).

Test planispirally coiled and involute, somewhat flattened, numerous broad and low chambers per whorl, whorls increasing rapidly in height, sutures nearly radial, periphery broadly rounded; wall agglutinated, with very thin imperforate outer layer and prominent thick alveolar subepidermal meshwork of a thickness exceeding that of the chamber lumen; aperture an interiomarginal equatorial slit and a series of round pores with elevated rims scattered over the face. Paleocene to Holocene; cosmopolitan.

Family ECOUGELLIDAE Loeblich and Tappan, 1985

Ecougellidae Loeblich and Tappan, 1985 (*1923), p. 101.

Test with two or more planispiral whorls in the early stage, later uncoiling and biserial; wall agglutinated, with imperforate epidermis and alveolar subepidermal layer, septal structure like that of outer walls; aperture a low interiomarginal arch. L. Cretaceous (Barremian to Bedoulian).

ECOUGELLA Arnaud-Vanneau, 1980

Plate 108, figs. 1-6

Type species, Ecougella campiloides Arnaud-Vanneau, 1980; OD.

Ecougella Arnaud-Vanneau, 1980 (*71), p. 510.

Test large, crozier-shaped, planispirally enrolled in the early stage, biumbilicate coil of about two whorls followed by an elongate uncoiled stage of biserially arranged chambers that commonly are not in the same plane as those of the early coil, sutures radial in the coiled stage, nearly horizontal in the biserial stage; wall agglutinated, outer part imperforate, microgranular calcareous and finely agglutinated with smoothly finished surface, subepidermal alveolar layer of test and septa with outer coarser alveoles dichotomously branching inward into more numerous and regularly arranged second order alveoles, inner part of the wall coarse grained, incorporating quartz particles, foraminiferal tests, and other shell fragments; aperture interiomarginal, large, occupying about two-thirds of the base of the face of the final chamber. L. Cretaceous (Barremian to Bedoulian); France.

Family SPIROCYCLINIDAE Munier-Chalmas, 1887

Spirocyclinidae Munier-Chalmas, 1887 (*2208), p. xxxi.
Spirocyclininae Maync, 1950 (*2066), p. 538 (subfamily).
Hauraniidae Septfontaine, 1986 (*2875A), p. 54 (name not available, ICZN Art. 13 (a) (i), no description).
Hauraniinae Septfontaine, 1986 (*2875A), p. 54 (name not available, ICZN Art. 13 (a) (i), no description).

Test planispiral to irregularly planispiral, becoming peneropliform to cyclic; chamber interior partially subdivided by septulae, and with pillars perpendicular to septa; aperture cribrate. L. Jurassic to Eocene.

ANCHISPIROCYCLINA Jordan and Applin, 1952

Plate 108, figs. 7-11; plate 109, figs. 1-6

Type species: Anchispirocyclina henbesti Jordan and Applin, 1952 = *Dicyclina lusitanica* Egger, 1902 (***1050**), p. 585; OD.

Anchispirocyclina Jordan and Applin, 1952 (*1624), p. 3.
Trematocyclina Choffatt, 1885 (*591), p. 23 (name not available, ICZN Art. 13 (a) (i), no description; syn. of *Iberina*, fide Schlumberger and Choffat, 1904 (*2778), p. 364).
Iberina Munier-Chalmas, 1902 (*2210), p. 350 (non *Iberina* Simon, 1881); type species: *Dicyclina lusitanica* Egger, 1902, obj.; OD.

Test enrolled, planispiral to slightly asymmetrical, large flattened and commonly slightly undulating discoid microspheric tests, early stage close coiled, later flaring, spreading, and peneropline to reniform or circular in outline, chambers broad, low, strongly arcuate in the early stage, later may become completely cyclic, periphery rounded to subacute; wall microgranular to finely agglutinated or may include occasional large grains or tests of smaller foraminifers, imperforate outer layer underlain by a reticulate choffatelloid subepidermal network of rafters and beams, the narrow chambers not subdivided inward from the reticulate zone but leave a narrow open canal into which the septal apertures open, chambers near the median plane occupied by an irregular labyrinthic structure produced by radial pillars or buttresses arising between adjacent apertural passages, and extending from septum to septum, buttresses of successive chambers radially aligned; aperture cribrate, scattered over the apertural face. U. Jurassic (L. Kimmeridgian) to L. Cretaceous (L. Valanginian): Spain; Portugal; France; Switzerland; Yugoslavia; Algeria; Morocco; Turkey; Atlantic: Cape Verde Islands; USA: North Carolina; Cuba.

HAURANIA Henson, 1948

Plate 110, figs. 1-7

Type species: Haurania deserta Henson, 1948; OD.

Haurania Henson, 1948 (*1460), p. 11.

Test free, elongate conical, brief early planispiral coil followed by elongate uncoiled and rectilinear stage; wall finely agglutinated, with imperforate epidermis, radial exoskeletal septula or beams are perpendicular to the septa and outer wall but unrelated to the apertural openings present in the early stage, beams bifurcating inward in later chambers and accompanied by rafters that parallel the septa, forming a coarse alveolar network in the lower part of the chamber and becoming finer in the upper part, endoskeletal pillars in the central region of the test are continuous in successive chambers; aperture cribrate, a series of openings in a circular area of the terminal face. L. Jurassic (M. Lias) to M. Jurassic (Bathonian); Morocco; Iraq; China: Markam region.

MARTIGUESIA Maync, 1959

Plate 110, figs. 8-10

Type species: Martiguesia cyclamminiformis Maync, 1959; OD.

Martiguesia Maync, 1959 (*2077), p. 21.

Test free, early stage planispirally enrolled, relatively thick, later uncoiling, periphery rounded, chambers numerous, broad and low, gently curved in the planispiral coil, nearly straight in the rectilinear portion; wall agglutinated, with imperforate epidermis and coarse subepidermal alveolar network, endoskeleton of irregular radial pillars that subdivide and nearly completely fill the chambers; aperture cribrate, areal. U. Cretaceous (Santonian): France.

PSEUDOSPIROCYCLINA Hottinger, 1967

Plate 111, figs. 4-8

Type species: Pseudospirocyclina mayncii Hottinger, 1967; OD.

Pseudospirocyclina Hottinger, 1967 (*1546), p. 70, 73.

Test free, large, compressed, planispirally enrolled, megalospheric test with simple proloculus followed by juvenile enrolled chambers, microspheric test with more numerous whorls and larger adult test, juvenile whorls involute, chambers low, strongly arched, whorl enlarging rapidly to produce a flaring test, adult tending to uncoil and become rectilinear, periphery rounded; wall agglutinated, exoskeleton of imperforate outer layer and underlying finely reticular subepidermal network, endoskeleton of thick septa perforated by irregularly arranged apertures that are aligned from one chamber to the next, postjuvenile chambers with endoskeletal pillars flanking the openings and aligned with the apertural axes, endoskeleton and exoskeleton separated by a lateral canal formed by the undivided portion of the chambers; aperture cribrate, with numerous pores scattered over the apertural face. U. Jurassic (Kimmeridgian): Morocco; Portugal.

QATARIA Henson, 1948

Plate 111, figs. 1-3

Type species: Qataria dukhani Henson, 1948; OD.

Qataria Henson, 1948 (*1460), p. 98.

Test large, about 6.6 mm in diameter, discoidal, early stage planispirally enrolled, megalospheric embryo probably bilocular, later chambers cyclical, outer part of chambers subdivided by numerous exoskeletal beams and rafters, forming chamberlets that are aligned radially from the center of the test toward the periphery, about forty per quadrant, chamberlets do not alternate in position from one side to the other; wall of imperforate microgranular calcite; aperture multiple, consisting of small perforations on the final chamber roof, aligned in rows that correspond to the pairs of chamberlets. U. Cretaceous (U. Cenomanian or Turonian): Arabia: Qatar Peninsula.

REISSELLA Hamaoui, 1963

Plate 112, figs. 1-5

Type species: Reissella ramonensis Hamaoui, 1963; OD.

Reissella Hamaoui, 1963 (*1378), p. 58.

Test planispirally enrolled and involute in the early stage, later may tend to uncoil and flare, up to about ten chambers in the final whorl, sutures radial, distinct, depressed, subepidermal mesh formed by elongate primary and short secondary exoskeletal beams vertical to the septa and aligned from chamber to chamber, adjacent beams connected by numerous short horizontal rafters that do not extend inward beyond the ends of the secondary beams; wall of imperforate microgranular calcite; primary aperture elliptical to slitlike, areal, slightly produced on a necklike elevation, near the base of the apertural face in the early stage, becoming central in later chambers, numerous secondary apertural pores scattered over the apertural face except for a marginal zone near the chamber periphery. U. Cretaceous (Cenomanian); Israel.

SAUDIA Henson, 1948

Plate 112, figs. 6-9

Type species: Saudia discoidea Henson, 1948: OD.

Saudia Henson, 1948 (*1460), p. 97.

Test large, discoidal to reniform, microspheric test with a vestigial spire, followed by arcuate uniserial chambers that form a flabelliform adult test; megalospheric test with large round proloculus followed by a reniform but not distinctly spiral stage; adult chambers evolute and cyclical, lateral zone on each side of the test with exoskeletal beams and rafters producing a thin and delicate subepidermal network, central zone of early chambers undivided, but as the test thickens interseptal pillars appear in the median plane, aligned from one chamber to the next, additional tiers of pillars being added as the test thickens with growth; apertures alternate in position with the pillars within a chamber. Paleocene to M. Eocene; Saudia Arabia; Iraq; Yugoslavia.

SORNAYINA Marie, 1960

Plate 113, figs. 1-4

Type species: Sornayina foissacensis Marie, 1960 (syn.: *Sornayina munieri* Marie, 1960; *Sornayina schlumbergeri* Marie, 1960): OD.

Sornayina Marie, 1960 (*2041), p. 320.

Test free, planispiral to slightly asymmetrically coiled, rarely uncoiling, numerous broad and low chambers, whorls enlarging rapidly, sutures depressed, periphery subangular, microspheric tests large and flaring, up to 3 mm in diameter, megalospheric ones somewhat smaller and more nautiloid; wall with imperforate epidermal layer and subepidermal reticular meshwork as in the Choffatellinae, chamber lumen subdivided into chamberlets by somewhat irregular or even bifurcating transverse septula perpendicular to the septa, these being less evenly spaced than in *Spirocyclina*, septula progressively reduced inward to form discontinuous pillars and finally only small projections, leaving the chambers open in the subcentral zone, but with a more or less continuous median partition resulting from a single elongate median septulum present in successive chambers that divides the test axially into two equal parts; aperture cribrate, the openings irregularly scattered over the slightly depressed central part of the apertural face, and absent from the compact thickened zone at the margins. U. Cretaceous (Coniacian); France.

SPIRALOCONULUS Allemann and Schroeder, 1980

Plate 114, figs. 1-9

Type species: Spiroconulus perconigi Alleman and Schroeder, 1972; OD.

Spiraloconulus Allemann and Schroeder, 1980 (*26), p. 358 (nom. subst. pro *Spiroconulus* Allemann and Schroeder, 1972).

Spiroconulus Allemann and Schroeder, 1972 (*25), p. 203 (non *Spiroconulus* Martens, 1892); obj.; OD.

Limognella Pelissié and Peybernès, 1982 (*2377), p. 120; type species: *Limognella dufaurei* Pelissié and Peybernès, 1982 = *Spiraloconulus giganteus* Cherchi and Schroeder, 1982 (*568), p. 164; OD.

Test large, conical to cylindrical, enrolled to rectilinear, early enrolled stage producing a flattened test apex, distinctly coiled microspheric specimens up to 2 mm in breadth and up to 1.6 mm in height, megalospheric tests smaller, with maximum height of 1.5 mm and diameter of 1.1 mm, conical to almost cylindrical, with more strongly developed rectilinear stage; wall microgranular calcareous, coarsely agglutinated, and may include very large calcareous grains, imperforate epidermis, with septulae (beams and rafters) forming an irregular subepidermal network or marginal zone, the central part of the chambers with pillarlike growths from the septa interspersed between the apertural pores, the pillars rarely completely crossing the chamber lumen but leave a narrow open space adjacent to the succeeding septum, septa of the rectilinear stage strongly convex toward the apertural face; aperture cribrate on the terminal face. M. Jurassic (Dogger); France; Italy: Sardinia; Arabia: Oman.

Remarks: *Spiraloconulus giganteus* Cherchi and Schroeder, 1982 and *Limognella dufaurei* Pelissié and Peybernès, 1982 are conspecific, and were published simultaneously. As first revisers, Cherchi and Schroeder (1983, ***570**, p. 249) retained the former as the valid name with *L. dufaurei* as a synonym.

SPIROCYCLINA Munier-Chalmas, 1887

Plate 113, figs. 5-8

Type species: Spirocyclina choffati Munier-Chalmas, 1887; OD.

Spirocyclina Munier-Chalmas, 1887 (*2208), p. xxxi.

Test large, up to 10 mm in diameter, flattened, planispirally enrolled to slightly asymmetrical, largely involute but spire increasing rapidly in height to become peneropline, rarely may be uncoiled and rectilinear in the final stage, chambers low and broad, strongly arcuate, about twenty-five in the final whorl, periphery subacute; wall microgranular calcareous, agglutinated, with imperforate epidermal layer and coarse subepidermal network, apertural face slightly depressed centrally and thickened toward the margins, septa compact, of slightly less thickness than the chamber lumen, endoskeletal interseptal septula or beams and rafters subdividing the chambers into rectangular secondary chamberlets, near the center of the test the beams may be reduced to pillars or to mere protuberances from the septa lying between the apertural pores, but a single elongated one lying in the plane of coiling between the apertural pores of successive chambers may subdivide the test; aperture multiple, two rows of pores lying in the slight depression on the apertural face, parallel to the plane of coiling. U. Cretaceous (Santonian); France.

STREPTOCYCLAMMINA
Hottinger, 1967
Plate 114, figs. 10-14

Type species: Pseudocyclammina (Streptocyclammina) parvula Hottinger, 1967; OD.

Pseudocyclammina (Streptocyclammina) Hottinger, 1967 (*1546), p. 64.

Test free, flattened, early stage may be streptospiral, adult planispirally coiled, numerous very low, broad, and strongly recurved chambers per whorl, whorls enlarging rapidly in peneropline fashion, sutures slightly depressed, periphery rounded; wall very finely agglutinated, exoskeleton consisting of imperforate outer layer and very fine subepidermal network, endoskeleton of massive septa perforated by numerous apertures, with a few irregular pillars in the later adult chambers; aperture cribrate, numerous openings covering the entire apertural face. L. Jurassic (M. Lias) to U. Jurassic (Kimmeridgian); Morocco; Italy; Yugoslavia.

Remarks: Although originally regarded as a subgenus of *Pseudocyclammina, Streptocyclammina* is here elevated to generic rank; it differs from the former genus in the early streptospiral stage, more numerous chambers, rapidly flaring whorls, very fine subepidermal network, and presence of endoskeletal pillars in the adult. The presence of these structures requires its transfer to the Spirocyclinidae.

TIMIDONELLA Bassoullet, Chabrier, and Fourcade, 1974
Plate 116, figs. 1-7

Type species: Timidonella sarda Bassoullet et al., 1974; OD.

Timidonella Bassoullet, Chabrier, and Fourcade, 1974 (*159), p. 2015; also see Bassoullet et al., 1976 (*160), p. 3.

Test free, flattened, microspheric stage peneropliform at first, later discoidal with as many as forty annular chambers, and up to 8 mm in diameter, megalospheric tests may be flabelliform or reniform to discoidal, of constant thickness equal to that of the proloculus, length up to 1.7 mm and breadth up to 2.1 mm, comprised of twenty to thirty chambers, with only a single plane of endoskeletal pillars; other megalospheric tests have an initial planispiral coil followed by an uncoiled rectilinear, cylindrical, or elliptical stage, up to 1.2 mm in length; wall agglutinated, microgranular calcareous, with imperforate epidermis, followed successively inward by a subepidermal network formed by beams and rafters, a zone with quadrangular chamberlets formed by the beams, an undivided zone termed the annular canal, and a zone of interseptal pillars; aperture terminal, multiple. M. Jurassic (Dogger); Italy: Sardinia; France; Iran; Madagascar.

VANIA Sirel and Gündüz, 1985
Plate 115, figs. 1-7

Type species: Vania anatolica Sirel and Gündüz, 1985; OD.

Vania Sirel and Gündüz, 1985 (*2990), p. 21.

Test large, up to 6.5 mm in diameter, discoidal, biconcave, bilaterally symmetrical, periphery moderately rounded, short planispiral stage of a few undivided in the microspheric test, later chambers spreading and successively flabelliform, reniform, and finally annular, interior subdivided by radially arranged beams and intercalated secondary beams, those of successive chambers aligned, with short rafters parallel to the septa forming a subepidermal network; wall finely agglutinated, imperforate; aperture consists of two alternating rows of pores on the periphery. U. Paleocene (Thanetian); Turkey.

Family LOFTUSIIDAE Brady, 1884

Loftusiidae Lister, in Lankester, 1903 (*1791), p. 142, nom. corr. pro family Loftusina.

Loftusina Lankester, 1885 (*1790), p. 847, nom. transl. ex subfamily Loftusinae.

Loftusinae Brady, 1884 (*344), p. 67 (subfamily; nom. imperf.).

Loftusiinae Loeblich and Tappan, 1961 (*1902), p. 280 (subfamily, nom. correct.).

Test large, planispiral, axis of coiling elongate; chamber interior with exoskeletal beams and rafters and endoskeletal pillars; wall agglutinated, with imperforate epidermis and inner alveolar layer; aperture multiple. L. Cretaceous (Barremian) to U. Cretaceous (Maastrichtian).

LOFTUSIA Brady, 1870

Plate 116, figs. 8-10

Type species: Loftusia persica Brady, in Carpenter and Brady, 1870; OD.

Loftusia Brady, in Carpenter and Brady, 1870 (*492), p. 751.

Test large, fusiform, ovoid or globular, planispirally enrolled with increasingly elongate axis of coiling, the earliest whorls in the microspheric form resembling *Choffatella* in equatorial section, strongly overlapping chambers gradually increasing in height as added, septa oblique in transverse section; wall with exoskeleton consisting of imperforate calcareous epidermis and subepidermal network of beams and rafters, septa and endoskeletal pillars distinctly agglutinated, pillars extend from chamber to chamber between the apertural pores and most numerous near the outer margins of the chambers, leaving a more open chamber lumen in the median region of the test, secondary transverse partitions may connect the pillars; aperture multiple, numerous small rounded pores set in transverse rows in the apertural face or primary septa. U. Cretaceous (Maastrichtian); Iran; Turkey; Sumatra.

PRAERETICULINELLA Deloffre and Hamaoui, 1970

Plate 117, figs. 1-3

Type species: Praereticulinella cuvillieri Deloffre and Hamaoui, 1970; OD.

Praereticulinella Deloffre and Hamaoui, 1970 (*931), p. 42.

Test free, subglobular, about 1.1 mm in length, proloculus followed by a short tubular chamber and then planispirally enrolled and involute, earliest whorl with simple chambers subdivided only by transverse partitions, those near the outer wall incomplete and leaving a canal-like opening against the outer wall of the septum, transverse partitions present from the third whorl, and both horizontal and oblique lamellae present in the adult stage, apertural face and septa much thickened near the base of the face; wall microgranular, calcareous, imperforate, agglutinated, with primary and secondary septula, axial transverse septula, and horizontal and oblique lamellae; aperture a row of pores near the base of the apertural face. L. Cretaceous (Barremian); Spain.

RETICULINELLA Cuvillier, Bonnefous, Hamaoui, and Tixier, 1970

Plate 117, figs. 4-6; plate 118, figs. 1-5

Type species: Reticulina reicheli Cuvillier et al., 1969; OD.

Reticulinella Cuvillier et al., in Bonnefous, Hamaoui, and Tixier, 1970 (*301), p. 39 (nom. subst. pro *Reticulina* Cuvillier et al., 1969).

Reticulina Cuvillier, Bonnefous, Hamaoui, and Tixier, 1969 (*864), p. 209 (non *Carinocythereis (Reticulina)* Bassiouni, 1969); obj.; OD.

Test free, spherical to ovoid, planispiral and involute, wall microgranular, calcareous, weakly agglutinated, with imperforate epidermis and reticulate subepidermal network, then a series of radial and transverse partitions that do not extend to the previous septum but leave a narrow open preseptal canal at the base of the septum against the chamber floor into which the apertures open; aperture multiple, a row of small round openings near the base of the septum. U. Cretaceous (Cenomanian to Maastrichtian); Algeria; Libya.

Superfamily SPIROPLECTAMMINACEA Cushman, 1927

Spiroplectamminacea Loeblich and Tappan, 1982 (*1917), p. 27, nom. corr.

Spiroplectamminidea Saidova, 1981 (*2696), p. 19, nom. transl. ex subfamily Spiroplectammininae.

Test planispirally coiled in early stage, later biserial; wall agglutinated, noncanaliculate. Carboniferous to Holocene.

Family SPIROPLECTAMMINIDAE Cushman, 1927

Spiroplectamminidae Saidova, 1981 (*2696), p. 19, nom. transl. ex subfamily Morulaeplectidae Saidova, 1981 (*2696), p. 21.

Early stage planispiral or streptospiral, later biserial, rarely becoming uniserial in the later stage; wall agglutinated. Carboniferous to Holocene.

Subfamily SPIROPLECTAMMININAE Cushman, 1927

Spiroplectammininae Cushman, 1927 (*742), p. 21.
Spiroplectammininea Saidova, 1981 (*2696), p. 19 (supersubfamily).

Test elongate, early stage planispirally coiled, later biserial, and may be reduced to uniserial, chambers simple, undivided; wall agglutinated. Carboniferous to Holocene.

AMMOBACULOIDES Plummer, 1932

Plate 119, figs. 3 and 4

Type species: Ammobaculoides navarroensis Plummer, 1932; OD.

Ammobaculoides Plummer, 1932 (*2425), p. 87.

Test free, elongate, narrow, slightly compressed, early chambers planispirally enrolled, later biserial, and finally uniserial; wall agglutinated on organic base, insoluble in acid, surface roughly finished; aperture at base of last chamber in coiled and biserial stages, becoming terminal, central and slitlike in the rectilinear chambers. L. Cretaceous (Valanginian) to U. Cretaceous (Maastrichtian); Canada; USA: Texas, Colorado, Wyoming, South Dakota, Montana, Kansas; Australia; USSR: Kazakh, Central and W. Siberia.

BOLIVINOPSIS Yakovlev, 1891

Plate 119, figs. 1 and 2

Type species: Bolivinopsis capitata Yakovlev, 1891; OD.

Bolivinopsis Yakovlev, 1891 (*3413), p. 349.
Spiroplectoides Cushman, 1927 (*739), p. 77; type species: *Spiroplecta rosula* Ehrenberg, 1854 (*1068), p. xxxii; OD.

Test elongate, narrow, early stage with large planispiral coil of a diameter greater than the early part of the following long biserial stage, which is of nearly constant width throughout, sutures commonly oblique in the later stage; wall finely agglutinated; aperture an interiomarginal arch. U. Cretaceous; Europe, North America, South America.

Remarks: Cenozoic species that have been referred to *Bolivinopsis* or *Spiroplectoides* probably are not congeneric. Some are true *Spiroplectammina*, others are hyaline calcareous species referable to *Spirobolivina* or elsewhere. *Bolivinopsis* differs from *Spiroplectammina* in being much more compressed and elongate and in having a smoothly finished wall.

HETERANTYX Loeblich and Tappan, 1982

Plate 119, figs. 8 and 9

Type species: Heterantyx antonovae Loeblich and Tappan, 1982; OD.

Heterantyx Loeblich and Tappan, 1982 (*1915), p. 57.

Test free, elongate, flaring, with lozenge-shaped cross section and truncated margins that may form a distinct ridge at each angle, early stage planispirally enrolled, later biserial, with elevated ridge along the zigzag suture between the two rows of biserial chambers; wall finely agglutinated, solid and noncanaliculate; aperture a slit or low arch at the base of the final chamber. L. Cretaceous (Barremian to Albian); USA: Texas; France; Netherlands; USSR: Krasnodar.

ORECTOSTOMINA Seiglie, 1965

Plate 119, figs. 10-17

Type species: Orectostomina camachoi Seiglie, 1965; OD.

Orectostomina Seiglie, 1965 (*2847), p. 70.
Spiroplectamminoides Brönnimann and Beurlen, 1977 (*391), p. 86 (non *Spiroplectamminoides* Skipp, 1969, nec Magniez, 1972); type species: *Spiroplectamminoides camposi* Brönnimann and Beurlen, 1977 (*391); OD.
Paraibaella Brönnimann and Beurlen, 1977 (*392), p. 279 (nom. subst. pro *Spiroplectamminoides* Brönnimann and Beurlen, 1977); type species: obj.; OD.

Test free, small, elongate, slightly compressed, early chambers planispirally coiled, later biserial; wall finely agglutinated, surface smoothly finished; aperture areal, a transverse slit midway up the final chamber face, bordered above and below by a protruding lip. Holocene; Caribbean: off Los Testigos Islands; Atlantic: Campos Shelf, off Brazil at 29 m to 45 m.

QUASISPIROPLECTAMMINA Loeblich and Tappan, 1982

Plate 119, figs. 5-7

Type species: Spiroplectammina nuda Lalicker, 1935 (*1771), p. 4; OD.

Quasispiroplectammina Loeblich and Tappan, 1982 (*1915), p. 60.

Test elongate, oval to nearly circular in section, enlarging gradually with growth, early planispiral coil of lesser breadth than the succeeding biserial portion; wall thin, solid, and noncanaliculate, of very finely agglutinated particles on an organic base, and when constructed largely of calcareous fragments the test readily disintegrates in HCl; aperture a low arch at the base of the last formed chamber. L. Cretaceous (Albian) to U. Cretaceous (Cenomanian): cosmopolitan.

SPIROPLECTAMMINA Cushman, 1927

Plate 119, figs. 19 and 20

Type species: Textularia agglutinans d'Orbigny var. *biformis* Parker and Jones, 1865 (*2351), p. 370; OD.

Spiroplectammina Cushman, 1927 (*742), p. 23.

Test free, elongate, narrow, ovoid in section, margins broadly rounded, large early planispiral coil of few chambers followed by biserially arranged chambers, the coil commonly of greater breadth than the first few pairs of biserial chambers; wall agglutinated, solid and noncanaliculate; aperture a low arch at the inner margin of the final chamber. Carboniferous to Holocene; cosmopolitan.

SPIROPLECTELLA Earland, 1934

Plate 119, fig. 18

Type species: Spiroplectella cylindroides Earland, 1934; OD(M).

Spiroplectella Earland, 1934 (*1041), p. 113.

Test small, elongate, early portion planispiral, later with biserial stage of breadth equal to that of early coil, finally uniserial, rectilinear, and circular in section, sutures slightly depressed; wall very finely arenaceous, color ferruginous brown; aperture simple, terminal, slightly produced on a short neck. Holocene; Scotia Sea, at 3,264 m.

Remarks: Regarded previously as a synonym of *Ammobaculoides*, this very tiny delicate deep water form is undoubtedly not closely related to the Cretaceous genus.

SPIROPLECTINELLA Kisel'man, 1972

Plate 120, figs. 1-16

Type species: Spiroplecta wrightii Silvestri, 1903 (*2930), p. 63; OD.

Spiroplectinella Kisel'man, 1972 (*1695), p. 135.

Spirorutilis Hofker, 1976 (*1525), p. 69; type species: *Textularia carinata* d'Orbigny, 1846 (*2309), p. 247; OD.

Test free, with early planispiral coil at least in the microspheric stage, followed by biserial adult stage that commonly increases rapidly in breadth, is lozenge shaped in section and may have a marginal keel; wall agglutinated, noncanaliculate, interior fine grained with inner organic lining, outer part of wall more coarsely agglutinated; aperture a low arch at the base of the apertural face. Paleocene to Holocene; cosmopolitan.

Remarks: Banner and Pereira (1981, *130, pl. 7, figs. 1-5) reported *S. wrightii* (as *Spirorutilis*) to be noncanaliculate.

Subfamily VULVULININAE Saidova, 1981

Vulvulininae Saidova, 1981 (*2696), p. 20.

Vulvulininea Saidova, 1981 (*2696), p. 19 (supersubfamily).

Test broad and flattened; planispirally enrolled in early stage, later rectilinear; chambers very broad, low, and recurved; aperture terminal in the rectilinear part, a single slit or row of slits. ?U. Cretaceous (Campanian), Paleocene to Holocene.

AMMOSPIRATA Cushman, 1933

Plate 120, figs. 17 and 18

Type species: Pavonina mexicana Cushman, 1926 (*733), p. 22; OD.

Ammospirata Cushman, 1933 (*769), p. 32.

Test free, palmate, compressed; globular proloculus followed by small planispiral coil of a few narrow elongate chambers in a single whorl, then a short biserial stage of a few pair of very broad low chambers that curve back at the periphery to nearly surround the early whorl, adult test with well-developed series of as many as fourteen broad, low, and strongly arched uniserial chambers, sutures thickened and elevated; wall finely agglutinated, smoothly finished; aperture terminal, multiple in the adult, consisting of a row of small pores in an elongate narrow depression on the upper margin of the final chamber. U. Eocene?; Oligocene; Mexico; USA: Texas, Florida.

VULVULINA d'Orbigny, 1826

Plate 120, figs. 19-21

Type species: Vulvulina capreolus d'Orbigny, 1826 = *Nautilus (Orthoceras) pennatula* Batsch, 1791 (***161**), No. 13, pl. 4, figs. 13a-d.; SD Cushman, 1928 (***747**), p. 118.

Vulvulina d'Orbigny, 1826 (***2303**), p. 264.

Schizophora Reuss, 1861 (***2584**), p. 12; type species: *Schizophora neugeboreni* Reuss, 1861; OD(M).

Venilina Gümbel, 1870 (***1337**), p. 648; type species: *Venilina nummulina* Gümbel, 1870; SD Cushman, 1928 (***747**), p. 118.

Trigenerina Schubert, 1902 (***2811**), p. 26; type species: obj.: SD (SM) Liebus, 1911 (***1844**), p. 930.

Bigenerina (Valvulina) Yabe and Hanzawa, 1929 (***3410**), p. 154 (nom. transl., err. cit. pro *Vulvulina*).

Test free, flaring or broad and elongate, lozenge shaped to rhomboidal in section, margins sharply angled, early portion planispirally coiled at least in the microspheric generation, later with very broad and low, biserially arranged chambers that are strongly curved backwards toward the proloculus, and in well-developed specimens may be uniserial in the final stage, sutures distinct; wall finely agglutinated, surface smoothly finished; aperture a broad low interiomarginal arch in the early stage, later becoming terminal, a narrow elongate slit. ?U. Cretaceous (Campanian); Paleocene to Holocene; cosmopolitan.

Subfamily SPIROTEXTULARIINAE Saidova, 1975

Spirotextulariinae Loeblich and Tappan, 1982 (***1917**), p. 27, nom. corr. pro subfamily Spirotextularinae.

Spirotextularinae Saidova, 1975 (***2695**), p. 119 (nom. imperf.).

Early stage planispiral, at least in the early microspheric stage, later biserial, outer part of each chamber partially or completely separated from main chamber lumen by a vertical partition; wall agglutinated, noncanaliculate. M. Eocene to Holocene.

Remarks: Although the subfamily and type genus were both originally defined as having an early coil in the microspheric generation, we consider the distinctive secondary partitions in the biserial chambers of the type species of *Spirotextularia* to be the definitive character. The Spirotextulariinae originally was defined as a subfamily of the Textulariidae (Saidova, 1975, ***2695**), but the type genus was later (Saidova, 1981, ***2696**) placed in the Spiroplectammininae, family Spiroplectamminidae.

SEPTIGERINA Keijzer, 1941

Plate 121, figs. 1-4

Type species: Septigerina dalmatica Keijzer, 1941; OD.

Septigerina Keijzer, 1941 (***1666**), p. 1006.

Test free, flattened, planispirally enrolled in the early stage, later biserial, each biserial chamber with a pillar in the outer part that extends from one face of the test to that opposite and is attached to the chamber floor and perpendicular to it although the pillar in the final pair of chambers may not reach the chamber floor; wall agglutinated; aperture an arch at the base of the final chamber face. M. Eocene; Yugoslavia: Dalmatia.

SPIROTEXTULARIA Saidova, 1975

Plate 121, figs. 7-12

Type species: Textularia sagittula Defrance var. *fistulosa* Brady, 1884 (***344**), p. 362; OD.

Spirotextularia Saidova, 1975 (***2695**), p. 123.

Spirotextularia Basov, 1974 (***156**), p. 155 (name not available, ICZN Art. 13 (a) (i), no description).

Neoseptigerina Halicz and Reiss, 1979 (***1363**), p. 313; type species: *Textularia floridana* Cushman, 1922 (***721**), p. 24; OD.

Fissotextularia Mikhalevich, 1981 (***2110**), p. 38; type species: *Textularia floridana* Cushman, 1922, (***721**), p. 24; OD.

Test with planispiral coil of one whorl, chambers laterally produced, internally a secondary septum cuts off the outer part of each chamber, leaving no connection from the distal chamberlet to the main chamber lumen; wall agglutinated, commonly of calcareous fragments, noncanaliculate, surface smoothly to roughly finished; aperture interiomarginal, a low arch against the previous chamber. Holocene; Pacific; Atlantic; Caribbean; Gulf of Mexico; Red Sea.

Remarks: The internal structure and wall characters of *Spirotextularia*, and the synonymy of *Fissotextularia* and *Neoseptigerina* were discussed by Loeblich and Tappan (1985, ***1926**, p. 185).

Subfamily NOVALESIINAE Loeblich and Tappan, 1984

Novalesiinae Loeblich and Tappan, 1984 (*1918), p. 12.

Test planispirally enrolled in the early stage, later biserial: interior of chambers subdivided by radially arranged vertical partitions that project inward from the outer wall, but do not reach the median septum between the two series of chambers, secondary horizontal partitions rarely may be present within a chamber; aperture interiomarginal. L. Cretaceous (U. Aptian to L. Albian).

Remarks: Differs from the Spiroplectamminae in having internal partitions within the chambers and differs from the Spirotextulariinae in having numerous partitions per chamber, in these being radially arranged rather than merely cutting off a short peripheral part of the biserial chambers, and in rarely having horizontal as well as vertical partitions.

NOVALESIA Magniez, 1974

Plate 121, figs. 13-15

Type species: Spiroplectamminoides productus Magniez, 1972 (*1978); OD.

Novalesia Magniez, 1974 (*1979), p. 155 (nom. subst. pro *Spiroplectamminoides* Magniez, 1972).

Spiroplectamminoides Magniez, 1972 (*1978), p. 181 (non *Spiroplectamminoides* Skipp, 1969, nec Brönnimann and Beurlen, 1977); obj.; OD.

Test free, elongate, early stage planispiral, later biserial as in *Spiroplectammina*, nearly circular in section; wall finely agglutinated, interior of each chamber subdivided by about four thin radial vertical septula projecting in from the outer wall but not quite reaching the median septum separating the two series of chambers, less frequently a supplementary horizontal septulum may be present in later chambers; aperture a low interiomarginal slit. L. Cretaceous (U. Aptian to L. Albian); Spain.

Subfamily MORULAEPLECTINAE Saidova, 1981

Morulaeplectinae Saidova, 1981 (*2696), p. 21.

Morulaeplectinea Saidova, 1981 (*2696), p. 21 (supersubfamily).

Early stage streptospirally enrolled, later biserial; wall thin, of an agglutinated single layer of grains; aperture interiomarginal. Holocene.

MORULAEPLECTA Höglund, 1947

Plate 121, figs. 5 and 6

Type species: Morulaeplecta bulbosa Höglund, 1947; OD.

Morulaeplecta Höglund, 1947 (*1487), p. 165.

Test streptospirally enrolled in the early stage so that the bulbous proloculus is completely enclosed, later biserial; wall of proloculus proteinaceous, wall of remainder of test agglutinated; aperture an interiomarginal arch. Holocene; Sweden.

Family TEXTULARIOPSIDAE Loeblich and Tappan, 1982

Textulariopsidae Loeblich and Tappan, 1982 (*1915), p. 61.

Test free, early stage biserial, or may have a single adventitious chamber resulting in a pseudotriserial base, later may be biserial, loosely biserial or uniserial. L. Jurassic (Pliensbachian) to U. Cretaceous (Maastrichtian).

AAPTOTOICHUS Loeblich and Tappan, 1982

Plate 122, figs. 1-4

Type species: Bigenerina clavellata Loeblich and Tappan, 1946 (*1879), p. 245; OD.

Aaptotoichus Loeblich and Tappan, 1982 (*1915), p. 62.

Short biserial stage followed by longer uniserial portion of broad low chambers; wall of fine siliceous agglutinated particles, held in organic material, solid, noncanaliculate, insoluble in HCl; aperture terminal, small and rounded. L. Cretaceous (Valanginian) to U. Cretaceous (Cenomanian); Australia?; Caribbean: Trinidad; Germany; USA: Texas.

BIMONILINA Eicher, 1960

Plate 122, figs. 5-8

Type species: Bimonilina variana Eicher, 1960; OD.

Bimonilina Eicher, 1960 (*1079), p. 65.

Biserial, commonly somehat twisted and tending to become loosely biserial but not completely uniserial; wall finely agglutinated, insoluble in acid; aperture terminal and slitlike and may have a projecting lip on one side. L. Cretaceous (Albian) to U. Cretaceous (Cenomanian); USA: Wyoming, Texas; Czechoslovakia.

HAIMASIELLA Loeblich and Tappan, 1982

Plate 122, figs. 14-17

Type species: Bigenerina wintoni Cushman and Alexander, 1930 (*803), p. 9; OD.

Haimasiella Loeblich and Tappan, 1982 (*1915), p. 63.

Test with early biserial stage elongate and compressed, then abruptly becoming uniserial with subcylindrical chambers; wall solid, noncanaliculate, of calcareous particles agglutinated in organic material, readily disintegrating in HCl; aperture terminal, rounded. Cretaceous (Albian); USA: Oklahoma, Texas.

MINYAICHME Loeblich and Tappan, 1982

Plate 122, figs. 11-13

Type species: Siphotextularia subcretacea Tappan, 1943 (*3121), p. 486; OD.

Minyaichme Loeblich and Tappan, 1982 (*1915), p. 66.

Test biserial, rarely with single adventitious third chamber at the base giving a pseudotriserial appearance, sides flattened, margins truncate to slightly rounded; wall solid, noncanaliculate, of agglutinated calcareous particles, readily disintegrating in HCl; aperture large, ovate, areal, terminal to subterminal in position. Cretaceous (Albian to Cenomanian); USA: Texas; Atlantic Ocean cores, Blake Plateau Escarpment.

PLECTINELLA Marie, 1956

Plate 122, figs. 18-23

Type species: Plectinella virgulinoides Marie, 1956; OD.

Plectinella Marie, 1956 (*2037), p. B240

Arenovirgulina Said and Barakat, 1958 (*2690), p. 243; type species: *Arenovirgulina aegyptiaca* Said and Barakat, 1958, p. 243; OD.

Test biserial, may be slightly twisted, chambers relatively high; wall solid, agglutinated, noncanaliculate; aperture subterminal, areal, slitlike, and may be slightly curved. M. Jurassic (Callovian) to U. Cretaceous (Maastrichtian); Egypt; France; Belgium; USSR: Belorussia; Australia; USA: Texas.

PLEUROSTOMELLOIDES Majzon, 1943

Plate 122, figs. 9 and 10

Type species: Pleurostomelloides andreasi Majzon, 1943; OD(M).

Pleurostomelloides Majzon, 1943 (*1982), p. 67, 157.

Test biserial, elongate, slender; early chambers reportedly with a small protuberance (possibly an adventitious chamber as occurs in other Textulariopsidae); wall agglutinated; aperture ovate, above the base of the apertural face. U. Cretaceous (Turonian to Maastrichtian); Hungary.

Remarks: Differs from *Bimonilina* in not being loosely biserial or tending to become rectilinear and differs from *Plectinella* in the slender test, lower and tightly appressed chambers, and broader apertural opening.

TEXTULARIOPSIS Banner and Pereira, 1981

Plate 122, figs. 24-28

Type species: Textulariopsis portsdownensis Banner and Pereira, 1981; OD.

Textulariopsis Banner and Pereira, 1981 (*130), p. 98.

Pseudotextilina Botvinnik, 1980 (*313), p. 28 (name not available, ICZN Art. 13 (a) (i), no description).

Verestshaginella Botvinnik, 1983 (*314), p. 44; type species: *Textularia indistincta* Akimets, 1961 (*18), p. 77; OD.

Test biserial throughout, but may have a single adventitious third chamber at the base, later may be flaring or elongate and parallel sided; wall agglutinated, commonly of calcareous particles, solid, noncanaliculate; aperture a low arch or slit at the base of the apertural face. L. Jurassic (Pliensbachian) to U. Cretaceous (Maastrichtian); cosmopolitan.

Remarks: *Verestshaginella* was described as having a secreted calcareous microgranular monolamellar wall but is agglutinated, using calcareous particles and possibly with calcareous cement, as in the type species of *Textulariopsis* and many other Textulariopsidae occurring in calcareous sediments. The agglutinated nature of *T. indistincta* is shown in the scanning electron micrographs given by Botvinnik (1983, *314, pl. 5, fig. 1), in which much of the test is comprised of agglutinated coccoliths. Thus it is a junior synonym of *Textulariopsis*.

Family PLECTORECURVOIDIDAE Loeblich and Tappan, 1964

Plectorecurvoididae Saidova, 1981 (*2696), p. 20, nom. transl. ex subfamily Plectorecurvoidinae.

Plectorecurvoidinae Loeblich and Tappan, 1964 (*1910), p. C258 (subfamily).

Test biserial, with biserial axis planispirally enrolled as in the calcareous Cassidulinidae. L. Cretaceous.

PLECTORECURVOIDES Noth, 1952

Plate 123, figs. 1-10

Type species: Plectorecurvoides alternans Noth, 1952; OD.

Plectorecurvoides Noth, 1952 (*2272), p. 117.
Globivalvulinella Bukalova, 1957 (*447), p. 185; type species: *Globivalvulinella grossheimi* Bukalova, 1957; OD.

Test with chambers biserially arranged and biserial axis planispirally enrolled; wall agglutinated; aperture a low interiomarginal slit, extending from near the plane of coiling on the periphery for about one-half the distance to the umbilicus, those of successive chambers on alternate sides of the test. L. Cretaceous (Albian); Austria; Czechoslovakia; USSR; E. Atlantic, off Africa.

Family PSEUDOBOLIVINIDAE Wiesner, 1931

Pseudobolivinidae Loeblich and Tappan, 1982 (*1917), p. 28, nom. transl. ex subfamily Pseudobolivininae.
Pseudobolivininae Wiesner, 1931 (*3375), p. 98 (subfamily).
Lacroixininae Saidova, 1981 (*2696), p. 21 (subfamily).
Lacroixininea Saidova, 1981 (*2696), p. 21 (supersubfamily).

Test biserial or loosely biserial with cuneate chambers in later stage; wall thin, agglutinated; aperture oval to rounded, single or multiple, areal to terminal and may be produced on a neck. Holocene.

LACROIXINA Saidova, 1981

Plate 123, figs. 19-24

Type species: Textularia cochleata Lacroix, 1932 (*1763), p. 27; OD.

Lacroixina Saidova, 1981 (*2696), p. 21.

Test biserial or loosely biserial throughout in the megalospheric generation, microspheric test with two pairs of opposed chambers at the base enclosing the proloculus, one pair being in the same plane as the later biserial chambers, the other perpendicular to this plane; wall agglutinated, very thin, noncanaliculate; aperture terminal, oval, produced on a neck. Holocene; Mediterranean; Sweden: Gullmar Fjord.

Remarks: The type and only species of this genus is poorly known, described from a single and probably juvenile specimen in the Mediterranean as biserial, with four pairs of chambers following the proloculus (with a diameter of 18 μm, and regarded as megalospheric). One additional and somewhat larger specimen was later illustrated from the Swedish Gullmar Fjord (Höglund, 1947, *1487, p. 184) as possibly microspheric, the proloculus of 13 μm diameter being enclosed by two pairs of opposed chambers, one pair being in the same plane as the later biserial chambers, the other perpendicular to this plane, these early chambers followed by six pairs of biserial chambers. Possibly the biserial test merely has two adventitious chambers adjacent to the proloculus, as found in some Textulariopsidae. The genus was proposed by Saidova, apparently on the basis of Höglund's description, as being streptospiral in the early stage. Whether the two known specimens represent the two generations of a single species, are conspecific or even congeneric, or are aberrant or juvenile specimens of *Parvigenerina* cannot be determined without study of additional material.

PARVIGENERINA Vella, 1957

Plate 123, figs. 13-16

Type species: Bifarina porrecta (Brady) var. *arenacea* Heron-Allen and Earland, 1922 (*1473), p. 132; OD.

Parvigenerina Vella, 1957 (*3285), p. 18.

Test tiny, biserial in the early stage, later loosely biserial and finally uniserial and rectilinear; wall finely agglutinated, fragile and noncanaliculate; aperture terminal, produced on a distinct neck. Holocene, 20 m to 140 m; S. Pacific: Fiji; New Zealand, Cook Strait: E. of North Cape.

Remarks: Differs from *Lacroixina* in being nearly uniserial in the later stage and in having a distinctly biserial, tapered base, and differs from *Pseudobolivina* in the uniserial later stage and terminal aperture on a neck.

PSEUDOBOLIVINA Wiesner, 1931

Plate 123, figs. 17 and 18

Type species: Pseudobolivina antarctica Wiesner, 1931, nom. subst. pro *Bolivina punctata* d'Orbigny var. *arenacea* Heron-Allen and Earland, 1922 (*1473), p. 133 (non *B. variabilis* var. *arenacea* Heron-Allen and Earland, 1922, nec *B. textilarioides* var. *arenacea* Heron-Allen and Earland, 1922, nec *B. inflata* var. *arenacea* Heron-Allen and Earland, 1922, nec *B. tortuosa inflata* var. *arenacea* Heron-Allen and Earland, 1922); OD(M).

Pseudobolivina Wiesner, 1931 (*3375), p. 99.

Test tiny, biserial, may be slightly twisted, tapered at the base, chambers increasing rapidly in size as added, sutures slightly depressed; wall finely agglutinated, thin, delicate, noncanaliculate; aperture a high interiomarginal arch extending up the final chamber face. Holocene; Antarctic.

Family NOURIIDAE Chapman and Parr, 1936

Nouriidae Loeblich and Tappan, 1961 (*1902), p. 279, nom. transl. ex subfamily Nouriinae.

Nouriinae Chapman and Parr, 1936 (*542), p. 149 (subfamily).

Chambers in loose high spiral or biserial, strongly overhanging at sides; aperture terminal and ovate, may be produced on a neck. Cretaceous to Holocene.

ABDULLAEVIA Suleymanov, 1965

Plate 123, figs. 25 and 26

Type species: Abdullaevia tosbulakensis Suleymanov, 1965; OD.

Abdullaevia Suleymanov, 1965 (*3095), p. 46.

Test fusiform, compressed, oval in section, chambers biserially arranged, high, and laterally strongly overlapping the earlier part of the test, sutures slightly depressed; wall agglutinated; aperture terminal, rounded, produced on a thick elongate neck. U. Cretaceous (L. Turonian); USSR: Uzbek SSR, Kyzyl Kum.

NOURIA Heron-Allen and Earland, 1914

Plate 123, figs. 11 and 12

Type species: Nouria polymorphinoides Heron-Allen and Earland, 1914; SD Cushman, 1927 (*746), p. 189.

Nouria Heron-Allen and Earland, 1914 (*1471), p. 375.

Test free, elongate, oval in section, early stage with few elongate chambers in polymorphine spiral, later biserial, strongly overlapping at the sides, sutures obscure to slightly depressed; wall thin, but coarsely agglutinated of large mineral grains, shell fragments and sponge spicules; aperture terminal, rounded to ovate, and may have slight lip. ?Eocene, Holocene; cosmopolitan.

Superfamily PAVONITINACEA Loeblich and Tappan, 1961

Pavonitinacea Loeblich and Tappan, 1985 (*1926), p. 187, nom. corr. pro superfamily Pavonitinidea.

Pavonitinidea Saidova, 1981 (*2696), p. 25, nom. transl. ex subfamily Pavonitininae.

Test large, early stage coiled, triserial or biserial, later may be reduced to biserial or uniserial, chambers broad and low; interior partially divided by numerous vertical septula or beams that project downward from the roof of the chambers and rarely may have a few connecting rafters; wall agglutinated, noncanaliculate; aperture a high arch at the base of the apertural face in the biserial stage, later may become terminal, single or multiple. U. Cretaceous (Senonian); L. Oligocene to Pliocene.

Family MARIEITIDAE Loeblich and Tappan, 1986

Marietidae Loeblich and Tappan, 1986 (*1929), p. 335.

Test triserial or may become uniserial in the later stage, triangular in section throughout, chamber interior partially subdivided by short thick beams, connecting rafters may be present adjacent to the outer wall; wall agglutinated, noncanaliculate; aperture terminal, cribrate. U. Cretaceous (Senonian).

Remarks: The family differs from other Pavonitinacea in the triserial early stage, in having numerous short exoskeletal partitions that subdivide the outer part of the chambers, and in having a terminal trematophore.

HENSONIA Marie, 1954

Plate 124, figs. 1-5

Type species: Hensonia tricarinata Marie, 1954; OD.

Hensonia Marie, 1954 (*2036), p. 121.

Test elongate, triserial, and triangular in section, with flattened to slightly excavated sides, internally a few oblique radial exoskeletal beams project obliquely downward from the chamber roof toward the zigzag suture on the center of the test sides and are oriented perpendicular to the outer wall, the intercalated shorter shallow beams and connecting rafters producing a fine subepidermal mesh; wall agglutinated; aperture terminal, multiple, on the upper surface of the final chamber. Upper Cretaceous (Senonian); France; Spain.

MARIEITA Loeblich and Tappan, 1964

Plate 124, figs. 6-9; plate 125, figs. 1-9

Type species: Reichelina prismatica Marie, 1954 (*2036), p. 122; OD.

Marieita Loeblich and Tappan, 1964 (*1910), p. C294 (nom. subst. pro *Reichelina* Marie, 1954).

Reichelina Marie, 1954 (*2036), p. 122 (non *Reichelina* Erk, 1942); type species: obj.; OD.

Test elongate, triangular in section throughout; broad and low chambers triserially arranged in the early stage, later uniserial, chambers partially subdivided by about eight to ten short thick radial beams projecting inward from each face of the test and aligned from chamber to chamber; wall agglutinated, thick; aperture cribrate, numerous rounded openings occupying a distinct trematophore. Upper Cretaceous (Santonian); France; Spain.

Remarks: The genus was originally erroneously described as having a labyrinthic interior and a subepidermal network. Short, thick vertical beams extend inward perpendicular to the outer wall, but as no horizontal connecting rafters are present, *Marieita* does not have a true subepidermal network. The combination of numerous beams with the low chambers and closely spaced septa may give the appearance of a more complicated interior however.

Family PAVONITINIDAE Loeblich and Tappan, 1961

Pavonitinidae Loeblich and Tappan, 1964 (*1910), p. C291, nom. transl. ex subfamily.

Test palmate or triangular in section, early stage coiled or biserial or possibly triserial, later reduced to biserial or uniserial, aperture basal to terminal, single to multiple. L. Oligocene to L. Pliocene.

Subfamily SPIROPSAMMIINAE Seiglie and Baker, 1984

Spiropsammiinae Seiglie and Baker, 1984 (*2851), p. 396.

Test elongate, flattened, early stage planispirally enrolled, later may be uncoiled and uniserial, interior with elongate septula projecting inward from the outer wall of the chambers, as in *Pavonitina:* aperture terminal. Oligocene to L. Pliocene.

SPIROPSAMMIA Seiglie and Baker, 1984

Plate 126, figs. 1-4

Type species: Cyclammina uhligi Schubert, 1902 (*2811), p. 22; OD.

Spiropsammia Seiglie and Baker, 1984 (*2851), p. 396 (also err cit. as *Spirosammia*, p. 394).

Test much compressed, with chambers in two to three planispirally enrolled and evolute whorls at least in the early stage, later may be uncoiled and rectilinear with a few equitant chambers; wall agglutinated; interior subdivided by numerous elongate septula that project inward from the chamber roof and outer wall as in *Pavonitina;* aperture terminal, rounded, with a low bordering lip. Oligocene to L. Pliocene; Italy; Angola; Cameroon.

Subfamily PAVONITININAE Loeblich and Tappan, 1961

Pavonitininae Loeblich and Tappan, 1961 (*1902), p. 283.

Pavonitininea Saidova, 1981 (*2696), p. 26 (supersubfamily).

Phyllopsamiinae Saidova, 1981 (*2696), p. 22.

Phyllopsamiinea Saidova, 1981 (*2696), p. 22 (supersubfamily).

Early stage triserial, biserial, or uniserial, later stage may be reduced to uniserial. L. Oligocene to Miocene.

PAVONITINA Schubert, 1914

Plate 126, figs. 5-11; plate 127, figs. 1-3

Type species: Pavonitina styriaca Schubert, 1914; OD.

Pavonitina Schubert, 1914 (*2822), p. 143.

Phyllopsammia Małecki, 1954 (*2000), p. 503, 507, 511; type species: *Phyllopsammia adanula* Małecki, 1954; OD.

Test of medium to large size, broad and flattened, spherical proloculus followed by biserial stage of up to eight pairs of broad and low chambers that curve back at the outer margins, the biserial stage being followed by broad low and centrally arched uniserial rectilinear chambers, interior of later biserial and uniserial chambers subdivided by secondary septula that project obliquely downward from the chamber roof; wall finely agglutinated, thin and fragile, noncanaliculate; aperture interiomarginal in the biserial stage, single and terminal in the uniserial stage. L. Oligocene to Miocene; France; Poland; Austria; Yugoslavia; Africa: offshore Cabinda (Angola).

Remarks: Interpretations of early chamber arrangement in *Pavonitina* originally were based on the appearance in oblique transmitted light of specimens immersed in glycerine. The resultant erroneous interpretation of an early triserial stage (Loeblich and Tappan, 1964, ***1910**; Seiglie and Baker, 1984, ***2851**) was corrected by Cimerman (1969, ***603**, p. 111), who upheld Schubert's original description of the early biseriality. A series of thin sections of the type species and other species (Loeblich and Tappan, 1985, ***1926**, p. 187) also show only a biserial early stage.

PAVOPSAMMIA Seiglie and Baker, 1984

Plate 127, figs. 7-9

Type species: Pavopsammia flabellum Seiglie and Baker, 1984; OD.

Pavopsammia Seiglie and Baker, 1984 (***2851**), p. 393.

Test elongate, palmate, flattened, proloculus followed by a few triserially arranged chambers, then biserial and finally uniserial, interior subdivided by numerous elongate septula that project inward from the chamber roof and outer wall as in *Pavonitina;* wall finely agglutinated; aperture terminal, possibly multiple. Oligocene; offshore from Cameroon, West Africa.

Remarks: *Pavopsammia* is recognized on the basis of the original description as being triserial in the early stage, although possibly the early stage may be biserial in spite of the triradiate section, as in *Pavonitina.* If the present genus should prove to be biserial in the early stage, it would be a synonym of *Pavonitina.*

PSEUDOTRIPLASIA Małecki, 1954

Plate 127, figs. 4-6

Type species: Pseudotriplasia elongata Małecki, 1954; OD.

Pseudotriplasia Małecki, 1954 (***2000**), p. 499, 509.

Test free, elongate, triangular in section with concave sides and acutely angled margins, apparently uniserial throughout; wall coarsely agglutinated, alveolar, with short thin septula projecting inward from the roof and outer wall of the chambers; aperture terminal, cribrate. Miocene; Poland.

Remarks: Misinterpretation of *Pavonitina* as triserial in the early stage led to placement of the present genus as a synonym (Loeblich and Tappan, 1964, ***1910**, p. C296). Restudy of *Pavonitina* has shown it to be biserial in the early stage, but examination of numerous topotype specimens of *Pseudotriplasia* has shown none with a recognizable triserial or biserial early stage, all being wholly uniserial. The similarity in internal structure indicates a close relationship of these genera.

ZOTHECULIFIDA Loeblich and Tappan, 1957

Plate 127, figs. 10-13

Type species: Textularia lirata Cushman and Jarvis, 1929 (***827**), p. 6; OD.

Zotheculifida Loeblich and Tappan, 1957 (***1897**), p. 224.

Test free, compressed, elongate or palmate, the numerous broad, low and biserially arranged chambers may be somewhat excavated adjacent to the sutures, leaving the latter elevated, interior subdivided by vertical septula projecting downward from the chamber roof, that may be reflected externally as short ridges radiating downward from the sutures; wall finely agglutinated, smoothly finished; aperture a high narrow interiomarginal arch at the base of the final chamber. U. Oligocene to L. Miocene; Trinidad, West Indies.

Superfamily TROCHAMMINACEA Schwager, 1877

Trochamminacea Loeblich and Tappan, 1982 (***1917**), p. 27, nom. corr. pro superfamily Trochamminidea.

Trochamminidea Saidova, 1981 (***2696**), p. 22, nom. transl. ex family Trochamminidea.

Trochamminini Mikhalevich, 1972 (***2103**), p. 19 (tribe).

Remaneicinidea Saidova, 1981 (***2696**), p. 23 (nom. transl. ex subfamily).

Test multilocular, chambers in low trochospiral coil, rarely tending to uncoil in the later stage; wall agglutinated, noncanaliculate. U. Carboniferous to Holocene.

Family TROCHAMMINIDAE Schwager, 1877

Trochamminidae Lister, in Lankester, 1903 (*1791), p. 142, nom. corr. pro family Trochamminidea.
Trochamminidea Schwager, 1877 (*2830), p. 21.
Trochammina Lankester, 1885 (*1790), p. 847.
Trochamminida Haeckel, 1894 (*1355), p. 185.
Trochamminae Delage and Hérouard, 1896 (*926), p. 133.
Artrochammidia Rhumbler, 1913 (*2621), p. 342 (err. emend).

Test trochospirally coiled; wall agglutinated; aperture interiomarginal to areal, single or multiple, and may have supplementary umbilical openings. U. Carboniferous to Holocene.

Subfamily TROCHAMMININAE Schwager, 1877

Trochammininae Brady, 1884 (*344), p. 66, nom. transl. ex family Trochamminidea.
Trochoporininae Soliman, 1972 (*3019), p. 40.
Tritaxinini Mikhalevich, 1972 (*2103), p. 25 (tribe; nom. imperf.: recte tribe Tritaxini).
Tritaxinae Loeblich and Tappan, 1982 (*1917), p. 27.

Test trochospiral or may tend to uncoil in later stage; wall agglutinated; aperture interiomarginal. U. Carboniferous to Holocene.

AMMOGLOBIGERINA Eimer and Fickert, 1899

Plate 128, figs. 9 and 10; plate 129, figs. 7-11

Type species: Ammoglobigerina bulloides Eimer and Fickert, 1899 = *Lituola nautiloidea* Lamarck var. *globigeriniformis* Parker and Jones, 1865 (*2351), p. 407; OD(M).

Ammoglobigerina Eimer and Fickert, 1899 (*1088), p. 704.
Haplophragmium (Reussina) Grzybowski, 1895 (*1325), p. 311 (non *Reussina* Neviani, 1895): type species: obj., OD (M).
Trochoporina Soliman, 1972 (*3019), p. 40; type species: *Trochoporina praeglobigeriniformis* Soliman, 1972; OD.
Globotrochamminopsis Brönnimann and Whittaker, in Brönnimann and Zaninetti, 1984 (*412), p. 66; type species: *Trochammina globulosa* Cushman, 1920 (*716), p. 77; OD.

Test free, trochospiral, with subglobular chambers increasing rapidly in size as added, few per whorl; wall thin, finely to moderately coarsely agglutinated; aperture an interiomarginal slit on the umbilical side. U. Cretaceous (Turonian to Coniacian); Holocene; cosmopolitan, deep water.

Remarks: *Trochoporina* was defined as having a perforate wall, but according to Brönnimann, Zaninetti, and Whittaker (1983, *417, p. 215) similar perforations were not evident at the surface on the lectotype of *Ammoglobigerina globigeriniformis* (Parker and Jones). They stated that only one extant syntype was present in the British Museum, and further information as to the perforate nature could not be obtained, hence regarded the species as a *"nomen oblitum"* (a misuse of this term, discussed below). The original description by Parker and Jones cited numerous occurrences for the species at many localitites in the N. and S. Atlantic, North Sea, Indian Ocean, Mediterranean, etc. The Parker and Jones collection of picked and identified faunal slides in the British Museum was filed in separate boxes with a written key, although individual specimens were not mounted separately. The lectotype of *globigeriniformis* was isolated from one of these slides and so labelled by us in 1953, with the permission of the British Museum authorities. Possibly the other specimens reported by Parker and Jones remain on the original faunal slides. As this species is widely reported in all the modern seas, there is no valid basis for regarding it as a *"nomen oblitum,"* a term that formerly referred to names that had been forgotten in the literature for more than 50 years, in force only between the dates of 6 November 1961 and 1 January 1973, but not recognized in the current Code (see ICZN 1985 edition, Glossary, p. 260). The genus *Ammoglobigerina* was recognized by Galloway (1933, *1205), and the species *globigeriniformis* has been widely and continuously reported for well over a century, including recognition as a distinct species by Soliman, although he regarded it as congeneric with *Trochoporina praeglobigeriniformis*. *Globotrochamminopsis* apparently also was described for such species and is here regarded as synonymous with *Ammoglobigerina*.

ASAROTAMMINA Brönnimann, 1986

Plate 136, figs. 1-4

Type species: Asarotammina asarotum Brönnimann, 1986; OD.

Asarotammina Brönnimann, 1986 (*389), p. 89.

Test in a low trochospiral coil, large oval proloculus with spoutlike aperture followed by about two whorls of rapidly enlarging chambers, ten to eleven chambers in the final whorl, sutures slightly depressed, strongly oblique on the spiral side, radial on the centrally depressed umbilical side; wall agglutinated, noncanaliculate, with organic inner layer, and thin agglutinated layer of calcareous grains; aperture a single high interiomarginal arch, midway between umbilicus and periphery, with smoothly finished border. Holocene; Brazilian Shelf, S. Atlantic, warm, shallow water.

INSCULPTARENULA Loeblich and Tappan, 1985

Plate 128, figs. 11-13

Type species: Trochammina texana Cushman and Waters, 1927 (*853), p. 85; OD.

Insculptarenula Loeblich and Tappan, 1985 (*1926), p. 193.

Test free, trochospiral, spiral side flattened to concave, umbilical side convex, periphery angular, commonly the peripheral margin of the chambers is slightly elevated on the spiral side, the elevated radially spiralling septa giving the test a sculptured appearance; early chambers tiny, those of the later whorls enlarging rapidly as added, about three whorls present, sutures arched and curved backwards at the periphery on the spiral side, radial on the umbilical side; wall thin and finely agglutinated, commonly with preserved organic lining, exterior with roughened surface and sugary appearance and may include platey fragments that lie flat on the surface to form a pavement; aperture an elongate extraumbilical slit, beginning about halfway between the periphery and the umbilicus, and extending along the base of the apertural face nearly to the umbilicus. U. Cretaceous; USA: Texas, Arkansas.

Remarks: *Insculptarenula* differs from *Trochammina* in the more rapidly enlarging chambers, planoconvex rather than biconvex test, angular periphery, strongly recurved sutures on the spiral side, and elongate extraumbilical slit aperture.

PARATROCHAMMINA Brönnimann, 1979

Plate 128, figs. 5-8

Type species: Paratrochammina madeirae Brönnimann, 1979; OD.

Paratrochammina Brönnimann, 1979 (*387), p. 6.

Test free, chambers in a low trochospiral coil, periphery rounded; wall agglutinated, single layered, imperforate; aperture single, interiomarginal, umbilical-extraumbilical, extending across the umbilicus over the margins of the two adjacent chambers, apertures of previous chambers remaining open into the umbilicus. Holocene; N. Atlantic, off USA: N. Carolina; Gulf of Mexico; S. Atlantic, Campos Shelf off Brazil; USA: off California; Gulf of California.

Remarks: Differs from *Trochammina* in having an umbilical-extraumbilical aperture rather than a basal aperture midway between the umbilicus and periphery.

PATELLOVALVULINA Neagu, 1975

Plate 129, figs. 15-19

Type species: Patellovalvulina patruliusi Neagu, 1975; OD.

Patellovalvulina Neagu, 1975 (*2236), p. 44.

Test free, convexo-concave, chambers in a low trochospiral coil, few per whorl, low and very broadly arcuate, strongly overlapping at the periphery, the final chamber occupying from one-fourth to one-half the umbilical side, interior simple and undivided, sutures curved and strongly oblique on both spiral and umbilical sides; wall finely agglutinated, solid; aperture interiomarginal, a low slit covered by a broad flap that may be lobate. L. Cretaceous (U. Valanginian to L. Aptian); Romania; France.

Remarks: Although placed in the Valvulinidae originally, *Patellovalvulina* does not have the canaliculate wall of that family. It is here transferred to the Trochamminidae, although with question in view of the reported apertural flap.

PORTATROCHAMMINA R. J. Echols, 1971

Plate 129, figs. 4-6

Type species: Portatrochammina eltaninae R. J. Echols, 1971; OD.

Portatrochammina R. J. Echols, 1971 (*1046), p. 145.

Paratrochammina (Portatrochammina) Brönnimann, Zaninetti, and Whittaker, 1983 (*417), p. 205 (incorrect nom. transl., ICZN Art. 23 (c),(e)(i)).

Test free, trochospiral, with few gradually enlarging chambers per whorl, umbilicus covered by a flap from each successive chamber, that of the final chamber obscuring those of previous chambers; wall of proloculus proteinaceous without foreign particles, wall of later chambers agglutinated; aperture a low interiomarginal arch in the final septal face, continuing as a low slit around the entire free border of the umbilical flap. Holocene; Antarctic.

Remarks: *Portatrochammina* differs from *Siphotrochammina* Saunders in the umbilical flap of each successive chamber covering those of all previous chambers, rather than having the umbilical extensions of earlier chambers remaining visible around the umbilicus.

PSEUDADERCOTRYMA Saidova, 1981

Plate 129, figs. 12-14

Type species: Haplophragmium truncatuliniforme Chapman, 1895 (***526**), p. 16; OD.

Pseudadercotryma Saidova, 1981 (***2696**), p. 17.

Test planoconvex, with rounded periphery, chambers coiled, probably in a low trochospiral, but completely biinvolute with only the final whorl of about twelve chambers visible on both sides, sutures slightly curved on the flattened side, radial around the depressed umbilicus on the convex side; wall finely agglutinated, with a few included coarser grains, yellowish-brown in color; aperture an interiomarginal arch on the convex side. Holocene: E. Arabian Sea, near the Laccadive Islands.

Remarks: Described from a single specimen obtained by Chapman (1895, ***526**) in a mixture of dredge samples taken in deep water ("not more than 1,238 fathoms") near the Laccadive Islands, the species has not been reported since. We have been unable to find this species in samples from this area of the Indian Ocean, hence whether or not it is truly trochospiral remains uncertain. The genus is tentatively recognized on the basis of the original description of the type species and is transferred from the Lituolidae (where it was placed originally) to the Trochamminidae.

TRITAXIS Schubert, 1921

Plate 128, figs. 1-4

Type species: Rotalina fusca Williamson, 1858 (***3379**), p. 55; SD Cushman, 1928 (***747**), p. 171.

Tritaxis Schubert, 1921 (***2823**), p. 180.

Test planoconvex, trochospirally enrolled, with few whorls and only three chambers per whorl, chambers crescentic and sutures strongly oblique on spiral side, sutures radial and final chamber occupying about one-half the face of the umbilical side, free living in the early stage, some adult specimens attached to the substrate by a spongy calcareous substance or "puffermasse"; wall agglutinated, imperforate; aperture interiomarginal, about midway between the umbilicus and periphery. Holocene; England.

Remarks: The neotype from off the Isle of Skye, Scotland (BMNH, ZF 4209), designated for *Tritaxis fusca* (Williamson) by Brönnimann and Whittaker (1984, ***407**, p. 293) changes the definition of this genus from being a senior synonym of *Trochamminella* to being a representative of the Trochammininae, and the subfamily Tritaxinae becomes synonymous with the Trochammininae.

TROCHAMMINA Parker and Jones, 1859

Plate 129, figs. 20-23

Type species: Nautilus inflatus Montagu, 1808 (***2169**), p. 81; OD(M).

Rotalia (Trochammina) Parker and Jones, 1859 (***2346**), p. 347.

Trochammina Jones and Parker, 1860 (***1618**), p. 304 (nom. transl.).

Test free, trochospiral, chambers increasing gradually in size as added, sutures radial, periphery rounded; wall agglutinated, imperforate, with inner and outer organic layers and smoothly finished surface; aperture an interiomarginal, umbilical-extraumbilical arch with narrow bordering lip, those of earlier chambers completely covered by later chambers. Carboniferous to Holocene; cosmopolitan.

Remarks: A neotype for *Trochammina inflata* (Montagu) was designated by Brönnimann and Whittaker (1984, ***409**, p. 312-313) as BMNH ZF 4267, from brackish water in Devon, England.

TROCHAMMINOPSIS Brönnimann, 1976

Plate 129, figs. 1-3

Type species: Trochammina pusilla Höglund, 1947 (***1487**), p. 201, non *Serpula pusilla* Geinitz, 1848 (= *Trochammina pusilla* (Geinitz)

Jones, Parker, and Kirkby, 1869, *1623, p. 389), = *Trochammina quadriloba* Höglund, 1948 (*1488), p. 46, nom. nov.; OD.

Trochamminopsis Brönnimann, 1976 (*386), p. 215.

Test free, trochospiral as in *Trochammina;* wall agglutinated, thin, imperforate; aperture interiomarginal and umbilical in position. Holocene; Sweden.

Remarks: Although *Trochammina pusilla* Höglund, 1947 was a junior secondary homonym of *Serpula pusilla* Geinitz, 1848, the two were originally in different genera and are not now regarded as congeneric. Nevertheless, as the new name *Trochammina quadriloba* was proposed before 1961, the junior secondary homonym, *T. pusilla,* is permanently invalid (ICZN Art. 59 (b)).

Subfamily VIALOVIINAE Suleymanov, 1983

Vialoviinae Suleymanov, 1983 (*3104), p. 33.

Bykoviellinae Loeblich and Tappan, 1984 (*1918), p. 13.

Test with low trochospiral coil of rapidly enlarging chambers that tend to uncoil in the final stage; wall agglutinated; aperture interiomarginal to areal and terminal. U. Cretaceous (Turonian) to Miocene.

Remarks: Differs from the Trochammininae and Trochamminellinae in the tendency to uncoil in the later stage and in the terminal aperture.

ARENONIONELLA Marks, 1951

Plate 130, figs. 1-3

Type species: Arenonionella voutei Marks, 1951; OD.

Arenonionella Marks, 1951 (*2043), p. 377.

Test free, low trochospiral coil of broad and low chambers that increase rapidly in breadth to produce an auriculate outline, final chamber with projecting lobe in the umbilical region; wall agglutinated on a proteinaceous base, thin and readily distorted; aperture a low equatorial, interiomarginal arch extending from the periphery nearly to the umbilicus. Miocene (Vindobonian); Algeria.

BYKOVIELLA V. I. Korchagin, 1964

Plate 130, figs. 9-18

Type species: Bykoviella chinaria V. I. Korchagin, 1964 (as "*chinarra*" on p. 77); OD.

Bykoviella V. I. Korchagin, 1964 (*1718), p. 74.

Yuanaia Hao and Zeng, in Hao, Zeng, and Li, 1982 (*1417), p. 54, 125: type species: *Yuanaia xinjiangensis* Hao and Zeng, 1982; OD.

Test free, at first with low trochospiral coil, later with tendency to uncoil, chambers subglobular, increasing rapidly in size as added, sutures radial, umbilicate; wall agglutinated, fine grained; aperture areal, near the peripheral angle in enrolled specimens, and almost terminal in chambers that tend to uncoil, rounded, and may be slightly produced or bordered with a slight lip. U. Cretaceous (Turonian); USSR: Tadzhik SSR; China.

VIALOVIA Suleymanov, 1966

Plate 130, figs. 4-8

Type species: Vialovia zerabulakensis Suleymanov, in Arapova and Suleymanov, 1966; OD.

Vialovia Suleymanov, in Arapova and Suleymanov, 1966 (*57), p. 125 (err. cit. as *Vialia*, expl. fig. 6 on p. 123).

Mendesia Petri, 1962 (*2388), p. 56 (non *Mendesia* de Joannis, 1902): type species: *Mendesia minuta* Petri, 1962; OD.

Test with low trochospiral coil and chambers increasing rapidly in size, later chambers increasing rapidly in breadth to give an auriculate outline to the test, extending somewhat onto the umbilical side as in *Nonionella*, sutures depressed, periphery rounded; wall agglutinated; aperture a low interiomarginal arch. U. Cretaceous (L. Turonian to Maastrichtian); USSR: Kazakh SSR; Brazil.

Subfamily ROTALIAMMININAE Saidova, 1981

Rotaliammininae Loeblich and Tappan, 1982 (*1917), p. 27, nom. corr.

Rotaliammina Saidova, 1981 (*2696), p. 22 (subfamily; nom. imperf.).

Test free or attached, a low trochospiral coil; wall agglutinated, very thin, flexible, with fine-grained particles held in small amount of cement; aperture at the end of an umbilical lobe or chamber extension. Holocene.

ROTALIAMMINA Cushman, 1924

Plate 130, figs. 19-25

Type species: Rotaliammina mayori Cushman, 1924; OD.

Rotaliammina Cushman, 1924 (*725), p. 11.

Polysiphotrocha Seiglie, 1964 (*2843), p. 500; type species: *Polysiphotrocha siphonata* Seiglie, 1964; OD.

Test trochospirally enrolled, attached by the umbilical side, and may be surrounded by a fine mud "puffermasse," chambers numerous, increasing gradually in size throughout the approximately three whorls, sutures curving back at the periphery, more oblique on spiral than umbilical side, chambers with umbilical extension on the umbilical side; wall agglutinated, thin, flexible; aperture interiomarginal, umbilical, terminal on the produced end of the chambers and facing the umbilicus. Holocene; Pacific, Marshall Islands; Atlantic, Brazilian shelf; Caribbean, off Venezuela; St. Croix.

SIPHOTROCHAMMINA Saunders, 1957

Plate 131, figs. 1-3

Type species: Siphotrochammina lobata Saunders, 1957; OD.

Siphotrochammina Saunders, 1957 (*2735), p. 9.

Test free, low trochospiral, chambers ovate, increasing gradually in size as added, sutures gently curved, periphery rounded; wall light brown in color, finely and sparsely agglutinated on a proteinaceous base, the early whorl darker brown and with very little agglutinated material; aperture interiomarginal, at the end of a siphonlike lobe projecting from the umbilical margin of the chamber and directed forward, and as the succeeding chamber overlaps the former aperture it remains as an intercameral foramen, opening into the umbilical lobe of the later chamber. Holocene; Caribbean, W. coast of Trinidad.

TIPHOTROCHA Saunders, 1957

Plate 131, figs. 4-8

Type species: Trochammina comprimata Cushman and Brönnimann, 1948 (***815**), p. 41; OD.

Tiphotrocha Saunders, 1957 (*2735), p. 11.

Test free, trochospiral, flattened, chambers increasing rapidly in size as added, sutures strongly oblique on spiral side and may be depressed, resulting in a lobulate outline, only four to five chambers visible on umbilical side, the final one occupying much of the umbilical surface and appearing T-shaped because of its pronounced umbilical lobe; wall finely agglutinated, thin and fragile, brown in color, darker in the early whorl, surface smoothly finished; aperture at the end of the umbilical chamber lobe and directed either into the umbilicus or backward toward the earlier chambers, may be partially covered by a shelflike lip. Holocene; Caribbean, E. coast of Trinidad.

Subfamily TROCHAMMINELLINAE Brönnimann, Zaninetti, and Whittaker, 1983

Trochamminellinae Brönnimann, Zaninetti, and Whittaker, 1983 (*417), p. 205.

Chambers in a low trochospiral coil, free living, at least in the early stage but later may become attached and surrounded by a low spreading area of agglutinated material or "puffermasse"; aperture ovate to slitlike, areal, on the umbilical side. Holocene.

Remarks: The original definition as "aperture areal, single or double," was emended (Loeblich and Tappan, 1985, ***1926**, p. 195) to include reference to the occasional attachment and development of a surrounding "puffermasse," and restricted to those with single primary apertural opening. The supposed secondary areal opening of *Ammoglobigerinoides* cannot be demonstrated in the holotype, and the genus therefore was suppressed as a synonym of *Pseudotrochammina* (Loeblich and Tappan, 1985, ***1926**, p. 195). No other member of the subfamily has a secondary areal opening.

ATLANTIELLA Saidova, 1981

Plate 131, figs. 9-12

Type species: Trochamminella atlantica F. L. Parker, 1952 (***2339**), p. 409; OD.

Atlantiella Saidova, 1981 (***2696**), p. 23.

Test small, a low trochoid spire of about five subglobular chambers per whorl, sutures radial to slightly curved; wall agglutinated, thin, surface rough; aperture areal, a curved extraumbilical slit bordered by a distinct lip. Holocene; Atlantic, off Canada.

Remarks: Regarded as a synonym of *Pseudotrochammina* by Brönnimann et al., (1983, ***417**), *Atlantiella* was reinstated (Loeblich and Tappan, 1985, *1926, p. 195) as differing in the extraumbilical aperture, rather than having an aperture symmetrically placed above the umbilicus.

PSEUDOTROCHAMMINA Frerichs, 1969

Plate 132, figs. 1-11

Type species: Pseudotrochammina triloba Frerichs, 1969; OD.

Pseudotrochammina Frerichs, 1969 (*1181), p. 1.

Ammoglobigerinoides Frerichs, 1969 (*1181), p. 1; type species: *Ammoglobigerinoides dehiscens* Frerichs, 1969; OD.

Test small, from 0.3 mm to 1.0 mm in diameter, with few subglobular chambers increasing rapidly in size, commonly only three and a half to four per whorl, sutures depressed; wall very finely agglutinated and smoothly finished or may include some larger particles; aperture areal, a slit facing the umbilicus and bordered by a slight lip. Holocene; Gulf of Mexico; North Sea: Skagerak; Antarctic: Scotia Sea.

Remarks: *Ammoglobigerinoides* was originally described as having a slitlike areal aperture and a secondary areal opening on the opposite side above the suture with the penultimate chamber, but the secondary opening is not evident on the holotype (Loeblich and Tappan, 1985, *1926, p. 195), hence it is was placed in synonymy of *Pseudotrochammina*.

TROCHAMMINELLA Cushman, 1943

Plate 131, figs. 13-17

Type species: Trochamminella siphonifera Cushman, 1943; OD.

Trochamminella Cushman, 1943 (*790), p. 95.

Test free in the early stage, later may be attached by a spreading calcareous "puffermasse," that may be pierced by radial tunnels that open terminally, planoconvex, chambers in a low trochospiral coil, few per whorl, appearing crescentic on the spiral side, and with final chamber occupying more than one-half the umbilical side; wall finely agglutinated, imperforate; aperture areal, oval, near the base of the final chamber face. Holocene; Atlantic, off Puerto Rico; Ireland.

Remarks: *Trochamminella* is characterized by the low planoconvex test, semilunate chambers as viewed from the spiral side, and areal aperture. Previously regarded as a synonym of *Tritaxis* (Loeblich and Tappan, 1964, *1910), the neotype designated for *Tritaxis fusca* by Brönnimann and Whittaker (1984, *407, p. 293) differs from *Trochamminella* in umbilical and apertural features, so that both are now recognized as distinct genera assigned to different subfamilies.

Subfamily JADAMMININAE Saidova, 1981

Jadammininae Saidova, 1981 (*2696), p. 22.

Test in a low trochospiral coil; wall thin and agglutinated, single layered; aperture equatorial, an ovate, V-shaped, or slitlike areal opening or openings, and may also have an interiomarginal opening. M. to U. Eocene; Holocene.

Remarks: Differs from the Trochamminellinae in the equatorially placed and symmetrical aperture or apertures, whereas the Trochamminellinae have an aperture on the umbilical side of the test. Differs from the Arenoparrellinae in having a symmetrical and equatorial basal or areal primary aperture.

ENTZIA Daday, 1883

Plate 133, figs. 1-3

Type species: Entzia tetrastomella Daday, 1883; OD(M).

Entzia Daday, 1883 (*870), p. 209 (non *Entzia* Lebour, 1922).

Test in low trochospiral coil, sutures radial, whorl increasing rapidly in height; wall thin, largely proteinaceous, with very little agglutinated material; aperture areal, with two pairs of openings in the lower half of the apertural face, slightly produced. Holocene; Romania, salt pools.

JADAMMINA Bartenstein and Brand, 1938

Plate 133, figs. 4-13

Type species: Jadammina polystoma Bartenstein and Brand, 1938 = *Trochammina inflata* (Montagu) var. *macrescens* Brady, 1870 (*328), p. 290; OD.

Jadammina Bartenstein and Brand, 1938 (*152), p. 38.

Borovina Shmal'gausen, 1950 (*2905), p. 869; type species: *Borovina zernovi* Shmal'gausen, 1950; OD.

Trochamminisca Shchedrina, 1955 (*2888), p. 7; type species: *Trochamminisca cyclostoma* Shchedrina, 1955; OD(M).

Test free, a flattened trochospiral that tends to be nearly planispiral in the adult, chambers increasing gradually in size as added, sutures radial to slightly curved, periphery rounded; wall finely and sparsely agglutinated on a proteinaceous base, imperforate; primary aperture a low interiomarginal equatorial slit, with one or more supplementary areal openings in the lower portion of the apertural face, each bordered by projecting lip. M. to U. Eocene; Arctic Canada. Holocene; Germany; USSR: White Sea, Kazakh SSR; North America.

Remarks: The lectotype designated by Brönnimann and Whittaker (1984, *408, p. 307) for *Trochammina inflata* var. *macrescens* Brady, 1870, BMNH, ZF-4212, is stated to be conspecific with *Jadammina polystoma* Bartenstein and Brand, 1938, hence the latter name is a junior synonym.

SEPETIBAELLA Brönnimann and Dias-Brito, 1982

Plate 134, figs. 1–4

Type species: Sepetibaella sepetibaensis Brönnimann and Dias-Brito, 1982; OD.

Sepetibaella Brönnimann and Dias-Brito, 1982 (*399), p. 13.

Test free, in a low trochospiral coil, whorl later increasing more rapidly in height to result in an auriculate test, chambers numerous, low and broad, sutures radial, periphery rounded; wall agglutinated, single layered, imperforate; aperture areal, symmetrically placed near the dorsal angle, an ovate to arched or bifid slit. Holocene; S. Atlantic, Brazilian Shelf.

Subfamily ARENOPARRELLINAE Saidova, 1981

Arenoparrellinae Brönnimann, Zaninetti, and Whittaker, 1983 (*417), p. 205, nom. corr. pro subfamily Arenoparrellininae.

Arenoparrellininae Saidova, 1981 (*2696), p. 22 (nom. imperf.).

As in the Polystomammininae but lacking umbilical supplementary openings and may have an interiomarginal slit or multiple areal pores in addition to the oblique slitlike aperture. Holocene.

ARENOPARRELLA Andersen, 1951

Plate 134, figs. 5–10

Type species: Trochammina inflata (Montagu) var. *mexicana* Kornfeld, 1931 (**1721**), p. 86; OD.

Arenoparrella Andersen, 1951 (*31), p. 31; also see Andersen, 1951 (*32), p. 96.

Test free, in a low trochospiral coil, chambers increasing gradually in size, sutures radial, periphery rounded; wall of proloculus entirely proteinaceous, without foreign particles, remainder of wall finely agglutinated on a proteinaceous base, surface smooth and polished; primary aperture a straight to curved slit beginning at or near the base of the apertural face, slightly to the spiral side of the equatorial position and directed upward at an angle to the plane of coiling, across the median plane in a gentle curve or with a distinct angle to end near the center of the face, aperture surrounded by a thin and delicate lip that may extend across the base so that the aperture becomes areal rather than interiomarginal, supplementary openings present at the apex of the final chamber. Holocene; USA: Louisiana, Texas; W. Atlantic, E. and W. coasts of Trinidad.

TROCHAMMINULA Shchedrina, 1955

Plate 134, figs. 11–13

Type species: Trochamminula fissuraperta Shchedrina, 1955 (= *Trochammina fissuraperta* Shchedrina, 1953 (**2887**), p. 15, nom. nud.); OD.

Trochamminula Shchedrina, 1955 (*2888), p. 5.

Test free, low trochospiral, with numerous chambers increasing gradually in size, sutures radial, periphery rounded; wall agglutinated; primary apertural interiomarginal, extending from near the periphery almost to the umbilicus on the umbilical side, with supplementary opening consisting of a short slit that extends obliquely up the apertural face toward the umbilical side, at an angle to the plane of coiling. Holocene, shallow depths, down to 50 m; Arctic: Okhotsk Sea, Barents Sea, Bering Sea.

Remarks: *Trochamminula* differs from *Arenoparrella* in having an interiomarginal primary aperture and short oblique supplementary slit and in lacking numerous areal supplementary openings near the peripheral angle. Fossil species with broad looplike aperture referred to this genus appear not to be congeneric.

Subfamily POLYSTOMAMMININAE Brönnimann and Beurlen, 1977

Polystomammininae Brönnimann and Beurlen, 1977 (*391), p. 81.

Test free or attached, low trochospiral coil; wall agglutinated, imperforate; primary aperture a curved or angled elongate slit, interiomarginal or extending obliquely up the chamber face toward the ventral side, with a supplementary umbilical sutural opening in each chamber. Holocene.

DEUTERAMMINA Brönnimann, 1976

Plate 135, figs. 1-5; plate 136, figs. 11-13

Type species: Trochammina glabra Heron-Allen and Earland, 1932 (*1480), p. 344; OD.

Deuterammina Brönnimann, 1976 (*386), p. 216.

Deuterammina (Centrodeuterammina) Brönnimann and Whittaker, 1983 (*405), p. 353; type species: *Deuterammina (Centrodeuterammina) dublinensis* Brönnimann and Whittaker, 1983; OD.

Test free, trochospiral, planoconvex, numerous chambers increasing gradually in size as added, sutures radial, periphery rounded; wall thin, agglutinated, single layered, imperforate; primary aperture interiomarginal, umbilical-extraumbilical, with secondary aperture at the inner tip of the final chamber opening into the umbilicus, those of previous chambers remaining open in the umbilical region as new chambers are added over the primary apertures. Holocene, at 15 m to 121 m; N. Atlantic, off Ireland; S. Atlantic, Argentina, Tierra del Fuego, S. of Cape Horn.

LEPIDODEUTERAMMINA Brönnimann and Whittaker, 1983

Plate 135, figs. 10-14

Type species: Rotalina ochracea Williamson, 1858 (*3379), p. 55; OD.

Deuterammina (Lepidodeuterammina) Brönnimann and Whittaker, 1983 (*404), p. 236.

Test attached, tiny, 0.2 mm to 0.25 mm in diameter, two to three rapidly enlarging whorls forming a very low trochospiral, chambers numerous, narrow, septa strongly arched, extending back at the periphery, with open umbilicus expanding radially at the sutures to appear stellate in outline; wall finely agglutinated, single layered, thin, and imperforate, chamber walls collapsing on the umbilical side; primary aperture interiomarginal and extraumbilical with secondary opening directed slightly backwards at the umbilical tip of the final chamber, those of earlier chambers remaining open into the umbilical cavity. Holocene; N. Atlantic, in shallow water.

Remarks: Originally described as a subgenus of *Deuterammina*, *Lepidodeuterammina* is here elevated to generic status.

POLYSTOMAMMINA Seiglie, 1965

Plate 135, figs. 6-9; plate 136, figs. 5-8

Type species: Trochammina nitida Brady, 1884 (*344), p. 339; OD.

Polystomammina Seiglie, 1965 (*2845), p. 53.

Arcoparrella Mikhalevich, 1971 (*2102), p. 64; type species: *Arcoparrella planulata* Mikhalevich, 1971; OD.

Test free, numerous chambers in low trochospiral coil, increasing rapidly in size as added, sutures straight to gently curved, periphery rounded, peripheral outline slightly lobulate; wall agglutinated, thin and fragile, single layered, imperforate; primary aperture a curved or angled slit, beginning at the base of the apertural face in an equatorial position, and curving obliquely upward onto the umbilical side of the chamber, an arched supplementary opening present at the umbilical tip of each chamber or at the proximal side of the umbilical chamber extension so that it opens posteriorly rather than directly into the umbilicus, supplementary openings of previous chambers remaining open as sutural relict supplementary apertures. Holocene, from 30 m to 160 m; N. and S. Atlantic; Indian Ocean; S. Pacific.

Family REMANEICIDAE Loeblich and Tappan, 1964

Remaneicidae Brönnimann, Zaninetti, and Whittaker, 1983 (*417), p. 204, nom. corr. pro Remaneicinidae.

Remaneicinidae Saidova, 1981 (*2696), p. 23, nom. transl. ex subfamily.

Test interior partially subdivided by secondary septula or infolding of the umbilical wall. Holocene.

Subfamily ASTEROTROCHAMMININAE Brönnimann, Zaninetti, and Whittaker, 1983

Asterotrochammininae Brönnimann et al., 1983 (*417), p. 205.

Low trochospiral test, interior partially subdivided by infoldings of the umbilical wall transverse to the septa, no secondary septa; wall finely agglutinated; primary aperture interiomarginal, secondary aperture at umbilical end of chamber lobe. Holocene.

ASTEROPARATROCHAMMINA Brönnimann and Zaninetti, 1984

Plate 136, figs. 9 and 10

Type species: Asteroparatrochammina towei Brönnimann and Zaninetti, 1984; OD.

Asteroparatrochammina Brönnimann and Zaninetti, 1984 (*412), p. 92.

Test small, up to 0.23 mm in diameter, in a very low trochospiral coil of two to three whorls, chambers enlarging rapidly as added, sutures curved on the convex spiral side, nearly radial on the concave umbilical side, with a single deep invagination about midway between the umbilicus and periphery producing a lobe at either side; wall agglutinated, single layered, imperforate, well cemented; aperture single, interiomarginal, beneath the umbilical lobe of the final chamber, those of earlier chambers remaining open into the umbilicus. Holocene; Brazil: Sepetiba Bay.

Remarks: Neither the spiral side nor an edge view has been illustrated for any representative of this genus, including the type species, which is known only from umbilical views of various specimens.

ASTEROTROCHAMMINA Bermúdez and Seiglie, 1963

Plate 136, figs. 14-16

Type species: Asterotrochammina delicatula Bermúdez and Seiglie, in Bermúdez and Rivero, 1963 (*211); OD.

Asterotrochammina Bermúdez and Seiglie, in Bermúdez and Rivero, 1963 (*211), p. 323.

Low trochospiral test that may be attached by a "puffermasse," chambers numerous, interior partially subdivided by infoldings of the umbilical wall that are oriented transverse to the septa, no secondary septa; wall finely agglutinated; primary aperture interiomarginal and extraumbilical, secondary opening at the inner end of an umbilical lobe extending from the main chamber cavity, secondary openings of previous chambers may remain visible around the open umbilicus. Holocene: S. Atlantic, off Brazil; N. Atlantic, off Puerto Rico; Gulf of Mexico, off Venezuela.

Subfamily REMANEICINAE Loeblich and Tappan, 1964

Remaneicinae Loeblich and Tappan, 1964 (*1910), p. C266.

Test attached, trochospirally coiled, chamber interior partially subdivided by secondary septula and with infoldings from the umbilical surface of the test; wall agglutinated, thin, imperforate, flexible. Holocene.

BRUNEICA Brönnimann, Keij, and Zaninetti, 1983

Plate 137, figs. 1-8

Type species: Bruneica clypea Brönnimann et al., 1983; OD.

Bruneica Brönnimann, Keij, and Zaninetti, 1983 (*400), p. 36.

Test small, from 0.3 mm to 0.8 mm in diameter, forming a low trochospiral coil of five to seven narrow chambers per whorl, sutures very strongly curved backward at the periphery on the spiral side, the strong overlap resulting in semilunate appearing chambers around the open umbilicus on the opposite side, final chamber with a median umbilically directed projection that results in a superficial resemblance to the hyaline calcareous *Neoconorbina*, after the first one to one and a half whorls the chambers are partially subdivided by septula resulting from radial infoldings of the inner organic layer of the spiral septum that become more numerous in later chambers; wall imperforate, with inner organic layer and outer finely agglutinated layer, septa and septula with little or no foreign particles covering the organic layer; aperture interiomarginal, at the end of the umbilical projection of the final chamber. Holocene, shallow brackish water; NW Borneo.

Remarks: *Bruneica* is herein transferred to the Remaneicinae, as it appears to be quite distinct from the much larger, spicule-producing *Zaninettia* [= *Carterina*] to which it was originally compared.

REMANEICA Rhumbler, 1938

Plate 137, figs. 9-11

Type species: Remaneica helgolandica Rhumbler, 1938; OD.

Remaneica Rhumbler, 1938 (*2624), p. 194.
Trochammina (Remaneica) Höglund, 1947 (*1487), p. 212 (nom. transl.).

Test with numerous chambers in a low trochospiral coil and may be surrounded by an attachment zone or "puffermasse"; wall brownish, finely agglutinated on proteinaceous base, thin, imperforate and flexible, primary septa single layered, secondary septula double walled as they result from invagination of the outer wall; primary aperture a small rounded interiomarginal extraumbilical opening, a smaller secondary umbilical opening occurs beneath a lobe extending into the umbilical area from the main chamber cavity. Holocene; Germany; Denmark; Atlantic, off Puerto Rico; USA: off New Hampshire.

Remarks: Reports of this genus, without figure or description (Antonova, 1975, *49), from the M. Jurassic (Bajocian) of the W. Caucasus, USSR, probably refer to an unrelated form.

SEPTOTROCHAMMINA S. Y. Zheng, 1979

Plate 138, figs. 1-8

Type species: Septotrochammina plicata (Terquem) of S. Y. Zheng, 1979, non *Patellina plicata* Terquem, 1876 = *Remaneica gonzalezi* Seiglie, 1964 (*2843), p. 500 (ICZN petition pending); OD.

Septotrochammina S. Y. Zheng, 1979 (*3449), p. 118, 203.
Remaneicella Brönnimann, Zaninetti, and Whittaker, 1983 (*417), p. 206, 208; type species: *Remaneica gonzalezi* Seiglie, 1964, obj., OD.

Test free or attached, depressed trochospiral, chambers numerous, umbilicus open, numerous radial secondary septa of four to five orders produced by invaginations from the peripheral wall; wall thin, flexible, proteinaceous, incorporating a very small amount of agglutinated silt; aperture interiomarginal, at the umbilical tip of the final chamber. Holocene; E. Atlantic, off France; W. Atlantic, off Brazil; Caribbean, off Venezuela; Pacific, off China: Xisha Islands.

Remarks: When *Septotrochammina* was described in 1979, the type species was identified as *Remaneica plicata* (Terquem). However, the neotype selected for *R. plicata* (Levy et al., 1975, *1838, p. 171) is not conspecific with the form illustrated by Zheng. Instead, *Septotrochammina plicata* of Zheng is conspecific with *Remaneica gonzalezi* Seiglie, 1964. In case of an unintentionally misidentified type species, a decision must be made by the International Commission of Zoological Nomenclature, hence a proposal has been submitted to designate as the type of *Septotrochammina* the nominal species, *R. gonzalezi*, which was misidentified in the original type designation. This species also was selected as the type species for *Remaneicella*, whose definition strongly resembles that of the earlier *Septotrochammina*. Zheng's article was not cited by Brönnimann and Maisonneuve (1980, *401) nor by Brönnimann et al. (1983, *417) in revisions of *Remaneica* and of the Trochamminacea.

Superfamily VERNEUILINACEA Cushman, 1911

Verneuilinacea Loeblich and Tappan, 1982 (*1917), p. 28, nom. transl. ex subfamily Verneuilininae.

Test multilocular, early stage trochospiral, triserial, or biserial, later may be uniserial; wall agglutinated, noncanaliculate. U. Carboniferous, Pennsylvanian to Holocene.

Family CONOTROCHAMMINIDAE Saidova, 1981

Conotrochamminidae Saidova, 1981 (*2696), p. 23.
Conotrochammininae Saidova, 1981 (*2696), p. 23 (subfamily).

Test with high trochospiral coil; wall agglutinated; aperture areal. L. to U. Paleocene.

CONOTROCHAMMINA Finlay, 1940

Plate 139, figs. 4-6

Type species: Conotrochammina whangaia Finlay, 1940; OD.

Conotrochammina Finlay, 1940 (*1129), p. 448.

Test with high trochospiral coil of about two to three volutions, about six chambers per whorl, sutures flush and somewhat obscure, umbilicus wide and depressed, outline nonlobulate; wall coarsely agglutinated, of clear coarse grains held in very little cement; aperture a small circular areal opening about one-third the distance from the base of the chamber. Paleocene; New Zealand.

Remarks: Brönnimann et al. (1983, *417, p. 206) stated that the areal aperture described in *C. whangaia* was not apparent on paratypes or topotypes of that species and suggested that the aperture was interiomarginal. They regarded the species and hence the present genus as a "nomen dubium." Although the coarsely agglutinated wall may obscure the aperture of some specimens, the aperture appears truly areal, and together with the elevated spire suggests a closer relationship to the Verneuilinacea than to either the Trochamminacea or to the Ammodiscidae where originally placed.

Family PROLIXOPLECTIDAE Loeblich and Tappan, 1985

Prolixoplectidae Loeblich and Tappan, 1985 (*1926), p. 197.

Test elongate, early stage trochospiral, later may have reduced number of chambers per whorl and become triserial, biserial, or uniserial; wall agglutinated, noncanaliculate; aperture interiomarginal and extraumbilical, to areal and terminal. M. Jurassic to Holocene.

Remarks: Taxa previously placed in the Dorothiidae or Eggerellidae but that have solid rather than canaliculate walls are now included in the Prolixoplectidae. Because the canaliculate wall appears to be more advanced, certain genera of Jurassic and Cretaceous age, for which no wall structure information is available, tentatively are also included here.

ARENOGAUDRYINA Podobina, 1975

Plate 140, figs. 1-4

Type species: Arenogaudryina granosa Podobina, 1975; OD.

Arenogaudryina Podobina, 1975 (*2434), p. 58.

Test subconical, trochospirally enrolled with four to five chambers in the first whorl, later reducing progressively to two chambers per whorl, chambers inflated, enlarging rapidly as added, sutures constricted; wall coarsely agglutinated on an organic base with little cement, solid or canaliculate nature unknown, surface roughly finished; aperture a large interiomarginal arch. U. Cretaceous (U. Senonian); USSR: W. Siberia.

EOMARSSONELLA Levina, 1972

Plate 140, figs. 9-12

Type species: Eomarssonella paraconica Levina, 1972; OD.

Eomarssonella Levina, 1972 (*1836), p. 101.

Test conical, early stage trochospirally enrolled, with four to five broad and low chambers per whorl in the first one or two whorls, later reduced to triserial, with chambers increasing in relative height and becoming subglobular, sutures depressed; wall agglutinated, solid or canaliculate nature unknown; aperture a low interiomarginal arch. U. Jurassic (Oxfordian); USSR: W. Siberia.

Remarks: Differs from *Dorothia* in being triserial rather than biserial in the adult stage and in the test being conical rather than parallel sided.

KARRERULINA Finlay, 1940

Plate 139, figs. 7-13

Type species: Gaudryina apicularis Cushman, 1911 (*702), p. 69; OD.

Karrerulina Finlay, 1940 (*1129), p. 450.

Gaudryinoides Burmistrova, 1974 (*452), p. 132, 134 (name not available; ICZN Art. 13 (a) (i), no description).

Gaudryinoides Saidova, 1975 (*2695), p. 104 (non *Gaudryinoides* Geodakchan, 1969); type species: *Gaudryinoides erigonum* Saidova, 1975; OD.

Karreriella (Karrerulina) Dyarkovich et al., 1984 (*1028), p. 186 (nom. transl.).

Test elongate, slender, circular to ovate in section, trochospirally coiled with five chambers per whorl in the early stage, then reduced to triserial and finally biserial, chambers slightly inflated, sutures depressed; wall agglutinated, coarse to fine grained, thin, noncanaliculate; aperture terminal, rounded, at the end of a necklike projection. Holocene, at 2,000 m to 7,900 m; N. and S. Atlantic; N. and S. Pacific.

Remarks: Differs from *Karreriella* in the thin and solid agglutinated wall and the aperture produced on a neck and is characteristically found in deep water.

MAGNESOINA Patterson, 1987

Plate 834, figs. 1-3

Type species: Listerella antillarum Cushman, 1936 (*781), p. 41; OD.

Magnesoina Patterson, 1987 (*2370), p. 140.

Test elongate, early stage trochospiral, later triserial, and finally uniserial and rectilinear, later chambers somewhat inflated, sutures straight, constricted; wall coarsely agglutinated, noncanaliculate, surface roughly finished; aperture terminal, rounded. Oligocene to Holocene; Atlantic; Caribbean.

ORIENTALIA N. K. Bykova, 1947

Plate 140, figs. 5 and 6

Type species: Orientalia exilis N. K. Bykova; 1947; OD.

Orientalia N. K. Bykova, 1947 (*469), p. 229.

Early stage trochospiral, with up to six or seven chambers per whorl, reduced to quadriserial in the adult that has four distinct vertical rows of inflated chambers; wall finely agglutinated, with considerable cement, solid or canaliculate nature unknown; aperture an interiomarginal slit. U. Cretaceous (Cenomanian); USSR: Guzar-Dari, Bukhara.

PLECTINA Marsson, 1878

Plate 140, figs. 19-21

Type species: Gaudryina ruthenica Reuss, 1851 (*2575), p. 41; SD Cushman, 1928 (*747), p. 127.

Plectina Marsson, 1878 (*2047), p. 160.

Listerella (Hechtina) Hofker, 1957 (*1512), p. 79 (err. nom. transl.: err. cit. pro *Plectina*).

Test elongate, early stage trochospiral with four to five chambers per whorl, later biserial, with test slightly flattened to ovate in section; wall finely agglutinated, solid or canaliculate nature unknown; aperture areal, subterminal, rounded or ovate. U. Cretaceous (Turonian to Maastrichtian) to Eocene; Europe; North America.

PROLIXOPLECTA Loeblich and Tappan, 1985

Plate 139, figs. 1-3

Type species: Dorothia exilis Cushman, 1936 (*781), p. 30; OD.

Prolixoplecta Loeblich and Tappan, 1985 (*1926), p. 197.

Test free, narrow and elongate, early stage of the microspheric form with a short trochospiral coil that forms a somewhat swollen initial part, later with numerous chambers in an elongate, narrow biserial stage, megalospheric generation lacks the early trochospiral coil but has an exceptionally large proloculus followed by a similar elongate biserial stage with low chambers and straight, depressed, and horizontal sutures; wall finely agglutinated, interior simple, noncanaliculate, surface smoothly finished; aperture a low arch at the base of the final chamber face. Holocene: West Indies.

Remarks: *Prolixoplecta* differs from *Karrerulina* in having a basal rather than terminal aperture produced on a neck. It differs from *Dorothia* in the much more elongate biserial stage, and in the megalospheric generation lacking a trochospiral stage, becoming biserial immediately following the very large proloculus; it differs from *Textularia* in having an early trochospiral coil in the microspheric generation and differs from both *Dorothia* and *Textularia* in the solid and noncanaliculate wall.

RIYADHELLA Redmond, 1965

Plate 140, figs. 16-18

Type species: Riyadhella regularis Redmond, 1965; OD.

Riyadhella Redmond, 1965 (*2538), p. 136.

Test elongate, early stage trochospiral with four to five chambers per whorl, later may be reduced to three chambers per whorl in the adult, with chambers increasing in relative height as added; wall finely agglutinated, with considerable proportion of calcareous material, solid or canaliculate nature unknown; aperture a high interiomarginal arch. M. Jurassic (Bajocian to Callovian); Saudia Arabia; W. India.

VERNEUILINELLA Tairov, 1956

Plate 140, figs. 13-15

Type species: Verneuilinella azerbaidjanica Tairov, 1956; OD.

Verneuilinella Tairov, 1956 (*3110), p. 113.

Test free, narrow, elongate, nearly circular in section, numerous inflated chambers in quadriserial arrangement throughout, increasing rapidly in size at first, later with nearly parallel sides, sutures distinctly depressed; wall finely agglutinated, solid or canaliculate nature unknown; aperture a low interiomarginal slit. Cretaceous (Aptian to Turonian); USSR: Azerbaidzhan; W. Siberia.

Family VERNEUILINIDAE Cushman, 1911

Verneuilinidae Cushman, 1927 (*742), p. 25, nom. transl. ex subfamily Verneuilininae.

Test triserial, at least in the early stage, later may be biserial, irregularly biserial or uniserial; aperture interiomarginal, may become slitlike, oval, or rounded and areal in biserial and uniserial taxa. Pennsylvanian to Holocene.

Subfamily VERNEUILINOIDINAE Suleymanov, 1973

Verneuilinoidinae Suleymanov, 1978 (*3103), p. 40 (nom correct pro Verneuilinoidesinae).
Verneuilinoidesinae Suleymanov, 1973 (*3102), p. 35 (nom. imperf.).

Test triserial at least in early stage, later may become biserial or uniserial, chambers globular and inflated rather than angular as in the Verneuilininae; wall agglutinated, simple, noncanaliculate; aperture an interiomarginal arch in the early stage, later may become terminal. Pennsylvanian to U. Eocene.

DUOTAXIS Kristan, 1957

Plate 140, figs. 22-25

Type species: Duotaxis metula Kristan, 1957; OD.

Duotaxis Kristan, 1957 (*1734), p. 294.

Test conical, with broad and low trochospirally enrolled chambers, three per whorl, appearing lunate as viewed from the flattened terminal face, sutures strongly oblique, the final chamber occupying over half the terminal face, apertural margin of the chamber lobulate; wall finely agglutinated; aperture an umbilical slit at the base of the final chamber, partially covered by a lobe from the chamber margin. U. Triassic (Rhaetian); Austria.

Remarks: Originally regarded as a member of the Tetrataxinae, *Duotaxis* differs in having an agglutinated wall rather than a two-layered microgranular calcareous one. It was considered a synonym of *Valvulina* by Loeblich and Tappan (1964, ***1910**, p. C279) but differs in the absence of an early triangular stage and in lacking a truly valvular tooth.

EGGERELLINA Marie, 1941

Plate 141, figs. 1 and 2

Type species: Bulimina brevis d'Orbigny, 1840 (*2307), p. 41; OD.

Eggerellina Marie, 1941 (*2031), p. 31.

Test triserial throughout, with inflated, subglobular chambers rapidly increasing in size, the final whorl occupying about four-fifths the length of the test, interior simple; wall agglutinated, noncanaliculate, largely of calcareous particles in abundant cement, surface smoothly finished; aperture a narrow, vertical hooklike slit extending up the apertural face for a short distance from its base. U. Cretaceous (Senonian); France; England.

FALSOGAUDRYINELLA Bartenstein, 1977

Plate 140, figs. 7 and 8

Type species: Gaudryinella tealbyensis Bartenstein, 1956 (*147), p. 513; OD.

Falsogaudryinella Bartenstein, 1977 (*150), p. 392.

Test elongate, rounded in section, early chambers triserial, later biserial and finally uniserial, chambers somewhat inflated, higher than wide, sutures slightly depressed; wall finely agglutinated, with considerable cement, surface smoothly finished; aperture a terminal or subterminal oval to elongate slit, bordered by a narrow lip, but lacking a neck. L. Cretaceous (Valanginian) to U. Cretaceous (Cenomanian); England; France; Poland; Romania.

Remarks: Although originally placed in the Verneuilinidae, Bartenstein (1977, ***150**) stated that the sutures were obscure and that the earliest chambers of *Falsogaudryinella* might be multiserial rather than triserial. Magniez-Jannin (1975, ***1980**, p. 77) stated definitely that *Uvigerinammina alta* (transferred to *Falsogaudryinella* by Bartenstein) has three chambers in the earliest whorl.

FLOURENSINA Marie, 1938

Plate 141, figs. 3 and 4

Type species: Flourensina douvillei Marie, 1938; OD.

Flourensina Marie, 1938 (*2030), p. 91.

Test triserial throughout, chambers inflated, and rapidly becoming strongly produced laterally as conical projections; wall coarsely agglutinated; aperture a high loop-shaped arch extending up from the base of the apertural face. L. Cretaceous (U. Vraconnian); France.

GAUDRYINOPSIS Podobina, 1975

Plate 140, figs. 26–32

Type species: Gaudryina vulgaris Kipriyanova, 1960 (***1691**), p. 78; OD.

Gaudryinopsis Podobina, 1975 (***2434**), p. 49.

Trochogaudryina Plotnikova, 1973 (***2414**), p. 816; type species: *Gaudryina neocomica* Challilov var. *robusta* Tairov, 1956 (***3109**), p. 22, non *Gaudryina robusta* Cushman, 1913 (genus not available, varieties not available as type species, ICZN Art. 45 (a), (e); OD. [see Remarks for renaming of this homonym and its elevation to specific rank].

Kadriayina Al-Najdi, 1975 (***27**), p. 3; type species: *Gaudryina gradata* Berthelin, 1880 (***221**), p. 24; OD(M).

Test elongate, with short early triserial stage, or trochospiral with three chambers per whorl, enlarging rapidly, later biserial and commonly with nearly parallel sides so that adult test is relatively narrow and elongate, chambers subglobular to slightly appressed, sutures depressed, test rounded to ovoid in section, not angular; wall finely agglutinated, simple; aperture a low arch at the base of the apertural face. U. Triassic to U. Eocene; cosmopolitan.

Remarks: Differs from *Gaudryina* in the inflated subglobular chambers and rounded section and from *Verneuilinoides* in the later biserial stage. Some species belonging here have erroneously been included in *Dorothia* but differ from that genus in having only three chambers per whorl and in the noncanaliculate wall.

Although *Trochogaudryina* Plotnikova, 1973, would have priority over *Gaudryinopsis*, no valid type species was designated, as discussed by Loeblich and Tappan (1985, ***1926**, p. 191). *Gaudryinopsis plotnikovae*, nom. nov., is here proposed for *Gaudryina neocomica* var. *robusta* Tairov, 1956 (***3109**, p. 22), non *Gaudryina robusta* Cushman, 1913. Although elevation to specific rank of this renamed homonym thus validates the type species of *Trochogaudryina* and thus the genus as of the present date and authorship (Loeblich and Tappan, 1987), *Trochogaudryina* remains a junior synonym of *Gaudryinopsis* Podobina, 1975.

MOOREINELLA Cushman and Waters, 1928

Plate 142, figs. 1–6

Type species: Mooreinella biserialis Cushman and Waters, 1928; OD.

Mooreinella Cushman and Waters, 1928 (***857**), p. 50.

Digitina Crespin and Parr, 1941 (***692**), p. 306; type species: *Digitina recurvata* Crespin and Parr, 1941; OD.

Test elongate, with brief triserial stage followed by a longer biserial stage, chambers somewhat inflated, sutures depressed; wall agglutinated on an organic base, specimens frequently compressed and may be variously distorted in preservation; aperture an arch at the base of the apertural face. Pennsylvanian to Permian; USA: Texas; Australia.

Remarks: The readily distorted test has led to various erroneous interpretations of this genus, ranging from an early trochospiral coil to an areal aperture. Examination of a large suite of specimens from numerous localities shows great variation in size as well as in the appearance that may result from compression, but in those specimens that are well preserved the early stage is clearly triserial, the later stage biserial, and the aperture a low interiomarginal arch. *Digitina* was regarded as differing from *Mooreinella* in having a basal aperture but is synonymous.

PALEOGAUDRYINA Said and Barakat, 1958

Plate 142, figs. 13–15

Type species: Paleogaudryina magharaensis Said and Barakat, 1958; OD.

Paleogaudryina Said and Barakat, 1958 (***2690**), p. 243.

Test free, small, flaring, chambers inflated, increasing rapidly in size as added, early stage triserial and subtriangular in section, later somewhat twisted biserial, slightly flattened and ovoid in section, sutures constricted; wall finely agglutinated, surface smoothly finished; aperture an elongate to arcuate areal slit, beginning just above the base of the final chamber. M. Jurassic (Callovian) to U. Jurassic (Kimmeridgian); Egypt: N. Sinai.

Remarks: Differs from *Gaudryina* in the smaller size, more inflated chambers, absence of a triangular early stage, and in the aperture being a subterminal vertical arched slit, and differs from *Paragaudryina* in the more lengthy triserial stage, flaring rather than parallel sided test, and narrower arcuate aperture.

PARAGAUDRYINA Suleymanov, 1958

Plate 141, figs. 5 and 6

Type species: Paragaudryina inornata Suleymanov, 1958; OD.

Paragaudryina Suleymanov, 1958 (*3088), p. 19.

Test narrow and elongate, triserial in early stage, later biserial, rounded to ovate in section, chambers rounded, increasing in height as added to become somewhat cuneate although remaining biserial, sutures slightly depressed; wall agglutinated; aperture an elongate to ovate areal slit but not completely terminal and symmetrical. U. Cretaceous (Turonian): USSR: Fergana.

PSEUDOREOPHAX Geroch, 1961

Plate 142, figs. 20-26

Type species: Pseudoreophax cisovnicensis Geroch, 1961; OD.

Pseudoreophax Geroch, 1961 (*1231), p. 159.

Test elongate, narrow, circular in section, early stage of the microspheric generation with a single trochospiral whorl (triserial?), then irregularly uniserial, megalospheric generation uniserial throughout; wall finely agglutinated, solid, surface smoothly finished; aperture terminal or subterminal, rounded, successive apertures located at opposite margins of the test, reflecting a pseudobiserial growth pattern. L. Cretaceous (Valanginian to L. Barremian); Poland: Carpathian Mountains.

REOPHACELLA Kaptarenko-Chernousova, 1956

Plate 142, figs. 7-10

Type species: Reophacella compressa Kaptarenko-Chernousova, 1956; OD.

Reophacella Kaptarenko-Chernousova, 1956 (*1648), p. 32.

Test elongate, somewhat expanding with growth, early stage loosely triserial, later irregularly biserial with high inflated chambers; wall finely agglutinated, probably with organic base as specimens are commonly crushed and distorted, aperture large and rounded, at the end of a thick short neck. L. Cretaceous (Albian) to U. Eocene (Kiev stage): USSR: Ukraine; Romania; Canada; USA: Alaska.

Remarks: Resembles *Uvigerinammina* in chamber arrangement and common occurrence in flysch deposits but differs in the prominent thick apertural neck.

TALIMUELLA Zeng and Li, 1982

Plate 141, figs. 7-12

Type species: Talimuella merosa Zeng and Li, in Hao, Zeng, and Li, 1982; OD.

Talimuella Zeng and Li, in Hao, Zeng, and Li, 1982 (*1417), p. 60, 130.

Test small, clavate in appearance, early stage subtriangular in section, with compact triserially arranged chambers, later abruptly becoming biserial, with test slightly reduced in diameter and subelliptical in section, final chambers tending to become uniserial; wall finely agglutinated, surface smoothly finished; aperture large, rounded, terminal on the final chamber. U. Cretaceous: China.

Remarks: *Talimuella* differs from *Gaudryinella* in lacking the loosely biserial stage prior to becoming uniserial; whether the wall is solid or canaliculate was not indicated originally.

UVIGERINAMMINA Majzon, 1943

Plate 141, figs. 13-20

Type species: Uvigerinammina jankoi Majzon, 1943; OD (M).

Uvigerinammina Majzon, 1943 (*1982), p. 68.

Test irregularly triserial, with three somewhat inflated chambers per whorl, increasing rapidly in size as added, sutures depressed; wall finely agglutinated, thick; aperture rounded, terminal, flush. L. Cretaceous to Paleocene; Poland; Romania; USSR: Ukraine, Carpathians; Atlantic, off W. Africa.

Remarks: *Uvigerinammina* is typically restricted to the flysch facies in which crushing and distortion is frequent.

VERNEUILINOIDES Loeblich and Tappan, 1949

Plate 142, figs. 11 and 12

Type species: Verneuilina schizea Cushman and Alexander, 1930 (*803), p. 9; OD.

Verneuilinoides Loeblich and Tappan, 1949 (*1880), p. 91.

Test free, elongate, rounded to lobulate in section, chambers subglobular, triserial throughout, sutures distinct, depressed; wall agglutinated, simple in structure; aperture an interiomarginal arch. Jurassic to Cretaceous; North America, Europe, Africa, Australia.

VIALOVELLA Voloshina, 1972

Plate 142, figs. 16–19

Type species: Ataxophragmium oblongum Reuss, 1866 (*2589), p. 458; OD.

Vialovella Voloshina, 1972 (*3312), p. 11.

Test elongate, flaring, triserial, chambers inflated to subangular, interior undivided; wall agglutinated, roughly finished; aperture a high loop-shaped opening perpendicular to the base of the chamber, tending to become areal in the later stage. U. Cretaceous (Cenomanian to Campanian); Europe.

Remarks: Originally placed in the Ataxophragmiidae, *Vialovella* is here placed in the Verneuilinoidinae because of the triserial rather than trochospiral test and the tendency for the loop-shaped aperture to become areal.

Subfamily SPIROPLECTINATINAE Cushman, 1928

Spiroplectinatinae Cushman, 1928 (*747), p. 235 (nom. subst. pro Spiroplectininae Cushman, 1927, non Schubert, 1902).

Spiroplectininae Cushman, 1927 (*742), p. 62 (name not available, based on *Spiroplectina* Cushman, 1927, non Schubert, 1902).

Belorussiellinae Balakhmatova, 1973 (*111), p. 52.

Test with much reduced triserial and triangular portion, later biserial and compressed, and may become uniserial in the adult; wall very finely agglutinated, smoothly finished; aperture terminal, rounded, produced on a neck. L. Cretaceous (Aptian) to U. Cretaceous (Santonian).

BELORUSSIELLA Akimets, 1958

Plate 143, figs. 1 and 2

Type species: Belorussiella bolivinaeformis Akimets, 1958; OD.

Belorussiella Akimets, 1958 (*17), p. 35.

Test small, elongate, up to 0.44 mm in length, tiny triangular triserial stage at the base followed by a more elongate biserial stage of ovate section, chambers increasing rapidly in height, sutures oblique and moderately depressed, periphery rounded; wall agglutinated of fine-grained calcareous particles; aperture an elongate slit extending from the base of the final chamber to the apex. U. Cretaceous (Turonian to Santonian); USSR: Belorussia SSR; Poland.

Remarks: Plotnikova (1978, *2418) stated that *Belorussiella* has a hyaline calcareous wall and an internal toothplate and transferred it to the Caucasinidae, but others regard it as agglutinated, and the calcareous species described by Plotnikova may have been misidentified. In addition, the triserial early stage is unlike the early trochospiral coil of the Caucasinidae.

GAUDRYINOIDES Geodakchan, 1969

Plate 143, figs. 3–5

Type species: Gaudryinoides pressa Geodakchan, 1969; OD.

Gaudryinoides Geodakchan, 1969 (*1219), p. 175.

Test elongate, flattened, early stage triserial and triangular, later biserial and becoming broader and flattened, chambers broad and low, sutures strongly oblique; wall agglutinated; aperture rounded, areal, near the base of the apertural face and bordered by a narrow lip. U. Cretaceous (Cenomanian); USSR: Azerbaydzhan.

Remarks: Differs from *Spiroplectinata* in the much flatter test and differs from it and *Spiroplectina* in the completely biserial later stage.

SPIROPLECTINA Schubert, 1902

Plate 143, figs. 6–11

Type species: Spiroplecta (Proroporus) jaekeli Franke, 1925 (*1172), p. 12; SD Botvinnik, 1971 (*312), p. 44.

Spiroplectina Schubert, 1902 (*2812), p. 84 (non *Spiroplectina* Cushman, 1927).

Pseudospiroplectinata Gorbenko, 1957 (*1275), p. 879; type species: *Pseudospiroplectinata plana* Gorbenko, 1957; OD.

Test elongate, early stage triangular in section with chambers triserially arranged, later broad and flattened with broad, low, and biserially arranged chambers, adult uniserial with arched or equitant chambers, sutures straight in the early portion, thickened and limbate, those of the uniserial part arched centrally; wall finely agglutinated; aperture terminal, rounded, on a short neck. U. Cretaceous (U. Cenomanian to U. Turonian); Germany; USSR: Ukraine, Donets Basin.

SPIROPLECTINATA Cushman, 1927

Plate 143, figs. 12 and 13

Type species: Textularia annectens Parker and Jones, 1863 (***2349**), p. 92; OD.

Spiroplectinata Cushman, 1927 (*742), p. 62 (nom. subst. pro *Spiroplectina* Cushman, 1927).

Spiroplectina Cushman, 1927 (*739), p. 78 (non Schubert, 1902); type species: obj.; OD.

Test free, elongate, short early stage triserial and triangular in section, later stage flattened and biserial with subparallel sides, finally becoming irregularly uniserial with subspherical but somewhat angular chambers; wall finely agglutinated; aperture terminal, rounded, on a distinct neck. L. Cretaceous (Aptian to Albian); England; France; Germany; USA: California.

Subfamily VERNEUILININAE Cushman, 1911

Verneuilininae Cushman, 1911 (*702), p. 52.

Gaudryininae Balakhmatova, 1973 (*111), p. 50.

Verneuilininea Saidova, 1981 (*2696), p. 24 (supersubfamily).

Test with triserial and triangular early stage, later may become biserial or uniserial, chambers angular and appressed; wall agglutinated, simple, noncanaliculate; aperture an interiomarginal arch in the early stage and may become terminal in later stage. U. Triassic to Holocene.

GAUDRYINA d'Orbigny, 1839

Plate 144, figs. 1-3

Type species: Gaudryina rugosa d'Orbigny, 1840 (***2307**), p. 44; SD Cushman, 1911 (***702**), p. 62.

Gaudryina d'Orbigny, 1839 (*2304), p. 112 (also err. cit. as *Gaudryna*, p. 219).

Test free, elongate, early stage triserial and triangular in section, later becoming biserial and triangular to rounded in section; wall agglutinated, solid, and noncanaliculate; aperture an arch at the inner margin of the final chamber, may lie in a slight reentrant. U. Triassic to Holocene; cosmopolitan.

Remarks: Sections of *Gaudryina rugosa* d'Orbigny show it to be noncanaliculate.

GAUDRYINELLA Plummer, 1931

Plate 144, figs. 13 and 14

Type species: Gaudryinella delrioensis Plummer, 1931; OD.

Gaudryinella Plummer, 1931 (*2424), p. 341.

Test elongate, early stage triangular and triserial, later irregularly and loosely biserial and progressively more nearly uniserial, chambers inflated, cuneate through most of growth; wall finely agglutinated, solid and noncanaliculate, surface rough; aperture at the base of the final chamber in the triserial stage, rounded and terminal in later biserial and uniserial stages. L. Cretaceous (U. Valanginian to Albian) to U. Cretaceous (Cenomanian); USA: Texas, Oklahoma; Caribbean, Trinidad; NE Iran; Germany; Romania.

LATENTOVERNEUILINA Loeblich and Tappan, 1985

Plate 143, figs. 14-19

Type species: Clavulina indiscreta Brady, 1881 (***339**), p. 55; OD.

Latentoverneuilina Loeblich and Tappan, 1985 (*1926), p. 191.

Test triserial throughout but becoming more loosely triserial with growth, until the final chamber appears almost uniserial, triangular in section but with distinctly rounded angles, septa obscure externally; wall very thick, agglutinated of varied-sized particles, with an organic lining, surface smoothly finished and polished, as successive chambers are added agglutinated material is deposited over the terminal face of the previous chamber in both directions from the actual suture, so that septa are secondarily thickened toward the outer wall and both suture and distal part of the previous chamber wall are covered by additional agglutinated material; aperture in the adult terminal, rounded, simple, and slightly produced on a neck, with a very thick surrounding wall. Holocene; Pacific Ocean, Fiji Islands, at 385 m.

Remarks: *Latentoverneuilina* differs from *Clavulina* and *Tritaxia* in lacking a truly uniserial final stage, from *Tritaxia* in lacking an internal apertural siphon, and from *Clavulina* in lacking an apertural tooth and a canaliculate wall. It differs from *Clavulinoides* in the noncanaliculate wall and in lacking a biserial and then uniserial stage. It differs from all three genera in the extremely thick wall and the secondary thickening of the distal part of the preceding chamber wall as the new chamber is added.

PSEUDOGAUDRYINELLA
Cushman, 1936

Plate 144, figs. 11 and 12

Type species: Gaudryinella capitosa Cushman, 1933 (***770**), p. 52; OD.

Pseudogaudryinella Cushman, 1936 (***781**), p. 23.

Test free, elongate, triserial, and triangular in section in the early stage, then biserial and somewhat flattened, and finally uniserial and rounded in section; wall agglutinated, simple; aperture interiomarginal in the biserial stage, terminal and rounded in the adult. U. Cretaceous (Santonian to Campanian); USA: Alabama, Arkansas, Mississippi, Tennessee, Texas.

Remarks: Differs from *Tritaxia* in having a biserial stage intercalated between the triserial and uniserial ones and differs from *Gaudryina* in becoming uniserial in the adult.

SIPHOGAUDRYINA Cushman, 1935

Plate 144, figs. 4-8

Type species: Gaudryina stephensoni Cushman, 1928 (***750**), p. 108; OD.

Gaudryina (Siphogaudryina) Cushman, 1935 (***778**), p. 3.
Siphogaudryina Hofker, 1957 (***1512**), p. 69 (nom. transl.).

Test free, elongate, increasing gradually in breadth, early chambers triserially arranged and triangular in section, later biserial, with flattened sides and quadrangular section, angles may be produced and subcarinate in both triserial and biserial parts; wall agglutinated, solid and noncanaliculate; aperture an interiomarginal arch. U. Cretaceous (Turonian to Senonian); Germany; Ireland; USA: Alabama, Mississippi, Tennessee, Texas.

Remarks: The genus is recognized here on the basis of the quadrate section of the biserial part of the test; species with fistulose processes previously assigned to *Siphogaudryina* belong elsewhere.

VERNEUILINA d'Orbigny, 1839

Plate 144, figs. 9 and 10

Type species: Verneuilina tricarinata d'Orbigny, 1840 (***2307**), p. 39; SD(SM).

Verneuilina d'Orbigny, 1839 (***2304**), p. 104.

Test free, elongate, chambers triserially arranged and triangular throughout, margins subcarinate to somewhat rounded; wall agglutinated, solid, fine to coarse grained; aperture an interiomarginal arch. U. Jurassic (Kimmeridgian) to U. Cretaceous (Maastrichtian); cosmopolitan.

Subfamily BARBOURINELLINAE
Saidova, 1981

Barbourinellinae Saidova, 1981 (***2696**), p. 25.
Bermudezininae Saidova, 1981 (***2696**), p. 25.
Bermudezininea Saidova, 1981 (***2696**), p. 25 (supersubfamily).

Test triserial and triangular, at least in the early stage, later may be reduced to biserial or uniserial; wall agglutinated, noncanaliculate; aperture areal, bordered by a distinct lip, and may be elevated on a neck. U. Cretaceous to Holocene.

BARBOURINELLA Bermúdez, 1940

Plate 144, figs. 15 and 16

Type species: Barbourina atlantica Bermúdez, 1939 (***198**), p. 9; OD.

Barbourinella Bermúdez, 1940 (***200**), p. 410 (nom. subst. pro *Barbourina* Bermúdez, 1939).
Barbourina Bermúdez, 1939 (***198**), p. 9 (non *Barbourina* Amaral, 1924); type species: obj.: OD.

Test free, triangular in section, triserial throughout; wall coarsely agglutinated, noncanaliculate, surface rough; aperture areal, circular, may be produced on a neck. U. Oligocene to Holocene; Cuba; Jamaica.

BERMUDEZINA Cushman, 1937

Plate 144, figs. 19-21

Type species: Heterostomella(?) *cubensis* Palmer and Bermúdez, 1936 (***2331**), p. 244; OD.

Bermudezina Cushman, 1937 (***782**), p. 102.

Test free, elongate, triangular, and triserial in the early stage with test enlarging rapidly, later biserial, with nearly parallel sides and more nearly quadrate in section; wall moderately coarsely agglutinated; aperture terminal, produced on a short neck. U. Eocene to Miocene; Caribbean; Europe.

HETEROSTOMELLA Reuss, 1866

Plate 144, figs. 17 and 18

Type species: Sagrina rugosa d'Orbigny, 1840 (*2307), p. 47; OD.

Heterostomella Reuss, 1866 (*2589), p. 448.

Test free, early stage triserial and roughly triangular in section, later chambers biserially arranged and test quadrangular in section, test angles marked by prominent ridges that may become fistulose, one ridge of the triangular part bifurcating, so that the adult biserial stage has four longitudinal ridges and may have additional supplementary longitudinal ridges; wall agglutinated, with considerable cement; aperture an interiomarginal arch in the early stage, later terminal, rounded, and may have a short neck. U. Cretaceous (Santonian to Campanian); Europe; North America.

Family TRITAXIIDAE Plotnikova, 1979

Tritaxiidae Plotnikova, 1979 (*2419), p. 14.

Test free, early stage triserial and triangular in section, later may become biserial; wall agglutinated, simple in structure; aperture at the base of the last chamber in the early stage, later becoming terminal and provided with an internal apertural tube. U. Jurassic to Cretaceous.

BITAXIA Plotnikova, 1978

Plate 145, figs. 8 and 9

Type species: Gaudryina? gorbachikae Plotnikova, 1976 (*2415), p. 13; OD.

Bitaxia Plotnikova, 1978 (*2417), p. 310.

Test elongate, early stage triserial and triangular in section, later beoming biserial, angles sharply carinate; wall agglutinated, simple; aperture a high interiomarginal arch, provided internally with a semicylindrical siphon that extends inward from the aperture to a Y-shaped base that attaches above the previous foramen. U. Jurassic (U. Tithonian) to L. Cretaceous (Berriasian); USSR: Crimea, Ukraine.

Remarks: Recognized herein as a homeomorph of *Gaudryina* but with internal siphon as in *Tritaxia*. Although originally stated to have a slitlike secondary opening near the main aperture that connects with the siphon, this is not clear from the diagrammatic illustrations, and the supposed "secondary opening" appears to be only the margin of the aperture that is partially obscured by the internal siphon.

TRITAXIA Reuss, 1860

Plate 145, figs. 1-3

Type species: Textularia tricarinata Reuss, 1844 (*2569), p. 215 (syn.: *Verneuilina dubia* Reuss, 1851 (*2575), p. 40); OD(M).

Tritaxia Reuss, 1860 (*2581), p. 227.

Test elongate, triserial, and triangular in early stage, commonly with carinate angles, later stage with a few uniserial chambers; wall agglutinated, relatively thick and solid; aperture rounded, at the inner margin in the triserial stage, terminal and central in the uniserial adult, may occur in a slight depression or be elevated on a neck, aperture of final one or two chambers provided with a thick internal siphon or tube that extends within from the apertural margin, flaring at the base to attach to the preceding septum. Cretaceous; cosmopolitan.

Superfamily ATAXOPHRAGMIACEA Schwager, 1877

Ataxophragmiacea Grigyalis, 1978 (*1306), p. 8, nom. correct. pro superfamily Ataxaphragmiidae.

Ataxaphragmiidae Suleymanov, 1969 (*3099), p. 50 (superfamily; nom. imperf.), nom. transl. ex family Ataxophragmidea.

Globotextulariidae Saidova, 1981 (*2696), p. 23 (superfamily; nom. imperf.).

Hagenowinoididea Saidova, 1981 (*2696), p. 25.

Ataxophragmiidea Saidova, 1981 (*2696), p. 26.

Textulariellidea Saidova, 1981 (*2696), p. 27.

Test trochospiral, may be reduced to biserial or uniserial in later stages; chamber interior may be subdivided by secondary partitions; wall agglutinated, noncanaliculate. M. Triassic (Anisian) to Holocene.

Family ATAXOPHRAGMIIDAE Schwager, 1877

Ataxophragmiidae Galloway and Heminway, 1941 (*1207), p. 320, nom. corr. pro family Ataxophragmidea.
Ataxophragmidea Schwager, 1877 (*2830), p. 22.

Test trochospiral, three or more chambers per whorl, later stage may have increased or decreased number of chambers per whorl; aperture a high narrow arch or straight to curved slit, may be bordered by a lip, interiomarginal or areal. U. Triassic (Norian) to Paleocene.

Subfamily ATAXOPHRAGMIINAE Schwager, 1877

Ataxophragmiinae Galloway, 1933 (*1205), p. 211, nom. transl. ex family Ataxophragmidea.
Ataxophragmiinea Saidova, 1981 (*2696), p. 26 (supersubfamily).

Test with three or more chambers in early whorl, later may increase in number but never reduced to biserial or uniserial in the axis of initial coiling, chamber interior simple. L. Cretaceous (Hauterivian) to Paleocene.

ARENOBULIMINA Cushman, 1927

Plate 145, figs. 10-14, 19, and 20

Type species: Bulimina preslii Reuss, 1845 (*2570), p. 38; OD.

Arenobulimina Cushman, 1927 (*739), p. 80.
Arenobulimina (Harena) Voloshina, 1965 (*3309), p. 149 (name not available, ICZN Art. 13 (a) (i), no description).
Arenobulimina (Pasternakia) Voloshina, 1965 (*3309), p. 149 (name not available, ICZN Art. 13 (a) (i), no description).
Arenobulimina (Harena) Voloshina, 1972 (*3311), p. 71; type species: *Arenobulimina amanda* Voloshina, 1961 (*3308), p. 76; OD.
Arenobulimina (Pasternakia) Voloshina, 1972 (*3311), p. 64; type species: *Bulimina d'orbignyi* Reuss, 1845 (*2570), p. 38; OD.

Test trochospirally enrolled, four or more chambers per whorl, intercameral sutures at a broadly acute angle to the axis of coiling, interior simple and undivided; wall agglutinated; aperture interiomarginal, a simple arch or loop, without apertural tooth. L. Cretaceous (Aptian) to Paleocene; Europe, USA: Arkansas, Texas.

Remarks: Barnard and Banner (1980, *142, p. 389) consider the presence or absence of intercameral partitions or buttresses to be subgeneric in character, whereas we recognize this feature as of both generic and subfamilial importance.

ATAXOORBIGNYNA Voloshina, 1965

Plate 146, figs. 1-4

Type species: Spirolina inflata Reuss, 1851 (*2575), p. 32; OD.

Orbignyna (Ataxoorbignyna) Voloshina, 1965 (*3309), p. 153.
Voloshinovella (Ataxoorbignyna) Barnard and Banner, 1980 (*142), p. 390 (nom. transl.).

Test in a low trochospiral coil in the early stage, later nearly planispiral, and finally tending to uncoil, chambers few in number, interior undivided; wall agglutinated, exterior smooth to roughened; aperture in the early stage may be interiomarginal, later a round areal opening in the middle of the apertural face, and finally terminal in uncoiled chambers. U. Cretaceous (Coniacian to Maastrichtian); USSR: Ukraine; W. Siberia.

ATAXOPHRAGMIUM Reuss, 1860

Plate 147, figs. 1-8

Type species: Bulimina variabilis d'Orbigny, 1840 (*2307), p. 40; SD Cushman, 1928 (*747), p. 129.

Ataxophragmium Reuss, 1860 (*2579), p. 52.
Ataxogyroidina Marie, 1941 (*2031), p. 53, 255, 258; type species: obj.; OD.
Ataxophragmoides Brotzen, 1948 (*429), p. 35; type species: *Ataxophragmoides frankei* Brotzen, 1948; OD.

Chambers in a low trochospiral coil, spiral side largely involute and early whorls not visible, chamber interior simple and undivided; wall coarsely agglutinated, with considerable cement; aperture loop-shaped and interiomarginal in the early stage, later becoming areal and no longer extending to the base of the apertural face. U. Cretaceous (Cenomanian) to Paleocene; France; Germany; England; Sweden; USSR.

HAGENOWELLA Cushman, 1933

Plate 145, figs. 4-7 and 21-23

Type species: Valvulina gibbosa d'Orbigny, 1840 (*2307), p. 38; OD.

Hagenowella Cushman, 1933 (*772), p. 2.
Arenobulimina (Novatrix) Voloshina, 1965 (*3309), p. 149, 153, 154; type species: *Globigerina elevata* d'Orbigny, 1840 (*2307), p. 34; OD.

Test subglobular to ovoid, trochospiral, with four chambers per whorl throughout, chambers inflated, intercameral sutures depressed, nearly vertically aligned, and parallel to the axis of coiling; wall agglutinated, interior of chambers simple; aperture an interiomarginal arch. U. Cretaceous (Cenomanian to Maastrichtian), cosmopolitan.

Remarks: *Hagenowella* was originally described as having internal partitions, as specimens from the Isle of Rügen were erroneously believed to be conspecific with *Valvulina gibbosa* d'Orbigny. The true nature of d'Orbigny's species was clarified by Marie (1941, ***2031**), who stated that based on the original types the species has a simple interior. The species with internal partitions is now referred to as *Hagenowina quadribullata* (von Hagenow). Previously regarded (Loeblich and Tappan, 1964, ***1910**, p. C273) as a synonym of *Arenobulimina*, the genus was recognized as distinct by Barnard and Banner (1980, ***142**, p. 389) as the intercameral sutures are nearly parallel to the axis of coiling rather than separated by a broad angle.

PITYUSINA Rangheard and Colom, 1967

Plate 146, figs. 5-10

Type species: Pityusina conica Rangheard and Colom, 1967; OD.

Pityusina Rangheard and Colom, 1967 (***2511**), p. 297.

Test free, a high conical and apparently trochospiral series of chambers, few per whorl in the early stage, increasing in number per whorl as added, and final whorl may have seven or more, septa may be thin and delicate and secondarily destroyed, leaving a cavernous interior, apertural surface flattened, periphery lobulate; wall coarsely agglutinated, noncanaliculate; aperture at the base of the final chamber. L. Cretaceous (Hauterivian to Barremian); Spain: Baleares.

Remarks: Although *Pityusina* was described as single chambered and belonging to the Saccamminidae, the presence of partitions in rare sections also suggested a relationship to the Valvulinidae. The above description is based largely on the original figures of the type species, those of the exterior of the cone (Rangheard and Colom, 1967, ***2511**, pl. V, figs. 3, 15, 20, 21) indicating an early spire and the flattened apertural surface of the holotype (ibid., pl. V, fig. 11), suggesting more than four chambers in the final whorl (the holotype is also shown on pl. V, figs. 14, 15). Similarly, the figures of sectioned specimens (ibid., pl. VI, figs. 7, 10) show distinct chambers that increase rapidly in size from the tip of the cone and the probable aperture on the flat side of the cone (ibid., pl. VI, figs. 2, 4, 5, 8), as well as that of an earlier chamber (ibid., pl. VI, fig. 7).

PRAECHRYSALIDINA Luperto Sinni, 1979

Plate 146, figs. 11-15

Type species: Praechrysalidina infracretacea Luperto Sinni, 1979; OD.

Praechrysalidina Luperto Sinni, 1979 (***1948**), p. 4.

Test conical, triserial throughout, rarely with incipient rafters behind the apertural face; wall calcareous, thick, microgranular, dark, at high magnification appearing to be crossed by fine striae aligned perpendicular to the test surface, the striae particularly evident in the region corresponding to the marginal zone, agglutinated material sparse; aperture terminal, cribrate, of numerous pores restricted to a well-defined area that is inclined toward the test axis and surrounded by a peripheral undivided marginal zone. L. Cretaceous (Aptian to Albian); Italy.

SABULINA Frieg and Price, 1982

Plate 145, figs. 15-18

Type species: Bulimina presli var. *sabulosa* Chapman, 1892 (***522**), p. 755; OD.

Arenobulimina (Sabulina) Frieg and Price, 1982 (***1185**), p. 63.

Test with high trochospiral coil of four broad and low chambers per whorl, enlarging rapidly as added so that final whorl occupies more than half the test length, apertural end of test distinctly flattened, nearly perpendicular to the lateral wall; wall coarsely agglutinated, solid, surface roughly finished; aperture a high slit, perpendicular to the basal suture of the chamber, and bordered by a narrow rim. L. Cretaceous (U. Albian); England.

Remarks: Described as a subgenus of *Arenobulimina*, *Sabulina* is elevated to generic status in view of the fewer chambers per whorl, coarsely agglutinated wall, and the broader flattened apertural end being nearly perpendicular to the test axis, rather than oblique.

Subfamily PERNERININAE Loeblich and Tappan, 1984

Pernerininae Loeblich and Tappan, 1984 (***1918**), p. 15.

Chamber interior with peripheral internal buttresses, partitions, or chamberlets. U. Triassic (Norian) to U. Cretaceous (Maastrichtian).

Remarks: Differs from other Ataxophragmiidae in having internal partitions within the chambers.

AGGLUTISOLENA Senowbari-Daryan, 1984

Plate 828, figs. 1-8

Type species: Agglutisolena conica Senowbari-Daryan, 1984; OD.

Agglutisolena Senowbari-Daryan, 1984 (***2869**), p. 89.

Test small, subconical, early stage uncertain, possibly trochospiral, later with broad low inflated chambers, constricted at the sutures; wall relatively thick, agglutinated; aperture terminal, produced, described as connecting to an internal continuous tube. U. Triassic (Norian), Palermo, Sicily, Italy.

Remarks: An interpretation was based on the nonoriented sections, suggesting that the conical test was provided with a continuous central tube that did not communicate with the chambers. However, no transverse sections were illustrated that would show such a continuous structure, and the section of the holotype shows continuous septa crossing the test, including the septa of the upper chambers that supposedly intersect the tube. These oblique sections could equally well be interpreted as intersecting radial beams in the later chambers.

COPROLITHINA Marie, 1941

Plate 147, figs. 9-13

Type species: Coprolithina subcylindrica Marie, 1941; OD.

Coprolithina Marie, 1941 (***2031**), p. 37.

Test free, large, up to 3.8 mm in length, subcylindrical or slightly curved at the initial end, early stage enrolled with a single nearly planispiral whorl, later uniserial, rectilinear, and of nearly constant test diameter, chambers with eight to fourteen radial beams extending from the chamber floor to the roof and projecting about halfway to the center of the chamber cavity; wall thick, coarsely agglutinated, constructed of numerous small foraminiferal tests and other shells and foreign particles; aperture terminal, cribrate, five to ten irregular openings leading into the central area of the domed final chamber. U. Cretaceous (Senonian); France; England.

CRENAVERNEUILINA Barnard and Banner, 1980

Plate 148, figs. 1-3

Type species: Flourensina mariei D. J. Carter and Hart, 1977 (***497**), p. 9 (originally as "*mariae*"; see ICZN art. 19 (a)(i); 32 (c)(ii); 33(b)(ii)); OD.

Crenaverneuilina Barnard and Banner, 1980 (***142**), p. 393.

Test elongate, triserial throughout, chamber interior subdivided by buttresses or radial partitions in the peripheral part; wall agglutinated, thick and rigid; aperture a high narrow arch or vertical straight to curved slit, interiomarginal to areal with a groove or depression connecting to the basal suture. Cretaceous (Albian to Cenomanian); England; Poland; Netherlands.

HAGENOWINA Loeblich and Tappan, 1961

Plate 148, figs. 17-19

Type species: Valvulina quadribullata von Hagenow, 1842 (***1359**), p. 570; OD.

Hagenowina Loeblich and Tappan, 1961 (***1905**), p. 242.

Test trochospirally enrolled with four chambers per whorl, intercameral sutures parallel to the axis of coiling, interior of chambers with internal buttresses or partitions extending up from the floor of the chamber for a short distance inward from the outer wall; wall finely agglutinated; aperture a small arch or loop against the base of the chamber. U. Cretaceous (Campanian to Maastrichtian); Europe.

KAEVERIA Senowbari-Daryan, 1984

Plate 828, figs. 9-11

Type species: Palaeolituonella fluegeli Zaninetti, Altiner, Dağer, and Ducret, 1982 (*3432), p. 107; OD.

Kaeveria Senowbari-Daryan, 1984 (*2869), p. 87.

Test subconical, chambers of early stage trochospirally enrolled, interior undivided, later chambers biserial and uncoiled, with interior subdivided by alternating longer and shorter radial beams; wall agglutinated; aperture terminal, simple. U. Triassic (Norian/Rhaetian); Turkey; Italy: Sicily; Austria.

OPERTUM Voloshina, 1972

Plate 148, figs. 4 and 5

Type species: Ataxophragmium (Opertum) incognitum Voloshina, 1972; OD.

Ataxophragmium (Opertum) Voloshina, 1972 (*3311), p. 111.

Ataxophragmium (Opertum) Voloshina, 1965 (*3309), p. 150, 154, 155 (name not available, ICZN Art. 13 (a)(i), no description).

Test subglobular, with few gradually enlarging chambers in a low trochospiral coil that is nearly involute on the spiral side, chamber interior subdivided by numerous tiers of internal partial partitions or buttresses that form distinct chamberlets and may be more numerous in later chambers; wall moderately coarsely agglutinated, surface roughened; aperture a low interiomarginal slit on the periphery and may be slightly oblique. U. Cretaceous (U. Campanian to Maastrichtian); USSR: Ukraine, Crimea, W. Siberian depression.

ORBIGNYNA von Hagenow, 1842

Plate 149, figs. 7-9

Type species: Orbignyna ovata von Hagenow, 1842; OD.

Orbignyna von Hagenow, 1842 (*1359), p. 573.

Test enrolled in a low trochospiral to pseudoplanispiral coil at first, later more loosely coiled, interior of chambers subdivided by buttresses and partitions; wall agglutinated, with shell fragments and other calcareous particles; aperture interiomarginal in the early stage, and later a rounded to irregular areal opening. U. Cretaceous (Campanian to Maastrichtian); Europe.

PERNERINA Cushman, 1933

Plate 149, figs. 3-6

Type species: Bulimina depressa Perner, 1892 (*2383), p. 55; OD.

Pernerina Cushman, 1933 (*772), p. 19.

Test trochospirally enrolled, nearly involute coiling on spiral side leaving visible externally only a small part of the early whorls, several chambers per whorl, interior partially subdivided by pillars that extend from chamber floor to roof; wall coarsely agglutinated, thick; aperture a loop at the base of the inner margin of the flattened apertural face. U. Cretaceous (Turonian to Coniacian); Czechoslovakia; Germany.

VOLOSHINOIDES Barnard and Banner, 1980

Plate 148, figs. 13-16

Type species: Arenobulimina labirynthica Voloshina, 1961 (*3308), p. 74; OD.

Arenobulimina (Voloshinoides) Barnard and Banner, 1980 (*142), p. 390 (nom. subst. pro *Arenobulimina (Columnella)* Voloshina, 1965).

Arenobulimina (Columnella) Voloshina, 1965 (*3309), p. 149, 154, 155 (non *Columnella* Levinsen, 1914); type species: obj.; OD.

Test trochospirally enrolled, four or more chambers per whorl, chambers commonly broad and low, with whorls enlarging rapidly, intercameral sutures at a broad angle to the axis of coiling; wall agglutinated, interior with numerous buttresses attached to the outer wall that may meet to form a coarse subepidermal mesh and irregular chamberlets; aperture a single interiomarginal arch. L. Cretaceous (Albian) to U. Cretaceous (Maastrichtian); Europe.

VOLOSHINOVELLA Loeblich and Tappan, 1964

Plate 148, figs. 6-12

Type species: Lituola aquisgranensis Beissel, 1886 (*173), p. 138; figured and redescribed in 1891 (*174), p. 12; OD.

Voloshinovella Loeblich and Tappan, 1964 (*1910), p. C291 (nom. nov. pro *Beisselina* Voloshinova and Balakhmatova, 1959).

Beisselina Voloshinova and Balakhmatova, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 227 (non *Beisselina* Canu, 1913); type species: obj.; OD.

Test at first enrolled in a very low trochospiral to nearly planispiral coil, biinvolute, later tending to uncoil, chambers broad, low, and cylindrical, chamber interior subdivided by radial partitions and buttresses that extend from chamber floor to roof; wall coarsely agglutinated, surface may be roughly finished; aperture in the uncoiled stage terminal, areal, and may be triradiate to tetraradiate. U. Cretaceous (Campanian); Europe.

Remarks: Voloshina (1972, ***3311**, p. 94) correctly cited the type species of *Voloshinovella* as *Lituola aequisgranensis* [sic] Beissel but only included Beissel's figure 32 of var. *conica* as *V. aquisgranensis*. In the same publication (1972, p. 118), this species also was indicated as *Orbignyna (Orbignyna) aequisgranensis* [sic] (Beissel). However, the type species originally designated for the genus cannot be later changed, and true *aquisgranensis* rather than the variety *conica* was designated as the type species of *Voloshinovella*. If two distinct species or genera are in fact represented, the one differing from typical *Voloshinovella* must be given a new specific name.

Family GLOBOTEXTULARIIDAE Cushman, 1927

Globotextulariidae Saidova, 1981 (***2696**), p. 23, nom. transl. ex subfamily Globotextulariinae.

Test coiled in high trochospiral at first, later may be quadriserial, triserial, or biserial; wall coarsely agglutinated, noncanaliculate; aperture interiomarginal to areal. U. Cretaceous (Campanian) to Holocene.

Subfamily GLOBOTEXTULARIINAE Cushman, 1927

Globotextulariinae Cushman, 1927 (***742**), p. 40 (subfamily).

Globotextulariinea Saidova, 1981 (***2696**), p. 24 (supersubfamily).

Verneuillinulinae Saidova, 1981 (***2696**), p. 24 (nom. imperf.).

Verneuilinullinae Loeblich and Tappan, 1984 (***1918**), p. 15, nom. corr. pro Verneuillinullinae.

Test in high trochospiral coil, later stage with three or four chambers per whorl; wall coarsely agglutinated, noncanaliculate; aperture an interiomarginal umbilical arch. Eocene to Holocene.

CRIBROTURRETOIDES D. J. Smith, 1949

Plate 149, figs. 1 and 2

Type species: Cribroturretoides miocenica D. J. Smith, 1949; OD.

Cribroturretoides D. J. Smith, 1949 (***3005**), p. 56.

Test elongate, a high trochospiral coil of about three inflated chambers per whorl, sutures deeply incised; wall agglutinated; aperture apparently an interiomarginal arch, umbilical in position. M. Miocene; USA: Louisiana.

Remarks: *Cribroturretoides* was originally described as having a cribrate aperture covering the entire upper surface of the test, on all chambers of the final whorl; it was later described (Loeblich and Tappan, 1964, ***1910**, p. C281) as having "a few relatively large irregular openings." Restudy of the holotype of *C. miocenica* does not support the description of a multiple aperture, as the latter appears only to be a small interiomarginal opening. Reflections from the quartz grains of the agglutinated test may have resulted in the erroneous interpretation. Although superficially resembling the Cretaceous *Verneuilinoides*, the present genus apparently has only three chambers per whorl and seems closer to the Globotextulariidae.

GLOBOTEXTULARIA Eimer and Fickert, 1899

Plate 150, figs. 1-7

Type species: Haplophragmium anceps Brady, 1884 (***344**), p. 313; OD.

Globotextularia Eimer and Fickert, 1899 (***1088**), p. 679.

Test free, large, trochospiral, with five chambers per whorl for up to three whorls, later reduced to four chambers per whorl, and commonly only three per whorl in the final stage, or may become triserial immediately after the trochospiral beginning; commonly an abrupt change in the axis of coiling in the later part results in an irregular or lopsided test, chambers subglobular, inflated, final one or two chambers may be very broad and show a slight median indentation, but this is not a reflection of internal subdivision, sutures depressed; wall thick, coarsely agglutinated but rather loosely cemented; aperture interiomarginal, a broad arch in the umbilical area. Holocene, from 713 m to 3,900 m depth; N. and S. Atlantic; N. and S. Pacific.

Remarks. Both external characters and the wall structure based on thin sections of the type species of *Globotextularia* were described by Loeblich and Tappan (1985, *1926, p. 197).

GRAVELLINA Brönnimann, 1953

Plate 149, figs. 10-14

Type species: Gravellina narivaensis Brönnimann, 1953; OD.

Gravellina Brönnimann, 1953 (*378), p. 87.
?*Bronnimannina* S. N. Singh and Kalia, 1969 (*2978), p. 45; type species: *Bronnimannina eocenica* S. N. Singh and Kalia, 1969; OD.

Test free, subconical, forming an elongate trochospiral coil, constantly with four chambers per whorl that overlap strongly the earlier part of the test so that final whorl comprises nearly half the test length; wall agglutinated, thick, interior simple; aperture a small interiomarginal opening. Eocene to Miocene; Trinidad, West Indies; India.

Remarks: *Gravellina* resembles *Tetrataxiella* in having four chambers per whorl and the basal aperture opening near the axis of coiling, although the umbilicus is closed in contrast to *Globotextularia.*

Bronnimannina was described as having an alveolar wall, but as the "alveoles" are confined to the wall itself and do not open into the chamber lumen, they may in fact be only sections of large quartz grains and do not indicate a true alveolar wall. In other respects *Bronnimannina eocenica* appears identical to *Gravellina.*

RHUMBLERELLA Brönnimann, 1981

Plate 151, figs. 1-6

Type species: Rhumblerella sepetibaensis Brönnimann, 1981; OD.

Rhumblerella Brönnimann, 1981 (*388), p. 45.
Toddella Brönnimann and Zaninetti, 1984 (*412), p. 100; type species: *Eggerella humboldti* Todd and Brönnimann, 1957 (*3204), p. 26; OD.

Test tiny, up to about 0.27 mm in length, robust in form, subconical, inflated subglobular chambers in trochospiral arrangement, final whorl reduced to three or four chambers, sutures distinct, depressed; wall agglutinated, noncanaliculate, coarse grained, surface roughly finished; aperture a single low interiomarginal arch, approximately or completely axial in position, against the chambers of the previous whorl. Holocene; S. Atlantic: Brazilian shelf; Trinidad: Gulf of Paria; at depths ranging from 6 m to 36 m.

Remarks: Both *Rhumblerella* and *Toddella* were described in the Eggerellidae and compared to *Eggerella* and *Eggerelloides*, although the latter genera have quite distinctive apertural features and a canaliculate wall. *Toddella* was described as differing from *Rhumblerella* in having a slightly asymmetrical aperture, but these do not appear sufficiently distinct for generic separation.

TETRATAXIELLA Seiglie, 1964

Plate 150, figs. 8-12

Type species: Tetrataxiella ayalai Seiglie, 1964; OD.

Tetrataxiella Seiglie, 1964 (*2844), p. 9.

Test free, elongate conical, quadriserial, chambers inflated and strongly overlapping, so that final whorl occupies one-half the test length, interior simple; wall agglutinated, surface smoothly finished except for frequent large grains of quartz or shell fragments; aperture a low interiomarginal arch, opening into the umbilicus. Holocene: Caribbean: NE Venezuela.

Remarks: Although *Trochammina quadriloba* Höglund, 1948 was included in *Tetrataxiella* by Seiglie, that species was later made the type species of the trochamminid genus *Trochamminopsis* Brönnimann, 1976. The high spired *Tetrataxiella* appears more closely related to *Globotextularia*, from which it differs in being quadriserial throughout.

VERNEUILINULLA Saidova, 1975

Plate 151, figs. 7-10

Type species: Verneuilinulla tessera Saidova, 1975; OD.

Verneuilinulla Saidova, 1975 (*2695), p. 102.
Verneuilinullinulla Saidova, 1981 (*2696), p. 24 (err. cit.).

Test elongate, subconical, early stage

trochospiral, with four to five chambers per whorl, later reduced to three per whorl; wall coarsely agglutinated, surface roughly finished; aperture an interiomarginal opening against the basal suture, umbilical in position. Holocene; N. Pacific, at 1,669 m.

Remarks: *Verneuilinulla* was originally placed in the Globotextulariinae, described as like *Eggerella* but with an interiomarginal aperture. Although the original figures of *V. tessera* are not clear, other species included in the generic diagnosis better indicate its nature.

Subfamily LIEBUSELLINAE Saidova, 1981

Liebusellinae Saidova, 1981 (*2696), p. 27.
Jarvisellinae Saidova, 1981 (*2696), p. 26.
Jarvisellinea Saidova, 1981 (*2696), p. 26 (supersubfamily).
Matanziinae Saidova, 1981 (*2696), p. 26.

Test trochospiral, may be reduced to three or fewer chambers per whorl in the adult, chamber interior subdivided by internal buttresses or partitions. U. Cretaceous (Campanian) to Holocene.

CUBANINA Palmer, 1936

Plate 152, figs. 1-5

Type species: Cubanina alavensis Palmer, 1936: OD.

Cubanina Palmer, 1936 (*2327), p. 123.

Test large, elongate, up to 4.5 mm in length, circular in section, early stage triserial, later uniserial, interior of chambers partially subdivided by narrow vertical partitions that project inward from the outer wall and extend from the chamber floor to the roof; wall agglutinated, aperture terminal, rounded, somewhat produced. L. Oligocene; Cuba.

JARVISELLA Brönnimann, 1953

Plate 152, figs. 6-10

Type species: Jarvisella karamatensis Brönnimann, 1953; OD.

Jarvisella Brönnimann, 1953 (*378), p. 88.

Test ovate in outline, somewhat flattened, early chambers trochospirally enrolled, triserial in the adult, interior partially subdivided by vertical infoldings of the outer wall at the lower edge of the chambers, forming apparently double-walled septula; wall finely agglutinated, thin and readily compressed and distorted; aperture an interiomarginal arch with bordering lip. Oligocene to Miocene; Trinidad, West Indies.

LIEBUSELLA Cushman, 1933

Plate 152, figs. 11-16

Type species: Lituola nautiloidea Lamarck var. *soldanii* Jones and Parker, 1860 (***1618**), p. 307; OD.

Liebusella Cushman, 1933 (*769), p. 36.

Test large, up to 5.5 mm in length, stout, with early trochospiral coil of four to five chambers per whorl, rapidly reducing to uniserial in the adult, chambers slightly inflated, somewhat overlapping previous chambers so that final chamber appears subconical, and previous chambers appear relatively short from the exterior, interior subdivided by vertical partitions projecting inward from the outer wall nearly but not quite to the center of the test, and extending from chamber floor to roof, sutures depressed; wall agglutinated, thick, commonly with calcareous particles in a considerable amount of light gray cement, and with occasional darker grains, surface smoothly finished; aperture terminal, slightly produced, commonly of one or more irregular, X- or V-shaped slits, and may have up to five separate small openings, or these may be connected in part to result in a triradiate or multiradiate opening. Eocene to Holocene; Europe; North America; West Indies; Pacific Ocean.

Remarks: Among species previously referred to *Liebusella*, some have different internal structures, some lack radial partitions and merely have canaliculate walls, and some have a simple rounded aperture. These should be transferred elsewhere.

MATANZIA Palmer, 1936

Plate 153, figs. 4-7

Type species: Matanzia bermudezi Palmer, 1936; OD.

Matanzia Palmer, 1936 (*2327), p. 125.

Test elongate, cylindrical, up to 1.8 mm in length, trochospirally enrolled in the early stage, with up to five chambers per whorl, then rapidly reduced to biserial, the biserial stage occupying about half the test length, interior of chambers subdivided by up to ten narrow vertical partitions that radiate inward from the outer wall; wall agglutinated; aperture a low arch at the base of the final chamber. L. Oligocene to Miocene; Cuba; ?New Zealand.

REMESELLA Vašíček, 1947

Plate 153, figs. 1-3

Type species: Remesella mariae Vašíček, 1947 = *Textulariella? varians* Glaessner, 1937 (*1246), p. 366; OD.

Remesella Vašíček, 1947 (*3256), p. 246.

Test subconical, up to 1.2 mm in length, early chambers trochospirally enrolled, later biserial, basal part of the chambers partially subdivided internally by incomplete vertical partitions, reflected by external grooves; wall agglutinated, with considerable cement, surface rough; aperture an interiomarginal arch. U. Cretaceous (Campanian) to Paleocene (Danian); Czechoslovakia; Switzerland; Austria; Romania; USSR: Crimea; New Zealand.

RUAKITURIA Kennett, 1967

Plate 153, figs. 10-13

Type species: Ruakituria pseudorobusta Kennett, 1967; OD.

Ruakituria Kennett, 1967 (*1672), p. 994.

Test elongate, stout, early trochospiral stage with four or more chambers per whorl, later reduced to biserial, chambers partly subdivided internally by vertical radial partitions that project inward from the outer wall; wall agglutinated, noncanaliculate; aperture a vertical slit or loop extending upward from the base of the final chamber. L. Miocene to Holocene; New Zealand; Andaman Sea, Car Nicobar; Pacific Ocean, off Fiji.

Family TEXTULARIELLIDAE Grönhagen and Luterbacher, 1966

Textulariellidae Grönhagen and Luterbacher, 1966 (*1313), p. 244.

Textulariellinae Saidova, 1981 (*2696), p. 27 (subfamily).

Textulariellinea Saidova, 1981 (*2696), p. 27 (supersubfamily).

Hagenowinoididae Saidova, 1981 (*2696), p. 25.

Hagenowinoidinea Saidova, 1981 (*2696), p. 25 (supersubfamily).

Hagenowinoidinae Saidova, 1981 (*2696), p. 25 (subfamily).

Alveovalvulinidae Seiglie, Fleisher, and Baker, 1986 (*2857), p. 169 (invalid, ICZN Art. 23 (a), included *Jarvisella*, upon which a prior family group name had been based).

Test trochospiral in early stage with three or more chambers per whorl, later becoming triserial, biserial, or uniserial: wall agglutinated, with alveolar inner structure. Miocene to Holocene.

ALVEOVALVULINA Brönnimann, 1951

Plate 153, figs. 8 and 9

Type species: Alveovalvulina suteri Brönnimann, 1951; OD.

Alveovalvulina Brönnimann, 1951 (*371), p. 100.

Test with early trochospiral stage of three or more chambers per whorl, later reduced to triserial, chambers strongly overlapping those of earlier whorls; wall agglutinated, with alveolar structure; aperture a low interiomarginal arch. Miocene; Trinidad, West Indies.

CUNEOLINELLA Cushman and Bermúdez, 1941

Plate 153, figs. 19-21

Type species: Cuneolinella lewisi Cushman and Bermúdez, 1941; OD.

Cuneolinella Cushman and Bermúdez, 1941 (*808), p. 101.

Test large, flattened, with four to five trochospirally coiled chambers in the first whorl, then biserial with broad low and compressed chambers of nearly constant height, the flat sides being parallel to the plane of biseriality as in *Cuneolina*, chambers increasing rapidly in breadth on the flat sides so that test becomes flabelliform, the chambers finally strongly recurved at the margins and almost cyclic; wall agglutinated, interior with subepidermal mesh, exterior smoothly finished; aperture interiomarginal, a row of low slits at the base of the final chamber face. M. Miocene; Dominican Republic.

Remarks: Although regarded as a synonym of *Textulariella* by Grönhagen and Luterbacher (1966, *1313, p. 244), *Cuneolinella* differs in having a multiple row of openings rather than a single aperture, as well as by the flattened test and strongly recurved chambers.

GUPPYELLA Brönnimann, 1951

Plate 153, figs. 14-18; plate 155, figs. 4-6

Type species: Goesella miocenica Cushman, 1936 (*781), p. 33; OD.

Guppyella Brönnimann, 1951 (*371), p. 98.

Alveovalvulinella Brönnimann, 1953 (*378), p. 90; type species: *Liebusella pozonensis* Cushman and Renz. 1941 (*846), p. 9; OD.

Test trochospiral in the early stage, with four to six chambers per whorl, later reduced to triserial, biserial, and finally uniserial, peripheral region of chambers subdivided into alveoles by plates arising perpendicular to the outer wall, the later chambers being almost completely filled with the alveolar partitions; wall agglutinated, surface smoothly finished; aperture a low interiomarginal slit in the early stage, later becoming terminal, subcircular to elongate, without a lip or neck. Upper L. Miocene to Holocene; Trinidad, West Indies; Costa Rica; Venezuela.

HAGENOWINOIDES Saidova, 1975

Plate 154, figs. 1-4

Type species: Hagenowinoides alveolarum Saidova, 1975; OD.

Hagenowinoides Saidova, 1975 (*2695), p. 106.

Test free, large, up to 1.1 mm in height, coiled in a high trochospiral, early whorls with more than three chambers, later with only three chambers per whorl, chambers inflated, enlarging rapidly as added, the final whorl occupying nearly half the test length; wall agglutinated, compact at the exterior, with thick alveolar inner layer; aperture a high interiomarginal arch. Holocene; Pacific.

Remarks: This genus is tentatively recognized on the basis of the reportedly alveolar wall, although no sections have been illustrated to show this character.

TEXTULARIELLA Cushman, 1927

Plate 154, figs. 5-11; plate 155, fig. 7

Type species: Textularia barrettii Jones and Parker, 1876 (*1621), p. 99 (syn. *Textularia barrettii* Jones and Parker, 1863, *1620, p. 80, name not available, no description); OD.

Textulariella Cushman, 1927 (*742), p. 24.

Neocuneolina Bermúdez and Rivero, 1963 (*211), p. 270; type species: *Cuneolina pavonia* d'Orbigny var. *angusta* Cushman, 1919 (*715), p. 34; OD.

Test of the megalospheric generation subconical, microspheric generation similar in early stage but later stage flattened, early trochospiral coil with three or more chambers per whorl, later reduced to biserial, interior with up to five orders of radial beams, some incomplete and attaching only to the chamber roof, whereas others extend from chamber floor to roof, primary beams nearly reach the center of the test, shorter ones being intercalated between them, beams joining and anastomosing inward to form tiny alveoles between the shorter beams near the outer wall, larger cavities remaining between adjacent beams near the center, beams interconnected by up to three series of horizontal rafters in the height of a chamber; wall coarsely agglutinated, surface smoothly finished; aperture a low interiomarginal arch. Miocene to Holocene; N. and S. Atlantic; Jamaica, West Indies; Gulf of Mexico; Caribbean.

Remarks: Grönhagen and Luterbacher (1966, *1313, p. 244) considered *Cuneolinella* Cushman and Bermúdez, 1941, to be a synonym of *Textulariella*, but it differs in the strongly overhanging chambers and multiple slitlike aperture. However, *Neocuneolina* is here placed in synonymy with *Textulariella*, the large flattened specimens being regarded as microspheric individuals of the species that has a megalospheric generation of more rounded section.

Family CUNEOLINIDAE Saidova, 1981

Cuneolinidae Brönnimann, Decrouez, and Zaninetti, 1983 (*398), p. 5, nom. transl. ex subfamily Cuneolininae.

Test conical to subflabelliform, trochospiral in early stage, with up to five chambers per whorl, rapidly reduced to biserial; chambers subdivided by many septulae extending from the outer wall toward the junction of the two series of chambers; wall agglutinated, with imperforate outer layer and reticulate subepidermal layer; aperture simple to multiple. M. Triassic (Anisian) to U. Cretaceous (Coniacian).

Subfamily CUNEOLININAE Saidova, 1981

Cuneolininae Saidova, 1981 (*2696), p. 26.

Chambers subdivided by radial partitions and may have horizontal partitions; wall agglutinated in both embryonic and biserial stage, imperforate; aperture simple to multiple, a row of pores at the base of the septal face. M. Triassic (Anisian) to U. Cretaceous (Coniacian).

CUNEOLINA d'Orbigny, 1839

Plate 155, figs. 1-3

Type species: Cuneolina pavonia d'Orbigny, 1846 (***2309**), p. 253; SD (SM).

Cuneolina d'Orbigny, 1839 (***2304**), p. 150.

Test free, compressed conical to flabelliform, early trochospire of about five chambers followed by very broad and low biserially arranged chambers, commonly compressed parallel to the plane of biseriality, interior subdivided into nearly rectangular chamberlets by radial partitions arising perpendicular to the outer wall and projecting inward toward the plane of biseriality, and by horizontal partitions paralleling the septa; wall agglutinated, imperforate, with reticulate subepidermal layer; aperture a row of pores at the base of the septal face. L. Cretaceous (Valanginian) to U. Cretaceous (Coniacian); China; USA; Europe.

PALAEOLITUONELLA Bérczi-Makk, 1981

Plate 155, figs. 8-10

Type species: Palaeolituonella majzoni Bérczi-Makk, 1981 = *Textularia meridionalis* Luperto, 1965 (***1945**), p. 177; OD.

Palaeolituonella Bérczi-Makk, 1981 (***189**), p. 390.

Test elongate, conical, with four to five chambers in the early trochospiral whorl, followed by uniserial stage of broad low chambers, radial internal partitions rudimentary; wall thick, agglutinated, simple in structure; aperture not observed. M. Triassic (Anisian) to U. Triassic (Carnian); Hungary; Italy; Yugoslavia; Austria; Bulgaria.

PSEUDOTEXTULARIELLA

Barnard, 1953

Plate 156, figs. 7-11

Type species: Textulariella cretosa Cushman, 1932 (***765**), p. 97; OD.

Pseudotextulariella Barnard, in Barnard and Banner, 1953 (***141**), p. 177, 198.

Test free, conical, early trochospiral stage with four to five chambers, later triserial, and adult wholly biserial, interior subdivided by radial and horizontal partitions, resulting in up to six tiers of chamberlets per chamber; wall finely agglutinated, surface smoothly finished; aperture interiomarginal, a low opening at the base of the flattened apertural face. U. Cretaceous (Cenomanian); Europe.

VERCORSELLA Arnaud-Vanneau, 1980

Plate 156, figs. 1-6

Type species: Vercorsella arenata Arnaud-Vanneau, 1980; OD.

Vercorsella Arnaud-Vanneau, 1980 (***71**), p. 518.

Test elongate and flaring, short early trochospiral stage followed by a more prominent biserial stage, laterally compressed parallel to the plane of biseriality, chamber interior subdivided by radial vertical partitions that increase in number in successive chambers, less well-developed horizontal partitions present in later chambers; wall agglutinated, with quartz and carbonate grains held in a microgranular calcareous cement, surface commonly rough; aperture a simple interiomarginal slit that extends nearly the entire breadth of the final chamber. L. Cretaceous (U. Hauterivian to Bedoulian); France; Italy; Yugoslavia.

Subfamily SABAUDIINAE Brönnimann, Decrouez, and Zaninetti, 1983

Sabaudiinae Brönnimann, Decrouez, and Zaninetti, 1983 (***398**), p. 5.

Chambers subdivided by vertical partitions and may have horizontal ones; embryonal stage with double wall, a microgranular inner layer and a perforate hyaline radial outer layer, biserial stage with imperforate agglutinated wall; aperture a simple interiomarginal slit. L. Cretaceous (U. Hauterivian to Aptian).

SABAUDIA Charollais and Brönnimann, 1965

Plate 157, figs. 1-6

Type species: Textulariella minuta Hofker Jr., 1965 (*1532), p. 186; OD.

Sabaudia Charollais and Brönnimann, 1965 (*545), p. 616.

Test a high cone with flattened base, small initial trochospiral stage of three to four subglobular chambers, followed by later biserial stage, biserial chambers partially subdivided by numerous vertical subepidermal partitions that arise perpendicular to the septa, secondary horizontal partitions also present in later chambers of large individuals, the ensemble of inner partitions resulting in a subepidermal network of chamberlets that open at the test interior; wall of embryonal trochospire double, with inner microgranular layer and outer hyaline radial and possibly perforate layer, wall of biserial stage agglutinated, imperforate; aperture an interiomarginal slit. L. Cretaceous (U. Hauterivian to Aptian); Germany; Switzerland; Spain.

Family DICYCLINIDAE Loeblich and Tappan, 1964

Dicyclinidae Loeblich and Tappan, 1964 (*1910), p. C301.
Dicyclininae Loeblich and Tappan, 1964 (*1910), p. C302 (subfamily).

Test free, discoidal, chambers cyclical, biserially added, partly subdivided by transverse or radial partitions or both to form numerous small chamberlets; wall of finely agglutinated calcareous particles, with imperforate epidermal layer; aperture multiple, peripheral. L. Cretaceous (Albian) to U. Cretaceous (Santonian).

DICYCLINA Munier-Chalmas, 1887

Plate 157, figs. 7-10

Type species: Dicyclina schlumbergeri Munier-Chalmas, 1887; OD.

Dicyclina Munier-Chalmas, 1887 (*2208), p. xxx.

Test free, discoidal, flattened to slightly undulating, initial stage slightly inflated, that of the megalospheric generation consisting solely of the proloculus, later chambers annular, alternately added on the two sides of the test, interior subdivided by numerous thin radial partitions, perpendicular to the outer wall and aligned from chamber to chamber; wall agglutinated, of calcareous fragments, with an imperforate epidermis and reticulate subepidermal layer; aperture consisting of round pores at the periphery. L. Cretaceous (Albian) to U. Cretaceous (Santonian); France; Spain; Yugoslavia.

Family DICTYOPSELLIDAE Brönnimann, Zaninetti, and Whittaker, 1983

Dictyopsellidae Loeblich and Tappan, 1984 (*1918), p. 17, nom. transl. ex subfamily.
Dictyopsellinae Brönnimann et al., 1983 (*417), p. 206 (subfamily).

Test a low trochospire, chambers semilunate as seen from spiral side, subtriangular with umbilical prolongation and nearly radial sutures on the umbilical side, chamber interior with prominent subepidermal network; wall finely agglutinated; primary aperture interiomarginal, with small secondary openings on the opposite side of the final chamber opening beneath the umbilical flap. L. Cretaceous (Barremian) to U. Cretaceous (Maastrichtian).

ANDAMOOKIA Ludbrook, 1966

Plate 158, figs. 1-4

Type species: Andamookia davenportensis Ludbrook, 1966; OD.

Andamookia Ludbrook, 1966 (*1941), p. 102.

Test large, up to 1.25 mm in diameter, attached by the umbilical side, chambers in a low trochospiral coil, all chambers visible from the convex spiral side, only the final whorl visible on the flattened to concave umbilical side, chambers numerous, three to five per whorl, subglobular in the early stage, then becoming very low and crescentic as seen from the spiral side, appearing broad and wedgelike on the umbilical side, interior divided by numerous radial partitions or beams, with a few transverse rafters between the beams; wall agglutinated, with grains of fine quartz; aperture interiomarginal, near the umbilicus on the umbilical side. L. Cretaceous (L. Aptian); South Australia.

Remarks: *Andamookia* was originally placed in the Trochamminidae and related to

Remaneica. However, *Remaneica* is a very small thin-walled form, whereas the present genus resembles *Dictyopsella* in the large size, the irregular form of the occasionally attached individuals, and the radial beams and interconnecting rafters forming a subepidermal mesh that is evident when the surface of the specimen is dampened.

CONORBINELLA Poroshina, 1976

Plate 159, figs. 5-7

Type species: Conorbinella azerbaidjanica Poroshina, 1976; OD.

Conorbinella Poroshina, 1976 (*2458), p. 110.

Test free, a low trochospiral cone or patelliform, all whorls visible on the convex spiral side, only the last whorl visible on the flat to concave umbilical side, crescentic chambers progressively broader and lower as added on the spiral side, appearing subtriangular around the small umbilicus and with nearly radial, depressed septa on the umbilical side; interior of chambers subdivided by numerous radial beams of varied length, the longest extending nearly to the umbilical region; wall variously regarded as calcareous perforate or as calcareous microgranular but probably agglutinated of calcareous particles, as are other Dictyopsellidae, surface fairly smooth; aperture a low slit on the umbilical side, midway between the umbilicus and periphery, and probably has a small sutural supplementary aperture at the opposite side of the final chamber as in *Dictyopsella*. L. Cretaceous (L. Barremian to L. Aptian = Bedoulian); Azerbaydzhan SSR; France.

Remarks. Although originally described in the subfamily Discorbinae, family Discorbidae, *Conorbinella* later was transferred to the Dictyopsellidae (Loeblich and Tappan, 1985, ***1926**, p. 177), although differing from *Dictyopsella* in lacking connections between adjacent septula. It is ancestral to *Dictyopselloides* that has only a few incipient rafters and, in turn, to *Dictyopsella* in which the meshwork occupies the entire surface area of the chambers.

DICTYOPSELLA Munier-Chalmas, 1900

Plate 158, figs. 5-7; plate 159, figs. 1-4

Type species: Dictyopsella kiliani Munier Chalmas, in Schlumberger, 1900; SD Cushman, 1928 (*747), p. 111.

Dictyopsella Munier Chalmas, in Schlumberger, 1900 (*2771), p. 462.

Low conical trochospiral test, with large globular proloculus followed by about two whorls of broad low, semilunate chambers as seen from the spiral side, on the umbilical side chambers appear subtriangular with an umbilical prolongation that may spread slightly, and sutures are slightly curved and incised, interior of chambers with numerous long radial beams that arise perpendicular to the apertural face and septa and extend nearly to the center of the test, proloculus and all later chambers with shallow secondary beams that project inward from the spiral and umbilical surfaces of the test and are interconnected by rafters to produce a characteristic subepidermal network; wall finely agglutinated, surface smoothly finished; primary aperture a low interiomarginal arch, located midway between umbilicus and periphery, with smaller secondary openings present on the opposite side of the umbilical chamber flap. U. Cretaceous (Cenomanian to Maastrichtian); France; Spain.

Remarks: *Dictyopsella* has been variously placed systematically, as the internal structure was not well understood. Because of the complex internal structure, it was compared to *Coxites* by Smout (1956, ***3010**, p. 342), then placed in the Barkerinidae, later in the Coxitinae, placed in the Ataxophragmiidae (Loeblich and Tappan, 1964, ***1910**, p. C285), compared to *Kurnubia* by Hottinger (1967, ***1546**, p. 94), and as the type of a subfamily Dictyopsellinae placed in the family Remaneicidae by Brönnimann et al., (1983, ***417**, p. 206). The internal structure and relationships were clarified by Loeblich and Tappan (1985, ***1926**, p. 177).

DICTYOPSELLOIDES Loeblich and Tappan, 1985

Plate 160, figs. 1-7

Type species: Dictyopsella cuvillieri Gendrot, 1968 (***1218**), p. 682; OD.

Dictyopselloides Loeblich and Tappan, 1985 (*1926), p. 183.

Test flattened lenticular, trochospirally enrolled with evolute spiral side and involute umbilical side, chambers crescentic and very broad and low, as seen from the spiral side, but subtriangular with slightly curved and nearly radial sutures on the umbilical side; interior with numerous fine radial beams, with shorter ones intercalated between longer ones that nearly reach the umbilicus but with very few or no cross partitions or rafters, so that the subepidermal skeleton does not form a distinct meshwork over the entire test; wall of finely agglutinated calcareous grains; aperture a low arch at the midpoint of the base of the apertural face on the umbilical side. U. Cretaceous (U. Santonian); France; Spain.

Remarks: With chambers subdivided by prominent exoskeletal radial beams but with few if any interconnecting rafters, *Dictyopselloides* is intermediate between *Conorbinella,* with exoskeleton consisting solely of radial beams, and *Dictyopsella* with its complex system of radial beams and cross rafters that produces a subepidermal mesh on both faces of the test, even including the proloculus.

Family PFENDERINIDAE Smout and Sugden, 1962

Pfenderinidae Smout and Sugden, 1962 (***3013**), p. 582.

Test trochospiral, later stage may have reduced number of chambers per whorl, chamber interior of advanced taxa may be subdivided by vertical or horizontal exoskeletal partitions or both, resulting in a reticulate subepidermal layer; wall of imperforate microgranular calcite with some agglutinated material. L. Jurassic (Lias) to U. Cretaceous (Maastrichtian).

Subfamily PFENDERININAE Smout and Sugden, 1962

Pfenderininae Loeblich and Tappan, 1964 (***1910**), p. C291, nom. transl. ex family Pfenderinidae.

Pseudopfenderininae Septfontaine, 1986 (***2875A**), p. 54 (name not available, ICZN Art. 13 (a) (i), no description).

Test trochospiral about a central column that is produced by successive perforated endoskeletal plates separated by secondarily infilled alveolar shell material; aperture consisting of pores on the central apertural plate. L. Jurassic to U. Cretaceous (Santonian).

ACCORDIELLA Farinacci, 1962

Plate 161, figs. 1-3

Type species: Accordiella conica Farinacci, 1962; OD.

Accordiella Farinacci, 1962 (***1115**), p. 7, 9.

Test large, conical, trochospiral, about three chambers per whorl spiralling about a broad axial region, chamber interior simple, axial region consisting of numerous endoskeletal horizontal plates interconnected by vertical pillars or buttresses; wall of imperforate microgranular calcite with infrequent agglutinated material, innermost part darker, perhaps with organic material, and exterior covered with a thin hyaline crystalline layer; cribrate aperture of numerous openings between the pillars in the central plate, inner foramina at the roof of the peripheral chambers allow communication with the inner labyrinthic axial region. U. Cretaceous (Coniacian to Santonian); Italy; Spain; France.

DOBROGELINA Neagu, 1979

Plate 162, figs. 1-8

Type species: Dobrogelina discorbiformis Neagu, 1979; OD.

Dobrogelina Neagu, 1979 (***2238**), p. 493.

Test trochospirally enrolled, in a nearly flat to moderately conical spire, numerous chambers per whorl, six to twelve in the final whorl, umbilical side with broad umbilicus covered by a succession of broad perforated plates, septa simple, chamber interior undivided; wall thin, consisting of nonlamellar, microgranular calcite, primary aperture a curved interiomarginal slit that may be covered by the umbilical plates, secondary apertures consisting of the pores in the umbilical plate. L. Cretaceous (U. Berriasian to U. Barremian; ?Bedoulian); Romania; France.

DREVENNIA Arnaud-Vanneau, 1980

Plate 161, figs. 4-6

Type species: Drevennia ecougensis Arnaud-Vanneau, 1980; OD.

Drevennia Arnaud-Vanneau, 1980 (***71**), p. 569.

Test free, elongate, over 1.2 mm in length, early stage conical and trochospiral, later uncoiled and subcylindrical, chambers low and discoidal, uniserial and rectilinear, septa thick and horizontal, in the rectilinear part leaving a central region of about one-third the test diameter that is filled with short thick pillars, fusing to form a central columellar mass; wall microgranular, calcareous, with some agglutinated particles; aperture cribrate, consisting of pores in the oval to subcircular apertural face, earlier ones, seen in section, may pierce the central columella as well as the septa. L. Cretaceous (U. Barremian to Bedoulian); France.

Remarks: *Drevennia* resembles *Satorina* in the trochospiral stage followed by an uncoiled rectilinear one, but the axial region is less well developed.

PFENDERELLA Redmond, 1964

Plate 162, figs. 9-11

Type species: Pfenderella arabica Redmond, 1964; OD.

Pfenderella Redmond, 1964 (*2537), p. 257.

Test a high trochospiral, with somewhat inflated chambers, their inner surfaces thickened by a secondary deposit of shell material but lacking the solid central columella present in *Pfenderina:* wall of imperforate microgranular calcite; aperture a low arch at the base of the apertural face of the final chamber, covered by a finely perforate hemispherical apertural plate, space between the apertural face and apertural plate filled by a porous endoskeletal deposit, secondary intercameral foramina connected by a shallow groove or subcameral tunnel that spirals around the axis of coiling. M. Jurassic (Bathonian or Callovian); Saudia Arabia.

PFENDERINA Henson, 1948

Plate 162, figs. 12-19

Type species: Eorupertia neocomiensis Pfender, 1938 (*2397), p. 236; OD.

Pfenderina Henson, 1948 (*1459), p. 609.

Test a high trochospiral, chambers numerous, surrounding an axial region of thickened shell material, septa perpendicular to the spiral axis, and oblique to the test axis; wall microgranular in structure, imperforate; aperture consisting of numerous pores in the center of the apertural face, with secondary intercameral foramina about equidistant from the ends of the chambers, appearing along the central solid column as a spiral groove or subcameral tunnel. U. Jurassic to U. Cretaceous (Cenomanian); Europe; SW Asia.

PSEUDOPFENDERINA Hottinger, 1967

Plate 163, figs. 1-7

Type species: Pfenderina butterlini Brun, 1962 (*442), p. 188; OD.

Pseudopfenderina Hottinger, 1967 (*1546), p. 87, 89.

Test a high trochospiral, chambers numerous, strongly inclined with respect to the axis of coiling, the microspheric generation becoming very high and almost rectilinear, megalospheric generation shorter and more conical in form, apertural face consists of a septal expansion covering the umbilical region, umbilical part of the chamber interior filled with numerous pillars that are continuous from chamber to chamber and form a columellar endoskeleton in the axis of coiling, axis of the juvenile whorls filled with secondary deposits, resulting in a massive central area but lacking a subcameral tunnel; wall calcareous, microgranular in structure; aperture consisting of many pores in the apertural face. L. Jurassic (M. Lias); Morocco.

SANDERELLA Redmond, 1964

Plate 163, figs. 8-11

Type species: Sanderella laynei Redmond, 1964; OD.

Sanderella Redmond, 1964 (*2537), p. 258.

Test a low trochospiral in the early stage, later uncoiling and becoming flattened, broad and irregular, chambers low and broad, of constant height but rapidly increasing in breadth, chamber infilling occurs at all stages, forming a solid central core in the coiled initial portion as in *Pfenderina*, but uncoiled stage with open chamber lumen concentrated on one side and with the infilling on the opposite side, producing a solid, nearly flat ventral plate; wall of imperforate microgranular calcite; apertural pores at the outer margin of the uncoiled portion and outer margin of the ventral surface, early coiled portion with a single subcameral tunnel that branches and is multiple in the uncoiled stage, additional tunnels intercalated as the uncoiled part widens. M. Jurassic (Bathonian or Callovian); Saudia Arabia.

SATORINA Fourcade and Chorowicz, 1980

Plate 164, figs. 1-7

Type species: Satorina apuliensis Fourcade and Chorowicz, 1980; OD.

Satorina Fourcade and Chorowicz, 1980 (*1161), p. 271.

Test free, megalospheric embryonal apparatus of protoconch and deuteroconch, followed by a trochospiral stage of numerous chambers per whorl, and finally uncoiled and rectilinear, with rectilinear growth in a direction perpendicular to the trochospiral axis; early stage unknown for the large flattened and fanlike microspheric test; septa extending only a short distance into the rectilinear part of the test to form the undivided marginal zone, central part of the test covered by successive apertural plates, interior of chambers beneath the apertural plates with endoskeletal radial pillars that anastomose toward the center of the test and are progressively thickened to form a compact columella that may be traversed by fine canals; a row of circular foramina lies at the contact of the previous apertural plate and the succeeding septum, but these do not open to the exterior; wall of imperforate microgranular calcite; aperture multiple, numerous pores covering the surface of the apertural plate over the central zone of the test. M. Jurassic; Italy; Yugoslavia; Turkey.

STEINEKELLA Redmond, 1964

Plate 161, figs. 7-10

Type species: Steinekella steinekei Redmond, 1964; OD.

Steinekella Redmond, 1964 (*2537), p. 259.

Test a high trochospiral, with numerous broad low chambers of nearly constant height between adjacent septa but with increasing number of chambers per whorl so that whorls enlarge rapidly and the apertural face of the final chamber occupies nearly half the test height, peripheral area of the chambers subdivided by vertical transverse partitions extending from chamber floor to roof but not aligned from chamber to chamber, openings near the inner ends of the partitions connect adjacent chamberlets within a single chamber; wall of imperforate microgranular calcite, with subepidermal reticulate network; aperture consists of a row of circular pores on the apertural face paralleling the peripheral margin, the pores concealed beneath a large apertural plate that covers most of the chamber face, space between the apertural face and the apertural plate occupied by a honeycomblike structure that is secondarily filled with shell material during growth, the filling and the secondary deposits on the chamber interior surfaces together forming a prominent solid central core pierced by multiple subcameral tunnels that run between the apertural pores of successive chambers. U. Jurassic (Oxfordian); Saudia Arabia.

Subfamily KURNUBIINAE Redmond, 1964

Kurnubiinae Redmond, 1964 (*2537), p. 252.

Test trochospiral about a central column in early stage; imperforate epidermis covers subepidermal network formed by vertical and possibly horizontal exoskeletal partitions, endoskeletal layers as in the Pfenderininae but lacking secondary infilling. L. Jurassic to U. Cretaceous (Maastrichtian).

GYROCONULINA Schroeder and Darmoian, 1977

Plate 164, figs. 8-11

Type species: Gyroconulina columellifera Schroeder and Darmoian, 1977; OD.

Gyroconulina Schroeder and Darmoian, 1977 (*2805), p. 118.

Test with conical early stage, later nearly cylindrical, globular proloculus followed by about two or three broad, low, and trochospirally arranged chambers per whorl but does not become completely uniserial; marginal zone of all chambers after the proloculus and second chamber subdivided by vertical exoskeletal beams and horizontal rafters, both perpendicular to the outer surface of the test and deflected at their junctions to form a honeycomblike subepidermal network, central zone with irregularly distributed vertical pillars that thicken at the chamber floor and roof; numerous small apertural pores on the surface of the central zone of the apertural face, those of previous chambers opening into the central zone of the chambers of the previous whorl. U. Cretaceous (U. Maastrichtian); Iraq.

KURNUBIA Henson, 1948

Plate 165, figs. 1-6

Type species: Kurnubia palastiniensis Henson, 1948 (syn.: *Valvulinella jurassica* Henson, 1948, ***1459**, p. 607); OD.

Kurnubia Henson, 1948 (***1459**), p. 608.

Test elongate, early chambers trochospiral about a central column with chambers somewhat inclined to the axis of coiling, later uncoiled, uniserial, and rectilinear, outer part of chambers has a characteristic subepidermal network, central part with endoskeletal pillars that are continuous from chamber to chamber, spaces between pillars later filled secondarily to produce a central column; apertural face consists of a plate over the umbilical region with many small apertures interspersed between pillars, where apertures are secondarily filled to produce a column, the septum adjacent to the column is resorbed to form a secondary foramen. L. Jurassic (Lias) to U. Jurassic (Kimmeridgian); SW Asia; Morocco; Yugoslavia; Crete.

PRAEKURNUBIA Redmond, 1964

Plate 165, figs. 7 and 8

Type species: Praekurnubia crusei Redmond, 1964; OD.

Praekurnubia Redmond, 1964 (***2537**), p. 254.

Test elongate, many broad low chambers in a high trochospiral coil, sutures strongly oblique to the axis of coiling, chamber interior subdivided by exoskeletal partitions that may extend partly or entirely from chamber floor to roof but without the horizontal secondary partitions present in *Kurnubia;* wall calcareous, imperforate, microgranular; aperture a low interiomarginal arch covered by a finely porous apertural plate, the space between the apertural face and the apertural plate being filled by a honeycomblike structure, apertural plate apparently secondarily resorbed as new chambers are added, leaving the low arched openings connecting successive chambers in the test interior. M. Jurassic (Bathonian or Callovian); Saudia Arabia; Crete.

Family COSKINOLINIDAE Moullade, 1965

Coskinolinidae Moullade, 1965 (***2196**), p. 4033.
Coskinolininae Cimerman, 1969 (***603**), p. 115 (subfamily).
Coskinolilninea Saidova, 1981 (***2696**), p. 26 (supersubfamily; nom. imperf.).

Test conical, early stage trochospiral, then becomes uniserial and rectilinear with broad, low chambers, interior subdivided by pillars or irregular partitions; wall agglutinated, of granular calcite, single layered; aperture basal, cribrate. U. Cretaceous (Cenomanian) to M. Eocene (Lutetian).

COLEICONUS Hottinger and Drobne, 1980

Plate 165, figs. 9 and 10

Type species: Coskinolina elongata Cole, 1942 (***623**), p. 20; OD.

Coskinolina (Coleiconus) Hottinger and Drobne, 1980 (***1555**), p. 233, 253.

Test large, high and conical in form, early trochospiral stage as in *Pfenderina* with simple interior, lacking exoskeletal or endoskeletal structures, later chambers with simple exoskeleton of widely spaced simple, thick, vertical beams, those of successive chambers alternating in position, later chambers have a few thick, widely spaced endoskleletal pillars in the center of the test; wall with keriothecal structure of closely spaced radial pores as in *Coskinolina;* aperture of numerous pores on the terminal face, those in the marginal zone alternating in position with the vertical beams. L. to M. Eocene; Jamaica, West Indies; USA: Florida.

COSKINOLINA Stache, 1875

Plate 165, figs. 11-15; plate 166, figs. 12-15

Type species: Coskinolina liburnica Stache, 1875; OD(M).

Coskinolina Stache, 1875 (***3055**), p. 337.
Lituonella Schlumberger, in Schlumberger and Douvillé, 1905 (***2779**), p. 297, 303; type species: *Lituonella roberti* Schlumberger, 1905; OD.

Test a high cone, with early trochospiral stage as in *Pfenderina*, later uniserial, numerous low chambers rapidly enlarging in diameter, no exoskeleton in the marginal chamber cavity, endoskeleton consists of vertical interseptal pillars; wall of imperforate granular calcite with keriothecal structure; aperture consists of pores scattered over the surface of the gently convex apertural face. Paleocene to M. Eocene; Yugoslavia; France.

Remarks. A neotype designated by Bignot (1973, *234) for *C. liburnica* and obtained from the type locality would have made this genus identical with *Fallotella* Mangin, 1954. However. Schroeder (1974, *2799) observed that a neotype could not be designated as Stache's type material was preserved in the Vienna Museum. Schroeder selected a lectotype from this type material that takes precedence over the proposed neotype. The lectotype, figured by Bignot (1973, *234, pl. 1, fig. 12), makes *Coskinolina* a senior synonym of *Lituonella* and distinct from *Fallotella*.

COSKINON Hottinger and Drobne, 1980

Plate 166, figs. 2-6

Type species: Coskinolina (Coskinon) rajkae Hottinger and Drobne, 1980; OD.

Coskinolina (Coskinon) Hottinger and Drobne, 1980 (*1555), p. 231, 253.

Coskinolina (Coskinon) Hottinger and Drobne, in Drobne, 1979 (*1007), p. 50 (name not available, ICZN art. 13 (a)(i), no description).

Coskinolina (Coskinon) Hottinger and Drobne, in Drobne and Pavlovec, 1979 (*1008), p. 218, 221 (name not available, ICZN art. 13 (a)(i), no description).

Test conical, with low trochospiral coiling, proloculus apical, followed by reduced early coiled stage, later uniserial, lacks any exoskeleton in the marginal chamber cavity as in *Coskinolina*, endoskeletal pillars present only in the uniserial stage; aperture consists of pores scattered over the terminal face. M. Paleocene to M. Eocene; Yugoslavia; Czechoslovakia; USA: Florida.

LITUONELLOIDES Henson, 1948

Plate 166, fig. 1

Type species: Lituonelloides compressus Henson, 1948; OD.

Lituonelloides Henson, 1948 (*1460), p. 26.

Test elongate, about 1.8 mm in length, early conical stage with trochospirally enrolled chambers, later laterally compressed, and chambers uniserial, rectilinear, and discoidal, outer part of chambers forms an undivided marginal zone, apparently bordered by a ridge, central region with lamelliform interseptal buttresses that may coalesce as irregular partitions or pillars; wall calcareous, imperforate, microgranular, with some foreign particles; aperture multiple, consisting of perforations in the central shield. U. Cretaceous (Maastrichtian); Arabia: Qatar Peninsula.

Remarks: The type species has not been well illustrated or described and remains poorly known.

PSEUDOLITUONELLA Marie, 1955

Plate 166, figs. 7-11

Type species: Pseudolituonella reicheli Marie, 1955; OD.

Pseudolituonella Marie, 1955 (*2036), p. 117.

Test elongate conical, early portion with a short trochospiral stage in the type species but more elongate in geologically younger species, later stage with broad and low uniserial chambers, chamber interior with tubular pillars projecting upward from the margins of the circular apertures but not completely crossing the chambers; wall calcareous, microgranular, imperforate, single layered; aperture cribrate, of numerous large circular pores in the center of the apertural face, surrounded by a broad imperforate marginal zone. U. Cretaceous (Cenomanian to Campanian): France; Spain; Israel; Turkey. Eocene (Lutetian): Libya.

Superfamily ORBITOLINACEA Martin, 1890

Orbitolinacea Loeblich and Tappan, 1982 (*1917), p. 28, nom. transl. ex family Orbitolinidae.

Test conical, chambers numerous, partially subdivided by radial or transverse partitions or with interseptal pillars; wall agglutinated. M. Jurassic to Oligocene.

Family ORBITOLINIDAE Martin, 1980

Orbitolinidae Martin, 1890 (*2049), p. 226.

Arorbitolidia Rhumbler, 1913 (*2621), p. 342 (err. emend.).

Orbitolinida Copeland, 1956 (*680), p. 186 (err. emend.).

Dictyoconidae Robinson, 1975 (*2636), p. 39 (nom. transl.).

Test conical; early stage trochospiral to pseudoplanispiral, then rectilinear with broad, low chambers subdivided by marginal subepidermal partitions, central zone containing pillars or vertical partitions; simple megalospheric embryonal apparatus of protoconch and deuteroconch or may be more complex, with one or two additional zones; may have trilaminar wall, with endoskeleton of transparent calcite partly covered by secondary granular calcite with organic material and may incorporate agglutinated particles; aperture consists of numerous pores in the central zone of the septa. M. Jurassic to Oligocene.

Subfamily DICTYOCONINAE Moullade, 1965

Dictyoconinae Moullade, 1965 (*2196), p. 4032.

Embryonal apparatus reduced to protoconch and deuteroconch. M. Jurassic to Oligocene.

ABRARDIA Neumann and Damotte, 1960

Plate 167, figs. 1–4

Type species: Dictyoconus mosae Hofker, 1955 (*1508), p. 115; OD.

Abrardia Neumann and Damotte, 1960 (*2250), p. 60.

Test a high cone, up to 1 mm in height, base flat and circular, reduced early trochospiral stage followed by rectilinear discoidal chambers having a peripheral zone subdivided by vertical, radial exoskeletal beams that may be thickened and inflated at their inner termination as well as thickened against the base of the test and tapering upward toward the chamber roof, similar but shorter second and third order beams intercalated between the primary beams, and a single short horizontal rafter parallels the chamber floor and roof, subdividing the peripheral portion of the chambers, the intersecting beams and rafters resulting in a subepidermal network of closely spaced rectangular chamberlets, occasional primary beams are elongated and may be thickened and undulating, extending across the central region of the test; wall of microgranular calcite, with fine agglutinated particles; apertures scattered over the base of the test. U. Cretaceous (Campanian to Maastrichtian); France; Spain; Netherlands.

CALVEZICONUS Caus and Cornella, 1982

Plate 167, figs. 8–12

Type species: Calveziconus lecalvezae Caus and Cornella, 1982; OD.

Calveziconus Caus and Cornella, 1982 (*515), p. 34.

Test conical, up to about 1.6 mm in height, megalospheric generation forming a narrow cone, up to 1.2 mm in maximum diameter, microspheric generation larger and more spreading, with maximum diameter up to 3.8 mm; simple megalospheric proloculus at the test apex followed by a few semilunate chambers, and then by many uniserial discoidal chambers of rapidly enlarging diameter; microspheric generation apparently uniserial immediately following the proloculus, final chambers of the spreading test annular; exoskeleton consists of the thick peripheral wall and numerous elongate radial beams subdividing the chamber interior, one or two shorter beams intercalated between adjacent major ones in the marginal zone, a single horizontal rafter near the periphery of each chamber, midway between chamber floor and roof, subdivides the marginal zone; wall agglutinated, endoskeletal chamberlets formed by the undulating ends of the radial beams that join in the chamber interior to produce a reticulate structure, chamberlets alternating in position from chamber to chamber; aperture of numerous round openings at the center of the apertural face, leading obliquely inward and alternating in position from chamber to chamber but absent from the marginal zone. U. Cretaceous (Campanian); Spain.

CAMPANELLULA De Castro, 1964

Plate 167, figs. 5–7

Type species: Campanellula capuensis De Castro, 1964; OD.

Campanellula De Castro, 1964 (*909), p. 55, 59.

Test conical to bell shaped, with flat to slightly concave base, early trochoid stage relatively large, adult with uniserial chambers separated by strongly undulating septa, the undulations of successive layers alternating in position to result in apparent triangular chamberlets as viewed in transverse section, intersection of the undulating septum giving the appearance in section of radial septula; wall of imperforate microgranular calcite; apertural pores at the margins of the undulations, the earlier foramina allowing oblique communication between adjacent chambers of the preceding and succeeding layers. L. Cretaceous (Valanginian to Barremian); Italy; Algeria.

Remarks: Although regarded as a primitive representative of *Orbitolinopsis* by Macoin et al. (1970, *1977, p. 255), *Campanellula* has a more prominent early coil, smaller and narrower test, lacks thick radial vertical beams but has chamberlets produced by the undulating septa, and lacks a pillared central zone.

CARINOCONUS Cherchi and Schroeder, 1982

Plate 829, figs. 7-10

Type species: Paracoskinolina casterasi Bilotte, Canerot, Moullade, and Peybernès, 1973 (*240), p. 183; OD.

Dictyoconus (Carinoconus) Cherchi and Schroeder, 1982 (*569), p. 226 (also used in generic sense, p. 227).

Megalospheric tests conical to cylindrical, up to 1.5 mm in height and up to 1.1 mm in diameter, early stage with globular protoconch and hemispherical deuteroconch, and by a large excentric trochospire of some thirty chambers, with axis of coiling up to 90° from that of the later cylindrical part of twenty to twenty-five discoidal rectilinear chambers, trochospiral part compressed and elliptical in vertical section, with sharply angular carina, until the beginning of the rectilinear part, the later half of the trochospiral chambers subdivided by two orders of vertical beams in the relatively wide marginal zone, the beams of successive chambers commonly aligned but lacks any horizontal rafters, pillars present in the central zone, those of successive chambers alternating in position, central zone filled by secondary deposits, base of the test flat to slightly inflated; microspheric test lower conical, up to 2.1 mm in height and 3.0 mm in breadth of the base, early microspheric stage unknown, probably trochospiral; wall finely agglutinated in the microgranular calcareous base; apertural openings subvertical at the base of pillars in the central zone, the openings at the margin of the radial zone being most evident in section. U. Albian to L. Cenomanian; Spain, France.

COSKINOLINOIDES Keijzer, 1942

Plate 168, figs. 10-14

Type species: Coskinolinoides texanus Keijzer, 1942 (syn.: *Coskinolina adkinsi* Barker, 1944, *137, p. 206); OD.

Coskinolinoides Keijzer, 1942 (*1667), p. 1016.

Test tiny, elongate conical but commonly with slightly curved axis, short trochospiral stage followed by low uniserial chambers that increase rapidly in diameter as added, chambers subdivided marginally by radial exoskeletal beams projecting inward from the outer wall, with additional beams inserted in later chambers, beams aligned from chamber to chamber, central shield flat to slightly concave, without interseptal pillars; aperture interiomarginal in the early trochospiral stage but consists of a few round openings on the central shield of the uniserial chambers. L. Cretaceous (Albian); USA: Texas.

CRIBELLOPSIS Arnaud-Vanneau, 1980

Plate 168, figs. 1-9

Type species: Orbitolinopsis? neoelongata Cherchi and Schroeder, 1978 (*565), p. 162; OD.

Cribellopsis Arnaud-Vanneau, 1980 (*71), p. 593, 667.

Test conical to subcylindrical, with simple embryonal apparatus followed by evolute subapical trochospire, later uncoiled with uniserial discoidal chambers, with marginal zone subdivided into rectangular chamberlets by alternating longer and shorter radial beams, the longer beams continuing into the central zone and secondary ones limited to the marginal zone, beams of successive chambers in vertical alignment; apertural face flat to convex, with smooth marginal zone and central zone that may have approximately radially arranged grooves, apertural pores with small collars, forming a circlet at the junction of the marginal and central zones, as well as scattered over the surface in the central zone, either obliquely piercing the radial plates or passing vertically through the septa between the radial plates. L. Cretaceous (U. Hauterivian to L. Bedoulian); France; Switzerland; Italy: Sardinia.

CUSHMANIA Silvestri, 1925

Plate 169, figs. 1-8; plate 170, figs. 1-6

Type species: Conulites americana Cushman, 1919 (*715), p. 43 (recte *americanus*); OD.

Cushmania Silvestri, 1925 (*2957), p. 52.

Orbitolinoides Vaughan, 1945 (*3270), p. 22; type species: *Orbitolinoides senni* Vaughan, 1945; OD.

Heterodictyoconus Butterlin and Moullade, 1968 (*460), p. 12; type species: obj., OD.

Dictyoconus (Cushmania) Hottinger and Drobne, 1980 (*1555), p. 247, 256 (nom. transl.).

Test conical, apical proloculus followed by a few incomplete annular chambers that represent a reduced early spiral stage, and then by numerous low rectilinear chambers that enlarge rapidly in diameter as added, base of cone convex in the early stage, later flattened to concave; wall with thin marginal epidermis, overlying a series of narrowly spaced, short vertical exoskeletal beams that alternate in position with the marginal apertural openings, a shorter secondary beam occurs in front of each aperture, and a third order of shorter beams also may be present, beams intersected by at least two orders of horizontal rafters that parallel the septa, the series of beams and rafters producing a complex reticular subepidermal network; the endoskeletal pillars are circular in section near the underlying septum but semicircular in section toward the chamber roof; numerous apertures scattered over the base of the cone. M. Eocene; Caribbean: Leeward Islands: St. Barthélemy; Cuba; Bahamas; USA: Florida.

DAVIESICONUS Hottinger and Drobne, 1980

Plate 172, figs. 1-3

Type species: Coskinolina balsilliei Davies, 1930 (*898), p. 496; OD.

Fallotella (Daviesiconus) Hottinger and Drobne, 1980 (*1555), p. 242, 253.

Small, high conical test, megalospheric proloculus eccentric and not apical in position, followed by hemispherical deuteroconch and a few almost planispirally coiled chambers, later rectilinear, base of cone convex in early stage, flattened in later stage, microspheric form not adequately known; wall thick, but lacking complex structure, simple exoskeleton of radial beams of approximately same thickness as outer wall, rarely with secondary beams and completely lacking any horizontal chamber subdivisions or rafters; endoskeleton pillars appear later in growth and are circular in section near the chamber floor, becoming semicircular in section near the chamber roof; aperture consists of a few relatively large pores on the final septum. L. Eocene; Pakistan; Somalia.

DICTYOCONELLA Henson, 1948

Plate 172, figs. 8-11

Type species: Dictyoconella complanata Henson, 1948; OD.

Dictyoconella Henson, 1948 (*1460), p. 24.

Test large, nearly 3 mm in height, flattened, peneropliform, early microspheric chambers planispirally enrolled, nature of megalospheric embryo unknown, later stage uncoiled, with numerous wide and low, slightly arched rectilinear chambers, interior with exoskeletal radial beams and shorter intercalated secondary ones, interconnected by one or two very shallow layers of exoskeletal horizontal rafters, the intersecting beams and rafters forming a subepidermal mesh; central zone with interseptal buttresses or pillars that may anastomose, some connecting with the longer radial beams; wall calcareous, imperforate, microgranular, and may include agglutinated particles; aperture of multiple pores in the central shield area. U. Cretaceous (U. Cenomanian or Turonian to Maastrichtian); Arabia: Qatar Peninsula.

DICTYOCONUS Blanckenhorn, 1900

Plate 173, figs. 12-14

Type species: Patellina egyptiensis Chapman, 1900 (*531), p. 11 (syn.: *Patellina aegyptiensis* Chapman, 1900 (*532), p. 96; nom. reject. ICZN Op. 585); SD Woodring, 1924 (*3394), p. 608.

Dictyoconus Blanckenhorn, 1900 (*253), p. xx in Sachsregister (nom. conserv. ICZN Op. 585).

Dictyoconos Blanckenhorn, 1900 (*253), p. 432, 434, 435, 436 (nom. reject. ICZN Op. 585).

Test conical, megalospheric embryo with spherical eccentric proloculus and hemispherical deuteroconch located below the apex, followed by short series of almost planispiral chambers and then by more numerous rectilinear chambers, microspheric generation with numerous spiraling chambers prior to becoming rectilinear; wall with thin marginal epidermis covering the long widely spaced primary exoskeletal beams, two orders of intercalated shorter beams, and two orders of horizontal partitions or rafters in each chamber resulting in a complex reticular subepidermal network; numerous endoskeletal pillars may partially encircle the apertural pores; aperture a series of pores over the base of the cone. L. Cretaceous (Aptian) to Oligocene; cosmopolitan.

Remarks: Woodring (1924, ***3394**, p. 608) stated that the type of *Dictyoconus* was fixed by monotypy, but the original publication by Blanckenhorn (1900, ***253**) included reference to *Dictyoconos egyptiensis* and *D. coralloides*, n. sp. (described in a footnote p. 435). Hence the type species was fixed by Woodring by subsequent designation.

FALLOTELLA Mangin, 1954

Plate 173, figs. 1-7

Type species: Fallotella alavensis Mangin, 1954; OD(M).

Fallotella Mangin, 1954 (***2019**), p. 209.

Test conical, early stage with much reduced low trochospiral coiling, megalospheric proloculus apical in position; exoskeleton simple, with numerous radial beams perpendicular to the septa, new ones being intercalated in the larger chambers so that spacing remains nearly constant, a rudimentary horizontal rafter consists only of a ridge paralleling the septa at the inside surface of the outer wall of each chamber; aperture consists of a few large pores on the basal surface of the cone. M. Paleocene; Spain; France; Italy; Yugoslavia; Albania; Greece; Turkey; Iran; Algeria.

FALSURGONINA Arnaud-Vanneau and Argot, 1973

Plate 174, figs. 1-9

Type species: Falsurgonina pileola Arnaud-Vanneau and Argot, 1973; OD.

Falsurgonina Arnaud-Vanneau and Argot, 1973 (***72**), p. 226.

Test small, conical, large early trochospiral coil asymmetrically placed with respect to the test axis, later chambers rectilinear and discoidal, peripheral part of chambers not subdivided but sparse radial partitions may be produced at the interior of the test by invaginations of the chamber floor, no true pillars in the central zone; aperture in the early coil a single round opening per chamber, in the rectilinear part a circle of regularly spaced pores lies at the inner margin of the undivided outer zone of the chambers, and a few less regularly spaced pores occur on the central zone of the chamber floor. L. Cretaceous (U. Barremian to Bedoulian); France.

GUTNICELLA Moullade, Haman, and Huddleston, 1981

Plate 173, figs. 8-11

Type species: Coskinolina (Meyendorffina) minoricensis Bourrouilh and Moullade, 1964 (***319**), p. 379; OD.

Meyendorffina (Gutnicella) Moullade et al., 1981 (***2198**), p. 484 (nom. subst. pro *Meyendorffina (Lucasella)* Gutnic and Moullade, 1967).

Meyendorffina (Lucasella) Gutnic and Moullade, 1967 (***1346**), p. 69 (non *Lucasella* Stewart, 1936); type species: obj.; OD.

High conical test with large spherical proloculus enclosed by prominent early planispiral and involute coil, later briefly trochospiral, followed by uniserial and rectilinear discoidal chambers that are subdivided in the outer part by radial vertical exoskeletal beams, somewhat longer primary beams alternating with shorter ones, central zone with incomplete pillars of irregular size and arrangement, commonly of greatest diameter near the chamber floor and tapering upward but not reaching the roof of the chambers; aperture not described, probably consisting of pores between the pillars of the central zone. M. Jurassic (Dogger); Spain: Balearic Islands, Menorca.

HETEROCOSKINOLINA Saint-Marc, 1978

Plate 174, figs. 10-15

Type species: Heterocoskinolina ruskei Saint-Marc, 1978; OD.

Heterocoskinolina Saint-Marc, 1978 (***2698**), p. 52.

Test conical, eccentric megalospheric embryonal apparatus of simple protoconch and deuteroconch, followed by a larger trochospiral nepionic stage, and finally by a rectilinear stage of numerous low discoidal chambers; well-developed marginal zone subdivided by vertical radial exoskeletal beams and intercalated second order beams but lacks horizontal chamber subdivisions, primary beams extend from chamber floor to roof in the marginal area but thicken and become lower and undulating toward the axial region until they no longer reach the chamber roof, leaving the central zone undivided near the roof but partially divided near the chamber floor by the low prolongations of a few radial beams, axial endoskeletal pillars lacking; aperture consists of circular pores in the central region, opening between the beams. U. Cretaceous (M. Cenomanian); Syria.

IRAQIA Henson, 1948

Plate 175, figs. 5-9

Type species: Iraqia simplex Henson, 1948; OD.

Iraqia Henson, 1948 (*1460), p. 69.

Test conical with convex base, early stage spiral, later with rectilinear discoid chambers, interior with exoskeleton of radial plates or beams that alternate in position from chamber to chamber, may also have secondary vertical beams and transverse rafters, resulting in a reticulate subepidermal network of cells with transverse interconnections; wall of imperforate microgranular calcite; aperture consists of numerous pores through the central part of the septa. L. Cretaceous (Aptian) to M. Cretaceous; Iraq; Iran; Spain; France.

KILIANINA Pfender, 1933

Plate 175, figs. 1-4

Type species: Kilianina blancheti Pfender, 1933; OD.

Kilianina Pfender, 1933 (*2394), p. 245.

Test a high cone, proloculus, and small deuteroconch followed by short trochospiral stage of a few undivided chambers coiled about a vertical axis, later rectilinear, with outer part of chambers subdivided into numerous chamberlets, successive rows alternating in position, interseptal endoskeletal pillars or buttresses fill the interior to form an alveolar axis, secondary filling of the intervening cavities results in a nearly solid axis; wall of imperforate microgranular calcite incorporating some agglutinated particles, trilamellar, with thick median calcite layer between two darker layers; apertural pores scattered over the terminal face and open into the central alveolar region, intercameral foramina in the outer part of the test lie at the lateral partitions between the chamberlets, allowing oblique communication to the preceding layer of chamberlets. M. Jurassic (U. Bathonian); France.

MEYENDORFFINA Aurouze and Bizon, 1958

Plate 177, figs. 8-10

Type species: Meyendorffina bathonica Aurouze and Bizon, 1958; OD.

Meyendorffina Aurouze and Bizon, 1958 (*95), p.72.

Coskinolina (Meyendorffina) Bourrouilh and Moullade, 1964 (*319), p. 379 (nom. transl.).

Test conical, early enrolled stage almost planispiral, later rectilinear, with rapidly enlarging broad and low discoidal chambers, chambers subdivided by exoskeletal vertical radial beams that project a short distance inward from the outer wall but lack horizontal rafters, central zone with endoskeletal pillars; wall of microgranular calcite; apertural openings in the septal face between the outer zone and the inner pillared zone, and additional openings are irregularly intercalated between the pillars. M. Jurassic (Bathonian); France.

ORBITOLINELLA Henson, 1948

Plate 175, figs. 10-13

Type species: Orbitolinella depressa Henson, 1948; OD.

Orbitolinella Henson, 1948 (*1460), p. 90.

Test free, conical, low, embryonic chambers unknown, discoidal chambers enlarging in diameter as added, interior subdivided by numerous exoskeletal vertical radial beams projecting inward from the lateral wall, those of successive chambers alternating in position, with shorter and thinner secondary beams intercalated between the main ones in the narrow marginal zone, some adjacent major beams fuse inward, with others irregularly anastomosing to form a reticulum in the central zone; wall of imperforate microgranular calcite, with vitreous layer over the apertural face; aperture consists of multiple pores over the central zone but absent from the outermost marginal zone, remaining as intercameral pores in later chambers. U. Cretaceous (U. Cenomanian or Turonian); Arabia: Qatar Peninsula.

ORBITOLINOPSIS Henson, 1948

Plate 178, figs. 1-6

Type species: Orbitolinopsis kiliani Henson, 1948 (***1460**), p. 67 (syn.: *Chapmania kiliani* Prever, in Prever and Silvestri, 1905 (***2472**), p. 470, nom. nud.; = *Orbitolina? kiliani* Silvestri, 1932 (***2964**), p. 159, 160, textfigs. 6, 7, pl. 9, figs. 14, 15, name not available, ICZN Art. 13 (a) (i), no description); OD.

Orbitolinopsis Henson, 1948 (***1460**), p. 67.

Orbitolinopsis A. Silvestri, 1932 (***2964**), p. 160 (name not available, ICZN Art. 13 (b); no valid species included, type not designated).

Test of medium size, up to 1.5 mm in diameter, conical to subcylindrical with flat base, rectilinear discoidal chambers with prominent marginal zone subdivided by long radial exoskeletal beams, rarely with secondary intercalated beams and lacking any horizontal exoskeletal partitions or rafters, beams slightly undulating toward the center of the test and may join in a somewhat reduced but distinctly reticulate axial region that lacks pillars, the cells of the reticular central zone interconnected by stolonlike passages. L. Cretaceous (Barremian to L. Aptian); France; Spain; SW Iran.

Remarks: The status and authorship of this genus and the type species have been incorrectly credited in the past. Prever, in Prever and Silvestri (1905, ***2472**), cited the species names *Chapmania kiliani* and *C. silvestrii*, both without description and hence not available. Silvestri (1932, ***2964**) mentioned *Chapmania kiliani* Prever and *C. silvestrii* Prever (on p. 159) and later referred to them as *Orbitolina? kiliani* and *O.? silvestrii* (footnote, p. 160), figuring *O.? kiliani* (Prever) in textfigs. 6 and 7 and pl. 9, figs. 14, 15). As Prever did not validate either species, they cannot be credited to him. The only description given by Silvestri indicated the generic characters for *Orbitolinopsis* but referred simultaneously to the two species previously mentioned, without a diagnosis of either. Thus Silvestri did not validate either species, and as a result the genus was invalid (after 1930 a genus must have a valid species designated as a type species). Cushman (1940, ***787**), p. 193) stated erroneously that "Silvestri has proposed a generic name, *Orbitolinopsis* with the genotype *Orbitolina conulus* Douvillé" but gave no definition of the genus, which remained invalid. Henson (1948, ***1460**, p. 67) described the genus and also described *O. kiliani* (in discussing Silvestri's figures), indicating the type species as *Orbitolinopsis kiliani* (Prever). As no earlier references met the basic requirements for validation, as discussed above, both genus and species were invalid prior to Henson's description and type designation, and both must be credited to Henson.

PALEODICTYOCONUS Moullade, 1965

Plate 176, figs. 5-10

Type species: Dictyoconus cuvillieri Foury, 1963 (***1165**), p. 3; OD.

Dictyoconus (Paleodictyoconus) Moullade, 1965 (***2196**), p. 4033.

Paleodictyoconus Schroeder, in Schroeder and Charollais, 1966 (Nov., ***2802**), p. 109 (nom. transl.).

Palaeodictyoconus Moullade, 1966 (Dec., ***2197**), p. 211, 278, textfigs. 9, 13, 14, 24 (err. emend.).

Test conical with elliptical base, trochospiral early coil lies to one side of the apex, later stage with numerous rectilinear chambers, with interior having a narrow marginal zone subdivided by many radial exoskeletal beams, primary beams alternating with two orders of shorter ones, and each chamber subdivided medially by a single transverse exoskeletal rafter, interior of central zone with numerous endoskeletal pillars that within each chamber are narrower toward the base of the test and widen toward the test apex, pillars in concentric rows, those of each row alternating in position with those of adjacent rows; aperture of pores located near the base of each pillar in the central zone. L. Cretaceous (Valanginian to Bedoulian;) France; Portugal; Qatar Peninsula.

PARACOSKINOLINA Moullade, 1965

Plate 176, figs. 1-4

Type species: Coskinolina sunnilandensis Maync, 1955 (*2072), p. 106; OD.

Meyendorffina (Paracoskinolina) Moullade, 1965 (*2196), p. 4033.

Test conical, proloculus globular, early spire limited to an asymmetrical apical knob or lacking, other chambers rectilinear and discoidal, interior of chambers with an outer zone subdivided by exoskeletal radial vertical beams alternating with shorter secondary beams, but lacking transverse rafters in the subepidermal region, central zone of the test with numerous somewhat irregular vertical endoskeletal pillars that appear continuous from one chamber to the next; wall of imperforate microgranular calcite; aperture consists of regularly distributed openings on the basal surface. L. Cretaceous (Barremian, Albian); USA: Florida; Mexico; Venezuela; Switzerland; France.

PSEUDORBITOLINA H. Douvillé, 1910

Plate 170, fig. 7; plate 171, figs. 1-8

Type species: Pseudorbitolina marthae H. Douvillé, 1910; OD.

Pseudorbitolina H. Douvillé, 1910 (*986), p. 57.

Test circular in outline, 2 mm to 3 mm in diameter, convexoconcave, bilocular embryonal apparatus that may be broken open or eroded from the surface appears as a somewhat swollen apex on the convex spiral side, followed by a very short spirally enrolled stage and then by numerous cyclic chambers, marked at the exterior by concentric sutures or lines of growth, on worn or eroded specimens chambers are seen to be finely subdivided radially into chamberlets, concave side with convex outer marginal band at the periphery marked by radial striations and terminating at a strongly inflated shoulder that forms a swollen ring, within the ring the central part of the test is strongly concave and may show indications of the sutures between the cyclic chambers, chamber interior with exoskeletal beams and rafters that form a subepidermal mesh beneath the outer wall, a median zone where the longer radial beams separate the chamberlets of the cyclic chambers, thickening toward the lower side of the test but leaving a large opening that results in an undivided zone adjacent to the ventral inflated area and provides a communication between all chamberlets of a single chamber; wall very finely agglutinated, of microgranular calcite; aperture consists of a single row of openings at the outer margin of the circular swelling of the concave side or rarely may be at the crest of the swelling, other smaller pores occur in the thickened axial partitions, and larger ones connect each undivided zone to the exterior or to the undivided zone of the preceding chamber. U. Cretaceous (Campanian); France.

SIMPLORBITOLINA Ciry and Rat, 1953

Plate 177, figs. 1-7

Type species: Simplorbitolina manasi Ciry and Rat, 1953; OD.

Simplorbitolina Ciry and Rat, 1953 (*609), p. 85.

Test a small cone with flattened base, adult chambers uniserial, low, and discoidal, interior divided by radial partitions or beams that are thin near the outer wall and thicken toward the axial region, becoming undulating or wedgelike until they anastomose inward with the adjacent beams, short secondary beams intercalated between the primary ones in the peripheral region, but no intracameral horizontal partitions present; aperture consists of scattered pores on the base of the test. L. Cretaceous (Aptian to Albian); France; Spain.

URGONINA Foury and Moullade, 1966

Plate 178, figs. 7-14

Type species: Urgonina protuberans Foury and Moullade, 1966; OD.

Urgonina Foury and Moullade, 1966 (*1167), p. 252.

High conical test with twisted apex consisting of an early trochospiral coil of more than one whorl of rapidly enlarging chambers, proloculus positioned laterally on the test, later chambers rectilinear and discoidal, outer part of chambers lacking any vertical or horizontal exoskeletal partitions or apertural pores, inner region of the chambers with sparse interseptal pillars connecting adjacent septa; wall thick, micrograpular, imperforate, and may have a thick median layer of transparent calcite; aperture consisting of a few large pores in the irregular basal surface. L. Cretaceous (Barremian); France.

VALDANCHELLA Canerot and Moullade, 1971

Plate 177, figs. 11-15

Type species: Simplorbitolina (?)*miliani* Schroeder, 1968 (***2797**), p. 313; OD.

Valdanchella Canerot and Moullade, 1971 (***479**), p. 214.

Test conical, megalospheric generation with apically located two- or three-chambered simple embryonic apparatus indicated by external sutures, as septa may be secondarily resorbed; later with broad, low rectilinear chambers that increase rapidly in diameter as added, marginal zone of chambers subdivided by numerous fine radial exoskeletal beams, of constant thickness throughout, the somewhat longer major beams alternate with shorter secondary ones, outermost part of the chambers with a single layer of horizontal rafters that together with the numerous beams subdivide the marginal zone into a reticular network, central zone occupied by vertical endoskeletal pillars that thicken toward both chamber floor and roof, where there is a slight tendency to anastomose, pillars narrowest slightly above the floor and appear triangular in axial section; wall of imperforate microgranular calcite; aperture not observed, probably a series of pores on the central part of the final septum. L. Cretaceous (Valanginian); Spain.

VERSEYELLA Robinson, 1977

Plate 172, figs. 4-7

Type species: Coskinolinoides jamaicensis Cole, 1956 (***629A**), p. 216; OD.

Verseyella Robinson, 1977 (***2636A**), p. 1414; OD.

Drobneina Loeblich and Tappan, 1985 (***1926**), p. 199; type species: obj.

Verseyella Robinson, 1975 (***2636**), p. 39 (name not available, ICZN Art. 13 (a) (i); no description); type species: obj.

High conical to subcylindrical test, apex biserial(?), later with uniserial and rectilinear chambers increasing rapidly in diameter as added, base of cone convex, interior of chambers subdivided by radial vertical beams that are aligned from chamber to chamber and form a ring around the raised central shield, smaller secondary beams may be interspersed between the primary ones and aligned with and external to the marginal apertures, central shield supported by a single pillar; marginal apertures form a ring around the periphery of the central shield, alternating in position with the major vertical beams, a few scattered openings also present on the central shield. L. Eocene; Jamaica, West Indies.

Remarks: Differs from *Coskinolinoides* in the much larger size, absence of a distinct early trochospiral stage, and more regular arrangement of apertures bordering the central shield and scattered over its surface. Although Robinson (1977, p. 1414), placed *Verseyella* in the Textulariidae, as having a "biserial juvenile stage," this has not yet been illustrated, and neither the wall structure nor the presence of beams, central shield, and marginal apertures is characteristic of the canaliculate Textulariidae.

Subfamily ORBITOLININAE Martin, 1890

Orbitolininae Cushman, in Eastman, 1913 (***1043**), p. 27, nom. transl. ex family Orbitolinidae.

Test with complex embryonal apparatus, may have a central reticular zone or one with pillars. L. Cretaceous (Barremian) to U. Cretaceous (Cenomanian).

ALPILLINA Foury, 1968

Plate 179, figs. 1-4

Type species: Alpillina antiqua Foury, 1968; OD.

Alpillina Foury, 1968 (***1166**), p. 151.

Test conical, with flattened to concave base, megalospheric generation with embryonic apparatus consisting of thin-walled protoconch and deuteroconch surrounded by an annular supraembryonal zone subdivided into about five chamberlets, spherical microspheric protoconch is followed by a few streptospirally coiled chambers at the test apex, later chambers uniserial and rectilinear, with very narrow marginal zone of vertical exoskeletal primary and secondary beams and horizontal rafters, beams narrow at the chamber floor and wider above, giving a triangular appearance in tangential section, poorly developed in the radial zone but joining to form a wide axial reticular zone in the central part of the test. L. Cretaceous (Barremian); France.

CONICORBITOLINA Schroeder, 1973

Plate 181, figs. 6-11

Type species: Orbitolites conica d'Archiac, 1837 (***63**), p. 178 (recte *conicus:* syn.: "*Orbitolina conica* d'Archiac" Sherborn, 1896, ***2900**, p. 279, err. cit.; = *Neorbitolina cenomana* Bilotte et al., 1974, ***242**, p. 95, pl. 1, figs. 1-3, non figs. 4, 5; = "*Neorbitolina convexa* [sic] Bilotte et al." of Schroeder, 1975, ***2800**, p. 225, err. cit.); OD.

Orbitolina (Conicorbitolina) Schroeder, 1973 (***2798**), p. 143.

Neorbitolina Bilotte, Moullade, and Vial, 1974 (***242**), p. 94; type species: *Neorbitolina cenomana* Bilotte et al., 1974; OD.

Test large, a low cone up to 10 mm in diameter, with pointed apex and flat to concave base, proloculus divided into protoconch and deuteroconch, the succeeding subembryonal zone already subdivided by radial plates, postembryonal chambers subdivided into a strongly differentiated outermost marginal zone with radial beams of three orders and horizontal rafters of two orders between the septa, a median radial zone occupied by the first order vertical radial beams that extend farther inward and become undulating and triangular in section, and a central reticular zone in which the radial beams are more regular in thickness rather than triangular in section, and showing a somewhat cellular structure of large cavities, commonly including quartz fragments. L. Cretaceous (Vraconnian) to U. Cretaceous (Cenomanian); France; Spain.

DICTYORBITOLINA Cherchi and Schroeder, 1976

Plate 180, figs. 1-7

Type species: Dictyorbitolina ichnusae Cherchi and Schroeder, 1976; OD.

Dictyorbitolina Cherchi and Schroeder, 1976 (***564**), p. 48.

?*Orbitolina (Eorbitolina)* B. G. Zhang, 1979 (***3444**), p. 131 (name not available, ICZN Art. 13 (a)(i), no description).

?*Orbitolina (Eorbitolina)* B. G. Zhang, 1982 (***3445**), p. 59, 77; type species: *Orbitolina (Eorbitolina) robusta* B. G. Zhang, 1982; OD.

Low conical test with slightly concave base, apically located embryonal apparatus consisting of simple protoconch and septulate deuteroconch, primary chambers discoidal and rectilinear, a relatively wide marginal zone subdivided by radial vertical exoskeletal beams that produce elongated chamberlets, beams of successive chambers being vertically aligned rather than alternating in position and with horizontal exoskeletal rafters, the short beams and rafters forming many small chamberlets in the marginal zone, central zone filled with small endoskeletal pillars that alternate in position from chamber to chamber, rather than being aligned. L. Cretaceous (Barremian to Aptian); Italy: Sardinia; China: Xizang Prov.

EOPALORBITOLINA Schroeder, 1968

Plate 181, figs. 1-5

Type species: Eopalorbitolina charollaisi Schroeder, in Schroeder and Conrad, 1968; OD.

Eopalorbitolina Schroeder, in Schroeder and Conrad, 1968 (***2803**), p. 149.

Test conical, similar to *Palorbitolina* in structure but with embryonal apparatus at one side of the apex and consisting of globular proloculus and a lateral chamber, later uniserial and discoidal chambers with differentiated marginal zone having strongly developed vertical radial beams or septula, and central zone with more labyrinthine arrangement, rather than with pillars. L. Cretaceous (Barremian); France.

EYGALIERINA Foury, 1968

Plate 179, figs. 5-8

Type species: Eygalierina turbinata Foury, 1968; OD.

Eygalierina Foury, 1968 (***1166**), p. 155.

Test conical, base flat to slightly concave centrally, megalospheric embryonal apparatus at test apex consists of flattened protoconch and large deuteroconch, surrounded by a hemispherical zone of five to ten periembryonal chambers, microspheric generation with slight streptospiral coil, later stage with rectilinear chambers subdivided into marginal, radial and reticular zones, the thin marginal zone characterized by a network produced by the exoskeletal primary vertical beams, secondary beams, and horizontal rafters; wide radial zone occupying about one-half the test diameter, containing many primary radial beams that thicken toward the center of the test and become somewhat sinuous as viewed from the test apex, meeting and anastomosing in the central reticulate zone; wall imperforate, of microgranular calcite. L. Cretaceous (Barremian); France.

MESORBITOLINA Schroeder, 1962

Plate 176; figs. 11-13; plate 182, figs. 1-11

Type species: Orbitulites texanus Roemer, 1849 (***2640**), p. 392; OD.

Orbitolina (Mesorbitolina) Schroeder, 1962 (*2791), p. 181.

?*Orbiqia* Mamgain and Jagannatha Rao, 1962 (*2017), p. 185; type species: *Orbiqia drasensis* Mamgain and Jagannatha Rao, 1962; OD.

Orbitolina (Columnorbitolina) B. G. Zhang, 1979 (*3444), p. 131 (name not available, ICZN Art. 13 (a) (i), no description).

Orbitolina (Columnorbitolina) B. G. Zhang, 1982 (*3445), p. 60, 77; type species: *Orbitolina (Columnorbitolina) pengboensis* B. G. Zhang, 1982; OD.

Test a low cone to nearly discoidal, up to 12 mm in diameter, apex rounded to mammillate, large embryonic apparatus, with equally well-developed supra- and subembryonal zones, in contrast to the weakly developed subembryonal zone of *Orbitolina*, both sub- and supraembryonal chambers with marginal zone subdivided by numerous exoskeletal beams that are perpendicular to the outer walls, early postembryonic chambers rectilinear, low, and discoidal, marginal zone subdivided by radial beams of two or three orders and by horizontal rafters, resulting in the formation of numerous rectangular chamberlets, well-developed radial zone of continuing first order beams that thicken rapidly at the junction of the marginal and radial zones, becoming triangular in section and zigzag in plan, central zone with thinner and flatter beams that are discontinuous because of the large number of pores in the central area, central zone may be lacking in later chambers that are annular rather than discoidal; wall of fine silt- to clay-sized agglutinated particles, with some large calcite grains; small apertural pores lie in reentrants in the main beams in the radial zone, become more numerous inward to the junction with the central zone, and are abundant in the central zone. L. Cretaceous (Albian) to U. Cretaceous (L. Cenomanian); USA: Texas; Spain; Italy; Yugoslavia; China: Tibet; India.

NAUPLIELLA Decrouez and Moullade, 1974

Plate 183, figs. 5, and 6

Type species: Naupliella insolita Decrouez and Moullade, 1974; OD.

Naupliella Decrouez and Moullade, 1974 (*915), p. 87.

High conical test, megalospheric embryonal apparatus at the test apex consisting of an undivided protoconch and a deuteroconch with upper part subdivided by vertical partitions or beams but without either subembryonal or supraembryonal zones, later chambers uniserial and rectilinear with reticular structure, marginal zone lacking horizontal rafters and without differentiation of a radial zone. L. Cretaceous (U. Albian); Greece.

NEOIRAQIA Danilova, 1963

Plate 183, figs. 1-4

Type species: Neoiraqia convexa Danilova, 1963; OD.

Neoiraqia Danilova, 1963 (*891), p. 226.

Test conical, apex rounded, with embryonic apparatus, subdivided supraembryonic area and incompletely divided subembryonal area, later chambers uniserial and discoidal with narrow cellular subepidermal marginal zone formed by intersecting primary and second order exoskeletal radial beams that alternate rather than being aligned from one chamber to the next, and the horizontal exoskeletal rafters, radial zone much reduced or absent but central reticulate zone is wide, occupying most of the test diameter, radial partitions wider near the chamber floor and taper upward toward the chamber roof but may be incomplete; wall of imperforate microgranular calcite, with insignificant amount of fine agglutinated material; numerous obliquely arranged intercameral pores present, in addition to pores connecting chamberlets of a single chamber. U. Cretaceous (U. Cenomanian); Yugoslavia.

NEORBITOLINOPSIS Schroeder, 1964

Plate 184, figs. 1-3

Type species: Orbitolina conulus H. Douvillé, 1912 (*988), p. 568; OD.

Neorbitolinopsis Schroeder, 1964 (*2794), p. 692, 693; also see Schroeder, 1965 (*2796), p. 580.

High conical test with convex base, symmetrical embryonic apparatus at the apex of the test, hemispherical proloculus partially enveloped by slightly larger ellipsoidal deuteroconch, later with uniserial discoidal chambers in which the marginal zone has short radial vertical exoskeletal beams and horizontal rafters, an intermediate radial zone of major beams is weakly developed, and the broad central zone is filled with a reticular mesh of septulae and intervening polygonal cavities. Cretaceous (U. Albian or L. Cenomanian); France; Spain.

ORBITOLINA d'Orbigny, 1850

Plate 183, figs. 7-13

Type species: Orbulites concava Lamarck, 1816 (*1780), p. 197 (non *Orbitolites concava* Lamarck, 1801, *1775, p. 376); SD Parker and Jones, 1860 (*2348), p. 38.

Orbitolina d'Orbigny, 1850 (*2312), p. 143, 184.

Orbitulina Bronn, in Bronn and Roemer, 1853 (*422), p. 93; type species: obj.

Test large, up to 30 mm in diameter, low conical to nearly discoidal form, very large apically situated embryonal apparatus with large and broad proloculus that may be irregular in shape, with narrow subembryonic zone, and a supraembryonic zone that is about three times thicker, both sub- and supraembryonic zones subdivided by vertical radial beams projecting inward from the outer wall and by irregular endoskeletal plates similar to the axial zone of the later chambers, embryonal chambers completely surrounded laterally by the first postembryonic chamber, later rectilinear and discoidal chambers extend across the entire lower surface, but latest adult chambers may be only annular, marginal zone very thin but well developed, with both primary radial exoskeletal beams and shorter second order beams, as well as one or more layers of horizontal rafters, the entire thin marginal zone commonly abraded and destroyed in preservation, radial zone may be poorly developed and the chamberlets of this zone in the microspheric test may appear almost rectangular in tangential section, most of the interior consists of a somewhat structureless central complex, with only occasional septa and chambers discernable; wall with imperforate epidermis, marginal zone of fine-grained agglutinated particles and more coarsely agglutinated central complex. L. Cretaceous (U. Albian) to U. Cretaceous (U. Cenomanian); France; Spain; Arabia: Qatar Peninsula.

PALORBITOLINA Schroeder, 1963

Plate 185, figs. 6-10

Type species: Madreporites lenticularis Blumenbach, 1805 (*262A), pl. lxxx (syn.: *Orbulites lenticulata* Lamarck, 1816, *1780, p. 197); OD.

Orbitolina (Palorbitolina) Schroeder, 1963 (*2792), p. 348.

Palorbitolina Schroeder, 1964 (*2793), p. 465 (nom. transl.).

Low conical test relatively small, up to 5 mm in diameter, embryonal apparatus consisting of protoconch and deuteroconch, overlying supraembryonal zone subdivided in the outer part by partial vertical septula, the resulting chamberlets opening into the underlying proloculus, laterally a periembryonal ring of obliquely arranged chamberlets borders the proloculus and supraembryonal zone, periembryonal chamberlets similarly subdivided by septula in the upper part, later chambers uniserial and discoidal, with thin marginal zone of primary vertical exoskeletal beams and horizontal rafters, and may be accompanied by secondary beams in the later chambers, poorly developed radial zone occupies one-third to one-half the chamber area, the main beams being thick and triangular in section and zigzagging irregularly toward the central region, main partitions irregular and intermittant in the central complex; wall imperforate, of granular calcite, with large quantity of fine-grained agglutinated material near the surface and coarser-grained in the inner zone; apertural pores obscure. L. Cretaceous (U. Barremian to Aptian); France; Italy; Bulgaria; Spain; Tibet; Iraq; Qatar Peninsula; Iran; Syria; Lebanon.

PALORBITOLINOIDES Cherchi and Schroeder, 1980

Plate 184, figs. 4-7

Type species: Palorbitolinoides hedini Cherchi and Schroeder, 1980; OD.

Palorbitolinoides Cherchi and Schroeder, 1980 (*567), p. 385.

Test discoidal to convexoconcave, very thin, only about 1 mm thick, megalospheric individuals 8 mm to 10 mm in diameter and one microspheric individual more than 23 mm in diameter, megalospheric embryo with a large central chamber having many short exoskeletal beams of two orders on the upper surface that result in an alveolar layer, central chamber also surrounded laterally and below by a periembryonic zone with numerous beams near the upper surface forming an alveolar layer at the sides of the central chamber, and a layer of relatively large and undivided irregular chambers below the proloculus; postembryonal chambers subdivided into a marginal zone with alveolar structure produced by the vertical radial beams, a radial zone with well-developed beams of triangular section that alternate in position from one chamber to the next, and a central zone in which the beams probably anastomose, although detailed structure is obscured by the coarse agglutinated material; apertural pores lead obliquely from one chamber to the next. L. Cretaceous (U. Aptian to ?Albian); India; Afghanistan; Tibet.

PRAEORBITOLINA Schroeder, 1965

Plate 185, figs. 1-5

Type species: Praeorbitolina cormyi Schroeder, 1965; OD.

Praeorbitolina Schroeder, 1965 (*2795), p. 412.

Test conical, megalospheric embryonal apparatus consisting of protoconch, deuteroconch, and subembryonal zone, somewhat eccentric in position and not completely surrounded laterally by the earliest postembryonal chamber, early stage with initial planispire or trochospire, followed by discoidal uniserial chambers subdivided into a narrow marginal zone with intersecting exoskeletal vertical radial beams of two orders and transverse rafters that parallel the chamber floor, a slightly broader radial zone in which the beams have a distinctly triangular cross-section as seen in tangential thin section, and finally a much wider central reticular zone. L. Cretaceous (L. Aptian); Spain; Italy; Afghanistan; Iran.

RECTODICTYOCONUS Schroeder, 1964

Plate 186, figs. 7-10

Type species: Rectodictyoconus giganteus Schroeder, 1964; OD.

Rectodictyoconus Schroeder, 1964 (*2793), p. 466.

Test conical, up to 4 mm in height and 5 mm in breadth, never with an early coiled or laterally inclined stage at the apex of the cone but with symmetrical embryonic apparatus consisting of protoconch and overlying deuteroconch, the latter with a marginal zone produced by vertical radial beams, later part of test with numerous relatively high discoidal and rectilinear chambers subdivided into narrow marginal and radial zones and a much wider central reticular zone, marginal zone with a distinct reticular pattern produced by three orders of exoskeletal vertical radial beams and short horizontal rafters at the periphery of each chamber, primary beams much thickened, triangular in cross-section and somewhat undulating in the radial zone, central zone with pillars that may be incomplete and anastomosing. L. Cretaceous (Barremian); Spain.

VALSERINA Schroeder and Conrad, 1968

Plate 186, figs. 1-6

Type species: Valserina broennimanni Schroeder and Conrad, in Schroeder et al., 1968; OD.

Valserina Schroeder and Conrad, in Schroeder, Conrad, and Charollais, 1968 (*2804), p. 201.

High conical test, embryonic apparatus of simple protoconch and deuteroconch, slightly eccentric in position, followed by many broad, low uniserial discoidal chambers that are subdivided into marginal, radial, and central zones, the narrow marginal zone with about three orders of radial exoskeletal beams and with horizontal exoskeletal rafters, the wider radial zone subdivided by the longer first order beams that thicken rapidly, becoming triangular in section and irregularly undulating and that continue into the central zone where they anastomose to form an irregular meshwork; aperture consisting of many small pores piercing the septa in the central zone. L. Cretaceous (M. Barremian): Europe (France).

Superfamily TEXTULARIACEA Ehrenberg, 1838

Textulariacea Grigyalis, 1978 (***1306**), p. 8, nom. transl. ex family Textularina.
Tawitawiidea Saidova, 1981 (***2696**), p. 21.
Tawitawiacea Loeblich and Tappan, 1984 (***1918**), p. 14.

Test trochospiral, triserial, or biserial in early stages; later may be biserial or uniserial; wall agglutinated, canaliculate. M. Jurassic (Bajocian) to Holocene.

Family EGGERELLIDAE Cushman, 1937

Eggerellidae Hofker, 1957 (***1512**), p. 35, nom. transl. ex subfamily Eggerellinae.
Dorothiidae Loeblich and Tappan, 1984 (***1918**), p. 15, nom. transl. ex subfamily Dorothiinae.

Test trochospirally enrolled or triserial in the early stage, later may be reduced to triserial, biserial, or uniserial; wall canaliculate, agglutinated, commonly of calcareous particles, on a thick organic layer; aperture an interiomarginal slit to areal, single to multiple. M. Jurassic (Bajocian) to Holocene.

Subfamily DOROTHIINAE Balakhmatova, 1972

Dorothiinae Balakhmatova, 1972 (***110**), p. 71.

Aperture simple, interiomarginal to areal, single to multiple. L. Cretaceous (Valanginian) to Holocene.

ARENODOSARIA Finlay, 1939

Plate 187, figs. 4-7

Type species: Clavulina robusta Stache, 1864 (***3054**), p. 169; = *Clavulina antipodum* Stache, 1864 (***3054**), p. 167; OD.

Arenodosaria Finlay, 1939 (***1127**), p. 95.

Test short and stout, early stage of up to five chambers per whorl, rapidly becoming triserial, then with a reduced biserial stage and short uniserial stage, circular in section; wall coarsely agglutinated, canaliculate, with thin dense inner layer, finely agglutinated thick and dense median layer, and an outer coating of coarse grains; aperture a vertical straight to curved slit in the juvenile, later nearly terminal and central, varying from a curved slit to subradiate or cribrate. M. Eocene to M. Miocene; New Zealand; Andaman Sea: Car Nicobar.

Remarks: Cushman (1937, ***783**, p. 167) placed *C. robusta* in the synonymy of *C. antipodum* Stache, regarding the former as the microspheric generation and the latter as the megalospheric generation, although Finlay (1939, ***1127**) considered both species as recognizable, with distinct ranges. Their synonymy has been upheld by Hornibrook (1971, ***1541**, p. 32), who selected a lectotype for *C. antipodum* from Stache's original slides. *Arenodosaria* differs from *Plectina* in having a distinct early triserial stage, reduced biserial stage, and final stage of three to four uniserial chambers.

BANNERELLA Loeblich and Tappan, 1985

Plate 187, figs. 1-3

Type species: Textularia gibbosa d'Orbigny, 1826 (***2303**), p. 262; OD.

Bannerella Loeblich and Tappan, 1985 (***1926**), p. 201.

Test free, subconical to elongate and subcylindrical, rounded in section, commonly large, up to 2 mm or more in length, trochospirally enrolled in the early stage, generally with about five chambers in the tiny early whorl of the microspheric generation, then reduced to triserial and finally biserial, sutures in the biserial stage straight and horizontal; wall agglutinated, distinctly canaliculate, surface may be smoothly finished; aperture a simple low and elongate, interiomarginal opening. Eocene to Holocene, cosmopolitan.

Remarks: Differs from *Dorothia* in the more coarsely agglutinated wall, very tiny early trochospiral coil, and rapidly flaring test.

DOROTHIA Plummer, 1931

Plate 187, figs. 8-12

Type species: Gaudryina bulletta Carsey, 1926 (*495), p. 28; OD.

Dorothia Plummer, 1931 (*2423), p. 130.

Test elongate, stout, early stage trochospirally enrolled, with four or more chambers per whorl, then reduced to biserial, increasing very slowly in size so that test has nearly parallel sides, circular in section; wall finely agglutinated and canaliculate, commonly of calcareous particles on a proteinaceous lining; aperture an interiomarginal slit in a slight reentrant of the final chamber face. L. to U. Cretaceous (Valanginian to Maastrichtian) to Paleocene; North America; Europe.

Remarks: The canaliculate wall of the type species of *Dorothia* was demonstrated in thin sections (Loeblich and Tappan, 1985, *1926, p. 201).

MARSSONELLA Cushman, 1933

Plate 188, figs. 1-3

Type species: Gaudryina oxycona Reuss, 1860 (*2581), p. 229; OD.

Marssonella Cushman, 1933 (*769), p. 36.

Test conical, circular in section, with tiny early trochospire of four to five chambers per whorl followed by a biserial stage of rapidly increasing diameter, terminal face flattened to concave; wall agglutinated, commonly of calcareous particles on an organic lining, canaliculate; aperture a low basal arch with a narrow bordering flap. L. to U. Cretaceous; cosmopolitan.

Remarks: Differs from *Dorothia* in the conical form rather than parallel sided test and in the flattened to concave terminal face.

Subfamily MINOUXIINAE Loeblich and Tappan, 1986

Minouxiinae Loeblich and Tappan, 1986 (*1929), p. 337.

Test free, elongate, triserial, or quadriserial, at least in the early stage, later may be reduced to biserial; wall agglutinated, canaliculate; aperture terminal, areal, and cribrate. U. Jurassic (Bajocian) to U. Cretaceous (Maastrichtian).

Remarks: Differs from the Dorothiinae in the multiple areal aperture, from the Chrysalidinidae in lacking endoskeletal pillars, and from the Verneuilinidae in having a canaliculate wall.

ANDERSENIA Neagu, 1968

Plate 188, figs. 16-18

Type species: Andersenia rumana Neagu, 1968; OD.

Andersenia Neagu, 1968 (*2234), p. 120.

Test free, early stage triserial, then biserial, the larger specimens tending to become loosely biserial, chambers subglobular, interior simple; sutures incised, nearly horizontal; wall finely agglutinated of quartz and carbonate particles; aperture cribrate, terminal on the final chamber, each rounded opening surrounded by a narrow rim. L. Cretaceous (Barremian); Romania.

MINOUXIA Marie, 1954

Plate 188, figs. 10-15

Type species: Minouxia gumbelitrioides Marie, 1954; OD.

Minouxia Marie, 1954 (*2036), p. 119.

Bermudezita Seiglie, 1961 (*2842), p. 342; type species: *Bermudezita borroi* Seiglie, 1961; OD.

Test free, triserial throughout, chambers inflated and globular to closely appressed, interior simple; sutures depressed; wall thin, finely agglutinated, largely of calcareous particles, finely canaliculate; aperture multiple, on a distinct trematophorelike plate that covers the umbilical region. U. Cretaceous (Santonian to Maastrichtian); France; Caribbean: Cuba.

PSEUDOMARSSONELLA Redmond, 1965

Plate 188, figs. 19 and 20

Type species: Pseudomarssonella maxima Redmond, 1965; OD.

Pseudomarssonella Redmond, 1965 (*2538), p. 133.

Test elongate conical, trochospirally enrolled around an increasingly widened umbilicus, umbilicus covered with a trematophore formed as an umbilical extension from the final chamber, early stage with four to five chambers per whorl, later may have three to five chambers per whorl; wall calcareous, microgranular, probably agglutinated; aperture cribrate, a series of pores perforating the trematophore that covers the umbilical region. M. Jurassic (U. Bajocian to Callovian); Saudia Arabia; W. India.

Remarks: Although the original description indicated that the wall was imperforate, no sections or other illustrations demonstrate the nature of the wall. The genus appears closely related to the similar *Minouxia* and *Tetraminouxia*, and the former is canaliculate.

TETRAMINOUXIA Gendrot, 1963

Plate 188, figs. 4-9 and 21

Type species: Tetraminouxia gibbosa Gendrot, 1963; OD.

Tetraminouxia Gendrot, 1963 (*1216), p. 70.

Test free, conical, chambers in quadriserial arrangement throughout, inflated and subglobular, interior undivided; wall finely agglutinated, exterior smoothly finished; aperture cribrate, consisting of numerous pores on a trematophore plate that covers the umbilical region. U. Cretaceous (Santonian); France, Spain.

Subfamily EGGERELLINAE Cushman, 1937

Eggerellinae Cushman, 1937 (*783), p. 30.
Eggerellinea Saidova, 1981 (*2696), p. 24 (supersubfamily).
Muttifidellinae Saidova, 1981 (*2696), p. 24 (nom. imperf.)
Karreriellinae Saidova, 1981 (*2696), p. 24.
Multifidellinae Loeblich and Tappan, 1984 (*1918), p. 15 (nom. corr.).

Test trochospiral or triserial in the early stage, later may be reduced to triserial, biserial, or uniserial; aperture basal to areal, single or multiple, and bordered by a lip. Paleocene to Holocene.

EGGERELLA Cushman, 1935

Plate 189, figs. 1-4

Type species: Verneuilina bradyi Cushman, 1911 (*702), p. 54; OD.

Eggerella Cushman, 1933 (*769), p. 33.
Alvarezina Bermúdez and Rivero, 1963 (*211), p. 266; type species: *Verneuilina mexicana* Nuttall, 1932 (*2277), p. 6; OD.

Test subconical, early stage in trochospiral coil of five inflated chambers per whorl, at least in the microspheric generation, later reduced to three chambers per whorl; wall finely agglutinated, commonly of calcareous particles on a proteinaceous base, canaliculate, the pores with an organic lining; aperture a low slit near the base of the apertural face, bordered by a narrow lip. Eocene to Holocene; cosmopolitan.

EGGERELLOIDES Haynes, 1973

Plate 189, figs. 5-7

Type species: Bulimina scabra Williamson, 1858 (*3379), p. 65 (as *B. arenacea* on pl. 5, figs. 136, 137); OD.

Eggerelloides Haynes, 1973 (*1436), p. 44.

Test subfusiform, early stage trochospiral, at least in the microspheric generation, later triserial; wall coarsely to finely agglutinated, held in an organic cement, surface roughly finished; aperture a high interiomarginal arch in the center of the slightly excavated apertural face, bordered by a lip, and with the lower margin in-turned as a troughlike toothplate that connects with the previous foramen. Holocene; Atlantic, off NW Europe; N. Pacific.

EGGERINA Toulmin, 1941

Plate 189, figs. 16-18

Type species: Eggerina cylindrica Toulmin, 1941; OD.

Eggerina Toulmin, 1941 (*3216), p. 573.

Test trochospirally enrolled, with about three very narrow high chambers per whorl that strongly overlap those of the preceding whorl, sutures depressed, nearly vertical in orientation; wall very finely agglutinated, surface smoothly finished, whether solid or canaliculate unknown; aperture a short slit near the base of the chamber face, entirely surunded by a low narrow lip. U. Paleocene; USA: Alabama.

KARRERIELLA Cushman, 1933

Plate 189, figs. 8–15

Type species: Gaudryina siphonella Reuss, 1851 (***2574**), p. 78; OD.

Karreriella Cushman, 1933 (***769**), p. 34.
Valvotextularia Hofker, 1951 (***1498**), p. 30; type species: *Textularia catenata* Cushman, 1911 (***702**), p. 23; OD.
Karreriella (Valvotextularia) Hofker, 1976 (***1525**), p. 67 (nom. transl.).

Test free, elongate, megalospheric generation and early stage of the microspheric generation trochospiral, with up to five chambers per whorl, later reduced to triserial and microspheric adult becoming biserial; wall agglutinated, canaliculate; aperture areal, a rounded opening slightly above the base of the apertural face in the trochospiral stage, subterminal in the biserial adult, surrounded by a distinct lip. Eocene to Holocene; cosmopolitan.

Remarks: Examination of material from the type locality of Reuss's *Gaudryina siphonella* indicates that more than one species has been included under this name. The megalospheric specimen illustrated by Reuss (1851, ***2574**, pl. 5, figs. 42a, b) was designated (Loeblich and Tappan, 1985, ***1926**, p. 202) as the lectotype of the type species. Similar megalospheric individuals are figured by Cushman (1937, ***783**, pl. 14, figs. 31, 32) and the microspheric form also was illustrated by Cushman (1937, ***783**, pl. 14, figs. 30a, b). The other species commonly included with *G. siphonella* has a flattened biserial stage, so that the test breadth is much greater than the thickness; such a form is illustrated by Reuss in side and apertural views (1851, ***2574**, pl. 5, figs. 40a, b), redrawn by Cushman (1933, ***769**, pl. 4, figs. 4a, b), and probably is *Karreriella chilostoma* (Reuss).

MARTINOTTIELLA Cushman, 1933

Plate 190, figs. 1–4

Type species: Clavulina communis d'Orbigny, 1826 (***2303**), p. 268; OD.

Martinottiella Cushman, 1933 (***769**), p. 37.
Listerella Cushman, 1933 (***769**), p. 36 (non *Listerella* Jahn, 1906); type species: *Clavulina primaeva* Cushman, 1913 (***705**), p. 635; OD.
Schenckiella Thalmann, 1942 (***3163**), p. 458 (nom. subst. pro *Listerella* Cushman, 1933).
Hechtina (Listerella) Hofker, 1957 (***1512**), p. 80 (nom. transl.; err. cit. pro *Plectina*).

Test free, elongate, cylindrical, early trochospiral coil with four to five chambers per whorl, later reduced to triserial, biserial, and a relatively elongate final uniserial stage; wall finely agglutinated, canaliculate, with inner organic lining; aperture terminal, a straight to arcuate slit produced on a short tubular neck in the center of the flattened terminal face. Paleocene to Holocene; cosmopolitan.

Remarks: The type species of both *Martinottiella* and *Schenckiella* are canaliculate.

MEIDAMONELLA Loeblich and Tappan, 1986

Plate 190, figs. 10–12

Type species: Gaudryina baccata var. *novangliae* Cushman, 1922 (***722**), p. 76.

Meidamonella Loeblich and Tappan, 1986 (***1929**), p. 337.

Test elongate, earliest whorl with five chambers, later reduced to triserial, and finally biserial in the adult; wall finely agglutinated, canaliculate, surface smoothly finished; aperture an elongate transverse slit a short distance above the base of the final chamber, bordered by a distinct lip. Eocene to Holocene; cosmopolitan.

Remarks: Differs from *Karreriella* in the elongate slitlike aperture bordered by a low lip, instead of a rounded one produced on a neck.

MULTIFIDELLA Loeblich and Tappan, 1961

Plate 190, figs. 8 and 9

Type species: Clavulina communis d'Orbigny var. *nodulosa* Cushman, 1922 (***722**), p. 85; OD.

Multifidella Loeblich and Tappan, 1961 (***1904**), p. 218.

Test free, elongate, early portion trochospiral, with four to five chambers per whorl, later triserial, biserial, and finally with a relatively long uniserial stage in the adult; wall finely agglutinated, canaliculate; aperture terminal, cribrate, consisting of elongate slits variously aligned in the center of the depressed apertural face, each slit bordered by a lip. Miocene to Holocene; Atlantic; Caribbean: Trinidad, West Indies.

RUDIGAUDRYINA Cushman and McCulloch, 1939

Plate 190, figs. 5–7

Type species: Rudigaudryina inepta Cushman and McCulloch, 1939; OD.

Rudigaudryina Cushman and McCulloch, 1939 (*830), p. 94.

Early stage triserial, followed by a more extensive biserial stage with broad low chambers increasing rapidly in breadth and finally by irregularly spreading subglobular chambers separated by deeply constricted sutures; wall finely agglutinated, surface smoothly finished, whether solid or canaliculate is unknown; aperture areal near the base of the final chamber in the biserial stage and terminal in the irregular stage, bordered by a short neck or lip. Holocene; N. and S. Pacific.

Family TEXTULARIIDAE Ehrenberg, 1838

Textulariidae Chapman, 1900 (*529), p. 9, nom. corr. pro family Textularina.
Textularina Ehrenberg, 1839 (*1054), p. 200.
Textularidae d'Orbigny, 1839 (*2304), p. 140.
Textularina Agassiz, 1844 (*15), p. 4.
Textilarideae Reuss, 1860 (*2581), p. 231.
Textilaridea Reuss and Fritsch, 1861 (*2593), p. 3.
Textularida Schmarda, 1871 (*2781), p. 164.
Textilarida Jones, in Griffith and Henfrey, 1875 (*1300), p. 320.
Plecanioidea Schwager, 1877 (*2830), p. 22.
Textilariidae Jones, 1895 (*1616), p. 140.
Textularinae Delage and Hérouard, 1896 (*926), p. 140.
Textulinidae Rhumbler, 1913 (*2621), p. 339.
Artextulidia Rhumbler, 1913 (*2621), p. 342 (err. emend.).
Tawitawiidae Saidova, 1981 (*2696), p. 21.

Test biserial, at least in the early stage, later may be reduced to uniserial; wall agglutinated, canaliculate; aperture interiomarginal to areal, single or multiple. Paleocene to Holocene.

Subfamily TEXTULARIINAE Ehrenberg, 1838

Textulariinae Chapman, 1900 (*529), p. 9, nom. correct. pro subfamily Textularinae.
Textularinae Carpenter, Parker, and Jones, 1862 (*494), p. 189, nom. transl. ex family Textularina.
Textilarida Schultze, 1854 (*2824), p. 52.
Textilaridae Schwager, 1877 (*2830), p. 21.
Textilaria Marriott, 1878 (*2045), p. 30.
Textularidae Bütschli, in Bronn, 1880 (*421), p. 203.
Textilariinae Jones, 1895 (*1616), p. 141.
Textularinea Saidova, 1981 (*2696), p. 20 (supersubfamily; nom. imperf.).
Bigenerininae Saidova, 1981 (*2696), p. 20.
Bigenerininea Saidova, 1981 (*2696), p. 20 (supersubfamily).

Test free, aperture interiomarginal, at least in the early stage, may become areal when test is terminally uniserial. Paleocene to Holocene.

BIGENERINA d'Orbigny, 1826

Plate 191, figs. 1 and 2

Type species: Bigenerina nodosaria d'Orbigny, 1826; SD Cushman, 1911 (*702), p. 27.

Bigenerina d'Orbigny, 1826 (*2303), p. 261.

Test elongate, early stage biserial, later abruptly becoming uniserial; wall agglutinated, canaliculate; aperture basal in biserial stage, becoming terminal, rounded, and areal in the uniserial stage. Eocene to Holocene; cosmopolitan.

HAEUSLERELLA Parr, 1935

Plate 191, figs. 3 and 4

Type species: Haeuslerella pukeuriensis Parr, 1935; OD(M).

Haeuslerella Parr, 1935 (*2357), p. 82.

Test free, elongate, early stage biserial, later chambers becoming cuneate and alternating in a loose biserial, sutures distinct, depressed; wall agglutinated, surface smoothly finished; aperture rounded, on the upper surface of the final chamber but not quite terminal. L. Miocene to L. Pliocene; New Zealand.

PARAVULVULINA Cicha and Zapletalová, 1965

Plate 192, figs. 1–4

Type species: Plecanium serratum Reuss, 1867 (*2590), p. 66; OD.

Paravulvulina Cicha and Zapletalová, 1965 (*600), p. 135.

Test large, up to 1.6 mm in length, broad, lenticular in section, with angular margins, chambers biserially arranged throughout, with a slight tendency for the final chamber to become nearly central in position; wall finely agglutinated, smoothly finished; aperture in the early stage at the base of the apertural face, in the adult an elongate terminal slit. Miocene (U. Tortonian); Poland; Czechoslovakia.

SAHULIA Loeblich and Tappan, 1985

Plate 191, figs. 9-12

Type species: Sahulia patelliformis Loeblich and Tappan, 1985 = *Textularia barkeri* Hofker, 1978 (*1528), p. 27; OD.

Sahulia Loeblich and Tappan, 1985 (*1926), p. 203.

Test free, biserial throughout and forming a low cone with circular outline, septa nearly horizontal or slightly arched, chambers very broad and low, chamber interior simple and undivided; wall finely agglutinated, thin, canaliculate; aperture at the base of the apertural face, forming a low and nearly straight slit across the center of the flattened terminal face, with a distinct flaplike lip bordering the opening, apertural reentrant present at the ends of the lip. Holocene; central and S. Pacific; N. Atlantic; Gulf of Mexico; Caribbean.

Remarks: Differs from *Textularia* in the low and conical rather than elongate test and in the low slitlike aperture that terminates in reentrants at either end of a flaplike lip. Typical *Textularia* has an open-arched aperture, without a bordering lip.

SEMIVULVULINA Finlay, 1939

Plate 191, figs. 5-8

Type species: Textilaria capitata Stache, 1864 (*3054), p. 270; OD.

Vulvulina (Semivulvulina) Finlay, 1939 (*1126), p. 505.
Semivulvulina Finlay, 1947 (*1130), p. 264 (nom. transl.).

Test free, flaring, rhomboidal in section, lateral margins acutely angled, broad and low chambers biserially arranged throughout, sutures depressed, oblique; wall finely agglutinated; aperture a low interiomarginal arch in the early stage, later with one or two additional areal openings above the basal one, the multiple openings may fuse to produce a very high and narrow slitlike opening extending up to one-third the distance across the terminal surface of the chamber, its scalloped margin reflecting the origin from separate openings. M. Eocene to L. Miocene; New Zealand.

TETRAGONOSTOMINA Mikhalevich, 1975

Plate 192, figs. 5-9

Type species: Tetragonostomina rhombiformis Mikhalevich, 1975; OD.

Tetragonostomina Mikhalevich, 1975 (*2105), p. 86.

Test free, flaring, and spatulate to rhomboidal in outline, flattened to diamond shaped in section, with broad, low, biserially arranged chambers, and thickened and elevated sutures that form a peripheral keel and a median ridge along the zigzag suture; wall agglutinated, with quartz and calcium carbonate particles in a fine-grained ground mass and with very small micropores opening at the surface; aperture a high quadrangular opening at the base of the final chamber face, with a distinct bordering ridge on three sides, the lateral borders of the aperture being slightly constricted. Holocene; Nigeria; Liberia; Ivory Coast.

TEXTULARIA Defrance, 1824

Plate 192, figs. 10-21; plate 193, figs. 1-4

Type species: Textularia sagittula Defrance in de Blainville, 1824; OD(M).

Textularia Defrance in de Blainville, 1824 (*246), p. 177.
Textilaria Ehrenberg, 1839 (*1054), opp. p. 120 (err. emend.).
Textilina Nørvang, 1966 (*2270), p. 6; type species: *Textularia stricta* Cushman, 1911 (*702), p. 11, fig. 13; OD.
Vulvulinella Saidova, 1975 (*2695), p. 121 (err. cit. as *Valvulinella* on pl. 39, fig. 8, non *Valvulinella* Schubert, 1907); type species: *Textularia milletti* Cushman, 1911 (*702), p. 13; OD.
Dorothia (Textilina) Hofker, 1976 (*1525), p. 67 (nom. transl.).
Textella Mikhalevich, 1979 (*2107), p. 17; type species: *Textularia foliacea* Heron-Allen and Earland var. *occidentalis* Cushman, 1922 (*722), p. 16; OD.
Norvanganina Mikhalevich, 1981 (*2110), p. 38; type species: *Textilina pseudorugosa* Lacroix subsp. *fistulosa* Mikhalevich, 1973 (*2104), p. 976 (non *Textularia sagittula* var. *fistulosa* Brady, 1884) = *Textularia valeriae* Loeblich and Tappan, nom. nov., herein; OD.
Textilinita Botvinnik, 1983 (*314), p. 43; type species: *Textilinita cognita* Botvinnik, 1983 = *Textularia sagittula* Defrance of Loeblich and Tappan, 1964 (*1910), p. C253, fig. 165 (2a, b); OD.

Test biserial throughout or may have an adventitious third chamber against the first pair of chambers in the microspheric generation; wall agglutinated, traversed by canaliculi that may open as perforations or be closed externally by a thin agglutinated layer and typically are closed internally by the organic lining of the test; aperture a low arch or slit at the base of the apertural face. Paleocene to Holocene; cosmopolitan.

Remarks: The agglutinated grains in the wall of *Textularia aegyptica* Said, 1949 are held in a calcareous fine-grained cement, the randomly oriented grains being equidimensional and about 0.2 μm to 0.4 μm in diameter, according to Toksvad and Hansen (1983, ***3205**, p. 161).

As noted by Loeblich and Tappan (1964, ***1910**, p. C253), Haynes (1973, ***1436**, p. 33), and Banner and Pereira (1981, ***130**, p. 90), *Textularia* is a wholly biserial form described from fossil material in Italy. It is not congeneric with the Holocene specimen from France proposed as a neotype by Nørvang (1966, p. 11). As the latter does not meet the requirements for a neotype, this designation was rejected by Banner and Pereira (1981, ***130**), and the specimen illustrated by Loeblich and Tappan from Castel' Arquato (1964, ***1910**, fig. 165, 2a, b) indicated as a neotype. However, as this specimen was not from the type locality at Siena, Italy, this designation also was invalid, and the other specimen figured by Loeblich and Tappan (1964, ***1910**, fig. 165, 1a, b), from the type locality at Siena, was then designated as the neotype (Loeblich and Tappan, 1985, ***1926**, p. 206).

The synonymy of *Textilina* and *Vulvulinella* with *Textularia* was demonstrated by Banner and Pereira (1981, ***130**). In addition, *Textella*, *Textilinita*, and *Norvanganina* were shown to be synonyms by Loeblich and Tappan (1985, ***1926**, p. 205). The type species of *Textularia* is biserial throughout, as illustrated by Loeblich and Tappan (***1910**) in the neotype from the original locality. The type species of *Textilinita* was based on the completely biserial specimen illustrated in the *Treatise* (***1910**, p. C253, fig. 165, 2a, b) as *Textularia sagittula* from Castel' Arquato, hence it is congeneric, although probably not conspecific, and should be known as *Textularia cognita* (Botvinnik).

Neither the holotype nor numerous additional specimens of the type species of *Textella* show any indication of an early coil; the specimens are biserial throughout, although the very coarsely agglutinated wall commonly obscures the chamber arrangement. The aperture is interiomarginal, as indicated by Mikhalevich, although not described either in the original or subsequent descriptions by Cushman.

To date, no sections have demonstrated the canaliculate wall in the probably synonymous *Norvanganina*; the supposed supplementary apertures along the peripheral margin are not regular in occurrence and appear to result from breakage, as the test shows no indication of internal septula such as occur in *Spirotextularia*. As *Norvanganina* is considered to be a synonym of *Textularia*, the type species becomes a junior secondary homonym of *Textularia sagittula* var. *fistulosa* Brady, 1884, hence is here renamed as *Textularia valeriae*, nom. nov., in recognition of the work on this group by Valeria Mikhalevich.

Subfamily SIPHOTEXTULARIINAE Loeblich and Tappan, 1985

Siphotextulariinae Loeblich and Tappan, 1985 (***1926**), p. 206.

Test free, biserial; wall agglutinated, canaliculate; aperture areal, surrounded by a distinct lip or may be elevated on a neck. Eocene to Holocene.

Remarks: Differs from the Textulariinae in the aperture invariably being in the final chamber face and commonly elevated on a neck or surrounded by a lip.

KARREROTEXTULARIA Y. Le Calvez, de Klasz, and Brun, 1974

Plate 193, figs. 13-17

Type species: Karrerotextularia gabonica Y. Le Calvez et al., 1974; OD.

Karrerotextularia Y. Le Calvez, de Klasz, and Brun, 1974 (***1808**), p. 383.

Textularinella Saidova, 1975 (***2695**), p. 129; type species: *Textularia albatrossi* Cushman, 1922 (***722**), p. 14; OD.

Test biserial, commonly subangular in section; wall finely agglutinated with carbonate cement; aperture a wide and low slitlike opening, slightly above the base of the face and bordered by a low lip. U. Middle Eocene to

Holocene; Gabon; New Zealand; S. Pacific; Atlantic; Caribbean.

Remarks: Neither specific nor generic description cited above indicates the nature of the wall microstructure. *Karrerotextularia* differs from *Siphotextularia* in having a broad and low aperture, rather than a short slit or oval opening, and in the aperture being bordered only by a lip above and below, rather than having a distinct spout or neck.

PLECANIUM Reuss, 1862

Plate 193, figs. 10-12

Type species: Textilaria labiata Reuss, 1861 (***2582**), p. 362; SD Cushman, 1928 (***747**), p. 114.

Plecanium Reuss, 1862 (***2586**), p. 383.
Textularia (Plecanium) El-Nakhal, 1980 (***1104**), p. 131, 132 (nom. transl.).

Test elongate, oval in section, biserial throughout, chambers inflated and rounded; wall agglutinated; aperture a short slit just above the base of the apertural face and completely surrounded by a lip. Miocene to Pliocene; cosmopolitan.

SIPHOSCUTULA Loeblich and Tappan, 1985

Plate 193, figs. 18, 19

Type species: Siphoscutula leroyi Loeblich and Tappan, 1985 (syn.: *Siphotextularia flintii* (Cushman) var. *pacifica* LeRoy, 1964, ***1827**, p. F18, pl. 2, figs. 3, 4; varietal names infrasubspecific, excluded from zoological nomenclature, ICZN Arts. 1 (b) (5) and 16); OD.

Siphoscutula Loeblich and Tappan, 1985 (***1926**), p. 206.

Test biserial throughout, diamond shaped in section, with angular lateral margins and medially inflated broad surfaces, chambers increasing rapidly in size as added, producing a flaring test, the final pair of chambers comprising nearly half the test length; wall finely agglutinated; aperture a small, slightly produced ovate opening just above the base of the apertural face. Miocene; Okinawa, Ryukyu Islands; New Zealand.

Remarks: Differs from *Siphotextularia* in the diamond-shaped rather than quadrate section, from *Textularinella* in the small, rounded, and somewhat produced aperture and angular test margins, and from *Valvotextularia* in the characteristic cross-section. The type species is not related to *Textularia flintii*, and the varietal name proposed by LeRoy is excluded from zoological nomenclature.

SIPHOTEXTULARIA Finlay, 1939

Plate 193, figs. 5 and 6

Type species: Siphotextularia wairoana Finlay, 1939; OD.

Siphotextularia Finlay, 1939 (***1126**), p. 510.
Karreriella (Siphotextularia) Hofker, 1976 (***1525**), p. 67 (nom. transl.).

Test biserial throughout or may have initial "triserial whorl" of a single adventitious chamber in the early part, later quadrangular in section; wall finely agglutinated, with canaliculate structure, pores either opening to the exterior or ending blindly as pseudopores; aperture areal, rounded, or a short slit, surrounded by a distinct lip or produced on a tubular neck. Eocene to Holocene; cosmopolitan.

TEXTULINA Saidova, 1975

Plate 193, figs. 7-9

Type species: Siphotextularia obesa Parr, 1950 (***2363**), p. 276; OD.

Textulina Saidova, 1975 (***2695**), p. 128.

Test biserial, chambers inflated, increasing gradually in size as added, margins rounded; wall agglutinated, aperture a short slit in the face of the final chamber, perpendicular to the base of the chamber face, and surrounded by a lip. Miocene to Holocene; S. Pacific: Tasman Sea; N. Pacific.

Remarks: Although Saidova originally included *Textularia saulcyana* d'Orbigny in *Textulina*, that species does not have the inflated chambers and rounded periphery nor the vertical slitlike aperture that we regard as the important features of *Textulina*. As restricted herein, this genus appears to be limited to the Pacific area.

Subfamily PLANCTOSTOMATINAE Loeblich and Tappan, 1984

Planctostomatinae Loeblich and Tappan, 1984 (***1918**), p. 16.

Test free, aperture basal in the early stage, later areal and cribrate. M. Eocene to Holocene.

Remarks: Differs from the Textulariinae in the cribrate areal aperture.

CRIBROBIGENERINA Andersen, 1961

Plate 194, figs. 10–13

Type species: Cribrobigenerina parkerae Andersen, 1961; OD.

Cribrobigenerina Andersen, 1961 (***34**), p. 26.

Test free, large, biserial with indistinct sutures in the early stage, later uniserial, with somewhat inflated chambers and slightly constricted sutures; wall coarsely agglutinated, with considerable cement, surface rough; aperture terminal, cribrate, with irregularly shaped openings. Holocene; USA: Louisiana.

OLSSONINA Bermúdez, 1949

Plate 194, figs. 1–5

Type species: Olssonina cribrosa Bermúdez, 1949; OD.

Olssonina Bermúdez, 1949 (***201**), p. 99.

Cribrotextularia Loeblich and Tappan, 1952 (***1883**), p. 79; type species: *Textularia coryensis* Cole, 1941 (***622**), p. 21; OD.

Test free, elongate, flaring, ovate to quadrangular in section, biserial throughout; wall agglutinated; aperture an interiomarginal arch in the early stage, with an areal ring of pores on the face of the final chamber, the basal arch may be partially closed in the later chambers, leaving a row of pores at the base of the chamber in addition to the areal cribrate aperture. M. Eocene; Dominican Republic; USA: Florida.

PLANCTOSTOMA Loeblich and Tappan, 1955

Plate 194, figs. 6–9

Type species: Textularia luculenta Brady, 1884 (***344**), p. 364; OD.

Planctostoma Loeblich and Tappan, 1955 (***1890**), p. 8.

Test free, elongate, biserial, or rarely with final chamber tending to become uniserial; wall agglutinated; aperture at the base of the chamber in the early stage, later a rounded terminal opening and may become multiple, with two or three rounded openings. Holocene; N. Atlantic; S. Atlantic; Caribbean.

Remarks: The Eocene and Oligocene species described as *Planctostoma* from Hungary (Sztràkos, 1979, ***3108**) do not appear to belong to this genus, as they lack a multiple aperture. Possibly they belong to a genus of the Siphotextulariinae.

PORITEXTULARIA Loeblich and Tappan, 1952

Plate 194, figs. 14–17

Type species: Poritextularia mexicana Loeblich and Tappan, 1952; OD.

Poritextularia Loeblich and Tappan, 1952 (***1885**), p. 264.

Test free, large, broad, and flaring, sides flattened, broad low chambers biserially arranged throughout and highest at the median zigzag suture; wall agglutinated; aperture a high vertical and elongate slit beginning at the base of the apertural face, becoming multiple in the later stage, as projections extend across the opening to form a single row of pores on the face of the final chamber. Holocene; Pacific Ocean: off Mexico.

Subfamily TAWITAWIINAE Loeblich and Tappan, 1961

Tawitawiinae Loeblich and Tappan, 1961 (***1902**), p. 282.
Tawitawiinea Saidova, 1981 (***2696**), p. 21 (supersubfamily).

Test biserial, flattened, and palmate, chambers subdivided by septula projecting downward from the chamber roof; wall thin, very coarsely agglutinated, canaliculate; aperture a terminal row of slits. Holocene.

TAWITAWIA Loeblich, 1952

Plate 194, figs. 18–23

Type species: Textularia immensa Cushman, 1913 (***705**), p. 633; OD.

Tawitawia Loeblich, 1952 (***1876**), p. 190.

Test large, flattened, of numerous low and biserially arranged chambers, strongly overlapping in the plane of biseriality, sutures slightly depressed, chambers subdivided by numerous secondary septula that project downward from the chamber roof; wall thin, with coarsely agglutinated mineral grains, shell fragments, and entire tests of smaller foraminifera, finer-grained areas canaliculate; aperture in the adult consists of a series of areal pores in a row paralleling the flat sides of the test. Holocene; N. Pacific: Philippines; S. Pacific: Indonesia.

Remarks: The very coarsely agglutinated wall, with a variety of shell fragments and entire foraminiferal tests, fish bone fragments, and mineral grains, obscures the canaliculate nature in thin section, but the pores were apparent during the process of sectioning.

Subfamily SEPTOTEXTULARIINAE Loeblich and Tappan, 1985

Septotextulariinae Loeblich and Tappan, 1985 (***1926**), p. 207.

Test free, biserial throughout, interior of chambers subdivided by a few vertical radial plates; wall agglutinated, canaliculate; aperture a low arch at the base of the apertural face. M. Miocene to Holocene.

Remarks: Differs from other Textulariidae in the vertical plates that subdivide the chamber lumen.

COLOMITA González-Donoso, 1968

Plate 195, figs. 1–4

Type species: Plecanium irregulare Seguenza, 1880 (***2839**), p. 151; OD.

Colomita González-Donoso, 1968 (***1263**), p. 73.

Test large, may be over 2 mm in length, elongate and biserial, possibly with tiny triserial base or may have an adventitious early chamber giving a pseudotriserial appearance, early stage with numerous low and flattened biserial chambers, later chambers somewhat higher and inflated, and test circular in section, interior of each chamber subdivided by about four short and narrow vertical radial partitions, sutures straight and horizontal, periphery of early stage carinate, later rounded; wall coarsely agglutinated, thick, with grains of varied size and composition, surface roughly finished; aperture interiomarginal, a low arch at the base of the flattened apertural face of the final chamber. M. Miocene (Tortonian); Italy; Spain.

Remarks: A neotype for *Plecanium irregulare* Seguenza from the Tortonian of Italy (Calabria) was designated by Ruggieri et al. (1972, ***2669**, p. 7), (University of Palermo, MP no. 778). Although no sections were made, they regarded it as biserial throughout and a synonym of *Textularia agglutinans* d'Orbigny, 1839. The generic description was based on specimens from the Depression of Granada, Spain, that were sectioned and proved to have internal partitions. The original description of *Colomita* stated that the partitions were very irregular, but thin sections received from Gonzáles-Donoso show clear boundaries of the straight and narrow partitions; extraneous material in the chamber lumen may have erroneously been regarded as part of the septula. The original generic description also indicated that the apertural face has a few large areal pores in addition to the basal aperture, but on the specimens we examined the very irregular surface appears to result from the loss of some grains from the wall, as the apparent pores are irregular both in shape and distribution. *Colomita* was originally placed in the Ataxophragmiidae, but that family is dominantly Cretaceous in age, although persisting into the Paleocene. It is here tentatively placed in the Septotextulariinae, although a canaliculate wall could not be demonstrated in the sections available.

SEPTOTEXTULARIA T. C. Cheng and S. Y. Zheng, 1978

Plate 195, figs. 5–8

Type species: Septotextularia rugosa T. C. Cheng and S. Y. Zheng, 1978 (***557**), p. 167 (syn.: *Textularia rugosa* Reuss of Brady, 1884, ***344**, p. 363, non *Plecanium rugosum* Reuss, 1869, and non *Gaudryina rugulosa* Cushman, 1932, p. 15; see ICZN Art. 70 (c), (i)); OD.

Septotextularia T. C. Cheng and S. Y. Zheng, 1978 (***557**), p. 167, 257.

Test free, large, up to 2 mm in length, stout, biserial throughout, the lower margin of each chamber deeply incised just anterior to the septa, and with about four backward directed projections on each chamber that overlap the sutures, chamber lumen subdivided by four to six vertical radial partitions that extend nearly to the center of the test; sutures slightly arched, septa thick, particularly in the vicinity of the aperture; wall agglutinated, canaliculate, thick, coarser grained near the exterior and somewhat fined grained toward the test interior; aperture a low arch at the base of the apertural face. Holocene: Pacific.

Remarks: In the original description of *Septotextularia*, T. C. Cheng and S. Y. Zheng (1978, ***557**, p. 167, 257) designated the type species as "*Textularia rugosa* Brady, 1884 (not Reuss, 1869)." The type designation as given is covered by the ICZN Art. 70 (c), and discussed in detail by Loeblich and Tappan (1985, ***1926**, p. 207). The type species is correctly cited as *Septotextularia rugosa* T. C. Cheng and S. Y. Zheng, 1978.

Subfamily TEXTULARIOIDINAE Loeblich and Tappan, 1984

Textularioidinae Loeblich and Tappan, 1984 (***1918**), p. 17.

Test attached in early stage, later may grow free of attachment; aperture a low arch at base of final chamber. Holocene.

Remarks: Differs from the Textulariinae in being attached in the early stage.

TEXTULARIOIDES Cushman, 1911

Plate 196, figs. 5-7

Type species: Textularioides inflatus Cushman, 1911; OD.

Textularioides Cushman, 1911 (***702**), p. 26.

Test attached, at least in the early stage, biserial, and somewhat flattened against the attachment, although final chambers may grow free of the attachment; wall coarsely agglutinated, coarsely canaliculate; aperture a low arch or slit at the base of the final chamber face. Holocene; N. Pacific.

Family PSEUDOGAUDRYINIDAE Loeblich and Tappan, 1985

Pseudogaudryinidae Loeblich and Tappan, 1985 (***1926**), p. 209.

Test elongate, early stage triserial, later reduced to biserial or uniserial; wall agglutinated, canaliculate; aperture an interiomarginal arch. U. Cretaceous to Holocene.

Remarks: Differs from the Verneuilinidae in the canaliculate wall and differs from the Valvulinidae in having a simple aperture without a tooth.

Subfamily PSEUDOGAUDRYININAE Loeblich and Tappan, 1985

Pseudogaudryininae Loeblich and Tappan, 1985 (***1926**), p. 209.

Chambers simple, not subdivided. U. Cretaceous to Holocene.

CLAVULINOIDES Cushman, 1936

Plate 196, figs. 8 and 9

Type species: Clavulina trilatera Cushman, 1926 (***734**), p. 588; OD.

Clavulinoides Cushman, 1936 (***781**), p. 20.

Test free, elongate, triangular throughout with distinct to carinate angles, early chambers triserially arranged, later abruptly becoming uniserial, test of microspheric generation flaring, megalospheric generation with nearly parallel margins in the adult; wall agglutinated, lateral walls canaliculate, the canaliculi opening into the chamber lumen but closed at the exterior by an outer pavement layer of the wall; aperture simple, interiomarginal in the triserial stage, terminal, areal, and rounded in the uniserial stage. Paleocene; Cuba; Trinidad; Venezuela; USA: Texas; Mexico; Algeria.

CLAVULINOPSIS Banner and Desai, 1985

Plate 196, figs. 1-4

Type species: Clavulinopsis hofkeri Banner and Desai, 1985; OD.

Clavulinopsis Banner and Desai, 1985 (***129**), p. 82.

Clavulinopsis Towe, 1984 (***3219**), p. 318 (nom. nud.).

Test free, triangular in section, early stage triserial, later abruptly becoming uniserial, chambers simple, sutures slightly depressed, horizontal to slightly arched at the center of the flattened sides; wall agglutinated, with considerable calcareous groundmass, lateral walls canaliculate, with canaliculi opening into the chamber lumen but sealed externally by a finely agglutinated outer layer, septa solid and noncanaliculate; aperture cribrate, with irregular pores at the end of a slightly produced neck. U. Cretaceous (Campanian to Maastrichtian); USA: Texas, Arkansas.

MIGROS Finlay, 1939

Plate 196, figs. 10-13

Type species: Gaudryina medwayensis Parr, 1935 (*2357), p. 83; OD.

Migros Finlay, 1939 (*1128), p. 312.

Test triserial and triangular in the early stage, later biserial; wall thick, coarsely agglutinated, canaliculate; aperture an ovate opening that in the early stage may be connected to the base of the apertural face by a narrow groove or depression, later becoming completely areal. M. Miocene to Holocene; New Zealand; N. and S. Pacific; N. and S. Atlantic; Gulf of Mexico; Jamaica; Trinidad.

PSEUDOCLAVULINA Cushman, 1936

Plate 197, figs. 10 and 11

Type species: Clavulina clavata Cushman, 1926 (*734), p. 589; OD.

Pseudoclavulina Cushman, 1936 (*781), p. 16.

Test free, elongate, early stage triserial and triangular, then uniserial with cylindrical chambers; wall agglutinated, finely canaliculate; aperture terminal, a semicircular to circular opening but without a distinct tooth. U. Cretaceous to L. Eocene; Mexico; Trinidad, West Indies; USA; Belgium; England; Denmark; Poland; Sweden; Germany; Netherlands.

PSEUDOGAUDRYINA Cushman, 1936

Plate 197, figs. 5-9

Type species: Textularia atlantica Bailey, 1851 (*106), p. 12; OD.

Gaudryina (Pseudogaudryina) Cushman, 1936 (*781), p. 12.

Test free, elongate, early stage triserial, later biserial, but test triangular throughout, so that the two series of angular biserial chambers are dissimilar, one series being roughly triangular in section and the other quadrangular in section, maintaining the triangular test shape; wall agglutinated, canaliculate; aperture an interiomarginal arch. U. Cretaceous (Senonian) to Holocene; Jamaica; Trinidad; USA: Texas, South Carolina; Australia; Caribbean; Gulf of Mexico; Atlantic; Germany.

Remarks: Thin sections of the type species of *Pseudogaudryina* show a distinctly canaliculate wall, whereas sections of the type species of *Gaudryina*, the Cretaceous *Gaudryina rugosa* d'Orbigny, show it to be noncanaliculate (Loeblich and Tappan, 1985, *1926, p. 209). Thus the canaliculate *Pseudogaudryina* can neither be regarded as a synonym nor as a subgenus of the noncanaliculate *Gaudryina* and is here recognized as a distinct genus.

VALVOREUSSELLA Hofker, 1957

Plate 197, figs. 1-4

Type species: Verneuilina bronni Reuss, 1846 (*2571), p. 38; OD.

Valvoreussella Hofker, 1957 (*1512), p. 87.

Test elongate, sharply triangular in section, early stage triserial, later biserial and may be flattened or irregularly triangular in section; wall finely agglutinated, canaliculate, surface smoothly finished; aperture interiomarginal in the triserial stage but may be somewhat above the base in the biserial stage, provided with a tooth. U. Cretaceous (Turonian to Campanian); Czechoslovakia; Germany; Netherlands.

Remarks: As noted by Hofker (1957, ***1512**, p. 88) the specimens illustrated as *Gaudryina bronni* (Reuss) by Cushman (1937, ***782**, pl. 5, figs. 4-6) and later by Loeblich and Tappan (1964, ***1910**, fig. 179, 7a,b) are not of this species but of a more coarsely agglutinated one with rounded angles. Specimens of *Verneuilina bronni* from the type area and horizon in Czechoslovakia, which are pyramidal with sharp angles and slightly concave sides and are very close to the original illustration of Reuss, have been sectioned and show neither a canaliculate wall nor an apertural tooth. If Hofker's specimens are conspecific, the discrepancy may be due to better preservation of the subsurface specimens that he studied. Thus the above generic description is largely taken from Hofker (1957, ***1512**), pending further study of better preserved material.

Subfamily SIPHONIFEROIDINAE Loeblich and Tappan, 1985

Subfamily Siphoniferoidinae Loeblich and Tappan, 1985 (*1926), p. 211.

Test with a chamberlet formed at the extremity of each chamber, communicating with the main chamber cavity only through the wall canaliculi, chamberlets originally closed externally but may be opened as a result of abrasion. Holocene.

PLOTNIKOVINA Mikhalevich, 1981

Plate 198, figs. 1–4

Type species: Gaudryina (Siphogaudryina) compressa Cushman, 1935 (*778), p. 3; OD.

Plotnikovina Mikhalevich, 1981 (*2110), p. 38.

Test elongate, with short early triserial and triangular stage and later biserial stage, with flattened to rhomboid section, chambers broad and low, lateral extremities distinctly produced at the chamber angle, an internal vertical partition then isolating a small distal chamberlet, inner partitions of successive chambers approximately in vertical alignment, the tip of the chamberlets commonly broken to leave a small opening at the surface; sutures slightly depressed, straight, at a slight angle from the horizontal; wall finely agglutinated, extremely thin outer wall of the lateral projections formed by the chamberlets, septa and vertical partitions canaliculate; aperture an interiomarginal arch. Holocene; Atlantic; Caribbean; S. Pacific.

Remarks: Both *Plotnikovina* and *Siphoniferoides* were proposed in 1981 and both originally included *Textularia siphonifera* Brady. *Plotnikovina* is here recognized in a more restricted sense, for species with flattened tests or with rhomboidal section in the biserial stage and with chamberlets restricted to the lateral angles. *Siphoniferoides* has rows of chamberlets on the chamber faces as well as the lateral edges and a nearly circular section in the biserial stage. Both genera were said to have lateral supplementary apertures, but both instead have lateral chamberlets cut off by vertical internal partitions; openings present in some specimens are due to secondary breakage of the chamberlet tips, rather than apertures communicating with the chamber lumen. The canaliculate wall was not mentioned for either genus, but sectioned specimens of their type species clearly demonstrate this.

SIPHONIFEROIDES Saidova, 1981

Plate 198, figs. 5–9

Type species: Textularia siphonifera Brady, 1881 (*339), p. 53; OD.

Siphoniferoides Saidova, 1981 (*2696), p. 25.

Test elongate, early stage triserial and sharply triangular, later biserial, chambers with fistulose projections at the lateral angles, and later chambers with similar projections in vertical rows on the chamber faces, the rows occasionally bifurcating so that the adult test may have six to eight such rows of tubular outgrowths that form small chamberlets external to the main chamber wall and cavity, lacking any connection with the test interior other than through the wall canaliculi, fistulose chamberlets also closed to the exterior in well-preserved specimens but commonly broken, irregular to vermiform openings of the wall canaliculi may be seen through the opening left into the chambers when tips of some or all projections are worn or broken; wall agglutinated, that of the sides of the test itself distinctly canaliculate but wall of the tubular projections, septa, and apertural face noncanaliculate, openings of the canaliculi irregular, the path of the pores then straight through the wall itself; aperture a low arch at the base of the apertural face, small and nearly circular in young specimens, forming a somewhat more elongate slit in the adult. Holocene; Indo-Pacific.

Remarks: *Siphoniferoides* was originally placed in the subfamily Gaudryininae, family Verneuilinidae, but has a canaliculate wall (Loeblich and Tappan, 1985, ***1926**, p. 211), whereas the Gaudryinidae are noncanaliculate.

Family VALVULAMMINIDAE Loeblich and Tappan, 1986

Valvulamminidae Loeblich and Tappan, 1986 (*1929), p. 341.

Test planoconvex, enrolled in a low trochospiral, sutures curved backward on the spiral side, more nearly radial on the opposite and umbilicate side; wall agglutinated, canaliculate; aperture umbilical in position, with a large valvuline tooth that in advanced forms becomes a distinctive umbilical flap or may be replaced by a convex trematophore plate. Eocene to Oligocene, ?Miocene.

Remarks: Differs from the Valvulinidae in the low trochospiral test, rather than a triserial and triangular early stage and elongate adult test.

ARENAGULA Bourdon and Lys, 1955

Plate 199, figs. 7-9

Type species: Arenagula globula Bourdon and Lys, 1955; OD.

Arenagula Bourdon and Lys, 1955 (*318), p. 336.

Test large, about 1.25 mm in greatest breadth, chambers forming a low trochospiral coil, five chambers in the first whorl, later increasing in breadth and number as the whorl expands rapidly, spiral side convex, umbilical side flattened; wall agglutinated, canaliculate, may have incipient pillars projecting slightly from the septa; aperture valvuline in the early stage, later cribrate, consisting of large irregular openings scattered over a convex plate covering the umbilicus and final chamber face. M. Eocene (Lutetian) to Oligocene, ?Miocene; France; Greece; USA: Florida; Pacific: Marshall Islands.

Remarks: Poignant (1964, *2438, p. 215) regarded *Cribrobulimina floridana* Cole, 1942, from the Eocene of Florida, and *Arenagula globula* as conspecific with *Lituonella kerfornei* Allix, 1922 from the M. Eocene. We regard these as three distinct species of *Arenagula.*

DISCORINOPSIS Cole, 1941

Plate 199, figs. 1-6

Type species: Discorinopsis gunteri Cole, 1941; OD.

Discorinopsis Cole, 1941 (*622), p. 36.

Test free, large, up to 2.9 mm in greatest breadth, chambers in a low trochospiral coil, about five in the first whorl, increasing very slowly in height but rapidly in breadth so that later whorls have more chambers, the increased height of the spire resulting in an auriculate test, spiral side strongly convex, umbilical side flattened to concave, with broad umbilicus, chamber lumen open and undivided, sutures strongly curved on the spiral side, nearly radial on the umbilical side, internally the septa thicken toward their umbilical ends; wall agglutinated of calcareous particles, canaliculate; chambers opening into the umbilicus that is covered by a prominent umbilical apertural flap, growing continuously in a corkscrewlike spiral from an early stage, with successive attachments to the umbilical margin of each chamber of the final whorl, flap pierced by large pores in the center as well as at the edges. M. Eocene; USA: Florida.

VALVULAMMINA Cushman, 1933

Plate 199, figs. 10-17

Type species: Valvulina globularis d'Orbigny, 1826 (*2303), p. 270 (err. cit. as *V. globulosa* by Cushman, 1933, *769, p. 37); OD.

Valvulammina Cushman, 1933 (*769), p. 37.

Test planoconvex, low trochospire of about five inflated chambers per whorl, enlarging rapidly so that the final chamber occupies about one-half of the umbilical surface of the test, sutures arched and oblique on the spiral side, radial and straight on the umbilical side; wall canaliculate, finely agglutinated, largely of calcareous particles, with a proteinaceous lining; aperture umbilical in position, partially covered by a broad umbilical flap that occupies about one-third of the test diameter, those of earlier chambers remaining visible within the open umbilicus. Eocene; France; Cuba.

Family VALVULINIDAE Berthelin, 1880

Valvulinidae Berthelin, 1880 (*221), p. 16.

Test trochospiral in early stage, later may have an increased number of chambers per whorl, or may become uniserial; wall agglutinated, canaliculate; aperture with valvular tooth or flap at least in early stage, may become multiple and areal in later stage. Paleocene to Holocene.

Subfamily VALVULININAE Berthelin, 1880

Valvulininae Schubert, 1921 (*2823), p. 179, nom. transl. ex family.

Clavulininae Balakhmatova, 1973 (*111), p. 53.

Test trochospiral to triserial in early stage, number of chambers per whorl later may increase or decrease. Paleocene to Holocene.

CLAVULINA d'Orbigny, 1826

Plate 200, figs. 1-5

Type species: Clavulina parisiensis d'Orbigny, 1826; SD Cushman, 1911 (***702**), p. 72.

Clavulina d'Orbigny, 1826 (*2303), p. 268.

Test elongate, early stage triserial and triangular in section, later stage uniserial and rectilinear, with angular to rounded section; wall agglutinated, with considerable calcareous cement, in at least some species addition of a new chamber results in addition of an imperforate floor to the new chamber, so that the septa are secondarily doubled; wall canaliculate, fine canaliculi bifurcating within the wall, openings of the canaliculi sealed internally by an inner organic lining, and externally by the imperforate surface layer of the wall; aperture interiomarginal in the early triserial stage, terminal and rounded in the adult, with imperforate bordering rim and an imperforate apertural toothplate obstructing part of the aperture, reducing it to a semilunate form, then extending inward from the aperture through the chamber to attach to that preceding, successive toothplates oriented 120° apart, reflecting the original triseriality. Paleocene to Holocene; cosmopolitan.

CRIBROBULIMINA Cushman, 1927

Plate 200, figs. 8-13

Type species: Valvulina mixta Parker and Jones, 1865 (***2351**), p. 438 (= *Valvulina* Carpenter, Parker, and Jones, 1862 (***494**), pl. 11, figs. 19-21, 24-26); OD.

Cribrobulimina Cushman, 1927 (*739), p. 80.

Test free, early stage triserial and triangular as in *Valvulina*, later with a loose spiral of five or more chambers per whorl and a rounded section; wall agglutinated, thick, both outer wall and septa canaliculate; aperture in early stage interiomarginal as in *Valvulina*, in the later stage the nearly circular platelike tooth attaches to the opposite wall, with large circular openings along its margin and over the surface of the apertural plate. Holocene; Australia.

Remarks: Contrary to the opinion stated in the *Treatise* (Loeblich and Tappan, 1964, ***1910**, p. C279), the reference by Parker and Jones (1865, ***2351**, p. 437, footnote) to earlier figures published in Carpenter et al. (1862, ***494**, pl. 11, figs. 19, 20, 25, 26) then was sufficient to validate *Valvulina mixta* (see ICZN Arts. 12 (a), and 12 (b) (1), and Parker and Jones's citation of Carpenter et al.'s pl. 11, fig. 21, 24 validated *Valvulina polystoma*, hence both nominal species correctly are credited to Parker and Jones. However, the two are conspecific, merely representing degrees of development of the multiple aperture.

CRIBROGOESELLA Cushman, 1935

Plate 201, figs. 1-4

Type species: Bigenerina robusta Brady, 1881 (***339**), p. 53; OD.

Cribrogoesella Cushman, 1935 (*778), p. 4.

Test large, elongate, early stage trochospiral with up to five chambers per whorl, rapidly reducing to three per whorl, then biserial and finally uniserial in the adult; wall moderately coarsely agglutinated, surface smoothly finished, thick, both lateral walls and septa strongly canaliculate; aperture interiomarginal in early stage, terminal and cribrate in the later uniserial stage. Miocene to Holocene; W. Atlantic; Trinidad, West Indies.

CYLINDROCLAVULINA Bermúdez and Key, 1952

Plate 201, figs. 7-13

Type species: Clavulina bradyi Cushman, 1911 (***702**), p. 73; OD.

Cylindroclavulina Bermúdez and Key, 1952 (*210), p. 76.

Test free, large, robust, cylindrical, short early triserial stage in the microspheric generation, megalospheric generation with only a slightly arcuate early series but without a distinct triserial stage, uniserial stage elongate; wall coarsely agglutinated, very thick, leaving a reduced chamber lumen; aperture rounded, terminal on a neck that flares somewhat at the rim, with distinct small valvular tooth projecting from one side. Oligocene to Holocene; Pacific; Italy; Hungary.

GOESELLA Cushman, 1933

Plate 200, figs. 6 and 7

Type species: Clavulina rotundata Cushman, 1913 (***705**), p. 635; OD.

Goesella Cushman, 1933 (***769**), p. 34.

Test large, elongate, up to 3 mm in length, tapering toward the base, and later nearly cylindrical in section, early stage trochospirally coiled with four to five chambers per whorl, later reduced to triserial, biserial, and finally uniserial, chamber interior not subdivided; sutures distinct, slightly depressed; wall coarsely agglutinated, coarse particles held in a fine-grained groundmass, wall of eroded specimens appearing somewhat vacuolar, exterior smoothly finished, reddish-brown in color; aperture terminal, central, rounded to irregular or may have a poorly developed tooth. Eocene to Holocene; cosmopolitan.

GYROVALVULINA Loeblich and Tappan, 1985

Plate 202, figs. 1-5

Type species: Valvulina columnatortilis d'Orbigny in Guerín-Menéville, 1843 (***1339**), p. 9, pl. 2, fig. 14 (also as *columna-tortilis* and *columna-tordis* on p. 9; as *columna-torilis* on pl. 2, fig. 14); = *Valvulina columna-tortilis* d'Orbigny, 1826, ***2303**, p. 270, name not available, ICZN Art. 13 (a) (i) no description); OD.

Gyrovalvulina Loeblich and Tappan, 1985 (***1926**), p. 213.

Test elongate, early stage triangular and triserial, later with relatively low chambers in a loose spiral, chambers gradually becoming broader and fewer per whorl, until each chamber extends more than half the distance around the test but is not completely uniserial; wall coarsely agglutinated, thick, canaliculate, surface roughly finished; aperture terminal and ovoid, with a distinct tooth that because of the spiralling nature of the terminal chamber projects obliquely within the chamber cavity. M. to U. Eocene (Lutetian to Bartonian); France: Paris Basin; USA: Florida; New Zealand.

Remarks: The correct name of the type species, variously cited in the literature, is discussed by Loeblich and Tappan (1985, ***1926**, p. 214). The holotype is in the MNHN, Paris, d'Orbigny collection FO-01.

Gyrovalvulina differs from *Valvulina* in the loosely spiralling adult stage, with less than three chambers per whorl, and having later chambers that may encircle the test; it differs from *Clavulina* in the loosely spiralling chamber arrangement after the triserial early stage, whereas *Clavulina* has an elongate uniserial stage abruptly following the triserial base.

MAKARSKIANA van Soest, 1942

Plate 201, figs. 5 and 6

Type species: Makarskiana trochoidea van Soest, 1942; OD.

Makarskiana van Soest, 1942 (***3015**), p. 27.

Test in a trochospiral coil, with four to five chambers in the early whorls, later reduced to three or four per whorl, chambers inflated, sutures incised, gently curved, and slightly oblique; wall agglutinated; aperture a high arched opening with a narrow valvuline tooth. M. to U. Eocene; Yugoslavia.

NEOCLAVULINA Puri, 1957

Plate 202, fig. 16

Type species: Valvulina intermedia Applin and Jordan, 1945 (***54**), p. 134; OD.

Neoclavulina Puri, 1957 (***2484**), p. 106.

Test elongate, cylindrical, early stage triserial, later with inflated chambers in an elongate spiral, gradually reduced to two per whorl, sutures depressed; wall agglutinated, whether solid or canaliculate not described; aperture with a valvular tooth. M. Eocene; USA: Florida.

VALVULINA d'Orbigny, 1826

Plate 202, figs. 6 and 7

Type species: Valvulina triangularis d'Orbigny, 1826; SD Parker, Jones, and Brady, 1865 (***2354**), p. 35.

Valvulina d'Orbigny, 1826 (***2303**), p. 268, 270.

Test triserial, triangular in section, sides flattened; wall agglutinated, canaliculate, the canaliculi sealed externally to form pseudopores, and in Holocene species at least are sealed internally by the organic lining; aperture interiomarginal, at the junction of the chambers of the final whorl, a prominent flaplike tooth projecting from the midpoint of the apertural rim and bordered on each side by strong indentations of the chamber margin. M. Eocene to Holocene; cosmopolitan.

Subfamily SIPHOBIGENERININAE Loeblich and Tappan, 1986

Siphobigenerininae Loeblich and Tappan, 1986 (*1929), p. 341.

Test biserial in the early stage, later uniserial; wall agglutinated, canaliculate; aperture terminal, ovate, with an internal toothplate whose changing orientation in successive chambers reflects the biserial early stage. Holocene.

Remarks: Differs from the Valvulininae in the biserial early stage. The similarity in wall and apertural characters suggests that the early triserial development has been lost.

SIPHOBIGENERINA S. Y. Zheng, 1979

Plate 202, figs. 11-15

Type species: Siphobigenerina compressa S. Y. Zheng, 1979; OD.

Siphobigenerina S. Y. Zheng, 1979 (*3449), p. 114, 201.

Test elongate, ovate in section, early stage biserial, later uniserial and rectilinear, each chamber somewhat overlapping that preceding; wall finely agglutinated, canaliculate, surface smoothly finished; aperture terminal, ovate, with thickened margin, and with a half funnel-shaped toothplate attached to one margin and extending within for less than half the length of the chamber lumen, those of successive chambers alternating in orientation by 180° thereby reflecting the earlier biserial development. Holocene; China: Xisha Islands, Guangdong Province.

Remarks: Originally referred to the Textulariidae, *Siphobigenerina* differs in the presence of the internal toothplate. It resembles *Clavulina* in having the internal siphonlike toothplate that changes in orientation from chamber to chamber and in the canaliculate agglutinated wall.

Subfamily TRITAXILININAE Loeblich and Tappan, 1986

Tritaxilininae Loeblich and Tappan, 1986 (*1929), p. 342.

Test trochospiral in the early stage, later biserial or uniserial, chamber interior subdivided by vertical radial exoskeletal beams; wall agglutinated, thick, canaliculate, with organic lining; aperture interiomarginal to areal. Eocene to Holocene.

Remarks: Differs from the Valvulinidae in having vertical radial exoskeletal beams subdividing the chambers.

TRITAXILINA Cushman, 1911

Plate 202, figs. 8-10

Type species: Clavulina caperata Brady, 1881 (*339), p. 54; OD.

Tritaxilina Cushman, 1911 (*702), p. 71.

Clavulinella Schubert, 1921 (*2823), p. 181; type species: obj., OD(M).

Test free, elongate, early stage in high trochospiral coil of up to five chambers per whorl, number of chambers per whorl later reduced and finally uniserial, chambers subdivided internally by up to fourteen vertical radial exoskeletal beams; wall thick, agglutinated, canaliculate; aperture interiomarginal in the early stage, later terminal, and rounded, radiate, or multiple, consisting of a few slitlike openings. Eocene to Holocene; cosmopolitan.

Family GLAUCOAMMINIDAE Saidova, 1981

Glaucoamminidae Loeblich and Tappan, 1985 (*1926), p. 211, nom. transl. ex subfamily.

Glaucommininae Saidova, 1981 (*2696), p. 23 (subfamily; nom. imperf.).

Test elongate, irregularly flattened, triangular or quadrangular in section, large chambers forming a single rectilinear series, the angularity reflecting a possible triserial ancestry, sutures obscure, periphery rounded to slightly subangular; wall very coarsely agglutinated, with a few large irregular canaliculi between the foreign particles, surface roughly finished; aperture terminal, slitlike to ovate. Holocene.

Remarks: Differs from the Valvulinidae in lacking an early trochoid or triserial stage and in the absence of a valvular tooth. The subfamily was originally described within the family Conotrochamminidae by Saidova but lacks a high trochospiral coil. It was considered as a synonym of the Verneuilininae by Loeblich and Tappan (**1984**, *1918, p. 14) as *Glaucoammina* was originally described as initially triserial. Restudy of the type species has shown it to be uniserial and the canaliculate wall required its placement in a distinct family.

GLAUCOAMMINA Seiglie and Bermúdez, 1969

Plate 203, figs. 1-4

Type species: Reophax trilateralis Cushman, 1935 (***778**), p. 2; OD.

Glaucoammina Seiglie and Bermúdez, 1969 (***2855**), p. 200.

Test elongate, broadest in the early triangular to quadrangular or flattened stage, later with nearly parallel sides, and may continue to be triangular or become broadly flattened to somewhat ovoid in section, chamber arrangement obscure from the exterior because of the coarsely agglutinated wall, sectioned specimens show it to be completely uniserial with somewhat overlapping chambers, but the triangular section suggests that it is probably derived from a triserial ancestor; wall coarsely agglutinated, the large grains tending to obscure the septa and chambers externally, with scattered large canaliculi of irregular form and orientation as they are offset by the large foreign particles in the wall; aperture terminal, ovate to slitlike. Holocene; Cuba; Atlantic Ocean: Puerto Rico Trench.

Remarks: As indicated by Loeblich and Tappan (1985, ***1926**, p. 213), all of the numerous thin sections of specimens from Cuba, both the triangular ones that closely resemble the holotype of the type species and the irregularly rounded and flattened and compressed specimens, proved to be wholly uniserial, regardless of the external form of the test. None are triserial in the early stage as had been reported. The perforated and very coarsely agglutinated wall separates *Glaucoammina* from the characteristically uniserial Hormosinidae, which have a simpler and solid wall, as well as from the Cribratinidae, which have a distinctly labyrinthic wall. The external morphology suggests derivation from a triserial ancestry, however.

Family CHRYSALIDINIDAE Neagu, 1968

Chrysalidinidae Loeblich and Tappan, 1982 (***1917**), p. 28, nom. transl. ex subfamily Chrysalidininae.
Chrysalidininae Neagu, 1968 (***2234**), p. 120 (subfamily).
Parurgonininae Septfontaine, 1986 (***2875A**), p. 55 (nom. imperf. as Parurgoniniinae; name not available, ICZN Art. 13 (a) (i), no description).

Test triserial, later biserial, with globular chambers; wall finely agglutinated, canaliculate; aperture multiple, covering a large area of the apertural face that is supported by pillars. U. Jurassic (Oxfordian) to U. Eocene.

CHRYSALIDINA d'Orbigny, 1839

Plate 204, figs. 1-5

Type species: Chrysalidina gradata d'Orbigny, 1839; OD(M).

Chrysalidina d'Orbigny, 1839 (***2304**), p. 109.
Pupina d'Orbigny, 1839 (***2304**), p. 29, 30 (non *Pupina* Vignard, 1829).

Test elongate conical, triserial, with numerous low and strongly overlapping chambers, the final three occupying one-third to one-half the test length, sutures horizontal on the faces of the test, interior of peripheral region of chambers undivided, but central area of the chamber beneath the apertural pores has short thick endoskeletal pillars projecting inward from the chamber roof, some completely crossing the chamber lumen; wall thick, finely agglutinated, largely of calcareous particles, very finely canaliculate; aperture consisting of numerous fine pores over the umbilical area and most of the upper surface of the three chambers of the final whorl, part of this porous region of the two previous chambers remaining exposed as each new chamber is added, outer row of pores in a slight groove that marks the border of the perforated region. M. Cretaceous (Cenomanian to Turonian); France; Yugoslavia.

Remarks: True *Chrysalidina* is of limited stratigraphic occurrence. Tertiary species placed here are not closely related.

DUKHANIA Henson, 1948

Plate 205, figs. 1 and 2

Type species: Dukhania conica Henson, 1948; OD.

Dukhania Henson, 1948 (*1459), p. 614.

Test elongate, triserial at the conical base, later biserial with nearly parallel sides, chambers strongly overlapping, sutures horizontal, narrow outer region of chambers undivided, forming the "marginal trough" of Henson, remainder of test interior filled from a very early stage of growth by numerous interseptal pillars of somewhat irregular thickness, oriented perpendicular to the surface of the apertural face; wall agglutinated, outer wall very thin, lateral wall and that covering the marginal trough simple, but remainder of the convex apertural face or "central shield" of Henson pierced by many circular apertural pores, some of the pores of all chambers of the final whorl remaining open. L. to M. Cretaceous; Arabia: Qatar Peninsula; Iran; Palestine.

Remarks: Although earlier regarded as a synonym of the Eocene *Pseudochrysalidina* (Loeblich and Tappan, 1964, *1910, p. C290), *Dukhania* is more closely related to *Chrysalidina,* from which it differs in becoming biserial in the later stage and in having a more extensive endoskeleton. *Dukhania* was originally described as having numerous chambers per whorl in the nucleoconch, but topotypes show only a triserial base, although the ontogenetically very early development of the endoskeletal pillars might give the false appearance of chambers in poorly preserved or abraded specimens.

PARURGONINA Cuvillier, Foury, and Pignatti Morano, 1968

Plate 206, figs. 1-5

Type species: Urgonina (Parurgonina) caelinensis Cuvillier et al., 1968; OD.

Urgonina (Parurgonina) Cuvillier, Foury, and Pignatti Morano, 1968 (*864A), p. 150.

Parurgonina Schroeder, in Schroeder et al., 1975 (*2806), p. 323 (nom. transl.).

Test a high cone, with globular proloculus and early trochospiral stage followed by rectilinear discoidal chambers, earliest trochospiral chambers undivided, later part of the enrolled test and the uniserial stage with vertical pillars in the central region of the test; wall agglutinated, outer wall finely canaliculate; aperture a series of large pores over the flattened terminal face, those of earlier chambers remaining as large septal pores between the pillars. U. Jurassic (Oxfordian to U. Portlandian); Italy; Greece; Switzerland; Yugoslavia; Algeria.

PFENDERICONUS Hottinger and Drobne, 1980

Plate 206, figs. 6-11

Type species: Lituonella makarskae van Soest, 1942 (*3015), p. 27; OD.

Chrysalidina (Pfendericonus) Hottinger and Drobne, 1980 (*1555), p. 216, 222, 224, 257.

Chrysalidina (Pfendericonus) Hottinger and Drobne, in Drobne, 1979 (*1007), p. 54 (name not available, ICZN Art. 13 (a) (i), no description).

Test with early stage in a high trochospiral coil, up to 3 mm in length, megalospheric test with globular proloculus followed by three to four chambers in the first whorl that has no endoskeletal structures, later with as many as six to ten wedgelike chambers per whorl, and may become uniserial in the final stage, peripheral region of chambers inflated and internally undivided; wall agglutinated, external wall canaliculate; wide umbilicus covered by convex extension of apertural face forming a central shield, successive extensions connected by widely spaced thin vertical endoskeletal pillars arranged in semicircles that alternate in position from chamber to chamber; apertural face strongly inclined to the axis of coiling, at about a 45° angle, with apertures in a semicircular row at the edge of the marginal zone, central shield pierced by numerous foramina that are aligned from chamber to chamber, diverging from the apex toward the apertural surface. U. Paleocene (Ilerdian): Pakistan; M. to U. Eocene: Yugoslavia.

Remarks: Although described as a subgenus of the Cretaceous *Chrysalidina*, *Pfendericonus* is here elevated to generic status as chambers are arranged in a multichambered trochospiral rather than triserial, and the apertures are limited to a central shield formed by an extension of the chamber margin over the umbilicus instead of being irregularly spaced on a caplike structure over the umbilicus.

PSEUDOCHRYSALIDINA Cole, 1941

Plate 205, figs. 3-10

Type species: Pseudochrysalidina floridana Cole, 1941; OD.

Pseudochrysalidina Cole, 1941 (*622), p. 35.
Pseudogoesella Keijzer, 1945 (*1668), p. 190; type species: *Pseudogoesella cubana* Keijzer, 1945; OD.

Test with early subconical and triserial stage, later biserial with more nearly parallel sides, few inflated chambers increasing rapidly in height and diverging from the test axis as added, the umbilical margin of the chamber wall curved downward as a partial partition to separate the undivided chamber lumen from the axial region, domed and perforated platelike extension from each chamber covers the umbilicus, vertical pillars extending from one to the next, and the plates perforated by round apertural pores, sutures incised, oblique; wall agglutinated, largely of calcareous material; aperture interiomarginal in the early stage, later consisting of numerous pores over much of the upper surface of the porous plate of the final chamber, successive plates covering those of previous chambers. L. to U. Eocene; USA: Florida; Yugoslavia; Somalia; Cuba; Dominican Republic; Jamaica.

Remarks: Difficult to see, the early stage was said to have "? 3" chambers in the first whorl (Keijzer, 1945, *1668, p. 190), four chambers per whorl (Bermúdez, 1949, *201, p. 100), or "about five" (Hottinger and Drobne, 1980, *1555, p. 221), but all topotype specimens we examined have only three chambers in the earliest whorl. Although placing *Pseudochrysalidina* in the synonymy of the mid-Cretaceous *Chrysalidina*, Hottinger and Drobne (1980, *1555, p. 221) nevertheless regarded it as an unrelated isomorph. In addition to the stratigraphic distance separating them, *Pseudochrysalidina* has fewer and more inflated chambers, oblique sutures, a biserial later stage, an open chamber lumen, and pillars and apertural pores restricted to the domed plate covering the umbilical region, whereas *Chrysalidina* is entirely triserial, has numerous strongly overlapping chambers and horizontal sutures, a chamber lumen much reduced by the many interseptal pillars, and the apertural pores remain open in all three chambers of the final whorl. *Coskinolina alvus* Silvestri, 1939, Eocene of Somalia, apparently is a *Pseudochrysalidina*.

VACUOVALVULINA Hofker, 1966

Plate 203, figs. 5-12

Type species: Marssonella keijzeri van Bellen, 1946 (*182), p. 30; OD.

Vacuovalvulina Hofker, 1966 (*1517), p. 249.

Test small, conical, with an early trochospiral coil of about four chambers per whorl, later with three or only two broad, low chambers per whorl around a continually widening umbilicus, final chamber occupying up to three-fourths of the test circumference, a strong umbilical flap from the final chamber extends over the umbilical area and covers similar flaps from previous chambers to form a lamellar central region; wall agglutinated, outer wall strongly canaliculate, but apertural surface solid; aperture from the chamber opening into the central region beneath the umbilical flap. Paleocene (Montian); Netherlands; Belgium.

Remarks: Originally placed in the Valvulinidae, *Vacuovalvulina* appears more closely related to the Chrysalidinidae in having numerous overlapping umbilical flaps and in the chamber aperture leading into the lamellar central region rather than directly to the exterior. It differs from other Chrysalidinidae in lacking pores through the flap.

Suborder FUSULININA Wedekind, 1937

Fusulinina Loeblich and Tappan, 1961 (*1904), p. 219, nom. corr. pro suborder Fusulinacea.

Cribrostomacea Wedekind, 1937 (*3355), p. 79.
Cribrospiracea Wedekind, 1937 (*3355), p. 79.
Fusulinacea Wedekind, 1937 (*3355), p. 79.
Endothyrida Fursenko, 1958 (*1199), p. 23 (order).
Fusulinida Fursenko, 1958 (*1199), p. 23 (order).
Palaeotextulariina Hohenegger and Piller, 1975 (*1533), p. 84.
Tournayellida Hohenegger and Piller, 1975 (*1533), p. 79 (order).
Archaediscida Poyarkov and Skvortsov, 1979 (*2467), p. 15 (order).
Rotaliea Mikhalevich, 1980 (*2108), p. 55 (class; partim).
Rotaliata Mikhalevich, 1980 (*2108), p. 56 (subclass; partim).
Parathuramminida Mikhalevich, 1980 (*2108), p. 57 (order).
Fusulinoida Mikhalevich, 1980 (*2108), p. 56 (superorder).
Ozawainellida Solov'eva, 1980 (*3025), p. 20 (order).
Biseriamminida Mikhalevich, 1981 (*2110), p. 39 (order).
Tetrataxida Mikhalevich, 1981 (*2110), p. 39 (order).
Archaediscina Haynes, 1981 (*1437), p. 137 (suborder).
Staffellina L. Zhang, Y. Wang, and J. Wang, 1981 (*3446), p. 35 (suborder).
Endothyrina Bogush, 1985 (*275), p. 56 (suborder).

Test wall of homogeneously microgranular calcite, of tightly packed equidimensional subangular crystals, a few μm in diameter. Advanced forms with wall differentiated into two or more layers. L. Silurian to U. Permian (Djulfian).

Superfamily PARATHURAMMINACEA E. V. Bykova, 1955

Parathuramminacea Loeblich and Tappan, 1961 (*1902), p. 283, nom. corr. pro superfamily Parathuramminidea.
Parathuramminidea Fursenko, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 174, nom. transl. ex family Parathuramminidae.

Test unilocular, globular to elongate or irregular, or may consist of a series or cluster of such chambers, free or attached. L. Silurian to Permian.

Family ARCHAESPHAERIDAE Malakhova, 1956

Archaesphaeridae Malakhova, 1956 (*1989), p. 87.

Test with one or more globular, elongate, or irregular chambers; wall not perforate; without evident apertures. U. Silurian to L. Permian (Asselian).

Subfamily ARCHAESPHAERINAE Malakhova, 1956

Archaesphaerinae Antropov, 1970 (*53) [not seen, cited in *Referativny Zhurnal*, 1971 no. 2, p. 30-31] (nom. transl. ex family).
Neotuberitininae A. D. Miklukho-Maklay, 1963 (*2130), p. 150, 155.

Test of one or more globular to irregular chambers, wall simple; no aperture. U. Silurian to L. Carboniferous (Tournaisian).

ARAKAEVELLA Pronina, 1964

Plate 207, fig. 1

Type species: Arakaevella arakaica Pronina, 1964; OD.

Arakaevella Pronina, 1964 (*2475), p. 8.

Test consisting of a few globular chambers joined in one plane but showing no intercommunication; wall calcareous, with an outer finely granular layer, inner lighter layer not always present and may result from secondary recrystallization, surface irregular in appearance; no evident pores and no aperture. U. Silurian (Ludlovian); USSR.

Remarks: Originally included in the Parathuramminidae, the genus lacks perforations and is transferred to the Archaesphaeridae.

ARCHAESPHAERA Suleymanov, 1945

Plate 207, fig. 2

Type species: Archaesphaera minima Suleymanov, 1945; OD.

Archaesphaera Suleymanov, 1945 (*3086), p. 126.

Test globular, up to 0.34 mm in diameter; wall thin, calcareous, dark, uniform, and finely granular, surface smooth; no pores or aperture observed. Devonian to L. Carboniferous; USSR: Ukraine.

DIPLOSPHAERINA Derville, 1952

Plate 207, figs. 5-9

Type species: Diplosphaera inaequalis Derville, 1931 (*940), p. 141; OD.

Diplosphaerina Derville, 1952 (*943), p. 237 (nom. subst. pro *Diplosphaera* Derville, 1931).
Diplosphaera Derville, 1931 (*940), p. 141; also see Derville, 1950 (*941), p. 471 (non *Diplosphaera* Haeckel, 1860); type species: *Diplosphaera inaequalis* Derville, 1931; OD (M).
Neotuberitina Poyarkov, 1957 (*2463), p. 33, 35, 36, 39 (name not available, ICZN Art. 13 (a) (i) and 13 (b), no description).
Quasituberitina Poyarkov, 1957 (*2463), p. 33, 35, 36, 38-40 (name not available, ICZN Art. 13 (a) (i), (b), no description).
Neotuberitina Miklukho-Maklay, 1958 (*2124), p. 134; type species: *Tuberitina maljawkini* Mikhaylov, 1939

(*2114), p. 48, pl. 1, fig. 11 (non fig. 12) (err. emend. as *T. maljuvkini* by Miklukho-Maklay, 1958): OD.
Quasituberitina Poyarkov, in Purkin, Poyarkov, and Rozhanets, 1961 (*2486), p. 24; type species: *Quasituberitina magna* Poyarkov; OD.

Test two chambered, a tiny sphere partially enveloped by a much larger sphere with which it may communicate; wall dark, finely granular, single layered, nonperforated; no external aperture. M. Devonian (Eifelian) to L. Carboniferous (Tournaisian); cosmopolitan.

EOAMMOSPHAEROIDES Pronina, 1970

Plate 836, figs. 10 and 11

Type species: Eoammosphaeroides subrus Pronina, 1970; OD.

Eoammosphaeroides Pronina, 1970 (*2478), p. 110.

Test with a single irregular chamber having a few subglobular budlike protrusions from the margin; wall calcareous, thin, dark, and finely granular; aperture not observed. U. Silurian (U. Ludlovian) to L. Devonian, USSR: E. slope of the Urals.

NEOARCHAESPHAERA A. D. Miklukho-Maklay, 1963

Plate 207, fig. 13

Type species: Neoarchaesphaera magna A. D. Miklukho-Maklay, 1963 (syn.: *Archaesphaera magna* Suleymanov of E. V. Bykova, 1955, ***464**, pl. 2, figs. 2, 3, non *Archaesphaera magna* Suleymanov, 1945, ***3086**, p. 126 = *Neoarchaesphaera bykovae* A. D. Miklukho-Maklay, 1965, ***2131**, p. 31): OD.

Neoarchaesphaera A. D. Miklukho-Maklay, 1963 (*2130), p. 142.

Test free, spherical, up to 0.2 mm in diameter; wall calcareous, finely granular, dark colored in section, apparently not perforated, exterior with numerous narrow radial extensions that also do not show perforations; no apparent aperture. U. Devonian (Fammenian); USSR: Ural Mountains and central Asia.

Remarks: Originally the type species was designated as *Archaesphaera magna* Bykova, although Bykova illustrated it as *A. magna* Suleymanov without description and not as a new species. Miklukho-Maklay also observed that Bykova's identification was in error, as Suleymanov's species has a smooth surface. The type designation therefore is a deliberate misidentification, and according to the ICZN Art. 70 (c), the type species should then be known by the same specific name in the new genus but credited to the author of the genus, that is, *Neoarchaesphaera magna* Miklukho-Maklay, 1963. The later proposed new name *N. bykovae* is a junior synonym. The specimen illustrated by Bykova (1955, ***464**, pl. 2, fig. 2) is here designated as the lectotype of *Neoarchaesphaera magna* Miklukho-Maklay. This specimen was reillustrated (somewhat retouched) by Miklukho-Maklay (1965, ***2131**, pl. 1, fig. 1), without indication as to whether or not this specimen was regarded as the "holotype" of *A. bykovae.*

PARASTEGNAMMINA Poyarkov, 1969

Plate 207, figs. 10-12

Type species: Parastegnammina fustisaeformis Poyarkov, 1969; OD.

Parastegnammina Poyarkov, 1969 (*2465), p. 130.

Test free, elongate, subcylindrical to fusiform; wall calcareous, uniformly finely granular; no aperture. M. Devonian (Eifelian) to U. Devonian (Frasnian, Famennian); USSR: Tien Shan.

Remarks: Originally placed in the Usloniinae by Poyarkov, the genus was transferred to the Archaesphaerinae (Sabirov, 1978, ***2684**, p. 13) because of the solid rather than perforate wall.

QUASIIRREGULARINA Sabirov, 1978

Plate 207, figs. 14-16

Type species: Quasiirregularina primula Sabirov, 1978; OD.

Quasiirregularina Sabirov, 1978 (*2684), p. 15.

Test of irregular shape, with a few subconical projections from the surface; wall thick, calcareous, finely granular, dark, homogeneous; no visible aperture. U. Devonian (Frasnian to L. Fammenian); USSR: Tadzhikstan.

RAUSERINA Antropov, 1950

Plate 207, fig. 3

Type species: Rauserina notata Antropov, 1950; OD.

Rauserina Antropov, 1950 (*51), p. 27.

Test free, of one or two subglobular interconnected chambers; wall thick, calcareous, finely microgranular; no external aperture. M. Devonian (Givetian) to U. Devonian (Fammenian): USSR: Russian Platform.

VICINESPHAERA Antropov, 1950

Plate 207, fig. 4

Type species: Vicinesphaera squalida Antropov, 1950; OD.

Vicinesphaera Antropov, 1950 (*51), p. 22.

Test free, globular, resembling *Archaesphaera* but with irregular surface and thick wall; wall calcareous, homogeneous, nonperforate; no aperture observed. U. Devonian (Fammenian); USSR: Russian Platform.

Subfamily INSOLENTITHECINAE

Loeblich and Tappan, 1986

Insolentithecinae Loeblich and Tappan, 1986 (*1929), p. 342.

Test elongate, irregular, without septa; wall calcareous, microgranular, homogeneous, with numerous small endothyroid and fusulinid foraminifers as agglutinated inclusions in the wall; no recognizable aperture. L. Carboniferous (L. Visean) to L. Permian (Asselian).

INSOLENTITHECA Vachard, 1979

Plate 208, figs. 1-8

Type species: Ammobaculites? horridus Brazhnikova, in Brazhnikova et al., 1967 (*353), p. 144; OD.

Insolentitheca Vachard, in Bensaid et al., 1979 (*185), p. 199.

Fukujia Igo et al., 1979 (*1580), p. 95 (name not available, ICZN Art. 13 (a) (i), no description).

Ichinotania Igo et al., 1979 (*1580), p. 95 (name not available, ICZN Art. 13 (a) (i), no description).

Fukujia Adachi, 1980 (*8), p. 267; type species: *Fukujia typica* Adachi, 1980; OD.

Ichinotania Adachi, 1980 (*8), p. 271; type species: *Ichinotania endothyroidea* Adachi, 1980; OD.

Parahaplophragmella Adachi, 1980 (*8), p. 272; type species: *Parahaplophragmella spira* Adachi, 1980; OD.

Haplophragmina (Haplophragminoides) Brazhnikova, in Brazhnikova and Vdovenko, 1983 (*356), p. 48; type species: *Ammobaculites? horridus* Brazhnikova, 1967; obj.; OD.

Test elongate, subcylindrical, and irregular, without regular constrictions or septa; wall calcareous, dark, microgranular, homogeneous, thick, with agglutinated particles including many relatively large endothyroid and fusulinid foraminifers, wall and septa of the agglutinated tests adjacent to the inner cavity of the agglutinating individual being destroyed by dissolution; no distinct aperture observed, although some specimens appear to have one or more irregularly distributed gaps in the wall as seen in section. L. Carboniferous (L. Visean) to L. Permian (Asselian); USSR: S. Urals, Donbas, Kazakhstan; Belgium; France; Spain; Algeria; Morocco; Libya; Afghanistan; Japan; N. Thailand.

Remarks: Because of the extreme variation in shape resulting from the coarsely agglutinated material, and because all are known only from random thin sections, various species and genera have been described as tubular, arcuate, uniserial, biserial, or radiate, and with no aperture, a simple one, or even a cribrate aperture. All specimens figured could equally well be regarded as having an irregular tubular form, without internal subdivision and without a recognizable aperture.

Family PARATHURAMMINIDAE

E. V. Bykova, 1955

Parathuramminidae E. V. Bykova, 1955 (*464), p. 15.

Cribrosphaeridae Sabirov, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 75, 104 (invalid, ICZN Art. 11 (f) (i) (1), and Art. 39; based on *Cribrosphaera* Reytlinger, 1954, non *Cribrosphaera* Popofsky, 1906).

Globular to elongate chamber; wall calcareous, homogeneous; aperture multiple at the ends of tubular projections. Silurian (Wenlockian) to L. Carboniferous (Visean), Mississippian.

Remarks: The Cribrosphaeridae was stated to have been proposed by Sabirov (1978, *2683), but this is apparently an unpublished dissertation, and the earliest published description appears to be that by Sabirov in Zadorozhnyy and Yuferev (1984, *3421). However, this is based on a homonym and not on the valid name for the genus. It is here regarded as synonymous with the Parathuramminidae.

Subfamily PARATHURAMMININAE

E. V. Bykova, 1955

Parathuramminınae Antropov, 1970 (*53) (not seen, cited in *Referativny Zhurnal*, 1971, no. 2, p. 30-31) (nom. transl. ex family).

Dagmarellinae Chuvashov, Yuferev, and Zadorozhnyy, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 74, 77 (invalid, ICZN Art. 11 (f) (i) (1), not based on an included genus, as *Dagmarella* Solov'eva, 1955 was not included; as *Parathurammina* was included, it is a junior synonym of the Parathuramminidae).

Cushmanellinae Yuferev, Chuvashov, and Zadorozhnyy, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 74, 84 (subfamily; invalid, ICZN Art. 11 (f) (i) (1), and Art. 39; based on *Cushmanella* Zadorozhnyy, 1984 = *Parathuramminites* Poyarkov, 1969, and non *Cushmanella* Palmer and Bermúdez, 1936).

Cribrosphaerinae Zadorozhnyy and Yuferev, 1984 (*3421), p. 75 (invalid, ICZN Art. 11 (f) (i) (1) and Art. 39; based on *Cribrosphaera* Reytlinger, 1954, non *Cribrosphaera* Popofsky, 1906).

Test globular, with apertures at the end of very short protrusions. M. Silurian (Wenlockian) to Mississippian (Visean).

CRIBROSPHAEROIDES Reytlinger, 1959

Plate 207, figs. 24 and 25

Type species: Cribrosphaera simplex Reytlinger, 1954 (*2598), p. 65; OD.

Cribrosphaeroides Reytlinger, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 174 (nom. subst. pro *Cribrosphaera* Reytlinger, 1954).

Cribrosphaera Reytlinger, 1954 (*2598), p. 65 (non *Cribrosphaera* Popofsky, 1906); type species: *Cribrosphaera simplex* Reytlinger, 1954; OD.

Bisphaera (Bullella) Malakhova and Pronina, in Pronina and Chuvashov, 1965 (*2481), p. 76 (non *Bullella* Simpson, 1900); type species: *Bisphaera (Bullella) uchalensis* Malakhova and Pronina, in Pronina and Chuvashov, 1965 (first figured as *Bulla uschalensis* [sic] Pronina by Malakhova, 1969, *1992, pl. 50, fig. 345); OD.

Test globular to irregular; wall granular, coarsely perforate, single layered; no apparent aperture. Devonian, cosmopolitan.

PARATHURAMMINA Suleymanov, 1945

Plate 207, figs. 17-21

Type species: Parathurammina dagmarae Suleymanov, 1945; OD.

Parathurammina Suleymanov, 1945 (*3086), p. 126.

Bykovaella Zadorozhnyy, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 74, 78; type species: *Parathurammina aperturata* Pronina, 1960 (*2473), p. 47; OD.

Suleimanovella (Kolongella) Zadorozhnyy, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 74, 88; type species: *Parathurammina kolongensis* Pronina, 1969 (*2477), p. 24; OD.

Test globular, up to 0.45 mm in diameter; wall calcareous, granular, may appear striate in section; surface with numerous tubular protuberances, terminating in apertures. U. Silurian (Ludlovian) to L. Carboniferous (Tournaisian), Mississippian; Europe; Asia.

PARATHURAMMINITES Poyarkov, 1969

Plate 208, figs. 9-13

Type species: Parathurammina cushmani Suleymanov, 1945 (*3086), p. 127 (as *P. cuchmani* on p. 125, 127); OD.

Parathurammina (Parathuramminites) Poyarkov, 1969 (*2465), p. 81.

Suleimanovella Yuferev, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 74, 86; type species: *Parathurammina suleimanovi* Lipina, 1950 (*1861), p. 120; OD.

Cushmanella Zadorozhnyy, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 74, 85 (non *Cushmanella* Palmer and Bermúdez, 1936); type species: obj.; OD.

Test free, subspherical, up to 0.48 mm in diamter, may have slight papillate prominences on the surface; wall calcareous, thick, uniform, nonperforate except for the large tubular structures that open at the surface prominences; aperture consists of the openings of the tubes that pierce the wall. Silurian (Wenlockian) to L. Carboniferous (Visean), Mississippian, especially common in the U. Devonian (Frasnian, Fammenian); USSR: Russian Platform, Urals.

Remarks: The subgenus *Parathuramminites* was stated by Poyarkov to have been described by Antropov (1967, thesis), but the first valid publication appears to be that of Poyarkov, 1969.

SALTOVSKAJINA Sabirov, 1982

Plate 207, figs. 22 and 23

Type species: Parathurammina scitula Chuvashov, 1965 (*595), p. 20; OD.

Parathurammina (Saltovskajina) Sabirov, 1982 (*2685), p. 67.

Test globular to externally somewhat irregular; wall calcareous, thick, of three layers, with thin, dark, fine-grained inner and outer layers separated by a thick, light gray to gray median layer; narrow tubular projections from the surface terminate in apertures, about five or six visible in a median section. U. Devonian (Fammenian); USSR: Urals; Tyan-Shan.

Subfamily IRREGULARININAE Zadorozhnyy and Yuferev, 1984

Irregularininae Loeblich and Tappan, nom. corr. herein.

Irregularinae Zadorozhnyy and Yuferev, 1984 (*3421), p. 104 (nom. imperf.).

Kalijanellinae Zadorozhnyy and Yuferev, 1984 (*3421), p. 75, 111.

Test irregular in outline, ranging from nearly globular to elongate; wall homogeneous, dark, thick, perforate; apertures at the end of large tubular projections. M. Devonian (Givetian) to L. Carboniferous (Visean).

Remarks: The subfamily Kalijanellinae is here regarded as a synonym of the Irregularininae. The original description of the Kalijanellinae included both *Kalijanella* and *Uslonia*, but if these were in the same family group, the Usloniinae would have priority. *Kalijanella* is here considered to be congeneric with *Pachythurammina*, and *Uslonia* is considered to belong to a different family group.

IRREGULARINA E. V. Bykova, 1955

Plate 209, figs. 1 and 2

Type species: Irregularina karlensis Vissarionova, 1950 (*3297), p. 35; OD.

Irregularina E. V. Bykova, 1955 (*464), p. 21.

Irregularina Vissarionova, 1950 (*3297), p. 35 (name not available, ICZN Art. 13 (b): type not designated).

Corbis Antropov, 1950 (*51), p. 26 (non *Corbis* Cuvier, 1817); type species: *Corbis nodosus* Antropov, 1950; OD.

Corbiella Reytlinger, 1954 (*2598), p. 62 (name not available, Art. 13 (a) (i), no description).

Corbiella Antropov, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 175 (nom. subst. pro *Corbis* Antropov, 1950); type species: *Corbis nodosus* Antropov, 1950; OD.

Test free, a single irregular chamber; wall calcareous, perforate, single layered; apertures at the ends of necklike projections. M. Devonian (Givetian) to L. Carboniferous (Tournaisian), Mississippian; USSR: central Asia, Russian Platform.

Remarks: *Corbiella* was described as irregular or boxlike, and no aperture was observed. Nonoriented sections may not have intersected the apertures of the irregularly shaped test, and it is regarded as a synonym of *Irregularina*.

PACHYTHURAMMINA Vachard, 1977

Plate 209, figs. 4-6

Type species: Pachythurammina sarcosphaera Vachard, 1977; OD.

Pachythurammina Vachard, 1977 (*3249), p. 164.

Kalijanella Petrova, 1981 (*2389), p. 90; type species: *Kalijanella incomposita* Petrova, 1981; OD.

Test globular, with a few necklike projections at the periphery; wall dark, thick, microgranular, finely canaliculate; apertures narrow, at the ends of canal-like passages through the necklike protuberances. M. Devonian (Givetian) to L. Carboniferous (Visean), Mississippian; France; USSR: central Urals.

Remarks: Discussion and illustrations of the chamber shape, necks, and the dark, porous wall appear identical for the type species of *Pachythurammina* and *Kalijanella*, and they are here regarded as synonymous.

PALACHEMONELLA H. Beckmann, 1953

Plate 209, fig. 3

Type species: Palachemonella torleyi H. Beckmann, 1953; OD.

Palachemonella H. Beckmann, 1953 (*169), p. 265.

Globular to ovate or irregular chamber; wall of finely porous granular calcite; apertures large, rounded, at the ends of a few irregularly spaced necklike protuberances. M. Devonian: Germany.

Family CHRYSOTHURAMMINIDAE Loeblich and Tappan, 1986

Chrysothuramminidae Loeblich and Tappan, 1986 (*1929), p. 342.

Test globular to irregular in outline, with a few large tubular projections that form the apertures; wall calcareous, dark, finely granular, a single layer. M. Devonian (Eifelian) to L. Carboniferous (Tournaisian).

CHRYSOTHURAMMINA Neumann, Pożaryska, and Vachard, 1975

Plate 209, figs. 13-15

Type species: Chrysothurammina tenuis Neumann et al., 1975; OD.

Chrysothurammina Neumann, Pożaryska, and Vachard, 1975 (*2251), p. 46.

Test a single subspherical chamber with a few necklike protrusions; wall calcareous, clear, yellowish, hyaline, homogeneous, and single layered; aperture at the open ends of the necklike projections. M. Devonian (Givetian) to L. Carboniferous (Tournaisian): Poland; USSR: Tomsk area; W. Urals and Tien Shan region.

Remarks: *Chrysothurammina* strongly resembles *Salpingothurammina* but has a hyaline rather than dark microgranular wall: it differs from *Pachythurammina* in the wall being hyaline rather than microgranular and finely canaliculate.

SALPINOGTHURAMMINA Poyarkov, 1961

Plate 209, figs. 7-12

Type species: Parathurammina tuberculata Lipina, 1950 (*1861), p. 118; OD.

Thurammina (Salpingothurammina) Poyarkov, in Purkin, Poyarkov, and Rozhanets, 1961 (*2486), p. 31.

Neoivanovella Chuvashov and Yuferev, 1981 (*598), p. 52: type species: *Neoivanovella discessa* Chuvashov and Yuferev, 1981; OD.

Radiosphaerella Yuferev, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 74, 90; type species: *Parathurammina radiosphaerica* Bogush and Yuferev, 1962 (*277), p. 81; OD.

Polygonella Yuferev, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 74, 91; type species: *Parathurammina tuberculata* Lipina, 1950, obj.; OD.

Test globular, with a few very elongate hollow necklike processes extending from the surface; wall calcareous, dark, homogeneous, single layered, not perforate; aperture consists of the open ends of the tubular necks. M. Devonian (Eifelian, Givetian) to U. Devonian (Frasnian, Fammenian); USSR: Ukraine, Kazakh, Ural Mountains.

Remarks: Although two- and three-layered walls have been reported in species referred to this genus, the wall of the type species has a single layer. *Chrysothurammina* and *Pachythurammina* are morphologically similar to *Salpingothurammina* but differ in having a hyaline wall and a finely perforate wall, respectively.

Family IVANOVELLIDAE Chuvashov and Yuferev, 1984

Ivanovellidae Chuvashov and Yuferev, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 74, 98.

Test spherical to irregularly rounded; wall calcareous, thick, of two layers, a thin dark compact, dense inner layer and a thick gray friable outer layer; wall pierced by canals that lead to the exterior and may open in small moundlike elevations but do not appear to communicate with the inner cavity. U. Silurian (Ludlovian) to L. Carboniferous.

ELENELLA Pronina, 1969

Plate 209, figs. 16-22

Type species: Neoarchaesphaera (Elenella) multispinosa Pronina, 1969; OD.

Neoarchaesphaera (Elenella) Pronina, 1969 (*2477), p. 25.

Lechangsphaera J. X. Lin, 1981 (*1854), p. 9; type species: *Lechangsphaera minima* J. X. Lin, 1981; OD.

Tamarina Petrova, 1981 (*2389), p. 99; type species: *Tamarina corpulenta* Petrova, 1981; OD.

Test spherical to irregularly rounded; wall calcareous, thick, porous, two layered, an inner thin dark finely granular layer and an outer grey finely granular layer, outer surface irregular and may have minute projections from the surface corresponding to the tubular pores piercing the wall; no aperture. M. Silurian (Ludlovian), M. Devonian (Eifelian, Givetian), L. Carboniferous; USSR: Ural Mountains; China.

Remarks: Although the original description of *Tamarina* indicated a triple-layered wall, this appears to be a matter of interpretation, as the description of the inner and outer wall layers is identical to that for *Elenella*, here elevated to generic status.

IVANOVELLA Pronina, 1969

Plate 210, figs. 1-3

Type species: Ivanovella isensis Pronina, 1969; OD.

Ivanovella Pronina, 1969 (*2477), p. 27.

Test free, spherical; wall thick, calcareous, two layered, with very thin dark microgranular inner layer and gray to brown outer layer, from the dark layer radiate both hollow projections that open to the exterior and others that are terminally closed; aperture consisting of openings at the ends of some projections. Silurian (Ludlovian); USSR: central Urals.

Family MARGINARIDAE Loeblich and Tappan, 1986

Marginaridae Loeblich and Tappan, 1986 (*1929), p. 342.

Test globular, with numerous conical projections at the surface; wall of three layers, the inner and outer ones dark colored and the median one light grey; canals lead to the exterior on the conical projections and widen inward to open into the chamber cavity. M. Devonian (Givetian) to U. Devonian (Fammenian).

CORDATELLA L. G. Petrova, 1984

Plate 210, fig. 4

Type species: Parathurammina cordata Pronina, 1960 (***2473**), p. 47; OD.

Cordatella Petrova, in Zadorozhnyy and Yuferev, 1984 (***3421**), p. 74, 81.

Test free, spherical, numerous very low tubular projections arising at the surface; wall calcareous, thin, of three layers, with light gray median layer surrounded by darker inner and outer layers, the inner layer thinning toward the flanks of the projections that may be only single layered at the summit. M. Devonian (Givetian) to U. Devonian (Fammenian); USSR.

Remarks: *Cordatella* resembles *Cribrosphaeroides* morphologically but differs in having a three-layered wall.

MARGINARA Petrova, 1984

Plate 210, figs. 5 and 6

Type species: Parathurammina tamarae Petrova, 1981 (***2389**), p. 88; OD.

Cordatella (Marginarae) L. G. Petrova, in Zadorozhnyy and Yuferev, 1984 (***3421**), p. 83 (nom. imperf.; ICZN Art. 11 (g), Art. 32 (d); Art. 33 (b) (iii)).

Marginara Loeblich and Tappan, 1986 (***1929**), p. 342 (nom. transl.; nom. corr.).

Test spherical, with a few low conical projections from the surface, canals lead from the interior through the projections to open at the surface; wall calcareous, relatively thick, with three distinct layers, a lighter gray layer separating the two dark inner and outer layers. M. Devonian (L. Givetian); USSR.

TURCMENIELLA A. D. Miklukho-Maklay, 1965

Plate 210, figs. 12 and 13

Type species: Turcmeniella astra A. D. Miklukho-Maklay, 1965; OD.

Turcmeniella A. D. Miklukho-Maklay, 1965 (***2131**), p. 34.

Test free, up to 0.20 mm in diameter, described as having two concentric chambers but appears to consist of a single chamber with thick calcareous wall, through which perforations extend to terminate in thornlike processes at the surface, inner layer of the wall thin, dark, and imperforate and gray outer layer thicker. M. Devonian (Givetian) to U. Devonian (Fammenian); USSR: central Asia, Urals.

Family URALINELLIDAE Chuvashov, Yuferev and Zadorozhnyy, 1984

Uralinellidae Chuvashov et al., in Zadorozhnyy and Yuferev, 1984 (***3421**), p. 75, 94.

Test unilocular, with three-layered wall, of which the median one commonly is thick and clear or may be gray, numerous apertural necks project from the surface, and the cavity extends through the outer layers to the inner one. M. Devonian (Givetian) to L. Carboniferous (Visean).

SOGDIANINA Saltovskaya, 1973

Plate 210, figs. 8-11

Type species: Sogdianina angulata Saltovskaya, 1973; OD.

Sogdianina Saltovskaya, 1973 (***2717**), p. 63.

Test attached, a single globular chamber but with numerous projections from the surface that may result in a faceted appearance; wall calcareous, three layered, with thin dark finely granular inner and outer layers separated by a thick gray and granular median layer; multiple apertures at the ends of prominent necks that appear to extend through the thick wall to the surface but show no connection to the internal cavity. L. Carboniferous (Visean); USSR: Tadzhikstan.

Remarks: Resembles *Elenella* but has a thicker wall, of three rather than two layers, and more prominent apertural necks.

URALINELLA E. V. Bykova, 1952

Plate 210, fig. 7

Type species: Uralinella bicamerata E. V. Bykova, 1952; OD.

Uralinella E. V. Bykova, 1952 (***463**), p. 15.

Test subglobular, with necklike tubular projections from the surface, the cavities of these necks extending through the entire wall to the globular inner cavity; wall calcareous, finely granular, with dark inner and outer layers separated by a wide clear area; apertures at the end of the elongate tubular necks that are continuous through the thick wall and project beyond its surface. M. Devonian (Givetian) to L. Carboniferous (L. Tournaisian); USSR: Urals, Bashkir ASSR, Tatar ASSR, W. Siberian Basin, Tien-Shan.

Remarks: Originally described as consisting of two concentric chambers connected by radiating tubular necks, *Uralinella* was reinterpreted by Chuvashov et al. (in Zadorozhnyy and Yuferev, 1984, *3421) as being single chambered and the space between the concentric spheres as being a thick inner layer between two thinner dark wall layers.

Family AURORIIDAE Loeblich and Tappan, 1986

Auroriidae Loeblich and Tappan, 1986 (*1929), p. 342.

Test irregularly globular to ovate; wall calcareous, thick, of two layers, a thin inner finely porous dark layer and a thick coarsely canaliculate gray outer layer. M. Devonian (Givetian) to U. Devonian (Fammenian).

APERTAURORIA Sabirov, 1984

Plate 210, figs. 14 and 15

Type species: Auroria (Apertauroria) aperta Sabirov, in Zadorozhnyy and Yuferev, 1984; OD(M).

Auroria (Apertauroria) Sabirov, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 111.

Test small, up to 0.4 mm in length, single chambered, elongate ovate, base broadly rounded, opposite end slightly tapered to the aperture; wall calcareous, of two layers, a thin, finely granular inner layer and a thick, friable, light gray outer layer that appears coarsely perforate; narrow aperture at the tapered end of the test. M. Devonian (Givetian) to U. Devonian (Fammenian); USSR.

AURORIA Poyarkov, 1969

Plate 210, figs. 16–18

Type species: Auroria singularis Poyarkov, 1969; OD.

Auroria Poyarkov, 1969 (*2465), p. 114.

Test free, irregularly globular; wall calcareous, with thin dark fine-grained inner layer and very thick, spongy outer layer pierced by large pores that may be branched; no aperture. M. Devonian (Givetian) to U. Devonian (Fammenian); USSR: Kirgiz.

Family USLONIIDAE A. D. Miklukho-Maklay, 1963

Usloniidae Conil and Longerstaey, in Conil et al., 1980 (*660), p. 20, nom. transl. ex subfamily.

Usloniinae A. D. Miklukho-Maklay, 1963 (*2130), p. 144 (err. cit. as Uslonianinae, p. 151 (subfamily).

Test globular to irregular in form; wall perforate; no evident aperture. M.Devonian to L. Carboniferous.

BISPHAERA Birina, 1948

Plate 211, figs. 1 and 2

Type species: Bisphaera malevkensis Birina, 1948; OD.

Bisphaera Birina, 1948 (*243), p. 159.

Test subglobular to pyriform, may have constriction suggesting a tendency to divide; wall single layered, of finely granular calcite, perforate; no aperture observed. M. Devonian to L. Carboniferous; USSR.

PARPHIA A. D. Miklukho-Maklay, 1965

Plate 211, figs. 6 and 7

Type species: Cribrosphaeroides (Parphia) robusta A. D. Miklukho-Maklay, 1965 (recte *robustus*); OD.

Cribrosphaeroides (Parphia) A. D. Miklukho-Maklay, 1965 (*2131), p. 32.

Parfia Kotel'nikov, 1974 (*1723), p. 38, 39 (nom. transl.; err. cit. pro *Parphia*).

Test spherical to ovate, up to 1 mm in diameter; wall calcareous, dark, up to 0.05 mm thick, and evenly porous, with fine pores of about 2.5 μm diameter; no aperture. U. Devonian; USSR: Turkmenia; central Asia; Ural Mountains.

USLONIA Antropov, 1959

Plate 211, figs. 15 and 16

Type species: Uslonia permira Antropov, 1959; OD.

Uslonia Antropov, 1959 (*52), p. 28; OD.

Test unilocular, irregular in form; wall calcareous, homogeneous, perforate; no aperture observed. U. Devonian (U. Frasnian); USSR: Bashkir, Tatar, Udmurt.

Family EOVOLUTINIDAE Loeblich and Tappan, 1986

Eovolutinidae Loeblich and Tappan, 1986 (*1929), p. 343.

Test globular to irregular, of one to two chambers; wall calcareous, microgranular, perforate; a distinct aperture present. U. Silurian (Pridolian) to U. Devonian (Fammenian).

Remarks: Differs from the Usloniidae in having a distinct aperture and differs from the Parathuramminidae in having a single aperture.

CRIBROHEMISPHAEROIDES Pronina, 1980

Plate 211, figs. 3-5

Type species: Cribrosphaeroides (Cribrohemisphaeroides) apertus Pronina, in Petrova and Pronina, 1980; OD.

Cribrosphaeroides (Cribrohemisphaeroides) Pronina, in Petrova and Pronina, 1980 (*2390), p. 51.

Test subspherical, up to 0.36 mm in diameter; wall calcareous, of medium thickness, distinctly perforate, finely granular, appearing dark in thin section; aperture at one pole of the test. U. Silurian (Pridolian) to M. Devonian (Eifelian); USSR: N. Ural Mountains.

Remarks: Although described as a subgenus of *Cribrosphaeroides*, it is elevated to generic status, differing in having a distinct aperture, not found in any representatives of the Usloniidae.

EOVOLUTINA Antropov, 1950

Plate 211, figs. 8-11

Type species: Eovolutina elementa Antropov, 1950; OD.

Eovolutina Antropov, 1950 (*51), p. 29.

Maclayina Saltovskaya, 1981 (*2718), p. 111; type species: *Maclayina scitula* Saltovskaya, 1981; OD.

Test tiny, up to 0.16 mm in diameter, globular to subglobular, with proloculus completely surrounded by second similarly globular chamber to which it is attached at one end; wall calcareous, with a single layer, microgranular, obscure; aperture terminal, present in each of the concentric chambers. U. Silurian to U. Devonian (Fammenian); USSR: Russian Platform, Turkestan, Gissar.

Family TUBERITINIDAE A. D. Miklukho-Maklay, 1958

Tuberitinidae A. D. Miklukho-Maklay, 1958 (*2124), p. 134.

Tuberitininae Loeblich and Tappan, 1961 (*1902), p. 284 (subfamily).

Atjusellinae Zadorozhnyy and Yuferev, 1984 (*3421), p. 76 (subfamily).

Tubeporininae Zadorozhnyy and Yuferev, 1984 (*3421), p. 76 (subfamily).

Test attached, consisting of one or more subhemispherical chambers; wall calcareous, microgranular, surface commonly punctate; no distinct aperture. L. Silurian (Llandoverian) to Permian.

BIORBIS Strank, 1983

Plate 211, figs. 12-14

Type species: Biorbis duplex Strank, 1983; OD.

Biorbis Strank, 1983 (*3075), p. 441.

Test consisting of two concentric spheres or ellipsoids, the outer being up to 0.35 mm in diameter; wall calcareous, microgranular to granular, outer sphere with wall of up to 0.05 mm thickness, wall of each sphere differentiated into a dark microgranular outer layer that grades inward into a less dense and more granular region and then into a second dark and dense microgranular inner layer, no perforations observed; no aperture known. L. Carboniferous (Dinantian); England.

BITUBERITINA A. D. Miklukho-Maklay, 1965

Plate 211, fig. 18

Type species: Bituberitina bicamerata A. D. Miklukho-Maklay, 1965; OD.

Bituberitina A. D. Miklukho-Maklay, 1965 (*2131), p. 35.

Test attached, with globular first chamber completely surrounded by a second similar but larger chamber; wall calcareous, inner chamber appears imperforate, but outer one is finely perforate; no external aperture. L. Carboniferous (Visean), Mississippian; central Asia.

EOTUBERITINA A. D. Miklukho-Maklay, 1958

Plate 211, fig. 17

Type species: Eotuberitina reitlingerae A. D. Miklukho-Maklay, 1958 (syn.: *Tuberitina maljavkini* Reytlinger, 1950 (*2597), p. 88, non *T. maljawkini* Mikhaylov, 1939); OD.

Eotuberitina A. D. Miklukho-Maklay, 1958 (*2124), p. 134.

Eotuberitina Poyarkov, 1957 (*2463), p. 33, 35, 36, 38-40) (name not available, ICZN Art. 13 (a) (i), and 13 (b), no description).

Single small chamber attached to basal disc of varied size; wall dark, finely granular, thin, imperforate, or very finely porous; no aperture. M. Devonian to M. Carboniferous; USSR: central Asia, Urals, Kazakhstan, Russian Platform.

HEMITHURAMMINA Mamet, 1973

Plate 212, figs. 13 and 14

Type species: Webbina fimbriata Howchin, 1888 (***1560**), p. 538; OD(M).

Hemithurammina Mamet, 1973 (***2006**), p. 116.

Single hemispherical chamber, about 0.25 mm in diameter, with a basal attachment disk surrounded by a ring of twelve to sixteen hollow tubular necks leading outward that may open at the ends; wall calcareous, white in color, microgranular, thin; aperture possibly consisting of the openings of the tubular necks, although these may be merely broken terminally. L. Carboniferous (Visean), Mississippian; England; France.

Remarks: Mamet (1973, ***2006**, p. 116) stated that the present repository of Howchin's type specimen is unknown, hence he designated as neotype a specimen from the U. Visean of France. However, this designation is invalid, as it is not from the type locality (ICZN Art. 75 (d) (5)), and the specimen was retained in the author's collection, although deposition of neotypes in a recognized scientific or educational institution is mandatory (ICZN Art. 75 (d) (6)). There is also no statement as to whether any search was made for the type specimen in the museums in Britain. If the type specimen is in fact not preserved, and if necessary for stabilization of the nomenclature, a neotype should be selected from the type region in the Carboniferous Zone D in northern England.

IVDELINA Malakhova, 1963

Plate 212, figs. 1-5

Type species: Ivdelina elongata Malakhova, 1963; OD.

Ivdelina Malakhova, 1963 (***1990**), p. 141.

Test attached, with globular chamber surrounded by an ovate to elongate pyriform outer chamber that may taper to a thick tube, the bicamerate individuals may occur in series of two to many individuals; wall calcareous, granular; numerous radial tubular structures extend from the wall of the inner chamber through the outer one and may project slightly as small necks at the surface where the openings are about 5 μm in diameter, no openings present on the tubular structures that connect separate individuals. L. Devonian; USSR: Urals.

ILLIGATA E. V. Bykova, 1956

Plate 212, figs. 15-17

Type species: Illigata annae E. V. Bykova, 1956; OD.

Illigata E. V. Bykova, 1956 (***465**), p. 21.

Test attached, a single elongate chamber that is flattened against the attachment and convex above and may be asymmetrical or irregular in outline according to the nature of the attachment; wall calcareous, perforate, smooth; apertural neck at one end, in the axis of greatest length. L. Silurian (Llandoverian); USSR: Lithuania.

MENDIPSIA Conil and Longerstaey, 1980

Plate 212, figs. 8-12

Type species: Mendipsia leesi Conil and Longerstaey, in Conil et al., 1980; OD.

Mendipsia Conil and Longerstaey, in Conil, Longerstaey, and Ramsbottom, 1980 (***660**), p. 17.

Atjussella Petrova, 1981 (***2389**), p. 93; type species: *Atjussella rarispinata* Petrova, 1981; OD.

Test globular to hemispherical, with basal attachment; wall thick, two layered, with thin dark microgranular inner layer and thick coarsely perforate outer layer. M. Devonian to L. Carboniferous (Dinantian; U. Tournaisian); England; Ireland; Belgium; USSR: eastern Urals.

Remarks: *Mendipsia* was described in the Calcisphaeridae but is here placed with the Tuberitinidae. *Atjussella* was stated to have a globular chamber attached to a basal disk and the chamber to be covered by radiating processes, but the original figures appear to show a thick wall with inner dark layer, a thick layer with radiating alternating light and dark areas, probably representing coarse perforations, and a thin outer dark line. They thus appear very similar to sections of *Mendipsia*, and *Atjussella* is regarded as a synonym.

ORIENTINA Poyarkov, 1969

Plate 212, figs. 6 and 7

Type species: Ivdelina? multicamerata A. D. Miklukho-Maklay, 1965 (*2131), p. 37; OD.

Orientina Poyarkov, 1969 (*2465), p. 104.

Test bicamerate, with globular inner chamber surrounded by a spherical to slightly ovate outer chamber, and may form colonies of three to four individuals as does *Ivdelina* but lacks the radial tubular structures from the inner spherical chamber that extend to openings at the surface of the outer chamber in *Ivdelina*. U. Devonian; USSR: central Asia Fergana district.

TUBEPORELLA Pronina, 1969

Plate 213, figs. 1-3

Type species: Tubeporella biloculata Pronina, 1969; OD.

Tubeporella Pronina, 1969 (*2477), p. 31.

Test bicamerate, with very small proloculus and much larger and partially enveloping spherical second chamber as in *Diplosphaerina;* wall calcareous, that of the large chamber relatively thick, with large perforations that may function as apertures. L. to M. Devonian; USSR: Ural Mountains.

Remarks: The original description states, without elaboration, that the wall is three layered and perforate, but the illustrations show no evidence of a complex wall. If this should prove to be simple, nonperforate, and single layered, *Tubeporella* would be a synonym of *Diplosphaerina*.

TUBEPORINA Pronina, 1960

Plate 213, figs. 4 and 5

Type species: Tubeporina gloriosa Pronina, 1960; OD.

Tubeporina Pronina, 1960 (*2473), p. 51.

Test attached, a single hemispherical to subglobular chamber with a basal attachment disk; wall thick, calcareous, reported to have three layers; wall coarsely perforate, no other aperture. M. Devonian (Givetian); USSR: Ural Mountains.

TUBERITINA Galloway and Harlton, 1928

Plate 213, figs. 6-11

Type species: Tuberitina bulbacea Galloway and Harlton, 1928; OD.

Tuberitina Galloway and Harlton, 1928 (*1206), p. 346.
Capidulina Maslov, 1935 (*2054), p. 11; type species: *Capidulina hemispherica* Maslov, 1935; OD.
Paratuberitina A. D. Miklukho-Maklay, 1957 (*2122), p. 95; type species: *Tuberitina collosa* Reytlinger, 1950 (*2597), p. 89; OD.

Test consisting of one or more rounded to ovate bulbous chambers in a straight to arcuate series and attached to a basal disc; wall calcareous, microgranular, thick and finely perforate, may have a punctate surface; no other aperture. U. Carboniferous (Namurian) to U. Permian; cosmopolitan.

Superfamily EARLANDIACEA Cummings, 1955

Earlandiacea Loeblich and Tappan, 1982 (*1917), p. 28, nom. transl. ex family Earlandiidae.

Test with globular proloculus and undivided straight or enrolled tubular second chamber. U. Silurian (Ludlovian) to U. Permian.

Family EARLANDIIDAE Cummings, 1955

Earlandiidae Cummings, 1955 (*696), p. 227.
Earlandiinae Pokorný, 1958 (*2447), p. 169 (subfamily).

Test free, single chambered to tubular, nonseptate. U. Silurian (Ludlovian) to U. Permian.

AEOLISACCUS Elliott, 1958

Plate 213, figs. 19 and 20

Type species: Aeolisaccus dunningtoni Elliott, 1958; OD.

Aeolisaccus Elliott, 1958 (*1100), p. 422.

Test elongate, tubular, and slightly tapering, straight to gently curved; wall thin, of crystalline calcite, tangential sections showing transverse lines in the wall; tube open at both ends, possibly apertures, but one or both ends may be broken. U. Permian; Iraq; Arabia.

Remarks: Described as possibly an alga and reported from the Triassic and Jurassic as well as the type level of the U. Permian. However, the younger occurrences may represent reworked specimens or a different tubular organism. It was regarded as a synonym of *Earlandia* by Brönnimann et al. (1972, ***414**, p. 871), but the conical Triassic specimens they figure do not appear to be congeneric with either *Aeolisaccus* or *Earlandia* and lack the wall character of the present genus.

EARLANDIA Plummer, 1930

Plate 213, figs. 12-16

Type species: Earlandia perparva Plummer, 1930; OD.

Earlandia Plummer, 1930 (***2422**), p. 12.

Oldella Pronina, 1968 (***2476**), p. 41; type species: *Hyperammina? sibirica* Lipina, 1959 (***1864**), p. 823; OD.

Earlandia (Quasiearlandia) Brazhnikova, in Brazhnikova and Vdovenko, 1973 (***355**), p. 98; type species: *Earlandia aspera* Pronina, 1963 (***2474**), p. 123; OD.

Earlandia (Oldella) Pronina, 1978 (***2480**), p. 4 (nom. transl.).

Test free, elongate, globular proloculus followed by long, straight, undivided tubular chamber, very slightly tapering; wall calcareous, microgranular; aperture at the open end of the tube. Silurian (Ludlovian) to Permian; USA: Texas; England; Poland; USSR.

Remarks: Although *Quasiearlandia* was said to differ in the less differentiated early chamber, more uneven surface, and coarser grained wall, the differences are not significant.

GIGASBIA Strank, 1983

Plate 213, figs. 17 and 18

Type species: Gigasbia gigas Strank, 1983 (syn.: *Earlandia minor* (Rauzer-Chernousova) Malakhova, 1975, ***1995**, p. 6, pl. 1, figs. 1, 2, non *Hyperammina vulgaris* var. *minor* Rauzer-Chernousova, 1948, ***2522**, p. 239, pl. 17, fig. 4); OD.

Gigasbia Strank, 1983 (***3075**), p. 435.

Test free, elongate, large, up to 2.0 mm in length, spherical proloculus up to 0.67 mm in diameter, followed by a straight tubular undivided chamber with inner cavity about one-half the diameter of the spherical chamber cavity; wall thick, calcareous, microgranular, more finely granular in the outer part of the wall; aperture not described. L. Carboniferous (Dinantian); England; USSR.

Family PSEUDOAMMODISCIDAE
Conil and Lys, 1970

Pseudoammodiscidae Conil and Lys, in Conil and Pirlet, 1970 (***669**), p. 52.

Proloculus followed by planispiral, trochospiral, or streptospirally coiled undivided tubular second chamber; aperture simple, at the open end of the tube. Devonian to L. Permian.

BRUNSIA Mikhaylov, 1935

Plate 214, figs. 1-4

Type species: Spirillina irregularis von Möller, 1879 (***2160**), p. 29 (err. cit. as *Spirillina irregulare* by Mikhaylov, 1935, ***2113**, p. 41, and as *S. irregularae* by Mikhaylov, 1939, ***2114**, p. 58); OD.

Brunsia Mikhaylov, 1935 (***2113**), p. 41; see also Mikhaylov, 1939 (***2114**), p. 50, 58.

Test with proloculus followed by streptospiral early coil and later planispirally enrolled tubular chamber; wall calcareous, finely granular; aperture at the open end of the tubular chamber. Devonian to Carboniferous (Tournaisian, Visean): USSR; Belgium.

Remarks: The original diagrammatic figure given by von Möller, 1879 for the type species (as well as for various other taxa) gave the impression of a coarsely perforate wall. Because of this supposed difference in wall character, Grozdilova and Lebedeva (1954, ***1321**, p. 29) regarded as poor the choice of type species for *Brunsia* and suggested changing the type species to *Brunsia pulchra* Mikhaylov, 1939. However, as Mikhaylov (1935, 1939) clearly designated von Möller's species as type of the genus, this cannot be changed (ICZN Art. 61 (a)). *Brunsia irregularis* has been identified from the USSR by Bogush and Yuferev (1966, ***278**, p. 91, pl. 1, figs. 23-25), and *Brunsia* is herein recognized as representing a valid genus of the Pseudoammodiscidae.

BRUNSIELLA Reytlinger, 1950

Plate 214, figs. 7-9

Type species: Glomospira ammodiscoidea Rauzer-Chernousova, 1938 (***2516**), p. 93, 151; OD.

Brunsiella Reytlinger, 1950 (***2597**), p. 16.

Test with globular proloculus followed by undivided enrolled tubular second chamber, a few early whorls streptospirally coiled, later ones planispiral and evolute; wall calcareous, thick, microgranular and homogeneous; aperture formed by the open end of the tube. L. Carboniferous (Visean) to L. Permian;

USSR: Moscow Basin; Tatar ASSR: Kazan; Ukraine SSR; Tien-shan.

PSEUDOAMMODISCUS Conil and Lys, 1970

Plate 214, figs. 5 and 6

Type species: Ammodiscus priscus Rauzer-Chernousova, 1948 (***2521**), p. 227; OD.

Pseudoammodiscus Conil and Lys, in Conil and Pirlet, 1970 (***669**), p. 53.

Test free, discoidal, up to 0.25 mm in diameter, with globular proloculus followed by planispirally enrolled tubular second chamber; wall calcareous, microgranular; aperture at the open end of the tube. L. Carboniferous (Tournaisian, Visean); USSR: Moscow Basin.

PSEUDOGLOMOSPIRA E. V. Bykova, 1955

Plate 214, fig. 10

Type species: Pseudoglomospira devonica E. V. Bykova, 1955; OD(M).

Pseudoglomospira E. V. Bykova, 1955 (***464**), p. 30.

Test with globular proloculus followed by streptospirally enrolled tubular second chamber of nearly constant diameter; wall calcareous, homogeneous, dark, and finely granular; aperture a simple opening at the end of the tubular chamber. Devonian and Carboniferous; USSR: Russian platform and western Ural Mountains.

QUASILITUOTUBA Brazhnikova, 1983

Plate 214, figs. 11 and 12

Type species: Quasilituotuba subplana Brazhnikova, in Brazhnikova and Vdovenko, 1983; OD.

Quasilituotuba Brazhnikova, in Brazhnikova and Vdovenko, 1983 (***356**), p. 45.

Proloculus followed by tubular second chamber that is planispirally or slightly streptospirally enrolled, becoming uncoiled and straight in the final stage, may occasionally show some constrictions due to periodic growth or possible rudimentary septation; wall calcareous, microgranular; aperture at the open end of the tube. L. Carboniferous (Serpukhovian substage); USSR: Donets Basin.

TURRISPIROIDES Reytlinger, 1959

Plate 214, fig. 13

Type species: Turrispira mira Reytlinger, 1950 (***2597**), p. 19; OD.

Turrispiroides Reytlinger, in Rauzer-Chernousova and Fursenko, 1959 (***2531**), p. 181 (nom. subst. pro *Turrispira* Reytlinger, 1950).

Turrispira Reytlinger, 1950 (***2597**), p. 18 (non *Turrispira* Conrad, 1866, nec Petho, 1906); type species: obj.; OD.

Test free, globular proloculus followed by low trochospirally coiled and evolute tubular second chamber; wall calcareous, dark, microgranular, undifferentiated; aperture at the open end of the tube. M. Carboniferous; USSR: Russian Platform.

Remarks: Although suggested to be synonymous with *Monotaxinoides* (Browne and Pohl, 1973, ***438**, p. 207), the latter genus has a double-layered wall, umbilical filling, and secondary apertures, whereas *Turrispiroides* has a simple spire and undifferentiated wall.

WARNANTELLA Conil and Lys, 1973

Plate 214, fig. 14

Type species: Glomospira flexuosa Conil and Lys, 1964 (***661**), p. 61, pl. 8, fig. 120 (err. cit. by Conil et al., 1973 (***659**) as "*Glomospira tortuosa* Conil and Lys, 1964, pl. 8, fig. 120"); OD.

Warnantella Conil and Lys, in Conil, Groessens, and Lys, 1973 (***659**), p. 216.

Test free or may be attached, with irregularly and asymmetrically coiled or zigzag tubular second chamber. L. Carboniferous (Namurian) to U. Carboniferous (Moscovian); Belgium.

Family PSEUDOLITUOTUBIDAE Conil and Longerstaey, 1980

Pseudolituotubidae Conil and Longerstaey, in Conil, Longerstaey, and Ramsbottom, 1980 (***660**), p. 24.

Test attached to a narrow support or may be encrusting, consisting of a tubular undivided chamber that is irregularly enrolled, commonly streptospiral; wall thick, calcareous, microgranular with included agglutinated particles; aperture terminal, simple. L. Carboniferous (Visean) to U. Carboniferous (Moscovian).

PSEUDOLITUOTUBA Vdovenko, 1971

Plate 214, figs. 15–18

Type species: Lituotuba? gravata Conil and Lys, 1965 (***662**), p. B24; OD.

Pseudolituotuba Vdovenko, 1971 (***3281**), p. 877.

Scalebrina Conil and Longerstaey, in Conil et al., 1980 (***660**), p. 25; type species: *Scalebrina compacta* Conil and Longerstaey, 1980; OD.

Test of small to medium size, consisting of an elongate undivided tube that coils streptospirally, is attached and winding about a narrow support or encrusting; wall calcareous, microgranular, commonly with included foreign particles; aperture terminal, simple. L. Carboniferous (Visean) to U. Carboniferous (Moscovian); W. Europe; USSR.

Remarks: Because of the presence of foreign material in the wall, *Pseudolituotuba* originally was placed in the Ammodiscidae by Vdovenko. It was later made the type genus of the family Pseudolituotubidae by Conil and Longerstaey (in Conil et al., 1980, ***660**, p. 24). According to Conil and Lys (1977, ***667**, p. 34) the very irregular chamber arrangement results from the attachment. Although *Scalebrina* was said to differ in being smaller and in having less foreign material in the wall, figured individuals appear indistinguishable.

Superfamily ARCHAEDISCACEA Cushman, 1928

Archaediscacea Piller, 1978 (***2408**), p. 96, 103, nom. transl. ex subfamily Archaediscinae.

Proloculus followed by planispiral, trochospirally, or streptospirally enrolled tubular second chamber; wall may have more than one layer, and secondary axial thickening may occur on one or both sides. L. Carboniferous (Visean) to U. Carboniferous (Moscovian).

Family ARCHAEDISCIDAE Cushman, 1928

Archaediscidae Chernysheva, 1948 (***583**), p. 151, nom. transl. ex subfamily Archaediscinae.

Test free, discoidal to globular; proloculus followed by enrolled undivided tubular chamber, although the latter may have pseudochambers; wall calcareous, formed of an inner dark microgranular layer that tends to be lost in advanced taxa and a clear radially built more or less perforate outer layer. L. Carboniferous (Visean) to U. Carboniferous (Moscovian).

Subfamily ARCHAEDISCINAE Cushman, 1928

Archaediscinae Cushman, 1928 (***747**), p. 209.

Tournarchaediscinae Conil and Pirlet, in Pirlet and Conil, 1974 (***2411**), p. 282.

Ammarchaediscinae Conil and Pirlet, in Pirlet and Conil, 1974 (***2411**), p. 271.

Planoarchaediscinae Mamet, 1975 (***2009**), p. 48.

Eosigmoilininae Brazhnikova and Vdovenko, 1977: not seen, cited by Marfenkova, 1983 (***2024**), p. 43.

Proloculus followed by enrolled undivided tubular chamber that may be planispiral or variable in coiling; two-layered wall of more or less well-developed inner layer and well-developed hyaline radial outer layer, laterally thickened but no stellate formation in interior and no chamber nodosities. L. Carboniferous (Visean) to U. Carboniferous (Moscovian).

ARCHAEDISCUS Brady, 1873

Plate 215, figs. 6-9, 13-19

Type species: Archaediscus karreri Brady, 1873; OD(M).

Archaediscus Brady, 1873 (***330**), p. 286.

Archaediscoum Rhumbler, 1913 (***2621**), p. 389 (err. emend.).

Propermodiscus A. D. Miklukho-Maklay, 1953 (***2117**), p. 128; type species: *Hemigordius ulmeri* Mikhaylov, 1939 (***2114**), p. 61; OD.

Paraarchaediscus Orlova, 1955 (***2313**), p. 621; type species: *Paraarchaediscus dubitabilis* Orlova, 1955; OD.

Hemiarchaediscus A. D. Miklukho-Maklay, 1957 (***2121**), p. 36; type species: *Hemiarchaediscus planus* A. D. Miklukho-Maklay, 1957; OD.

Betpakodiscus Marfenkova, 1983 (***2024**), p. 51; type species: *Propermodiscus? attenuatus* Marfenkova, 1978 (***2023**), p. 86; OD.

Test free, discoidal to lenticular, proloculus followed by long undivided evolutely coiled tubular second chamber, floor of the chamber against the previous whorl convex to concave, coiling variable, appearing in section as variously aligned, oscillating or sigmoidal; wall calcareous, microgranular, thin, dark inner layer moderately to weakly developed but without lateral thickening or contreforts, outer radial layer entirely covering the test except in the immediate vicinity of the aperture; aperture at the open end of the tube. L. to M. Carboniferous (Visean to Moscovian); Europe; Asia; North America.

EOSIGMOILINA Ganelina, 1956

Plate 214, figs. 19-23

Type species: Eosigmoilina explicata Ganelina, 1956; OD.

Eosigmoilina Ganelina, in Kiparisova et al., 1956 (***1689**), p. 17.

Quasiarchaediscus A. D. Miklukho-Maklay, 1960 (***2129**), p. 150; type species: *Quasiarchaediscus pamirensis* A. D. Miklukho-Maklay, 1960; OD.

Test fusiform in shape, with proloculus followed by undivided evolutely enrolled tubular second chamber, with plagiosigmoid coiling and polar superposition of whorls, wall with much reduced microgranular layer and with important hyaline radial wall layer; aperture at the open end of the tube. L. Carboniferous (Visean) to U. Carboniferous (Namurian); USSR; Czechoslovakia; North America.

Remarks: Although previously considered to belong to the Miliolidae (Ganelina, 1956; Bogdanovich and Voloshinova, in Rauzer-Chernousova and Fursenko, 1959, *2531) or Ophthalmidiinae (Loeblich and Tappan, 1964, *1910), *Eosigmoilina* was regarded as a senior synonym of *Quasiarchaediscus* by Zaninetti and Altiner (1979, *3429, p. 170) and thus placed in the Archaediscidae.

GLOMODISCUS Malakhova, 1973

Plate 215, figs. 1-5

Type species: Glomodiscus biarmicus Malakhova, 1973; OD.

Glomodiscus Malakhova, 1973 (*1993), p. 161.

Archaediscus (Melarchaediscus) Conil and Pirlet, in Pirlet and Conil, 1974 (*2411), p. 256; type species: *Propermodiscus oblongus* Conil and Lys, 1964 (*661), p. 135; OD.

Archaediscus (Glomodiscus) Conil, in Bless et al., 1976 (*254), p. 108, 114 (nom. transl.).

Test discoidal, proloculus followed by enrolled undivided tubular second chamber that is involutely coiled, whorls aligned to oscillating, floor of chambers convex; wall with thick microgranular inner layer, including lateral thickening or contreforts and with outer radial layer completely obscuring the axial region. Carboniferous (L. Visean); Europe: Belgium; USSR: S. Urals.

NUDARCHAEDISCUS Conil and Pirlet, 1974

Plate 215, figs. 10-12

Type species: Planoarchaediscus concinnus Conil and Lys, 1964 (*661), p. 132; OD.

Archaediscus (Nudarchaediscus) Conil and Pirlet, in Pirlet and Conil, 1974 (*2411), p. 255.

Archaediscus (Brunsiarchaediscus) Conil and Pirlet, in Pirlet and Conil, 1974 (*2411), p. 262; type species: *Propermodiscus contiguus* Omara and Conil, 1965 (*2299), p. B229; OD.

Ammarchaediscus (Leptodiscus) Conil and Pirlet, in Pirlet and Conil, 1974 (*2411), p. 275 (non *Leptodiscus* Hertwig, 1877; nec Baal, 1937; nec Tucolesco, 1962); type species: *Permodiscus umbogmaensis* Omara and Conil, 1965 (*2299), p. B227; OD.

Ammarchaediscus (Leptarchaediscus) Conil and Pirlet, in Conil, 1980 (*657), p. 44 (nom. subst. pro *A. (Leptodiscus)* Conil and Pirlet, 1974); type species: *Permodiscus umbogmaensis* Omara and Conil, 1965 (*2299), p. B227; OD.

Similar to *Planoarchaediscus* but with coiling involute and planispiral to oscillating, final whorl may become evolute; wall with weak to medium inner dark layer, continuous throughout test, outer radial layer may cover both sides and periphery or may be absent at periphery of final whorl. L. to U. Carboniferous (Visean, Namurian); Belgium; England; Germany; USSR; Iran; Egypt.

PLANOARCHAEDISCUS A. D. Miklukho-Maklay, 1956

Plate 216, figs. 1-12

Type species: Archaediscus spirillinoides Rauzer-Chernousova, 1948 (*2523), p. 12; OD.

Planoarchaediscus A. D. Miklukho-Maklay, in Kiparisova et al., 1956 (*1689), p. 10.

Parapermodiscus Reytlinger, 1969 (*2609), p. 15 (non *Parapermodiscus* A. D. Miklukho-Maklay, 1953); type species: *Parapermodiscus transitus* Reytlinger, 1969; OD.

Parapermodiscus (Eodiscus) Vdovenko, 1970 (*3278), p. 1062 (non *Eodiscus* Matthew, 1895); type species: *Parapermodiscus (Eodiscus) explanatus* Vdovenko, 1970; OD.

Planodiscus Vdovenko, 1970 (*3278), p. 1062 (nom. subst. pro *Parapermodiscus* Reytlinger, 1969; non *Planodiscus* Sellnick, 1926); type species: *Parapermodiscus transitus* Reytlinger, 1969; OD.

Ammarchaediscus Conil and Pirlet, in Pirlet and Conil, 1974 (*2411), p. 272; type species: *Ammarchaediscus (Ammarchaediscus) bozorgniai* Conil and Pirlet, in Pirlet and Conil, 1974 (as "*bozorgniae*"); OD.

Ammarchaediscus (Eodiscus) Marfenkova, 1984 (*2025), p. 20 (nom. transl.).

Test discoidal, with planispirally enrolled tubular chamber; wall thick, calcareous, microgranular, inner dark layer strong and continuous in all whorls and outer radially built layer only present laterally, producing an umbilical filling in all but the last one or two whorls, or may be weakly present between whorls in more evolute forms, chamber lumen remaining open. Carboniferous (L. Visean to Serpukhovian); Iran; Egypt: Sinai; Belgium; USSR.

Remarks: In the original diagnosis of *Ammarchaediscus, Archaediscus spirillinoides* Rauzer-Chernousova, 1948 was included as an example of the genus (Pirlet and Conil, 1974, ***2411**, p. 272), although that species is the type species of *Planoarchaediscus.* Zaninetti and Altiner (1979, ***3429**, p. 170) noted that the two genera might be synonymous but that *A. spirillinoides* apparently lacked hyaline radial umbilical masses. Although the figures were not clear, Rauzer-Chernousova (1948, ***2523**, p. 12) nevertheless clearly described the markedly thickened hyaline radial structure at the sides of the test.

PLANOSPIRODISCUS Sosipatrova, 1962

Plate 216, figs. 16–18

Type species: Planospirodiscus taimyricus Sosipatrova, 1962 (err. cit. as *"tajmyricus"* on pl. 5, figs. 19–21); OD.

Planospirodiscus Sosipatrova, 1962 (***3030**), p. 63; OD.
Viseidiscus Mamet, 1975 (***2009**), p. 48; type species: *Permodiscus? primaevus* Pronina, 1963 (***2474**), p. 150; OD.
Permodiscus (Planospirodiscus) Conil, in Conil et al., 1980 (***660**), p. 34, 48 (nom. transl.).

Proloculus followed by undivided enrolled tubular second chamber, evolute, whorls aligned, central stellate region present but outer whorls without complexity and no secondary deposits; wall with reduced inner microgranular layer and reduced outer hyaline radial layer covering all whorls but lacking any umbilical masses; aperture simple, at the open end of the tubular chamber. L. Carboniferous (L. to M. Visean); USSR; North America.

TOURNARCHAEDISCUS Conil and Pirlet, 1974

Plate 216, fig. 19

Type species: Tournarchaediscus lysi Conil and Pirlet, 1974 (= *Archaediscus*? sp. Conil and Lys, 1966, ***663**, pl. 2, fig. 15); OD.

Tournarchaediscus Conil and Pirlet, in Pirlet and Conil, 1974 (***2411**), p. 282.

Test probably lenticular, proloculus followed by undivided tubular enrolled chamber of about five whorls, with intercameral partial subdivisions producing numerous pseudochambers in the last half whorl, no central stellate region or nodosities, coiling variable; wall with well-developed microgranular inner layer and poorly developed hyaline radial layer of uniform thickness to absent. L. Carboniferous (Visean); France; Belgium.

TUBISPIRODISCUS Browne and Pohl, 1973

Plate 216, figs. 20–23

Type species: Tubispirodiscus simplissimus Browne and Pohl, 1973; OD.

Tubispirodiscus Browne and Pohl, 1973 (***438**), p. 202.
Ammarchaediscus (Tubispirodiscus) Conil and Pirlet, in Pirlet and Conil, 1974 (***2411**), p. 280 (err. nom. transl.).

Test discoidal to biconcave, proloculus followed by planispirally enrolled and evolute undivided tubular second chamber, chamber floor convex; wall calcareous, microgranular layer reduced in early species and without lateral thickening, entirely lacking in later ones so that the wall consists only of the clear, fibrous radial outer layer, without lateral thickenings; aperture circular, at the open end of the tubular chamber. L. Carboniferous (Visean); North America.

Remarks: Conil and Pirlet (1974, ***2411**) incorrectly considered *Tubispirodiscus* Browne and Pohl, 1973 as a subgenus of their new genus *Ammarchaediscus,* but this incorrect allocation was followed by Browne et al. (1977, ***437**, p. 214). If regarded as subgenera of a single genus, *Tubispirodiscus* has priority (ICZN Art. 23 (d) and 67 (j)) and the subgenus correctly would have been *Tubispirodiscus (Ammarchaediscus). Tubispirodiscus* is regarded as a distinct genus herein and *Ammarchaediscus* a synonym of *Planoarchaediscus.*

URALODISCUS Malakhova, 1973

Plate 216, figs. 13–15

Type species: Uralodiscus librovichi Malakhova, 1973; OD.

Uralodiscus Malakhova, 1973 (***1993**), p. 158.
Ammarchaediscus (Rectodiscus) Conil, in Conil, Groessens, and Lys, 1973 (***659**), expl. pl. 3, figs. 27–31, 34 (name not available, ICZN Art. 13 (a) (i), no description).
Ammarchaediscus (Rectodiscus) Conil and Pirlet, in Pirlet and Conil, 1974 (***2411**), p. 277; type species: *Permodiscus rotundus* Chernysheva, 1948 (***583**), p. 155; OD.

Test lenticular, proloculus followed by planispirally enrolled and involute tubular second chamber or coiling axis may vary slightly, chamber floor convex; wall with well-developed thin dark finely granular inner layer showing lateral thickening or contreforts, hyaline radial layer covering the umbilical region and thinning markedly toward the test periphery; aperture at the end of the tubular chamber, semilunate because of the convex chamber floor. L. Carboniferous (Visean); USSR: S. Urals; Belgium; Iran.

Subfamily ASTEROARCHAEDISCINAE
A. D. Miklukho-Maklay, 1957

Asteroarchaediscinae A. D. Miklukho-Maklay, 1957 (*2121), p. 37.
Kasachstanodiscinae Marfenkova, 1983 (*2024), p. 43.
Permodiscinae Salaj, Borza, and Samuel, 1983 (*2711), p. 132.

Proloculus followed by enrolled undivided tubular chamber with variable coiling, ranging from planispiral to oscillating or sigmoidal as seen in section; microgranular inner wall layer reduced or absent but hyaline radial layer present to well developed, central stellate portion well developed, chamber lumen may be partially filled by secondary deposits, and nodosities and surface rugosities may occur. L. Carboniferous (Visean) to U. Carboniferous (Moscovian).

ASTEROARCHAEDISCUS
A. D. Miklukho-Maklay, 1956
Plate 217, figs. 1-3

Type species: Archaediscus baschkiricus Krestovnikov and Teodorovitch, 1936 (***1732**), p. 87; OD.

Asteroarchaediscus A. D. Miklukho-Maklay, in Kiparisova et al., 1956 (*1689), p. 10.
Lensarchaediscus Porshnyakova, in A. D. Miklukho-Maklay, 1957 (*2121), p. 37; type species: *Lensarchaediscus ovalis* Porshnyakova, 1957; OD.
Nodosarchaediscus (Asteroarchaediscus) Conil and Pirlet, in Pirlet and Conil, 1974 (*2411), p. 270 (nom. transl.).
Neoarchaediscus (Lensarchaediscus) Zaninetti and Altiner, 1979 (*3429), p. 167, 168 (nom. transl.).

Test discoidal to lenticular, globular proloculus followed by tubular enrolled second chamber, coiling variable, whorls aligned, oscillating or sigmoidal, chamber cavity filled by massive occlusions, so that chamber lumen remains open only in the last whorl, central stellate region well developed; wall with almost complete loss of the inner dark granular layer but with well-developed radial layer. L. to M. Carboniferous (Visean to Moscovian); Europe; USSR: W. part, Urals, Kazakhstan, central Asia; Iran?; North America.

BRENCKLEINA Zaninetti and Altiner, 1979
Plate 217, figs. 4-6

Type species: Eosigmoilina rugosa forma *typica* Brazhnikova, 1964 (***350**), p. 13 (infrasubspecific, ICZN Art. 45 (e), (g)(i), recte *Eosigmoilina rugosa*; OD.

Brenckleina Zaninetti and Altiner, 1979 (*3429), p. 172.
Nodosigmoilina Conil, in Conil, Longerstaey, and Ramsbottom, 1980 (*660), p. 32; type species: obj.: OD(M).

Test free, lenticular, somewhat elongate, globular proloculus followed by enrolled undivided tubular second chamber, coiled in varying planes that produce a sigmoidal spire resembling that of *Sigmoilina* but without subdivision into chambers; wall calcareous, consisting of a single hyaline, finely radiate layer, producing nodosities that increase distally to completely fill the chamber lumen except in the final whorl; aperture simple and terminal. U. Carboniferous (Namurian); USSR; North America.

NEOARCHAEDISCUS
A. D. Miklukho-Maklay, 1956
Plate 217, figs. 7-9

Type species: Archaediscus incertus Grozdilova and Lebedeva, 1954 (***1321**), p. 60; OD.

Neoarchaediscus A. D. Miklukho-Maklay, in Kiparisova et al., 1956 (*1689), p. 11.
Rugosoarchaediscus A. D. Miklukho-Maklay, 1957 (*2121), p. 37; type species: *Archaediscus akchimensis* Grozdilova and Lebedeva, 1954 (*1321), p. 53; OD.
Nodosarchaediscus (Asperodiscus) Conil and Pirlet, in Pirlet and Conil, 1974 (*2411), p. 268; type species: *Archaediscus mutans* Conil and Lys, 1964 (*661), p. 125; OD.

Test with proloculus followed by enrolled, undivided tubular second chamber, whorls aligned, oscillating or imperfectly sigmoidal, without nodosities or other occlusion in the outer one to two whorls, but confused central area has well-developed stellate region; wall with weak to imperceptible inner dark layer, entirely covered by the radial layer. Carboniferous (Visean, Namurian, Bashkirian); western Europe; USSR; Iran; North America.

NODASPERODISCUS Conil and Pirlet, 1974

Plate 217, fig. 10

Type species: Archaediscus saleei Conil and Lys, 1964 (*661), p. 126; OD.

Nodosarchaediscus (Nodasperodiscus) Conil and Pirlet, in Pirlet and Conil, 1974 (*2411), p. 267.

Test discoidal, proloculus followed by enrolled tubular second chamber, whorls aligned, sigmoidal or oscillating in arrangement, similar to *Neoarchaediscus* but has both chamber nodosities and central stellate region in which the nature of the early spire becomes confused by the occlusion of the chamber lumen; wall with inner dark layer weakly developed to imperceptible in the later whorls and entirely covered by the hyaline radial layer throughout the test. Carboniferous (U. Visean, Namurian and Bashkirian); W. Europe; USSR; Iran; North America.

NODOSARCHAEDISCUS Conil and Pirlet, 1974

Plate 217, fig. 15

Type species: Archaediscus maximus Grozdilova and Lebedeva, 1954 (*1321), p. 51; OD.

Nodosarchaediscus Conil and Pirlet, in Pirlet and Conil, 1974 (*2411), p. 264.

Test discoidal, proloculus followed by well-developed early coil, with whorls aligned, sigmoidal or oscillating, lacking a central stellate area but with rounded to angular nodosities filling most of the chamber lumen; wall with inner dark wall layer entirely covered by the radial layer throughout the test. Carboniferous (L. to M. Visean); W. Europe; USSR; Iran; North America.

Remarks: Although regarded as a synonym of *Lensarchaediscus* by Zaninetti and Altiner (1979, *3429), *Nodosarchaediscus* has some openings remaining in the chamber lumen, whereas the original illustration of the holotype of *Lensarchaediscus* shows a completely occluded chamber as in typical *Asteroarchaediscus*. Thus *Nodosarchaediscus* is recognized as distinct.

PERMODISCUS Dutkevich, 1948

Plate 217, figs. 11-14

Type species: Permodiscus vetustus Dutkevich, in Chernysheva, 1948; OD.

Permodiscus Dutkevich, in Chernysheva, 1948 (*583), p. 154.

Permodiscus Mikhaylov, 1939 (*2114), p. 49 (name not available, ICZN Art. 13 (a) (i), no description).

Kasachstanodiscus Marfenkova, 1978 (*2023), p. 87; type species: *Planospirodiscus bestubensis* Marfenkova, in Marfenkova and Saltovskaya, 1972 (*2026), p. 39; OD.

Test lenticular, proloculus followed by enrolled tubular undivided second chamber, early whorls open and readily visible, without a central stellate area, later with rounded to angular nodosities partially filling the chamber lumen; wall with imperceptible or weakly developed inner dark layer and with radial layer covering the sides and obscuring the spire. L. to M. Carboniferous (Visean to Bashkirian); USSR: Urals, Kazakhstan, central Asia, Caucasus.

Remarks: The first published description of *Permodiscus* is that given in Chernysheva (1948, *583), in which both the genus and the type species were credited to "Dutkevich msc.," and two other species, *P. rotundus* and *P. syzranicus* were described as new by Chernysheva. The type species was cited as follows (transl.): "Genotype: *Permodiscus vetustus* Dutk. msc. Visean beds of the central Urals (Kizel)." The occurrence cited was for the species described in Dutkevich's manuscript, and no holotype was mentioned by Chernysheva, who illustrated specimens from the western slope of the Urals, from Well 1, at Levshino. These were not from Dutkevich's material, which Chernysheva indicated was from Kizel.

Grozdilova (in Dain and Grozdilova, 1953, *881), cited the genus as "*Permodiscus* Dutkevich emend. N. Tchernysheva," and illustrated "*Permodiscus vetustus* Dutkevich," indicating her figure of pl. IV, fig. 23 as the "holotype (from Dutkevich), Kizel" (about 150 km NNW of Perm). In addition, she figured as *P. vetustus* (pl. IV, fig. 22) a specimen from

Syzran' that had been illustrated earlier by Rauzer-Chernousova (1948, *2522, pl. 17, fig. 15), as *Permodiscus syzranicus* Chernysheva.

Grozdilova and Lebedeva (1954, *1321, p. 63), credit both the genus and the type species to Dutkevich, placing *P. syzranicus* of Rauzer-Chernousova (1948, *2522, pl. 17, figs. 14, 15) in synonymy of *P. vetustus* and describing part of the *P. vetustus* as figured by Chernysheva (1948. *583, pl. 2, fig. 15) as a new species, *P. uniensis*.

Ellis and Messina (1940, *1102, suppl. for 1958, no. 1) recognize *Permodiscus* Chernysheva, stating "Although Chernysheva credited this generic name to Dutkevich, it should be credited to Chernysheva, since Dutkevich was responsible for the name alone, not for the definition (International Rules of Zoological Nomenclature, Article 21)." However, both the genus and species invariably are credited to Dutkevich by Russian workers, and as noted above, the holotype was that of Dutkevich. In addition, Dain, Grozdilova, Myatlyuk, and Reytlinger (in Rauzer-Chernousova and Fursenko, 1959, *2531, p. 342), also cite the genus as "*Permodiscus* Dutkevitch in N. Tchernysheva, 1948," with the type species "*P. vetustus* Dutkevitch, 1948."

Consistant references to a manuscript of Dutkevich by Chernysheva, Rauzer-Chernousova, and others indicate that this manuscript provided not only the name of the genus and type species but also indicated the geologic occurrence, holotype, and other data. According to ICZN Art. 50, "The author of a name is the person who first publishes it in a way that satisfies the criteria of availability. . . . If it is clear from the contents of the publication that . . . some other person is alone responsible both for the name and for satisfying the criteria of availability other than publication, then that person is the author of the name." As an actual manuscript had been consulted, and Dutkevich was responsible for more than the name alone, he is correctly credited with the genus and its type species.

Family LASIODISCIDAE Reytlinger, 1956

Lasiodiscidae Reytlinger, 1956 (*2599), p. 74.

Test discoidal to conical, proloculus followed by undivided enrolled tubular chamber; wall with finely granular dark inner layer and a clear vitreous and radially fibrous outer layer that is particularly concentrated in the umbilical region where it may form tubercles or pillars and may be perforated by canal-like fissures; aperture at end of the tubular chamber, and additional supplementary openings may occur along the spiral suture between successive whorls. L. Carboniferous (Visean) to Permian.

EOLASIODISCUS Reytlinger, 1956

Plate 217, figs. 16-18

Type species: Eolasiodiscus donbassicus Reytlinger, 1956; OD.

Eolasiodiscus Reytlinger, 1956 (*2599), p. 75.

Test discoidal, concavoconvex, spherical proloculus followed by spirally coiled tubular or hemicylindrical second chamber that is nearly planispiral to slightly trochospiral, spiral suture thickened, slightly depressed; wall calcareous, with two layers, an inner dark microgranular layer and an outer distinctly pseudofibrous layer, with an umbilical filling on the concave side of the test; aperture at the open end of the chamber, with fissurelike supplementary openings on the convex side of the test along the spiral suture and perpendicular to it. M. to U. Carboniferous; USSR: North America.

Remarks: The genera *Eolasiodiscus* and *Monotaxinoides* were described in the same issue of Voprosy Mikropaleontologii. Regarded as congeneric by Loeblich and Tappan (April 2, 1964, *1910), p. C358), *Monotaxinoides* was recognized as the valid genus and *Eolasiodiscus* placed in synonymy. However, if they are regarded as congeneric, this synonymy was antedated by Pogrebnyak (Feb. 20, 1964, *2436, p. 4), who recognized *Eolasiodiscus* and placed *Monotaxinoides* in synonymy. In a later study of numerous specimens of the two type species, Groves (1983, *1316, p. 21) stated that the two were distinct, recognizable on the basis of the supplementary apertures at the surface of *Eolasiodiscus*. This is accepted herein.

GLOMOTROCHOLINA A. P. Nikitina, 1977

Plate 217, figs. 19 and 20

Type species: Glomotrocholina pojarkovi A. P. Nikitina, 1977; OD.

Glomotrocholina A. P. Nikitina, in Sosnina and A. P. Nikitina, 1977 (*3041), p. 43.

Test conical, proloculus followed by tubular enrolled second chamber, early whorls streptospirally enrolled, later forming a high trochospiral that may be slightly irregular, surrounding a large central area that is filled with microgranular shell material; wall calcareous, microgranular, dark, stated to be single layered but original figure of the holotype appears to show a differentiated outer layer; aperture at the open end of the tubular chamber. U. Permian; USSR.

HOWCHINIA Cushman, 1927

Plate 218, figs. 1-8

Type species: Patellina bradyana Howchin, 1888 (*1560), p. 544; OD.

Howchinia Cushman, 1927 (*742), p. 42.

Monotaxis Vissarionova, 1948 (*3295), p. 190 (non *Monotaxis* Bennett, 1830, nec Hulst, 1898; nec Hampson, 1900); type species: *Tetrataxis conica* var. *gibba* von Möller, 1879 (*2160), p. 71; OD.

Vissariotaxis Habeeb and Banner, 1979 (*1351), p. 83; type species: *Monotaxis subconica* Brazhnikova and Yartseva, 1956 (*357), p. 63 (non *Vissariotaxis* Mamet, 1970); OD.

Test free, conical, proloculus followed by undivided tubular chamber coiled in a high spire around an umbilical region that is filled with fibrous microcrystalline calcite, spiral suture depressed, bridged by numerous extensions of shell matter that separate small pits; wall calcareous, dark, microgranular, and may have a second thin fibrous radial layer on the base of the spire; aperture terminal, simple. L. to M. Carboniferous (Visean to Moscovian): England; Belgium; USSR; Iran; USA: Alaska; Canada.

LASIODISCUS Reichel, 1946

Plate 218, figs. 9-13

Type species: Lasiodiscus granifer Reichel, 1946; OD.

Lasiodiscus Reichel, 1946 (*2545), p. 525.

Test free, proloculus followed by planispirally enrolled tubular second chamber, tubular chamberlets around the open umbilicus lead into the spirally wound tubular chamber through apertures along the spiral suture; wall calcareous, finely granular, dark in transmitted light, a series of vitreous tubercles of hyaline radial fibrous calcite present on the surface of the side opposite that with chamberlets. M. Carboniferous to U. Permian: Greece; Cyprus; USSR.

LASIOTROCHUS Reichel, 1946

Plate 218, figs. 14 and 15

Type species: Lasiotrochus tatoiensis Reichel, 1946; OD.

Lasiotrochus Reichel, 1946 (*2545), p. 531.

Test conical, with proloculus followed by tubular spirally wound chamber, tubular chamberlets similar to those of *Lasiodiscus* present at the outer extremity of the coiled chamber and recurving toward the proloculus, the tubercles of the opposite side having become distinct hyaline pillars of transparent calcite; wall calcareous, microgranular, the umbilical pillars vitreous. Permian; Greece; USSR: Azerbaydzhan.

MONOTAXINOIDES Brazhnikova and Yartseva, 1956

Plate 218, figs. 16 and 17

Type species: Monotaxinoides transitorius Brazhnikova and Yartseva, 1956; OD.

Monotaxinoides Brazhnikova and Yartseva, 1956 (*357), p. 65.

Spherical proloculus followed by tubular or hemicylindrical second chamber that is trochospirally coiled in a low cone to nearly planispiral, similar to *Howchinia* but less high spired, spiral suture may be slightly depressed; wall calcareous, of two layers, a dark microgranular inner layer and a pseudofibrous outer layer that expands into an umbilical filling on the concave side of the test; aperture a simple opening at the end of the tubular chamber, lacking the supplementary apertures found in *Eolasiodiscus*. Carboniferous; USSR; Canada; USA.

Superfamily MORAVAMMINACEA Pokorný, 1951

Moravamminacea Loeblich and Tappan, 1982 (*1917), p. 28, nom. transl. ex subfamily Moravammininae.

Proloculus followed by tubular enrolled or rectilinear second chamber; periodic growth results in incipient or partial septa. U. Silurian (Ludlovian) to L. Carboniferous (Tournaisian).

Family CALIGELLIDAE Reytlinger, 1959

Caligellidae Reytlinger, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 175.

Test attached, proloculus followed by straight to curved tube with incipient septa projecting inward from the wall. U. Silurian (Ludlovian) to L. Carboniferous (Tournaisian).

BAITUGANELLA Lipina, 1955

Plate 219, fig. 1

Type species: Baituganella chernyshinensis Lipina, 1955; OD.

Baituganella Lipina, 1955 (*1863), p. 19.

Test irregular in form, with proloculus followed by irregularly tubular chamber that appears to coil about the proloculus in the early stage, partially subdivided by incipient septa that project inward from the wall at irregular intervals but do not completely cross the chamber lumen; wall calcareous, microgranular, reported to have some included agglutinated particles; aperture not seen in the sections observed, probably at the end of the tubular chamber. L. Carboniferous (Tournaisian); USSR.

CALIGELLA Antropov, 1950

Plate 219, fig. 2

Type species: Caligella borovkensis Antropov, 1950; OD.

Caligella Antropov, 1950 (*51), p. 28.

Test tiny, elongate, with oval proloculus followed by undivided straight to arcuate tube of up to 0.09 mm in diameter, incipient septa partially dividing the tube but rarely completely crossing the inner cavity; wall calcareous, microgranular, dark gray in color; aperture at the open end of the tube. U. Devonian (Frasnian to Fammenian); USSR.

EVLANIA E. V. Bykova, 1952

Plate 219, figs. 5–8

Type species: Evlania transversa E. V. Bykova, 1952; OD.

Evlania E. V. Bykova, 1952 (*463), p. 20.

Test may be attached, proloculus followed by tubular portion of irregular breadth and increasing in diameter that may be enrolled for a single whorl, be slightly curved, or nearly straight, interior with irregular or incipient septa that may be nearly opposite in position or offset from side to side; wall appears somewhat translucent, light, and vitreous in section; aperture a slit at the narrowed open end of the tube. Devonian (Frasnian); USSR.

GLUBOKOEVELLA Pronina, 1970

Plate 836, fig. 12

Type species: Paracaligella (Glubokoevella) acuta Pronina, 1970; OD.

Paracaligella (Glubokoevella) Pronina, 1970 (*2478), p. 113.

Test with oval to somewhat indistinct separated proloculus, with later slightly curved, irregularly tubular chamber of varied diameter; wall calcareous, dark, finely granular, perforate, wall thickness varies somewhat within slight limits. U. Silurian, (Ludlovian), USSR: E. slope of the Urals.

Remarks: Differs from *Paracaligella* in the presence of a weakly isolated proloculus, in the porous wall, and in the absence of incipient septa projecting from the inner wall.

PARACALIGELLA Lipina, 1955

Plate 219, figs. 9–14

Type species: Paracaligella antropovi Lipina, 1955; OD.

Paracaligella Lipina, 1955 (*1863), p. 26.

Eocaligella Pronina, 1978 (*2480), p. 5 (name not available, ICZN Art. 13 (a) (i), no description).

Eotikhinella Pronina, in Petrova and Pronina, 1980 (*2390), p. 56; type species: *Eotikhinella orbiculata* Pronina, 1980; OD.

?*Eocaligella* Pronina, in Petrova and Pronina, 1980 (*2390), p. 58; type species: *Eocaligella isensis* Pronina, 1980; OD.

Proloculus oval to subspherical, followed by somewhat irregular tubular chamber that may be irregularly and partially divided by incipient septa, commonly alternating first from one side and then the other but rarely if ever entirely crossing the chamber lumen; wall calcareous, dark, and microgranular or questionably double layered with thin dark inner layer and thicker outer gray layer; aperture at the open end of the tube. U. Silurian (Ludlovian, Pridolian) to L. Carboniferous (U. Tournaisian); USSR; USA.

Remarks: The wall of *Paracaligella* was merely stated to be dark and granular, whereas *Eotikhinella* was said to be single layered and *Eocaligella* was said to have a double-layered wall. Although they appear very similar in general growth pattern, the double wall is not evident in the published figures of *Eocaligella*, and the true wall characteristics of all three taxa may have been modified in preservation.

PRONINELLA Reytlinger, 1971

Plate 219, figs. 3 and 4

Type species: Proninella tamarae Reytlinger, 1971; OD.

Proninella Reytlinger, in Menner and Reytlinger, 1971 (*2092), p. 36.

Test narrow conical, interior with irregular partial partitions that arch upward; wall calcareous, microgranular, appearing light, semitransparent, and yellowish in thin sections; aperture terminal, central. M. Devonian (Givetian) to U. Devonian (Fammenian); USSR: Siberia.

Family MORAVAMMINIDAE Pokorný, 1951

Moravamminidae Loeblich and Tappan, 1961 (*1902), p. 283, nom. transl. ex subfamily Moravammininae.
Moravammininae Pokorný, 1951 (*2442), p. 7 (subfamily).

Test attached, tubular, and may be enrolled about attachment; irregularly septate; wall microgranular; aperture terminal. M. Devonian (Givetian) to U. Devonian (Frasnian).

KETTNERAMMINA Pokorný, 1951

Plate 220, fig. 15

Type species: Kettnerammina givetiana Pokorný, 1951; OD.

Kettnerammina Pokorný, 1951 (*2442), p. 3.

Globular or bulbous proloculus followed by nonseptate tubular chamber of up to 0.44 mm diameter that coils about an attachment, then grows erect and bifurcates at irregular intervals, the branches extending in any direction from the dominant plane of growth, entire test having a total length of several mm; wall calcareous, homogeneous; aperture at the open end of the tube. M. Devonian (Givetian); Czechoslovakia.

MORAVAMMINA Pokorný, 1951

Plate 220, figs. 1–4 and 14

Type species: Moravammina segmentata Pokorný, 1951; OD.

Moravammina Pokorný, 1951 (*2442), p. 7.
Litya E. V. Bykova, 1955 (*464), p. 27; type species: *Litya sizranensis* Bykova, 1955; OD.

Test an elongate tube, slightly tapered at the base, and may be enrolled about an attachment, later uncoiled and erect, interior subdivided by thin but distinct septa perpendicular to the axis of the tube; wall calcareous, microgranular, single layered; aperture probably at the open end of the tube. M. Devonian (Givetian) to U. Devonian (Frasnian); Czechoslovakia; USSR.

SACCORHINA E. V. Bykova, 1955

Plate 220, figs. 5 and 6

Type species: Saccorhina trivirgulina E. V. Bykova, 1955; OD.

Saccorhina E. V. Bykova, 1955 (*464), p. 33.

Test with globular proloculus, later tubular with a tendency to bifurcate, surface with regular constrictions resulting from periodic growth or possibly sutures reflecting incipient septa within; wall calcareous, microgranular, single layered, hyaline in section; aperture probably at the open end of the tubes. M. Devonian (Givetian) to U. Devonian (Frasnian); USSR.

Family PARATIKHINELLIDAE Loeblich and Tappan, 1984

Paratikhinellidae Loeblich and Tappan, 1984 (*1918), p. 19.
Paratikhinellidae Loeblich and Tappan, 1982 (*1917), p. 29 (name not available, ICZN, Art. 13 (a) (i), no description).

Test free, elongate, interior partially subdivided by incomplete septa; wall of microgranular calcite, single layered; aperture terminal. M. Devonian (Givetian) to L. Carboniferous (Avonian).

Remarks: The Earlandiidae differ in being nonseptate, and the Nodosinellidae differ in being distinctly septate.

PARATIKHINELLA Reytlinger, 1954

Plate 220, figs. 7-10

Type species: Tikhinella cannula E. V. Bykova, 1952 (*463), p. 32; OD.

Paratikhinella Reytlinger, 1954 (*2598), p. 71.

Earlandinella Cummings, 1955 (*696), p. 229; type species: *Nodosinella cylindrica* Brady, 1876 (*334), p. 104; OD.

Test free, elongate, with subspherical proloculus followed by tapering cylindrical portion that is partially subdivided by incomplete septa formed by internal thickenings of the test wall; wall calcareous, microgranular; aperture terminal, rounded. U. Devonian (Frasnian) to L. Carboniferous (Avonian); USSR; England.

SACCAMMINOPSIS Sollas, 1921

Plate 221, figs. 4-9

Type species: Saccammina carteri Brady, 1871 (*329), p. 177 = *Nodosaria fusulinaformis* M'Coy, 1849 (*1960), p. 131; OD(M).

Saccamminopsis Sollas, 1921 (*3021), p. 193, 211.

Carteria Brady, in C. Moore, 1870 (*2177), p. 372 (non *Carteria* Diesing, 1866, nec Gray, 1867, nec Signoret, 1874); type not designated.

Baculella Conil and Dreesen, in Dreesen et al., 1985 (*1005), p. 322 (non *Baculella* Tendal and Hessler, 1977); type species: *Baculella gemina* Conil and Dreesen, in Dreesen et al., 1985; OD.

Test free, uniserial, strongly constricted between the globular to ovate chambers and commonly breaking apart at the junctures in preservation; wall thin, calcareous, microgranular, and radially fibrous but commonly silicified or dolomitized in preservation; aperture terminal, rounded. U. Devonian Fammenian) to Carboniferous; British Isles; Belgium.

Remarks: *Baculella* was said to differ from *Saccamminopsis* in wall character (Conil and Dreesen, in Dreesen et al., 1985). However, both were described as commonly silicified or dolomitized, and the original structure may have been modified in preservation; the perforate appearance of *Baculella* may be due to the radially fibrous structure, like that of *Saccamminopsis carteri.*

VASICEKIA Pokorný, 1951

Plate 220, figs. 11-13

Type species: Vasicekia moravica Pokorný, 1951; OD.

Vasicekia Pokorný, 1951 (*2442), p. 11.

Test a uniserial series of ovoid chambers of up to 0.4 mm in length, each with an elongate tubular neck up to 1 mm in length that may be curved or bent, commonly broken apart in preservation, so that an isolated ovate chamber may have a tubular neck at each pole; wall calcareous, microgranular, translucent, homogeneous, single layered; aperture at the open end of the tube. M. Devonian (Givetian); Czechoslovakia.

Superfamily NODOSINELLACEA Rhumbler, 1895

Nodosinellacea Loeblich and Tappan, 1982 (*1917), p. 29, nom. transl. ex family Nodosinellidae.

Test of one or more distinct chambers; wall single layered or with microgranular outer layer and fibrous inner layer. U. Silurian (Ludlovian) to Permian.

Family EARLANDINITIDAE Loeblich and Tappan, 1984

Earlandinitidae Loeblich and Tappan, 1984 (*1918), p. 19.

Test free, elongate, uniserial, straight to slightly arcuate; wall a single layer of microgranular calcite; aperture terminal and central, single or multiple. U. Devonian (Frasnian) to U. Carboniferous (Namurian).

Remarks: Differs from other Nodosinellacea in being distinctly chambered and rectilinear, with single-layered wall.

DARJELLA Malakhova, 1964

Plate 221, figs. 1-3

Type species: Darjella monilis Malakhova, 1964; OD.

Darjella Malakhova, 1964 (*1991), p. 110.

Test large, uniserial, and rectilinear to slightly arcuate, consisting of a few rapidly enlarging globular to ovate chambers that enclose the terminal end and neck of the preceding chamber, sutures strongly constricted; wall calcareous, granular, with calcite inclusions, probably due to recrystallization of the wall, and possibly with some agglutinated particles, thick, particularly in the region of the neck; aperture terminal, simple, rounded, at the end of the prominent neck. L. Carboniferous (L. Visean); USSR: Urals.

Remarks: *Darjella* was originally regarded as similar to *Reophax* but appears much closer to the similarly Carboniferous *Lugtonia*, from which it differs in the more inflated chambers with prominent necks successively overlapped by succeeding chambers.

EARLANDINITA Cummings, 1955

Plate 221, figs. 14-16

Type species: Nodosinella perelegans Plummer, 1930 (*2422), p. 14; OD.

Earlandinita Cummings, 1955 (*696), p. 230.

Test free, elongate, uniserial, straight or slightly arcuate, with well-defined septa and chambers; wall calcareous, microgranular, single layered; aperture terminal, rounded. L. Carboniferous (Avonian) to U. Carboniferous (Namurian); British Isles; USA: Texas.

LUGTONIA Cummings, 1955

Plate 221, figs. 11-13

Type species: Nodosinella concinna Brady, 1876 (*334), p. 106; OD.

Lugtonia Cummings, 1955 (*696), p. 231.

Test free, with subglobular chambers in a rectilinear series, septa domed, reflecting the shape of the terminal wall, sutures constricted; wall apparently originally calcareous and single layered but known specimens secondarily silicified; aperture terminal, rounded. L. Carboniferous (Tournaisian) to U. Carboniferous (Namurian); British Isles; USA.

TIKHINELLA E. V. Bykova, 1952

Plate 221, fig. 10

Type species: Tikhinella measpis E. V. Bykova, 1952; OD.

Tikhinella E. V. Bykova, 1952 (*463), p. 29.

Test free, uniserial, and rectilinear or slightly arcuate, chambers gradually enlarging, sutures horizontal, nearly flush; wall calcareous, of microgranular calcite, single layered, dark and not vitreous in section; aperture rounded, terminal. U. Devonian (Frasnian); USSR: Russian platform; Canada.

Remarks: Previously considered a synonym of *Nodosinella* (Loeblich and Tappan, 1964, *1910, p. C323), it differs in the simple rather than double layered wall and smaller and more delicate test.

Family NODOSINELLIDAE Rhumbler, 1895

Nodosinellidae Rhumbler, 1895 (*2616), p. 85.
Nodosinellida Copeland, 1956 (*680), p. 186 (err. emend.).
Nodosinellinae Loeblich and Tappan, 1961 (*1902), p. 285 (subfamily).

Test free, uniserial; wall double, with microgranular outer layer and fibrous or perforate inner layer; aperture terminal. U. Silurian (Ludlovian) to Permian.

BIPARIETATA Zolotova, 1980

Plate 222, figs. 1 and 2

Type species: Biparietata ampula Zolotova, in Zolotova and Baryshnikov, 1980; OD.

Biparietata Zolotova, in Zolotova and Baryshnikov, 1980 (*3455), p. 99.

Test small, elongate, uniserial, and rectilinear, chambers few and flasklike, circular in section, sutures not apparent externally; wall calcareous, of two layers, the inner layer microgranular and gray in color, forming the margin of the flasklike chambers, the outer wall closely appressed to the broader part of the chambers but nearly straight, leaving an open space external to the chamber neck and continuing to the base of the succeeding chamber, no surface ornamentation; aperture terminal, rounded, at the end of a somewhat produced neck. M. Permian (Kungurian); USSR: W. Urals.

Remarks: The above description is based on the original description and figures. The reported wall character is unlike any known elsewhere and cannot be verified from the published photograph.

EOLAGENA Lipina, 1959

Plate 222, figs. 15-17

Type species: Eolagena minuta Lipina, 1959; OD.

Eolagena Lipina, 1959 (*1864), p. 825.

Test oval, pyriform, or flask shaped; wall calcareous, with inner radial layer and outer finely granular layer; aperture a simple rounded opening. U. Silurian (Ludlovian): USSR: Siberia.

Remarks: Although a single chamber, and thus resembling the Archaesphaeridae or Usloniidae, *Eolagena* has a distinct aperture and a double-layered wall that appears close in structure to the Nodosinellidae.

NODOSINELLA Brady, 1876

Plate 222, figs. 18-22

Type species: Nodosinella digitata Brady, 1876; SD S. A. Miller, 1889 (***2140**), p. 161.

Nodosinella Brady, 1876 (***334**), p. 102.

Arnodosinum Rhumbler, 1913 (***2621**), p. 442 (err. emend.).

Test free, robust, uniserial, chambers increasing gradually in size, septa slightly domed in the center, sutures straight and horizontal; wall calcareous, with microgranular outer layer and radially fibrous inner layer; aperture rounded, terminal. Permian; England.

Superfamily GEINITZINACEA Bozorgnia 1973

Geinitzinacea Loeblich and Tappan, 1984 (***1918**), p. 20, nom. transl. ex family Geinitzinidae.

Test uniserial; wall with dark microgranular inner layer and radially fibrous outer layer, advanced forms with secondary lateral thickening. U. Devonian (Frasnian) to U. Permian.

Family GEINITZINIDAE Bozorgnia, 1973

Geinitzinidae Bozorgnia, 1973 (***324**), p. 149.
Lunucamminidae Haynes, 1981 (***1437**), p. 137.

Test uniserial, early species rounded in section, later ones compressed, ovate to triradiate in section; wall with thicker light-colored hyaline radiate layer and thin dark granular inner layer; aperture terminal, rounded to ovate. U. Devonian (Frasnian) to U. Permian.

EONODOSARIA Lipina, 1950

Plate 222, figs. 3-7

Type species: Eonodosaria evlanensis Lipina, 1950; OD.

Eonodosaria Lipina, 1950 (***1861**), p. 126.

Test free, uniserial and rectilinear; wall calcareous, double layered, with an outer light-colored radial layer and an inner thin dark granular layer forming the inner surface of the chambers; aperture simple, rounded. U. Devonian; USSR; Canada; USA: Nevada.

Remarks: Regarded as a synonym of *Nodosaria* by E. V. Bykova, Dain, and A. V. Fursenko (in Rauzer-Chernousova and Fursenko, 1959, ***2531**, p. 249), it was transferred to the Nodosinellinae because of the two-layered wall but regarded as a synonym of *Nodosinella* by Loeblich and Tappan (1964, ***1910**, p. C323). As *Nodosinella* has an outer microgranular wall layer and an inner fibrous one, whereas *Eonodosaria* has an outer fibrous one, *Eonodosaria* is reinstated as distinct.

FRONDILINA E. V. Bykova, 1952

Plate 222, figs. 8-14

Type species: Frondilina devexis E. V. Bykova, 1952; OD.

Frondilina E. V. Bykova, 1952 (***463**), p. 24.

Test free, uniserial, globular proloculus followed by gradually enlarging wide and low chambers, triradiate and symmetrical in section, strongly overlapping previous chambers at the outer margins, so that the chambers appear equitant in section, sutures incised and oblique; wall calcareous, double layered, with dark micritic inner layer and pseudofibrous clear or yellowish outer layer; aperture a round opening, axial and terminal in position. U. Devonian (Frasnian); USSR; USA: Alaska.

Remarks: Originally regarded as having an elongate ovate section, with bilateral symmetry, numerous sections of *Frondilina sororis* Bykova were described from Alaska (Mamet, in Mamet and Plafker, 1982, ***2014**) that show a distinctly triradial section, requiring emendation of the description.

HOWCHINELLA Palmieri, 1985

Plate 223, figs. 1-4

Type species: Frondicularia woodwardi Howchin, 1895 (***1562**), p. 197; OD.

Howchinella Palmieri, in Foster, Palmieri, and Fleming, 1985 (***1158**), p. 83.

Howchinella Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 118 (2 species designated as type species, *F. woodwardi* on p. 118, and *Geinitzina caseyi* Crespin, 1958, on p. 172, hence name unavailable, ICZN Art. 13 (b); and unavailable, ICZN Art. 15 as conditionally proposed, p. 118, although definitely proposed on p. 171).

Test elongate and flattened with longitudinal central depression, tapering at the base, uniserial equitant chambers increasing rapidly in breadth in the early stage, then very slowly so that lateral margins are nearly parallel, sutures chevron shaped, early ones flush, later weakly depressed, periphery rounded; wall calcareous, with dark thin inner organic layer and outer hyaline layer of optically radial calcite, secondarily nonlamellar (atelomonolamellar) or partially lamellar (plesiomonolamellar): aperture terminal, radiate, slightly produced. L. Permian (Sakmarian); Western Australia.

LUNUCAMMINA Spandel, 1898

Plate 223, figs. 5-8 and 13-17

Type species: Geinitzella (Lunucammina) permiana Spandel, 1898; SD Cushman, 1928 (*747), p. 119.

Geinitzella (Lunucammina) Spandel, 1898 (*3046), p. 8.

Geinitzella Spandel, 1898 (*3046), p. 7 (non *Geinitzella* Waagen and Wentzel, 1866); type species: *Textularia cuneiformis* Jones, in King, 1850 (*1688), p. 18, non *Textularia cuneiformis* d'Orbigny, 1826; = *Textularia jonesi* Brady, 1876 (*334), p. 133; SD Cushman, 1928 (*747), p. 119.

Geinitzina Spandel, 1901 (*3047), p. 189 (nom. subst. pro *Geinitzella* Spandel, 1898); type species: obj.; SD Cushman, 1928 (*747), p. 119.

Lunucammina Chapman, 1902 (*534), p. 260 (nom. transl.).

Spandelina Cushman and Waters, 1928 (*856), p. 363; type species: *Spandelina excavata* Cushman and Waters, 1928; OD.

Eogeinitzina Lipina, 1950 (*1861), p. 124; type species: *Eogeinitzina devonica* Lipina, 1950; OD.

Neogeinitzina K. V. Miklukho-Maklay, 1954 (*2134), p. 34; type species: *Neogeinitzina orientalis* K. V. Miklukho-Maklay, 1954; OD.

Test elongate, narrow to broadly flaring and subtriangular in outline, compressed, ovate to reniform in section, commonly with a median longitudinal depression that in slightly tangential longitudinal sections may give the appearance of two opposed and not alternating rows of chambers, globular proloculus followed by gradually widening, low, uniserial and rectilinear chambers, slightly to distinctly arched at the midline of the flat sides, sutures medially arched, depressed; wall calcareous, with microgranular inner layer and radially striate or fibrous outer layer; surface smooth to longitudinally striate; aperture terminal, rounded to ovate. U. Devonian to U. Permian (Zechstein); Europe; Asia; Australia; North America.

SPANDELINOIDES Cushman and Waters, 1928

Plate 223, figs. 9-12

Type species: Spandelina (Spandelinoides) nodosariformis Cushman and Waters, 1928; OD.

Spandelina (Spandelinoides) Cushman and Waters, 1928 (*856), p. 367.

Test narrow, elongate, up to 1.1 mm in length, chambers uniserial and rectilinear, earlier ones in the microspheric generation chevron shaped and slightly compressed, later becoming circular in section, with sutures nearly horizontal; wall calcareous, microgranular, surface smooth; aperture terminal, circular, may be bordered by a lip. U. Carboniferous (U. Pennsylvanian)? or probably L. Permian; USA: Texas.

Family PACHYPHLOIIDAE Loeblich and Tappan, 1984

Pachyphloiidae Loeblich and Tappan, 1984 (*1918), p. 20.

Test free, uniserial, compressed, with broad low chambers recurved laterally; wall microgranular, calcareous, with secondary lamellar thickening on both sides of test. L. to U. Permian.

Remarks: Differs from the Geinitzinidae in the prominent lamellar thickening on each side of the test.

MAICHELINA Sosnina, 1977

Plate 224, figs. 1-5

Type species: Maichelina consueta Sosnina, 1977; OD.

Maichelina Sosnina, 1977 (*3037), p. 21.

Test elongate, large, up to 2.5 mm in length, chambers uniserial and rectilinear, tapered at the base, widening gradually in the early stage, later with more nearly parallel sides or even reduced in breadth, sutures obscure in the thick-walled early stage, visible only in the thinner-walled later part; wall calcareous, thick.

vitreous, radial, multilayered in the early stage resulting in an inflated test, wall thinner and without lamination in the later chambers, surface smooth; aperture terminal, simple, rounded. U. Permian; USSR: S. Primorye.

PACHYPHLOIA Lange, 1925

Plate 224, figs. 6 and 10-17

Type species: Pachyphloia ovata Lange, 1925; SD Galloway, 1933 (*1205), p. 172.

Pachyphloia Lange, 1925 (*1788), p. 230.

Parapermodiscus A. D. Miklukho-Maklay, 1953 (*2117), p. 129; type species: *Parapermodiscus gefoensis* A. D. Miklukho-Maklay, 1953; OD.

Pseudogeinitzina K. V. Miklukho-Maklay, 1954 (*2134), p. 35; type species: *Pseudogeinitzina magna* K. V. Miklukho-Maklay, 1954; OD.

Parapachyphloia K. V. Miklukho-Maklay, 1954 (*2134), p. 57; type species: *Parapachyphloia asymmetrica* K. V. Miklukho-Maklay, 1954; OD.

Parageinitzina K. V. Miklukho-Maklay, 1954 (*2134), p. 61; type species: *Parageinitzina depressa* K. V. Miklukho-Maklay, 1954; OD.

Test elongate, compressed, ovate in outline, fusiform to sinuate in horizontal section, consisting of a rectilinear series of very broad, low, strongly overlapping chambers; wall calcareous, two layered, with very thin dark inner layer and thicker hyaline outer layer of radial structure, lamellar thickening especially prominent at the flattened sides; aperture terminal, rounded, bordered by radial grooves. Permian; Malay Archipelago: Sumatra; USSR; Iran; Turkey.

ROBUSTOPACHYPHLOIA J. X. Lin, 1980

Plate 224, figs. 7-9

Type species: Robustopachyphloia annectena J. X. Lin, 1980; OD.

Robustopachyphloia J. X. Lin, 1980 (*1853), p. 42.

Test elongate, uniserial, and rectilinear, tapered at the base to a tiny proloculus, widening rapidly in the early stage, later with sides nearly parallel, chambers relatively broad and low, septa arched in the midportion of the test, chambers abruptly higher in the later stage and septa more flattened and less arched; wall calcareous, radially fibrous in structure, with a thin, dark granular inner layer, thick and strongly laminated in the early stage as in *Pachyphloia* but thinner and nonlamellar in the later higher chambers; aperture terminal, central, rounded. U. Permian (Changxing Limestone); China: Guangdong and Hubei Provinces.

Superfamily COLANIELLACEA Fursenko, 1959

Colaniellacea Haynes, 1981 (*1437), p. 137, nom. transl. ex subfamily Colaniellinae.

Test uniserial, chambers strongly overlapping, internally subdivided by vertical radial partitions; wall with outer vitreous layer and finely granular inner layer; aperture rounded to radiate. U. Devonian to U. Permian.

Family COLANIELLIDAE Fursenko, 1959

Colaniellidae Loeblich and Tappan, 1961 (*1902), p. 285, nom. transl. ex subfamily Colaniellinae.

Colaniellinae Fursenko, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 251 (subfamily).

As in the superfamily.

COLANIELLA Likharev, 1939

Plate 225, figs. 1-15

Type species: Pyramis parva Colani, 1924 (*618), p. 181; OD.

Colaniella Likharev, 1939 (*1850), p. 31 (nom. subst. pro *Pyramis* Colani, 1924).

Pyramis Colani, 1924 (*618), p. 181 (non Boulten, 1798; nec Schumacher, 1817; nec Otto, 1921; nec Brown, 1827; nec Putzeys, 1845; nec Haeckel, 1887); type species: obj.: OD(M).

Pseudocolaniella K. L. Wang, 1966 (*3341), p. 215, 221; type species: *Pseudocolaniella xufulingensis* K. L. Wang, 1966; OD.

Paracolaniella K. L. Wang, 1966 (*3341), p. 216, 221; type species: *Paracolaniella leei* K. L. Wang, 1966; OD.

Test free, elongate, subfusiform, numerous very low uniserial and rectilinear chambers, circular in section and increasing steadily in diameter as added, very strongly arched centrally and strongly overlapping at the margins, chamber interior subdivided by numerous vertical radial platelike partitions that extend nearly to the test axis and with similar but shorter vertical partitions; wall calcareous, finely perforate, with radial or fibrous structure, and may have a very thin opaque inner layer; aperture terminal, radiate. U. Permian; Viet Nam; China; Japan; USSR; Greece; Turkey.

Remarks: Sellier de Civrieux and Dessauvagie (1965, *2867, p. 141) proposed substituting *Colaniella cylindrica* K. V. Miklukho-Maklay, 1954 as type species for the genus because the original description of *C. parva* had been based on random sections. However, once designated in accordance with the Code, the type of any taxon cannot be changed except by exercise of the plenary powers of the International Zoological Commission (ICZN Art. 61 (a)).

CYLINDROCOLANIELLA Loeblich and Tappan, 1985

Plate 226, figs. 1 and 2

Type species: Wanganella ussuriensis Sosnina, in Kiparisova et al., 1956 (*1689), p. 15; OD.

Cylindrocolaniella Loeblich and Tappan, 1985 (*1927), p. 218 (nom. subst. pro *Wanganella* Sosnina, 1956).

Wanganella Sosnina, in Kiparisova et al., 1956 (*1689), p. 15 (non Laserow, 1954); type species: obj.; OD.

Cylindrocolaniella Towe, 1985 (*3220), p. 64 (name not available, ICZN Art. 13 (a) (i), no description).

Test free, uniserial and rectilinear to slightly arcuate, resembling *Colaniella* in structure but very narrow, elongate and cylindrical in form, numerous (up to 30) short, cup-shaped septa differing from the very strongly overlapping ones of *Colaniella*, interior of all chambers except the proloculus subdivided by a few, relatively thick vertical radial partitions; aperture terminal, radiate. U. Permian; E. USSR.

MULTISEPTIDA E. V. Bykova, 1952

Plate 226, figs. 3-9

Type species: Multiseptida corallina E. V. Bykova, 1952; OD.

Multiseptida E. V. Bykova, 1952 (*463), p. 27.

Test elongate, rectilinear, uniserial, proloculus followed by low discoidal overlapping chambers that enlarge gradually in diameter as added, septa extend inward for about one-third the test diameter and leave open an increasingly wide area of the central cavity, septa secondarily thickened and deflected downward at the inner margin, peripheral part of chamber lumen subdivided by radial partitions that are perpendicular to the outer wall and chamber roof, with shorter partitions intercalated between the longer ones; wall of two layers, an outer thin, radially striate hyaline layer that may not be preserved and an inner thick darker layer of fine-grained calcite; aperture rounded, terminal, bordered by a rim. U. Devonian; USSR: Russian Platform; Canada: Alberta; USA: Alaska.

PSEUDOWANGANELLA Sosnina, 1983

Plate 226, figs. 10-15

Type species: Pseudowanganella tenuitheca Sosnina, 1983; OD.

Pseudowanganella Sosnina, 1983 (*3040), p. 41.

Test narrow and elongate, up to 1.0 mm in length, slightly flattened and elliptical in section, uniserial, rectilinear to slightly arcuate, enlarging gradually, chambers numerous, arched centrally, and overlapping at the periphery, resembling a series of nested cups, interior subdivided by vertical radial partitions produced by an infolding of the outer wall, and forming narrow vertical channels in the wall; sutures obscure externally, septa somewhat thickened adjacent to the aperture; wall calcareous, thin; aperture terminal, rounded, with thickened rim. U. Permian; USSR: S. Primorye.

Superfamily PTYCHOCLADIACEA Elias, 1950

Ptychocladiacea Loeblich and Tappan, 1984 (*1918), p. 20, nom. transl. ex family Ptychocladiidae.

Test attached, branching or spreading, uniserial; wall microgranular calcareous, banded, possibly with transverse tubuli; no distinct aperture. U. Devonian (Frasnian) to U. Carboniferous (Stephanian).

Family PTYCHOCLADIIDAE Elias, 1950

Ptychocladiidae Elias, 1950 (*1099), p. 288.

Ptychocladiinae Loeblich and Tappan, 1961 (*1902), p. 285 (subfamily).

As in the superfamily. U. Devonian (Frasnian) to U. Carboniferous (Stephanian).

PTYCHOCLADIA Ulrich and Bassler, 1904

Plate 227, figs. 2-4

Type species: Ptychocladia agellus Ulrich and Bassler, 1904; OD.

Ptychocladia Ulrich and Bassler, 1904 (*3245), p. 289.

Test attached, with uniserial rows of chambers arising from the proloculus and spreading in all directions, rows may branch dichotomously or row may give rise to more numerous branches, branches may anastomose to form a spreading discoid structure, chambers numerous, broad and low to subcylindrical; wall calcareous, microgranular, two layered, with thin dark inner layer and thicker light-colored outer layer; no distinct aperture. U. Pennsylvanian; USA: Illinois, Nebraska; Oklahoma.

SHUGURIA Antropov, 1950

Plate 227, fig. 1

Type species: Shuguria flabelliformis Antropov, 1950; OD.

Shuguria Antropov, 1950 (*51), p. 30.

Test with proloculus followed by broad, low, and nearly cyclic chambers, later with radial branches from the periphery; wall thick, calcareous, dark; aperture consists of pores at the periphery. U. Devonian (Frasnian); USSR: Russian Platform.

Remarks: Originally described as having a planispiral early stage, then becoming biserial and finally multiserial, but this is not evident in the original illustrations, which appear much closer to the structure of *Ptychocladia*. Has been regarded as an alga by Chuvashov, 1968 (***596**), p. 17, 18, 71, 74, 77.

Superfamily PALAEOTEXTULARIACEA Galloway, 1933

Palaeotextulariacea Habeeb, 1979 (***1350**), p. 82, nom. transl. ex subfamily Palaeotextulariinae.

Test biserial or enrolled biserial or may become uniserial; wall microgranular calcareous and may have thin adventitious coating; aperture single or may be multiple in later stages. M. Devonian (Givetian) to Permian.

Family SEMITEXTULARIIDAE Pokorný, 1956

Semitextulariidae Pokorný, 1956 (***2446**), p. 284.
Pseudopalmulidae E. V. Bykova, in Rauzer-Chernousova and Fursenko, 1959 (***2531**), p. 264.

Test biserial or may become uniserial; wall microgranular calcareous, not differentiated into more than one layer but may include a considerable amount of agglutinated material; aperture basal to areal, single to multiple. Devonian to Pennsylvanian.

Subfamily PSEUDOPALMULINAE E. V. Bykova, 1959

Pseudopalmulinae Loeblich and Tappan, 1982 (***1917**), p. 29, nom. transl. ex family Pseudopalmulidae.

Test biserial, flattened, elongate, narrow to palmate; wall microgranular; aperture terminal, ovate. M. to U. Devonian.

PARATEXTULARIA Pokorný 1951

Plate 227, figs. 13 and 14

Type species: Textularia? proboscidea Cushman and Stainbrook, 1943 (***847**), p. 78; OD.

Paratextularia Pokorný, 1951 (***2442**), p. 20.
Cremsia E. V. Bykova, 1952 (***463**), p. 50; type species: obj.; OD.

Test free, elongate, narrow, chambers biserially arranged throughout, final chamber produced in the apertural region; wall calcareous, microgranular; aperture terminal, rounded at the end of the terminal prolongation of the final chamber. M. Devonian (Givetian) to U. Devonian (Frasnian); USA: Iowa; Czechoslovakia; Poland; USSR: Russian Platform.

PETCHORINA Reytlinger, 1962

Plate 227, figs. 5–6

Type species: Petchorina schezhimovensis Reytlinger, in Varsanof'eva and Reytlinger, 1962; OD.

Petchorina Reytlinger, in Varsanof'eva and Reytlinger, 1962 (***3255**), p. 56.

Test ovate to irregularly subangular, with interior partly subdivided by short pseudosepta into two or three pseudochambers; wall calcareous, microgranular, about 36 μm in thickness, whether perforate or not is unknown; aperture not observed. U. Devonian (Frasnian); USSR: Pechora district.

Remarks: Known only from thin sections, the characters of this genus are not fully known, but it appears to have a biserial chamber arrangement.

PSEUDOPALMULA Cushman and Stainbrook, 1943

Plate 227, figs. 10-12

Type species: Pseudopalmula palmuloides Cushman and Stainbrook, 1943; OD.

Pseudopalmula Cushman and Stainbrook, 1943 (*847), p. 78.

Test free, small, palmate, flattened, chambers biserially arranged throughout, low and wide, extending far back toward the ovate proloculus at both margins; wall calcareous, finely granular; aperture ovate, subterminal, on the apertural face of the final chamber. Devonian (Couvinian to Frasnian); USA: Iowa; USSR: Russian Platform; Poland.

Remarks: Based on species found in the Russian Platform, E. V. Bykova (1952, ***463**, p.42) emended the genus as having internal vertical partitions similar to those of *Semitextularia* and a multiple aperture. However, the type species from the Devonian of Iowa does not have internal partitions in the chambers and has only a single rounded aperture. If Bykova's specimens are subdivided internally, they may be referrable to *Semitextularia* but are not congeneric with *Pseudopalmula*.

Subfamily SEMITEXTULARIINAE Pokorný, 1956

Semitextulariinae Loeblich and Tappan, 1984 (*1918), p. 20, nom. transl. ex family Semitextulariidae.

Test laterally compressed and palmate; chambers broad and low, arched centrally, interior with vertical interseptal partitions, those of successive chambers not aligned; aperture a row of ovate openings on the apertural face. M. Devonian (Givetian) to U. Devonian (Fammenian).

SEMITEXTULARIA A. K. Miller and Carmer, 1933

Plate 227, figs. 7-9

Type species: Semitextularia thomasi Miller and Carmer, 1933; OD.

Semitextularia Miller and Carmer, 1933 (*2138), p. 428.

Test free, flattened, palmate, short early biserial portion with two to four pairs of broad and low biserially arranged chambers, followed by more numerous very broad, low, and arched uniserial chambers that may be laterally produced to result in a serrate test margin; chamber interior subdivided by numerous vertical interseptal partitions, those of successive chambers not in alignment; wall calcareous, microgranular; aperture multiple, a row of pores on the outer margin of the final chamber. M. to U. Devonian (Givetian to Fammenian); USA: Iowa, New York; Canada: Alberta; Czechoslovakia; Poland; USSR: Russian Platform.

Subfamily KOSKINOBIGENERININAE Loeblich and Tappan, 1984

Koskinobigenerininae Loeblich and Tappan, 1984 (*1918), p. 20.

Test biserial at first, later may tend to become rectilinear and uniserial; wall calcareous, single layered, microgranular, reportedly agglutinated of calcareous material, but the separate grains and ground mass cannot be resolved under the microscope; aperture basal in the early biserial stage, later becoming terminal and cribrate. L. Mississippian (Visean) to U. Carboniferous.

KOSKINOBIGENERINA Eickhoff, 1968

Plate 228, figs. 1-4

Type species: Koskinobigenerina breviseptata Eickhoff, 1968; OD.

Koskinobigenerina Eickhoff, 1968 (*1087), p. 168.

Test free, elongate, large, up to 1.7 mm in length, tapering at the base, chambers biserially arranged in the early stage, later becoming uniserial and rectilinear, with test enlarging less rapidly; wall single layered, calcareous, microgranular, and may have included angular calcareous grains (of foreign particles?); aperture in the early stage single and at the base of the last chamber, in the later stage multiple, with a few rounded openings in the terminal face. L. Carboniferous (Visean) to U. Carboniferous; France, Germany; USSR: Moscow Basin.

KOSKINOTEXTULARIA Eickhoff, 1968

Plate 228, figs. 5-8

Type species: Koskinotextularia cribriformis Eickhoff, 1968; OD.

Koskinotextularia Eickhoff, 1968 (*1087), p. 164.

Test free, large, up to 1.04 mm in length, elongate, flaring from the globular proloculus, chambers in biserial arrangement throughout; wall calcareous, single layered, microgranular, with agglutinated calcareous grains that in the microscope cannot be resolved as distinct from the ground mass; aperture simple, single, and basal in the early stage, later becoming multiple and cribrate on the terminal face. L. Carboniferous (Visean) to U. Carboniferous; Germany; Belgium; France; USA: Oklahoma; Canada.

Family PALAEOTEXTULARIIDAE Galloway, 1933

Palaeotextulariidae Wedekind, 1937 (*3355), p. 79, nom. transl. ex subfamily Palaeotextulariinae.
Palaeotextulariinae Galloway, 1933 (*1205), p. 221 (subfamily).
Cribrostomatidae Wedekind, 1937 (*3355), p. 79.

Test biserial, later may become uniserial; wall calcareous, microgranular, commonly with an inner radial fibrous layer and finely granular outer layer that may include small amounts of adventitious material; aperture an interiomarginal arch in the biserial forms, becoming terminal and cribrate in uniserial ones. L. Carboniferous (Tournaisian) to Permian.

CLIMACAMMINA Brady, 1873

Plate 228, figs. 9-13

Type species: Textularia antiqua Brady, in Young and Armstrong, 1871 (***3419**), p. 13; OD(M).

Climacammina Brady, in Etheridge, 1873 (***1113**), p. 94.
Cribrostomum von Möller, 1879 (***2160**), p. 39; type species: *Cribrostomum textulariforme* von Möller, 1879; SD Cushman, 1928 (***747**), p. 120.
Moellerina Eimer and Fickert, 1899 (***1088**), p. 677 (non *Moellerina* Ulrich, 1886, nec Schellwien, 1898); type species: *Cribrostomum gracile* von Möller, 1879 (***2160**), p. 59; SD Cushman, 1928 (***747**), p. 120.

Test free, large, early stage biserial, later uniserial, chambers enlarging gradually, broad, low, somewhat inflated; wall calcareous, two layered, with inner radially fibrous layer and outer microgranular layer that may include some foreign particles; aperture in the early stage at the base of the last chamber, later becoming areal, multiple, and cribrate, with numerous openings in the adult, that may be bordered internally by downward projecting pillarlike siphons. L. Carboniferous to Permian; cosmopolitan.

CRIBROGENERINA Schubert, 1908

Plate 229, fig. 4

Type species: Bigenerina sumatrana Volz, 1904 (***3321**), p. 96 (err. cit. as *B. sumatrensis* Volz, 1904, p. 107, 108, 110); OD(M).

Cribrogenerina Schubert, 1908 (***2816**), p. 245.

Test free, elongate, with short early biserial portion of one or two pair of chambers, at least in the microspheric generation, later uniserial, with numerous broad and low chambers; wall calcareous, with inner fibrous layer and microgranular and possibly partially agglutinated outer layer; aperture a lunate slit in the biserial stage, multiple and cribrate in the uniserial chambers, consisting of numerous rounded pores. Permian; Sumatra; USSR; USA.

DECKERELLA Cushman and Waters, 1928

Plate 229, figs. 1-3

Type species: Deckerella clavata Cushman and Waters, 1928; OD.

Deckerella Cushman and Waters, 1928 (***855**), p. 128.

Test free, elongate, globular proloculus followed by tapering early stage, with slightly inflated, biserially arranged chambers, later uniserial and rectilinear, circular in section; wall thick, microgranular, dark in transmitted light, with incomplete inner fibrous layer lining the lateral walls and may have an irregular agglutinated external coating; aperture a low interiomarginal lunate slit in the early stage, later areal, terminal, and symmetrical, with two parallel oval to slitlike openings separated by a narrow partition. L. Carboniferous (Visean) to U. Carboniferous (Pennsylvanian); USA; USSR; Britain.

DECKERELLINA Reytlinger, 1950

Plate 229, figs. 5-7

Type species: Deckerellina istiensis Reytlinger, 1950; OD.

Deckerellina Reytlinger, 1950 (***2597**), p. 57.

Test biserial throughout, ovoid in section, sutures slightly depressed and horizontal; wall calcareous, microgranular, with poorly developed radial layer and may have patchy external agglutinated coating; aperture in the early stage a low interiomarginal opening but adult aperture of two parallel slits, one interiomarginal and the other a curved areal slit a short distance above the base of the chamber face. L. Carboniferous (Visean) to M. Carboniferous; USSR; Britain.

PALAEOBIGENERINA Galloway, 1933

Plate 229, figs. 14-16

Type species: Bigenerina geyeri Schellwien, 1898 (*2751), p. 271; OD.

Palaeobigenerina Galloway, 1933 (*1205), p. 223.

Test biserial in the early stage, later uniserial, with broad low chambers, circular in section; wall calcareous, of two layers, a main microgranular layer and an incomplete inner fibrous layer forming a chamber lining, and may have a thin, incomplete external agglutinated coating; aperture interiomarginal, a low arched slit in the biserial stage but a single, terminal, rounded opening in the uniserial stage. L. Carboniferous (Visean) to Permian; cosmopolitan.

PALAEOTEXTULARIA Schubert, 1921

Plate 229, figs. 8-13

Type species: Palaeotextularia schellwieni Galloway and Ryniker, 1930 (*1208), p. 20 (syn.: *Textularia textulariformis* (von Möller) Schellwien, 1898 (*2751), p. 268, non *Cribrostomum textulariforme* von Möller, 1879); SD Galloway and Ryniker, 1930 (*1208), p. 20.

Palaeotextularia Schubert, 1921 (*2823), p. 183, 185.

Test biserial, elongate, rounded to ovate in section, chambers gradually enlarging as added; wall calcareous, with thick dark granular layer, and clear to yellowish fibrous inner layer, rarely may have a thin impersistent agglutinated outer coating; aperture a single low slitlike opening at the base of the final chamber. L. Carboniferous (Tournaisian) to L. Permian; cosmopolitan.

Family BISERIAMMINIDAE
Chernysheva, 1941

Biseriamminidae Chernysheva, 1941 (*582), p. 70.
Dagmaritidae Bozorgnia, 1973 (*324), p. 144.

Test biserial, with planispirally enrolled plane of biseriality or may uncoil in later stage; wall calcareous, microgranular, may have more than one layer; aperture at inner border of apertural face. L. Carboniferous (Tournaisian) to U. Permian (Djulfian).

Subfamily BISERIAMMININAE
Chernysheva, 1941

Biseriammininae Zaninetti and Altiner, 1981 (*3430), p. 42, nom. transl. ex family Biseriamminidae.
Globivalvulinae Reytlinger, 1950 (*2597), p. 75 (nom. imperf.).
Globivalvulininae Pokorný, 1958 (*2447), p. 200 (nom. correct.).

Closely enrolled biserial tests with globular chambers or may have tendency to uncoil. L. Carboniferous (Tournaisian) to U. Permian (Djulfian).

BISERIAMMINA Chernysheva, 1941

Plate 229, figs. 25-27

Type species: Biseriammina uralica Chernysheva, 1941; OD.

Biseriammina Chernysheva, 1941 (*582), p. 69.

Test free, chambers biserially arranged, with planispirally enrolled axis of biseriality, so that the few subglobular chambers alternate from side to side as added; wall calcareous, microgranular; aperture a narrow interiomarginal slit against the previous chamber, in a nearly equatorial position and a short distance above the contact of the chamber with those of the preceding whorl. L. Carboniferous (Tournaisian); USSR: Ural Mountains; Bashkirian ASSR.

BISERIELLA Mamet, 1974

Plate 229, figs. 17-20

Type species: Globivalvulina parva Chernysheva, 1948 (*584), p. 249; OD.

Biseriella Mamet, in Armstrong and Mamet, 1974 (*70), p. 660.

Test free, subglobular, chambers enlarging rapidly as added, arrangement biserial and close coiled in the early stage, later with open helicoid spire, valvular projections poorly developed; wall calcareous, microgranular, may have a thin and poorly developed radial layer; aperture simple, at the base of the apertural face, opening into a curved apertural depression. U. Carboniferous (L. Namurian to M. Moscovian); Europe; Asia; Africa; North America.

GLOBISPIROPLECTAMMINA Vachard, 1977

Plate 229, figs. 21-24

Type species: Globispiroplectammina mameti Vachard, 1977; OD.

Globispiroplectammina Vachard, 1977 (*3249), p. 157.

Test free, elongate, early stage biserial and enrolled as in *Globivalvulina*, later uncoiling, biserial, and rectilinear; wall calcareous, microgranular, and may include small agglutinated calcareous grains; aperture in the early stage as in *Globivalvulina*, becoming simple and terminal in the rectilinear later stage. L. Carboniferous (Visean); France.

GLOBIVALVULINA Schubert, 1921

Plate 230, figs. 11-14

Type species: Valvulina bulloides Brady, 1876 (*334), p. 89; OD.

Globivalvulina Schubert, 1921 (*2823), p. 153.

Test free, subglobular to flattened perpendicular to the broad apertural face, chambers biserially arranged, with axis of biseriality enrolled in a planispiral to slightly trochoid manner; wall calcareous, microgranular, may have an inner fibrous or radial layer that is best developed along the septa; aperture interiomarginal, against the preceding chamber, and partially covered by a valvular projection near the center of the edge of the apertural face that overlaps the preceding aperture. M. Carboniferous to U. Permian (U. Djulfian); cosmopolitan.

LIPINELLA Malakhova, 1975

Plate 230, figs. 1-5

Type species: Lipinella notata Malakhova, 1975; OD.

Lipinella Malakhova, 1975 (*1995), p. 76.

Urtasella Malakhova, 1979 (*1997), p. 135 (nom. superfl.); type species: obj.; OD.

Test free, large globular proloculus followed by biserially arranged chambers, with plane of biseriality enrolled in a few whorls, possibly with a few intracameral partial partitions but available sections not clear; wall calcareous, thick, microgranular, with rare inclusions of large calcite grains, and a dark outer layer recognizable on some septa; aperture probably basal. L. Carboniferous (L. Visean); USSR: S. Urals.

Remarks: Malakhova proposed *Urtasella* as a replacement for *Lipinella* Malakhova, 1975 as a supposed "homonym of *Lipinella* Cummings, 1961." However, Cummings (1961, *698, p. 109, 122, 123) used the name *Lipininella*, rather than *Lipinella*, and as Cummings's name was published without description, illustration, or designation of type, it is not an available name (ICZN Art. 13 (a) (i)). Thus *Urtasella* is a superfluous junior synonym of *Lipinella* Malakhova, 1975.

PARAGLOBIVALVULINA Reytlinger, 1965

Plate 230, figs. 7-10

Type species: Paraglobivalvulina mira Reytlinger, 1965; OD.

Paraglobivalvulina Reytlinger, 1965 (*2607), p. 63.

Septoglobivalvulina J. X. Lin, 1978 (*1852), p. 27; type species: *Septoglobivalvulina guangxiensis* J. X. Lin, 1978; OD.

Test large, up to 2.8 mm in diameter, inflated, nearly spherical, chambers biserially arranged, plane of biseriality planispirally to slightly trochospirally enrolled, later chambers strongly enveloping with a tendency to become involute, interior with small chamberlets produced by short interseptal partitions; wall calcareous, microgranular, single layered; aperture simple, interiomarginal, extending much of the width of the test, accompanied within the chamber by a strongly recurved apertural tongue that appears hooklike in section and forms a small apertural chamberlet. U. Permian (Djulfian); USSR: Transcaucasus; Turkey; Iran; India; Thailand; China: Guangxi.

PARAGLOBIVALVULINOIDES Zaninetti and Jenny-Deshusses, 1985

Plate 829, figs. 11 and 12

Type species: Paraglobivalvulina? septulifera Zaninetti and Altiner, 1981 (*3430), p. 40; OD.

Paraglobivalvulinoides Zaninetti and Jenny-Deshusses, 1985 (*3439), p. 344.

Test globular, chambers biserially arranged and plane of biseriality enrolled, chambers strongly enveloping, involute, internal whorls connected by septula to the terminal chambers; wall calcareous, microgranular, a single layer; one rim of the aperture with a well-developed tongue that bends inward and forms an oral chamberlet. U. Permian (Dorashamian, = U. Djulfian); central Elbourz, Iran.

Subfamily DAGMARITINAE Bozorgnia, 1973

Dagmaritinae Zaninetti and Altiner, 1981 (*3430), p. 42. nom. transl. ex family Dagmaritidae.

Test biserial, may be slightly arcuate, chambers angular or laterally produced and spinose. U. Permian (Djulfian).

DAGMARITA Reytlinger, 1965

Plate 231, figs. 1-5

Type species: Dagmarita chanakchiensis Reytlinger, 1965; OD.

Dagmarita Reytlinger, 1965 (*2607), p. 62.

Test free, biserial, possibly with short enrolled biserial earliest stage, flattened to cuneate in section, with thornlike projections at the outer margins of the angular chambers; wall calcareous, thin, but thickening at the chamber junctions, microgranular and dark in thin section, septa commonly with a transparent light median or outer layer; adjacent chambers overlapping and bending sharply at the margin of the simple aperture to appear hooklike in section, possibly forming an apertural chamberlet as in *Globivalvulina*. U. Permian: USSR: Transcaucasus; India; Iran; Turkey; China.

Remarks: The median light layer of the wall described and illustrated by Reytlinger was interpreted by Hao and Lin (1982, *1416, p. 27, 31) as a supplementary chamber developed along the septa, leading from a pore at the exterior to open into the chamber cavity.

PARADAGMARITA Lys, 1978

PLate 230, fig. 6

Type species: Paradagmarita monodi Lys, 1978; OD.

Paradagmarita Lys, in Lys and Marcoux, 1978 (*1955), p. 1419.

Test free, small, up to 0.75 mm in length, chambers inflated, biserially arranged, early stage enrolled, completely involute, later biserial stage uncoiling; wall thick, calcareous, finely microgranular, with an outer thin dark layer, a median translucent layer, and an inner dark layer; aperture at the base of the final chamber face. U. Permian (Djulfian): Turkey; Iran; Oman; ?Afghanistan.

Subfamily LOUISETTITINAE Loeblich and Tappan, 1984

Louisettitinae Loeblich and Tappan, 1984 (*1918), p. 21.

Test biserial or may be slightly arcuate, chambers with a secondary partition that arises perpendicular to the septum below and produces a small chamberlet near the test periphery. U. Permian (U. Djulfian).

Remarks: Differs from the Biseriamminae in the uncoiled test and angular chambers and differs from it and the Dagmaritinae in the presence of secondary partitions in the outer part of the chambers.

LOUISETTITA Altiner and Brönnimann, 1980

Plate 231, figs. 6 and 7

Type species: Louisettita elegantissima Altiner and Brönnimann, 1980; OD.

Louisettita Altiner and Brönnimann, 1980 (*29), p. 39.

Test free, spherical proloculus followed by biserially arranged chambers that in the early stage are enrolled and probably trochospiral, interior of chambers subdivided by nearly vertical partitions perpendicular to the septa and to the flat faces of the test that isolate small chamberlets at the peripheral margin of the chambers, chamber angles with thickened wall to produce spinelike margins as in *Dagmarita*; wall with a dark microgranular outer layer, a hyaline translucent median layer, and a thicker dark microgranular inner layer; aperture at the base of the final chamber. U. Permian (U. Djulfian): Turkey.

Superfamily TOURNAYELLACEA Dain, 1953

Tournayellacea Loeblich and Tappan, 1984 (*1918), p. 21. nom. corr. pro superfamily Tournayellidea.

Tournayellidea Dain, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 183, nom. transl. ex family Tournayellidae.

Proloculus followed by planispiral to streptospiral enrolled tubular second chamber, may uncoil in later stage; periodic growth or slight internal protuberances from the wall may result in incipient septa; wall of microgranular calcite, may have agglutinated inclusions; aperture single or cribrate. U. Devonian (Frasnian) to U. Carboniferous (Namurian).

Family TOURNAYELLIDAE Dain, 1953

Tournayellidae Dain, in Dain and Grozdilova, 1953 (*881), p. 16.

Forschiidae Grozdilova and Lebedeva, 1954 (*1321), p. 36.

As in the superfamily. U. Devonian (Frasnian) to U. Carboniferous (Namurian).

Subfamily TOURNAYELLINAE Dain, 1953

Tournayellinae Dain, in Dain and Grozdilova, 1953 (*881), p. 20.

Test planispirally coiled; wall dark, opaque, and microgranular, or may have an inner translucent layer or translucent secondary deposits at the sutures; aperture simple, single, basal or terminal. U. Devonian (Frasnian) to L. Carboniferous (Visean).

CARBONELLA Dain, 1953

Plate 231, figs. 8-10

Type species: Carbonella spectabilis Dain, 1953; OD.

Carbonella Dain, in Dain and Grozdilova, 1953 (*881), p. 36.

Lechangia J. X. Lin, 1981 (*1854), p. 2 (err. cit. pro *Carbonella*, fide pers. comm. J. X. Lin, June 10, 1983).

Test planispirally enrolled throughout, early whorls undivided, septation and basal secondary deposits more or less well developed in final whorl; wall calcareous, microgranular, undifferentiated; aperture simple, a low slit at the base of the apertual face. L. Carboniferous (U. Tournaisian to L. Visean); USSR; China; USA: Alaska, Idaho, Montana, Wyoming.

COSTAYELLA Conil and Lys, 1977

Plate 231, fig. 16

Type species: Tournayella costata Lipina, 1955 (*1863), p. 36; OD.

Tournayella (Costayella) Conil and Lys, 1977 (*667), p. 17.

Test with tubular enrolled test, streptospiral in the early stage, later planispiral, later part with indentations of the wall to form pseudochambers, basal supplementary deposits forming nodosities or projections opposite the constriction; wall calcareous, microgranular, thin, dark, and undifferentiated; aperture basal, simple. L. Carboniferous (Tournaisian to Visean); USSR: Urals, Russian platform.

EOTOURNAYELLA Lipina and Pronina, 1964

Plate 231, figs. 11-15

Type species: Tournayella (Eotournayella) jubra Lipina and Pronina, 1964; OD.

Tournayella (Eotournayella) Lipina and Pronina, 1964 (*1870), p. 125.

Eotournayella Conil and Lys, 1977 (*667), p. 17 (nom. transl.).

Test a simple coiled tube throughout, with slight growth constrictions but little indication of pseudochambers, early stage streptospiral or irregular, later planispiral and evolute for most of the growth; wall calcareous, microgranular, with little or no differentiation and no secondary deposits; aperture simple, at the open end of the tube. U. Devonian (Frasnian); USSR: Urals.

POHLIA Conil and Lys, 1977

Plate 232, figs. 1-5

Type species: Septatournayella henbesti Skipp, in Skipp et al., 1966 (*3001), p. 25; OD.

Septatournayella (Pohlia) Conil and Lys, 1977 (*667), p. 18.

Test discoid, biconcave, consisting of a planispirally enrolled tube that resembles *Septatournayella* but has distinct septa in the final one or two whorls, basal supplementary deposits in the form of nodosities or transverse ridges; aperture at the slightly contracted end of the tube, low and simple. L. Carboniferous (Visean); USA; USSR.

RECTOSEPTATOURNAYELLA Brazhnikova and Rostovceva, 1963

Plate 231, figs. 19 and 20

Type species: Rectoseptatournayella stylaensis Brazhnikova and Rostovceva, in Poyarkov, 1963; OD.

Septatournayella (Rectoseptatournayella) Brazhnikova and Rostovceva, in Poyarkov, 1963 (*2464), p. 226.
Rectoseptatournayella Conil and Lys, 1977 (*667), p. 18 (nom. transl.)

Early stage of the test as in *Septatournayella*, with undivided planispiral coil followed by pseudochambers and finally with septa and distinct chambers, final stage uncoiled and rectilinear; wall calcareous, microgranular, undifferentiated; aperture terminal, simple in the early stage, cribrate in the adult. L. Carboniferous (Tournaisian): USSR; USA.

Remarks: Although described as a subgenus, *Rectoseptatournayella* was used in the generic sense in the original description of the type species. Conil and Lys (1977) formally elevated it to generic status.

SEPTATOURNAYELLA Lipina, 1955

Plate 231, figs. 17, 18, and 21-23

Type species: Tournayella segmentata Dain, in Dain and Grozdilova, 1953 (*881), p. 34; OD.

Septatournayella Lipina, 1955 (*1863), p. 36.
Septatournayella (Eoseptatournayella) Lipina, in Poyarkov, 1963 (*2464), p. 225; type species: *Septatournayella rauserae* Lipina, 1955 (*1863), p. 40; OD.

Test consisting of a planispirally enrolled tube, early stage with pseudochambers resulting from slight constrictions of the wall, later stage with septa forming distinct chambers; wall calcareous, simple, microgranular; aperture simple, basal. U. Devonian (Fammenian) to L. Carboniferous (Visean); Europe; Asia; North America.

TOURNAYELLA Dain, 1953

Plate 232, figs. 6, 7, and 10-14

Type species: Tournayella discoidea Dain, 1953; OD.

Tournayella Dain, in Dain and Grozdilova, 1953 (*881), p. 30.
Cepekia Vašiček and Ružička, 1957 (*3258), p. 342; type species: *Cepekia cepeki* Vašiček and Ružička, 1957; OD.

Test enrolled, with clearly developed pseudochambers but lacking definite septa and chambers and without supplementary deposits such as mounds or projections; wall calcareous, microgranular, simple, aperture simple and basal. L. Carboniferous (Tournaisian to Visean); USSR: Urals, Russian platform; Czechoslovakia; USA.

Subfamily FORSCHIINAE Dain, 1953

Forschiinae Dain, in Dain and Grozdilova, 1953 (*881), p. 20, 38.

Test planispirally enrolled; wall clearly differentiated with thick outer coarse layer that may include some agglutinated particles and a thin dark microgranular inner layer; aperture at the open end of the tube, a rounded areal opening or cribrate. L. Carboniferous (Tournaisian to Visean).

CONILITES Vdovenko, 1970

Plate 232, figs. 8 and 9

Type species: Ammobaculites? dinantii Conil and Lys, 1964 (*661), p. 67; OD.

Conilites Vdovenko, 1970 (*3279), p. 74.

Test with enrolled, planispiral, undivided early whorls, later whorls with incipient septa resulting in pseudochambers, the last whorl of the enrolled portion with distinct septa and chambers and followed by a few uncoiled and rectilinear chambers; wall calcareous, microgranular, differentiated as a thick outer layer and a thin microgranular inner layer; aperture simple and basal in the enrolled portion, becoming terminal in the uniserial stage, and finally multiple and cribrate. U. Carboniferous (U. Tournaisian and L. Visean); Belgium; USSR: Donets Basin, Urals.

Remarks: The original description of *Ammobaculites? dinantii* figured two specimens, pl. 8, fig. 153 and pl. 9, fig. 154, citing both as the holotype. Vdovenko (1970, *3279) indicated pl. 8, fig. 153 as holotype (recte "lectotype").

EOFORSCHIA Mamet, 1970

Plate 233, figs. 3 and 4

Type species: Tournayella moelleri Malakhova, in Dain and Grozdilova, 1953 (*881), p. 33; OD.

Eoforschia Mamet, in Mamet et al., 1970 (*2013), p. 21.
Eoforschia Mamet, in Mamet and Skipp, 1970 (*2015), p. 1135 (nom. nud.).

Test enrolled, proloculus followed by planispirally coiled tubular chamber with pseudosepta resulting from periodic growth but lacking complete septa; wall two layered, outer layer extremely thin and microgranular and well-developed inner layer with agglutinated inclusions; aperture simple, slitlike, basal. L. Carboniferous (U. Tournaisian to Visean);

USSR; Europe; N. Africa; Asia; Canada: Alberta; USA: Alaska, Nevada.

FORSCHIA Mikhaylov, 1935

Plate 233, figs. 5-7

Type species: Spirillina subangulata von Möller, 1879 (***2160**), p. 27, 130 (also as *S. angulata* on p. 27); OD.

Forschia Mikhaylov, 1935 (***2113**), p. 41; see also Mikhaylov, 1939 (***2114**), p. 50, 59.

Test discoidal, proloculus followed by evolutely coiled and undivided tubular chamber, with pseudochambers in the later part but without true septa; wall two layered; aperture cribrate. L. Carboniferous (Visean); USSR; USA.

FORSCHIELLA Mikhaylov, 1935

Plate 233, fig. 8

Type species: Forschiella prisca Mikhaylov, 1935; OD.

Forschiella Mikhaylov, 1935 (***2113**), p. 41.

Early stage as in *Forschia* with later stage uncoiled and rectilinear, pseudochambers present but without true septa in the coiled stage; aperture terminal and cribrate in the uncoiled stage. L. Carboniferous (Visean); USSR; Belgium; Netherlands; Iran.

SEPTAFORSCHIA Conil and Lys, 1977

Plate 233, figs. 1 and 2

Type species: Tournayella questita Malakhova, in Dain and Grozdilova, 1953 (***881**), p. 35; OD.

Septaforschia Conil and Lys, 1977 (***667**), p. 19.

Test large, up to 1.1 mm in diameter, discoidal and biconcave, enrolled throughout, early whorls undivided, later with pseudochambers, and final whorl with true septa and chambers; wall two layered, outer layer thick, irregularly granular, and containing some agglutinated particles, inner layer thin, dark, and microgranular; aperture basal, simple. L. Carboniferous (Tournaisian); USSR; W. Europe.

VISEINA Conil and Lys, 1977

Plate 233, fig. 9

Type species: Septatournayella? conspecta Conil and Lys, 1967 (***664**), p. B400; OD.

Viseina Conil and Lys, 1977 (***667**), p. 20.

Test large, up to 1.15 mm in diameter, enrolled throughout, early whorls undivided, later with pseudochambers, and final whorl with true septa and somewhat inflated chambers; wall calcareous, thin in the early whorls, becoming much thicker in the final whorl, of two layers, the outer one with occasional agglutinated calcite grains; aperture basal and simple in the early stage, then areal and finally cribrate in the adult. L. Carboniferous (Visean); Belgium; USSR.

Subfamily SEPTABRUNSIININAE
Conil and Lys, 1977

Septabrunsiininae Conil and Lys, 1977 (***667**), p. 20.

Test planispiral to streptospiral, later may be uncoiled; wall little differentiated to undifferentiated, microgranular to granular, advanced and uncoiled species may have some agglutinated material, and secondary chomatalike deposits may occur; aperture simple and basal to cribrate. U. Devonian (Fammenian) to L. Carboniferous (Visean).

AVESNELLA Conil and Lys, 1970

Plate 233, figs. 10-13

Type species: Avesnella streeli Conil and Lys, 1970; OD.

Avesnella Conil and Lys, 1970 (***666**), p. 253.

Test enrolled, may be irregular and nonseptate in the early stage, later planispiral with septa between distinct and inflated chambers, sutures depressed; wall calcareous, undifferentiated, microgranular to finely granular; aperture areal, in the later stage cribrate. U. Devonian (U. Fammenian); W. Europe.

BAELENIA Conil and Lys, 1977

Plate 234, figs. 1-3

Type species: Septaglomospiranella? gosseleti Conil, in Bouckaert, Conil, and Thorez, 1967 (***316**), p. 169; OD.

Baelenia Conil, in Conil and Lys, 1977 (***667**), p. 23.

Test enrolled, about 0.4 mm in diameter, discoidal, thick, with sides slightly excavated, early stage streptospiral and undivided, later planispiral with pseudochambers, well-developed septa and chambers only in the later part, prominent supplementary basal deposits on the chamber floor and angles;

wall calcareous, microgranular to granular, undifferentiated; aperture basal, simple. U. Devonian (Fammenian); Belgium; ?USSR.

GLOMOSPIRANELLA Lipina, 1951

Plate 234, figs. 4-10

Type species: Glomospiranella asiatica Lipina, 1951; OD.

Glomospiranella Lipina, 1951 (*1862), p. 110.

Brunsiina Lipina, in Dain and Grozdilova, 1953 (*881), p. 27; type species: *Brunsiina uralica* Lipina, 1953; OD.

Septaglomospiranella (Neoseptaglomospiranella) Lipina, in Poyarkov, 1963 (*2464), p. 226; see also Lipina, 1965 (*1866), p. 68; type species: *Septaglomospiranella dainae* Lipina, 1955 (*1863), p. 47; OD.

Test streptospirally enrolled in early stage, later becoming planispiral, without distinct septation but with slight constrictions resulting in pseudochambers; wall calcareous, microgranular, undifferentiated; aperture simple, at the slightly constricted open end of the tubular chamber. U. Devonian to L. Carboniferous (Tournaisian, Visean); USSR; France; Belgium; Germany; USA.

GLOMOSPIROIDES Reytlinger, 1950

Plate 234, figs. 11-15

Type species: Glomospiroides fursenkoi Reytlinger, 1950 (nom. corr. Voloshinova, Dain, and Reytlinger, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 184, pro *G. fursenki* Reytlinger, 1950, nom. imperf.); OD.

Glomospiroides Reytlinger, 1950 (*2597), p. 28.

Glomospirella Reytlinger, 1950 (*2597), p. 27 (non *Glomospirella* Plummer, 1945); type species: *Glomospirella borealis* Reytlinger, 1950; OD.

Septabrunsiina (Rectoseptabrunsiina) Lipina, 1965 (*1866), p. 57; type species: *Septabrunsiina (Rectoseptabrunsiina) postchusovensis* Lipina, 1965; OD.

Early stage streptospirally enrolled, later nearly planispiral, and final stage uncoiling, early stage undivided, later with pseudosepta that are thin and somewhat irregular in distribution; wall calcareous, microgranular, undifferentiated; aperture simple and terminal. M. to U. Carboniferous; USSR.

LAXOSEPTABRUNSIINA Vachard, 1977

Plate 234, figs. 19-22

Type species: Laxoseptabrunsiina valuzierensis Vachard, 1977; OD.

Laxoseptabrunsiina Vachard, 1977 (*3249), p. 138.

Test free, enrolled, about 0.5 mm in diameter, with spire increasing rapidly in height, early stage streptospiral and undivided, later becoming planispiral with true septa and chambers; wall calcareous, microgranular, a single dark undifferentiated layer, no supplementary deposits present; aperture terminal, a basal slit. L. Carboniferous (Visean); France.

RECTOAVESNELLA Conil and Lys, 1977

Plate 234, figs. 16-18

Type species: Avesnella mourloni Conil and Lys, 1970 (*666), p. 256; OD.

Rectoavesnella Conil and Lys, 1977 (*667), p. 24.

Early stage irregularly enrolled, probably streptospiral, later planispiral, with well-developed septa and chambers, final chambers uncoiling and rectilinear; wall calcareous, microgranular to granular, single layered or with a slight tendency toward differentiation; aperture areal, at least in the final whorl and terminal in the uncoiled portion. U. Devonian (Fammenian); France.

RECTOSEPTAGLOMOSPIRANELLA Reytlinger, 1961

Plate 235, figs. 1 and 2

Type species: Septaglomospiranella (Rectoseptaglomospiranella) asiatica Reytlinger, 1961; OD.

Septaglomospiranella (Rectoseptaglomospiranella) Reytlinger, 1961 (*2603), p. 62.

Rectoseptaglomospiranella Loeblich and Tappan, 1964 (*1910), p. C350 (nom. transl.).

Test elongate, up to 0.95 mm in length, early stage somewhat irregularly coiled and without distinct septa, later uncoiled with well-developed septa; wall calcareous, microgranular to irregularly granular with some included large calcite grains; aperture terminal, simple or rarely cribrate. U. Devonian (U. Fammenian) to L. Carboniferous (Tournaisian); USSR.

SEPTABRUNSIINA Lipina, 1955

Plate 235, figs. 3-5

Type species: Endothyra? krainica Lipina, 1948 (*1860), p. 254; OD.

Septabrunsiina Lipina, 1955 (*1863), p. 42.

Septaglomospiranella Lipina, 1955 (*1863), p. 46; type species: *Endothyra? primaeva* Rauzer-Chernousova, 1948 (*2523), p. 5 (non *Endothyra primaeva* Chernysheva, 1940) = *Septabrunsiina educta* Conil and Lys, 1977 (*667), p. 22: OD.

Test enrolled, early stage nonseptate and may be streptospiral, later planispiral, final one or more whorls with septa and distinct chambers; wall calcareous, microgranular to granular, undifferentiated; aperture basal, simple. L. Carboniferous (Tournaisian): USSR; USA: Alaska, Idaho, Montana, Wyoming.

Remarks: *Septaglomospiranella* was regarded as a synonym of *Septabrunsiina* by Loeblich and Tappan (1964, *1910, p. C341), a synonymy later accepted by Conil and Lys (1977, *667, p. 21). *Tournayellina* also was considered to be a synonym in 1964 but is now recognized as distinct.

SPINOBRUNSIINA Conil and Longerstaey, 1980

Plate 235, figs. 6 and 7

Type species: Septabrunsiina (Spinobrunsiina) ramsbottomi Conil and Longerstaey, 1980; OD.

Septabrunsiina (Spinobrunsiina) Conil and Longerstaey, in Conil et al., 1980 (*660), p. 54.

Septabrunsiina (Spinobrunsiina) Conil and Longerstaey, in Conil and Lys, 1977 (*667), p. 22; type species: obj., not available, type species not available, ICZN Art. 13 (a)(i).

Test enrolled, early stage streptospiral with pseudochambers, later becoming nearly planispiral with true septa and chambers; wall calcareous, microgranular, undifferentiated, supplementary deposits present in the form of nodes, arches, and basal projections and basal and lateral thickening; aperture simple. L. Carboniferous (Tournaisian to Visean); W. Europe; USSR; North America.

SPINOLAXINA Conil and Naum, 1977

Plate 235, figs. 8–12

Type species: Plectogyra pauli Conil and Lys, 1964 (*661), p. 203; OD.

Laxoseptabrunsiina (Spinolaxina) Conil and Naum, 1977 (*668), p. 121.

Laxoseptabrunsiina (Spinolaxina) Conil, in Bless et al., 1976 (*254), pl. 9, fig. 21, 22 (name not available, ICZN Art. 13 (a)(i), no description).

Test streptospirally coiled in the early stage, later becoming nearly planispiral, spire enlarging rapidly with growth; wall calcareous, microgranular, thin, and may show a tendency to differentiation, with supplementary deposits in the form of basal projections; aperture basal. L. Carboniferous (Visean): Belgium; Germany; USSR: Urals.

Subfamily LITUOTUBELLINAE A. D. Miklukho-Maklay, 1963

Lituotubellinae A. D. Miklukho-Maklay, 1963 (*2130), p. 183.

Glomospirellinae Reytlinger, 1950 (*2597), p. 26 (invalid, ICZN Art. 39; based on *Glomospirella* Reytlinger, 1950, non *Glomospirella* Plummer, 1945).

Test streptospiral at least in early stage, later may uncoil; wall clearly differentiated into coarse thick outer layer and thin microgranular inner layer; aperture single and basal, becoming terminal and cribrate in the rectilinear portion. L. Carboniferous (U. Tournaisian to Visean).

BOGUSHELLA Conil and Lys, 1977

Plate 235, fig. 13

Type species: Mstinia ziganensis Grozdilova and Lebedeva, 1960 (*1321A), p. 49; OD.

Bogushella Conil and Lys, 1977 (*667), p. 25.

Test with early streptospiral coiling, later rectilinear, periodic constrictions of the wall result in pseudochambers but no true septa present; wall calcareous, clearly differentiated into a thick coarsely granular outer layer and thin microgranular inner layer; aperture cribrate in the adult. L. Carboniferous (Visean); USSR; England.

LITUOTUBELLA Rauzer-Chernousova, 1948

Plate 235, figs. 14 and 15

Type species: Lituotubella glomospiroides Rauzer-Chernousova, 1948; OD.

Lituotubella Rauzer-Chernousova, 1948 (*2517), p. 161.

Early coiling streptospiral, later planispiral, uncoiling and rectilinear in the adult, without distinct septa but with constrictions of the wall resulting in pseudochambers; wall calcareous, microgranular, clearly differentiated into an external layer that includes some agglutinated material and a thin microgranular inner layer; aperture terminal, multiple. L. Carboniferous (Visean); USSR.

MSTINIELLA Conil and Lys, 1977

Plate 235, figs. 16-18

Type species: Mstinia fursenkoi Dain, in Dain and Grozdilova, 1953 (*881), p. 47 (syn.: *Mstinia (a) fursenko* [sic] Mikhaylov, 1939, *2114A, textfig. 3a-c on p. 65, name not available, ICZN Art. 13 (a) (i), no description); OD.

Mstiniella Conil and Lys, 1977 (*667), p. 26.

Test enrolled throughout, early whorls streptospiral and undivided, later planispiral with septa and true chambers; wall thick and well differentiated into outer agglutinated layer and more compact inner layer; aperture basal and simple in the early stage, cribrate in the adult. L. Carboniferous (Visean); USSR; W. Europe.

NEOBRUNSIINA Lipina, 1965

Plate 236, figs. 1-7

Type species: Glomospiranella finitima Grozdilova and Lebedeva, 1954 (*1321), p. 35; OD.

Brunsiina (Neobrunsiina) Lipina, 1965 (*1866), p. 51.

Uvatournayella Ganelina, 1966 (*1213), p. 74: type species: *Uvatournayella uva* Ganelina, 1966; OD.

Neobrunsiina Conil and Lys, 1977 (*667), p. 25 (nom. transl.).

Test enrolled, early portion streptospiral, later becoming planispiral with pseudochambers produced by constrictions in the wall but without true septa; wall calcareous, thick, microgranular, differentiated wall not known for type species; aperture simple. L. Carboniferous (U. Tournaisian to Visean); USSR; W. Europe.

PSEUDOLITUOTUBELLA Vdovenko, 1967

Plate 236, fig. 8

Type species: Pseudolituotubella multicamerata Vdovenko, 1967; OD.

Pseudolituotubella Vdovenko, 1967 (*3277), p. 25.

Early stage streptospirally enrolled and undivided, later planispiral, at first with pseudochambers and later with true septa and chambers, adult uncoiled and rectilinear with septa perpendicular to the outer wall; wall clearly differentiated, with thick outer layer and some agglutinated foreign particles; aperture basal and simple in the coiled portion, becoming cribrate and terminal in the uncoiled stage. L. Carboniferous (U. Tournaisian to L. Visean); USSR.

UVIELLA Ganelina, 1966

Plate 236, figs. 9-11

Type species: Uviella aborigena Ganelina, 1966; OD.

Uviella Ganelina, 1966 (*1213), p. 81.

Test discoid, biconcave, with broadly rounded periphery, large, up to more than 1.0 mm in diameter, early stage streptospirally enrolled and undivided, later planispiral with constrictions resulting in pseudochambers, true septa and chambers present in the final whorl; wall thick, granular, with some inclusions of light calcite grains and a tendency to develop a thin more compact inner layer; aperture basal, simple. L. Carboniferous (Tournaisian to Visean); USSR; W. Europe.

Subfamily CHERNYSHINELLINAE Reytlinger, 1958

Chernyshinellinae Reytlinger, 1958 (*2601), p. 60.

Test streptospirally enrolled at first, later may be uncoiled and rectilinear, early chambers typically chernyshinelline, teardrop shaped and few per whorl, but geologically later taxa have more endothyroid adult chambers; wall undifferentiated to clearly differentiated; aperture interiomarginal in the enrolled stage, terminal in the uncoiled stage, single to cribrate. U. Devonian (Fammenian) to U.? Carboniferous (Namurian).

CHERNOBACULITES Conil and Lys, 1977

Plate 237, figs. 1-3

Type species: Ammobaculites sarbaicus Malakhova subsp. *beschevensis* Brazhnikova, in Brazhnikova et al., 1967 (*353), p. 141; OD.

Chernobaculites Conil and Lys, 1977 (*667), p. 32.

Early stage streptospirally coiled, later planispiral and finally uncoiled and rectilinear, chambers of the enrolled portion chernyshinelline in appearance, rectilinear portion with straight and horizontal septa; wall calcareous, microgranular, with differentiated thick outer agglutinated layer and thin, microgranular inner layer; aperture simple, basal, at the end of the teardrop chambers, becoming terminal in the rectilinear stage. U. Carboniferous (Namurian); USSR; Europe: Pyrenees.

CHERNYSHINELLA Lipina, 1955

Plate 237, figs. 4-7 and 11-13

Type species: Endothyra glomiformis Lipina, 1948 (***1860**), p. 254; OD.

Chernyshinella Lipina, 1955 (***1863**), p. 47.

Chernyshinella (Eochernyshinella) Lipina, 1965 (***1866**), p. 81; type species: *Chernyshinella (Eochernyshinella) crassitheca* Lipina, 1965; OD.

Test enrolled throughout, early portion may be tubular and without subdivision, final whorl with strongly asymmetrical and teardrop-shaped chambers, few per whorl; wall calcareous, microgranular, undifferentiated, without supplementary deposits; aperture basal, simple. U. Devonian (U. Fammenian); USSR; France.

CHERNYSHINELLINA Reytlinger, 1959

Plate 237, figs. 8 and 9

Type species: Ammobaculites? pygmaeus Malakhova, 1954 (***1988**), p. 58; OD.

Chernyshinellina Reytlinger, in Rauzer-Fursenko and Fursenko, 1959 (***2531**), p. 196.

Test streptospirally enrolled in early stage, with teardroplike chambers in numerous whorls, periphery lobulate, final chambers uncoiled, rectilinear and uniserial, separated by distinct horizontal septa; wall calcareous, micrognanular, nonhomogeneous in structure; aperture basal in the enrolled stage, terminal in the rectilinear part. L. Carboniferous (Tournaisian); USSR: central and S. Urals, Karatau.

CONDRUSTELLA Conil and Longerstaey, 1977

Plate 237, figs. 14-17

Type species: "Mstinia" modavensis Conil and Lys, 1967 (***664**), p. B398; OD.

Condrustella Conil and Longerstaey, in Conil and Lys, 1977 (***667**), p. 32.

Test of medium size, up to 0.8 mm in diameter, enrolled and fully chambered throughout, with few whorls and few teardrop-shaped chambers in each whorl; wall calcareous, micrognanular, thick, coarsely agglutinated, with thin dark inner micrognanular layer; aperture simple, basal. L. Carboniferous (U. Tournaisian to Visean); Belgium; England.

EBLANAIA Conil and Marchant, 1977

Plate 237, fig. 10

Type species: Plectogyra michoti Conil and Lys, 1964 (***661**), p. 194; OD.

Eblanaia Conil and Marchant, in Conil, 1977 (***656**), p. 469; also see Conil and Marchant, in Conil and Lys, 1977 (***667**), p. 30.

Test completely enrolled throughout, early chambers chernyshinelline, later endothyroid with whorls evolute and test biconcave; wall calcareous, micrognanular, weakly to clearly differentiated, main layer thick and irregularly granular and may be agglutinated, more or less well-developed dark and micrognanular inner layer, supplementary deposits consist of low mounds, thickenings at the ends of the septa, infilling of the corners, and a prominent terminal projection; aperture simple, basal. L. Carboniferous (U. Tournaisian to L. Visean); W. Europe; USA: Rocky Mountains.

ENDOCHERNELLA Conil and Lys, 1980

Plate 238, figs. 1-3

Type species: Plectogyra (Latiendothyra) quaesita Ganelina, 1966 (***1213**), p. 106; OD(M).

Endochernella Conil and Lys, in Conil et al., 1980 (***660**), p. 57.

Endochernella Dil, 1977 (***960**), p. 377, pl. 2, figs. 28, 33 (name not available, ICZN Art. 13 (a)(i), (b), no description).

Endochernella Conil and Lys, 1977 (***667**), p. 29 (name not available, ICZN Art. 13 (b), 3 species cited, type not designated).

Early stage as in *Chernyshinella* with teardroplike chambers, later as in *Endothyra*, with radial septa and more numerous chambers per whorl; wall calcareous, micrognanular, in advanced forms tends to be differentiated into three layers, with secondary deposits in the chamber angles but without projections or nodosities; aperture basal, simple. L. Carboniferous (L. Tournaisian to Visean); USSR; Turkey; W. Europe; USA: Utah, Colorado, Mississippi.

LIPINELLINA Loeblich and Tappan, 1985

Plate 238, figs. 6-8

Type species: Chernyshinella (Rectochernyshinella) kinelensis Lipina, 1965 (***1866**), p. 88; OD.

Lipinellina Loeblich and Tappan, 1985 (*1922), p. 92 (nom. subst. pro *Chernyshinella (Rectochernyshinella)* Lipina, 1965).
Chernyshinella (Rectochernyshinella) Lipina, 1965 (*1866), p. 88 (non *Rectochernyshinella* Lipina, 1960, *1865, p. 49, 51 [with type species *Spiroplectammina mirabilis* Lipina, 1948, *1860, p. 257]); type species: obj., OD.
Rectochernyshinella Conil and Lys, 1977 (*667), p. 28 (non *Rectochernyshinella* Lipina, 1960).

Test with early streptospirally enrolled stage, consisting of a few teardroplike chambers per whorl, periphery lobulate, later stage uncoiled and rectilinear, with horizontal septa; wall calcareous, microgranular, undifferentiated, with rare included calcite grains; aperture large, basal in the coiled stage, becoming central and terminal in the uncoiled part. U. Devonian (Famennian) to L. Carboniferous (Visean); USSR.

Remarks: *Rectochernyshinella* was very briefly described by Lipina, 1960, and *Spiroplectammina mirabilis* designated as type species; this genus and usage was recorded by Loeblich and Tappan (1964, ***1910**, p. C346), who then considered it to be a synonym of *Endothyranella*, and by Ganelina (1966, ***1213**, p. 93), who included six additional species. However, in 1965, Lipina (***1866**) again described *Chernyshinella (Rectochernyshinella)* as new but with designation of a different type species: *Chernyshinella (Rectochernyshinella) kinelensis* Lipina. Although later use of the same generic group name in a different sense and with a different type species is clearly invalid, the latter description and type designation were followed by Conil and Lys (1977, ***667**, p. 28) and again by Conil and Longerstaey (in Conil et al., 1980, ***660**, p. 58), the latter article also incorrectly crediting the genus to Conil and Lys, 1977.

MSTINIA Dain, 1953

Plate 238, figs. 4 and 5

Type species: Mstinia bulloides Dain, in Dain and Grozdilova, 1953, p. 47 (syn.: *Mstinia bulloides* Mikhaylov, 1935, ***2113**, p. 34; *M. bulloides* Mikhaylov, 1939, ***2114**, pl. 2, figs. 8, 9; neither name available in Mikhaylov, 1935, 1939, ICZN Art. 13 (a)(i), as no description given); OD.

Mstinia Dain, in Dain and Grozdilova, 1953 (*881), p. 45.
Mstinia Mikhaylov, 1935 (*2113), p. 34, 35 (name not available, ICZN, Art. 13 (b); no type designated and no included described species).
Mstinia Mikhaylov, 1939 (*2114), p. 59 (genus described, type species designated, and two undescribed species illustrated, but type species a nomen nudum, hence genus not available, ICZN Art. 13 (b)).

Test completely enrolled and involute, with teardroplike chambers and strongly lobulate outline; wall differentiated into thick outer layer with included calcite grains and thin, dark and compact inner layer; aperture basal in the early stage, cribrate in the adult. L. Carboniferous (U. Visean); USSR.

NEVILLEA Conil and Lys, 1980

Plate 238, figs. 12-14

Type species: Georgella dytica Conil and Lys, 1977 (***667**), p. 33; OD.

Nevillea Conil and Lys, in Conil et al., 1980 (*660), p. 58 (nom. subst. pro *Georgella* Conil and Lys, 1977; non *Nevillea* Paetel, 1889, err. pro *Nevillia* Martens, 1880; name available, ICZN Art. 19 (a) and 33 (c)).
Georgella Conil and Lys, 1977 (*667), p. 33 (non *Georgella* Koenike, 1907); type species: *Georgella dytica* Conil and Lys, 1977 (also err. cit. as *Haplophragmella dytica*, p. 33); OD.
Nevillella Conil and Lys, in Conil, 1980 (*657), p. 48 (nom. subst. pro *Nevillea* Conil and Lys, 1979, nom. superfl., ICZN Art. 19 (a) and 13 (c)); type species: obj.

Early enrolled stage with few inflated chernyshinellid chambers per whorl, later stage uncoiled and rectilinear, with broad and low chambers and centrally arched septa; wall calcareous, thick, clearly differentiated into a coarsely granular and agglutinated outer layer and a thin, dark microgranular inner layer; aperture basal in the early coiled stage, later multiple, with cribrate aperture occupying the entire terminal chamber surface. L. Carboniferous (Visean); USSR; Czechoslovakia; Ireland.

Remarks: Although *Nevillella* was proposed as a replacement name for *Nevillea* Conil and Lys, 1980 (non *Nevillea* Paetel, 1889), Paetel's usage of the name was an erroneous subsequent spelling of *Nevillia* Martens, 1880, and thus does not enter into homonymy, ICZN Art. 33 (c). *Nevillea* is therefore the correct generic name.

NODOCHERNYSHINELLA Conil and Lys, 1977

Plate 238, figs. 9-11

Type species: Chernyshinella tumulosa Lipina, 1955 (*1863), p. 51; OD.

Chernyshinella (Nodochernyshinella) Conil and Lys, 1977 (*667), p. 28.

Test resembling *Chernyshinella*, with few rapidly enlarging, teardroplike chambers per whorl and with lobulate periphery; wall calcareous, microgranular, undifferentiated, with well-developed supplementary deposits in the form of a node or mound at the floor of each chamber of the last whorl; aperture simple, basal. L. Carboniferous (Tournaisian); USSR.

RECTOTOURNAYELLINA Lipina, 1965

Plate 239, fig. 1

Type species: Tournayellina (Rectotournayellina) elegans Lipina, 1965; OD.

Tournayellina (Rectotournayellina) Lipina, 1965 (*1866), p. 79.

Rectotournayellina Conil and Lys, 1977 (*667), p. 29 (nom. transl.)

Test enrolled in the early stage, with few large chambers per whorl, later uncoiled and rectilinear; wall calcareous, microgranular to coarsely granular and may have some inclusions; aperture basal, simple. U. Devonian (Fammenian) to L. Carboniferous (Tournaisian to Visean); USSR; W. Europe.

SPINOCHERNELLA Conil and Lys, 1977

Plate 239, fig. 2

Type species: Spinochernella brencklei Conil and Lys, 1977; OD.

Spinochernella Conil and Lys, 1977 (*667), p. 29.

Spinochernella Dil, 1977 (*960), p. 377, pl. 2, fig. 33, pl. 3, fig. 46 (name not available, ICZN Art. 13 (a) (i), no description).

Test streptospirally enrolled in the early stage, later nearly planispiral, with relatively numerous endothyroid chambers as seen in section; wall calcareous, more or less granular, with a slight tendency for a more compact inner layer to become differentiated, supplementary deposits present throughout at least the final whorl, in sections appearing as persistant spinelike projections from the chamber floor that are directed toward the aperture; aperture basal, simple. L. Carboniferous (Tournaisian to L. Visean); Belgium; Netherlands.

SPINOTOURNAYELLA Mamet, 1970

Plate 239, fig. 3

Type species: Plectogyra tumula E. J. Zeller, 1957 (*3443), p. 697; OD.

Spinotournayella Mamet, in Mamet et al., 1970 (*2013), p. 44.

Test discoidal, biumbilicate, with rounded periphery, enrolled and involute, early stage streptospiral with asymmetrical pseudochambers, later stage planispiral with endothyroid chambers as seen in section; wall calcareous, microgranular, simple, with supplementary deposits forming prominent nodes on the chamber floor with a height of up to two-thirds that of the chamber lumen; aperture simple, basal. L. Carboniferous (U. Tournaisian); USA: Utah.

TOURNAYELLINA Lipina, 1955

Plate 239, figs. 4 and 5

Type species: Tournayellina vulgaris Lipina, 1955; OD.

Tournayellina Lipina, 1955 (*1863), p. 52.

Test enrolled throughout, with few whorls and few rapidly enlarging subglobular chambers per whorl; wall calcareous, microgranular and homogeneous in the early species, that of geologically later species tending to be differentiated and agglutinated; aperture simple and basal. U. Devonian (Fammenian) to L. Carboniferous (Tournaisian); USSR; W. Europe; Iran.

Family PALAEOSPIROPLECTAMMINIDAE Loeblich and Tappan, 1984

Palaeospiroplectamminidae Loeblich and Tappan, 1984 (*1918), p. 22.

Test streptospirally coiled in the initial part, later planispiral and finally biserial; wall micrогranular calcareous, undifferentiated, and may have some agglutinated particles; aperture at the base of the final chamber. U. Devonian (Fammenian) to L. Carboniferous (Visean).

Remarks: This family represents a biserial development from the Chernyshinellinae, family Tournayellidae, and may be ancestral to the Palaeotextulariidae.

Subfamily PALAEOSPIROPLECTAMMININAE Loeblich and Tappan, 1984

Palaeospiroplectammininae Loeblich and Tappan, nom. transl. herein ex family.

Chambers teardroplike in the early coil, later uncoiled and biserial. U. Devonian (Fammenian) to L. Carboniferous (Visean).

EOTEXTULARIA Mamet, 1970

Plate 239, figs. 6–8

Type species: Palaeotextularia diversa Chernysheva, 1948 (***584**), p. 248; OD.

Eotextularia Mamet, in Mamet et al., 1970 (***2013**), p. 21.

Proloculus followed by a small enrolled stage of one or two irregularly coiled whorls of teardroplike chambers, later uncoiled with a few pair of biserial chambers; wall thick and coarsely granular with numerous calcite inclusions and may have a thin dark microgranular inner layer; aperture simple, a basal slit. L. Carboniferous (U. Tournaisian to M. Visean); USSR; Belgium; Denmark.

Remarks: Although described by Mamet (1970) as having a single layer in the wall, Conil and Lys (1977, ***667**, p. 31-32) state that the wall is differentiated into an outer coarsely granular layer with numerous calcite inclusions and a thin, dark microgranular inner layer.

HALENIA Conil, 1980

Plate 239, fig. 9

Type species: Halenia legrandi Conil, 1980; OD.

Halenia Conil, 1980 (***657**), p. 45.

Test elongate, early stage of test unknown but with elongate biserial stage resembling *Eotextularia* or *Palaeospiroplectammina*, and finally uniserial with horizontal septa; wall calcareous, microgranular to coarsely granular, with calcite inclusions; aperture basal in the biserial stage, terminal in the uniserial stage, and cribrate in the adult. L. Carboniferous (Visean); Belgium.

Remarks: The base is missing on the observed individuals, but Conil noted that it occurred with *Eotextularia*. Possibly the associated "*Eotextularia*" in Belgium are in fact only young stages of *Halenia*.

PALAEOSPIROPLECTAMMINA Lipina, 1965

Plate 239, figs. 10–15

Type species: Spiroplectammina tchernyshinensis Lipina, 1948 (***1860**), p. 256; OD.

Palaeospiroplectammina Lipina, 1965 (***1866**), p. 91.

Spiroplectamminoides Skipp, in McKee and Gutschick, 1969 (***1972**), p. 227 (non *Spiroplectamminoides* Magniez, 1972, nec Brönnimann and Beurlen, 1977); type species: *Spiroplectammina parva* Chernysheva, 1940 (***581**), p. 130, 135; OD.

Test with small streptospirally enrolled early stage, with teardroplike chambers at least in the final whorl, later uncoiled, biserial, and elongate with arched septa; wall calcareous, microgranular to granular, a single undifferentiated layer but with calcite inclusions; aperture simple, basal. U. Devonian (Fammenian) to L. Carboniferous (L. Visean); USSR; W. Europe; USA: Arizona.

RECTOCHERNYSHINELLA Lipina, 1960

Plate 240, figs. 1–4

Type species: Spiroplectammina mirabilis Lipina, 1948 (***1860**), p. 257; OD.

Rectochernyshinella Lipina, 1960 (***1865**), chart on p. 49, p. 51.

Chernyshinella (Birectochernyshinella) Lipina, 1965 (***1866**), p. 90; type species: obj.; OD.

Birectochernyshinella Conil and Lys, 1977 (***667**), p. 31 (nom. transl.).

Test with relatively large streptospirally enrolled early stage, and teardroplike chambers in the final whorl, later stage uncoiled, with a few biserially arranged chambers; wall calcareous, microgranular to granular, undifferentiated, and may have some calcite inclusions; aperture simple, basal. U. Devonian (U. Fammenian) to L. Carboniferous (L. Tournaisian); USSR.

Remarks: The original diagnosis of *Rectochernyshinella*, with designation of *S. mirabilis* as the type species (Lipina, 1960, ***1865**), was quoted with reillustration of the type species by Loeblich and Tappan (1964, ***1910**, p. C346, fig. 262 (11, 12), although the genus was then regarded as a synonym of *Endothyranella*. Later, the same generic name was used incorrectly for a different concept (Lipina, 1965, ***1866**) and a different species cited as type species; the previously designated and therefore correct type species, *S. mirabilis*, was then designated as the type species for *Chernyshinella (Birectochernyshinella)*. However, if a type species was designated when the genus was defined, it remains the type species regardless of any other consideration and cannot be changed except by action of the International Zoological Commission (ICZN Art. 61 (a)). Thus the correct name for the present genus is *Rectochernyshinella* Lipina, 1960, with *S. mirabilis* as type species, and the *Rectochernyshinella* of Lipina, 1965 has been renamed *Lipinellina*.

Subfamily ENDOSPIROPLECTAMMININAE Loeblich and Tappan, 1986

Endospiroplectammininae Loeblich and Tappan, 1986 (*1929), p. 343.

Test streptospiral in the early stage, later uncoiling and biserial, chambers endothyroid in character; wall undifferentiated. L. Carboniferous (Tournaisian to Visean).

ENDOSPIROPLECTAMMINA Lipina, 1970

Plate 240, figs. 5-12

Type species: Spiroplectammina venusta Vdovenko, 1954 (***3275**), p. 74; OD.

Endospiroplectammina Lipina, 1970 (*1867), p. 23.

Endothyra (Birectoendothyra) Lipina, 1970 (*1867), p. 22; type species: *Spiroplectammina nana* Lipina, 1955 (*1863), p. 80; OD.

Birectoendothyra Conil and Longerstaey, in Conil et al., 1980 (*660), p. 64 (nom. transl.).

Test elongate, early stage streptospirally enrolled, with distinctly endothyroid chambers, later becoming nearly planispiral and then uncoiled with a biserial stage of greater or lesser importance; wall calcareous, microgranular to coarsely granular, undifferentiated; aperture simple, basal in both the enrolled and biserial stage. L. Carboniferous (U. Tournaisian to M. Visean); USSR.

Remarks: Lipina (1970, ***1867**) described *Birectoendothyra* as intermediate between *Endothyra* and *Endospiroplectammina*. It appears to include shorter species or perhaps a different generation of the same species. We regard *Birectoendothyra* and *Endospiroplectammina* as congeneric.

Superfamily ENDOTHYRACEA Brady, 1884

Endothyracea Loeblich and Tappan, 1961 (*1902), p. 284, nom. corr. pro superfamily Endothyridea.

Endothyridea Glaessner, 1945 (*1250), p. 107, nom. transl. ex subfamily Endothyrinae.

Test planispiral to streptospiral in early stage, later may be uncoiled and rectilinear; wall microgranular, calcareous, may have two or three distinct layers and may have some agglutinated particles; aperture single, basal to areal in position. U. Devonian (Fammenian) to L. Permian.

Family ENDOTHYRIDAE Brady, 1884

Endothyridae Rhumbler, 1894 (*2615), p. 92, nom. corr. pro family Endothyrina.

Endothyrina Lankester, 1885 (*1790), p. 847, nom. transl. ex subfamily Endothyrinae.

Endothyrinae Delage and Hérouard, 1896 (*926), p. 133.

Plectogyridae Reytlinger, in Poyarkov, 1957 (*2463), p. 29.

Quasiendothyridae Rozovskaya, in Poyarkov, 1963 (*2464), p. 223.

Endothyranopsidae Reytlinger, 1966 (*2608), p. 56.

Test free, coiling planispiral to streptospiral, more or less involute, later may be uncoiled and rectilinear; wall microgranular, may be differentiated into more than one layer, may be alveolar, supplementary deposits present in advanced forms; aperture simple and basal to areal, cribrate in advanced forms, may have supplementary sutural apertures. U. Devonian (Fammenian) to U. Carboniferous.

Subfamily ENDOSTAFFELLINAE Loeblich and Tappan, 1984

Endostaffellinae Loeblich and Tappan, 1984 (*1918), p. 22.

Test streptospirally enrolled, at least in early stage; later may be nearly planispiral and may uncoil in the adult; wall microgranular, undifferentiated, may develop secondary chomatal deposits; aperture basal, equatorial. L. Carboniferous (Tournaisian) to U. Carboniferous (L. Moscovian).

Remarks: Differs from the Endothyrinae in the undifferentiated wall, rather than having two or more distinct wall layers.

ANDREJELLA Malakhova, 1975

Plate 240, figs. 18 and 19

Type species: Andrejella laxiformis Malakhova, 1975; OD.

Andrejella Malakhova, 1975 (*1994), p. 62.

Test enrolled, with tightly coiled streptospiral early whorls, final whorl with chambers rapidly increasing in height, the final chamber occupying nearly one-half the test diameter, septa short, strongly oblique; wall calcareous, thin, dark, microgranular, no secondary deposits; aperture basal and simple, at least in the early stage. L. Carboniferous (Visean); USSR: S. Urals.

Remarks: The original diagnosis of the genus noted the very high final chambers and suggested that the test tended to become uniserial or possibly biserial and the aperture terminal. The illustrated sections do not show more than a simple coil with rapidly enlarging final whorl, and the aperture is not clearly demonstrable as terminal.

DAINELLA Brazhnikova, 1962

Plate 240, figs. 13-15

Type species: Endothyra? chomatica Dain, in Brazhnikova, 1962; OD.

Dainella Brazhnikova, 1962 (*349), p. 22.

Test subglobular, closely coiled, streptospiral and involute throughout, numerous chambers per whorl, increasing gradually in size as added; wall calcareous, single layered and homogeneous, with secondary deposits in the form of massive chomata; aperture simple, basal. L. Carboniferous (L. Visean); USSR: Donets Basin, Ukraine; Belgium.

ELERGELLA Conil, 1984

Plate 240, figs. 20 and 21

Type species: Elergella simakovi Conil, 1984 (paratype figured as Endothyridae nov. in Conil et al., 1982, *670, pl. 1, fig. 15); OD(M).

Elergella Conil, in Shilo et al., 1984 (*2902), p. 180.

Test tightly enrolled, early whorls streptospiral, later with nearly 90° change in plane of coiling, becoming planispiral and evolute, numerous chambers per whorl, septa short, slightly oblique; wall calcareous, microgranular, single layered, without chomata or axially located spines but with secondary deposits in the form of lateral thickenings of the wall; aperture basal. L. Carboniferous (Tournaisian); E. Asiatic USSR: Omolon Massif.

ENDOSTAFFELLA Rozovskaya, 1961

Plate 241, figs. 1-5

Type species: Endothyra parva von Möller, 1879 (*2160), p. 18; OD.

Endostaffella Rozovskaya, 1961 (*2661), p. 20.

Test enrolled, thick, early whorls streptospiral, later with a 90° change in plane of coiling and becoming planispiral and evolute; wall calcareous, microgranular, undifferentiated, secondary deposits absent or with small rudimentary chomata in the last one or two whorls; aperture simple and basal. L. Carboniferous (U. Tournaisian to Visean); USSR: Russian Platform, Urals, Kazakhstan, Siberia; Great Britain; Belgium.

EOENDOTHYRA

A. D. Miklukho-Maklay, 1960

Plate 240, figs. 16 and 17

Type species: Endothyra communis Rauzer-Chernousova, 1948 (*2523), p. 6; OD.

Eoendothyra A. D. Miklukho-Maklay, 1960 (*2128), p. 140.

Quasiendothyra (Eoendothyra) Conil and Lys, 1964 (*661), p. 225 (nom. transl.).

Test large, early stage streptospiral and involute, later nearly planispiral, with rounded periphery, chambers numberous; wall calcareous, microgranular, dark, single layered, and undifferentiated, chomata well developed to massive, asymmetrical; aperture large, basal. U. Devonian (Fammenian) to L. Carboniferous (Visean); USSR; W. Europe.

EOQUASIENDOTHYRA Durkina, 1963

Plate 241, figs. 6-8

Type species: Endothyra bella Chernysheva, 1952 (*585), p. 16; OD.

Quasiendothyra (Eoquasiendothyra) Durkina, in Poyarkov, 1963 (*2464), p. 223.

Test enrolled, early stage streptospiral, later planispiral, with inflated chambers and septa slightly oblique to the outer wall; wall calcareous, microgranular, dark, heterogeneous, chomata weakly to moderately developed; aperture simple, basal. U. Devonian to L. Carboniferous (Tournaisian); USSR.

EUXINITA Conil and Dîl, 1980

Plate 241, figs. 19-23

Type species: Dainella? efremovi Vdovenko and Rostovtseva, in Brazhnikova et al., 1967 (*353), p. 148; OD.

Euxinita Conil and Dîl, in Conil et al., 1980 (*660), p. 87 (nom. nov. pro *Euxinella* Conil and Dîl, 1977).

Euxinella Conil and Dîl, in Dîl, 1977 (*960), p. 380 (non *Euxinella* Moisseiev, 1936); type species: obj.; OD.

Test small, enrolled, numerous chambers per whorl, early stage streptospiral, later nearly planispiral, in a plane about 90° from that of the early coiling; wall relatively thick, commonly recrystallized, with supplementary deposits as chomata or pseudochomata; aperture simple and basal. L. Carboniferous (Visean to Namurian); USSR; Iran.

GLOBOCHERNELLA Hance, 1983

Plate 241, figs. 9-12

Type species: Globochernella braibanti Hance, 1983; OD.

Globochernella Hance, 1983 (*1389), p. 113.

Globochernella Hance, 1982 (*1388), p. 143, expl. pl. 2, fig. 11 (name not available, ICZN Art. 13 (a)(i), no description).

Test enrolled, subglobular, chambers enlarging rapidly as added, septa thick at the base and tapering rapidly to a very thin inner edge; wall calcareous, microgranular, irregular but very thick, with coarsely agglutinated inclusions, no secondary deposits; aperture basal and large in the early stage, cribrate in the adult. L. Carboniferous (Visean); Belgium.

Remarks: The genus was described as having chernyshinellid chambers, but the chambers appear almost quadrate in section, rather than teardroplike. The wall contains agglutinated material, and the original description suggested that it differentiated an inner tectum, but this is not evident in the figures in which the agglutinated particles can be seen against the inner margin, hence the genus is here regarded as having an undifferentiated wall and as belonging to the Endostaffellinae.

GRANULIFERELLA E. J. Zeller, 1957

Plate 241, figs. 17 and 18

Type species: Granuliferella granulosa E. J. Zeller, 1957 = *Endothyra rjausakensis* Chernysheva, 1940 (*581), p. 127; OD.

Granuliferella E. J. Zeller, 1957 (*3443), p. 694.

Test discoidal, involute, early stage streptospiral, later nearly planispiral, with relatively few chambers per whorl, septa short, slightly oblique and directed toward the aperture, somewhat thickened at the base as seen in section; wall calcareous, more or less coarsely granular with calcite inclusions, single layered, without secondary deposits; aperture low and narrow, basal in position. U. Devonian (Famennian) to L. Carboniferous (Tournaisian to Visean); USA: Montana, Utah, Wyoming; USSR; Belgium; England.

GRANULIFERELLOIDES McKay and Green, 1963

Plate 241, figs. 13-16

Type species: Granuliferelloides jasperensis McKay and Green, 1963; OD.

Granuliferelloides McKay and Green, 1963 (*1971), p. 47.

Test elongate, up to 0.86 mm in length, streptospirally enrolled at first, later nearly planispiral, with few whorls of a few slightly inflated chambers and oblique septa, finally becoming uncoiled and rectilinear, with short cylindrical chambers and nearly horizontal septa; wall calcareous, coarsely granular with numerous inclusions, thick, single layered; aperture simple, basal in the enrolled stage, terminal in the uncoiled stage. L. Carboniferous (U. Tournaisian); Canada: Alberta; USA: Utah.

HOLKERIA Strank, 1982

Plate 242, figs. 1 and 2

Type species: Rhodesina avonensis Conil and Longerstaey, in Conil et al., 1980 (*660), p. 77; OD.

Holkeria Strank, 1982 (*3074), p. 145.

Test enrolled, discoidal, and biumbilicate, with plane of coiling oscillating in the early stage, later nearly planispiral and evolute, about eight chambers in the final whorl, periphery rounded but slightly truncate in the later chambers, septa short and follow the curvature of the chambers; wall calcareous, microgranular, thick, undifferentiated, with agglutinated particles; aperture simple and basal in most of the test, becoming multiple and areal in the last one or two chambers. L. Carboniferous (M. Visean); England.

KLUBONIBELIA Conil, 1980

Plate 242, fig. 3

Type species: Klubonibelia immanis Conil, 1980; OD.

Klubonibelia Conil, 1980 (*657), p. 49.

Early stage streptospirally enrolled, later planispiral, with numerous subquadrate chambers per whorl, septa radial, final stage uncoiled and rectilinear; wall calcareous, microgranular to granular, with calcite inclusions, extensive chomatal deposits against the previous chamber wall; aperture simple, basal in the enrolled test, terminal in the uncoiled chambers. L. Carboniferous (M. to U. Visean); Great Britain.

LATIENDOTHYRA Lipina, 1963

Plate 242, figs. 4-6, 16, and 17

Type species: Endothyra latispiralis Lipina, in Grozdilova and Lebedeva, 1954 (***1321**), p. 88; also as new by Lipina, in Lebedeva, 1954 (***1794**), p. 254, and in Lipina, 1955 (***1863**), p. 65; OD.

Plectogyra (Latiendothyra) Lipina, in Poyarkov, 1963 (*2464), p. 225 (species cited with *Latiendothyra* used in generic sense).

Latiendothyra Gorecka and Mamet, 1970 (*1277), p. 162 (nom. transl.).

Globoendothyra (Eogloboendothyra) Vdovenko, 1972 (*3282), p. 108; type species: *Endothyra globulus* (Eichwald) var. *parva* Chernysheva, 1948 (*584), p. 247; OD.

Test inflated, with broadly rounded periphery and flattened sides, early stage streptospiral, later planispiral, with rapidly enlarging whorl, moderate number of chambers per whorl (about six to eight in the final whorl), septa short, thick, and slightly oblique, projecting toward the aperture; wall calcareous, thick, microgranular, dark, single layered, with secondary deposits that result in septal thickening; aperture simple at the base of the apertural face. L. Carboniferous (U. Tournaisian to L. Visean); USSR; USA: Alaska, Idaho, Montana, Wyoming.

Remarks: The type species of *Latiendothyra* was described by Lipina (1955, ***1863**), but some five and a half months prior to publication of her article, descriptions and figures of this and many other new species of Lipina and other authors were published "with the permission of the author" in two articles (Grozdilova and Lebedeva, 1954, ***1321** and Lebedeva, 1954, ***1794**) in a volume compiling information on Lower Carboniferous foraminifera. The various species were described as "*Endothyra latispiralis* Lipina, n. sp.," etc. As their published figures and description may not actually have been provided by Lipina, the Ellis and Messina catalogue credited all species to Grozdilova and Lebedeva, 1954 or to Lebedeva, 1954. Nevertheless, the volume indicates that work of others had been included, quoting the geologic and geographic occurrences cited for the various species by their original authors. As apparently manuscripts then in press had been used for preparing the compilation, these species should be credited to the original authors in Grozdilova and Lebedeva or in Lebedeva.

Eogloboendothyra was defined as a subgenus of *Globoendothyra*, but the latter has a well-developed multilayered wall, whereas typical *Eogloboendothyra* does not. The type species appears very close to that of *Latiendothyra* in coiling, character of the chambers and septa, and wall structure.

LYSELLA Bozorgnia, 1973

Plate 242, figs. 7-9

Type species: Lysella gadukensis Bozorgnia, 1973; OD.

Lysella Bozorgnia, 1973 (*324), p. 84.

Test enrolled, nautiloid, early stage streptospiral, later becoming abruptly planispiral, with many chambers per whorl that appear subquadrate in section, septa radial to slightly inclined toward the aperture; wall calcareous, microgranular, dark to light colored, supplementary deposits in the form of chomata; apertural face convex, with low, lunate basal aperture. L. Carboniferous (Visean); Iran.

MEDIOPSIS Bogush, 1984

Plate 242, figs. 11 and 12

Type species: Planoendothyra? kharaulakhensis Bogush and Yuferev, 1966 (***278**), p. 148; OD.

Mediopsis Bogush, in Bushmina, Bogush, and Kononova, 1984 (*457), p. 63.

Test small, enrolled, with few whorls, involute, laterally compressed, coiling irregular in first half to one and a half whorls, later planispiral, final whorl with up to eight chambers, periphery slightly lobulate, septa thick and radial; wall calcareous, relatively thick, undifferentiated, and microgranular, including many large clear grains, secondary deposits obscuring the axial region, small pseudochomata irregularly present. L. Carboniferous (U. Tournaisian to Visean); USSR: NW Altaya, Siberian Platform.

MELATOLLA Strank, 1983

Plate 242, fig. 10

Type species: Melatolla whitfieldensis Strank, 1983; OD.

Melatolla Strank, 1983 (*3075), p. 440.

Test streptospirally enrolled in the early stage, later planispiral, with about nine chambers in the final whorl, and finally tending to uncoil, septa gently curved, reflecting the curvature of the outer wall of the slightly inflated chambers and somewhat thickened at the inner ends, sutures incised; wall calcareous, microgranular, dark, single layered, supplementary deposits well developed, especially in the final whorl, resulting in much thickened chamber floors, massive and robust chomatal deposits in the last chambers; aperture simple and basal in the early stage, becoming areal and cribrate in the uncoiled part. L. Carboniferous (Visean); England; USSR.

NEOPARADAINELLA Vdovenko, 1973

Plate 242, figs. 13-15

Type species: Paradainella (Neoparadainella) primordialis Vdovenko, 1973; OD.

Paradainella (Neoparadainella) Vdovenko, in Brazhnikova and Vdovenko, 1973 (*355), p. 154.

Test enrolled, nautiloid, early whorls streptospiral, later whorls planispiral, about nine to eleven chambers in the final whorl, septa nearly radial, periphery broadly rounded; wall calcareous, microgranular to granular, with scattered calcite inclusions, secondary deposits in the form of chomata or pseudochomata; aperture simple, oval. L. Carboniferous (Visean); USSR.

PARADAINELLA Brazhnikova, 1971

Plate 242, figs. 18-20

Type species: Paradainella dainelliformis Brazhnikova and Vdovenko, 1971; OD.

Paradainella Brazhnikova, in Brazhnikova and Vdovenko, 1971 (*354), p. 42.

Test large, nautiloid, with broadly rounded periphery, streptospirally enrolled in the early stage and may change planes by 90° from one whorl to the next, final whorls nearly planispiral; wall calcareous, thick, granular to coarsely granular, with light-colored calcite inclusions, locally with secondary deposits forming massive chomata or pseudochomata that may cover the inner surface of the whorls; aperture simple, basal. L. Carboniferous (U. Tournaisian); USSR: Donets Basin.

PARAENDOTHYRA Chernysheva, 1940

Plate 243, figs. 1-4

Type species: Paraendothyra nalivkini Chernysheva, 1940; OD.

Paraendothyra Chernysheva, 1940 (*581), p. 129.

Test large, up to 1.2 mm in diameter, enrolled and biumbilicate, with broadly rounded periphery, early stage with slight variations in plane of coiling, later nearly completely planispiral, chambers inflated, sutures radial; wall calcareous, microgranular with calcite inclusions, single layered, with supplementary deposits at the angular base of the apertural face resulting in a much thickened wall, so that in section the supplementary deposits and parts of the septa against the previous whorl give a serrate appearance, final few septa hooklike as viewed in section; aperture areal, a lunate slit in the apertural face. L. Carboniferous (M. Tournaisian); USSR: southern Urals.

PLANOENDOTHYRA Reytlinger, 1959

Plate 243, figs. 7 and 8

Type species: Endothyra aljutovica Reytlinger, 1950 (*2597), p. 34; OD.

Planoendothyra Reytlinger, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 194.

Planoendothyra Reytlinger, 1958 (*2601), p. 57 (name not available, ICZN Art. 13 (a)(i), no description).

Test nautiloid, slightly compressed, biumbilicate, streptospirally enrolled in the early stage, with sharp changes in plane of coiling, final whorls planispiral and evolute, periphery broadly rounded, numerous inflated chambers per whorl, septa radial to slightly oblique; wall calcareous, microgranular, with well-developed secondary deposits in the form of pseudochomata and a layer lining the base and sides of the chambers; aperture simple, large, basal. L. Carboniferous (Visean) to U. Carboniferous (Bashkirian); USSR: Moscow Basin, Komi ASSR; Belgium; USA: Wyoming, Montana.

POJARKOVELLA Yu. A. Simonova and Zub, 1975

Plate 243, figs. 9 and 10

Type species: Pojarkovella honesta Yu. A. Simonova and Zub, 1975 = *Quasiendothyra nibelis* Durkina, 1959 (*1025), p. 152; OD.

Pojarkovella Yu. A. Simonova and Zub, 1975 (*2974), p. 21.
Nibelia Conil, 1980 (*657), p. 48; type species: *Quasiendothyra nibelis* Durkina, 1959 (*1025), p. 152; OD.

Test enrolled throughout, nautiloid, sides flattened to biumbilicate, early stage streptospiral, tightly coiled and involute, later becoming planispiral after an abrupt change in plane of coiling of about 90°, about eleven to thirteen chambers per whorl, septa straight and radiate; wall calcareous, dark, microgranular, single layered, massive secondary deposits consisting of angular chomata. L. Carboniferous (Visean); Bulgaria; USSR: Timan, Pechora Basin, Tien-Shan, Karatau.

PRISCELLA Mamet, 1974

Plate 243, figs. 5 and 6

Type species: Endothyra prisca Rauzer-Chernousova and Reytlinger, in Rauzer-Chernousova et al., 1936 (*2529), p. 213; OD.

Priscella Mamet, 1974 (*2007), p. 200.
Priscella Sando and Mamet, 1974 (*2731), p. 621 (name not available, ICZN Art. 13 (a)(i), no description).

Test free, small, lenticular to discoidal, enrolled, early chambers streptospirally coiled, later nearly planispiral, with six to eleven chambers in the final whorl, septa long, strongly oblique to the periphery; wall calcareous, microcrystalline, dark, with minor basal secondary deposits but without chomata, hooks, or other projections; aperture a low slit at the base of the apertural face. L. Carboniferous (Tournaisian to Namurian); cosmopolitan in northern hemisphere: Europe; Asia; North America.

PSEUDOCHERNYSHINELLA Brazhnikova, 1974

Plate 243, figs. 24-28

Type species: Pseudochernyshinella biformis Brazhnikova, 1974 (as *Pseudochernyshinella subrotunda* (Malakhova) subsp. *biformis* Brazhnikova, 1974); OD.

Pseudochernyshinella Brazhnikova, 1974 (*351), p. 14.

Test free, subglobular, early stage close coiled, with numerous small chambers per whorl, and showing slight variation in plane of coiling, chambers becoming much larger and inflated in final whorls and fewer per whorl, sutures incised; wall calcareous, finely to coarsely granular, secondary deposits present as tubercles, spines, or hooks in the last whorl; aperture simple and basal. L. Carboniferous (Tournaisian); USSR.

Remarks: Although *Pseudochernyshinella subrotunda* subsp. *biformis* Brazhnikova was originally indicated as the type species of the genus that also included *P. subrotunda* (Malakhova) subsp. *subrotunda*, the type species of a genus must be a nominal species (ICZN Art. 67 (a)), and if a subspecies is so designated, "it is deemed to have been first raised to the rank of species" (ICZN Art. 61 (d)). Thus the nominal type of the present genus is correctly *Pseudochernyshinella biformis* Brazhnikova.

PSEUDOPLANOENDOTHYRA Brazhnikova and Vdovenko, 1982

Plate 243, figs. 13-15

Type species: Quasiendothyra rotayi Brazhnikova, 1962 (*349), p. 18 (nom. imperf. as *rotai*, patronymic for A. P. Rotay); (syn.: *Quasiendothyra rotayi* Dain, in Mirchinka, 1958 (*2153), p. 279, name not available, ICZN Art. 13 (a)(i), figured but no description); OD.

Pseudoplanoendothyra Brazhnikova and Vdovenko, in Brazhnikova, 1982 (*352), p. 19.

Test enrolled, laterally compressed and discoidal, early whorls streptospiral, later whorls with plane of coiling changed by about 90°, finally nearly planispiral and evolute, up to fourteen chambers in the final whorl, early whorls with pseudosepta, later with short and strongly oblique septa; wall calcareous, microgranular, dark, single layered, rare secondary deposits in the form of chomata or pseudochomata; aperture at the base of the apertural face. L. Carboniferous (U. Tournaisian to L. Visean); USSR.

Remarks: The type species originally was figured in a petroleum geology dictionary without description and was first validated when a description of the species was provided by Brazhnikova (1962, *349). Bogush et al. (1965, *276, p. 34) considered it to be conspecific with *Quasiendothyra kedrovica* Durkina, 1959, but if so the latter would have priority as a species. However, *Q. kedrovica* is less compressed laterally and has thicker walls, hence appears to be a distinct species. *Pseudoplanoendothyra* differs from *Planoendothyra* in having shorter septa as seen in section, probably because of the larger aperture, and in the septa being strongly oblique, curving toward the apertural end. Early whorls have pseudosepta, whereas in *Planoendothyra* the septa are radial and complete.

RECTOENDOTHYRA Brazhnikova, 1983

Plate 243, figs. 11 and 12

Type species: Endothyra (Rectoendothyra) donbassica Brazhnikova, 1983; OD.

Endothyra (Rectoendothyra) Brazhnikova, in Brazhnikova and Vdovenko, 1983 (*356), p. 50.

Test with early stage streptospirally coiled and whorl increasing slowly in height, final whorl enlarging more rapidly and may tend to uncoil, last chamber occupying up to one-half the test diameter, septa straight and radial; wall calcareous, microgranular to coarsely granular, secondary deposits variable, may be massive against the chamber floors; aperture basal and simple in the early stage, that of the final chamber areal and multiple. L. Carboniferous (U. Serpukhovian): USSR: Donets basin.

Remarks: Differs from *Andrejella* in the presence of extensive secondary deposits.

SPINOENDOTHYRA Lipina, 1963

Plate 243, figs. 16-20

Type species: Endothyra costifera Lipina, in Grozdilova and Lebedeva, 1954 (*1321), p. 86; also as new in Lipina, 1955 (*1863), p. 61; OD.

Plectogyra (Spinoendothyra) Lipina, in Poyarkov, 1963 (*2464), p. 225 (subgenus, but used in generic sense).

Endothyra (Inflatoendothyra) Brazhnikova and Vdovenko, in Vdovenko, 1972 (*3282), p. 107; type species: *Endothyra inflata* Lipina, in Lebedeva, 1954 (*1794), p. 254; also as new in Lipina, 1955 (*1863), p. 54 (non *Endothyra inflata* Morozova, 1949) = *Spinoendothyra oldalipinae* Loeblich and Tappan, nom. nov., herein; OD.

Spinoendothyra Vdovenko, 1975 (*3283), table 1 on p. 31 (nom. transl.).

Endothyra (Spinoendothyra) Conil, in Bless et al., 1976 (*254), p. 96 (nom. transl.).

Spinoendothyra (Inflatoendothyra) Lipina, 1985 (*1869), p. 35 (nom. transl.).

Test close coiled in the early stage, with the three to four whorls increasing gradually in height, numerous small chambers per whorl, about nine to ten in the final whorl, coiling of early stage variable, then planispiral for the last whorl or so, septa long and straight, not thickened at the ends; wall calcareous, finely granular, obscure, single layered, secondary deposits well developed as half arches, hooks, and forward projecting spines; aperture simple, basal, a relatively high opening. L. Carboniferous (U. Tournaisian to L. Visean); USSR.

Remarks: For a discussion of attribution of authorship for the type species of the subgenera *Spinoendothyra* and *Inflatoendothyra*, see remarks herein under *Latiendothyra*. Ganelina (1966, *1213, p. 113) referred *E. inflata* Lipina to *Plectogyra (Spinoendothyra)*. A comparision of the original figures of the two type species supports the conclusion as to their congeneric status, hence *Inflatoendothyra* is considered to be a synonym of *Spinoendothyra*. The type species of *Inflatoendothyra*, a junior primary and secondary homonym that apparently has not been renamed, is here renamed in honor of Ol'da Lipina as *Spinoendothyra oldalipinae* Loeblich and Tappan, nom. nov. pro *Endothyra inflata* Lipina (in Lebedeva, 1954, *1794, p. 254), non *Endothyra inflata* Morozova (1949, *2187, p. 245).

URBANELLA Malakhova, 1963

Plate 243, figs. 21-23

Type species: Quasiendothyra urbana Malakhova, 1954 (*1988), p. 59 (err. cit. as "*Endothyra urbana* Malakhova, 1954" by Malakhova, in Poyarkov, 1963); OD.

Loeblichia (Urbanella) Malakhova, in Poyarkov, 1963 (*2464), p. 225.

Urbanella Reytlinger, 1981 (*2612), p. 48, 49 (nom. transl.).

Test enrolled, sides flattened, periphery broadly rounded, early whorls streptospiral and forming a ball-like central region, later whorls increasing in height, becoming planispiral and evolute; wall calcareous, dark, finely granular, single layered, secondary deposits present as small rounded chomata at the margins of the aperture; aperture a low ovate basal opening. L. Carboniferous (Tournaisian to L. Visean); USSR: central Urals, Ukraine.

Remarks: Originally regarded as a subgenus of *Loeblichia* but differs in having a robust test with large early streptospiral coil and chomata of beaded appearance, whereas *Loeblichia* has a flattened, discoidal test that is planispiral throughout and lacks secondary deposits. Reytlinger (1981, *2612, p. 48, 49) suggested that *Banffella* Mamet, 1970 might be a synonym of *Urbanella*, but *Banffella* has many more chambers per whorl, a less prominent early streptospiral coil, and a layered wall, hence is here included in the Endothyrinae.

Subfamily ENDOTHYRINAE Brady, 1884

Endothyrinae Brady, 1884 (*344), p. 66.

Plectogyrinae Reytlinger, 1958 (*2601), p. 57.

Quasiendothyrinae Reytlinger, 1961 (*2603), p. 53.

Test planispiral to streptospiral, involute to evolute, later may be uncoiled; chambers inflated; wall microgranular calcareous, tending to be differentiated as two to three layers, may develop supplementary deposits; aperture simple, basal to areal. U. Devonian to U. Carboniferous.

BANFFELLA Mamet, 1970

Plate 244, figs. 9-13

Type species: Endothyra? banffensis McKay and Green, 1963 (*1971), p. 30; OD.

Banffella Mamet, in Mamet and Skipp, 1970 (*2016), p. 335.

Test discoidal, close coiled, early whorls streptospiral, later nearly planispiral and evolute, with up to fifteen chambers per whorl, septa straight, slightly oblique, and directed forward, the inner margins secondarily resorbed and the bases thickened secondarily against the outer wall to appear wedgelike between the small rectangular chambers as seen in horizontal section; wall calcareous, layered, granular and pseudofibrous, with a tendency for recrystallization; aperture a low basal slit. L. Carboniferous (L. to U. Visean); Canada: Alberta; USA: Alaska, Arizona, Utah.

Remarks: Although suggested to be a junior synonym of *Urbanella* by Reytlinger (1981, *2612, p. 48, 49), *Banffella* has a layered wall and more numerous chambers per whorl and is placed in the Endothyrinae.

ENDOTHYRA Phillips, 1846

Plate 244, figs. 1-6

Type species: Endothyra bowmani Phillips, 1846 (syn.: *Involutina lobata* Brady, 1870, *327, p. 382; *Endothyra bradyi* Mikhaylov, 1939, *2114, p. 51); OD(M).

Endothyra Phillips, 1846 (*2403), p. 277 (nom. conserv., ICZN Op. 724, April, 1965; non *Endothyra* Gude, 1899).

non *Endothyra* Phillips, in Brown, 1843 (*436), p. 17 (nom. reject., ICZN Op. 724, April, 1965).

Plectogyra E. J. Zeller, 1950 (*3442), p. 3; type species: *Plectogyra plectogyra* E. J. Zeller, 1950; OD.

Plectogyrina Reytlinger, 1958 (*2601), p. 57 (name not available, ICZN Art. 13(a)(i), no description); type species: *Endothyra? fomichaensis* Lebedeva, 1954 (*1794), p. 256; OD.

Plectogyrina Reytlinger, in Rauser-Chernousova and Fursenko, 1959 (*2531), p. 196; type species: *Endothyra? fomichaensis* Lebedeva, 1954 (*1794), p. 256; OD.

Test enrolled throughout, partially involute, periphery broadly rounded, early stage streptospirally enrolled or with plane of coiling changing abruptly during growth, chambers inflated and few per whorl and with few whorls; wall calcareous, microgranular, with two or three layers, a thin dark outer layer or tectum and a thicker, fibrous to alveolar inner layer or diaphanotheca, commonly in part recrystallized and may have an inner tectorium, secondary deposits consist of nodes, ridges, or hooks on the chamber floor; aperture a low basal slit, those of earlier chambers enlarged by resorption. L. Carboniferous to U. Carboniferous (Moscovian); cosmopolitan.

EOENDOTHYRANOPSIS Reytlinger and Rostovzeva, 1966

Plate 244, figs. 7, 8, and 14-23

Type species: Parastaffella pressa Grozdilova, in Lebedeva, 1954 (*1794), p. 276; OD.

Eoendothyranopsis Reytlinger and Rostovzeva, in Reytlinger, 1966 (*2608), p. 55.

Eoendothyranopsis Reytlinger, 1964 (*2606), p. 52 (name not available, ICZN Art. 13 (a)(i), no description).

Eomillerella Skipp, in McKee and Gutschick, 1969 (*1972), p. 216; type species: *Endothyra scitula* Toomey, 1961 (*3208), p. 26 (syn.: *Endothyra symmetrica* E. J. Zeller, 1957, *3443, p. 701, non *E. symmetrica* Morozova, 1949); OD.

Skippella Browne and Pohl, 1973 (*438), p. 218; Sando and Mamet, 1974 (*2731), p. 621 (name not available, ICZN Art. 13 (a)(i), no description).

Skippella Mamet, 1974 (*2007), p. 201; type species: *Endothyra (Globoendothyra) redwallensis* Skipp, in McKee and Gutschick, 1969 (*1972), p. 210; OD.

Test enrolled, inflated nautiloid to flattened and biumbilicate, involute, periphery rounded, early coiling slightly irregular, later planispiral, septa oblique, a continuation of the curve of the outer chamber wall; wall calcareous, microgranular, dark, with poorly defined inner hyaline radial layer, secondary deposits at the base of the chambers appear as a forward projecting hook or spine in the final chamber, those of earlier chambers resorbed but leave a low residual knob; aperture basal, a low arcuate slit. L. Carboniferous (L. Visean); USSR: Siberia, Urals, Kuznetsk; USA: Arizona, Idaho, Wyoming, Montana, Mid-Continent, Alaska; Canada.

GLOBOENDOTHYRA Bogush and Yuferev, 1962

Plate 245, figs. 1-5

Type species: Globoendothyra pseudoglobulus Bogush and Yuferev, 1962 (*277), p. 150 (syn.: *G. pseudoglobulus* Reytlinger, 1958, *2601, p. 55, nom. nud.; also Rauzer-Chernousova and Fursenko, 1959, *2531, p. 196, nom. nud.); nom. subst. pro *Endothyra globulus* (Eichwald) von Möller, 1878 (*2159), p. 98, non *Nonionina globulus* Eichwald, 1860 (*1086), p. 350; OD.

Globoendothyra Bogush and Yuferev, 1962 (*277), p. 149.

Globoendothyra Reytlinger, 1958 (*2601), p. 55, 57, 64, 68; Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 196 (name not available, ICZN Art. 13 (a)(i), no description).

Endothyra (Globoendothyra) Skipp, in McKee and Gutschick, 1969 (*1972), p. 209 (nom. transl.).

Test enrolled, early stage streptospiral, later nearly planispiral but somewhat oscillating, chambers inflated, septa oblique, aligned with the curvature of the outer wall; wall calcareous, three layers, a distinct dark tectum, clear diaphanotheca, dark inner layer, and possibly an additional one, secondary deposits form a low continuous layer on the chamber floors, thickening in the chamber corners, a prominent forward directed spinelike projection in the final chamber; aperture a low basal slit. L. Carboniferous (Visean to Moscovian); Eurasia; N. Africa; Australia; North America.

Remarks: The validity of this genus and its type species have received various interpretations. The name was proposed for the genus (Reytlinger, 1958, *2601), and the type species designated as *G. pseudoglobulus*, new name for *Endothyra globulus* von Möller, non *Nonionina globulus* Eichwald. However, this was not a renamed homonym but a new species based on a previously misidentified species. For a new species, a specific description is required, and neither the 1958 nor 1959 publications by Reytlinger fulfilled this requirement. Lacking a valid type species, the genus also was invalid. Other workers (e.g., Rozovskaya, 1963, *2662, p. 49) have considered Eichwald's and von Möller's specimens to be conspecific, although both had very much idealized illustrations. They therefore recognized the genus, and cited Eichwald's species as the type, although Reytlinger's original discussion of the genus excluded Eichwald's material. This genus was first validated by Bogush and Yuferev (1962, *277) who provided a citation of the type species and a separate diagnosis and description for both the genus *Globoendothyra* and the type species *pseudo-*

globulus. Later, Bogush et al. (1965, *276, p. 43) state that the "holotype" of the species *pseudoglobulus* (recte lectotype, as this was not designated originally) is the specimen of von Möller (1878, *2159, pl. IV, fig. 4).

KLUBOVELLA Lebedeva, 1956

Plate 245, figs. 6 and 7

Type species: Klubovella konensis Lebedeva, 1956; OD.

Klubovella Lebedeva, 1956 (*1795), p. 52.
Quasiendothyra (Klubovella) Conil and Lys, 1964 (*661), p. 225 (nom. transl.).

Test streptospirally enrolled in the early stage, later uncoiling and rectilinear, wall calcareous, of two layers, a dark finely granular layer and an inner light hyaline radiate one, secondary deposits low and chomatalike in the enrolled stage, together with a considerable thickening of the septa that are much thicker than the outer wall, particularly at the inner margins; aperture basal in the early stage, central and simple in the early uncoiled chambers, relatively large or possibly secondarily enlarged in earlier rectilinear chambers, becoming cribrate and multiple in the final chamber. U. Devonian (Fammenian); USSR: Kazakh ASSR.

Remarks: Originally described as coiled to biserial, *Klubovella* was compared to *Spiroplectammina*, although the wall character indicated a relationship to *Endothyra*. Later, Reytlinger (1961, *2603, p. 53) regarded *Klubovella* as a synonym of *Quasiendothyra*, but on the explanation to her plate 4, fig. 1-3, 5, she considered *Klubovella* as a subgenus of *Quasiendothyra*. Both the typical entirely coiled specimens and the coiled to rectilinear ones were placed in *Quasiendothyra*, the latter figured as *Q. (Klubovella) kobeitusana* subsp. *mirabilis* Chernysheva and *Q. (Klubovella) konensis* (Lebedeva). *Endothyra konensis* Lebedeva was regarded as the basionym of the latter species, but no mention was made of *Klubovella konensis* Lebedeva of the same publication, the type species of *Klubovella*. If *Endothyra konensis* Lebedeva, 1956, p. 44, and *Klubovella konensis* Lebedeva, 1956, p. 52 are regarded as distinct species, and both placed in *Quasiendothyra*, even if in different subgenera, one would need to be renamed as a secondary homonym. However, we regard the two as distinct genera, although *Klubovella* is uniserial rather than biserial in the later stage, as indicated by Conil and Longerstaey (in Conil et al., 1980, *660, p. 86).

LAXOENDOTHYRA Brazhnikova and Vdovenko, 1972

Plate 245, figs. 10-12

Type species: Endothyra parakosvensis Lipina, 1955 (*1863), p. 68; OD.

Endothyra (Laxoendothyra) Brazhnikova and Vdovenko, in Vdovenko, 1972 (*3282), p. 106.
Laxoendothyra Reytlinger, 1981 (*2612), p. 47 (nom. transl.).

Test small, inflated, enrolled, early stage streptospiral, later nearly or entirely planispiral, rapidly enlarging spire with few somewhat elongate chambers per whorl, septa short, inclined toward the aperture; wall calcareous, microgranular, two layers, no supplementary deposits; aperture large, basal. L. Carboniferous (Tournaisian to Visean); USSR; Belgium.

MIRIFICA Shlykova, 1969

Plate 245, figs. 8 and 9

Type species: Endothyra mirifica Rauzer-Chernousova, 1948 (*2519), p. 179; OD.

Omphalotis (Mirifica) Shlykova, 1969 (*2904), p. 49.
Mirifica Reytlinger, 1981 (*2612), p. 47 (nom. transl.).

Test large, subglobular, enrolled, and involute with whorl increasing rapidly in height, periphery broadly rounded, early stage streptospiral, later nearly planispiral but asymmetrical, numerous chambers per whorl, sutures short in the outer whorls, hooked and thick, sutures nearly flush externally; wall calcareous, fibrous, with radial vitreous layer at the exterior of the inner whorls, supplementary deposits weakly developed, also appearing as a vitreous radial layer over the outer surface of the previous whorl; aperture in the early stage basal, simple, slitlike, becoming multiple and cribrate in the final whorl. L. Carboniferous (U. Visean); European and central Asiatic USSR.

OMPHALOTIS Shlykova, 1969

Plate 246, figs. 1–4

Type species: Endothyra omphalota Rauzer-Chernousova and Reytlinger, in Rauzer-Chernousova and Fursenko, 1937 (*2530), p. 265; OD.

Omphalotis Shlykova, 1969 (*2904), p. 47.

Omphalotis Mamet, 1969 (*2004), p. 132; type species: obj.; OD.

Test nautiloid, enrolled, involute, and biumbilicate, early coiling slightly variable, later planispiral, sutures radial to slightly oblique; wall calcareous, outer tectorium continuing to produce a distinct septal margin, thick radiate median layer and dense microcrystalline tectum, well-developed secondary deposits on the chamber floor, the low chomatalike deposits may be hooklike or a forward directed spine in the final chamber; aperture a broad and low basal opening. L. Carboniferous (M. Visean) to U. Carboniferous (L. Namurian); European and Asiatic USSR; France; N. Africa; USA: Idaho, Utah.

PARAPLECTOGYRA Okimura, 1958

Plate 246, figs. 12–17

Type species: Paraplectogyra masanae Okimura, 1958; OD.

Paraplectogyra Okimura, 1958 (*2295), p. 254.

Endothyra (Mediendothyra) Brazhnikova and Vdovenko, in Vdovenko, 1972 (*3282), p. 107; type species: *Plectogyra obscura* Brazhnikova and Vdovenko, 1971 (*354), p. 52; OD.

Test small, enrolled, involute, periphery broadly rounded, sides flattened, early stage with variable coiling, later planispiral, whorls expanding rapidly and with relatively few chambers per whorl, septa straight, radial or directed slightly forward; wall calcareous, microgranular, with three layers, corresponding to the tectum, diaphanotheca, and lower tectorium, secondary deposits form axial thickenings and line the chamber floor; aperture low, basal, equatorial. L. Carboniferous (U. Tournaisian to L. Visean); Japan; USSR.

QUASIENDOTHYRA
Rauzer-Chernousova, 1948

Plate 246, figs. 10 and 11

Type species: Endothyra kobeitusana Rauzer-Chernousova, 1948 (*2523), p. 7 (syn.: *E. coheitusana* Grablin et al., 1940, *1285, p. 48, nom. nud.); OD.

Quasiendothyra Rauzer-Chernousova, 1948 (*2522), p. 228.

Test free, discoidal, periphery broadly rounded, sides concave, early whorls slightly irregular with later change in plane of coiling, close coiled, chambers numerous, septa directed forward, about equal in thickness to the outer wall; wall calcareous, of two layers, outer layer finely granular and homogeneous and inner layer hyaline and radial, secondary deposits chomatalike, at each side of the median line against the previous whorl; aperture basal, relatively high and oval. U. Devonian (Fammenian) to L. Carboniferous (Tournaisian); USSR; Turkey.

SEMIENDOTHYRA Reytlinger, 1980

Plate 246, fig. 18

Type species: Semiendothyra surenica Reytlinger, 1980; OD.

Semiendothyra Reytlinger, 1980 (*2611), p. 29.

Test large, laterally compressed, nautiloid and involute, early whorls streptospiral, later planispiral and may be slightly evolute, chambers somewhat inflated, septa slightly arched forward in continuation of the curvature of the outer wall; wall calcareous, microgranular, of three layers, thick light-colored granular median layer bordered by thin and dark inner and outermost layers, secondary deposits extensive, small chomatalike mounds near the aperture, spinelike in the final chamber; aperture simple, basal, low. M. Carboniferous (Namurian); USSR: Bashkir ASSR.

TUBERENDOTHYRA Skipp, 1969

Plate 246, figs. 5–9

Type species: Endothyra tuberculata Lipina, 1948 (*1860), p. 253; OD.

Endothyra (Tuberendothyra) Skipp, in McKee and Gutschick, 1969 (*1972), p. 210 (also used in generic sense, p. 210).

Test discoidal to subglobular, biumbilicate, periphery rounded, early stage streptospiral, later planispiral, septa long, directed slightly forward and following the curvature of the outer wall; wall dark to gray, two layers, secondary deposits on the floor of all chambers form prominent unconnected mounds or tubercles that are equidimensional to elongate and may appear in section as nodes or spines, inner tips of the septa may be thickened; basal aperture low to moderate in size. L. Carboniferous (U. Tournaisian to L. Visean); USSR: Siberia, Ural Mountains, Russian Platform; USA: Arizona, Colorado, New Mexico, Alaska; Canada: Alberta.

Remarks: Although described as a subgenus, *Tuberendothyra* was then consistently used in the generic sense in the original publication.

ZELLERINELLA Mamet, 1981

Plate 247, figs. 1-5

Type species: Endothyra discoidea Girty, 1915 (*1242), p. 27; OD.

Zellerinella Mamet, 1981 (*2011), p. 140 (nom. subst. pro *Zellerina* Mamet, 1970).

Zellerina Mamet, in Mamet and Skipp, 1970 (*2016), p. 336 (non *Zellerina* Torre and Callejas, 1958); type species: obj., OD.

Test small, discoidal, sides slightly excavated, early stage slightly streptospiral, later planispiral and evolute; wall calcareous, microgranular, with differentiated inner and outer layers, secondary deposits form weak pseudochomata; aperture simple, basal. L. Carboniferous (U. Visean to L. Namurian); USA: Arkansas; Southeast Asia: Laos.

Remarks: As no holotype was indicated in the original description of the type species, the specimen figured by Girty (1915, *1242, pl. 10, fig. 15) is here designated as lectotype for *Zellerinella discoidea* (Girty).

Subfamily HAPLOPHRAGMELLINAE Reytlinger, 1959

Haplophragmellinae Reytlinger, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 185.

Early stage planispiral to streptospiral, chambers enlarging rapidly, later may be uncoiled and rectilinear; wall coarsely microgranular and undifferentiated, no supplementary deposits; aperture single and basal in the early stage, cribrate in the adult. L. Carboniferous (Tournaisian) to U. Carboniferous (Moscovian).

CORRIGOTUBELLA Ganelina, 1966

Plate 247, figs. 13 and 14

Type species: Corrigotubella posneri Ganelina, 1966; OD.

Corrigotubella Ganelina, 1966 (*1213), p. 98.

Test large, robust, up to 1.08 mm in length, early stage streptospiral, later planispiral, about five to six chambers in the last whorl, finally with a few short, broad, uncoiled, and rectilinear chambers, septa in the enrolled stage short, continuing the curvature of the outer wall and equal to it in thickness, septa of the rectilinear portion horizontal and thicker than the outer wall; wall calcareous, microgranular, with some inclusions; aperture simple and basal in the coiled stage, terminal in the rectilinear portion, with a double opening in at least the final chamber. L. Carboniferous (U. Tournaisian to L. Visean); USSR: Urals.

CRIBROSPIRA von Möller, 1878

Plate 247, figs. 15-17

Type species: Cribrospira panderi von Möller, 1878; OD(M).

Cribrospira von Möller, 1878 (*2159), p. 86.

Test free, large, planispirally enrolled throughout or slightly irregularly coiled with rapidly enlarging spire, five to six chambers per whorl, septa very short, sutures slightly depressed and radial; wall calcareous, microgranular, compact and undifferentiated, without secondary deposits; aperture large and basal in the early stage, that of the final chamber multiple and cribrate on a trematophorelike structure. L. Carboniferous (Visean); European and central Asiatic USSR; USA: Idaho, Utah.

HAPLOPHRAGMELLA Rauzer-Chernousova and Reytlinger, 1936

Plate 247, figs. 8-12

Type species: Endothyra panderi von Möller, 1879 (*2160), p. 17; OD.

Haplophragmella Rauzer-Chernousova and Reytlinger, in Rauzer-Chernousova et al., 1936 (*2529), p. 215, 228.

Test large, streptospirally enrolled in the early stage, with few chambers per whorl, later chambers uncoiled and rectilinear; wall calcareous, thick, coarse grained, with some inclusions; aperture in the early stage simple and basal, becoming multiple and cribrate in the later coiled chambers and the uncoiled stage. L. Carboniferous (Visean); USSR; USA: Idaho, Montana, Wyoming.

HAPLOPHRAGMINA Reytlinger, 1950

Plate 247, figs. 6 and 7

Type species: Haplophragmina kashkirica Reytlinger, 1950; OD.

Haplophragmina Reytlinger, 1950 (*2597), p. 28.

Test large, robust, elongate, up to 2.15 mm in length, early stage planispirally enrolled and involute, with few chambers per whorl and slightly incised radial septa, later and dominant stage uncoiled and rectilinear, chambers slightly inflated and subcylindrical and sutures horizontal; wall thick, calcareous, coarsely granular, with considerable calcareous agglutinated material, including smaller foraminiferal tests and other shell fragments; aperture simple, basal in the enrolled stage, terminal in the rectilinear part, cribrate in the final chamber. U. Carboniferous (Moscovian); USSR: Moscow Basin, Mordov ASSR, Komi ASSR, Kuibyshev district.

MIKHAILOVELLA Ganelina, 1956

Plate 248, fig. 3

Type species: Endothyrina? gracilis Rauzer-Chernousova, 1948 (***2517**), p. 163; OD.

Mikhailovella Ganelina, 1956 (*1212), p. 100.

Test streptospirally enrolled in the early stage, later uncoiled and rectilinear, chambers inflated, septa arched forward, sutures depressed; wall calcareous, microgranular, dark and homogeneous, thin and of constant thickness throughout; aperture basal, low, and slitlike in the early enrolled part, becoming terminal and cribrate in the later enrolled chambers or only in the uncoiled stage. L. Carboniferous (M. Visean); USSR: Moscow Basin; USA: Idaho, Utah.

RHODESINELLA Conil and Longerstaey, 1980

Plate 248, fig. 2

Type species: Cribrospira pansa Conil and Lys, 1965 (***662**), p. B36; OD.

Rhodesinella Conil and Longerstaey, in Conil, 1980 (*657), p. 48 (nom. subst. pro *Rhodesina* Conil and Longerstaey, 1980).

Rhodesina Conil and Longerstaey, in Conil et al., 1980 (*660), p. 77 (non *Rhodesina* Malloch, 1921, nec Curran, 1939); type species: obj.; OD.

Test enrolled, early part streptospiral, later planispiral with rapidly expanding whorl and a tendency to uncoil in the later stage, chambers inflated, septa moderately short, straight, and inclined toward the aperture; wall calcareous, granular to coarsely granular, with some agglutinated particles; aperture basal, low in the early stage, multiple and cribrate in the final chamber. L. Carboniferous (L. Visean); Belgium; England.

Subfamily ENDOTHYRANOPSINAE Reytlinger, 1958

Endothyranopsinae Reytlinger, 1958 (*2601), p. 57.

Test large, planispiral, and involute, rarely uncoiling in the adult; septa thick and massive; wall coarsely microgranular, with a tendency to recrystallize, thick and finely perforate in geologically later forms, supplementary deposits as chomata and parachomata; aperture simple, basal, rarely cribrate. L. Carboniferous (Visean) to U. Carboniferous (Stephanian).

CRIBRANOPSIS Conil and Longerstaey, 1980

Plate 248, fig. 1

Type species: Cribranopsis fossa Conil and Longerstaey, in Conil et al., 1980 (***660**), p. 79 (syn.: *Endothyra menneri* Bogush and Yuferev subsp. *solida* Conil and Lys forma *fossa* Conil and Naum, 1977 (***668**), pl. 6, fig. 79; forma category infrasubspecific, and excluded from zoological nomenclature, ICZN Art. 16, hence name unavailable as of this earlier date and authorship); OD.

Cribranopsis Conil and Longerstaey, in Conil et al., 1980 (*660), p. 78, 79.

Test enrolled, early stage may be streptospiral, later coiling planispiral, numerous chambers per whorl, last whorl expanding rapidly, septa nearly radial, short and thick; wall calcareous, thick, coarsely granular, with agglutinated inclusions; aperture basal in the early stage, in the last one or two chambers becoming terminal and cribrate, with large openings. L. Carboniferous (Visean); Czechoslovakia; Belgium; Great Britain.

ENDOTHYRANELLA Galloway and Harlton, 1930

Plate 248, figs. 7 and 8

Type species: Ammobaculites powersi Harlton, 1927 (***1422**), p. 21; OD.

Endothyranella Galloway and Harlton, in Galloway and Ryniker, 1930 (***1208**), p. 13.

Test enrolled in the early stage, later uncoiling, early whorls slightly streptospiral, later planispiral and evolute, chambers slightly inflated and wedgelike, sutures depressed, septa thickened, especially in the apertural region of the rectilinear chambers, where they may be up to four times the thickness of the outer wall; wall calcareous, thin, and undifferentiated, granular, fibrous, and perforate; aperture simple and basal in the enrolled stage, later areal and rounded, terminal in the rectilinear stage. U. Carboniferous (Moscovian to Stephanian); USA: Texas, Oklahoma, Indiana; USSR.

Remarks: *Endothyranella* has been reported from the L. Carboniferous to the Triassic, but species other than those of the Upper Carboniferous do not appear to be congeneric with the type species.

ENDOTHYRANOPSIS Cummings, 1955

Plate 248, figs. 9-11

Type species: Involutina crassa Brady, in Moore, 1870 (***2177**), p. 379, 382; OD.

Endothyranopsis Cummings, 1955 (***694**), p. 1.

Test free, subglobular to nautiloid, planispiral and involute, or with slight asymmetry, biumbilicate, periphery broadly rounded, chambers appearing subquadrate in section, septa straight or slightly inclined toward the aperture; wall calcareous, thick, finely granular, perforate, or with radiate structure in section, commonly recrystallized; aperture a low basal equatorial arch. L. Carboniferous (Visean); Eurasia; North America.

LATIENDOTHYRANOPSIS Lipina, 1977

Plate 249, figs. 12 and 13

Type species: Endothyra latispiralis var. *grandis* Lipina, 1955 (***1863**), p. 66; OD.

Endothyra (Latiendothyranopsis) Lipina, 1977 (***1868**), p. 16.

Latiendothyranopsis Conil and Longerstaey, in Conil et al., 1980 (***660**), p. 78, 80 (nom. transl.).

Test relatively large, up to 1.0 mm in diameter, nautiloid, slightly concave sides and rounded periphery, early stage streptospiral, later planispiral, whorls increasing gradually in height, from six to ten chambers in the final whorl, septa straight, long, thick; wall calcareous, thick, microgranular, with calcite inclusions and coarsely agglutinated material, may show slight differentiation of a thin dark outer layer, secondary deposits lacking or consisting of a layer on the floors and infilling the corners of the chambers; aperture basal. L. Carboniferous (L. Visean); USSR; Belgium; Japan.

PLECTOGYRANOPSIS Vachard, 1977

Plate 249, figs. 1-3

Type species: Endothyra convexa Rauzer-Chernousova, 1948 (***2518**), p. 169; OD.

Plectogyranopsis Vachard, 1977 (***3249**), p. 145.

Convexoendothyra (fide Conil and Longerstaey, in Conil et al., 1980 (***660**), p. 80, used by Reytlinger, but an isogenotypic synonym of *Plectogyranopsis*; no reference cited).

Test robust, planispiral or with slightly irregular early whorls, nautiloid, biumbilicate, chambers inflated, enlarging rapidly, four to five in the final whorl, septa short, straight, thick, following the curvature of the outer wall but bluntly terminated; wall calcareous, finely granular, may be recrystallized or partially replaced and thus appear more coarsely granular or even agglutinated, thick, finely perforate, no supplementary deposits other than thickening of the septa; aperture basal, simple. L. Carboniferous (L. Visean) to U. Carboniferous (L. Namurian): European USSR; Belgium; Czechoslovakia; Denmark; France; Germany.

SPINOTHYRA Mamet, 1976

Plate 249, figs. 4-9

Type species: Endothyra pauciseptata Rauzer-Chernousova, 1948 (***2519**), p. 176; OD.

Spinothyra Mamet, 1976 (***2010**), p. 11.

Test enrolled, robust, involute, biumbilicate, coiling slightly irregular to streptospiral, whorls enlarging rapidly, few chambers per whorl, commonly four in the final whorl, chambers inflated, septa short and thicker than the outer wall; wall calcareous, fibrous radiate, secondary deposits chomatalike at the floor of the chambers, those of the final whorl appearing as prominent anteriorly directed hooks; aperture a low basal slit. L. Carboniferous (M. Visean) to U. Carboniferous (L. Namurian): USSR; Canada: British Columbia; USA: Arizona.

TIMANELLA Reytlinger, 1981

Plate 248, figs. 4–6

Type species: Endothyra eostaffelloides Reytlinger, 1950 (***2597**), p. 35; OD.

Timanella Reytlinger, 1981 (***2612**), p. 57.

Test discoidal, laterally slightly compressed, enrolled, planispiral, or with slightly irregular early whorls, two to three rapidly enlarging whorls and ten to twelve chambers in the final whorl, septa straight, slightly oblique, thick; wall calcareous, granular, and may be recrystallized or have foreign inclusions, light gray in color, supplementary deposits finely granular and darker gray, clearly differentiated from the primary wall, deposits covering the chamber floor and filling the lateral areas; aperture an arched basal opening. U. Carboniferous (Moscovian); USSR.

Family BRADYINIDAE Reytlinger, 1950

Bradyinidae Reytlinger, 1958 (***2601**), p. 57, nom. transl. ex subfamily Bradyininae.

Bradyininae Reytlinger, 1950 (***2597**), p. 38 (subfamily).

Glyphostomellinae A. D. Miklukho-Maklay, 1963 (***2130**), p. 191, 197.

Test planispiral and involute, or rarely enrolled biserial; few chambers per whorl; microgranular wall with tectum, alveolar with tectum, or microgranular and finely perforate; septa with septal lamellae, no basal supplementary deposits; aperture simple in early stage, cribrate in last few chambers of adult, may have sutural supplementary openings. L. Carboniferous (Visean) to L. Permian (Sakmarian).

BIBRADYA Strank, 1983

Plate 249, figs. 10 and 11

Type species: Bibradya inflata Strank, 1983; OD.

Bibradya Strank, 1983 (***3075**), p. 436.

Test enrolled, coiling irregular to streptospiral, whorl expanding very rapidly, chambers inflated and rapidly enlarging, few per whorl, final chamber occupying 25 percent to 35 percent of the test periphery, septa short, thicker than the adjacent wall and bifurcating close to the outer wall but nearly radial and terminating bluntly; wall calcareous, microgranular to very finely granular, dense and compact, thin but increasing slightly in thickness in later chambers; aperture basal in the early stage, cribrate in the adult. L. Carboniferous (U. Visean: Asbian); Great Britain.

Remarks: Although the original description states that the wall structure is "endothyroid," no indication is given as to whether the wall is undifferentiated or has more than one layer.

BRADYINA von Möller, 1878

Plate 250, figs. 1–6

Type species: Bradyina nautiliformis von Möller, 1878 = *Nonionina rotula* Eichwald, 1860 (***1086**), p. 349; SD Cushman, 1927 (***746**), p. 189.

Bradyina von Möller, 1878 (***2159**), p. 78.

Test robust, nautiloid, planispiral, and involute, sutures deeply incised, pre- and postseptal plates or lamellae that converge toward the septa form small chamberlets or canals near the septa, the small chamberlets open to the exterior by means of a row of septal pores; wall calcareous, with microgranular tectum and inner perforate or keriothecal structure; aperture basal in the early stage, final chambers with numerous pores in the apertural face forming a cribrate aperture. L. Carboniferous (Visean) to L. Permian: USSR: Urals, Kazakhstan, Bashkir, Komi ASSR, central Asia; Iran; Mongolia; China; England, Scotland, Belgium; USA: Kansas.

GLYPHOSTOMELLA Cushman and Waters, 1928

Plate 251, figs. 1–5

Type species: Ammochilostoma? triloculina Cushman and Waters, 1927 (***854**; Sept.), p. 152 = *Bradyina holdenvillensis* Harlton, 1927 (***1422**; July), p. 18 (fide Warthin, 1930, ***3352**, p. 23); OD.

Glyphostomella Cushman and Waters, 1928 (*857), p. 53.

Test enrolled, planispiral, and involute, commonly three rapidly enlarging chambers per whorl, triangular septal chamberlets formed by septal lamellae or partitions as in *Bradyina:* wall calcareous, granular, with outer tectum and inner part alveolar to keriothecal and perforate; aperture basal in the early stage, later areal and multiple with a few horizontal slits, and finally consisting of elongate slits up the apertural face as well as horizontal slits at the position of the internal septal lamellae or partitions, sutural openings as in *Bradyina* but much larger vertical slits perpendicular to the septa. U. Carboniferous (Westphalian to Stephanian) to Permian; USA: Oklahoma, Colorado, Texas; USSR: Russian Platform, Urals, central Asia; Egypt.

JANISCHEWSKINA Mikhaylov, 1935

Plate 250, figs. 7-10

Type species: Janischewskina typica Mikhaylov, 1935; OD.

Janischewskina Mikhaylov, 1935 (*2113), p. 40.

Samarina Rauzer-Chernousova and Reytlinger, in Rauzer-Chernousova and Fursenko, 1937 (*2530), p. 297; type species: *Samarina operculata* Rauzer-Chernousova and Reytlinger, 1937; OD.

Test enrolled, planispiral, and involute, incised sutures resulting in septal chamberlets as in *Bradyina:* wall calcareous, fibrous, but without the alveolar structure of *Bradyina:* aperture basal in the early stage, later multiple and cribrate, on an apertural trematophore, sutural openings present in the septal chamberlets. L. Carboniferous (U. Visean); USSR; Belgium; England; Scotland; France.

POSTENDOTHYRA J. X. Lin, 1984

Plate 830, figs. 1-6

Type species: Postendothyra scabra J. X. Lin, 1984; OD.

Postendothyra J. X. Lin, 1984 (*1855), p. 136, 329.

Test free, subspherical, planispirally enrolled and involute, biumbilicate, only two to three chambers per whorl, small chamberlets present along the sutures, periphery rounded; wall calcareous, with outer tectum and inner coarsely alveolar keriotheca; primary aperture a low interiomarginal equatorial slit, supplementary sutural slits open into the septal chamberlets. Upper part L. Permian; China: Xintan, Hubei Province.

PSEUDOBRADYINA Reytlinger, 1950

Plate 249, figs. 14-19

Type species: Pseudobradyina pulchra Reytlinger, 1950; OD.

Pseudobradyina Reytlinger, 1950 (*2597), p. 45.

Test free, enrolled, planispiral, involute, chambers inflated, rapidly increasing in size as added, three per whorl, sutures incised, septa short, oblique, with a rudimentary postseptal lamina present only in the final chamber if at all; wall calcareous, granular, finely perforate, that of the final whorl much thicker than in earlier chambers; aperture simple and basal in the early stage, multiple with a few straight to arcuate slits perpendicular to the suture in the final chamber but poorly developed or no sutural slits present between earlier chambers. U. Carboniferous (Moscovian to Stephanian) to L. Permian (Sakmarian); USSR: Moscow Basin, central Asia; USA: Kansas.

Superfamily TETRATAXACEA Galloway, 1933

Tetrataxacea Haynes, 1981 (*1437), p. 136, nom. transl. ex subfamily Tetrataxinae.

Test conical, trochospiral, spiral side evolute, umbilical side involute; few to many chambers per whorl, secondary partitions may result in many tiny chamberlets; wall microgranular calcareous, may have one or two distinct layers; aperture umbilical. L. Carboniferous (Tournaisian) to U. Permian.

Remarks: Differs from the Endothyracea in the distinctly conical trochospiral test.

Family PSEUDOTAXIDAE Mamet, 1974

Pseudotaxidae Mamet, 1974 (*2007), p. 201.

As in the superfamily; wall single layered. L. Carboniferous (Tournaisian) to U. Carboniferous (Namurian).

PSEUDOTAXIS Mamet, 1974

Plate 251, figs. 13-16

Type species: Tetrataxis eominima Rauzer-Chernousova, 1948 (*2523), p. 12; OD.

Pseudotaxis Mamet, 1974 (*2007), p. 202.

Endotaxis Bogush and Brazhnikova, in Brazhnikova and

Vdovenko, 1983 (*356), p. 56; type species: *Tetrataxis? brazhnikovae* Bogush and Yuferev, 1966 (*278), p. 177 (nom. subst. pro *Tetrataxis minuta* Brazhnikova, 1951 (*348), p. 85, non *Tetrataxis minuta* Morozova, 1949); OD.

Test free, low, and conical, proloculus followed by irregularly trochospiral coil, three to five chambers per whorl, without internal subdivisions; wall calcareous, microcrystalline, single layered; aperture umbilical in position as in *Tetrataxis*. L. Carboniferous (U. Tournaisian) to U. Carboniferous (Namurian); Europe; Asia; North America; Australia.

VISSARIOTAXIS Mamet, 1970

Plate 251, figs. 17-21

Type species: Monotaxis exilis Vissarionova, 1948 (*3295), p. 194; OD.

Vissariotaxis Mamet, 1970 (*2005), p. 45.

Vissariotaxis Cummings, 1961 (*698), p. 117, 119-123, 126, pl. 4; Cummings, in R. B. Wilson, 1961 (*3382), p. 48-56, 61 (name not available, ICZN Art. 13 (a)(i), (b), no description).

Vissariotaxis Mamet, Choubert, and Hottinger, 1966 (*2012), p. 15-18 (name not available, ICZN Art. 13 (a)(i), no description).

Howchiniopsis Habeeb and Banner, 1979 (*1351), p. 82; type species: obj.; OD.

Test small, low, and conical, with broad circular umbilical cavity, chambers trochospirally coiled, one per whorl; wall calcareous, microgranular, homogeneous, single layered; aperture wide, umbilical in position. U. Carboniferous (Namurian); USSR; England; Belgium; N. Africa.

Remarks: The date of validation of *Vissariotaxis* is discussed in full by Loeblich and Tappan (1984, *1919, p. 1156).

Family TETRATAXIDAE Galloway, 1933

Tetrataxidae Pokorný, 1958 (*2447), p. 199, nom. transl. ex subfamily Tetrataxinae.

Tetrataxinae Galloway, 1933 (*1205), p. 161 (subfamily).

Tetrataxiinae Reytlinger, 1950 (*2597), p. 71 (err. emend.).

Test conical, numerous whorls of few low chambers per whorl, leaving an open central umbilicus at the base of the cone; wall calcareous, microgranular, two layered; aperture beneath a flap at the center of the umbilical margin of the chamber, opening into the umbilicus. L. Carboniferous (Tournaisian) to U. Carboniferous (Moscovian).

GLOBOTETRATAXIS Brazhnikova, 1983

Plate 251, fig. 12

Type species: Tetrataxis (Globotetrataxis) elegantula Brazhnikova, in Brazhnikova and Vdovenko, 1983; OD.

Tetrataxis (Globotetrataxis) Brazhnikova, in Brazhnikova and Vdovenko, 1983 (*356), p. 58.

Test moderately large, up to 0.72 mm in diameter, conical, early stage as in *Tetrataxis*, gradually enlarging chambers surrounding an open umbilical region, later with a large hemispherical umbilical chamber that forms a convex base; wall calcareous, coarsely granular, two layered, a thin dark layer and a thick vitreous fibrous layer; aperture slitlike, opening into the umbilical cavity. L. Carboniferous (U. Visean); USSR; Belgium.

Remarks: The original description stated that the central cavity might be partitioned into chamberlets and that the hemispherical umbilical chamber may also have weakly developed partitions. These are not evident in the illustrations, hence have been omitted from the above description.

POLYTAXIS Cushman and Waters, 1928

Plate 251, figs. 6-8

Type species: Polytaxis laheei Cushman and Waters, 1928; OD.

Polytaxis Cushman and Waters, 1928 (*857), p. 51.

Falsotetrataxis Marie, in Deleau and Marie, 1961 (*927), p. 95; type species: *Tetrataxis scutella* Cushman and Waters, 1928 (*858), p. 65; OD.

Test large, up to 2.25 mm in diameter, low and conical, early stage as in *Tetrataxis*, up to six chambers in the earliest whorl, later with low, crescentic chambers, gradually decreasing to four per whorl, forming many whorls and a spreading test; wall calcareous, microgranular, outer granular layer and inner hyaline fibrous layer; aperture umbilical in position, a narrow opening beneath a valvelike flap from the inner margin of the final chamber, those of earlier chambers and earlier whorls also may remain open. U. Carboniferous (Moscovian); USA: Texas, Oklahoma; Austria; Algeria.

Remarks: Triassic species that previously were assigned to *Polytaxis* are said to have an agglutinated wall, apparently lack the characteristic aperture of *Polytaxis*, and probably belong to the Trochamminidae.

TETRATAXIS Ehrenberg, 1854

Plate 251, figs. 9-11

Type species: Tetrataxis conica Ehrenberg, 1854; OD(M).

Tetrataxis Ehrenberg, 1854 (***1068**), p. 24.

Tetrataxis Ehrenberg, 1843 (***1060**), p. 106 (name not available, no description or illustration).

Artetraxoum Rhumbler, 1913(***2621**), p. 391 (err. emend.).

?*Ruditaxis* Schubert, 1921 (***2823**), p. 180; type species: *Valvulina rudis* Brady, 1876 (***334**), p. 90; OD.

Pseudotetrataxis Marie, in Deleau and Marie, 1961 (***927**), p. 91; type species: *Tetrataxis planolocula* Lee and Chen, in Lee et al., 1930 (***1817**), p. 94; OD.

Test conical, of varied height, circular in plan, numerous whorls formed by few, commonly four chambers per whorl, early chambers appearing rounded from the spiral side, those of later whorls becoming low, broad, and crescentiform but are strongly overlapping on the umbilical side where a median flap from the chambers partially overlaps the quadrilateral to cruciform umbilical cavity; wall calcareous, outer dark microgranular layer, and hyaline, white to amber-colored fibrous or radiate inner layer that is best developed on the test base around the umbilical opening; aperture a narrow slit beneath the valvular projection that opens into the umbilical cavity. L. Carboniferous (U. Tournaisian to Visean) to U. Carboniferous (Namurian, Moscovian); England; Scotland; Belgium; Spain; Poland; Algeria; Iran; USSR; China; Australia; USA: Oklahoma, Texas, Nevada, Alaska.

Remarks: Species referred to *Tetrataxis* from the Triassic are reported to have an agglutinated wall and probably are unrelated to the present genus.

Family VALVULINELLIDAE Loeblich and Tappan, 1984

Valvulinellidae Loeblich and Tappan, 1984 (***1918**), p. 23.

Valvulinellidae Loeblich and Tappan, 1982 (***1917**), p. 29 (name not available, ICZN Art 13 (a)(i), no description.

Test free, conical, trochospiral, interior of chambers subdivided by numerous horizontal and vertical partitions; wall calcareous, microcrystalline, apparently a single layer; aperture interiomarginal on the umbilical side of test. L. Carboniferous (Visean) to U. Carboniferous (Namurian).

Remarks: Differs from the Pseudotaxidae and Tetrataxidae in having subdivided chambers.

VALVULINELLA Schubert, 1908

Plate 252, figs. 1-5

Type species: Valvulina youngi Brady, 1876 (***334**), p. 86; SD Schubert, 1908 (***2815**), p. 379.

Valvulinella Schubert, 1908 (***2816**), p. 248

Valvulinella Schubert, 1907 (***2814**), p. 211 (name not available, ICZN Art. 13 (a)(i), no description).

Palaeovalvulina Schubert, 1921 (***2823**), p. 179; type species: obj., SD Loeblich and Tappan, 1964 (***1910**), p. C338.

Test conical, trochospirally coiled, with two to three chambers per whorl, interior subdivided by numerous vertical beams and one or two horizontal rafters per chamber, the vertical partitions being aligned from chamber to chamber; wall calcareous, microgranular, undifferentiated; aperture interiomarginal on the flattened base of the test. L. Carboniferous (Visean) to U. Carboniferous (Namurian); England; Scotland; Belgium; Germany; Yugoslavia; Turkey; USSR: Donets Basin, Russian Platform; North America.

Family ABADEHELLIDAE Loeblich and Tappan, 1984

Abadehellidae Loeblich and Tappan, 1984 (***1918**), p. 23.

Abadehellidae Loeblich and Tappan, 1982 (***1917**), p. 29 (name not available, ICZN Art. 13 (a)(i), no description).

Test free, conical, trochospiral, commonly two chambers per whorl surrounding a broad open umbilical region, chambers subdivided by two to three transverse plates paralleling the base of the test and by many radially arranged vertical plates; wall calcareous, outer wall with two layers, an outer dark microgranular one and an inner light fibrous one, but septa and septula are single layered and microgranular. U. Permian.

Remarks: Differs from the Valvulinellidae in having a double-layered wall rather than an undifferentiated one.

ABADEHELLA Okimura and Ishii, 1975

Plate 252, figs. 6-8

Type species: Abadehella tarazi Okimura and Ishi, in Okimura et al., 1975; OD.

Abadehella Okimura and Ishi, in Okimura et al., 1975 (*2296), p. 41, also err. cit. as *Abedehella*, p. 41.

Test conical, large, up to 1.35 mm in diameter at the concave base, trochospirally, numerous whorls, up to twenty, each with one and a half to two low chambers surrounding the open umbilicus, chambers subdivided by regularly and closely spaced radial beams; wall calcareous, external wall with outer dark microgranular layer and inner light fibrous layer, septa and beams with a single microgranular layer; aperture from each chamber opens into the umbilical region beneath a short valvular projection. U. Permian (U. Dzhulfian); Iran; India: Kashmir; Malaysia; Japan; Cambodia; USSR: Transcaucasus.

Superfamily FUSULINACEA von Möller, 1878

Fusulinacea Loeblich and Tappan, 1961 (*1902), p. 287, nom. corr. pro superfamily Fusulinoidea.

Fusulinoidea Ciry, in Piveteau, 1952 (*2413), p. 179, nom. transl. ex family Fusulinidae.

Fusulinaceae A. D. Miklukho-Maklay, 1957 (*2121), p. 96.

Neoschwagerinaceae A. D. Miklukho-Maklay, 1957 (*2121), p. 109.

Fusulinidea Pokorný, 1958 (*2447), p. 220.

Verbeekinacea A. D. Miklukho-Maklay, 1958 (*2124), p. 7.

Verbeekinidea A. D. Miklukho-Maklay, Rauzer-Chernousova, and Rozovskaya, 1958 (*2132), p. 17.

Verbeekinaceae A. D. Miklukho-Maklay, 1963 (*2130), p. 132, 177, 203, 259, 274.

Verbeekinoidea Pasini, 1965 (*2367), p. 94.

Ozawainellacea Solov'eva, 1978 (*3024), p. 159.

Staffellacea Solov'eva, 1978 (*3024), p. 159.

Neoschwagerinacea Solov'eva, 1978 (*3024), p. 159.

Test spherical, discoidal, or fusiform in shape, enrolled or less commonly uncoiling in later stage, numerous chambers per whorl; wall calcareous, microgranular, in one to four distinct layers; partial resorption may result in tunnels or foramina, and secondary deposits may produce chomata, parachomata, tectoria, and axial fillings. M. Devonian (Givetian) to U. Permian (Djulfian).

Family LOEBLICHIIDAE Cummings, 1955

Loeblichiidae Brönnimann, 1968 (*385), p. 73, nom. corr. pro family Loeblichinidae.

Loeblichinidae Rozovskaya, in Poyarkov, 1963 (*2464), p. 223 (nom. imperf.; nom. transl. ex subfamily Loeblichinae).

Nanicellidae Poyarkov, 1979 (*2466), p. 28.

Test planispiral throughout, evolute, with short axis of coiling; chambers numerous, increasing slowly in height as added; aperture basal. M. Devonian (Givetian) to U. Carboniferous (Moscovian).

Subfamily NANICELLINAE Fursenko, 1959

Nanicellinae Fursenko, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 252.

Test planispiral, evolute; chambers numerous, increasing gradually in height; wall with thin dark outer layer and thicker, finely granular inner layer; aperture basal, slitlike. M. Devonian (Givetian) to U. Devonian (Frasnian).

NANICELLA Henbest, 1935

Plate 253, figs. 1-3, 9, and 10

Type species: Endothyra gallowayi A. O. Thomas, 1931 (*3178), p. 40; OD.

Nanicella Henbest, 1935 (*1456), p. 34.

Test discoidal, planispirally enrolled and evolute, biumbilicate, whorls enlarging rapidly so that the test flares somewhat, although chamber lumen maintains a nearly constant height, chambers slightly overlap those of the previous whorl laterally to result in an equitant axial section, chambers numerous, up to fourteen in the final whorl, periphery subacute; wall calcareous, finely granular, translucent, with thick inner yellowish layer and thin dark outer layer; aperture a low arcuate basal and equatorial slit. U. Devonian (U. Frasnian); USA: Iowa; USSR: Tatar ASSR, Saratov district.

RHENOTHYRA H. Beckmann, 1950

Plate 252, figs. 9-11

Type species: Rhenothyra refrathiensis H. Beckmann, 1950; OD.

Rhenothyra H. Beckmann, 1950 (*168), p. 184.

Test discoidal, planispirally enrolled and evolute, whorls enlarging slowly, with numerous chambers in the later whorls, about thirteen to fourteen, nearly equidimensional in axial section, septa radial, slightly convex toward the aperture, somewhat thinner than the outer wall; wall calcareous, microgranular, thick, and massive throughout growth, three layered, the layers equivalent to the fusulinid tectum, diaphanotheca, and tectorium, no secondary deposits present; aperture an equatorial circular opening at the base of the apertural face. Uppermost M. Devonian (Givetian); Germany.

Subfamily LOEBLICHIINAE Cummings, 1955

Loeblichiinae Loeblich and Tappan, 1961 (*1902), p. 286, nom. corr. pro subfamily Loeblichinae.
Loeblichinae Cummings, 1955 (*694), p. 3 (nom. imperf.).

Test planispiral, compressed, evolute, chambers numerous, of nearly equal height throughout; aperture basal. L. Carboniferous (Visean) to U. Carboniferous (Moscovian).

LOEBLICHIA Cummings, 1955

Plate 253, figs. 4-8

Type species: Endothyra ammonoides Brady, 1873 (*331), p. 63, 95; OD.

Loeblichia Cummings, 1955 (*694), p. 3.

Test free, small, discoidal, sides flat, numerous low whorls planispirally enrolled and evolute, with many small subrectangular chambers, up to twenty in the final whorl, septa straight, radial to slightly oblique; wall calcareous, microgranular, undifferentiated, secondary deposits absent or consisting of low pseudochomata; aperture a low equatorial basal arch. L. Carboniferous (Visean); England; Scotland; USSR: Russian Platform, Kazakhstan, Ukraine.

NOVELLA Grozdilova and Lebedeva, 1950

Plate 253, figs. 11-13

Type species: Novella evoluta Grozdilova and Lebedeva, 1950; OD.

Novella Grozdilova and Lebedeva, 1950 (*1320), p. 20
Novella Kireeva, 1949 (*1692), p. 26 (name not available, ICZN Art. 13 (a)(i), no description).

Test small, discoidal, planispirally enrolled and evolute, up to seven whorls, chambers small and low, increasing in number per whorl in later whorls, septa straight, simple; wall calcareous, granular, thin, dark, undifferentiated, well-developed chomata in later whorls; aperture a low arch. U. Carboniferous (Namurian to L. Moscovian); USSR: Ural Mountains, Moscow Basin, Komi ASSR, central Asia.

SEMINOVELLA Rauzer-Chernousova, 1951

Plate 253, figs. 14-16

Type species: Eostaffella (Seminovella) elegantula Rauzer-Chernousova, in Rauzer-Chernousova et al., 1951; OD.

Eostaffella (Seminovella) Rauzer-Chernousova, in Rauzer-Chernousova et al., 1951 (*2532), p. 64 (subgenus, but used in generic sense on p. 64, and expl. pl. 2, figs. 6-8).
Millerella (Seminovella) A. D. Miklukho-Maklay, Rauzer-Chernousova, and Rozovskaya, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 208 (nom. transl.).
Seminovella Loeblich and Tappan, 1964 (*1910), p. C350 (nom. transl.).

Test discoidal to biconcave, planispiral, or slightly asymmetrical, earliest whorls involute, later evolute with broadly rounded periphery and whorls increasing rapidly in thickness, leaving a broad and deep umbilicus, septa simple; wall calcareous, homogeneous in structure, with weakly developed pseudochomata; aperture single. U. Carboniferous (U. Namurian to Moscovian); USSR.

Family OZAWAINELLIDAE Thompson and Foster, 1937

Ozawainellidae A. D. Miklukho-Maklay, 1958 (*2124), p. 13, nom. transl. ex subfamily Ozawainellinae.
Pseudoendothyridae Mamet and Skipp, 1970 (*2015), p. 1137, 1140 (name not available, ICZN Art. 13 (a)(i), no description).
Pseudoendothyridae Mamet, in Mamet, Mikhailoff, and Mortelmans, 1970 (*2013), p. 36.
Eostaffellidae Mamet, in Mamet, Mikhailoff, and Mortelmans, 1970 (*2013), p. 33.

Test discoidal, spherical, or ovoid, geologically early taxa planispiral and evolute, later ones involute to irregularly coiled, axis of coiling short to elongate; wall or spirotheca of early forms with tectum, upper and lower tectoria, later ones with diaphanotheca between tectum and lower tectorium, single tunnel, chomata indistinct to massive. L. Carboniferous (Visean) to U. Permian (Murgabian).

Subfamily OZAWAINELLINAE Thompson and Foster, 1937

Ozawainellinae Thompson and Foster, 1937 (*3193), p. 132.
Reichelininae A. D. Miklukho-Maklay, 1959 (*2125), p. 630.

Test small, lenticular, involute or rarely evolute, early coiling may be streptospiral; wall simple, microgranular, single layered or with weakly developed diaphanotheca, secondary deposits in the form of chomata and pseudochomata. L. Carboniferous (Visean) to U. Permian (Murgabian).

CHENELLA A. D. Miklukho-Maklay, 1959

Plate 253, fig. 19

Type species: Orobias kueichihensis S. Chen, 1934 (*553), p. 15; OD.

Chenella A. D. Miklukho-Maklay, 1959 (*2125), p. 628.

Test small and lenticular, axially compressed, umbilicus slightly depressed, planispirally enrolled, with final whorl increasing abruptly in height, periphery angled; wall calcareous, with thin outer tectum and thick inner diaphanotheca. U. Permian (Murgabian); S. China (Chihsia Formation, originally regarded by Chen as U. Carboniferous but considered as U. Permian by Miklukho-Maklay); USSR: Primorye Territory.

EOSTAFFELLOIDES A. D. Miklukho-Maklay, 1959

Plate 253, fig. 18

Type species: Eostaffelloides orientalis A. D. Miklukho-Maklay, 1959; OD.

Eostaffelloides A. D. Miklukho-Maklay, 1959 (*2125), p. 629.

Test small and lenticular, planispirally enrolled, whorls enlarging gradually; wall undifferentiated, secondary deposits form triangular chomata. U. Permian; USSR: central Asia.

MILLERELLA Thompson, 1942

Plate 254, figs. 1-3

Type species: Millerella marblensis Thompson, 1942; OD.

Millerella Thompson, 1942 (*3185), p. 404.
Eostaffella (Millerella) Rauzer-Chernousova et al., 1951 (*2532), p. 61 (nom. transl.).

Test small, discoidal, biumbilicate, planispiral, but may show a 90° change in coiling direction in the early stage, involute at first, later almost completely evolute, septa slightly arched forward; wall thin, with tectum and upper and lower tectoria, indistinct to massive rounded chomata border the low, narrow, and straight tunnel. L. Carboniferous (Visean) to U. Carboniferous (Moscovian), ?L. Permian; North America; USSR; N. Africa; China; Japan.

OZAWAINELLA Thompson, 1935

Plate 253, figs. 17, 20, and 21

Type species: Fusulinella angulata Colani, 1924 (*618), p. 74; OD.

Ozawainella Thompson, 1935 (*3180), p. 114.
Moscoviella K. V. Miklukho-Maklay, 1952 (*2133), p. 991; type species: *Ozawainella mosquensis* Rauzer-Chernousova, in Rauzer-Chernousova et al., 1951 (*2532), p. 136; OD.

Test small, maximum diameter from 1 mm to 4 mm, discoidal, planispiral, and involute throughout, with sharply angular periphery, septa numerous, radial or slightly projecting forward; wall calcareous, with thin dark tectum, thin diaphanotheca, and heavier less dense upper and lower tectoria, chomata bordering a straight tunnel are developed throughout growth and may be massive and asymmetrical, sloping steeply toward the tunnel and very gently toward the sides. U. Carboniferous (Namurian) to Permian; cosmopolitan.

PARAREICHELINA K. V. Miklukho-Maklay, 1959

Plate 254, figs. 13 and 14

Type species: Parareichelina reticulata K. V. Miklukho-Maklay, 1959; OD.

Parareichelina K. V. Miklukho-Maklay, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 208.
Parareichelina Rauzer-Chernousova and Rozovskaya, 1955 (*2535), p. 99 (name not available, ICZN Art. 13 (a)(i), no description).
Parareichelina K. V. Miklukho-Maklay, 1956 (*2135), p. 531; K. V. Miklukho-Maklay, in A. D. Miklukho-Maklay et al., 1958 (*2132), p. 17 (name not available, ICZN Art. 13 (a)(i), no description).
Reichelina (Parareichelina) F. Kahler and G. Kahler, 1966 (*1632), p. 101, 175 (nom. transl.).

Test lenticular in the early stage, planispirally enrolled and similar to *Reichelina*, but final whorl uncoiling and fanlike, symmetrically embracing the lenticular early whorls, septa in the early whorls straight or slightly arched, fluted in the penultimate whorl and uncoiled final whorl. U. Permian: USSR: N. Caucasus, Crimea, Primorye Territory.

Remarks: The original publication of the genus and type species did not indicate a holotype. Rozovskaya (1975, *2665, p. 246) indicated as "holotype" for *Parareichelina reticulata* the specimen figured by K. V. Miklukho-Maklay (in Rauzer-Chernousova and Fursenko, 1959, *2531, Pl. 6, fig. 14b); however, as this was a subsequent designation by Rozovskaya, it should be termed a lectotype.

PSEUDOKAHLERINA Sosnina, 1968

Plate 254, figs. 4 and 5

Type species: Pseudokahlerina discoidalis Sosnina, 1968; OD.

Pseudokahlerina Sosnina, 1968 (*3035), p. 103.

Test small, up to 1.78 mm in diameter, discoidal, sides flattened to slightly umbilicate and periphery rounded, globular proloculus followed by about four slowly enlarging whorls, final whorl expanding more rapidly, early septa straight to slightly curved, later ones more strongly arched, slightly expanded at the inner end; wall of early whorls thin and poorly differentiated, later somewhat thicker, with dark thin tectum and inner more transparent and finely porous diaphanotheca; aperture single, slitlike, chomata weakly developed. U. Permian; USSR: Primorye Territory.

PSEUDONOVELLA Kireeva, 1949

Plate 254, figs. 11 and 12

Type species: Pseudonovella irregularis Kireeva, 1949; OD.

Novella (Pseudonovella) Kireeva, 1949 (*1692), p. 27 (described as subgenus but used in generic sense).

Pseudonovella Rozovskaya, 1963 (*2662), p. 111 (nom. transl.).

Test small, up to 0.4 mm in diameter, lenticular, biumbilicate, periphery subangular to rounded, whorls regularly increasing in height, early whorls evolute, final whorl enveloping much of the early stage but not completely involute; wall calcareous, microgranular, undifferentiated, supplementary deposits form weakly developed pseudochomata. U. Carboniferous (U. Bashkirian to Moscovian); USSR: Donbass.

Remarks: Differs from *Novella* in the more angular periphery and tendency for later whorls to become involute.

PSEUDOREICHELINA Leven, 1970

Plate 254, figs. 17 and 18

Type species: Pseudoreichelina darvasica Leven, 1970; OD.

Pseudoreichelina Leven, 1970 (*1833), p. 19.

Test small, up to 0.75 mm in diameter, early stage lenticular, planispirally coiled and involute, biumbilicate, periphery subangular, whorls enlarging slowly at first, then more rapidly, final whorl uncoiled and rectilinear, septa strongly curved backward in the enrolled stage, slightly arched centrally in the rectilinear part; wall light colored, gray, with tectum and poorly differentiated diaphanotheca; single aperture, chomata weakly developed. L. Permian (Sakmarian to Artinskian); USSR: Darvaz; Yugoslavia; Viet Nam.

RECTOMILLERELLA Liem, 1974

Plate 254, figs. 6–10

Type species: Rectomillerella texasensis Liem, 1974 (syn.: *Millerella marblensis* var. W. L. Moore, 1964, *2179, p. 301); OD.

Rectomillerella Liem, 1974 (*1847), p. 25.

Test lenticular, planispiral, and involute in the early stage, later evolute, and finally uncoiling and rectilinear, septa straight; wall thin, with tectum, diaphanotheca, and outer tectorium in the coiled part but only tectum and diaphanotheca in the uncoiled part, secondary deposits consist of weakly developed chomata forming low buttresses; foramen basal in the enrolled part, becoming central in the uncoiled part. U. Carboniferous (Namurian to Moscovian): USA: Texas.

REICHELINA Erk, 1942

Plate 255, figs. 1–8

Type species: Reichelina cribroseptata Erk, 1942; OD.

Reichelina Erk, 1942 (*1111), p. 249.
Reichelina Erk, 1941 (*1110), p. 137 (name not available, ICZN Art. 13 (b), type species not described).

Test small, lenticular, early stage planispirally enrolled and involute, whorls enlarging gradually, periphery subangular, final whorl increasing rapidly in height and uncoiling to appear almost peneropliform, septa arched forward, particularly in the later uncoiling stage; wall with tectum and diaphanotheca, secondary deposits consist of broad chomata, extending and thickening poleward from the tunnel, tunnel subtriangular with rounded angles, septa also with pores. U. Permian; USSR: Caucasus, Crimea, central Asia; China; Southeast Asia; Greece; Turkey; North America.

SICHOTENELLA Tumanskaya, 1953

Plate 254, figs. 15 and 16

Type species: Sichotenella sutschanica Tumanskaya, 1953; OD.

Sichotenella Tumanskaya, 1953 (*3231), p. 22.

Test lenticular, resembling *Chenella*, final whorl increasing rapidly in height or uncoiling, uncoiled stage relatively large; wall three layered, with diaphanotheca. U. Permian; USSR: Primorye Territory.

Subfamily PSEUDOSTAFFELLINAE Putrya, 1956

Pseudostaffellinae Putrya, 1956 (*2492), p. 395.
Pseudoendothyridae Mamet, in Mamet, Mikhailoff, and Mortelmans, 1970 (*2013), p. 36.

Test discoidal to nautiloid, involute, may be streptospiral in early stage; wall weakly differentiated, later ones with tectum, thin diaphanotheca and two tectoria, chomata well developed. U. Mississippian (L. Visean) to U. Permian (Murgabian).

CHOMATOMEDIOCRIS Vdovenko, 1973

Plate 255, figs. 9-11

Type species: Mediocris (Chomatomediocris) brevisculiformis Vdovenko, 1973; OD.

Mediocris (Chomatomediocris) Vdovenko, in Brazhnikova and Vdovenko, 1973 (*355), p. 214.
Chomatomediocris Conil and Longerstaey, in Conil et al., 1980 (*660), p. 85 (nom. transl.).

Test discoidal with broadly rounded periphery, axis of coiling may be slightly oscillating in the early stage, later planispiral and involute, or final whorls may be slightly evolute; wall calcareous, thin, almost undifferentiated, secondary deposits fill the lateral regions of the chambers as in *Mediocris* and also form high narrow chomata. L. Carboniferous (M. to U. Visean); USSR: Ukraine, Moldavia, Dnieper-Donets Basin, S. Urals.

EOSTAFFELLA Rauzer-Chernousova, 1948

Plate 255, figs. 21-24

Type species: Staffella (Eostaffella) parastruvei Rauzer-Chernousova, 1948; OD.

Staffella (Eostaffella) Rauzer-Chernousova, 1948 (*2523), p. 14.
Staffella (Eostaffella) Theodorovich, 1941 (*3177), p. 799 (name not available, ICZN Art. 13 (a)(i), no description).
Eostaffella Vissarionova, 1948 (*3296), p. 219 (nom. transl.).
Paramillerella Thompson, 1951 (*3190), p. 115; type species: *Millerella? advena* Thompson, 1944 (*3186), p. 427; OD.
Eostaffella (Eostaffellina) Reytlinger, 1963 (*2605), p. 28, 35, 42, 44; type species: *Eostaffella protvae* Rauzer-Chernousova, 1948 (*2521), p. 235; OD.
Eostaffella (Paramillerella) Mamet and Skipp, 1970 (*2015), p. 1138 (nom. transl.).

Test tiny, discoidal, involute to slightly evolute, umbilical region slightly depressed to rounded; wall calcareous, microgranular, with tectum and upper and lower tectoria, discontinuous knobs on either side of the tunnel but no continuous chomata. L. Carboniferous (Visean) to U. Carboniferous (Moscovian); North America; Europe; Asia.

HUBEIELLA J. X. Lin, 1977

Plate 255, figs. 17-20

Type species: Hubeiella simplex J. X. Lin, 1977; OD.

Hubeiella J. X. Lin, 1977 (*1851), p. 20.

Test small, discoidal, with slightly concave umbilical region, periphery rounded, coiling planispiral and involute in the early stage, four to five volutions, later ones may be evolute, final whorl greatly expanded in height and flaring, septa straight; wall of tectum and fine keriotheca, increasing in thickness in the later stage, small but distinct chomata present only in the inner whorls bordering the crescentic tunnel. Upper part of L. Permian; China: Hubei and Hunan Provinces.

KANGVARELLA Saurin, 1962

Plate 256, figs. 1-3

Type species: Kangvarella irregularis Saurin, 1962: OD.

Kangvarella Saurin, 1962 (***2739**), p. 465.

Test small, up to 0.48 mm in diameter, lenticular, globular proloculus followed by about five whorls, early ones involute, later whorls with rapid increase in height and slightly evolute, septa plane and not fluted but in section appear strongly arched backward at the periphery; wall calcareous, well preserved even when other co-occurring species are recrystallized, consisting of tectum, diaphanotheca, and inner and outer tectoria, all four layers continuing into the septa; irregular and asymmetrical parachomata may be present in the second and third whorls. U. Permian (U. Murgabian); Cambodia.

MEDIOCRIS Rozovskaya, 1961

Plate 255, figs. 12 and 13

Type species: Eostaffella mediocris Vissarionova, 1948 (***3296**), p. 222; OD.

Mediocris Rozovskaya, 1961 (***2661**), p. 20.

Test free, discoidal, with broadly rounded periphery and flattened sides, early whorls may show some oscillation, later planispirally enrolled and involute; wall calcareous, microgranular, with dark tectum and poorly defined tectoria, strong secondary deposits in the axial region form a micritic plug but lacks the pronounced chomata of *Chomatomediocris;* aperture a simple slit at the base of the apertural face. L. Carboniferous (M. and U. Visean) to U. Carboniferous (L. Moscovian); USSR; Europe (Tethyan region); USA: Alaska; Canada: British Columbia.

NEOSTAFFELLA A. D. Miklukho-Maklay, 1959

Plate 256, fig. 4

Type species: "Pseudostaffella sphaeroidea Ehrenberg" of Rauzer-Chernousova, in Rauzer-Chernousova et al., 1951 (***2532**), p. 128 (err. cit. pro *Borelis labyrinthiformis* Ehrenberg; non *Melonia (Borelis) sphaeroidea* Ehrenberg, 1842, ***1058**, p. 274, and non *Melonites sphaeroidea* Lamarck, 1816) = *Borelis labyrinthiformis* Ehrenberg, 1854 (***1068**), p. 21, pl. XXXVII, XI, 11/3 (syn.: *Melonia? labyrinthus* Ehrenberg, 1843, ***1060**, p. 106, name not available, ICZN Art. 12 (a), no description); OD.

Neostaffella A. D. Miklukho-Maklay, 1959 (***2125**), p. 630.

non *Neostaffella* Thompson, in Loeblich and Tappan, 1964 (***1910**), p. C409; type species: *Melonia (Borelis) sphaeroidea* Ehrenberg, 1842 (recte *Melonites sphaeroidea* Lamarck, 1816); OD.

Test moderately large, subspherical to subquadrate in section, earliest whorls streptospiral, later planispiral and involute; wall of early whorls microgranular, later with diaphanotheca, chomata very broad and ribbonlike, extending from the edge of the narrow tunnel outward to the umbilical region. U. Carboniferous (Moscovian); Europe; Asia; North America.

Remarks: The status of the type species has been discussed by various authors. Miklukho-Maklay (1959, ***2125**) originally cited the type species as *Pseudostaffella sphaeroidea* Ehrenberg of Rauzer-Chernousova, 1951, plate IX, fig. 3. However, her plate explanation indicated this specimen as close to the holotype of *Pseudostaffella sphaeroidea* (Ehrenberg), and both her synonymy and discussion cited "*Borelis sphaeroidea*? Ehrenberg, Mikrogeologie, taf. XXXVII, XI, fig. 11/3." This was clearly an erroneous citation as Ehrenberg identified this figure as "*Borelis labyrinthiformis*," from the "Hornstein des Bergkalkes von Tula, Russland." The other Ehrenberg reference cited by Rauzer-Chernousova (in Rauzer-Chernousova et al., 1951, ***2532**, p. 128) was that of Ehrenberg (1842, ***1058**, p. 274), in which he discussed the occurrence of *Melonia (Borelis) sphaeroidea* without indicating authorship, illustration, or description but undoubtedly referred to *Melonites sphaeroidea* of Lamarck. In Mikrogeologie, Ehrenberg (1854, ***1068**) the explanation of pl. XXXVII, XI, fig. 11/3 identified the figure as *Borelis labyrinthiformis* 1843, but in the 1843 article he referred only to *Melonia? labyrinthus*, without description or illustration, hence this earlier name had no formal standing. The type species, *Pseudostaffella sphaeroidea* Ehrenberg of Rauzer-Chernousova is correctly *Neostaffella labyrinthiformis* (Ehrenberg).

NINELLA Malakhova, 1975

Plate 256, figs. 5-9

Type species: Endothyra staffelliformis Chernysheva, 1948 (*584), p. 246; OD.

Ninella Malakhova, 1975 (*1995), p. 31.

Test enrolled, nautiloid, biumbilicate, periphery broadly rounded, early whorl streptospiral, later nearly planispiral, septa straight, directed slightly forward; wall calcareous, thin, undifferentiated, with widely spaced rounded pseudochomata in all whorls; aperture broad, low, and equatorial. L. Carboniferous (Visean); USSR: S. Urals.

PLECTOMEDIOCRIS Brazhnikova and Vdovenko, 1983

Plate 255, figs. 14-16

Type species: Mediocris (Plectomediocris) asymmetrica Brazhnikova and Vdovenko, 1983; OD.

Mediocris (Plectomediocris) Brazhnikova and Vdovenko, 1983 (*356), p. 67.

Test ovoid, asymmetrically enrolled, commonly with abrupt changes in direction of coiling; wall calcareous, with lateral secondary deposits as in *Mediocris*, and with chomata weakly developed if present. L. Carboniferous (Visean); USSR: Donets Basin.

PLECTOMILLERELLA Brazhnikova and Vdovenko, 1983

Plate 256, figs. 10-13

Type species: Millerella (Plectomillerella) extenta Brazhnikova and Vdovenko, 1983; OD.

Millerella (Plectomillerella) Brazhnikova and Vdovenko, 1983 (*356), p. 66.

Test discoidal, sides flattened to biumbilicate, with broadly rounded periphery, axis of coiling changing abruptly in the early stage, later may be nearly planispiral and evolute; wall thin, dark, finely granular, with irregularly developed low pseudochomata. U. Carboniferous (Namurian); USSR: Donets Basin.

PRIMORIINA Sosnina, 1981

Plate 258, figs. 4 and 5

Type species: Primoriina ovoidea Sosnina, 1981; OD.

Primoriina Sosnina, 1981 (*3039), p. 19.

Test lenticular with subangular to rounded periphery, planispirally coiled with about three to five whorls, involute, septa straight and nonplicate; wall calcareous, thin, slightly differentiated in the early whorls, later with thin dark tectum and inner tectorium, a thicker light diaphanotheca present locally; single row of equally spaced foramina present at the base of the septa in the last one or two whorls, chomata weakly developed and absent from the last whorl. U. Permian; USSR: E. Siberia.

PSEUDOENDOTHYRA Mikhaylov, 1939

Plate 256, figs. 14-17; plate 257, figs. 1-14; plate 258, figs. 1-3

Type species: Fusulinella struvii von Möller, 1879 (*2160), p. 22; OD.

Pseudoendothyra Mikhaylov, 1939 (*2114), p. 54, 60.

Parastaffella Rauzer-Chernousova, in Theodorovich, 1941 (*3177), p. 799 (name not available, ICZN Art. 13 (a)(i), no descripton).

Parastaffella Rauzer-Chernousova, 1948 (*2523), p. 14; type species: obj.; OD.

Parastaffella (Eoparastaffella) Vdovenko, 1954 (*3275), p. 64; type species: *Parastaffella (Eoparastaffella) simplex* Vdovenko, 1954; OD.

Parastaffella (Parastaffelloides) Reytlinger, 1963 (*2605), p. 28, 50; type species: *Staffella pseudosphaeroidea* Dutkevich, 1934 (*1027), p. 17, 66; OD.

Pseudoendothyra (Eoparastaffella) Vdovenko, 1964 (*3276), p. 25 (nom. transl.).

Eoparastaffella Vdovenko, 1971 (*3280), p. 6 (nom. transl.).

Eoparastaffella (Eoparastaffellina) Vdovenko, 1971 (*3280), p. 7; type species: *Eoparastaffella (Eoparastaffellina) subglobosa* Vdovenko, 1971; OD.

Praemisellina Kalmykova, 1972 (*1637), p. 57; type species: *Praemisellina georgii* Kalmykova, 1972; OD.

Parastaffella (Staffelloides) Liem, 1976 (*1848), p. 124; type species: *Parastaffella (Staffelloides) poliaxica* Liem, 1976; OD.

Pseudoendothyra (Volgella) Reytlinger, in Reytlinger and Mel'nikova, 1977 (*2614), p. 78; type species: *Pseudoendothyra (Volgella) orbiculata* Mel'nikova, in Reytlinger and Mel'nikova, 1977; OD.

Pseudoendothyra (Parastaffella) Poyarkov and Skvortsov, 1979 (*2467), p. 14 (nom. transl.).

Test free, lenticular to subspherical, planispiral or with slight change in coiling axis in the early whorls, involute, septa plane; wall of tectum, diaphanotheca, and inner and outer tectoria, supplementary deposits adjacent to the aperture but do not form continuous chomata. L. Carboniferous (Visean) to L. Permian (Sakmarian); USSR; Mongolia; China; Japan; North America; Europe.

Remarks: Mikhaylov (1939, ***2114**) designated von Möller's plate V, figures 4a and 4c as the "genotype" of *Pseudoendothyra*, thus effectively restricting this species. Rauzer-Chernousova (1948, ***2523**) stated that the genus was originally too inclusive and did not recognize it; she also objected to this restricted concept of *Fusulinella struvii*, stating that von Möller's pl. V, fig. 4b showed a much clearer diaphanotheca than did the other two figures, hence "should be the lectotype of this species." Rauzer-Chernousova futher stated that von Möller's fig. 4a probably was referrable to her new genus *Eostaffella* (although if congeneric, *Pseudoendothyra* would be the senior name). Although Mikhaylov's restriction of the species has clear priority and cannot be disregarded, Rauzer-Chernousova then described the new genus *Parastaffella*, also with *F. struvii* as the type species, based on von Möller's fig. 4b, although her description of the type species included all of von Möller's figures in the synonymy. Although Rauzer-Chernousova had ignored the prior valid restriction of *F. struvii* and included all of von Möller's figures in synonymy, Reytlinger (1963, ***2605**, p. 50) regarded the type designation for *Parastaffella* to be covered under ICZN Art. 70 (b)(i), as an example of a deliberately misidentified type species. In such cases, the species actually studied by the author of the genus becomes a new nominal species with the same name and is credited to the author of the genus. However, this does not apply to the present case, as all figures of von Möller were included by Rauzer-Chernousova, hence it was not a misidentified type species. Apparently von Möller's original type specimens are not preserved, his illustrations were all stylized drawings, and the wall as shown in the two original figures selected by Mikhaylov and by Rauzer as "the lectotype" of "*struvii*" are generically indistinguishable. Thus, the two nominal genera appear synonymous, and "*Parastaffella struvii* Rauzer-Chernousova" is a junior synonym of *Pseudoendothyra struvii* (von Möller).

PSEUDOSTAFFELLA Thompson, 1942

Plate 259, figs. 1-11

Type species: Pseudostaffella needhami Thompson, 1942; OD.

Pseudostaffella Thompson, 1942 (***3185**), p. 407.

Atetsuella Okimura, 1958 (***2295**), p. 251; type species: *Atetsuella imamurai* Okimura, 1958; OD.

Pseudostaffella (Semistaffella) Reytlinger, 1971 (***2610**), p. 12; type species: *Pseudostaffella variabilis* Reytlinger, 1961 (***2604**), p. 240; OD.

Eostaffella (Plectostaffella) Reytlinger, 1971 (***2610**), p. 14; type species: *Plectostaffella jakhensis* Reytlinger, 1971; OD.

Test small, globular to slightly umbilicate, periphery broadly rounded, large globular proloculus followed by up to seven involutely coiled whorls, axis of coiling later changing abruptly to planispiral coiling, septa straight, long, unfluted, and perpendicular to the outer wall, slightly curved in the polar regions; wall thin, three layered, a median tectum and inner and outer tectoria; chomata well developed on either side of the narrow tunnel, which has an irregular path in the early whorls. U. Carboniferous (Namurian to Moscovian); Arctic Canada; central and western USA; Spain; Algeria; USSR: Russian Platform, Urals, Donets Basin, central Asia; Viet Nam; China; Japan.

Remarks: As no holotype was originally designated for the type species, one of the original syntypes was later designated as lectotype; this specimen reportedly was lost and a new lectotype was proposed from the remaining original specimens (Groves, 1984, ***1317**, p. 72).

QUYDATELLA Liem, 1966

Plate 258, figs. 6-9, 12, and 13

Type species: Quydatella staffellaeformis Liem, 1966; OD.

Quydatella Liem, 1966 (***1846**), p. 45.

?*Schubertina* Marshall, 1969 (*2046), p. 122; type species: *Schubertina circuli* Marshall, 1969; OD.

Test subspherical, planispiral, and involute in the early stage, resembling *Pseudostaffella*, later stage umbilicate, with whorls enlarging more rapidly, and coiling axis perpendicular to that of the early stage, septa nearly flat; wall with three layers, tectum and inner and outer tectoria, and in the later stage a faint diaphanotheca is recognizable, chomata present. U. Carboniferous (Bashkirian); North Viet Nam; South Viet Nam; USA: Nevada.

RAUSERELLA Dunbar, 1944

Plate 258, figs. 14-19

Type species: Rauserella erratica Dunbar, 1944; OD.

Rauserella Dunbar, 1944 (*1015), p. 37.

Test small, earliest whorls planispiral with short axis and rounded periphery, coiling axis later changes abruptly, whorls become much wider and irregular and the test fusiform, septa plane in the early planispiral stage but irregular in outer whorls; wall thin, obscure, a thin median tectum with clear inner and outer tectoria in the early whorls, later whorls with tectum and diaphanotheca; septal pores present in the outer whorls. M. Permian (Kungurian); Mexico; USA: Texas; Japan; USSR: Crimea, Caucasus, Primorye Territory.

SHOUGUANIA J. X. Lin, 1981

Plate 258, figs. 10 and 11

Type species: Shouguania furongshanensis J. X. Lin, 1981; OD.

Shouguania J. X. Lin, 1981 (*1854), p. 27.

Test small, up to 0.57 mm in diameter, lenticular, periphery angular, poles flattened to depressed, globular proloculus followed by four to four and a half rapidly enlarging planispiral whorls, first whorl evolute, later ones involute, septa straight, no axial fillings; wall calcareous, light yellow or gray in color, with four layers, tectum, diaphanotheca, and inner and outer tectoria, chomata small but prominent, at the top of the lateral slopes, tunnel crescentic. Upper part of L. Carboniferous; China; USSR; W. Europe.

TORIYAMAIA Kanmera, 1956

Plate 259, figs. 12-14

Type species: Toriyamaia latiseptata Kanmera, 1956; OD.

Toriyamaia Kanmera, 1956 (*1641), p. 251.

Test small, elongate fusiform to subcylindrical, broadly rounded at the poles, small rounded proloculus, early whorls discoidal and first whorl evolute, later whorls subcylindrical, involute, increasing rapidly in height, with coiling axis perpendicular to that of the early stage, septa sparse, widely separated, unfluted, resembles *Rauserella* but does not develop the later irregular coiling; wall thin, with tectum and less dense structureless lower layer. L. Permian; Japan.

Family SCHUBERTELLIDAE Skinner, 1931

Schubertellidae A. D. Miklukho-Maklay, Rauzer-Chernousova, and Rozovskaya, 1958 (*2132), p. 17, nom. transl. ex subfamily Schubertellinae.

Boultonidae Toriyama, 1960 (*3212), p. 36 (nom. imperf., recte Boultoniidae).

Test fusiform to subcylindrical, advanced taxa may be uncoiled and rectilinear or flaring in later stage; early coiling streptospiral or with sharp change in direction from early whorls to later ones; early septa flat, fluted in advanced taxa; wall varied, with tectum and upper and lower tectoria, tectum, and diaphanotheca, tectum and lower tectorium only, a single thin layer, or with tectum and alveolar keriotheca; tunnel single, chomata low to large and asymmetrical. U. Carboniferous (Moscovian) to U. Permian.

Subfamily SCHUBERTELLINAE Skinner, 1931

Schubertellinae Skinner, 1931 (*2991), p. 257.

Test with plane of coiling changing during early whorls; septa flat to axially undulating; weakly differentiated wall structure, chomata present. U. Carboniferous (Moscovian) to U. Permian (Murgabian).

EOSCHUBERTELLA Thompson, 1937

Plate 260, figs. 1-7

Type species: Schubertella lata Lee and Chen, in Lee et al., 1930 (*1817), p. 111; OD.

Schubertella (Eoschubertella) Thompson, 1937 (March) (*3184), p. 123.
Eoschubertella Dunbar and Skinner, 1937 (July) (*1022), p. 563 (nom. transl.).
Pseudoschubertella Marshall, 1969 (*2046), p. 124; type species: *Pseudoschubertella fusiforma* Marshall, 1969; OD.

Test elongate ovate, early whorls close coiled, later with coiling axis at a sharp angle to that of the early stage, septa plane; wall of tectum, thin diaphanotheca (not recognizable in most sections), inner and outer tectoria; broad tunnel bordered by low chomata. U. Carboniferous (Moscovian = Desmoinesian); North America; South America; Europe; Asia.

Remarks: *Eoschubertella* was originally described as having a four-layered wall, including a rarely recognizable thin diaphanotheca but later (Thompson, in Loeblich and Tappan, 1964, ***1910**, p. C401) was regarded as having only a tectum and upper and lower tectoria.

FUSIELLA Lee and Chen, 1930

Plate 261, figs. 12-14

Type species: Fusiella typica Lee and Chen, in Lee et al., 1930; OD.

Fusiella Lee and Chen, in Lee et al., 1930 (*1817), p. 107.

Test very small, elongate, early whorls discoidal and endothyroid, later with 90° change in axis of coiling and test fusiform; wall thin, of tectum, diaphanotheca (termed the protheca by A. D. Miklukho-Maklay et al., in Rauzer-Chernousova and Fursenko, 1959, ***2531**, p. 211), and thin outer tectorium, axial fillings prominent. U. Carboniferous (Moscovian); North America; USSR; China; Japan.

Remarks: Thompson (1937, ***3184**, p. 124) stated that the middle layer of the three-layered wall of *Fusiella* corresponds to the tectum and diaphanotheca but later (in Loeblich and Tappan, 1964, ***1910**, p. C401) regarded the wall as having only a tectum and inner and outer tectoria.

KWANTOELLA Sakagami and Omata, 1957

Plate 260, figs. 8-11

Type species: Kwantoella fujimotoi Sakagami and Omata, 1957; OD.

Kwantoella Sakagami and Omata, 1957 (*2703), p. 251.

Test small, elongate fusiform, axis of coiling straight, septa numerous, straight and unfluted in the central part of the test but may be fluted toward the poles; wall of two layers, a tectum and less dense lower layer or keriotheca, tunnel single, chomata poorly developed, axial fillings restricted to the polar regions of the early whorls but more extensive in later whorls. L. Permian (Sakmarian); Japan.

MESOSCHUBERTELLA Kanuma and Sakagami, 1957

Plate 260, figs. 18-22

Type species: Mesoschubertella thompsoni Sakagami, in Kanuma and Sakagami, 1957; OD.

Mesoschubertella Kanuma and Sakagami, 1957 (*1645), p. 42.

Test small, inflated fusiform, up to 2 mm in length, early whorls closely coiled and evolute, later more elongate and involute, following a sharp change in axis of coiling, septa slightly fluted; wall of tectum, keriotheca, and inner tectorium, tunnel low and narrow, chomata well developed and asymmetrical. L. Permian; Japan; USSR.

NEOFUSULINELLA Deprat, 1912

Plate 261, figs. 1-7

Type species: Neofusulinella praecursor Deprat, 1913 (***936**), p. 40; SD Galloway and Ryniker, 1930 (***1208**), p. 23.

Neofusulinella Deprat, 1912 (*935), p. 1549.
Depratella Ozawa, 1928 (*2320), p. 9; type species: *Neofusulinella giraudi* Deprat, 1915 (*938), p. 11; OD.

Test small and ovoid in the early stage, later fusiform, up to 3 mm in length, planispirally coiled throughout, about six or seven whorls, septa flat, slightly curved forward, plane or only slightly fluted; chomata large and asymmetrical. U. Carboniferous (L. Moscovian); Laos.

Remarks: The type species is variously cited, as no described species were included in the original description of the genus. The first inclusion of any species was when Deprat (1913, ***936**) described *N. praecursor, N. lantenoisi*, and *N. schwagerinoides*, all of which thus were available; the first valid subsequent type designation was that of Galloway and Ryniker (1930, *1208), as discussed by R. C. Moore (note on p. C409, in Loeblich and Tappan, 1964, *1910).

NEOSCHUBERTELLA Saurin, 1962

Plate 260, figs. 12-14

Type species: Neoschubertella sisophonensis Saurin, 1962; OD.

Neoschubertella Saurin, 1962 (*2739), p. 469.

Test small, up to 0.5 mm in length, fusiform, poles acuminate, spherical proloculus followed by about four whorls, the first three with short axis of coiling so that the test is lenticular, followed by a sharp change of 90° in coiling axis midway in the third whorl, and a rapid increase in length of the axis, septa slightly curved but not fluted, appearing straight in sagittal section, later whorls with up to fifteen septa; wall dense and dark colored in the inner whorls, final whorl has a tectum and very finely porous keriotheca and is continuous with the septa, wall of somewhat irregular thickness, possibly due to preservation, no chomata but pseudochomata may be continuous with secondary deposits in the inner whorls. L. Permian (Sakmarian) to U. Permian (U. Murgabian); Cambodia; Laos.

SCHUBERTELLA Staff and Wedekind, 1910

Plate 260, figs. 15-17

Type species: Schubertella transitoria Staff and Wedekind, 1910; OD.

Schubertella Staff and Wedekind, 1910 (*3060), p. 112, 121.

Test small, up to about 1.5 mm in length, early stage discoidal, later stage with sharply changed axis of coiling and becoming fusiform with acute poles, septa numerous, unfluted, or with slight fluting at the poles of the outer whorls; wall of tectum and diaphanotheca, chomata low, asymmetrical and bordering a broad low tunnel. Permian; Europe; Asia; North America.

Subfamily BOULTONIINAE Skinner and Wilde, 1954

Boultoniinae Skinner and Wilde, 1954 (*2993), p. 437.

Test may uncoil in final volution; septa moderately to intensely fluted; wall with tectum and thin diaphanotheca, septal pores common, chomata present. L. to U. Permian.

BOULTONIA Lee, 1927

Plate 261, figs. 8-11

Type species: Boultonia willsi Lee, 1927: OD.

Boultonia Lee, 1927 (*1813), p. 10.

Test small, elongate, fusiform, early one to two whorls discoidal, later whorls with abruptly changed axis of coiling and rapidly beoming elongate, septa strongly fluted throughout; wall thin, of tectum and very faintly porous diaphanotheca, chomata asymmetrical. L. Permian; N. China; Thailand; USSR; W. Europe: Austria; USA: Texas, Nevada, Washington.

CODONOFUSIELLA Dunbar and Skinner, 1937

Plate 262, figs. 1 and 2

Type species: Codonofusiella paradoxica Dunbar and Skinner, 1937; OD.

Codonofusiella Dunbar and Skinner, 1937 (*1022), p. 606.

Test small, up to about 1.5 mm in length, earliest one or two whorls tightly planispiral, with short axis of coiling, followed by sharp change in axis of coiling, test then becoming elongate and fusiform, final whorl rapidly increasing in length and height, finally uncoiling and rectilinear, septa very thin and strongly fluted, the folds reaching the roof of the chamber in the final whorl; wall very thin, of thin tectum and slightly thicker and less dense homogeneous layer, chomata present but tunnel not clearly defined. U. Permian; USA: Texas; Canada: British Columbia; Japan; Cambodia; Pakistan; Yugoslavia; Greece; Turkey; USSR: Crimea.

DUNBARULA Ciry, 1948

Plate 262, figs. 3-10

Type species: Dunbarula mathieui Ciry, 1948 OD.

Dunbarula Ciry, 1948 (*605), p. 108.

Test elongate ellipsoid to ovoid, poles rounded, early stage with short axis of coiling, then later whorls increase rapidly in height and length following a sharp change in coiling axis, so that axis becomes elongate as in *Eoschubertella*, septa strongly fluted throughout, the folds reaching the roof of the chambers; wall with tectum and thin, finely porous diaphanotheca; septal pores closely spaced and diagonally aligned. U. Permian; Yugoslavia; USSR; China; Japan; N. Africa: Tunisia; North America.

GALLOWAIINA Chen, 1934

Plate 263, figs. 1-4

Type species: Gallowaiina meitiensis Chen, 1934; OD.

Gallowaiina Chen, 1934 (*552), p. 237.
Gallowaiinella Chen, in Dunbar and Skinner, 1937 (*1022), p. 571 (nom. superfl.; ICZN Art. 56 (b)); obj.
Gallowayina Thompson, in Loeblich and Tappan, 1964 (*1910), p. C406 (err. emend.; non *Gallowayina* Ellis, 1932); obj.
Gallowayinella Thompson, in Loeblich and Tappan, 1964 (*1910), p. C406 (err. emend.).

Test elongate, fusiform, with bluntly rounded extremities, septa very thin, closely fluted throughout, with folds extending over most of the chamber height; wall very thin, largely a single clear structureless layer but with a thin dark film on both inner and outer surfaces, tunnel narrow, no chomata present, axial fillings only in the axial region. U. Permian (Changxingian); S. China; USSR.

LANTSCHICHITES Tumanskaya, 1953

Plate 263, figs. 5, 9, and 10

Type species: Codonofusiella (Lantschichites) maslennikovi Tumanskaya, 1953; OD.

Codonofusiella (Lantschichites) Tumanskaya, 1953 (*3231), p. 20.
Paraboultonia Skinner and Wilde, 1954 (*2993), p. 441; type species: *Paraboultonia splendens* Skinner and Wilde, 1954; OD.
Lantschichites Rauzer-Chernousova and Rozovskaya, 1955 (*2535), p. 99 (nom. transl.).

Test elongate, fusiform to cylindrical, poles bluntly rounded, inner whorls with short axis of coiling, later with changed coiling axis at a high angle to the earlier one, elongate and fusiform, final stage may enlarge rapidly, flaring and tending to become rectilinear, septa thin, strongly fluted, with cuniculi developed at the base of the septa in the outer whorls; wall thin, with tectum and diaphanotheca, chomata in first two volutions, tunnel low and erratic, disappearing in the later whorls where cuniculi are present; septal pores abundant in later whorls. M. Permian (Kungurian); USA: Texas; USSR.

Remarks: Differs from *Minojapanella* in the flaring final whorl that tends to become rectilinear, the loss of chomata in the outer whorls, and the development of cuniculi.

MINOJAPANELLA Fujimoto and Kanuma, 1953

Plate 264, figs. 1-5

Type species: Minojapanella elongata Fujimoto and Kanuma, 1953; OD.

Minojapanella Fujimoto and Kanuma, 1953 (*1196), p. 150.
Tavajzites Tumanskaya, 1953 (*3231), p. 22; type species: *Fusulina pseudoprisca* var. *delicata* Colani, 1924 (*618), p. 180 (as *F. pseudo-prisca* var. *delicata*); OD.

Test subcylindrical, early whorls with short axis, then with sharp change in axis of coiling and rapidly lengthening test, septa intensely fluted, but without development of cuniculi; wall with light layer or diaphanotheca, and inner and outer darker layers, chomata and axial thickenings present, may be massive. Upper part of L. Permian to U. Permian: Japan; China; Inner Mongolia Autonomous Region of China; Sumatra; Yugoslavia; USSR.

NANLINGELLA Rui and Sheng, 1981

Plate 261, figs. 15-17

Type species: Nanlingella meridionalis Rui and Sheng, 1981; OD.

Nanlingella Rui and Sheng, 1981 (*2670), p. 35.

Test ellipsoidal to fusiform, small proloculus followed by endothyroid early whorls with short axis of coiling, then after a sharp change in direction of coiling the test rapidly increases in length and whorls enlarge rapidly; septa strongly fluted except in the median part, folds broad and low, occupying only the lower part of the chambers; wall thin, of tectum and diaphanotheca, tunnel distinct but poorly developed chomata present only in the first one or two whorls. U. Permian; S. China.

PALAEOFUSULINA Deprat, 1912

Plate 264, figs. 9 and 10

Type species: Palaeofusulina prisca Deprat, 1913 (*936), p. 37 (syn.: *Fusulina pseudoprisca* Colani, 1924, *618, p. 24, 79, nom. subst. pro *Fusulina prisca* (Deprat) Colani, = *Palaeofusulina prisca* Deprat, 1912, non *Fusulina prisca* (Ehrenberg) von Möller, 1878 and non *Alveolina prisca* Ehrenberg, 1842); SD(SM).

Palaeofusulina Deprat, 1912 (*935), p. 1548.

Fusulina (Palaeofusulina) Likharev, 1926 (*1849), p. 59 (nom. transl.).

Test small, subcylindrical to fusiform, inflated, septa strongly fluted throughout, with high and dense narrow folds; wall with a single dense layer, or may have a faint division into tectum and diaphanotheca, chomata faint; septal pores large. U. Permian; Viet Nam; China; Japan; Timor; USSR: N. Caucasus; Yugoslavia.

PARADOXIELLA Skinner and Wilde, 1955

Plate 266, figs. 1-4

Type species: Paradoxiella pratti Skinner and Wilde, 1955; OD.

Paradoxiella Skinner and Wilde, 1955 (*2995), p. 934.

Test small, maximum diameter about 2.5 mm, adult test discoidal, thickest at the center of the disk and thinning at the periphery that may be recurved and turned upward, earliest one to one and a half whorls with short axis of coiling, then, after a 90° change in the direction of coiling, followed by about two whorls with elongate axis of coiling, finally flaring and uncoiling with chambers extending laterally and recurved at the ends to reach the early coil, lateral extremities of chambers finally meeting so that chambers are annular as viewed from the undulating dorsal side, septa gradually completely overlapping the test on the opposite side, septa intensely fluted, and cuniculi well developed; wall and septa very thin, with tectum and diaphanotheca, very narrow tunnel may be bordered by low chomata in the coiled part of the test, the tunnel rising from the floor in the flaring part and continuing as a series of openings near the upper edge of the septa; septal pores numerous. U. Permian (Murgabian); USA: Texas; Japan.

PARADUNBARULA Skinner, 1969

Plate 265, figs. 1-5

Type species: Paradunbarula dallyi Skinner, 1969; OD.

Paradunbarula Skinner, 1969 (*2992), p. 6.

Test inflated fusiform to subglobular, poles bluntly rounded, proloculus tiny, followed by discoidal early whorls with short axis of coiling, later whorls expand more rapidly after a change in the axis of coiling; septa intensely fluted from pole to pole, the high folds extending to the chamber roof; wall with tectum, diaphanotheca, and inner tectorium, the latter extending over the interior of the septa as well as the outer wall, tunnel single, moderately wide, weak chomata only in the early whorls; septal pores numerous. U. Permian (Murgabian): Turkey; S. China; USSR: Pamir.

PARANANLINGELLA Rui and Sheng, 1981

Plate 263, figs. 6-8

Type species: Palaeofusulina acervula Sheng and Rui, in J. K. Zhao et al., 1981 (*3448), p. 49, 50, 78, 79; OD.

Parananlingella Rui and Sheng, 1981 (*2670), p. 35.

Parananlingella Sheng and Rui, 1979 (*2897), p. 3, 4 (name not available, ICZN Art. 13(a)(i), no description).

Test of medium size, ellipsoidal to fusiform, tiny proloculus followed by tightly coiled, endothyroid whorl with short coiling axis that is at a large angle to axis of later rapidly expanding whorls, septa strongly fluted throughout test, in the last volution appearing like cuniculi; wall of tectum and diaphanotheca, no chomata, indistinct tunnel in outer whorls. U. Permian: S. China.

RUSSIELLA A. D. Miklukho-Maklay, 1957

Plate 264, figs. 11 and 12

Type species: Russiella pulchra A. D. Miklukho-Maklay, 1957; OD.

Russiella A. D. Miklukho-Maklay, 1957 (*2122), p. 98.

Minojapanella (Russiella) Leven, 1967 (*1831), p. 130 (nom. transl.).

Test small, elongate fusiform to subcylindrical, first two whorls endothyroid, axis of later whorls changed by 90°, chambers rapidly elongate axially to produce the fusiform test; septa regularly and strongly fluted in the polar regions, grading to more weakly fluted near the center; wall thin, with thin tectum and slightly thicker finely alveolar diaphanotheca, single tunnel, weakly developed chomata in all but final two volutions, very heavy axial fillings occupying much of the polar regions of all but the last two whorls, coating the wall and partly filling the chambers. U. Permian (Murgabian); S. China; USSR: Pamir, Crimea.

Remarks: Although originally described as having a three-layered wall, Sheng (1963, ***2896**, p. 43, 168) stated that better preserved specimens show it to have only two layers.

TEWOELLA X. F. Sun, 1979

Plate 266, figs. 5-8

Type species: Tewoella longa X. F. Sun, 1979; OD.

Tewoella X. F. Sun, 1979 (***3106**), p. 165, 168.

Test small, elongate, fusiform to obovate, poles bluntly rounded, small globular proloculus followed by a few rapidly enlarging whorls, septa strongly fluted throughout length of test; wall very thin, of tectum and poorly developed diaphanotheca in the inner whorls and only a tectum in the outermost whorl, may have chomata in the earliest whorl, no axial fillings. U. Permian; N. China.

WUTUELLA J. C. Sheng, 1963

Plate 266, figs. 9-11

Type species: Gallowaiinella wutuensis Kuo, 1949 (***1757**), p. 233; OD.

Minojapanella (Wutuella) J. C. Sheng, 1963 (***2896**), p. 40, 165.

Test elongate fusiform, poles acuminate, proloculus tiny and spherical, first whorl discoidal with short axis of coiling, outer whorls with a distinct change in axis of coiling but all whorls compactly coiled; septa strongly and regularly fluted throughout into narrow and parallel-sided folds that reach the chamber roof and appear like vertical pillars in axial section; wall very thin, a thin tectum and thicker but irregular diaphanotheca, no chomata, tunnel indistinct, axial fillings restricted to the axial line of the inner three to four whorls. Upper part of L. Permian; S. China.

ZIGUIELLA J. X. Lin, 1980

Plate 264, figs. 6-8

Type species: Gallowaiinella quasicylindrica Ding, 1978 (***962**), p. 282; OD.

Ziguiella J. X. Lin, 1980 (***1853**), p. 41.

Test of moderate size, ovoid to subcylindrical, bluntly rounded at the poles, loosely planispirally enrolled, three to four and a half whorls that increase rapidly in height, septa intensely fluted throughout length of the test, with commonly irregular, high, and narrow folds that nearly reach the chamber roof; wall of two layers, tectum and diaphanotheca, weakly developed axial fillings only in the inner whorls, no chomata. Uppermost Permian; China: Hubei Province.

Family FUSULINIDAE von Möller, 1878

Fusulinidae von Möller, 1878 (***2159**), p. 133.
Fusulinina Lankester, 1885 (***1790**), p. 848.
Fusulinida Haeckel, 1894 (***1355**), p. 185.
Fusulininae Delage and Hérouard, 1896 (***926**), p. 148.
Fusulinellidae Solov'eva, 1969 (***3023**), p. 38 (nom. transl. ex subfamily).

Fusiform to subcylindrical test planispirally coiled throughout or with early whorls at a distinct angle from the later plane of coiling; septa flat to fluted; tunnel single, chomata weak to massive; spirotheca of tectum and upper and lower tectoria, or of tectum and diaphanotheca. U. Carboniferous (Moscovian) to U. Permian (Murgabian).

Subfamily FUSULINELLINAE Staff and Wedekind, 1910

Fusulinellinae Staff and Wedekind, 1910 (***3060**), p. 112.
Pulchrellinae Solov'eva, 1983 (***3026**), p. 14.

Septa flat to slightly fluted; wall of three to four layers, with diaphanotheca and generally pronounced outer tectorium, may be perforate, chomata prominent. U. Carboniferous (Moscovian) to U. Permian (Murgabian).

DAGMARELLA Solov'eva, 1955

Plate 267, fig. 13

Type species: Dagmarella prima Solov'eva, 1955; OD.

Dagmarella Solov'eva, 1955 (***3022**), p. 945.
Dagmarella (Sunghonella) M. G. Kang, 1973 (***1638**), p. 21; type species: obj.; OD.

Test robust, fusiform, globular proloculus followed by close-coiled and rapidly expanding whorls, septa numerous, those of inner volutions plane, loosely fluted in the median region of the final one or two volutions with folds extending half the chamber height, more strongly fluted toward the poles; wall of three layers, with tectum and inner and outer tectoria, inner tectorium exceptionally heavy, tunnel narrow, chomata prominent, asymmetrical, with vertical side facing the tunnel and grading toward the poles into the secondary thickening of the wall. U. Carboniferous (Moscovian); USSR; Kyzyl Kum; China; Japan; USA.

FUSULINELLA von Möller, 1877

Plate 266, figs. 12-19

Type species: Fusulinella bocki von Möller, 1878 (*2159), p. 104; SD H. Douvillé, 1907 (*984), p. 584.

Fusulinella von Möller, 1877 (*2158), p. 144.

Nipperella Solov'eva, 1983 (*3026), p. 12, 13 (name not available, ICZN Art. 13 (a)(i), no description).

Nipperella Solov'eva, 1984 (*3027), p. 133; type species: *Fusulinella nipperensis* Ross and Sabins, 1965 (*2651), p. 188; OD.

Test fusiform, planispiral, septa slightly to strongly fluted in the polar region; wall of tectum, inner clear diaphanotheca that may extend down both the anterior and posterior side of the septa, and upper and lower tectoria, chomata prominent, asymmetrical. U. Carboniferous (Moscovian); USA: Missouri, Illinois, Ohio, South Dakota, Nevada, Colorado, New Mexico, Oklahoma, Texas, Wyoming; Canada; Mexico; Peru; Chile; Greenland; Spain; Austria; Hungary; USSR: Russian Platform; China; Japan; Southeast Asia.

OBSOLETES Kireeva, 1950

Plate 267, figs. 10-12

Type species: Fusulina obsoleta Schellwien, 1908 (*2753), p. 186; OD.

Obsoletes Kireeva, 1950 (*1693), p. 201.

Test elongate fusiform, whorls enlarging rapidly, septa numerous, plane in the central area, fluted at the poles; wall thin, perforate, of tectum, protheca, and thin discontinuous outer tectorium, chomata fairly wide, ranging from low to massive, asymmetrical, bordering a rapidly widening tunnel. U. Carboniferous (Kasimovian); USSR: Russian Platform, Donbass; China.

PLECTOFUSULINA
W. J. Stewart, 1958

Plate 267, figs. 1-4

Type species: Plectofusulina franklinensis W. J. Stewart, 1958; OD.

Plectofusulina W. J. Stewart, 1958 (*3068), p. 1056.

Test tiny, subglobular to ellipsoidal, loosely streptospirally enrolled throughout, large globular proloculus followed by rapidly enlarging whorls, septa nearly flat in the center of the whorl, progressively more fluted toward the poles; wall thin, of uniform thickness throughout, consisting of tectum, diaphanotheca, and upper and lower tectoria, chomata dense, well developed, and symmetrical to slightly asymmetrical, tunnel path irregular because of the streptospiral coiling. U. Carboniferous (L. Moscovian to L. Stephanian); USA: Texas, New Mexico, Arizona, Utah, Colorado.

PROFUSULINELLA Rauzer-Chernousova and Belyaev, 1936

Plate 267, figs. 5-9

Type species: Profusulinella pararhomboides Rauzer-Chernousova and Belyaev, in Rauzer-Chernousova et al., 1936; OD.

Profusulinella Rauzer-Chernousova and Belyaev, in Rauzer-Chernousova et al., 1936 (*2529), p. 175, 220.

Aljutovella Rauzer-Chernousova, in Rauzer-Chernousova et al., 1951 (*2532), p. 182; type species: *Profusulinella aljutovica* Rauzer-Chernousova, 1938 (*2516), p. 97; OD.

Test small, up to about 1 mm in length, fusiform, globular proloculus followed by closely coiled early whorls, rapidly becoming elongate after a sharp change in coiling axis, septa plane and not fluted; wall with three layers, tectum, diaphanotheca, and upper tectorium, with lower tectorium in a few chambers of some advanced species, chomata prominent, asymmetrical, secondary thickening extending laterally toward the poles. U. Carboniferous (Moscovian); USA: Texas; Peru; China; Japan; USSR.

Remarks: The profusulinellid wall was originally described as having a tectum and inner and outer tectoria, but the wall of *Profusulinella* was restudied by Skinner and Wilde (1954, *2994, p. 446) and shown to have a primary tectum and diaphanotheca with an outer tectorium and a lower tectorium only rarely in a few chambers.

PROTRITICITES Putrya, 1948

Plate 268, fig. 1

Type species: Protriticites globulus Putrya, 1948; OD.

Protriticites Putrya, 1948 (*2490), p. 91.

Fusulinella (Protriticites) T. S. Chen', 1963 (*555), p. 73 (nom. transl.).

Test fusiform to ellipsoidal, planispiral, with constant axis of coiling, septa plane to moderately fluted in the axial region; wall of early whorls with four layers, outer whorls with three-layered wall, a tectum, protheca and very thin outer tectorium, chomata massive and asymmetrical, bordering the rapidly widening tunnel. U. Carboniferous (Kasimovian); USSR: Russian Platform, Urals, Donbass, Timan; Japan; N. China.

PSEUDOFUSULINELLA Thompson, 1951

Plate 268, figs. 2-6

Type species: Neofusulinella occidentalis Thompson and Wheeler, in Thompson, Wheeler, and Hazzard, 1946 (*3195), p. 25; OD.

Pseudofusulinella Thompson, 1951 (*3190), p. 117.

Pseudofusulinella (Kanmeraia) T. Ozawa, 1967 (*2316), p. 151; type species: *Pseudofusulinella utahensis* Thompson and Bissell, in Thompson, 1954 (*3191), p. 34; OD.

Fusulinella (Pseudofusulinella) Rauzer-Chernousova, 1965 (*2526), p. 62 (nom. transl.).

Pulchrella Solov'eva, 1983 (*3026), p. 15; type species: *Fusulinella pulchra* Rauzer-Chernousova and Belyaev, in Rauzer-Chernousova et al., 1936 (*2529), p. 23; OD.

Test inflated, fusiform, with gradually enlarging whorls, septa closely spaced, plane in the central part of the test, fluted at the poles; wall of tectum and diaphanotheca, secondary deposits continuous with the massive, asymmetrical chomata, chomata with vertical to overhanging side facing the narrow tunnel, gradually sloping laterally into the axial fillings. U. Carboniferous (Moscovian) to L. Permian (Sakmarian); USA: Utah, Nevada, California, Idaho; Canada: British Columbia; USSR.

TAITZEHOELLA J. C. Sheng, 1951

Plate 268, figs. 7 and 8

Type species: Taitzehoella taitzehoensis J. C. Sheng, 1951; OD.

Taitzehoella J. C. Sheng, 1951 (*2894), p. 79.

Profusulinella (Taitzehoella) A. D. Miklukho-Maklay, Rauzer-Chernousova, and Rozovskaya, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 209 (nom. transl.).

Test small, fusiform, median region inflated, narrower poles of sharply reduced diameter, tips broadly rounded, early whorls with short axis and streptospiral coiling, later planispiral whorls with changed axis, septa plane; wall thin, of two or three layers, including tectum and less dense lower layer, weakly developed axial fillings throughout test, chomata high, asymmetrical, and may overhang the gradually widening tunnel. U. Carboniferous (Moscovian); China; Greenland.

THOMPSONELLA Skinner and Wilde, 1965

Plate 269, figs. 1-3

Type species: Thompsonella rugosa Skinner and Wilde, 1965; OD.

Thompsonella Skinner and Wilde, 1965 (*2997), p. 25.

Test subcylindrical to fusiform, poles bluntly rounded, proloculus small, followed by up to eight slowly enlarging whorls, septa plane in inner whorls and strongly fluted in the outer whorls; wall and septa thin, rugose, consisting of tectum and diaphanotheca, axial fillings consisting of secondary deposits on both faces of the septa, narrow tunnel bordered by distinct narrow chomata. U. Carboniferous (U. Stephanian); USA: California.

URALOFUSULINELLA Chuvashov, 1980

Plate 269, fig. 7

Type species: Fusulinella (Uralofusulinella) ajensis Chuvashov, 1980; OD.

Fusulinella (Uralofusulinella) Chuvashov, 1980 (*597), p. 57.

Test small, subspherical to robust fusiform, large proloculus followed by rapidly enlarging whorls of gradually lengthened axis of coiling, nearly planispiral or slightly irregular coiling, septa weakly fluted near the poles; wall of early whorls with tectum, thin and weakly developed diaphanotheca, and inner and outer tectoria, later whorls with only two layers, a tectum and finely porous layer, secondary deposits consist of well-developed, asymmetrical chomata in all but the final whorl, steeply sided facing the tunnel, no axial deposits. L. Permian (Artinskian); USSR: middle and southern Urals.

WAERINGELLA Thompson, 1942

Plate 268, figs. 9-12

Type species: Waeringella spiveyi Thompson, 1942; OD.

Waeringella Thompson, 1942 (***3185**), p. 413.

Test small, elongate fusiform, with inflated central area and axial tapering ends, septa numerous, plane in the central area, fluted toward the poles; wall of tectum, lower thin structureless layer and upper layer that may represent a tectorium or correspond to the axial fillings, chomata distinct, bordering a narrow, irregularly aligned tunnel, axial fillings heavy. U. Carboniferous (Stephanian) to L. Permian; USA: Texas, Utah, Arizona; USSR: Timan.

YANGCHIENIA J. S. Lee, 1934

Plate 269, figs. 8 and 9

Type species: Yangchienia iniqua J. S. Lee, 1934; OD.

Yangchienia J. S. Lee, 1934 (***1815**), p. 14.

Test small, robust fusiform, earliest three to four whorls discoidal with short axis of coiling, later whorls with changed and rapidly lengthening axis of coiling; septa plane, unfluted; wall with tectum and diaphanotheca, tectoria not apparent, tunnel widening rapidly, bordered by massive, asymmetrical chomata that extend nearly to the poles. U. Permian (Darvasian to Murgabian); S. China; Japan; Korea; USSR; Yugoslavia; Sicily; Greece; Turkey; Afghanistan; Algeria.

Subfamily FUSULININAE von Möller, 1878

Fusulininae Brady, 1884 (***344**), p. 74, nom. corr. pro subfamily Fusulinidae.

Fusulinidae Bütschli, in Bronn, 1880 (***421**), p. 213 (nom. imperf.), nom. transl. ex family Fusulinidae.

Pseudotriticitinae Putrya, 1948 (***2491**), p. 97.

Quasifusulininae Putrya, 1956 (***2492**), p. 467.

Hemifusulininae Putrya, 1956 (***2492**), p. 467.

Septa moderately to strongly fluted; wall with two to four layers, including diaphanotheca, outer tectorium weakly developed to absent, pores simple; chomata or pseudochomata may be present. U. Carboniferous (Moscovian) to L. Permian (Sakmarian).

AKIYOSHIELLA Toriyama, 1953

Plate 269, figs. 4-6

Type species: Akiyoshiella ozawai Toriyama, 1953 (syn.: *Fusulina japonica* Rozovskaya, 1975 (***2665**), p. 250, expl. pl. 9, figs. 9-11, nom. nov. pro *Fusulina ozawai* (Toriyama), non *Fusulina ozawai* Rauzer-Chernousova and Belyaev, 1940; non *Fusulina japonica* Gümbel, 1874); OD.

Akiyoshiella Toriyama, 1953 (***3211**), p. 251.

Fusulina (Akiyoshiella) Ishii, 1958 (***1589**), p. 38, 51, pl. 1, fig. 1, pl. 4, fig. 1 (nom. transl.).

Test of small to medium size, up to 7.0 mm in length, spherical to ovoid proloculus followed by three to four early volutions of slowly increasing chamber height, then enlarging more rapidly and producing an elongate fusiform test with straight to slightly curved axis of coiling, later volutions irregularly coiled, and last ones may uncoil and form a flange at one side, final whorl may be of slightly decreased height; septa numerous, up to thirty in the final whorl, thin, single layered, and strongly fluted at the base throughout test length in the planispiral part, irregularly and strongly fluted in the uncoiled stage; wall thin, of tectum and transparent diaphanotheca that may not be distinguishable in places, discontinuous upper and lower tectoria also present in all but the final coiled volution, single tunnel in the enrolled part, narrow in the early whorls but wider in later ones, chomata present in the early volutions but absent from later chambers, axial fillings present in the polar regions of early whorls. U. Carboniferous (Moscovian); Japan; Canada: British Columbia.

Remarks: When *Akiyoshiella* is recognized as a distinct genus, the valid name of the type species is *A. ozawai*; if *Akiyoshiella* is regarded as a subgenus of *Fusulina* or as a synonym of

Fusulina, the type species becomes a junior secondary homonym of *Fusulina ozawai* Rauzer-Chernousova and Belyaev, 1940, and was therefore renamed as *F. japonica* by Rozovskaya, 1975; however, this latter name is a junior primary homonym of *Fusulina japonica* Gümbel, 1874.

BARTRAMELLA Verville, Thompson, and Lokke, 1956

Plate 270, figs. 1-3

Type species: Bartramella bartrami Verville et al., 1956; OD.

Bartramella Verville, Thompson, and Lokke, 1956 (***3290**), p. 1278.

Test small, up to 4.3 mm in length, elongate, subcylindrical to subfusiform, axis of coiling curving to irregular, whorls increasing gradually in height, septa increasing in number per whorl from about eight to twenty-seven, septal fluting narrow, present throughout the entire height of the septa as well as throughout test length, the folds of adjacent septa producing small chamberlets except immediately above the tunnel; wall thin, consisting of tectum and thicker but similar lower layer that has more evident perforations from about the fifth whorl, tunnel low and broad with slightly irregular path, high asymmetrical chomata present in all but last chambers, chomata have a steep side facing the tunnel, heavy axial fillings in the early whorls may fill the chambers in the polar region but are less prominent in later whorls. U. Carboniferous (Moscovian); USA: Nevada, New Mexico, Idaho.

BEEDEINA Galloway, 1933

Plate 270, figs. 4-7

Type species: Fusulinella girtyi Dunbar and Condra, 1928 (***1016**), p. 76; OD.

Beedeina Galloway, 1933 (***1205**), p. 401.

Test large, up to 10 mm in length, inflated fusiform to elongate fusiform in younger species, poles pointed to bluntly rounded, septa plane to weakly fluted in the early whorls, later strongly fluted; wall in the early whorls of tectum and thin diaphanotheca that thickens in the later whorls, and with thick upper and lower tectoria covering the floor and roof of the chambers, adult of geologically later species may have thicker diaphanotheca and discontinuous tectoria, secondary fillings also coat the septa; tunnel prominent but narrow, tunnel angle commonly decreased with growth, chomata massive, high and broad in the young stage, but lower in the adult, axial fillings generally absent. U. Carboniferous (M. to U. Moscovian); USA: Iowa, Illinois, Oklahoma, Texas, New Mexico; China; Japan: USSR.

Remarks: *Beedeina* has been regarded as a synonym of *Fusulina* (Thompson, 1948, ***3189**; Thompson, in Loeblich and Tappan, 1964, ***1910**; and Rozovskaya, 1975, ***2665**), of *Girtyina* (Kahler and Kahler, 1966, ***1633**), or possibly of *Hemifusulina* (Thompson, 1948, ***3189**). Ishii (1958, ***1589**) noted that it differs from *Fusulina* in the more robust test, strongly developed chomata, and in the early stage having a thin diaphanotheca, well-developed tectoria, and plane to weakly fluted septa. *Fusulina* is more elongate and cylindrical, has poorly developed chomata, strongly fluted septa, and a thick diaphanotheca throughout growth. *Hemifusulina* differs in having a keriotheca rather than a diaphanotheca.

DUTKEVICHELLA Putrya, 1956

Plate 270, fig. 8

Type species: Fusulina dutkevitchi Putrya, 1938 (***2487**), p. 68; OD.

Dutkevichella Putrya, 1956 (***2492**), p. 460.

Test small to large in size, ovoid to subcylindrical, septa moderately and regularly fluted, with more intense fluting in the axial region of later volutions; wall thin, poorly differentiated in the early whorls, later with tectum, diaphanotheca, and inner and outer tectoria, tunnel present, chomata subquadrate in shape. U. Carboniferous (Moscovian): USSR: Russian platform, central Asia.

FUSULINA Fischer de Waldheim, 1829

Plate 270, figs. 9-11

Type species: Fusulina cylindrica Fischer de Waldheim, 1830 (***1134**), pl. 13, figs. 1-5; SD Meek and Hayden, 1865 (***2086**), p. 13.

Fusulina Fischer de Waldheim, 1829 (***1133**), p. 330.

Fusulina (Schellwienia) Staff and Wedekind, 1910 (*3060), p. 109 (nom. superfl., recte *Fusulina (Fusulina)*); type species: obj.

Test fusiform to subcylindrical, up to 8 mm in length, planispiral throughout, up to seven volutions, poles rounded to bluntly pointed, test form constant throughout growth, septa strongly fluted even in the earliest stages, with higher and stronger folding near the poles; wall of tectum and thick diaphanotheca, upper and lower tectoria incomplete or may be absent, tunnel angle wide, chomata poorly developed, weak and spreading, axial fillings usually present in the polar regions. U. Carboniferous (Moscovian); cosmopolitan.

Remarks: Most American species that had been referred to *Fusulina* were shown by Ishii (1958, *1589, p. 40) to represent a distinct lineage from that of the dominantly Eurasian *Fusulina* and therefore should be placed in *Beedeina*.

HANOSTAFFELLA Cheong, 1984

Plate 270, fig. 12

Type species: Staffella paradoxa Dutkevich, 1934 (*1027), p. 14, 65; OD.

Neostaffella (Hanostaffella) Cheong, 1984 (*559), p. 472.

Test small, up to 1.03 mm in diameter, subspherical in early stage, coiling involute about the moderate-sized proloculus, later with slightly changed axis of coiling, four to eight whorls in the adult, final one or two volutions appearing subquadrate to biconcave in axial section, with slightly concave poles and periphery in the sagittal plane but with inflated corners, septa plane; wall with tectum and upper and lower tectoria in the early whorls, diaphanotheca intermittantly developed in the final whorls, tunnel a narrow slit, chomata high and well developed. U. Carboniferous (U. Moscovian); USSR: Urals; Japan; Korea.

HEMIFUSULINA von Möller, 1877

Plate 270, figs. 13–16

Type species: Hemifusulina bocki von Möller, 1878 (*2159), p. 76 (syn.: *Fusulina minima* Schellwien, 1908, *2753, p. 167, nom. nov. pro *Hemifusulina bocki* von Möller, 1878, non *Fusulina bocki* von Möller, 1878); SD(SM).

Hemifusulina von Möller, 1877 (*2158), p. 146 (also err. cit. as *Hemifusina*, p. 144).

Test small, ovoid, early whorls closely coiled, later more loosely coiled, septa slightly to moderately fluted, forming regular small arches; wall thin, of tectum and keriotheca with widely spaced narrow pores, single tunnel, chomata rounded and well developed throughout growth, no axial deposits. U. Carboniferous (Moscovian); USSR: Russian Platform, Urals, central Asia; Hungary; Yugoslavia; China; Japan.

Remarks: Schellwien (1908, *2753) regarded *Hemifusulina* as congeneric with *Fusulina*, hence renamed *H. bocki* von Möller, 1878 (non *Fusulina bocki* von Möller, 1878) as *Fusulina minima* Schellwien. If the genera are recognized as distinct, *Hemifusulina bocki* remains the correct name for the present type species.

HEMIFUSULINELLA Rumyantseva, 1962

Plate 270, figs. 17 and 18

Type species: Hemifusulina (Hemifusulinella) djartassensis Rumyantseva, 1962 (also as *djartessensis* on p. 170); OD.

Hemifusulina (Hemifusulinella) Rumyantseva, 1962 (*2672), p. 170.

Hemifusulinella Rozovskaya, 1975 (*2665), p. 67 (nom. transl.).

Test ovoid, of medium size, up to about 3.5 mm in length, septa plane in the early whorls, slightly fluted in later ones and forming chamberlets, may be somewhat twisted at the poles; wall very thin, early whorls with three layers, tectum, protheca, and outer tectorium, later whorls with only two finely perforate layers or may have a faint diaphanotheca, chomata low, knoblike, tunnel broad, low, oval in section, with straight path. U. Carboniferous (L. Moscovian); USSR: central Asia.

HIDAELLA Fujimoto and Igo, 1955

Plate 271, figs. 2–4

Type species: Hidaella kameii Fujimoto and Igo, 1955; OD.

Hidaella Fujimoto and Igo, 1955 (*1195), p. 45.

Test small, about 3 mm in length, elongate fusiform, slightly inflated centrally, poles broadly rounded, five to secen whorls, the early two to three whorls tightly coiled about the tiny spherical proloculus, axis of coiling short and test subspherical to subquadrate, outer volutions inflated and test rapidly becoming fusiform, septa numerous, thin, strongly fluted in the polar regions; wall with thin dense tectum, less dense diaphanotheca, upper and lower tectoria, outer wall strongly and irregularly undulating, giving an extremely rugose appearance, tunnel single, massive chomata of moderate height, no axial fillings. U. Carboniferous (U. Moscovian); Japan.

PSEUDOTRITICITES Putrya, 1940

Plate 271, fig. 1

Type species: Fusulina? donbassica Putrya, 1939 (***2488**), p. 139, OD.

Pseudotriticites Putrya, 1940 (***2489**), p. 61, 132.

Test elongate fusiform, about five planispiral whorls following the globular proloculus, septa regularly fluted throughout length, more strongly toward the poles; wall similar to *Fusulina*, inner whorls with diaphanotheca, outer whorls coarsely perforate and with only two layers, axial fillings sporadic, chomata developed to a varied degree. U. Carboniferous; USSR: Donbass, Russian Platform.

PUTRELLA Rauzer-Chernousova, 1951

Plate 271, figs. 12 and 13

Type species: Pseudotriticites brazhnikovae Putrya, 1948 (***2491**), p. 98; OD.

Putrella Rauzer-Chernousova, in Rauzer-Chernousova et al., 1951 (***2532**), p. 319.

Test large, fusiform to subcylindrical, straight axis of coiling, septa with high, close, and irregular fluting that appears in section as narrow loops; wall of two layers, first whorl may have tectum and indistinct diaphanotheca, beginning with second whorl wall has tectum and wide protheca, both coarsely perforate, but lacks tectoria, tunnel simple, chomata present only in the first whorl, supplementary deposits only in the central area. U. Carboniferous (Moscovian); USSR: Donets Basin, Russian Platform, Urals; China.

QUASIFUSULINA Chen, 1934

Plate 271, figs. 7-11

Type species: Fusulina longissima von Möller, 1878 (***2159**), p. 59; OD.

Quasifusulina Chen, 1934 (***553**), p. 91.

Epifusulina Chen, in Grabau, 1936 (***1284**), p. 21 footnote.

Test elongate, subcylindrical, up to 12 mm in length, poles bluntly rounded, whorls loosely coiled, chambers of early whorls with constant height throughout length, increasing in height at the poles of later whorls, septa intensely fluted throughout length and may form cuniculi; wall very thin, of tectum and diaphanotheca and may have poorly developed inner tectorium, tunnel narrow, poorly developed, straight, chomata weakly developed adjacent to the septa, absent in the median part of the chambers, axial fillings heavy. U. Carboniferous (Moscovian) to L. Permian (Asselian to Sakmarian); Carnic Alps; Hungary; Yugoslavia; Spitzbergen; Turkey; USSR: Donbass, Timan, Fergana, Pamir; Mongolia; China; Southeast Asia; Japan; Canada: British Columbia.

QUASIFUSULINOIDES
Rauzer-Chernousova and Rozovskaya, 1959

Plate 271, fig. 6

Type species: Pseudotriticites fusiformis Rozovskaya, 1952 (***2659**), p. 29; OD.

Quasifusulinoides Rauzer-Chernousova and Rozovskaya, in Rauzer-Chernousova and Fursenko, 1959 (***2531**), p. 210.

Quasifusulinoides Rauzer-Chernousova and Rozovskaya, in A. D. Miklukho-Maklay et al., 1958 (***2132**), p. 17 (name not available, ICZN Art. 13(a)(i), no description).

Fusulina (Quasifusulinoides) T. S. Chen, 1963 (***555**), p. 73 (nom. transl.).

Test fusiform to subcylindrical, septa intensely fluted, wall of tectum, protheca, and irregularly developed inner tectorium, early whorls with chomata and axial thickenings. U. Carboniferous (Stephanian) to L. Permian (Asselian to Sakmarian); USSR.

XENOSTAFFELLA Cheong, 1973

Plate 271, fig. 5

Type species: Xenostaffella koreaensis Cheong, 1973; OD.

Xenostaffella Cheong, 1973 (***558**), p. 66.

Test small, up to 1.05 mm in length, with concave umbilici and concave periphery in the sagittal plane from the third to the last whorl, small proloculus followed by eight or more tightly coiled volutions that increase gradually in height, planispiral and involute in the early stage, final whorl evolute, septa plane; wall thin, early whorls with tectum and upper and lower tectoria, outer whorls with diaphanotheca, tunnel of moderate height and width, chomata well developed and asymmetrical, up to two-thirds the height of the chambers, gradually decreasing in height laterally. U. Carboniferous (U. Moscovian); Korea.

Remarks: *Xenostaffella* is very similar to *Hanostaffella* but was said to differ in having more numerous volutions and an evolute final whorl. As they were from the same area and geologic age, *Hanostaffella* possibly may represent small species or juveniles of *Xenostaffella*.

Subfamily EOFUSULININAE Rauzer-Chernousova and Rozovskaya, 1959

Eofusulininae Rauzer-Chernousova and Rozovskaya, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 210.

Eofusulininae Rauzer-Chernousova and Rozovskaya, in A. D. Miklukho-Maklay, Rauzer-Chernousova, and Rozovskaya, 1958 (*2132), p. 17 (name not available, ICZN Art. 13 (a)(i), no description).

Few whorls, commonly three or four; wall thin and weakly differentiated, with inconstant outer tectorium; axial thickenings present, may have chomata. U. Carboniferous (Moscovian).

EOFUSULINA Rauzer-Chernousova, 1951

Plate 272, figs. 1-3

Type species: Fusulina triangula Rauzer-Chernousova and Belyaev, in Rauzer-Chernousova et al., 1936 (*2529), p. 185; OD.

Eofusulina Rauzer-Chernousova, in Rauzer-Chernousova et al., 1951 (*2532), p. 268.

Test elongate fusiform to cylindrical, with coiling axis elongate throughout growth, large globular proloculus followed by a few rapidly enlarging whorls, septa strongly fluted throughout with high and narrow folds; wall thin, of tectum and diaphanotheca; outer volution may have simple pores. U. Carboniferous (L. Moscovian); USSR: Russian Platform, Urals, central Asia.

NEOFUSULINA A. D. Miklukho-Maklay, 1963

Plate 272, fig. 4

Type species: Eofusulina (Paraeofusulina) subtilissima Putrya, 1956 (*2492), p. 459; OD.

Neofusulina A. D. Miklukho-Maklay, 1963 (*2130), p. 221.

Test large, subcylindrical, elongate, septa intensely and regularly folded, forming cuniculi; wall thin, protheca may be differentiated in places, outer whorls with weakly developed diaphanotheca and inner tectorium, small chomata in earliest whorls only, well-developed axial deposits fill the central area from the proloculus to the poles. U. Carboniferous (U. Moscovian); USSR: Donets Basin, central Asia.

PARAEOFUSULINA Putrya, 1956

Plate 272, figs. 5 and 6

Type species: Eofusulina (Paraeofusulina) trianguliformis Putrya, 1956; OD.

Eofusulina (Paraeofusulina) Putrya, 1956 (*2492), p. 458 (described as subgenus but used in both generic and subgeneric sense in the original publication).

Test of medium to large size, elongate fusiform in all whorls, septa strongly fluted throughout and forming strongly arched loops; wall single layered and finely porous in the early whorls, poorly differentiated pseudochomata in the early whorls, axial deposits fill the central region. U. Carboniferous (Moscovian); NE Greenland; USSR: Donbass, central Asia.

VERELLA Dalmatskaya, 1951

Plate 272, fig. 7

Type species: Verella warsanofievae Dalmatskaya, 1951; OD.

Verella Dalmatskaya, 1951 (*884), p. 194.

Test small, elongate fusiform, septa flat or slightly wavy in the early whorls, becoming weakly to moderately fluted in the later whorls, low and weakly developed chomata, moderate axial thickenings present. U. Carboniferous (U. Bashkirian); European USSR; Uzbekistan; central Asia.

Subfamily WEDEKINDELLININAE F. Kahler and G. Kahler, 1966

Wedekindellininae F. Kahler and G. Kahler, 1966 (*1633), p. 407.

Test fusiform, septa nearly flat with little or no plication; wall of three or four layers, chomata prominent. U. Carboniferous (Moscovian to Stephanian).

EOWAERINGELLA Skinner and Wilde, 1967

Plate 272, figs. 8-11

Type species: Wedekindellina ultimata Newell and Keroher, 1937 (*2254), p. 700; OD.

Eowaeringella Skinner and Wilde, 1967 (*3000), p. 1004.

Test small, 3 mm to 4 mm in length, fusiform to subcylindrical, poles bluntly rounded, small proloculus followed by up to nine regularly planispiral volutions, septa nearly plane in midregion of test, slightly to moderately fluted toward the poles; wall thin, of tectum, diaphanotheca, and inner and outer tectoria, secondary deposits on the septa form moderate axial deposits that are less prominent than in *Wedekindellina*, chomata over half the chamber height, asymmetrical, with steep side facing the narrow to moderately broad tunnel. U. Carboniferous (U. Moscovian to L. Stephanian: Desmoinesian to Missourian); USA: Iowa, Missouri, Kansas, Texas, New Mexico, Nevada.

EOWEDEKINDELLINA Ektova, 1977

Plate 272, figs. 15-17

Type species: Eowedekindellina fusiformis Ektova, 1977; OD.

Eowedekindellina Ektova, 1977 (*1096), p. 40.

Eowedekindellina Bel'govskiy and Ektova, 1966 (*180), p. 1389 (name not available, ICZN Art. 13 (a)(i), no description).

Test small, up to 3.5 mm in length, fusiform to subcylindrical, axis lengthening rapidly, globular proloculus followed by three to four regularly planispiral whorls, early ones close coiled, final whorl rapidly increasing in height, septa plane in early whorls, slightly fluted axially in final whorl; wall of three layers, tectum, and inner and outer tectoria, chomata massive to moderate, asymmetrical, steepest side facing the tunnel, axial thickenings well developed and may fill much of the test cavity. U. Carboniferous (Bashkirian); USSR: Tyan-Shan.

FRUMENTELLA W. J. Stewart, 1958

Plate 273, figs. 1-5

Type species: Frumentella exempla W. J. Stewart, 1958; OD.

Frumentella W. J. Stewart, 1958 (*3068), p. 1055.

Test very small, up to 1.2 mm in length, fusiform, with relatively large proloculus followed by four volutions, the earliest being streptospirally coiled, later stage becoming fusiform after a change in coiling axis, septa flat, without fluting; wall of three layers, with tectum, diaphanotheca, and irregularly developed outer tectorium, chomata present, extending laterally into the axial secondary deposits. U. Carboniferous (Moscovian), Strawn; USA: Texas; New Mexico.

PARAFUSULINELLA W. J. Stewart, 1970

Plate 273, figs. 6-8

Type species: Parafusulinella propria W. J. Stewart, 1970; OD.

Parafusulinella W. J. Stewart, 1970 (*3069), p. 50.

Test small, up to 2.4 mm in length, fusiform, with bluntly pointed extremities, small to average-sized proloculus followed by about six to seven volutions in a closely and streptospirally coiled ovoid juvenarium, later whorls with changed axis of coiling that lengthens rapidly, septa slightly undulating in the central region and slightly fluted toward the apices; wall thin, three layered, of tectum, relatively dense diaphanotheca, and outer tectorium and rarely may have a suggestion of a thin lower tectorium, chomata well developed in all but final whorl, asymmetrical, about half the height of the chamber, tending to overhang the tunnel that is developed after the coiling axis straightens and elongates, secondary deposits gradually thinning toward the apices and may grade into the axial filling, or the latter may be present only in the apical areas and absent from the axial region. U. Carboniferous (Moscovian), L. Desmoinesian; USA: New Mexico; Mexico.

PARAWEDEKINDELLINA Safonova, 1951

Plate 272, figs. 12-14

Type species: Parawedekindellina kamensis Safonova, in Rauzer-Chernousova et al., 1951; OD.

Parawedekindellina Safonova, in Rauzer-Chernousova et al., 1951 (*2532), p. 240.

Test small, up to 1.5 mm in length, fusiform and inflated from the early whorls, gradually expanding spire of three to five whorls, septa plane throughout or weakly undulating at the polar regions; wall thin, four layered, with tectum, weakly developed diaphanotheca that is present only in later whorls and well-developed outer tectorium covering the surface of all whorls to the poles and that may merge with the distinct low chomata. U. Carboniferous (Moscovian); USSR: Russian Platform, Komi ASSR.

Remarks: The wall is stated to be four layered, hence apparently includes an inner tectorium, although this was not mentioned in the original description.

PSEUDOWEDEKINDELLINA Sheng, 1958

Plate 273, figs. 9-11

Type species: Pseudowedekindellina prolixa Sheng, 1958; OD.

Pseudowedekindellina Sheng, 1958 (*2895), p. 87.

Test small, up to 3.7 mm in length, elongate, fusiform, poles bluntly pointed, axis of coiling slightly irregular, small proloculus followed by about four closely coiled volutions, numerous chambers per whorl, septa plane or may be slightly fluted in the polar regions; three-layered wall of tectum and upper and lower tectoria, axial fillings well developed, low narrow tunnel bordered by broad and prominent chomata that reach nearly two-thirds the height of the chamber and extend almost to the poles. U. Carboniferous (Moscovian); N. China.

WEDEKINDELLINA Dunbar and Henbest, 1933

Plate 273, figs. 12-14

Type species: Fusulinella euthusepta Henbest, 1928 (***1454**), p. 80 (= *Wedekindella euthysepta* Dunbar and Henbest, 1930, ***1017**, p. 362, err. emend.); OD.

Wedekindellina Dunbar and Henbest, in Cushman, 1933 (***766**), p. 134 (nom. subst. pro *Wedekindia* Dunbar and Henbest, 1931).

Wedekindella Dunbar and Henbest, 1930 (*1017), p. 362 (non *Wedekindella* Schindewolf, 1928); obj.; OD.

Fusulinella (Wedekindiella) Yabe and Hanzawa, 1932 (***3412**), p. 42 (nom. transl.; err. cit.).

Wedekindia Dunbar and Henbest, 1931 (*1018), p. 458 (non *Wedekindia* Schindewolf, 1925; nom. subst. pro *Wedekindella* Dunbar and Henbest, 1930); type species: obj.

Test elongate, fusiform, up to nearly 6 mm in length, globular to ovoid proloculus followed by about nine to ten tightly coiled volutions, axis of coiling straight, the numerous septa per whorl straight in the central area of the test but may be slightly fluted toward the extremities, those of earlier whorls commonly obscured by the heavy axial deposits; wall four layered, of tectum, thick diaphanotheca, and thin inner and outer tectoria, perforations penetrate all layers, narrow tunnel of regular to very irregular path, bordered by asymmetrical chomata that may be low or up to two-thirds the chamber height and commonly extend laterally into the axial fillings; septal pores present in the outer whorls. U. Carboniferous (Moscovian); USA: Illinois, Indiana, Ohio, Iowa, Kansas, Oklahoma, Texas, New Mexico, Nevada, Colorado, Utah, Wyoming; Canada: Ellesmereland; NE Greenland; Japan; China; USSR: Donets, Timan, Russian Platform, N. Urals, Asiatic USSR.

Family SCHWAGERINIDAE Dunbar and Henbest, 1930

Schwagerinidae Dunbar and Henbest, 1930 (***1017**), p. 363.

Test large, fusiform to irregularly cylindrical, planispiral and involute, later volutions may be inflated or uncoiled; septa strongly fluted, may have cuniculi or phrenothecae; spirotheca thick, of tectum and alveolar keriotheca; tunnel generally single, chomata faint to massive, axial fillings absent to prominent. U. Carboniferous (Moscovian) to U. Permian.

Subfamily POLYDIEXODININAE A. D. Miklukho-Maklay, 1953

Polydiexodininae A. D. Miklukho-Maklay, 1953 (***2118**), p. 21.

Test very large, closely coiled, septa regularly and intensely fluted and form cuniculi; axial thickenings present; one to several apertures. M. Permian (Kungurian).

EOPOLYDIEXODINA Wilde, 1975

Plate 274, figs. 1-6

Type species: Polydiexodina afghanensis Thompson, 1946 (***3188**), p. 150; OD.

Eopolydiexodina Wilde, 1975 (*3376), p. 76.
Eopolydiexodina J. A. Douglas, 1950 (*972), p. 48, 49 (name not available, ICZN Art. 13 (b), no species included).

Test large, elongate fusiform to cylindrical, up to 38 mm long and 5 mm wide, axis of coiling irregular to curved, central region slightly inflated, proloculus irregular, eight to ten gradually enlarging volutions, at first irregularly coiled, later more regularly coiled and rapidly widening, septa intensely fluted throughout entire length and in all volutions of the test, cuniculi well developed; wall thin, of coarsely alveolar keriotheca and sporadically preserved thin dark tectum, the upper wall surface appearing to have been resorbed during formation of the tunnels, median tunnel not well defined or present only in the microspheric generation, sporadic supplementary tunnels rare or may number up to twenty-four, axial fillings present in the extreme polar regions from the third volution. M. Permian (M. Kungurian), M. Guadalupian; Afghanistan; China; Iraq; Iran; Turkey; Yugoslavia; USSR.

Remarks: Differs from *Polydiexodina* in lacking a median tunnel and in having only sporadic supplementary tunnels.

POLYDIEXODINA Dunbar and Skinner, 1931

Plate 274, figs. 7-9

Type species: Polydiexodina capitanensis Dunbar and Skinner, 1931; OD.

Polydiexodina Dunbar and Skinner, 1931 (*1020), p. 263.
Paleofusulina (Polydiexodina) Yabe and Hanzawa, 1932 (*3412), p. 42 (nom. transl.).

Test elongate cylindrical, microspheric test up to 22 mm in length, large irregular proloculus may be flattened, followed by nine to eleven low, closely coiled volutions, septa numerous, twelve to fifteen in the early whorls, up to fifty in the final whorl, regularly and strongly fluted, with narrow septal folds, the fluting of adjacent septa opposed and producing cuniculi where in contact; wall thin, both tectum and keriotheca thin, central tunnel well defined, low, and slitlike, with regularly arranged supplementary tunnels that are continuous into the outer whorls, no chomata or parachomata present, heavy axial fillings confined to the axial region in the early whorls. M. Permian (U. Kungurian), U. Guadalupian; USA: Texas, New Mexico; Mexico.

SKINNERINA Ross, 1964

Plate 275, figs. 1-5

Type species: Skinnerina typicalis Ross, 1964 = *Polydiexodina*? *rotundata* Dunbar and Skinner, 1937 (*1022), p. 697; OD.

Skinnerina Ross, 1964 (*2647), p. 313.

Test of moderate size, subcylindrical to fusiform, up to 11.3 mm in length, up to nine or ten volutions, septa increasing from eleven in the first whorl up to thirty-eight in later whorls, intensely and regularly fluted from pole to pole, resulting in high and well-developed cuniculi, septal loops high with bluntly squared tops as seen in section; wall thin in early volutions, consisting of tectum and keriotheca, the latter thickening in the outer whorls and becoming coarsely alveolar, widespread secondary deposits thickening the tops of the septal loops, no well-defined median tunnel, supplementary tunnels sporadic and discontinuous in the megalospheric test but may be present in the microspheric one. M. Permian (L. Kungurian), L. Guadalupian; USA: Texas.

Remarks: Differs from *Polydiexodina* by the absence of a median tunnel and in having only sporatic and discontinuous accessory ones. The M. Guadalupian *Eopolydiexodina* differs in the irregular shaped proloculus and thus the irregular surrounding early whorls.

Subfamily CHUSENELLINAE F. Kahler and G. Kahler, 1966

Chusenellinae F. Kahler and G. Kahler, 1966 (*1633), p. 422.

Test with septal plications lacking or very weakly developed in early stage. L. to U. Permian.

CHUSENELLA Hsu, 1942

Plate 276, figs. 1-8; plate 277, figs. 1-3.

Type species: Chusenella ishanensis Hsu, 1942; OD.

Chusenella Hsu, 1942 (*1570), p. 175; OD.
Chusenella Lee, 1942 (*1816), p. 171 (name not available, ICZN Art. 13 (b), no species included).

Orientoschwagerina A. D. Miklukho-Maklay, 1955 (*2119), p. 573; type species: *Orientoschwagerina abichi* A. D. Miklukho-Maklay, 1955; OD.

Chusenella (Sosioella) Skinner and Wilde, 1966 (*2999), p. 10; type species: *Chusenella sosioensis* Pasini, 1964 (*2366), p. 172; OD.

Test ovate, robust fusiform to elongate fusiform with sharp apices, up to 13.5 mm in length, small to medium-sized proloculus, early whorls tightly coiled, up to eight or nine volutions in the adult, later ones more loosely expanded, early septa without fluting, later septa highly and tightly fluted throughout length: wall thin, with tectum and weakly fibrous keriotheca increasing slowly in thickness, rudimentary chomata in the juvenile stage of some species, or chomata may be completely lacking throughout, axial filling prominent, but tunnel present in the equatorial region. L. Permian (Sakmarian), Wolfcampian to U. Permian: China; Indo-China; Laos; Japan; USA: California, Texas, Washington; Yugoslavia; Turkey; central Asiatic USSR.

RUGOSOCHUSENELLA Skinner and Wilde, 1965

Plate 275, figs. 6–8

Type species: Rugosochusenella zelleri Skinner and Wilde, 1965; OD.

Rugosochusenella Skinner and Wilde, 1965 (*2996), p. 102.

Test of medium to large size, up to 7 or more mm in length, elongate fusiform, with pointed extremities, up to eight volutions, earliest ones tightly coiled about the tiny proloculus and thin walled, then gradually increasing in height, septa plane in the earliest whorls, irregularly fluted in later whorls throughout the length of the test, increasing from about nine septa per whorl in the early stage up to thirty-two in the latest whorl; wall of tectum and coarsely alveolar keriotheca, tunnel moderately wide, straight, chomata present in early whorls but poorly developed or lacking in outer ones, heavy axial fillings, particularly toward the poles, sutures deeply indented and chamber surface also has longitudinal and transverse indentations, resulting in a rough pebbly surface that together with the irregular septal fluting produces the rugose appearance of sections. L. Permian (Sakmarian), Wolfcampian; Southwest USA.

Subfamily SCHWAGERININAE Dunbar and Henbest, 1930

Schwagerininae Yabe and Hanzawa, 1932 (*3412), p. 42, nom. transl. ex family Schwagerinidae.

Pseudofusulininae Dutkevich, 1934 (*1027), p. 9, 10, 61, 62; 1934 (*1026), p. 53.

Pseudofusulinae Dutkevich, 1934 (*1027), p. 9, 10, 61, 62 (tribe).

Paraschwagerininae F. Kahler and G. Kahler, 1966 (*1634), p. 707 (invalid; provisional).

Rugusofusulininae Davydov, 1986 (*902A), p. 35 (name not available, ICZN Art. 13 (a)(i), no description).

Triticitinae Davydov, 1986 (*902A), p. 35 (name not available, ICZN Art. 13 (a)(i), no description).

Test of medium to large size, septa may be wavy and weakly or irregularly fluted to intensely and regularly fluted; outer tectorium present in more primitive forms only, chomata present; aperture single. U. Carboniferous (U. Moscovian) to U. Permian.

DARVASITES A.D. Miklukho-Maklay, 1959

Plate 277, fig. 4

Type species: Triticites ordinatus var. *daroni* A. D. Miklukho-Maklay, 1949 (*2115), p. 70; OD.

Darvasites A. D. Miklukho-Maklay, 1959 (*2126), p. 12, 13, 16.

Darvasites A. D. Miklukho-Maklay, 1957 (*2122), p. 108 (name not available, ICZN Art. 13 (a)(i), no description).

Nagatoella (Darvasites) Rozovskaya, 1969 (*2664), p. 42 (nom. transl.).

Test of medium size, about 6 mm in length, ovoid to subfusiform, eight to nine gradually enlarging whorls, septa moderately folded near the base, producing low but regular arches, fluting more prominent toward the poles; wall thin, with tectum and keriotheca, chomata moderately to massively developed, present in all whorls. L. Permian to U. Permian: USSR: central Asia, Caucasus; China; Japan.

Remarks: *Darvasites* resembles *Nagatoella* but differs in the more strongly developed chomata in all whorls, whereas chomata are lower and occur only in the earlier whorls of *Nagatoella*.

DUNBARINELLA Thompson, 1942

Plate 278, figs. 1–4

Type species: Dunbarinella ervinensis Thompson, 1942; OD.

Dunbarinella Thompson, 1942 (*3185), p. 416.

Test fusiform, poles sharply acuminate, axis of coiling straight, very small proloculus followed by six to ten whorls, the earliest two to four forming a closely coiled juvenarium, later whorls expanding uniformly, septa strongly and narrowly fluted throughout; wall very thin in the juvenarium, thicker in later whorls, of tectum and coarsely alveolar keriotheca, chomata strong and form definite ridges in the juvenarium and present in all but last one or two volutions, a single narrow tunnel present, axial fillings heavy, completely filling the chambers of all but the inner few whorls and the final one. U. Carboniferous (Stephanian), Virgilian, to L. Permian (Sakmarian), Wolfcampian; USA: Oklahoma, Texas, New Mexico, California; China; European USSR.

Remarks: Differs from *Schwagerina* and from *Pseudofusulina* in the presence of the heavy axial fillings and distinct chomata.

EOPARAFUSULINA Coogan, 1960

Plate 278, figs. 5-15

Type species: Fusulina gracilis Meek, 1864 (***2084**), p. 4; OD.

Parafusulina (Eoparafusulina) Coogan, 1960 (***678**), p. 262.
Eoparafusulina Skinner and Wilde, 1965 (***2997**), p. 73 (nom. transl.).
Alaskanella Skinner and Wilde, 1966 (***2998**), p. 57: type species: *Alaskanella laudoni* Skinner and Wilde, 1966; OD.

Test relatively small, up to 11 mm in length, subcylindrical to subglobular, small proloculus followed by up to eight closely coiled and gradually expanding volutions, upper part of septa nearly plane, lower part strongly fluted from pole to pole, the opposed folds of adjacent septa joining to produce small chamberlets in the lower part, and resorption producing spiralling passages or cuniculi in the outer whorls; wall of tectum and keriotheca, low tunnel bordered by chomata that occur both on the proloculus and later chambers, either chomata or discontinuous septal thickenings or pseudochomata present in all but the outermost whorls, secondary deposits may occur at the tops of septal folds near the tunnel, and axial deposits present near the poles. L. Permian; USA: California, Texas.

Remarks: The original definition of *Eoparafusulina* was based on specimens identified as *Fusulina gracilis* Meek, one of which had been designated as a neotype by Thompson and Wheeler (in Thompson et al., 1946, ***3195**, p. 31). Skinner and Wilde (1965, ***2997**, p. 74) noted that this specimen had been misidentified and they described as the new species *Eoparafusulina thompsoni* the actual species studied by Thompson and Wheeler and by Coogan. Skinner and Wilde also illustrated topotypes of the true *Fusulina gracilis*. A ruling by the ICZN (Op. 916, Melville and China, 1970, ***2091**, p. 39) then set aside the neotype designation by Thompson and Wheeler and recognized the species *gracilis* Meek as based on the lectotype designated and illustrated by Wilson (1967, ***3381**, p. 234, pl. 1, figs. 4, 5) from the original syntypes in the collections of the Museum of Comparative Zoology, Harvard University.

IOWANELLA Thompson, 1957

Plate 279, figs. 1 and 2

Type species: Triticites winterensis Thompson, Verville, and Lokke, 1956 (***3194**), p. 807; OD.

Kansanella (Iowanella) Thompson, 1957 (***3192**), p. 301.

Moderate in size, up to 8 mm in length, inflated fusiform, sharp to bluntly pointed poles, proloculus spherical, first whorl short and inflated, later whorls expanding slowly and regularly and test becoming elongate and fusiform, septa closely spaced, irregularly fluted throughout; wall very thin and appearing structureless in earliest whorls, later whorls with tectum and thin alveolar keriotheca, tunnel narrow and high, straight to slightly varied in direction, chomata asymmetrical, high, and broad, extending along the chamber floor to the poles as axial fillings in the inner volutions, and only part of this distance in outer whorls, nearly completely filling the chambers near the tunnel; numerous septal pores. U. Carboniferous (Stephanian), L. Missourian; USA: Iowa.

KANSANELLA Thompson, 1957

Plate 279, figs. 3-5

Type species: Kansanella (Kansanella) joensis Thompson, 1957; OD.

Kansanella Thompson, 1957 (***3192**), p. 299.

Test large, up to 10 or more mm in length, elongate, subcylindrical to fusiform, poles rounded to bluntly pointed, small spherical proloculus followed by about nine slowly and uniformly expanding whorls, septa irregularly fluted throughout the test length; wall thin, of tectum and thin keriotheca, tunnel narrow at first, later moderately wide, bordered in the earlier whorls by broad and asymmetrical chomata that extend a considerable distance toward the poles, chomata more symmetrical in outer whorls, thin and discontinuous axial fillings present in the polar regions. U. Carboniferous (Stephanian), U. Missourian; USA: Iowa, Kansas, Missouri, Oklahoma, Utah.

LEPTOTRITICITES Skinner and Wilde, 1965

Plate 279, figs. 6 and 7

Type species: Leptotriticites hatchetensis Skinner and Wilde, 1965; OD.

Triticites (Leptotriticites) Skinner and Wilde, 1965 (*2996), p. 89 (stated to be a subgenus but used in generic sense).

Test small to large, up to 11 mm in length, elongate subcylindrical to subglobose, with sharply pointed poles, axis of coiling straight, up to thirteen volutions following the small spherical proloculus, septa numerous, closely spaced, strongly fluted from pole to pole, most intensely in the polar areas where the folds may nearly reach the top of the chambers; wall very thin, of tectum and finely alveolar keriotheca, although alveoles may not be recognizable in the early whorls, tunnel present, up to half the height of the chamber, massive chomata appear blocky in axial section and commonly reach the top of the whorls. L. Permian (Sakmarian), Wolfcampian; USA: New Mexico, Arizona, Kansas, Texas, Utah, Oklahoma, Nevada.

MCCLOUDIA Ross, 1967

Plate 279, figs. 8-10

Type species: Eoparafusulina contracta Skinner and Wilde, 1965 (*2997), p. 78; OD.

Eoparafusulina (Mccloudia) Ross, 1967 (*2648), p. 945.

Test robust, subcylindrical, fusiform or subglobose, poles broadly rounded, up to 6 mm in length, small proloculus and first one or two volutions coiled in a different plane than later whorls, septa crenulate, crests of the folds thickened by secondary deposits, especially adjacent to the tunnel, cuniculi developed in the outer volutions where folds of adjacent septa are in contact; wall of early whorls thin, rapidly thickening in later whorls, of tectum and prominent thick keriotheca, chomata and pseudochomata commonly present but axial fillings minor or absent. L. Permian (Sakmarian), (L. to M. Wolfcampian); USA: California, Nevada.

MONODIEXODINA Sosnina, 1956

Plate 277, fig. 5

Type species: Schwagerina wanneri var. *sutschanica* Dutkevich, 1934 (*1026) (not seen); Dutkevich, in Likharev, 1939 (*1850), p. 39 (not seen); OD.

Monodiexodina Sosnina, in Kiparisova et al., 1956 (*1689), p. 24.

Parafusulina (Monodiexodina) Coogan, 1960 (*678), p. 263 (nom. transl.).

Test large, elongate, subcylindrical, poles broadly rounded, five to eight low, closely coiled whorls, septal fluting with long and low folds restricted to the lower part of the septa and forming low cuniculi; wall of tectum and thin alveolar keriotheca, earliest one or two volutions may have rudimentary chomata bordering the single tunnel, later whorls lack chomata, axial deposits massive, especially near the poles. L. Permian (M. Wolfcampian) to M. Permian (Kungurian), Guadalupian; USSR; India; Japan; Timor; Canada; USA: Texas, Nevada.

MONTIPARUS Rozovskaya, 1948

Plate 279, figs. 11 and 12

Type species: Triticites (Montiparus) montiparus Rozovskaya, 1948 (see ICZN Art. 70 (c); = *Fusulina montipara* Ehrenberg of von Möller, 1878 (*2159), p. 61; non *Alveolina montipara* Ehrenberg, 1854); OD.

Triticites (Montiparus) Rozovskaya, 1948 (*2655), p. 1637.

Montiparus A. D. Miklukho-Maklay, 1959 (*2126), p. 14 (nom. transl.).

Eotriticites Wilde, 1984 (*3377), p. 545, 547; type species: *Fusulina montipara* Ehrenberg of von Möller, 1878 (*2159), non *Alveolina montipara* Ehrenberg, 1854, obj.: OD.

Test fusiform to ovoid, early stage close coiled, whorls enlarging with growth, septa flat to irregularly plicate; wall finely alveolar, of tectum, keriotheca, and outer tectorium, chomata subquadrate, massive; septal pores present. U. Carboniferous (U. Moscovian); USSR; China; Japan.

Remarks: *Montiparus* was described by Rozovskaya with the type species *"Triticites montiparus* Ehr. em. Möll." Ehrenberg's material was from the Pinega Valley, near Archangel, Russia, and is of Permian age. Dunbar and Skinner (1936, ***1021**, p. 84) restudied the original material of Ehrenberg and determined Ehrenberg's specimen to be *Schwagerina*, which they cited as *Schwagerina montipara* (Ehrenberg). Specimens referred by von Möller to this species were from the basal part of the Upper Carboniferous, as was the geologic range given for *Montiparus* by Rozovskaya in the original generic diagnosis. Wilde (1984, ***3377**) regarded *Montiparus* as a synonym of *Schwagerina* and proposed the new genus *Eotriticites*, with the type species indicated as *Fusulina montipara* von Möller, non *Alveolina montipara* Ehrenberg. However, the same designation was given by Rozovskaya, as she considered the type species to be that of von Möller and not Ehrenberg, hence *Eotriticites* is a junior isotypic synonym of *Montiparus*.

According to the ICZN Art. 70 (c), "If an author fixes as the type species of a new nominal genus . . . a species . . . used in the sense of the misidentification of a previous author, the type species . . . is deemed to be a new nominal species . . . [with] the same species group name as was misapplied . . . combined with the new generic or subgeneric name." The type species of the present genus is thus *Triticites (Montiparus) montiparus* Rozovskaya. Rozovskaya (1975, ***2665**, p. 252) stated that the specimen she figured in 1950 (***2657**), pl. 2, fig. 5 was the "holotype" and that von Möller's specimen of 1878 (***2159**), pl. 8, fig. 2, was the "lectotype," thus incorrectly citing two types for the same species. Von Möller did not describe a new species, hence Rozovskaya's specimen (1950, ***2657**, pl. 2,fig. 5) is the holotype of *Montiparus montiparus* (Rozovskaya), non *Alveolina montipara* Ehrenberg.

NAGATOELLA Thompson, 1936

Plate 280, figs. 1-6

Type species: Fusulina (Schellwienia) ellipsoidalis var. *orientis* Ozawa, 1925 (***2318**), p. 22; OD.

Nagatoella Thompson, 1936 (***3183**), p. 196.

Test large, up to 7 mm in length, ellipsoidal, poles broadly rounded, adult tests with about thirteen whorls, septa increasing from about eight per whorl in the early stage to thirty in the outer whorl, septa nearly plane in their upper part, widely spaced fluting at the base of the septa throughout the length of the test, locally forming cuniculi; wall of early whorls thin, later thicker, of tectum and thick, coarsely alveolar keriotheca that extends along the septa to result in a wedgelike form, tunnel wide and well developed, bordered by low, narrow, and asymmetrical chomata in the inner four to five whorls, later discontinuous, outer whorls with prominent secondary deposits on both faces of the septa as well as the inner surface of the chambers from the tunnel to the poles, axial fillings present in the early whorls. M. Permian (Kungurian); Japan; USA: California, Oregon.

NIPPONITELLA Hanzawa, 1938

Plate 280, figs. 7-10

Type species: Nipponitella explicata Hanzawa, 1938; OD.

Nipponitella Hanzawa, 1938 (***1403**), p. 256.

Test with elongate fusiform early stage of spherical proloculus and three to six regularly expanding whorls, followed by much larger irregularly uncoiled later stage, septa narrowly fluted at the poles but fluting limited to the base of the septa in the central part of the test, uncoiled part with intense irregular fluting; wall of tectum and coarsely alveolar keriotheca, enrolled stage has a single tunnel and bordering chomata, but neither are present in the uncoiled part. U. Permian; Japan; USSR.

OKETAELLA Thompson, 1951

Plate 280, figs. 11 and 12

Type species: Oketaella fryei Thompson, 1951; OD.

Oketaella Thompson, 1951 (*3190), p. 116.

Test small, inflated, ellipsoidal to fusiform, relatively large proloculus followed by about six loosely coiled volutions, septa thick, unfluted throughout; wall thick, of tectum and thick keriotheca, with very finely porous upper keriotheca and coarsely alveolar lower keriotheca, septal wall of tectum and an extension of the keriotheca from the chambers on both sides, single tunnel with straight to irregular path, low and narrow chomata in the first whorl, and high, broad, and asymmetrical chomata in later whorls that are continuous with the coatings on the chamber floor and merge with the axial fillings. L. Permian (Sakmarian), Wolfcampian; USA: Missouri, Kansas, Oklahoma, Texas, New Mexico, Nevada; Japan; Yugoslavia: Montenegro.

PARAFUSULINA Dunbar and Skinner, 1931

Plate 283, figs. 7-10

Type species: Parafusulina wordensis Dunbar and Skinner, 1931; OD.

Parafusulina Dunbar and Skinner, 1931 (*1020), p. 258.

Palaeofusulina (Parafusulina) Yabe and Hanzawa, 1932 (*3412), p. 42 (nom. transl.).

Parafusulina (Skinnerella) Coogan, 1960 (*678), p. 262; type species: *Parafusulina schucherti* Dunbar and Skinner, 1937 (*1022), p. 672; OD.

Test elongate, up to 65 mm in length, fusiform to subcylindrical, tapering slightly to the bluntly rounded poles, proloculus large, followed by seven to nine gradually enlarging volutions, coiling axis straight to irregular, septa numerous, intensely and regularly fluted, folds of adjacent septa touching and forming numerous chamberlets above the floor of the chamber, and producing cuniculi against the floor; wall thin in relation to the size of the test, of tectum and alveolar keriotheca, tunnel low and well defined, no chomata, but with heavy axial fillings. Permian: USA: Texas, Nevada, Arizona, California, Washington; Mexico; Venezuela; Japan; S. China; Mongolia.

PRAVITOSCHWAGERINA Toriyama, 1982

Plate 281, figs. 3-6

Type species: Pravitoschwagerina thailandensis Toriyama, 1982; OD.

Pravitoschwagerina Toriyama, 1982 (*3213), p. 4.

Test small to moderate in size, up to 5.6 mm in length, fusiform to elongate cylindrical, axis of coiling straight to slightly curved, large proloculus followed by about five to eight rapidly enlarging whorls, or may have a much reduced chamber cavity in the last one or two whorls so that successive outer walls are in contact for some distance, the septa of the outer whorl may even penetrate the tectum into the keriotheca of the preceding whorl, septa thick, strongly and irregularly fluted; wall of thin dense tectum and very thick alveolar keriotheca that apparently twists somewhat in the outer volutions so that the alveoli locally appear perpendicular to the surface when viewed in axial section, but nearby in the same thin section the alveoli are seen in cross-section and give the wall a honeycomblike appearance. L. Permian (Artinskian); Thailand.

PSEUDOFUSULINA Dunbar and Skinner, 1931

Plate 281, figs. 1 and 2; plate 282, figs. 1-7; plate 283, figs. 1-6

Type species: Pseudofusulina huecoensis Dunbar and Skinner, 1931; OD.

Pseudofusulina Dunbar and Skinner, 1931 (*1020), p. 252.

Leeina Galloway, 1933 (*1205), p. 406; type species: *Fusulina vulgaris* var. *fusiformis* Schellwien, 1909 (*2754), p. 165; OD.

Rugosofusulina Rauzer-Chernousova, 1937 (*2515), p. 11; type species: *Alveolina prisca* Ehrenberg em. von Möller, 1878 (*2159), p. 56; OD.

Schwagerina (Rugofusulina) Dunbar and Henbest, 1942 (*1019), p. 82 (nom. transl.; err. cit.).

Codonoschwagerina Viên, 1959 (*3292), p. 111; type species: *Codonoschwagerina thuanae* Viên, 1959; OD.

Pseudofusulina (Rugosofusulina) Ross and Dunbar, 1962 (*2650), p. 39 (nom. transl.).

Pseudofusulinoides Bensh, 1972 (*187), p. 118; type species: *Pseudofusulinoides subobscurus* Bensh, 1972; OD.

Test large, up to 15 mm in length, elongate fusiform, with acuminate poles, axis of coiling straight, large proloculus followed by about eight loosely coiled whorls, septa fluted throughout, most strongly at the base of the septa and toward the poles and may be sufficiently strongly folded to produce closed chamberlets, thin dense partitions or phrenothecae may cross the chambers between folds of the septa; wall thick, of tectum and coarsely alveolar keriotheca, axial fillings may be thin and confined to the poles, or even absent in some species, chomata distinct in early taxa, but less prominent in later ones, tunnel straight. L. Permian (Asselian-Sakmarian to Artinskian), Wolfcampian to Leonardian, to M. Permian (Kungurian); North America; Europe; Asia.

SCHWAGERINA von Möller, 1877

Plate 284, figs. 1-9

Type species: Borelis princeps Ehrenberg, 1842 (*1058), p. 274; OD(M); ICZN Opinion 213, Hemming, 1954 (*1453), p. 38.

Schwagerina von Möller, 1877 (*2158), p. 143.

Triticites (Jigulites) Rozovskaya, 1948 (*2655), p. 1638; type species: *Triticites jigulensis* Rauzer-Chernousova, 1938 (*2516), p. 120, 157; OD.

Jigulites Rozovskaya, 1966 (*2663), p. 103 (nom. transl.).

Globifusulina Alekseeva, Izotova, and Polenova, in Izotova et al., 1983 (*1594), p. 23; type species: *Fusulina krotowi* Schellwien, 1908 (*2753), p. 190 = *Borelis princeps* Ehrenberg, 1842; OD.

Test small, up to 6 mm in length, robustly fusiform, with flanks convex and poles subacute to bluntly rounded, proloculus small, followed by about six gradually enlarging volutions, septa regularly and intensely fluted, folds of adjacent septa opposed and touching to divide the lower part of the chambers into small chamberlets; wall gradually increasing in thickness, of tectum and alveolar keriotheca, upper part commonly with finer alveoli and lower part with fewer and coarser alveoli, chomata weak or absent, tunnel narrow, wandering slightly. L. Permian (Sakmarian to Artinskian), Wolfcampian to Leonardian; cosmopolitan.

Remarks: The species described by von Möller (1877, *2158) as *Schwagerina princeps* (Ehrenberg) was renamed as *Schwagerina moelleri* Rauzer-Chernousova, as it is neither conspecific nor congeneric with Ehrenberg's types of *Borelis princeps* (restudied and illustrated by Dunbar and Skinner, 1936, *1021). As this was a case of an inadvertently misidentified type species, a ruling was made by the ICZN (Hemming, 1954) unalterably fixing the type of *Schwagerina* as that named in the original description (i.e., *Borelis princeps* Ehrenberg). Dunbar and Skinner (1936, *1021, p. 86, 87) state that *Fusulina krotowi* Schellwien, 1908 is a junior synonym of *Borelis princeps* Ehrenberg, 1842, hence *Globifusulina* is a synonym of *Schwagerina*.

TRITICITES Girty, 1904

Plate 284, figs. 10-14; plate 285, figs. 1-14

Type species: Miliolites secalicus Say, in James, 1823 (*1599), p. 328; OD.

Triticites Girty, 1904 (*1239), p. 234.

Girtyina Staff, 1909 (*3059), p. 490 (on p. 490 refers to "*Fusulina (Girtyina) ventricosa* in Schellwien's Manuskript" but discusses *Girtyina* in the generic sense, with type species "*G. ventricosa* Meek"; *Girtyina* is regarded as a subgenus on p. 506, without indication as to the genus); type species: *Fusulina cylindrica* var. *ventricosa* Meek and Hayden, 1859 (*2085), p. 261; OD.

Schwagerina (Triticites) Deprat, 1913 (*936), p. 8 (nom. transl.).

Grabauina Lee, 1924 (*1812), p. 51; type species: *Grabauina disca* Lee, 1924; OD.

Triticites (Rauserites) Rozovskaya, 1948 (*2655), p. 1637 (name not available, ICZN Art. 13(a)(i), no description).

Triticites (Rauserites) Rozovskaya, 1950 (*2657), p. 30; type species: *Triticites stuckenbergi* Rauzer-Chernousova, 1938 (*2516), p. 110, 155; OD.

Ferganites A. D. Miklukho-Maklay, 1959 (*2126), p. 16; type species: *Triticites ferganensis* A. D. Miklukho-Maklay, 1950 (*2116), p. 61, 68; OD.

Paratriticites Kochansky-Devidé, 1969 (*1711), p. 298; type species: *Paratriticites jesenicensis* Kochansky-Devidé, 1969; OD.

Small to medium in size, inflated fusiform to subcylindrical, poles acuminate to bluntly pointed, whorls expanding slowly and evenly, septa of earlier species plane in the median region, irregularly fluted toward the poles, septa of advanced species regularly fluted throughout; wall of tectum and well-defined alveolar keriotheca, single straight tunnel bordered by chomata that range from thin to massive. U. Carboniferous (L. Stephanian), Missourian, to L. Permian (Sakmarian), Wolfcampian; USA: Iowa, Illinois, Ohio, Kansas, Missouri, Texas, New Mexico, Nevada, Utah, Idaho, Wyoming, Arizona, California; South America; Yugoslavia; European and Asiatic USSR; Japan; China; Southeast Asia.

Subfamily BIWAELLINAE Davydov, 1984

Biwaellinae Davydov, 1984 (*902), p. 9.

Test nautiloid, earliest volution may be endothyroid, later planispiral, axis of coiling short in the early stage, sharply increasing in length from the third whorl, so that test becomes subcylindrical, septa plane to weakly fluted; wall undifferentiated or with tectum and primatheca in early whorls, later with keriotheca, chomata may be present. U. Carboniferous (Gzhel'ian) to L. Permian (Asselian).

BIWAELLA Morikawa and Isomi, 1960

Plate 286, figs. 4-6

Type species: Biwaella omiensis Morikawa and Isomi, 1960; OD.

Biwaella Morikawa and Isomi, 1960 (*2185), p. 301.

Test small, up to 3 mm in length, fusiform to cylindrical, axis of coiling straight to irregular, poles bluntly rounded, minute proloculus followed by four to five whorls, of which the first two are low and somewhat irregular in coiling and later ones expand rapidly, septa few, plane to slightly curved near the poles; wall of tectum and upper and lower tectoria in inner volutions, later with tectum and finely alveolar keriotheca, tunnel wide, chomata not apparent in the early whorls but prominent and asymmetrical in the later whorls. L. Permian (Asselian), Wolfcampian; Japan; USA: New Mexico; Yugoslavia: Montenegro.

DUTKEVICHITES Davydov, 1984

Plate 286, figs. 1-3

Type species: Dutkevichites darvasica Davydov, 1984; OD.

Dutkevichites Davydov, 1984 (*902), p. 11.

Test small, subcylindrical, tiny proloculus, early whorls tightly coiled, with short coiling axis that lengthens abruptly after the third volution, later whorls with moderately looser coiling, septa few, thin, strongly but irregularly fluted, appearing as high arches and loops in axial section and more intensely fluted toward the poles; wall in inner whorls undifferentiated or with tectum and primatheca, outer whorls with tectum and keriotheca and of increased thickness, minute chomata present in outer whorls. U. Carboniferous (Gzhel'ian) to L. Permian (Asselian); USSR: central Asia; Yugoslavia.

SPHAEROSCHWAGERINA A. D. Miklukho-Maklay, 1959

Plate 286, figs. 9 and 10

Type species: Schwagerina sphaerica var. *karnica* Shcherbovich, in Rauzer-Chernousova and Shcherbovich, 1949 (*2536), p. 102; OD.

Sphaeroschwagerina A. D. Miklukho-Maklay, 1959 (*2127), p. 157.

Sphaeroschwagerina A. D. Miklukho-Maklay, 1956 (*2120), p. 1154 (name not available, ICZN Art. 13 (a)(i), no description).

Test robust, adult stage nearly spherical and with shortened axis of coiling, up to 6 mm in length and slightly greater diameter, about nine whorls, inner two to four volutions tightly coiled and the test fusiform, whorl diameter sharply increased at the beginning of the adult stage, of maximum height in the penultimate whorl, and final whorl again of reduced height, septa thin, weakly fluted, forming a meshlike region at the poles; wall thin, gradually thickening as the test enlarges, small and inconstant chomata mark a broad low tunnel. L. Permian; USSR.

Remarks: *Sphaeroschwagerina* differs from *Pseudoschwagerina* in the shorter axis of coiling, less fluted septa, and presence of chomata even in the adult test.

Subfamily PSEUDOSCHWAGERININAE L. H. Chang, 1963

Pseudoschwagerininae L. H. Chang, 1963 (*519), p. 224.

Test spherical to fusiform; early stage tightly coiled, later whorls expanding unevenly, septa straight to slightly plicated; wall of tectum and keriotheca; chomata weakly developed; aperture single. U. Carboniferous (L. Stephanian, Kasimovian) to U. Permian (Murgabian).

ACERVOSCHWAGERINA Hanzawa, 1949

Plate 287, figs. 1-3

Type species: Paraschwagerina (Acervoschwagerina) endoi Hanzawa, 1949; OD.

Paraschwagerina (Acervoschwagerina) Hanzawa, 1949 (*1407), p. 207.

Acervoschwagerina A. D. Miklukho-Maklay, 1955 (*2119), p. 573 (nom. transl.).

Test large, may exceed 18 mm in length, robustly fusiform, poles rounded to bluntly pointed, axis of coiling straight, elongate fusiform juvenarium of two to three low volutions that are closely coiled about the small spherical proloculus, followed by two or three rapidly enlarging whorls that may exceed 1.5 mm in height, septa in the juvenarium regularly and highly fluted, in later whorls the extremely irregular fluting to the tops of the chambers may produce a number of vesicular chamberlets in the height of a single chamber; wall thin, alveolar; small chomata present in the inner whorls, narrow tunnel with irregular path and increasing unevenly in width with growth, may be roofed by phrenothecalike layers. L. Permian (Sakmarian): Japan.

CHALAROSCHWAGERINA Skinner and Wilde, 1965

Plate 286, figs. 7 and 8

Type species: Chalaroschwagerina inflata Skinner and Wilde, 1965; OD.

Chalaroschwagerina Skinner and Wilde, 1965 (*2997), p. 72.

Test small to large, up to 11 mm in length, fusiform to subspherical, poles rounded to bluntly pointed, large proloculus followed by four to eight whorls, with first one and a half to two volutions tightly coiled, later whorls expand rapidly although the change is not abrupt, final one or two whorls again of reduced height, septa strongly fluted in the lower part but only slightly wavy in the upper part, opposed folds of adjacent septa commonly meeting to divide the lower part of the chamber into small chamberlets but do not form cuniculi, phrenothecae present; wall thick, of tectum and coarsely alveolar keriotheca, tunnel commonly low and narrow, weak chomata on the proloculus and may be present on the first whorl but absent from later whorls, axial filling formed by secondary deposits on the septa. L. Permian (Sakmarian), Wolfcampian; USA: California, Nevada, Oregon; S. Chile: Isla Tarlton.

CUNICULINELLA Skinner and Wilde, 1965

Plate 288, figs. 6-8

Type species: Cuniculinella tumida Skinner and Wilde, 1965; OD.

Cuniculinella Skinner and Wilde, 1965 (*2997), p. 84.

Test of moderate to large size, fusiform to subglobular, poles rounded to sharply pointed, large proloculus followed by up to eight loosely coiled whorls, symmetrical throughout, septa intensely fluted and folds reach the tops of the septa, those of adjacent septa opposed and joined to produce small chamberlets in the lower parts of the chambers, resorption of the base of the folds produces well-developed cuniculi that encircle the test in the sagittal plane, especially in the outer whorls, phrenothecae commonly are strongly developed; wall thick, of tectum and coarsely alveolar keriotheca, tunnel single, low, and narrow, chomata present only in the proloculus, pseudochomata rare, axial fillings due to secondary deposits on the septa are common. L. Permian (U. Asselian), Wolfcampian; USA: California.

DAIXINA Rozovskaya, 1949

Plate 288, figs. 1-3

Type species: Daixina ruzhencevi Rozovskaya, 1949; OD.

Daixina Rozovskaya, 1949 (*2656), p. 252.

Pseudofusulina (Daixina) Ross and Dunbar, 1962 (*2650), p. 38 (nom. transl.).

Daixina (Bosbytauella) Isakova, 1982 (*1588), p. 32; type species: *Daixina gallowayi* (Chen) subsp. *bosbytauensis* Bensh, 1962 (*186), p. 211; OD.

Test inflated fusiform to elongate, globular proloculus followed by about four to five rapidly enlarging whorls, septa with shallow to strong and irregular fluting; wall uneven but not crenulate, thick, of tectum and coarsely alveolar keriotheca, tunnel well defined, chomata rarely present in the early volutions, none in later whorls, secondary deposits consist of irregular localized coatings on the septa. U. Carboniferous (L. Stephanian, Kasimovian) to L. Permian (Asselian to Sakmarian); USSR; Sicily; Yugoslavia; Greenland; China; Japan; USA: New Mexico, Utah.

DUTKEVITCHIA Leven and Shcherbovich, 1978

Plate 287, figs. 4-7

Type species: Rugosofusulina devexa Rauzer-Chernousova, 1937 (*2515), p. 19; OD.

Dutkevitchia Leven and Shcherbovich, 1978 (*1834), p. 96.

Test large, inflated fusiform, large globular proloculus followed by low first whorl and then by three to four rapidly enlarging whorls during which the test becomes more elongate, septa thin, intensely folded, strong plications over the full height of the septa throughout the length of the test; wall with strongly rugose tectum and alveolar keriotheca, no chomata, and no axial thickenings. L. Permian (Asselian); USSR: S. Urals, Caspian Basin, Fergana, Darvaz; Afghanistan; Yugoslavia; Carnic Alps; Thailand.

Remarks: Differs from *Chalaroschwagerina* in the rugose outer wall.

EOZELLIA Rozovskaya, 1975

Plate 288, figs. 4 and 5

Type species: Pseudoschwagerina primigena Rauzer-Chernousova, in Rauzer-Chernousova and Shcherbovich, 1949 (***2536**), p. 65; OD.

Eozellia Rozovskaya, 1975 (***2665**), p. 97.

Test of medium to large size, up to nearly 8 mm in length, inflated fusiform to subspherical, with broadly rounded poles, globular proloculus followed by tightly coiled juvenarium of a few whorls, then a sharp expansion to greater chamber height, followed by whorls of nearly even size, septa with moderate degree of irregular fluting, increasing in intensity in later whorls; wall thick, wide tunnel with irregular path beginning in the early stage, chomata well developed, outer tectorium also may be developed on the whorls of the juvenarium, later whorls with weakly developed chomata, or none. L. Permian (Asselian); USSR; China; Japan; Carnic Alps.

KLAMATHINA Skinner and Wilde, 1965

Plate 289, figs. 1-3

Type species: Klamathina elongata Skinner and Wilde, 1965; OD.

Klamathina Skinner and Wilde, 1965 (***2997**), p. 89.

Test large, up to nearly 14 mm in length, elongate fusiform, large spherical proloculus followed by juvenarium of two to three tightly coiled whorls, then an abrupt expansion to the final two or three loosely coiled whorls, septa intensely and irregularly fluted throughout test length with folds extending to the top of the septa, opposed folds of adjacent septa fuse at contact, dividing the lower part of the chambers into small rounded chamberlets, but do not form cuniculi, phrenothecae well developed; wall of tectum and coarsely alveolar keriotheca, tunnel low, ranging from narrow to wide, weak chomata present only on the proloculus, axial fillings present and may be prominent, filling the axial extremities of the tightly coiled juvenarium, absent from the early expanded whorls but again developed in the polar region of the final whorls. L. Permian (Sakmarian), U. Wolfcampian; USA: California.

OCCIDENTOSCHWAGERINA A. D. Miklukho-Maklay, 1959

Plate 289, figs. 9 and 10

Type species: Schwagerina fusulinoides Schellwien, 1898 (***2751**), p. 259; OD.

Occidentoschwagerina A. D. Miklukho-Maklay, 1959 (***2127**), p. 166.

Pseudoschwagerina (Occidentoschwagerina) Rauzer-Chernousova et al., 1979 (***2533**), p. 186 (nom. transl.).

Test fusiform, poles broadly rounded, about six volutions, inner ones closely coiled, later more loosely coiled with higher chambers that enlarge gradually, septa plane to undulating in the early whorls, later with regular fluting; wall of tectum and alveolar keriotheca, small but distinct chomata present in the earliest whorls only, phrenothecae may occur. L. Permian (Asselian); Carnic Alps; USSR; China; Japan; Viet Nam.

PARASCHWAGERINA Dunbar and Skinner, 1936

Plate 289, figs. 6-8

Type species: Schwagerina gigantea M. P. White, 1932 (***3367**), p. 82; OD.

Paraschwagerina Dunbar and Skinner, 1936 (***1021**), p. 89.

Test large, up to 12 mm in length, robust, fusiform to subspherical, tiny proloculus followed by well-defined fusiform juvenarium of two to five low and tightly coiled whorls, then after a sharp increase in size later whorls are high and strongly inflated, final whorl of slightly reduced height, septa distinctly fluted throughout test, with high, strong, and parallel-sided folds, opposed folds of adjacent septa touching at their bases to produce small chamberlets; wall relatively thin, of thin tectum and coarsely alveolar keriotheca, tunnel low, narrow, and irregular throughout growth, defined by small chomata in the juvenarium but later whorls lack chomata, rare or no secondary deposits on the septa. L. Permian (Asselian to Sakmarian); USA: Texas; Mexico; China; Japan; USSR: S. Urals, Timan; Turkey; Carnic Alps.

PRAEPARAFUSULINA Tumanskaya, 1962

Plate 291, figs. 7-10

Type species: Parafusulina pseudojaponica Dutkevich, in Gorsky, 1939 (*1282), p. 43; OD.

Praeparafusulina Tumanskaya, 1962 (*3233), p. 1397.

Test of moderate size, to about 10 mm in length, elongate fusiform to subcylindrical, large globular proloculus followed by about five loosely coiled whorls, septa somewhat thinner than the outer wall, septal fluting intense from pole to pole, producing chamberlets near the poles but without formation of true cuniculi, no phrenothecae present; wall thick, of tectum and keriotheca, may have pseudochomata in the earliest whorls but axial secondary deposits adjacent to the proloculus only. L. Permian (Sakmarian to Artinskian); European and Asiatic USSR; Hungary; N. China; Japan; Spitzbergen.

PRAEPSEUDOFUSULINA Ketat and Zolotukhina, 1984

Plate 289, figs. 4 and 5

Type species: Pseudofusulina? fastuosa Ketat, in Kireeva et al., 1971 (*1694), p. 89; OD.

Praepseudofusulina Ketat and Zolotukhina, 1984 (*1677), p. 469.

Test small to medium in size, inflated fusiform, large globular proloculus followed by four to five and a half gradually enlarging whorls, axis of coiling shorter in early whorls, gradually lengthening with growth, septa plane to undulating in the midregion but strongly fluted toward the poles; wall calcareous, clear, with keriotheca and tectum, rudimentary chomata may be present in the inner whorls; single aperture. L. Permian (Asselian); Southeast European USSR.

PSEUDOSCHWAGERINA Dunbar and Skinner, 1936

Plate 290, figs. 1-5; plate 291, figs. 1-6

Type species: Schwagerina uddeni Beede and Kniker, 1924 (*172), p. 27; OD.

Pseudoschwagerina Dunbar and Skinner, 1936 (*1021), p. 89.

Parazellia Rauzer-Chernousova, 1961 (*2524), p. 9; type species: *Fusulina muongthensis* Deprat, 1915 (*938), p. 5; OD.

Alpinoschwagerina Bensh, 1972 (*187), p. 100; type species: *Alpinoschwagerina turkestanica* Bensh, 1972; OD.

Erkina Okan, 1981 (*2293), p. 68; type species: *Erkina ankarensis* Okan, 1981; OD.

Test subspherical to robustly fusiform, large proloculus followed by closely coiled inner two to five volutions that form a compact juvenarium, later whorls high and strongly inflated but final whorl again of reduced height, septa plane to weakly and irregularly fluted near their base, folds of adjacent septa widely spaced and not in contact; wall of tectum and keriotheca, a single low median tunnel, chomata distinct in juvenarium, rudimentary or absent from inflated whorls. L. Permian (Asselian-Sakmarian) to M. Permian (Kungurian); USSR; Turkey; Yugoslavia; China; Japan; Viet Nam; North America; South America.

Remarks: Although *Alpinoschwagerina* was described as differing from *Pseudoschwagerina* in having a smaller proloculus and more closely enrolled juvenarium, illustrations of the type species show no substantial differences from *Pseudoschwagerina*.

ROBUSTOSCHWAGERINA A. D. Miklukho-Maklay, 1959

Plate 293, figs. 1-3

Type species: Pseudoschwagerina tumida Likharev, 1939 (*1850), p. 41; OD.

Robustoschwagerina A. D. Miklukho-Maklay, 1959 (*2127), p. 160.

Robustoschwagerina A. D. Miklukho-Maklay, 1956 (*2120), p. 1154 (name not available, ICZN Art. 13 (a)(i), no description).

Pseudoschwagerina (Robustoschwagerina) Igo, 1964 (*1579), p. 287 (nom. transl.).

Test large, subspherical, biumbilicate, inflated, early whorls closely coiled, forming a fusiform juvenarium, later whorls rapidly enlarging in height but coiling axis enlarging more slowly so that adult test becomes globular and strongly umbilicate, final whorl of reduced height as in *Pseudoschwagerina;* wall of tectum and keriotheca, chomata prominent in the fusiform juvenarium, very faint in later whorls. L. Permian (Asselian to Sakmarian); USSR; China; Japan; Carnic Alps; Yugoslavia; Turkey; USA: Texas.

RUGOSOSCHWAGERINA
A. D. Miklukho-Maklay, 1959
Plate 292, figs. 1-3

Type species: Schwagerina yabei Staff, 1909 (*3059), p. 463; OD.

Rugososchwagerina A. D. Miklukho-Maklay, 1959 (*2127), p. 160.

Rugososchwagerina A. D. Miklukho-Maklay, 1956 (*2120), p. 1154 (name not available, ICZN Art. 13 (a)(i), no description).

Test large, up to almost 12 mm in length, subspherical or with slightly protruding poles, earliest four to five volutions form a tightly coiled fusiform juvenarium around the very small proloculus, nine or ten septa in the earliest whorl increasing to twenty or more by the fourth whorl, juvenarium followed abruptly by four to five more loosely coiled whorls that increase rapidly in height and less rapidly in length to produce a more robust adult of up to forty-five septa per whorl, final whorl sharply reduced in height, septa intensely fluted in the juvenarium, the folds commonly reaching the top of the chamber but fluting restricted to the lower part of the septa in the inflated later stage; wall consisting of tectum and coarsely alveolar keriotheca, thin but slightly rugose in the early stage, thickening abruptly in later whorls, weak chomata and low and narrow tunnel in the juvenarium and in earlier whorls of adult stage. U. Permian (Darvasian to Murgabian); Italy: Sicily; Iran; Iraq; Afghanistan; China; USSR.

ZELLIA F. Kahler and G. Kahler, 1937
Plate 292, figs. 4-6

Type species: Pseudoschwagerina (Zellia) heritschi F. Kahler and G. Kahler, 1937; OD.

Pseudoschwagerina (Zellia) F. Kahler and G. Kahler, 1937 (*1630), p. 20.

Zellia Morikawa, 1955 (*2184), p. 76 (nom. transl.).

Test robust, globular to ovoid, about 5 mm in length, early whorls tightly coiled with elongate axis resulting in fusiform shape, abrupt increase in height after the juvenarium followed by four to five larger whorls, septa nearly plane to slightly fluted at the base; wall thick, of tectum and coarsely alveolar keriotheca, increasing in thickness in the adult stage, chomata very low and widely spaced; septal pores numerous. L. Permian (Sakmarian) Wolfcampian; Austria; Yugoslavia; Turkey; Iraq; USSR: W. part, S. Urals, and Asiatic region; Japan; S. China; Viet Nam.

Family STAFFELLIDAE
A. D. Miklukho-Maklay, 1949

Staffellidae A. D. Miklukho-Maklay, 1958 (*2123), p. 11, nom. corr. pro family Staffellinidae.

Staffellinidae A. D. Miklukho-Maklay, 1957 (*2122), p. 96 (nom. imperf.), nom. transl. ex subfamily Staffellininae.

Staffellininae A. D. Miklukho-Maklay, 1949 (*2115), p. 46 (subfamily; nom. imperf.).

Staffellinae Rozovskaya, 1950 (*2658), p. 378 (subfamily).

Nankinellinae A. D. Miklukho-Maklay, 1963 (*2130), p. 201, 210 (subfamily).

Leellinae Pasini, 1965 (*2367), p. 67 (subfamily).

Cheniinae F. Kahler and G. Kahler, 1966 (*1632), p. 99 (subfamily).

Haoellinae J. X. Lin, 1984 (*1855), p. 176, 330 (subfamily; nom. superfl., included *Leella*, type of prior subfamily).

Pisolininae Rauzer-Chernousova, 1985 (*2528), p. 19 (subfamily).

Test small, subspherical to discoidal, septa closely spaced, simple, and not fluted, tunnel single, chomata distinct, asymmetrical; wall of tectum and diaphanotheca and may have tectoria, secondary deposits common, wall tends to be secondarily silicified and structure difficult to recognize. L. Carboniferous (Visean) to U. Permian (Djulfian).

CASPIELLA Gibsham and Sipko, 1985
Plate 293, figs. 4-6

Type species: Sphaerulina? volgensis Ketat, 1982 (*1676), p. 36; OD.

Caspiella Gibsham and Sipko, 1985 (*1237), p. 27.

Test of medium size, subspherical to ovoid, involute, whorls enlarging gradually or later whorls may enlarge more rapidly, septa plane in axial area; wall of tectum, diaphanotheca, and inner tectorium, chomata distinct and parachomata scarcely discernable; aperture commonly single but rudimentary additional foramina may be present. L. Permian (L. Artinskian); USSR: Southeast Russian Platform; Carnic Alps.

CHENIA Sheng, 1963

Plate 294, fig. 1

Type species: Chenia kwangsiensis Sheng, 1963; OD.

Chenia Sheng, 1963 (*2896), p. 83, 213.

Test small, up to 3 mm in diameter, lenticular, periphery acutely angled, umbilical region rounded to slightly depressed, short axis of coiling with nine to ten whorls in the adult, septa plane, unfluted; wall thin, strongly mineralized but appears to have originally had a tectum, thicker finely alveolar keriotheca, and thin, dense lower layer; chomata well developed in all whorls, poorly developed and discontinuous parachomata present in the outer four or five whorls, slitlike tunnel present in all whorls, foramina few, circular, present only in outermost whorls. M. Permian (Kungurian), (Guadalupian); S. China.

EOVERBEEKINA J. S. Lee, 1934

Plate 294, figs. 6 and 7

Type species: Eoverbeekina intermedia J. S. Lee, 1934; OD.

Eoverbeekina J. S. Lee, 1934 (*1815), p. 18.

Test globular, or with slightly flattened poles, up to about 3.5 mm in diameter, proloculus followed by ten to thirteen closely coiled whorls, septa straight, unfluted; wall thin in the early whorls, thickening in later ones, with very thin tectum and finely alveolar keriotheca but without tectoria,
median tunnel crescentic in the early whorls, later low, elongate, and slitlike, early whorls lack basal foramina, but these are numerous and regularly spaced in later whorls, chomata absent, parachomata few (up to three on each side of the tunnel) and rudimentary, not continuous spirally and present only in outer whorls near the tunnel; foramina numerous, circular. L. to U. Permian (L. Artinskian to U. Tatarian); China; Japan; USSR: Caucasus, Fergana; Yugoslavia; USA: Texas; British Honduras; Guatemala; Mexico.

HAOELLA F. S. Gung, 1966

Plate 294, figs. 2-5

Type species: Haoella sinensis F. S. Gung, 1966; OD.

Haoella F. S. Gung, 1966 (*1340), p. 81, 86.

Test relatively small, up to 3 mm in length, ovate to subcylindrical, small globular proloculus followed by nine to eleven whorls, early whorls closely coiled and test lenticular, later with lengthened axis of coiling, septa plane; wall secondarily silicified, probably originally with tectum and keriotheca, median tunnel, chomata small, foramina weakly developed. M. Permian (Kungurian), Guadalupian; China.

HAYASAKAINA Fujimoto and Kawada, 1953

Plate 294, figs. 9-11

Type species: Hayasakaina kotakiensis Fujimoto and Kawada, 1953; OD.

Hayasakaina Fujimoto and Kawada, 1953 (*1197), p. 119.

Test small, up to 2 mm in maximum diameter, with subangular to slightly rounded periphery, tiny proloculus followed by up to nine volutions, inner six to seven volutions planispiral and with short axis of coiling, outer two to three volutions with coiling axis perpendicular to the earlier axis, septa numerous, plane, at right angles to the periphery; wall thin, of tectum and less dense upper and lower tectoria, tunnel single, chomata developed throughout the inner whorls. L. Permian (Artinskian); Japan.

LEELLA Dunbar and Skinner, 1937

Plate 295, figs. 1-5

Type species: Leella bellula Dunbar and Skinner, 1937; OD.

Leella Dunbar and Skinner, 1937 (*1022), p. 603 (as *Leëlla*).

Test small, fusiform, up to 2.6 mm in length, early whorls symmetrical and staffelloid, later elongating rapidly to become a fusiform adult, septa plane, up to about twenty-five per whorl; wall of thin tectum, well-defined diaphanotheca and thin upper and lower tectoria, tunnel low and wide, chomata well developed and asymmetrical, with steep side facing the tunnel. U. Permian (Kazanian), U. Guadalupian; USA: Texas.

MUFUSHANELLA S. Chen, 1964

Plate 295, figs. 6 and 7

Type species: Mufushanella mufushanensis S. Chen, 1964; OD.

Mufushanella S. Chen, 1964 (*554), p. 346.

Test large, lenticular, up to 5.5 mm along the axis and up to 7 mm diameter, lateral slopes concave, proloculus small, rounded periphery in early whorls, later with sharply angular periphery, septa plane; wall of tectum, diaphanotheca, and inner tectorium, a curved median tunnel present in the inner volutions, accompanied by a circular foramen in the outer whorls, septal pores rare, chomata high and narrow, no parachomata. M. Permian (U. Qixian); China.

NANKINELLA J. S. Lee, 1934

Plate 294, fig. 12

Type species: Staffella discoides J. S. Lee, 1931 (***1814**), p. 286; OD.

Nankinella J. S. Lee, 1934 (*1815), p. 14.

Test discoidal, up to 6 mm in diameter, poles rounded to umbilicate, early stage with angular to rounded periphery, later more angular, up to fourteen whorls in the adult, septa plane; wall of tectum and thicker inner layer, variously interpreted as a diaphanotheca or as an inner tectorium but commonly recrystallized so that structure is obscured, median crescentic tunnel, distinct chomata. L. Permian (Sakmarian) to U. Permian (Changxingian); China; Japan; USSR: Crimea, Trans-Caucasus; Turkey; Greece.

Remarks: Dunbar and Skinner (1937, ***1022**) erroneously cited *N. orbicularis* Lee (recte *N. orbicularia* Lee) as the type species, rather than *N. discoides* Lee.

PALAEOREICHELINA Liêm, 1974

Plate 295, figs. 13-15

Type species: Palaeoreichelina donghoiensis Liêm, 1974; OD.

Palaeoreichelina Liêm, 1974 (*1847), p. 24.

Test lenticular, planispirally enrolled, periphery subangular in the early stage, final whorl tending to uncoil and become rectilinear, septa plane; wall thick, undifferentiated in the early enrolled stage, final whorl and uncoiled part with an indistinct diaphanotheca; aperture simple, single, basal in the enrolled stage, areal and central in the uncoiled part. U. Carboniferous (Moscovian); Viet Nam; Thailand.

PALAEOSTAFFELLA Liêm, 1966

Plate 294, fig. 8

Type species: Staffella moelleri Ozawa, 1925 (***2318**), p. 19; OD.

Pseudoendothyra (Palaeostaffella) Liêm, 1966 (*1846), p. 47.

Test subellipsoidal, periphery broadly rounded, about six gradually enlarging volutions in the adult, early ones involute and final one or two evolute about the depressed axial region, septa thin; wall relatively thick but commonly recrystallized so that structure is unclear, diaphanotheca present in at least the outer volutions, low and highly asymmetrical chomata with steep sides border the low and narrow tunnel. U. Carboniferous (Moscovian) to L. Permian; Japan; Viet Nam.

PAMIRINA Leven, 1970

Plate 295, figs. 8-12

Type species: Pamirina darvasica Leven, 1970; OD.

Pamirina Leven, 1970 (*1832), p. 23.

Chinlingella K. L. Wang and X. F. Sun, 1973 (*3342), p. 152, 171; type species: *Chinlingella chinlingensis* K. L. Wang and X. F. Sun, 1973; OD.

Test small, robustly discoidal, up to about 1.1 mm in diameter, with broadly rounded periphery, small spherical proloculus followed by up to seven regularly but rapidly enlarging whorls, septa plane, long; wall of tectum and finely alveolar keriotheca, single low and broad tunnel, distinct small chomata but none in the final whorl. L. Permian (Sakmarian to Artinskian); USSR: Southwest Darvaz; China.

PISOLINA J. S. Lee, 1934

Plate 296, figs. 1 and 2

Type species: Pisolina excessa J. S. Lee, 1934; OD.

Pisolina J. S. Lee, 1934 (*1815), p. 19.

Test small, up to 4 mm in diameter, spherical throughout growth or with slightly depressed poles, very large proloculus of up to 1 mm in diameter, followed by seven or eight whorls, septa thick, plane, about thirty or more in the adult whorls; wall thin, of tectum and poorly defined keriotheca, commonly recrystallized or replaced, single tunnel with slightly irregular path, chomata asymmetrical, low but well defined. L. Permian; China; USSR: Armenia; Iran.

REITLINGERINA
Rauzer-Chernousova, 1985
Plate 296, figs. 6-8

Type species: Fusulinella bradyi von Möller, 1878 (***2159**), p. 111; OD.

Reitlingerina Rauzer-Chernousova, 1985 (***2528**), p. 13.

Test lenticular, planispiral, and involute, from five to seven whorls, earliest whorl nautiloid with rounded periphery, later lenticular with subangular periphery, final one to two whorls may be partially evolute; wall calcareous, distinct diaphanotheca present even in the septa, external whorl with protheca, chomata, and pseudochomata may be present in different growth stages; aperture single. L. Carboniferous (Visean) to U. Permian (rare); Europe; Asia; Canada: British Columbia.

SPHAERULINA J. S. Lee, 1934
Plate 296, figs. 3-5

Type species: Sphaerulina crassispira J. S. Lee, 1934; OD.

Sphaerulina J. S. Lee, 1934 (***1815**), p. 16.

Test small, subspherical, planispiral, early whorls about the subspherical proloculus have short axis and lenticular test, later whorls with somewhat lengthened axis and spherical test or with slightly depressed umbilici, septa plane; wall thick, of tectum and very finely alveolar keriotheca, single tunnel, chomata low and asymmetrical, sloping gently toward the poles. U. Permian (Lopingian); China; Japan; USSR: Caucasus; Turkey; Carnic Alps.

STAFFELLA Ozawa, 1925
Plate 297, figs. 1-4

Type species: Fusulina sphaerica Abich, 1859 (***3**), p. 439, 528 (syn.: *Staffella moellerana* Thompson, 1935, ***3180**, p. 113); OD.

Staffella Ozawa, 1925 (***2317**), p. 24.

Test small, lenticular to subspherical, periphery broadly rounded, relatively short axis of coiling of up to 4.5 mm, umbilici slightly depressed; wall of tectum, diaphanotheca, and upper and lower tectoria, tunnel low and narrow with somewhat irregular path, strongly developed and asymmetrical chomata more than one-half the height of the chambers extend laterally about half the distance to the poles. L. Permian (Artinskian) to M. Permian (Kungurian), Guadalupian: USSR; China; Japan; Turkey; Greece; Yugoslavia; USA: Texas; Mexico.

Remarks: In describing the genus, Ozawa (1925, ***2317**) first listed the type species as *Staffella sphaerica* (v. Möller), although von Möller referred his illustrations and specimens to *Fusulinella sphaerica* Abich and did not describe the species as new. The specimens described by Abich and those described by von Möller were from Armenia. Later, Ozawa (in Cushman, 1928, ***747**, p. 131) correctly cited the type species as *Fusulina sphaerica* Abich. Thompson (1935, ***3180**) considered the type species of *Staffella* to be that of von Möller, which he stated was not conspecific with that of Abich. Thus, Thompson (1935, ***3180**, p. 113) described the new species *Staffella moellerana* Thompson for von Möller's specimens and regarded it as the type species of *Staffella*. Baulina (1963, ***162**), restudied *Staffella sphaerica*, on the basis of material from Abich's original Armenian collections, and determined that *S. sphaerica* included *S. moellerana* Thompson within its intraspecific variation and that the latter was thus a junior synonym.

ZARODELLA Sosnina, 1981
Plate 296, figs. 9 and 10

Type species: Zarodella zhamoidai Sosnina, 1981; OD.

Zarodella Sosnina, 1981 (***3039**), p. 27.

Test tiny, up to 0.6 mm in diameter, nautiloid with broadly rounded periphery, sides flattened to slightly umbilicate, proloculus relatively large for the size of the adult test, only three to five whorls present; wall thin, poorly differentiated, or may have weakly developed diaphanotheca, commonly recrystallized, secondary deposits may occur on the chamber floors, chomata poorly developed or lacking but may have rudimentary pseudochomata, aperture slitlike. L. Permian (Sakmarian); USSR: E. Siberia; Yugoslavia; Japan.

Family VERBEEKINIDAE Staff and Wedekind, 1910

Verbeekinidae A. D. Miklukho-Maklay, 1957 (*2122), p. 110, nom. transl. ex subfamily Verbeekininae.

Test large, subspherical to cylindrical; planispiral, completely involute; wall of tectum and alveolar keriotheca and may have secondary layers; multiple tunnels present, foramina numerous and parachomata may occur. L. Permian (Sakmarian) to U. Permian (Tatarian).

Subfamily VERBEEKININAE Staff and Wedekind, 1910

Verbeekininae Staff and Wedekind, 1910 (*3060), p. 114.
Verbeekinae Dutkevich, 1934 (*1027), p. 9, 10, 61, 62 (tribe).

Test globose, wall of tectum and thicker light-colored alveolar layer and may have thin lower dense layer, chomata may occur in early whorls and parachomata in outer ones; numerous apertures. L. Permian (Artinskian) to U. Permian (Tatarian).

ARMENINA A. D. Miklukho-Maklay, 1955

Plate 298, figs. 7 and 8

Type species: Armenina karinae A. D. Miklukho-Maklay, 1955; OD.

Armenina A. D. Miklukho-Maklay, 1955 (*2119), p. 576.
Verbeekina (Armenina) Sheng, 1963 (*2896), p. 86, 217 (nom. transl.).

Test globular, about 3 mm in diameter, tiny proloculus followed by up to thirteen whorls that increase slowly in height as added, septa thick, numerous, straight, and unfluted; from about the sixth whorl spiral septula hang from the parachomata and gradually increase in number to about fifteen or sixteen in later whorls; wall three layered, of tectum, keriotheca, and thin dense lower tectorium, multiple tunnels present, numerous well-developed parachomata present in all but the first two whorls; apertures numerous. Upper L. Permian (U. Artinskian) to U. Permian (L. Kazanian); USSR: Transcaucasus, Crimea, Pamir; China; Japan.

QUASIVERBEEKINA Y. J. Wang, Sheng, and Zhang, 1981

Plate 297, figs. 5-7

Type species: Verbeekina (Quasiverbeekina) pedashanica Y. J. Wang, Sheng, and Zhang, 1981; OD.

Verbeekina (Quasiverbeekina) Y. J. Wang, Sheng, and Zhang, 1981 (*3347), p. 59, 74.

Test subspherical, of medium size, early whorls tightly coiled, with short axis of coiling and angular periphery, followed by whorls of sharply increased height, longer axis of coiling and rounded periphery, the whorls then continuing to enlarge slowly and test becomes subspherical to spherical, septa plane; wall with tectum, finely alveolar keriotheca, and lower thin dense layer, small parachomata well developed in the early whorls, poorly developed or absent from outer volutions; foramina tiny, oval. Upper L. Permian; China: Xizang.

VERBEEKINA Staff, 1909

Plate 298, figs. 1-6

Type species: Fusulina verbeeki Geinitz, in Geinitz and von der Marck, 1876 (*1215), p. 399; OD.

Verbeekina Staff, 1909 (*3059), p. 468 footnote, 506.
Schwagerina (Verbeekina) Staff, 1909 (*3059), p. 468, 476 (nom. transl.).
Doliolina (Verbeekina) Ozawa, 1925 (*2317), p. 2, 20, 25 (nom. transl.).
Paraverbeekina A. D. Miklukho-Maklay, 1955 (*2119), p. 574; type species: *Paraverbeekina pontica* A. D. Miklukho-Maklay, 1955; OD.
Verbeekina (Paraverbeekina) F. Kahler and G. Kahler, 1966 (*1632), p. 62, 72 (nom. transl.).

Test subspherical, up to about 14 mm in length, tiny proloculus followed by irregularly coiled or endothyroid juvenarium, succeeding whorl of sharply increased diameter, then with up to twenty slowly enlarging planispiral whorls, septa formed by downward deflection of the tectum and keriotheca, angled forward, unfluted; wall of tectum and thin, extremely fine alveolar keriotheca, inner and outer surfaces of the wall and both sides of the septa may be coated with dense calcite resembling parachomata in structure, and the more extensive coatings at the poles may nearly fill the chambers, parachomata absent or rudimentary in early whorls but well developed between the foramina of the outer whorls, project forward from the septa, and may join those of the succeeding chamber and form nearly continuous ridges for a short distance, no tunnel, numerous elliptical basal foramina, as many as a hundred in later whorls. M. Permian (U. Artinskian) to U. Permian (L. Tatarian); Sumatra; Viet Nam; Java; China; Japan; Turkey; Yugoslavia; Greece; Sicily; Afghanistan; USSR: Turkestan, Crimea, Caucasus, Pamir; USA: Washington.

Subfamily MISELLININAE A. D. Miklukho-Maklay, 1958

Misellininae A. D. Miklukho-Maklay, 1958 (***2123**), p. 9.
Doliolininae Gubler, 1935 (***1328**), p. 9 (invalid, ICZN Art. 39; based on *Doliolina* Schellwien, 1902, non Borgert, 1894).

Test inflated, fusiform to subcylindrical; early coiling may be endothyroid, later fusulinoid; wall with thin but distinct keriotheca; parachomata well developed. L. Permian (Sakmarian) to U. Permian (Tatarian).

BREVAXINA Schenck and Thompson, 1940

Plate 297, figs. 8 and 9

Type species: Doliolina compressa Deprat, 1915 (***938**), p. 14; OD.

Misellina (Brevaxina) Schenck and Thompson, 1940 (***2755**), p. 587.
Brevaxina Thompson, 1948 (***3189**), p. 59 (nom. transl.).

Test small, subspherical, poles flattened to slightly umbilicate, axis of coiling less than the diameter, small proloculus followed by endothyroid juvenarium, then with about eight gradually enlarging whorls; wall thick, with tectum, parachomata high and broad, up to more than half the chamber height; numerous foramina, up to twenty-four, occur near the base of the septa of the final whorl. L. Permian (Sakmarian) to U. Permian (Kazanian); Laos; Japan; S. China; USSR: Pamir, Crimea, Darvaz.

METADOLIOLINA Ishii and Nogami, 1961

Plate 297, figs. 12 and 13

Type species: Pseudodoliolina pseudolepida (Deprat) subsp. *gravitesta* Kanmera, 1954 (***1640**), p. 12; OD.

Metadoliolina Ishii and Nogami, 1961 (***1590**), p. 162.

Test large, elongate, up to 10.5 mm in length, ellipsoidal to subcylindrical, slightly inflated in the median plane, poles broadly rounded, small globular proloculus followed by sixteen or more slowly enlarging whorls, septa thin, closely spaced, up to about thirty-three per whorl, flat and unfluted, directed slightly forward at the base; wall of earliest whorls with tectum and less dense lower layer, later whorls with tectum, thick diaphanotheca or keriotheca, and thick inner and outer tectoria, numerous small parachomata extend about half the chamber height but almost reach the top of the chamber adjacent to the septa; foramina small, circular in early whorls, later elliptical, up to about thirty-four in the later whorls. U. Permian (U. Kazanian to L. Tatarian); Japan; S. China; Cambodia.

MISELLINA Schenck and Thompson, 1940

Plate 297, figs. 10 and 11

Type species: Doliolina ovalis Deprat, 1915 (***938**), p. 15; OD.

Misellina Schenck and Thompson, 1940 (***2755**), p. 587.

Test small, ellipsoidal to subspherical, length of coiling axis greater than test diameter, small proloculus followed by endothyroid juvenarium and up to eight slowly enlarging later whorls, chambers numerous, septa plane, unfluted; wall thick, of tectum, thick keriotheca and thin inner layer, broad and low parachomata and foramina present throughout growth. L. Permian (Sakmarian to Artinskian); Laos; Sumatra; China; Japan; USSR: Pamir, Darvaz, Karakorum; Turkey; Yugoslavia.

NEOMISELLINA Sheng, 1962

Plate 299, figs. 1-8

Type species: Schwagerina lepida Schwager, 1883 (***2831**), p. 138; OD.

Neomisellina Sheng, in Sheng and Wang, 1962 (***2898**), p. 180, 186; OD.
Fusulina (Moellerina) Schellwien, 1898 (***2751**), p. 238,

257, 281 (non *Moellerina* Ulrich, 1866, nec Eimer and Fickert, 1899); type species: obj.: OD(M).
Doliolina Schellwien, 1902 (*2752), p. 67 (nom. subst. pro *Moellerina* Schellwien, 1898; non *Doliolina* Borgert, 1894); type species: obj.

Test large, may exceed 4 mm in length, inflated fusiform with bluntly pointed poles, spherical proloculus followed by about twelve to fifteen whorls, septa numerous, straight, unfluted; wall of thin tectum, thicker but finely alveolar keriotheca and thin dense lower layer, parachomata narrow, high, well developed throughout test; foramina abundant, up to fourteen in the later whorls, nearly circular. M. Permian (Kungurian), Guadalupian; China; Japan; USSR.

Subfamily PSEUDODOLIOLININAE Leven, 1963

Pseudodoliolininae Leven, 1963 (*1830), p. 57, 58, 61, 68.

Test ellipsoid to elongate; septa plane; wall thin in early volutions, later with tectum, thin inner layer and middle layer that may be alveolar, septa single layered; parachomata narrow, high; foramina closely spaced. L. Permian (Artinskian) to U. Permian (Tatarian).

PSEUDODOLIOLINA Yabe and Hanzawa, 1932

Plate 299, figs. 9-11

Type species: Pseudodoliolina ozawai Yabe and Hanzawa, 1932; OD.

Pseudodoliolina Yabe and Hanzawa, 1932 (*3412), p. 41.

Test of medium size, up to 8 mm in length, elongate ovate, subcylindrical to slightly fusiform, with bluntly to broadly rounded poles, large proloculus followed by up to about twenty planispiral whorls, chambers numerous, septa plane, unfluted, perpendicular to the outer wall; wall thin, undifferentiated in early whorls, later with tectum, light median layer corresponding to the keriotheca and thin inner layer; narrow and high parachomata present throughout growth and may reach the top of the chambers adjacent to the septa, appearing as septula in axial section; numerous foramina developed throughout growth, about fifty in outer whorls. L. Permian (Artinskian) to U. Permian (Tatarian); Japan; Viet Nam; China; USSR; USA: Washington.

Subfamily KAHLERININAE Leven, 1963

Kahlerininae Leven, 1963 (*1830), p. 57, 58, 61, 68.

Test globose, axially depressed, juvenarium endothyroid, whorls few, with eight to ten rapidly enlarging chambers per whorl; septa flat, thick; wall with tectum and finely alveolar keriotheca; chomata minor and rarely with very small parachomata, tunnel low and discontinuous; foramina and fine septal pores present. L. Permian (Artinskian) to U. Permian (Tatarian).

KAHLERINA Kochansky-Devidé and Ramovš, 1955

Plate 300, figs. 1-7

Type species: Kahlerina pachytheca Kochansky-Devidé and Ramovš, 1955; OD.

Kahlerina Kochansky-Devidé and Ramovš, 1955 (*1713), p. 383, 412.
Ussuriella Sosnina, in Kiparisova et al., 1956 (*1689), p. 21 (non *Ussuriella* Paranomov, 1929); type species: *Ussuriella ussurica* Sosnina, 1956; OD.

Test small, up to 1.7 mm in diameter, small globular proloculus followed by about five whorls, microspheric generation with lenticular and evolute endothyroid juvenarium and nautiloid to subspherical adult test, periphery broadly rounded and umbilical regions slightly depressed, septa thick, nearly plane; wall of earliest whorls very thin and poorly differentiated, thick in the later whorls, with thin tectum and much thicker and finely alveolar keriotheca, tunnel low and wide, very small asymmetrical chomata developed in the outer volutions; septal pores small. L. Permian (U. Artinskian) to U. Permian (L. Tatarian); Yugoslavia; Turkey; Sicily; Asiatic USSR; China.

Family NEOSCHWAGERINIDAE Dunbar and Condra, 1927

Neoschwagerinidae Dunbar, in Cushman, 1948 (*801), p. 164, nom. transl. ex subfamily Neoschwagerininae.
Thailandinidae Toriyama, in Asano, 1970 (*90), pl. 18, p. 219, 226, 250, 259 (nom. transl.).

Test fusiform to subcylindrical; transverse septula always present, axial septula may occur, as may secondary transverse or axial septula or both; spirotheca of tectum and alveolar keriotheca or a single dense layer; foramina throughout length of test, parachomata prominent. L. Permian (Asselian) to U. Permian (Djulfian).

Subfamily NEOSCHWAGERININAE Dunbar and Condra, 1927

Neoschwagerininae Dunbar and Condra, 1928 (*1016), p. 74.

Lepidolininae A. D. Miklukho-Maklay, 1958 (*2123), p. 10.

Test large, fusiform to nearly spherical; wall with tectum and keriotheca and may have inner tectorium; development of spiral and axial septulae variable; parachomata well developed but may be reduced in advanced forms; numerous foramina at base of septa. L. Permian (Asselian) to U. Permian (Djulfian).

CANCELLINA Hayden, 1909

Plate 301, figs. 1-8

Type species: Fusulina (Neoschwagerina) primigena Hayden, 1909; SD Y. Ozawa, 1925 (*2317), p. 26.

Fusulina (Cancellina) Hayden, 1909 (*1432), p. 244.

Neoschwagerina (Cancellina) Y. Ozawa, 1925 (*2317), p. 18 (nom. transl.).

Cancellina Dunbar and Condra, 1928 (*1016), p. 74 (nom. transl.).

Crimellina Tumanskaya, 1953 (*3231), p. 4; type species: *"Crimellina verae"* Tumanskaya, 1953 (name not available, ICZN Art. 13 (b); type species not available); OD.

Neoschwagerina (Minoella) Honjo, 1959 (*1536), p. 124; type species: *Neoschwagerina (Cancellina) nipponica* Y. Ozawa, 1927 (*2319), p. 160; OD.

Minoella Honjo, in Minato and Honjo, 1959 (*2152), p. 325 (nom. transl.).

Test relatively small, up to about 3.2 mm in length, fusiform and inflated centrally with acuminate poles, small proloculus followed by a juvenarium of a few tightly coiled early whorls, adult with about ten to twelve slowing enlarging whorls, septa arcuate and closely spaced, after the first few whorls short and broad transverse septula are formed by the downward extension of the lower part of the keriotheca; wall of tectum and thick finely alveolar lower layer that extends about one-third the distance on both sides of the septa, narrow and high parachomata are in contact with the transverse septula; foramina alternate in position with the parachomata. L. Permian (Darvasian, Artinskian) to U. Permian (L. Murgabian, Kazanian); China; Japan; Yugoslavia; Turkey; Iran; Afghanistan; USSR: Crimea, Pamir.

COLANIA Lee, 1934

Plate 302, figs. 1-3

Type species: Colania kwangsiana Lee, 1934; OD.

Colania Lee, 1934 (*1815), p. 20.

Gifuella Honjo, 1959 (*1536), p. 131; type species: *Gifuella gifuensis* Honjo, 1959; OD.

Neoschwagerina (Gifuella) Chisaka, 1960 (*590), p. 25 (nom. transl.).

Test of medium to large size, fusiform, dimorphism distinct, megalospheric test small with large proloculus, microspheric test with tiny proloculus, numerous whorls, and very large test, septa thin and widely spaced, axial septula well developed, thin, short, and of irregular length, slender primary transverse septula connect to the tops of the parachomata, secondary transverse septula rare and only in outer volutions; wall thin, of tectum and keriotheca, parachomata narrow and high; numerous foramina at the base of the septa. M. Permian (Maokouan) Guadalupian; China; Japan; Thailand.

MAKLAYA Kanmera and Toriyama, 1968

Plate 300, figs. 8-11

Type species: Cancellina pamirica Leven, 1967 (*1831), p. 186; OD.

Maklaya Kanmera and Toriyama, 1968 (*1643), p. 33.

Test small, subspherical with blunt to rounded poles, up to twelve involute, planispiral whorls, septa short and thick, incipient primary transverse septula broad and short and do not connect to the parachomata, no axial septula and no secondary septula; wall thick, of tectum and thick alveolar keriotheca, parachomata broad and low, foramina at the base of the septa. L. Permian (U. Darvasian, Artinskian); USSR: Pamir; Iran; Japan; Thailand.

NEOSCHWAGERINA Yabe, 1903

Plate 302, figs. 4-6; plate 303, figs. 1 and 2; plate 304, fig. 1

Type species: Schwagerina craticulifera Schwager, 1883 (*2831), p. 140; OD.

Fusulina (Neoschwagerina) Yabe, 1903 (*3400), p. 5.
Neoschwagerina H. Douvillé, 1907 (*984), p. 584 (nom. transl.).
Metaschwagerina Minato and Honjo, 1958 (*2151), frontispiece (name not available, ICZN Art. 13 (a)(i), no description).
Metaschwagerina Minato and Honjo, in Honjo, 1959 (*1536), p. 151; type species: *Metaschwagerina ovalis* Minato and Honjo, in Honjo, 1959; OD.

Test ovoid to subspherical, with bluntly rounded poles, about twelve volutions present, axis of coiling of early whorls of microspheric generation may be at an angle to that of the later whorls, septa plane, perpendicular to outer wall and more widely separated in outer whorls, simple axial septula appear early in development, broad transverse septula well developed and regularly spaced, formed by extension of the lamellae of the alveolar wall, no secondary transverse septula; wall of distinct tectum, very thick keriotheca that may be differentiated into an upper finely alveolar layer and a lower layer with fewer and coarser alveoli and with upper and lower tectoria, parachomata poorly developed but present throughout growth beneath but not in contact with the transverse septula. L. Permian (Darvasian) to M. Permian (Murgabian), Guadalupian; USSR: Caucasus, Crimea, Pamir; Sicily, Yugoslavia; Greece; Afghanistan; China; Sumatra; Japan; Tunisia; Canada: British Columbia; USA: Washington.

SHENGELLA Yang, 1985

Plate 301, figs. 9 and 10

Type species: Shengella datieguanensis Yang, 1985; OD.

Shengella Yang, 1985 (*3414), p. 308, 334.

Test ellipsoidal to fusiform, nine to eleven whorls, septa plane, a few thin primitive and imperfect primary transverse septula occur but no axial septula and no secondary transverse septula; wall very thin, of tectum and finely alveolar keriotheca, parachomata narrow and high, and their slender and acuminate upper ends may reach the lower margin of the septula; foramina present. L. Permian (L. Asselian); China: Guizhou Province.

YABEINA Deprat, 1914

Plate 304, figs. 2–4; plate 305, figs. 1–6; plate 306, figs. 1 and 2

Type species: Neoschwagerina (Yabeina) inouyei Deprat, 1914; OD(M).

Neoschwagerina (Yabeina) Deprat, 1914 (*937), p. 30.
Yabeina Deprat, 1914 (*937), p. 29 (nom. transl.).
Lepidolina Lee, 1934 (*1815), p. 21; type species: *Neoschwagerina (Sumatrina) multiseptata* Deprat, 1912 (*934), p. 53; OD.
Pseudoyabeina Tumanskaya, 1954 (*3232), p. 98; type species: *Yabeina lantschichensis* Tumanskaya, 1953 (*3231), p. 18; OD.
Gublerina Minato and Honjo, 1959 (*2152), p. 331 (non *Gublerina* Kikoïne, 1948); type species: *Neoschwagerina elongata* Gubler, 1935 (*1328), p. 108; OD.

Test large, up to 20 mm in length, inflated fusiform, with poles bluntly pointed to rounded, tiny microspheric proloculus followed by as many as twenty-seven whorls, numerous relatively thin septa, axial septula thin to thick, of varied length, up to nine present between adjacent septa, transverse septula triangular to irregular in shape, short and irregular secondary transverse septula well developed in outer whorls, as many as three between the primary transverse septula; wall of thin to medium thickness, of tectum and finely alveolar keriotheca, parachomata narrow, well developed, connected to the lower ends of the septula; numerous foramina at the base of the septa, commonly 50 to 60 in the outer volutions, and as many as 135 in very large specimens. U. Permian (U. Murgabian, Tatarian to Dzhulfian) Guadalupian to Ochoan; Japan; China; Viet Nam; Cambodia; New Zealand; USSR: Crimea, Caucasus, Pamir; Canada: British Columbia; USA: Washington.

Remarks: The synonymy of *Lepidolina* and *Yabeina* was suggested by Skinner and Wilde (1954, *2994, p. 450) who stated that their differences were in degree rather than in kind. Ishii and Nogami (1964, *1591, p. 12) also noted that the type species of *Lepidolina* differed only in the somewhat thinner walls, septa, and septula, whereas those of the type species of *Yabeina* may become thicker in later ontogeny; they suppressed *Lepidolina* as a synonym.

Subfamily SUMATRININAE Silvestri, 1933

Sumatrininae Silvestri, 1933 (*2965), p. 15, 35.

Test of medium to large size, ellipsoid to fusiform or subcylindrical; pendant secondary spiral and axial septula of uniform length, with up to four secondary septula between two primary ones; wall thin, compact, with poorly differentiated structure; thin long parachomata present, axial fillings in all but last part of final whorl. U. Permian.

AFGHANELLA Thompson, 1946

Plate 306, figs. 3-9

Type species: Afghanella schencki Thompson, 1946; OD.

Afghanella Thompson, 1946 (*3188), p. 152.

Pseudosumatrina Tumanskaya, 1950 (*3230), p. 91; type species: *Neoschwagerina sumatrinaeformis* Gubler, 1935 (*1328), p. 123; OD.

Test small, up to about 4 mm in length, fusiform to inflated, adult test with about thirteen whorls, straight axis of coiling, septa long, thin, and widely spaced, projecting slightly forward, primary transverse septula short and thin, uniform in size and shape, and join the tops of the parachomata, secondary transverse septula thin and short, lower part of septula thickened by secondary deposits; wall thin, of tectum and thin irregular and finely alveolar keriotheca, well-developed parachomata are high and narrow; semicircular foramina developed throughout test. U. Permian (Murgabian); Laos; Japan; China; USSR: Crimea; Afghanistan; Turkey; Greece; Yugoslavia.

PRESUMATRINA Tumanskaya, 1950

Plate 308, figs. 1-4

Type species: Doliolina schellwieni Deprat, 1913 (*936), p. 51; OD.

Presumatrina Tumanskaya, 1950 (*3230), p. 77.

Praesumatrina A. D. Miklukho-Maklay, Rauzer-Chernousova, and Rozovskaya, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 206 (err. emend.).

Test small, elongate, subfusiform, with bluntly rounded poles, septa thin and widely spaced, thin and short transverse septula alternating with foramina, thickened at the lower ends where they join with the tops of the parachomata, one or two axial septula between adjacent septa, outer whorls may also have a secondary transverse septulum between adjacent primary transverse septula; wall thin, of tectum and thin keriotheca, parachomata well developed, narrow, and high. U. Permian (L. Murgabian); Viet Nam; Japan; S. China; USSR: Crimea, Pamir.

SUMATRINA Volz, 1904

Plate 307, figs. 1-6

Type species: Sumatrina annae Volz, 1904; OD.

Sumatrina Volz, 1904 (*3321), p. 182.

Neoschwagerina (Sumatrina) Deprat, 1912 (*934), p. 13, 15 (nom. transl.).

Pseudolepidolina Tumanskaya, 1953 (*3231), p. 14; type species: *Neoschwagerina (Sumatrina) longissima* Deprat, 1914 (*937), p. 36; OD.

Test of medium size, elongate fusiform to subcylindrical, large proloculus and few loosely coiled whorls, septa long, thin, and widely spaced, thin and short primary transverse septula, two to four thin secondary transverse septula between adjacent primary transverse septula, their lower part thickened and clavate, may have up to seven axial septula between adjacent septa; wall very thin, of tectum and extremely thin keriotheca, parachomata massive and high, attaching to the lower ends of the primary transverse septula, axial fillings present in all but part of the last whorl; numerous foramina occur throughout the length of the test. U. Permian (U. Murgabian); China; Japan; Cambodia; Sumatra; Yugoslavia.

Subfamily THAILANDININAE Toriyama and Kanmera, 1968

Thailandininae Toriyama and Kanmera, 1968 (*3214), p. 31, 43.

Test ellipsoidal to fusiform, proloculus large, volutions numerous, transverse septula present in some younger taxa; wall invariably recrystallized even when associated taxa are not affected, rarely with a suggestion of an alveolar keriotheca. M. to U. Permian (Kubergandian to Murgabian).

NEOTHAILANDINA Toriyama and Kanmera, 1968

Plate 308, figs. 5-8

Type species: Neothailandina pitakpaivani Toriyama and Kanmera, 1968; OD.

Neothailandina Toriyama and Kanmera, 1968 (***3214**), p. 36.

Test of moderate to large size, up to about 14 mm in length, fusiform to subcylindrical, poles bluntly pointed to rounded, megalospheric tests with very large proloculus and up to nine whorls, microspheric ones with up to nineteen whorls, septa plane, unfluted, about twenty-four in the final whorl, transverse septula present throughout or at least in the outer whorls, their lower ends connecting to the underlying parachomata, no axial septula; outer wall and that of septa and septula almost invariably secondarily replaced, but outer wall appears to have a tectum and lower thicker and less dense layer, parachomata present throughout growth, about one-half to two-thirds the height of the chambers; small circular foramina alternate with parachomata at the base of the septa. M. to U. Permian (Kubergandian to Murgabian); Thailand.

Remarks: Yang (1985, ***3414**, p. 334) maintains that the special wall characters described as characteristic of *Neothailandina* merely result from the deeply mineralized and replaced shells of various Neoschwagerinidae and does not recognize this genus.

THAILANDINA Toriyama and Kanmera, 1968

Plate 308, figs. 9-15

Type species: Thailandina buravasi Toriyama and Kanmera, 1968; OD.

Thailandina Toriyama and Kanmera, 1968 (***3214**), p. 31.

Test small to moderately large, inflated fusiform, poles bluntly pointed, mature test with up to eleven whorls, megalospheric proloculus large, juvenile stage subspherical, later progressively more elongate, septa plane, unfluted, lower part may be thickened secondarily, no transverse or axial septula present; structure of wall and septa destroyed by secondary replacement, but outer wall thin and outer whorls seem to have a tectum and lower thicker and less dense finely alveolar layer and upper and lower surfaces lined by an extremely thin dense layer that is continuous with the parachomata, parachomata well developed throughout growth, especially adjacent to the septa; small circular foramina alternate with parachomata at the base of the septa. M. to U. Permian (Kubergandian to Murgabian); Thailand.

Suborder INVOLUTININA Hohenegger and Piller, 1977

Involutinina Hohenegger and Piller, 1977 (***1534**), p. 414.
Involutinacea Zaninetti, 1975 (***3425**), p. 131 (superfamily).
Rotaliea Mikhalevich, 1980 (***2108**), p. 55 (class; partim).
Rotaliata Mikhalevich, 1980 (***2108**), p. 56 (subclass; partim).
Rotaliicea Saidova, 1981 (***2696**), p. 35 (class: partim).
Rotallicae Saidova, 1981 (***2696**), p. 35 (subclass; partim).

Proloculus followed by enrolled tubular second chamber; wall calcareous, perforate, radiate, originally aragonitic but commonly recrystallized to homogeneous microgranular structure, with lamellar thickenings or pillar-like structures in umbilical region of one or both sides. L. Permian to U. Cretaceous (Cenomanian).

Family INVOLUTINIDAE Bütschli, 1880

Involutinidae Sigal, in Piveteau, 1952 (***2413**), p. 159, nom. transl. ex subfamily Involutinae.
Trocholinidae Kristan-Tollmann, 1963 (***1738**), p. 150.
Pseudovidalinidae Altiner, 1986 (***28A**), p. 25.

Test consisting of proloculus and undivided tubular chamber that is planispirally to trochospirally coiled; may have additional shell material deposited at one or both sides of the test as thickening or nodes. L. Permian to U. Cretaceous (Cenomanian).

Subfamily TRIADODISCINAE Zaninetti, 1984

Triadodiscinae Zaninetti, 1984 (***3428**), p. 206.
Lamelliconinae Zaninetti, Ciarapica, Decrouez, and Martini, 1987 (***3437A**), p. 2.

Test with proloculus and planispirally to trochospirally enrolled tubular second chamber, chamber lumen much restricted in size, additional lamellae added over the umbilical region with the formation of each new whorl, lamellae may serve as one wall of the tubular chamber. L. Triassic (Scythian) to U. Triassic (Carnian).

LAMELLICONUS Piller, 1978

Plate 309, figs. 1-4

Type species: Trocholina (Trocholina) biconvexa Oberhauser, 1957 (***2288**), p. 263; OD.

Lamelliconus Piller, 1978 (***2408**), p. 71.

Test subglobular to lenticular, globular proloculus followed by trochospirally enrolled undivided tubular second chamber that may be a complete tube or hemitubular against the preceding whorl, outer surface partially covered by one lamella of shell material added per whorl of the tubular chamber but with additional lamellae deposited in the umbilical region; aperture simple at the open end of the tube. M. Triassic (Ladinian) to U. Triassic (Carnian); Austria; Czechoslovakia; Bulgaria.

TRIADODISCUS Piller, 1983

Plate 309, figs. 5-14

Type species: Trocholina (Paratrocholina) eomesozoicus Oberhauser, 1957 (***2288**), p. 266; OD.

Triadodiscus Piller, 1983 (***2409**), p. 179 (nom. subst. pro *Mesodiscus* Piller, 1978).

Mesodiscus Piller, 1978 (***2408**), p. 41 (non *Mesodiscus* Minot, 1877); type species: obj.; OD.

Test lenticular, globular proloculus and enrolled undivided tubular second chamber, coiling planispiral to very low trochospiral and involute, a complete whorl added at each period of test formation, formed by a single lamella that may partially or completely cover the entire test. L. Triassic (Scythian) to U. Triassic (Carnian; ?Rhaetian); Austria; Bulgaria; Poland; USSR; Iran.

Subfamily AULOTORTINAE Zaninetti, 1984

Aulotortinae Zaninetti, 1984 (***3428**), p. 206.

Miliospirellinae Grigyalis, 1985 (***1308**), p. 173.

Auloconinae Zaninetti, Ciarapica, Decrouez, and Martini, 1987 (***3437A**), p. 2.

Test lenticular to conical, globular proloculus and enrolled undivided second chamber that is a hemicylinder lying against the previous whorl and forms a half volution at each period of growth, coiling may be planispiral, oscillating, or trochospiral, each half whorl of tubular chamber formation is followed by the lamellar deposition of one or two layers over the test. L. Permian to U. Jurassic (Kimmeridgian).

ANGULODISCUS Kristan, 1957

Plate 309, figs. 15-18

Type species: Angulodiscus communis Kristan, 1957; OD.

Angulodiscus Kristan, 1957 (***1734**), p. 278.

Test large, up to about 1.2 mm in diameter, lenticular, with subangular periphery, globular proloculus followed by undivided tubular second chamber that is involutely coiled, lamellae added over the umbonal area with each whorl, chamber lumen low, strongly curved, gradually tapering toward the umbonal region as seen in axial section; wall calcareous; aperture a high arch at the open end of the tubular chamber. U. Triassic (Norian to Rhaetian); Austria; Czechoslovakia.

Remarks: Although previously regarded as a synonym of *Aulotortus* (Loeblich and Tappan, 1964, ***1910**, p. C740; Koehn-Zaninetti, 1969, ***1715**, p. 74; Piller, 1978, ***2408**, p. 45), *Angulodiscus* is here recognized as having more regular planispiral coiling than does *Aulotortus*.

ARENOVIDALINA He, 1959

Plate 310, figs. 4 and 5

Type species: Arenovidalina chialingchiangensis He, 1959; OD.

Arenovidalina He, 1959 (***1443**), p. 414.

Test small, up to 0.4 mm in diameter, proloculus followed by planispirally wound undivided tubular second chamber that increases rapidly in size in the early whorls, coiling involute, walls of successive whorls laterally in contact, forming a thickened umbonal region and strongly biconvex test, whereas the chamber lumen is of ovoid section and remains limited to the median plane; wall calcareous, thick, commonly recrystallized; aperture simple, at the open end of the tubular chamber. M. Triassic (Anisian) to U. Triassic (Rhaetian); China; Austria; Czechoslovakia.

Remarks: *Arenovidalina* was originally described by He (1959, *1443) as arenaceous, with calcareous grains in a calcareous groundmass. This was regarded as a highly recrystallized but originally granular calcareous wall, and the genus was considered to be a synonym of *Aulotortus* in the Involutinidae by Loeblich and Tappan (1964, *1910, p. C740). Later it was regarded as generically distinct and as having a calcareous perforate radial wall (Salaj, in Salaj et al., 1967, *2710, p. 42), considered to be a synonym of *Ophthalmidium* (Zaninetti, 1976, *3426) or a synonym of *Hemigordius* (Trifonova, 1977, *3223, p. 59). The latter two genera have a porcelaneous wall, a streptospiral early coil, and much more irregular later coiling, and *Ophthalmidium* is subdivided into distinct chambers. *Arenovidalina* has a tubular undivided second chamber that is planispiral throughout and is characterized by a lamellar umbonal region on each side of the test.

AULOCONUS Piller, 1978

Plate 310, figs. 1-3

Type species: Trocholina permodiscoides Oberhauser, 1964 (*2291), p. 207; OD.

Auloconus Piller, 1978 (*2408), p. 74.

Test lenticular to conical, globular proloculus followed by trochospirally enrolled undivided tubular second chamber, each half whorl followed by the formation of a laminated sheet over the umbilicus, building a thick and solid umbilical filling; aperture at the end of the tubular chamber. U. Triassic (Norian to Rhaetian); Austria; Czechoslovakia; Yugoslavia; Greece; Italy; USSR: Caucasus.

AULOTORTUS Weynschenk, 1956

Plate 310, figs. 6-10

Type species: Aulotortus sinuosus Weynschenk, 1956; OD.

Aulotortus Weynschenk, 1956 (*3364), p. 26.

Trocholina (Paratrocholina) Oberhauser, 1957 (*2287), p. 196; type species: *Trocholina (Paratrocholina) oscillens* Oberhauser, 1957 = *Aulotortus sinuosus* Weynschenk, 1956; OD.

Rakusia Salaj, in Salaj et al., 1967 (*2710) p. 129; type species: *Rakusia oberhauseri* Salaj, 1967; OD.

Test discoidal to lenticular with broadly rounded periphery, globular proloculus followed by tubular undivided enrolled second chamber, the coiling commonly oscillating as in the Paleozoic Archaediscidae, about one-half whorl formed at a single step, accompanied by the development of lamellae over the sides of the test; wall calcareous, originally aragonitic but commonly recrystallized; aperture at the open end of the tube. M. Triassic (Anisian) to M. Jurassic; Austria; Czechoslovakia; Turkey; China; USA: Nevada.

MILIOSPIRELLA Grigyalis, 1958

Plate 310, figs. 11-15

Type species: Miliospirella lithuanica Grigyalis, 1958; OD.

Miliospirella Grigyalis, in N. K. Bykova et al., 1958 (*475), p. 75.

Test ovate in outline, proloculus followed by tubular undivided enrolled second chamber of nearly constant thickness throughout, coiling of the tubular chamber in three planes 60° apart, each whorl in a single plane, followed by a rotation of 120° to a new plane for the next complete whorl, axial rotation may cease in the adult that tends to become planispiral; wall calcareous, hyaline, coarsely perforate; aperture at the open end of the tubular chamber. M. Jurassic (Bajocian) to U. Jurassic (Kimmeridgian); USSR: Lithuania, Caucasus; Italy.

Remarks: *Miliospirella* is here transferred to the Aulotortinae because of the changing planes of coiling, similar to that in the early stage of some *Aulotortus*. Although the original description mentioned only the changing planes, the original figures appear to show a tendency toward a final planispiral stage, as also seen in *Miliospirella delicata* Ruggieri and Giunta (1965, *2668, p. 404), from the Italian Dogger. *Miliospirella* apparently lacks the secondary lamellar deposits of other Aulotortinae.

NEOHEMIGORDIUS K. L. Wang and X. F. Sun, 1973

Plate 311, fig. 9

Type species: Neohemigordius maopingensis K. L. Wang and X. F. Sun, 1973; OD.

Neohemigordius K. L. Wang and X. F. Sun, 1973 (*3342), p. 158, 178.

Test lenticular, periphery broadly rounded, globular proloculus followed by enrolled undivided tubular second chamber of up to seven whorls, planispiral or with axis of first whorl slightly oblique to that of later whorls, second chamber not a complete tube but utilizes the peripheral margin of the previous whorl as the floor of the new whorl, outer wall of the whorls extending back over the umbilicus as lamellar thickening, chamber lumen of successive whorls increasing slowly in height and more rapidly in width, becoming ovate to reniform in section; wall calcareous, gray to black, appearing granular but probably recrystallized in preservation: aperture simple at the end of the tubular chamber. L. Permian; China.

Remarks: Although compared to *Hemigordius*, that genus does not show the very prominent umbilical thickening of *Neohemigordius;* the latter appears more closely related to the Involutinina. Some species that were previously referred to *Permodiscus* or *Hemigordius* may belong to *Neohemigordius*.

PRAGSOCONULUS Oberhauser, 1963

Plate 311, figs. 1-8

Type species: Pragsoconulus robustus Oberhauser, 1963; OD.

Pragsoconulus Oberhauser, 1963 (*2290), p. 29.

Test conical, from 0.5 mm to 3 mm in height, undivided second chamber trochospirally enrolled about an axial cavity from which radiate numerous hollow bifurcating or irregularly branching tubes; wall calcareous, finely laminated, the lamellae parallel to the test base; aperture not described, probably at the flat base of the test. M. Triassic (Ladinian) to U. Triassic (Carnian); Austria; Czechoslovakia.

Remarks: Although the original description of the wall suggests that it may belong with the Involutinina, the systematic position of this genus is somewhat uncertain. It has been illustrated only by sketches of the exterior and of a half section. Photographs of axial and horizontal thin sections may be required for interpretation of many as yet unknown characteristics of *Pragsoconulus*.

PSEUDOVIDALINA Sosnina, 1978

Plate 311, figs. 14-16

Type species: Pseudovidalina ornata Sosnina, 1978 (also err. cit. as *"orienta"* on p. 27); OD.

Pseudovidalina Sosnina, 1978 (*3038), p. 27.

Test small, discoid, large globular proloculus followed by planispirally enrolled tubular undivided second chamber, coiling evolute, but with strong secondary lamellar thickening in the umbilical region, apparently a layer being added at the formation of each of the early whorls, later whorls appear wholly evolute without added umbilical lamellae; wall calcareous, apparently with a thin inner dark layer and a vitreous outer layer, appearing in section as light yellow and radiate in structure; aperture simple at the open end of the tubular chamber. M. Permian (Kungurian, Chandalazsk Horizon), Guadalupian; USSR: Northeast Asia, S. Primorye Territory.

Remarks: Originally placed in the Cornuspiridae and described as having a single-layered wall with radial structure, the illustrated thin sections appear to show a distinct inner dark layer about half the thickness of the outer light-colored one. The coiling was reported to be involute in the early stage, but the figures show a chamber lumen restricted to the peripheral region, as in a typical evolute coil, and the lamellar thickening in the umbilical region appears to be formed only by the early whorls, whereas the last three to four whorls are wholly evolute.

Subfamily TRIASININAE Loeblich and Tappan, 1986

Triasininae Loeblich and Tappan, 1986 (*1929), p. 343.

Test with proloculus and broad and low, undivided, planispirally enrolled and involute second chamber, interior with numerous short cylindrical pillars extending from the chamber floor to the roof; wall calcareous, commonly recrystallized and probably originally aragonitic, secondary thickening may be present in the umbilical region. M. Triassic (Ladinian) to U. Triassic (Rhaetian).

PARATRIASINA He, 1980

Plate 311, figs. 10-13

Type species: Paratriasina jiangyouensis He, 1980; OD.

Paratriasina He, 1980 (*1444), p. 1170.

Test discoidal, proloculus followed by elongate tubular second chamber, early whorls in short zigzag bends that are streptospirally wound about the proloculus, later becoming planispiral, interior with pillars similar to those of *Triasina;* wall calcareous, granular as seen in section, but probably recrystallized; aperture at the end of the tubular chamber. M. Triassic (Ladinian); China.

Remarks: The original description of *Paratriasina jiangyouensis* did not indicate a holotype, hence the specimen figured by He (1980, ***1444,** pl. 73, fig. 12a) is here designated as lectotype.

The early stage of *Paratriasina* was compared to that of *Meandrospira* because of the coiling in zigzag bends, followed by later planispiral development. The axial section was said to resemble that of *Triasina*, hence suggests that internal pillars may be present, although these were not mentioned in the description. Although stated to be calcareous and imperforate and assigned to the Fischerinidae, no representative of the latter has internal pillers. It is here tentatively placed in the Triasininae, although additional study of the type species is required for definite allocation of the genus.

TRIASINA Majzon, 1954

Plate 312, figs. 1-7

Type species: Triasina hantkeni Majzon, 1954; OD.

Triasina Majzon, 1954 (*1984), p. 245.

Test flattened, ovoid, or globular, proloculus followed by planispirally enrolled undivided second chamber of five to nine low and involute whorls that strongly overlap laterally, interior with numerous short cylindrical pillars that extend from the floor to the roof of the tubular chamber and in thin section may appear falsely to represent subdivision into chamberlets; wall calcareous, commonly strongly recrystallized, that of final whorl very thin, secondary thickening may occur in the umbilical region; aperture not observed. U. Triassic (Norian to Rhaetian); Hungary; China; Himalayas; Malaysia; Indonesia: Ceram; Philippine Islands.

Subfamily INVOLUTININAE Bütschli, 1880

Involutininae Thalmann, 1935 (*3154), p. 715 (nom. corr. pro Involutinae).

Involutinae Bütschli, in Bronn, 1880 (*421), p. 209 (nom. imperf.).

Problematininae Rhumbler, 1913 (*2621), p. 389.

Arproblematoia Rhumbler, 1913 (*2621), p. 389 (err. emend.).

Test with globular proloculus followed by planispirally to trochospirally coiled tubular second chamber, secondary lamellar thickening in the umbilical region of one or both sides is formed independently of the tubular chamber. U. Triassic (Norian) to U. Cretaceous (Cenomanian).

BABELISPIRILLINA Ruggieri and Giunta, 1965

Plate 312, fig. 8

Type species: Babelispirillina babelis Ruggieri and Giunta, 1965; OD.

Babelispirillina Ruggieri and Giunta, 1965 (*2668), p. 406.

Test small, up to 0.53 mm in height, tubular undivided chamber forming a high trochospiral open coil, resembling *Alanwoodia* but with whorls circular to oval in section and more loosely coiled, so that they may be separated by a distance equalling up to half the height of the tubular chamber, interior of the open cone with calcareous filling. M. Jurassic (Dogger); Italy.

CORONIPORA Kristan, 1958

Plate 312, figs. 14-19

Type species: Coronella austriaca Kristan, 1957 (*1734), p. 281; OD.

Coronipora Kristan, 1958 (*1735), p. 114 (nom. subst. pro *Coronella* Kristan, 1957).
Coronella Kristan, 1957 (*1734), p. 280 (non *Coronella* Laurentis, 1768, nec Goldfuss, 1828); type species: obj.; OD.

Test lenticular to discoidal, with peripheral keel, globular proloculus followed by tubular undivided second chamber, enrolled in a planispiral or low trochospiral coil, all whorls visible from one side of the test, umbilical region covered with lamellae on the opposite side; aperture simple at the end of the tubular chamber. U. Triassic (Norian to Rhaetian); Austria.

CYLINDROTROCHOLINA Loeblich and Tappan, 1986

Plate 313, figs. 1-5

Type species: Alanwoodia excelsa Ruggieri and Giunta, 1965 (***2668**), p. 406; OD.

Cylindrotrocholina Loeblich and Tappan, 1986 (*1929), p. 343 (also err. cit as *Cyclindrotrocholina*, p. 343).

Test small, up to 0.58 mm in height and about 0.13 mm in diameter, of proloculus and enrolled tubular and undivided second chamber in a very high trochospire, so that adult test is elongate and has nearly parallel sides, tubular chamber much wider than high and surrounds a wide umbilical region filled with calcareous deposits; wall calcareous, probably originally aragonitic, both the outer wall and the septa that separate adjacent whorls appearing double in section. M. Jurassic (Dogger); Italy.

GLOBOSPIRILLINA Antonova, 1964

Plate 313, figs. 6-10

Type species: Globospirillina condensa Antonova, 1964 = *Spirillina neocomiana* Moullade, 1961 (***2193**), p. 213; OD.

Globospirillina Antonova, in Antonova et al., 1964 (*50), p. 68.
Bitrochospirillina Gofman, 1967 (*1260), p. 44, 55, 148 (name not available, ICZN Art. 13 (a)(i); manuscript name, err. pro *Globospirillina*, fide Antonova, personal commun. of Aug. 3, 1979).

Test small, up to 0.5 mm in diameter, globular proloculus followed by undivided tubular enrolled second chamber, earlier whorls may be slightly irregular but most of test planispirally coiled, chamber lumen ovoid, lamellae extending laterally over the umbilical region of the test to produce a thickened area on both sides; wall calcareous, glassy, with pseudopores in the central region; aperture at the open end of the tubular chamber. U. Jurassic (Tithonian) to L. Cretaceous (Aptian); USSR: Crimea, Caucasus, Azerbaydzhan; France; Romania.

HENSONINA Moullade and Peybernès, 1974

Plate 312, figs. 9 and 10

Type species: Trocholina lenticularis F. R. S. Henson, 1947 (***1458**), p. 452; OD.

Hensonina Moullade and Peybernès, 1974 (*2199), p. 178.

Test lenticular, biconvex with angular periphery, globular proloculus followed by long planispirally enrolled and slowly enlarging undivided tubular second chamber with ogival section; wall calcareous, umbilical region with lamellar filling, resembling *Involutina* but having exterior surfaces covered by a prominent reticular network on both sides; aperture at the end of the enrolled chamber. L. Cretaceous (Albian) to U. Cretaceous (Cenomanian); Qatar Peninsula; N. Spain.

HOTTINGERELLA Piller, 1983

Plate 313, figs. 11-16

Type species: Trocholina chouberti Hottinger, 1976 (***1548**), p. 819; OD.

Hottingerella Piller, 1983 (*2409), p. 197.

Test conical, of medium to large size, up to 2.2 mm in diameter, spherical proloculus followed by trochospirally coiled undivided second chamber, umbilical region with lamellar filling, possibly a single lamella formed with each whorl, filling perforated by a canal system that includes a spiral canal parallel to the inner margin of the chamber, communicating with the chamber lumen through slitlike passages. U. Jurassic?, L. Cretaceous (Berriasian to Barremian); Morocco; USSR: Crimea.

INVOLUTINA Terquem, 1862

Plate 314, figs. 1-6

Type species: Involutina jonesi Terquem and Piette, in Terquem, 1862 (***3137**), p. 461 = *Nummulites liassicus* Jones, in Brodie, 1853

(*359), p. 275; SD Bornemann, 1874 (*307), p. 711.

Involutina Terquem, 1862 (*3137), p. 450.

Problematina Bornemann, 1874 (*307), p. 733; type species: *Involutina deslongchampsi* Terquem, 1864 (*3138), p. 432); SD Cushman, 1927 (*746), p. 188.

Arinvolutoum Rhumbler, 1913 (*2621), p. 390 (err. emend.).

Arproblematoum Rhumbler, 1913 (*2621), p. 390 (err. emend.).

Pachyspirillina Ruggieri and Giunta, 1965 (*2668), p. 408: type species: *Pachyspirillina lacunosa* Ruggieri and Giunta, 1965; OD.

Test discoidal to lenticular, globular proloculus followed by planispirally enrolled and undivided tubular second chamber, umbilical region on both sides of the test filled with lamellar deposits; wall calcareous, originally aragonitic, as shown by X-ray determination, but commonly replaced or recrystallized in preservation, a single whorl of the tube or semitube being produced at a single step, followed by deposition of a lamellar and papillose layer that is confined to the umbilical region and a second papillose layer over the entire test; aperture at the open end of the tube. U. Triassic (Norian) to U. Cretaceous (Cenomanian); Europe; Asia.

JURELLA Danich, 1977

Plate 314, figs. 7-10

Type species: Jurella spirillinoides Danich, 1977; OD.

Jurella Danich, 1977 (*890), p. 115.

Test discoidal, with broadly rounded periphery, globular proloculus followed by planispirally enrolled and rapidly enlarging undivided second chamber, coiled chamber closely appressed against the previous whorl so that the chamber lumen is arcuate in section, umbilical regions of both sides of the test have a lamellar filling that results in nearly flat sides; aperture an arch at the open end of the tube. M. Jurassic (Callovian) to U. Jurassic (Oxfordian); USSR: Moldavian SSR.

Remarks: Although originally referred to the Spirillinidae, the thick and apparently recrystallized wall and the prominent umbilical fillings indicate that *Jurella* is closer to the Involutinidae. Although details are lacking as to the structure of the umbilical fillings, *Jurella* appears closest to *Involutina*.

SEMIINVOLUTA Kristan, 1957

Plate 314, figs. 11-18

Type species: Semiinvoluta clari Kristan, 1957; OD.

Semiinvoluta Kristan, 1957 (*1734), p. 276.

Test inflated to discoidal, asymmetrical, the globular proloculus followed by an undivided enrolled tubular second chamber, coiling semi-involute, umbilical pillarlike fillings on the flattened side of the test, the lamellar deposits leaving a smooth surface on the inflated side; aperture at the open end of the chamber. U. Triassic (Norian to Rhaetian); Austria; Czechoslovakia; Yugoslavia.

TROCHOLINA Paalzow, 1922

Plate 315, figs. 1-16

Type species: Involutina conica Schlumberger, 1898 (*2770), p. 151; SD Cushman, 1933 (*766), p. 231.

Trocholina Paalzow, 1922 (*2322), p. 10.

Neotrocholina Reichel, 1956 (*2552), p. 404; type species: *Neotrocholina valdensis* Reichel, 1956; OD.

Trocholina (Trochonella) Kristan, 1957 (*1734), p. 285; type species: *Trocholina (Trochonella) crassa* Kristan, 1957; OD.

Ichnusella Dieni and Massari, 1966 (*958), p. 170; type species: *Ichnusella trocholinaeformis* Dieni and Massari, 1966; OD.

Test conical, globular proloculus followed by trochospirally enrolled tubular second chamber, all whorls visible on the convex spiral side, only the final whorl visible on the umbilical side around the wide umbilicus that contains nodes and pillars of lamellar structure, one lamella deposited at the formation of each whorl of the enrolled tubular chamber; wall coarsely perforate on the spiral side, more finely perforate on the umbilical side; aperture at the end of the tubular chamber. U. Triassic (Norian) to U. Cretaceous (Cenomanian); cosmopolitan.

TROCHOSPIRILLINA Mityanina, 1957

Plate 312, figs. 11-13

Type species: Trochospirillina granulosa Mityanina, 1957; OD.

Trochospirillina Mityanina, 1957 (*2154), p. 230.

Test discoidal, small, up to 0.4 mm in diameter, tiny proloculus followed by gradually enlarging undivided tubular second chamber that forms a very low trochospiral or nearly planispiral coil, periphery rounded, all whorls visible from the spiral side, umbilical side with covering of small granules or numerous radiating ridges, probably similar to the secondary lamellar covering of *Involutina* or *Coronipora:* wall calcareous, hyaline, porous; aperture at the open end of the tubular chamber. U. Jurassic (L. Oxfordian); USSR: Belorussia.

Family HIRSUTOSPIRELLIDAE Zaninetti, Ciarapica, Cirilli, and Cadet, 1985

Hirsutospirellidae Zaninetti, Ciarapica, Cirilli, and Cadet, 1985 (*3437), p. 334.

Test with proloculus and undivided tubular trochospirally enrolled second chamber, spiral side with prominent spinelike protrusions and umbilical side with shallow umbilical filling. U. Triassic (Norian).

HIRSUTOSPIRELLA Zaninetti, Ciarapica, Cirilli, and Cadet, 1985

Plate 830, figs. 7-12

Type species: Hirsutospirella pilosa Zaninetti et al., 1985; OD.

Hirsutospirella Zaninetti, Ciarapica, Cirilli, and Cadet, 1985 (*3437), p. 334.

Test small, a low cone, proloculus followed by undivided tubular second chamber, coiled in a low trochospire about a wide, shallow umbilicus; wall calcareous, hyaline, spiral surface covered with pillarlike spines or projections of microgranular texture, appearing dark in section and possibly serving for attachment, umbilical side with simple thickening, without spines; aperture not observed, probably at the end of the tube. U. Triassic (Norian); Yugoslavia: Bosnia; Italy: Sicily.

Family PLANISPIRILLINIDAE Piller, 1978

Planispirillinidae Piller, 1978 (**2408**), p. 84.
Planispirillinidae Hohenegger and Piller, 1977 (*1534), p. 414 (name not available, ICZN Art. 13 (a)(i), no description).

Test with globular proloculus followed by undivided planispiral or trochospiral tubular second chamber, semi-involute to partially evolute, asymmetrical, umbilical region of one or both sides filled with lamellae that extend from the inner margin of the chamber; wall aragonitic; aperture single at the open end of the tube. Holocene.

ALANWOODIA Loeblich and Tappan, 1955

Plate 316, figs. 1-4

Type species: Patellina campanaeformis Brady, 1884 (**344**), p. 634; OD.

Alanwoodia Loeblich and Tappan, 1955 (**1890**), p. 26.

Test free, a high cone with flattened base, globular proloculus followed by trochospirally coiled undivided broad and low second chamber, with lamellae filling the wide umbilical region; wall hyaline, acting as a single crystal, but probably of aragonite; aperture at the open end of the spiralling tubular chamber and a row of small pores adjacent to the spiral suture on the evolute side. Holocene; S. Pacific, at about 315 m.

Remarks: The presence of the small openings adjacent to the spiralling suture and the calcareous lamellae in the umbilical region were noted by Loeblich and Tappan (1955, ***1890**, p. 26–27). Although the composition then was regarded as probably of calcite, no specimens were available for X-ray determination.

CONICOSPIRILLINOIDES T. C. Cheng and S. Y. Zheng, 1978

Plate 316, figs. 5-8

Type species: Spirillina semidecorata Heron-Allen and Earland, 1915 (**1472**), p. 685; OD.

Conicospirillinoides T. C. Cheng and S. Y. Zheng, 1978 (*557), p. 218, 262.

Test with globular proloculus and undivided planispirally enrolled tubular second chamber, wall extending into a high spiralling flange bordering the whorls that partially overlaps the umbilical region and slopes sharply upward considerably beyond the chamber lumen, surface of the flange bearing numerous curved radial indentations that are slightly oblique to the periphery and spiral suture and falsely appear to represent internal septa, but present only on the flanges and do not subdivide the chamber lumen; on the flattened umbilical side similar but horizontal flanges extend from the inner chamber margin, covering the umbilical region with thick lamellae that have a papillate surface with numerous rounded bosses; aperture at the end of the tubular chamber at the periphery. Holocene; S. Pacific: Torres Straits; S. China Sea: Xisha Islands; Indian Ocean: off N. Mozambique.

Remarks: Originally placed in the Spirillinidae, *Conicospirillinoides* is here transferred to the Planispirillinidae because of the presence of the umbilical flanges.

PLANISPIRILLINA Bermúdez, 1952

Plate 316, figs. 9-11

Type species: Spirillina limbata Brady var. *papillosa* Cushman, 1915 (***707**), p. 6 (syn.: *Spirillina margaritifera* Terquem, 1880 (***3146**), p. 34, non *Spirillina margaritifera* Williamson, 1858 = *Spirillina terquemi* A. Silvestri, 1923, ***2950**, p. 72); OD.

Planispirillina Bermúdez, 1952 (***205**), p. 26.

Test discoidal, globular proloculus followed by undivided tubular and planispirally enrolled second chamber, evolute on one side and involute on the opposite; wall perforate on the evolute side, imperforate on the opposite side where earlier whorls are obscured by a covering of papillose lamellae, wall of aragonite by X-ray determination; aperture at the open end of the tubular chamber. Holocene; Pacific: off Japan; Guam; Hawaiian Islands; S. China Sea; Atlantic: English Channel; W. Atlantic: Florida; Mediterranean Sea.

TROCHOLINOPSIS Piller, 1983

Plate 316, figs. 12-17

Type species: Trocholinopsis porosuturalis Piller, 1983; OD.

Trocholinopsis Piller, 1983 (***2409**), p. 195.

Test a small low cone, spherical proloculus followed by undivided trochospirally enrolled second chamber that has the form of a half tube, spiral side slightly convex, evolute, umbilical side slightly concave and covered by papillose lamellae that obscure all but the final whorl, one lamella formed for each whorl of the tubular chamber, surface papillae built of small aragonite needles, periphery with sharp flangelike keel; wall aragonitic; aperture broad and low, at the open end of the tubular chamber on the umbilical side, pores present on the spiral side along the spiral suture. Holocene; Mediterranean: Straits of Sicily.

Remarks: *Trocholinopsis* differs from *Alanwoodia* in having a very low spired test and a wide peripheral keel.

Family VENTROLAMINIDAE Weynschenck, 1950

Ventrolaminidae Weynschenk, 1950 (***3362**), p. 17.
Ventrolamininae Loeblich and Tappan, 1961 (***1902**), p. 292 (subfamily).

Test lenticular, planispiral, oscillating in coiling or a low trochospiral, numerous chambers in rapidly enlarging whorl; wall calcareous, of two layers, an inner microgranular one and an outer hyaline radial layer. M. Jurassic (U. Bajocian) to L. Cretaceous (Berriasian).

ARCHAEOSEPTA Wernli, 1970

Plate 317, figs. 1-9

Type species: Archaeosepta platierensis Wernli, 1970; OD.

Archaeosepta Wernli, 1970 (***3359**), p. 87.

Test tiny, 0.14 mm to 0.24 mm in diameter, auriculate in outline, planoconvex, spiral side convex and umbilical side flattened to weakly concave, rapidly enlarging chambers in low trochospiral coil of about one and a half whorls, sutures curved, flush, periphery rounded; wall calcareous, not secondarily lamellar, with dark microgranular inner layer and outer clear, hyaline, optically radial layer of approximately equal thickness; aperture a simple interiomarginal umbilical arch. M. Jurassic (U. Bajocian and Bathonian); France; Italy: Sardinia.

PROTOPENEROPLIS Weynschenck, 1950

Plate 317, figs. 10-14

Type species: Protopeneroplis striata Weynschenck, 1950; OD.

Protopeneroplis Weynschenck, 1950 (***3362**), p. 13 (non *Protopeneroplis* Hofker, 1950, p. 393).
Ventrolamina Weynschenck, 1950 (***3362**), p. 17; type species: *Ventrolamina* cribrans Weynschenck, 1950 = *Protopeneroplis striata* Weynschenck, 1950; OD.

Test lenticular, 0.4 mm to 0.8 mm in diameter and up to 0.42 mm in thickness, enrolled in about two rapidly enlarging and loosely coiled planispiral, oscillating, or low trochospiral whorls, final whorl with twelve to sixteen chambers, involute, periphery angular to rounded; wall calcareous, lamellar, of two layers, an inner microgranular one and an outer hyaline layer of radial structure, septa largely formed by the inner layer or may be partially covered by the outer layer, the hyaline layer rapidly thickening from the beginning of the last whorl and may appear distinctly lamellar in equatorial section, in axial section lamellae and wall layers result in alternating dark and light layers, surface may have calcareous pustules; aperture areal, in the lower part of the apertural face, and somewhat protruding. M. Jurassic (U. Dogger) to L. Cretaceous (Berriasian); Austria; Italy; France; Yugoslavia; Switzerland; Israel; Turkey.

Suborder SPIRILLININA Hohenegger and Piller, 1975

Spirillinina Hohenegger and Piller, 1975 (***1533**), p. 88.
Spirillinoidea Chapman, Parr, and Collins, 1934 (***543**), p. 554 (superfamily).
Spirillinidea Pokorný, 1958 (***2447**), p. 311 (superfamily).
Spirillinacea Loeblich and Tappan, 1961 (***1902**), p. 317 (superfamily).
Spirillinida Gorbachik and Mantsurova, 1980 (***1272**), p. 36 (order).
Rotaliea Mikhalevich, 1980 (***2108**), p. 55 (class; partim).
Rotaliata Mikhalevich, 1980 (***2108**), p. 56 (subclass; partim).
Rotallicea Saidova, 1981 (***2696**), p. 35 (class; partim).
Rotallicae Saidova, 1981 (***2696**), p. 35 (subclass; partim).

Coiling planispiral to high trochospiral, proloculus followed by enrolled tubular undivided chamber or with few chambers per whorl, chambers may be secondarily subdivided; wall of calcite, optically a single crystal or few to a mosaic of crystals; *a*-axis preferred orientation along axis of coiling and *c*-axis parallel to umbilical surface *(Patellina)*; may have pseudopores or micropores filled with organic matter and closed by sieve plates, wall formed by marginal accretion, not by calcification of an organic template produced by pseudopodia. U. Triassic, to Holocene.

Family SPIRILLINIDAE Reuss and Fritsch, 1861

Spirillinidae Rhumbler, 1895 (***2616**), p. 85, nom. corr. pro family Spirillidea.
Spirillidea Reuss and Fritsch, 1861 (***2593**), p. 2.
Spirillinidea Reuss, 1862 (***2586**), p. 364.
Spirillininae Brady, 1884 (***344**), p. 72 (subfamily).
Arspirillinia Rhumbler, 1913 (***2621**), p. 388 (err. emend.).
Turrispirillininae Cushman, 1927 (***742**), p. 73 (subfamily).

Spherical proloculus followed by nonseptate enrolled tubular chamber, planispiral or low to high trochospiral, or may enroll back on itself to result in a double-layered cone; aperture single at open end of tube or tube may be closed terminally. U. Triassic to Holocene.

Remarks: R. K. Smith and Isham (1974, ***3006**, p. 63) suggest that the term "prolocular area" be used rather than proloculus for the Spirillinacea, as there is no septum separating the early globular portion from the later tubular one. We regard the relatively large spherical portion as the proloculus, as the early part of the following tubular chamber is of distinctly lesser diameter. No septa are produced at any stage of growth in the Spirillinidae.

CONICOSPIRILLINA Cushman, 1927

Plate 318, figs. 1-3

Type species: Spirillina trochoides Berthelin, 1879 (***220**), p. 37; OD.

Conicospirillina Cushman, 1927 (***742**), p. 73.

Test conical, proloculus followed by undivided tubular and trochospirally enrolled second chamber, spiral side evolute and strongly convex, involute umbilical side flat to concave and may leave open a small umbilicus; aperture at the open end of the spiralling tube. L. Jurassic (L. Pliensbachian); Europe.

MYCHOSTOMINA Berthelin, 1881

Plate 318, figs. 9-15

Type species: Spirillina vivipara Ehrenberg var. *revertens* Rhumbler, 1906 (***2619**), p. 32; SD Galloway, 1933 (***1205**), p. 88.

Mychostomina Berthelin, 1881 (***222**), p. 557.

Test low conical, with convex evolute spiral side, opposite side flat to concave, proloculus followed by tubular enrolled second chamber of several low trochospiral whorls that then crosses the periphery to add one or two whorls on the flattened side as it coils toward the umbilicus, periphery may be carinate; wall calcareous, hyaline, of a single crystal to many crystals of calcite, both surfaces of the test with coarse pseudopores; aperture at the end of the tubular chamber, opening into the umbilicus, and may be bordered by a thickened lip. L. Cretaceous (Barremian) to Holocene; USSR: Caucasus; Atlantic; Pacific.

SEJUNCTELLA Loeblich and Tappan, 1957

Plate 318, fig. 8

Type species: Sejunctella earlandi Loeblich and Tappan, 1957 = *Spirillina lateseptata* O. Terquem, 1875 (***3143**), p. 21; OD.

Sejunctella Loeblich and Tappan, 1957 (***1897**), p. 228.

Test discoidal, globular to ovate proloculus followed by planispirally enrolled undivided tubular second chamber that is loosely coiled and separated from the previous whorl by a narrow solid platelike area, periphery carinate, the keel appearing fimbriate or bearing numerous relatively long solid spines; wall hyaline, appearing optically as a single crystal except for the plate separating the whorls, numerous prominent perforations on one side, and opposite side imperforate but with secondarily added granulations; aperture a simple rounded opening at the end of the tubular chamber. Holocene; Atlantic.

Remarks: Although *Sejunctella earlandi* previously was regarded as distinct from *Spirillina lateseptata*, the neotype selected for the latter (Levy et al., 1975, ***1838**, p. 175) is conspecific with *S. earlandi* and Terquem's name thus has priority.

SPIRILLINA Ehrenberg, 1843

Plate 318, figs. 4-7

Type species: Spirillina vivipara Ehrenberg, 1843; OD(M).

Spirillina Ehrenberg, 1843 (***1059**), p. 402 (also as *Spirulina*, p. 323; non *Spirulina* Bory, 1826).

Spirulina Ehrenberg, 1841 (***1057**), p. 144 (name not available, ICZN Art. 12 (a), no description, non *Spirulina* Bory, 1826).

Arspirillinum Rhumbler, 1913 (***2621**), p. 388 (err. emend.).

Test discoidal, globular proloculus followed by a gradually enlarging enrolled, undivided tubular second chamber, earliest few whorls may be in a low trochospiral, later ones planispiral, commonly four to nine closely appressed whorls, tubular chamber may not be entirely cylindrical but lies against the periphery of the preceding whorl, and final part of the last whorl may bend at a right angle so that the aperture opens into the umbilical depression, asexually formed gamont with smaller test and smaller proloculus than those of sexually produced agamont; wall calcareous, hyaline, appearing optically as a single calcite crystal with *c*-axis oriented perpendicular to the plane of coiling or less commonly parallel to this plane, others may have a transitional orientation with *c*-axis at first perpendicular to the coiling axis and becoming progressively oblique to this in successive whorls, or may have a helicoidal structure, with *c*-axes at an angle of about 45° to the radii from the center of the test, or may consist of a mosaic of crystals in which the *c*-axes are variously oriented, the calcite being deposited over an organic membrane; surface commonly with numerous pores or pseudopores of limited distribution; aperture rounded to crescentic, at the open end of the tubular chamber; gamont individuals uninucleate, agamont multinucleate, asexual multiple fission occurs within a reproductive cyst formed by the animal, during sexual reproduction two or three individuals are enclosed within a fertilization cyst, the syzygy ensuring gametic fusion. U. Triassic (Rhaetian) to Holocene; cosmopolitan.

SPIROTROCHOLINA Azbel', 1986

Plate 319, figs. 1-7

Type species: Turrispirillina incerta Svetovostokova, in Myatlyuk, 1953 (***2217**), p. 28; OD.

Spirotrocholina Azbel', 1986 (***105**), p. 27.

Test a low cone, proloculus and all whorls of the undivided trochospirally coiled second chamber visible from the spiral side, umbilical side concave, with prominent and indistinctly laminated umbilical pillar, the laminae extending across the open part of the umbilicus to the edge of the spiralling second chamber, leaving beneath a spiralling canal; wall calcitic, thin, acting optically as a single crystal, surface smooth or may have surface pustules and low radial ridges on the spiral side; aperture at the open end of the tubular chamber. U. Jurassic (L. to M. Oxfordian); USSR; Scotland.

TURRISPIRILLINA Cushman, 1927

Plate 319, figs. 8-10

Type species: Spirillina conoidea Paalzow, 1917 (***2321**), p. 217; OD.

Turrispirillina Cushman, 1927 (***742**), p. 73.

Test a small, low cone, of globular proloculus and long undivided tubular enrolled second chamber forming about four whorls that are visible on the convex side and around the umbilical region of the concave side: wall calcareous, finely perforate: aperture at the open end of the tube on the flattened concave side. U. Jurassic to Holocene; cosmopolitan.

Family PATELLINIDAE Rhumbler, 1906

Patellinidae Gorbachik and Mantsurova, 1980 (***1272**), p. 36, nom. transl. ex subfamily Patellininae.

Test with proloculus followed by spiral undivided tubular chamber, later stage with two crescentic chambers per whorl that may have or lack radial septula. L. Cretaceous (Aptian) to Holocene.

Subfamily HERGOTTELLINAE Loeblich and Tappan, 1984

Hergottellinae Loeblich and Tappan, 1984 (***1918**), p. 32.

Patellinidae in which the chambers are not subdivided by radial septula. L. Cretaceous (Aptian) to Holocene.

HERGOTTELLA Ludbrook, 1966

Plate 319, figs. 11-16

Type species: Patellina jonesi Howchin, 1895 (***1563**); p. 199; OD.

Hergottella Ludbrook, 1966 (***1941**), p. 135.

Test a high small cone, with flattened to concave umbilical side, somewhat ovoid in plan, each chamber an elongate spiral of about one volution or more in length, tapering terminally as the next chamber commences, all whorls visible from the convex side, only the last whorl visible around the umbilicus on the flattened side, sutures very slightly depressed; wall calcareous, relatively thick, of large calcite crystals that may also fill the central area, a row of large perforations present just below the sutures: aperture a low arch beneath a long narrow flap near the umbilicus. L. Cretaceous (Aptian): South Australia.

Remarks: The conical form, thick wall, and calcareous filling of the test suggests a relationship to the Trocholinidae but because of the distinct chambers this genus is assigned to the Patellinidae.

HETEROPATELLINA McCulloch, 1977

Plate 319, figs. 23-25

Type species: Heteropatellina frustratiformis McCulloch, 1977; OD.

Heteropatellina McCulloch, 1977 (***1961**), p. 280.

Test a low planoconvex cone, globular proloculus followed by undivided tubular second chamber of about two whorls, then with two and later with three or four broad and low crescentic chambers per whorl, umbilicus open on the flattened side, lacks the internal columella that is formed by the sharply bent termination of the chambers in *Patellina;* wall calcareous, proloculus with distinct pseudopores, surface of chambers smooth but with prominent peripheral keel, that of earlier whorls remaining as an elevated spiralling ridge on the spiral side; aperture an umbilical arch. Holocene; Pacific: Philippine Islands.

PATELLINOIDES Cushman, 1933

Plate 319, figs. 17-22

Type species: Patellinoides conicus Heron-Allen and Earland, 1932 (***1480**), p. 408 (as "*conica*"); OD.

Patellinoides Cushman, 1933 (***766**), p. 236 (validated by designation of type species).

Patellinoides Heron-Allen and Earland, 1932 (***1480**), p. 407 (name not available, ICZN Art. 13 (b): type species not designated).

Test tiny, low conical, planoconvex, ovate in outline, proloculus and undivided spiral tubular second chamber of one or two volutions followed by chambers biserially arranged around an internal S-shaped columella as in *Patellina,* all whorls visible from the convex side, only the final pair of chambers visible from the flattened umbilical side, lacking the secondary partitions of *Patellina:* wall calcareous, perforate, acting optically as a single crystal of calcite; aperture a small arch near the umbilicus of the flattened side. Holocene; N. and S. Atlantic.

Subfamily PATELLININAE Rhumbler, 1906.

Patellininae Rhumbler, 1906 (*2619), p. 35.
Arpatellinia Rhumbler, 1913 (*2621), p. 390 (err. emend.).

Chambers subdivided by numerous radial septula extending inward from the chamber periphery. L. Cretaceous (Aptian) to Holocene.

MESOPATELLINA McCulloch, 1977

Plate 320, figs. 1-3

Type species: Mesopatellina differens McCulloch, 1977; OD.

Mesopatellina McCulloch, 1977 (*1961), p. 281.

Tiny, low conical test of elongate ovate outline, globular proloculus followed by undivided tubular chamber of about one whorl, then with two chambers per whorl around a slightly oblique axis, successive intercameral sutures curving obliquely with respect to the greatest diameter of the test, all chambers visible on the elevated spiral side, only the final pair of chambers visible on the umbilical side, later chambers subdivided by numerous short radially arranged septula, sutures slightly depressed, periphery angular; wall calcareous, hyaline, surface smooth; aperture directed toward the umbilicus, with scroll-like median septum as in *Patellina* present in the final pair of chambers, the scrolls and bordering slits forming more than one complete cycle. Holocene, at 30 m; Pacific: Hood Island, Galapagos.

PATELLINA Williamson, 1858

Plate 320, figs. 4-14

Type species: Patellina corrugata Williamson, 1858; OD(M).

Patellina Williamson, 1858 (*3379), p. 46.
Arpatellum Rhumbler, 1913 (*2621), p. 391 (err. emend.).
Discobolivina Hofker, 1951 (*1500), p. 358; type species: obj.: OD.
Praepatellina McCulloch, 1977 (*1961), p. 281; type species: *Praepatellina simplissima* McCulloch, 1977; OD.

Test low conical, planoconvex, all chambers visible from the convex spiral side, only the final pair of the last whorl visible on the flattened umbilical side, periphery carinate, the keel projecting from the basal surface so that it supports the test and prevents it from resting on the umbilical wall, proloculus followed by undivided coiled tubular chamber of one to three whorls that form in a single growth stage, later stage in the agamont with two broad and low crescentic chambers per whorl, under favorable conditions gamonts may reproduce immediately after formation of the spiral chamber, but semicircular chambers are formed if reproduction is delayed, distal end of the tubular chamber and of later biserial chambers turned sharply toward the umbilical area so that the aperture opens toward the umbilicus, chambers subdivided in the outer part by numerous short radial septula and may have an additional intercalated series of shorter septula, the septula extending for about the width of the chamber that is visible from the spiral side but not extending to the umbilicus of the opposite side, interior with a scroll-like median septum resulting from the sharp turn of the two edges of each chamber where the aperture is directed toward the umbilicus, those of successive whorls building a median columella; wall calcareous, acting as a single crystal of high magnesium calcite with preferred orientation of *c*-axis parallel to the umbilical surface and *a*-axis parallel to the axis of coiling, growth occurs by lateral accretion along the edge of the chamber wall and does not form an organic template, wall of a new chamber first forms on the spiral side and radial septula and underlying basal plates then arise from the peripheral carina, continued growth and fusion of the basal plates forms the lower wall of the test, basal plates in early development showing angular edges that correspond to the crystal faces and a funnel-like central depression consistent with development as a crystal skeleton in a supersaturated solution, pseudopores originate as indentations in the upper chamber wall between the septula, are filled with organic matter, and locally suppress calcification during wall construction, pores closed internally by pore sieve-plates that do not allow passage of cytoplasm but may allow transfer of gases or dissolved nutrients, test surfaces covered by a thin organic membrane continuous with that of the pore canals, that prevents deposition of secondary lamellae; aperture a low opening at the end of the semicircular chamber, where it turns sharply toward the umbilicus, later covered by a broad T-shaped apertural plate with recurved ends, apertures of successive chambers approximately 180° apart, each successively in a lower plane, rarely more than one aperture may be produced due to bifurcation of the chamber near the umbilical termination. L. Cretaceous (Aptian) to Holocene; cosmopolitan.

Remarks: *Praepatellina* was based on a juvenile specimen, possibly of *Patellina corrugata.*

Suborder CARTERININA Loeblich and Tappan, 1981

Carterinina Loeblich and Tappan, 1981 (*1914), p. 163.
Carterinacea Loeblich and Tappan, 1961 (*1902), p. 317 (superfamily).
Carterinoida Mikhalevich, 1980 (*2108), p. 59 (superorder).

Test attached, trochospiral, early chambers semicircular, later ones becoming crescentic and finally irregular or spreading in the adult, with undulating surface, earliest chambers simple, later ones may have radial secondary septula resulting from infolding of the wall; wall with organic inner lining and outer layer of rodlike or fusiform secreted spicules, each one crystallographically a single elongate crystal (determined by electron diffraction) of low magnesium calcite (determined by X-ray), in a groundmass of smaller spicules loosely held in an organic matrix. Eocene, Holocene.

Family CARTERINIDAE Loeblich and Tappan, 1955

Carterinidae Loeblich and Tappan, 1955 (*1890), p. 27.
Carterininae Brönnimann et al., 1983 (*417), p. 205 (subfamily).
Zaninettiinae Brönnimann and Whittaker, 1983 (*406), p. 14 (subfamily).

As for the suborder. Eocene, Holocene.

CARTERINA Brady, 1884

Plate 321, figs. 1-12

Type species: Rotalia spiculotesta Carter, 1877 (*504), p. 470; OD(M).

Carterina Brady, 1884 (*344), p. 66, 345.
Zaninettia Brönnimann and Whittaker, 1983 (*406), p. 15; type species: *Zaninettia manaarensis* Brönnimann and Whittaker, 1983 = *Rotalia spiculotesta* Carter, 1877; OD.

Test probably free-living in the early stage, later attached to the substrate, large flattened specimens with numerous rapidly enlarging and progressively more crescentic to irregular trochospirally coiled chambers may represent the microspheric generation, and the surrounding spreading flange may be a reproductive structure; after about two whorls infolding of both the organic lining and spicular layer of the wall may form radial secondary septula, or chamber subdivision may be delayed and later chambers have an undulating surface of alternately inflated and constricted areas around the circumference, each undulation provided with a separate umbilical aperture like those of the chamberlets; wall imperforate, with a thick organic inner lining that imparts a distinctive brown color to the first one or two whorls, covered by an outer layer of calcareous fusiform to rodlike secreted calcite spicules with concentrically layered structure, held in a ground mass of smaller but similar spicules, spiral side may have an inner layer of spicules aligned approximately perpendicular to the test periphery and a surface layer of spicules arranged parallel to the periphery or in somewhat chevronlike arrangement, spicules of progressively larger size in later chambers, tiny spicules also line the interior and fill the space between larger ones, umbilical side against the attachment has a single layer of spicules in parallel groups of a few spicules but of more random orientation than on the spiral side, spreading flange also covered with spicules and apertural region may have a mass of spicules; aperture umbilical in position, single in the early chambers, multiple in the expanded later chambers, with separate umbilical openings from each lobe or chamberlet of the final whorl. U. Eocene: Spain; Holocene: cosmopolitan in tropical shallow water.

Remarks: *Carterina* has variously been regarded as a unique foraminiferan with test constructed of spicules formed by the organism or as a trochamminid with agglutinated test of foreign particles. Although lacking definitive evidence of either possibility, Brönnimann and Whittaker (1983, ***406**) placed in the Superfamily Trochamminacea both *Carterina*, in the Trochamminidae, and *Zaninettia*, subfamily Zaninettiinae, in the Remaneicidae, considering the test to be agglutinated of spicules from some other, unknown organism and not secreted by the foraminifer itself. Although *Remaneica* has radial infoldings of the wall, the small, thin-walled, delicate, scalelike test is formed of agglutinated quartz particles of nonbiologic origin. Homeomorphy in chamber form and arrangement is common in unrelated foraminifers, whereas wall composition and structure provide the major basis for taxonomic categories at the subordinal level, and we regard these as unrelated.

Ultrastructural studies with electron microprobe and transmission and scanning electron microscopy (Deutsch and Lipps, 1976, ***950**; Hansen and Grønlund, 1977, ***1394**) indicate that the calcite spicules are secreted in the protoplasm of the foraminifer and then positioned secondarily. The unusual morphologic and crystallographic nature of the spicules, slight differences of spicular morphology in different species, absence of an extraneous source for such secreted spicules in each area where carterinids occur (the *Trichosphaerium* spicules discussed by Angell (1978, ***41**, p. 184) are smaller, elongate thin needles of triangular section and pyramidal terminations, and unlike those of the carterinids), the difficulty that a sessile organism would have in accumulating sufficient quantities of such specialized test material worldwide, where none has been recognized to occur in the local areas, the absence of conspecific individuals including a variety of agglutinated particles, and the absence of such spicules in associated agglutinated foraminifers all support the original description of these as secreted by the foraminifer itself.

Hansen (1979, ***1392**, p. 174) stated, "If *Carterina* is included in the textulariids a modified definition of agglutinated Foraminifera would include secretion of an organic skeleton with or without agglutinated material not secreted at its final place in the wall." Because of the unique character of its wall, consideration of the Carterinidae as the single family of a separate suborder appears preferable to a major modification of the description of the otherwise homogeneous suborder Textulariina. Thus the suprageneric placement of *Carterina* by Brönnimann and Whittaker (1983, ***406**) among the agglutinated Textulariina is rejected.

The original figured type of Carter's species from "East Oceania" is not preserved, and no additional specimens are known from the type locality. Brönnimann and Whittaker (1983, ***406**, p. 14) state concerning Carter's original description, "If any internal structures would have been present, and they would have shown up clearly under water or inside of the broken chamber, there is no doubt that Carter would have seen and reported them. We can therefore safely assume that internal structures are not present in the type specimen of *R. spiculotesta*." However, of the two specimens now extant that were identified by Carter himself as *R. spiculotesta*, one in the British Museum and one in the Paris Museum, both have such internal partitions apparently unnoticed by Carter, as well as peripheral flanges. Externally both appear identical to his original description, suggesting that his identification of these as conspecific with his lost holotype is correct. The internal partitions cannot be seen without a clarifying liquid, and apparently were not observed in other specimens by any workers in the 78 years following Carter's original description, prior to our restudy of the genus (Loeblich and Tappan, 1955, ***1890**) on the basis of Carter's specimen in the Paris museum. Since these partitions were described, they have been reported in specimens from Eniewetok, Indonesia, Java Sea, Philippines, Japan, China Sea, Brazil, Venezuela, and Qatar in the Persian Gulf. The second of Carter's two known specimens, in the British Museum, was used by Brönnimann and Whittaker as the holotype for *Zaninettia manaarensis*.

Keij (1976, *1665, p. 339) stated that Carter's slide in Paris had been designated by us as the lectotype of *Carterina spiculotesta*, although we had then indicated it only as a hypotype. Although identified by Carter, the label on the specimen indicates that it was collected after the genus was described and thus cannot be designated as lectotype, and no specimens originally used in description of the genus are preserved. However, in order to stabilize the nomenclature of this group, and recognize the genus on the basis of the only two specimens known to have been identified by Carter, and conspecific with those on which extensive morphological and ultrastructural studies have been made recently, we herein designate this specimen as a neotype. It is attached to an algal fragment, mounted in a wooden slide labelled by Carter by hand on one end as "*Rotalia spiculotesta*, Bass Rock, Ceylon, 26-9-79" with the reference written on the other end as "Ann. and Mag. Nat. History 1877, vol. XX, pl. xvi, p. 470."

Suborder MILIOLINA Delage and Hérouard, 1896

Miliolina Loeblich and Tappan, 1961 (*1904), p. 219, nom. corr. pro suborder Miliolidae.
Miliolidae Delage and Hérouard, 1896 (*926), p. 117 (suborder).
Miliolidea Lankester, 1885 (*1790), p. 846 (order).
Miliolidaceae Hartog, in Harmer and Shipley, 1906 (*1424), p. 59 (order).
Miliolida Calkins, 1909 (*477A), p. 39 (order).
Cornuspiroidea Wedekind, 1937 (*3355), p. 87 (order).
Orbitolitacea Wedekind, 1937 (*3355), p. 120 (suborder).
Cornuspiridea Jírovec, 1953 (*1613), p. 335 (suborder).
Rotaliea Mikhalevich, 1980 (*2108), p. 55 (class; partim).
Rotaliata Mikhalevich, 1980 (*2108), p. 56 (subclass; partim).
Cornuspirida Mikhalevich, 1980 (*2108), p. 57 (order).
Schlumbergerinida Mikhalevich, 1980 (*2108), p. 56 (order).
Orbitolitida Mikhalevich, 1980 (*2108), p. 57 (order).
Alveolinida Mikhalevich, 1980 (*2108), p. 57 (order).
Miliolicea Saidova, 1981 (*2696), p. 27 (class).
Miliolicae Saidova, 1981 (*2696), p. 28 (subclass).
Cyclogyrina Saidova, 1981 (*2696), p. 28 (suborder).
Nubeculariina Saidova, 1981 (*2696), p. 29 (suborder).
Soritina Saidova, 1981 (*2696), p. 33 (suborder).
Alveolinellinina Saidova, 1981 (*2696), p. 35 (suborder).

Test of porcelaneous high magnesium calcite, of fine randomly oriented rodlike crystals, 1.5 μm to 2.0 μm in length and 0.24 μm in diameter, seen only with the electron microscope, the random crystal orientation refracting light in all directions to result in the milky opacity or porcelaneous appearance in reflected light, wall appears brown and glassy in transmitted light, may have surface layer of variously arranged tabular rhombohedral crystals, commonly with organic lining and may have added adventitious material; true pores may occur in protoconch of some, generally imperforate in post embryonic stage, but may have pseudopores; may have flexostyle or spiral passage between proloculus and later chambers; sexual reproduction in some known to involve many inequally biflagellate gametes with characteristically long blepharoplast and axostyle that are freed in the water column. Carboniferous to Holocene.

Superfamily SQUAMULINACEA Reuss and Fritsch, 1861

Squamulinacea Loeblich and Tappan, 1984 (*1918), p. 27, nom. transl. ex family Squamulinidea.

Unilocular test of imperforate porcelaneous calcite; free or attached. U. Cretaceous-Holocene.

Family SQUAMULINIDAE Reuss and Fritsch, 1861

Squamulinidae Loeblich and Tappan, 1964 (*1910), p. C444, nom. corr. pro family Squamulinidea.
Squamulinidea Reuss and Fritsch, 1861 (*2593), p. 1.
Squamulinida Haeckel, 1894 (*1355), p. 190.

As for the superfamily. U. Cretaceous; Holocene.

Subfamily BRASILIELLINAE Loeblich and Tappan, 1986

Brasiliellinae Loeblich and Tappan, 1986 (*1929), p. 343.

Free living, with unilocular porcelaneous test. U. Cretaceous.

BRASILIELLA Troelsen, 1978

Plate 322, figs. 2-6

Type species: Brasiliella variabilis Troelsen, 1978; OD.

Brasiliella Troelsen, 1978 (***3228**), p. 461.

Test small, up to 0.39 mm in length, unilocular, spherical, ovoid, or subcylindrical; wall calcareous, porcelaneous, white, and opaque, ultrastructure shows inner veneer of two-dimensional randomly arranged calcite crystals, an intermediate layer with faint radial alignment and an outer layer of three-dimensional randomly arranged crystals, surface of test smooth, pitted, or transversely wrinkled; aperture rounded, subterminal and excentric, flush to slightly produced. U. Cretaceous (Maastrichtian); Brazil.

Subfamily SQUAMULININAE Reuss and Fritsch, 1861

Squamulininae Loeblich and Tappan, 1986 (***1929**), p. 343 (nom. transl. ex family).

Test unilocular, attached. Holocene.

SQUAMULINA Schultze, 1854

Plate 322, fig. 1

Type species: Squamulina laevis Schultze, 1854; OD(M).

Squamulina Schultze, 1854 (***2824**), p. 56.

Arsquamulum Rhumbler, 1913 (***2621**), p. 346 (err. emend.).

Test unilocular, attached, subglobular; wall calcareous, imperforate; aperture a rounded opening on the upper surface. Holocene; Italy; North Sea; Baltic Sea.

Superfamily CORNUSPIRACEA Schultze, 1854

Cornuspiracea Bogdanovich, in Subbotina, Voloshinova, and Azbel', 1981 (***3083**), p. 47, nom. transl. ex family Cornuspirida.

Cyclogyridea Saidova, 1981 (***2696**), p. 28.

Nubeculariidea Saidova, 1981 (***2696**), p. 29.

Nubeculariacea Haynes, 1981 (***1437**), p. 166.

Ophthalmidiacea Haynes, 1981 (***1437**), p. 166.

Cornuspiroidea Temirbekova and Antonova, 1985 (***3132A**), p. 9.

Test free or attached; may be planispiral or trochospiral, evolute or involute, spreading or discoidal; proloculus followed by undivided spiral passage or enrolled tubular chamber, later may be irregularly coiled, uncoiled, or show zigzag growth pattern and may be distinctly chambered. L. Carboniferous (Visean) to Holocene.

Family CORNUSPIRIDAE Schultze, 1854.

Cornuspiridae Reuss, 1860 (***2581**), p. 177, nom. corr. pro family Cornuspirida.

Cornuspirida Schultze, 1854 (***2824**), p. 52.

Cornuspiridea Reuss, 1862 (***2586**), p. 364, 394.

Cornuspirideae Gümbel, 1870 (***1337**), p. 26.

Cyclogyridae Saidova, 1981 (***2696**), p. 29.

Test free or attached, proloculus followed by undivided planispiral to streptospiral tubular second chamber that may show later zigzag growth. L. Carboniferous (Visean) to Holocene.

Subfamily CORNUSPIRINAE Schultze, 1854

Cornuspirinae Rhumbler, 1904 (***2617**), p. 284, nom. transl. ex family Cornuspirida.

Arcornuspirinia Rhumbler, 1913 (***2621**), p. 387 (err. emend.).

Cyclogyrinae Loeblich and Tappan, 1961 (***1902**), p. 290.

Test planispirally coiled, involute or evolute, and may uncoil in later stage. U. Carboniferous (Moscovian) to Holocene.

CORNUSPIRA Schultze, 1854

Plate 322, figs. 7 and 8

Type species: Orbis foliaceus Philippi, 1844 (***2402**), p. 147; SD Brady, 1884 (***344**), p. 199.

Cornuspira Schultze, 1854 (***2824**), p. 40 (placed on Official List of Generic Names in Zoology, ICZN Op. 1114, see Melville, 1978 (***2089**), p. 108).

Cyclogyra S. V. Wood, 1842 (***3393**), p. 458; type species: *Cyclogyra multiplex* Wood, 1842 (genus and species suppressed for purposes of Law of Priority, but not for those of Law of Homonymy, ICZN Op. 1114, see Melville, 1978, ***2089**, p. 108); OD(M).

Arcornuspirum Rhumbler, 1913 (***2621**), p. 387 (err. emend.).

Test free, discoidal, of globular proloculus and undivided planispirally enrolled and evolute tubular second chamber; wall calcareous, porcelaneous, imperforate, surface smooth or with occasional transverse growth lines; aperture at the open end of the tube. Carboniferous to Holocene; cosmopolitan.

RECTOCORNUSPIRA Warthin, 1930

Plate 323, figs. 9 and 10

Type species: Rectocornuspira lituiformis Warthin, 1930; OD.

Rectocornuspira Warthin, 1930 (***3352**), p. 15.

Test elongate, globular proloculus followed by planispirally enrolled undivided tubular second chamber, later uncoiling and rectilinear; wall calcareous, porcelaneous, imperforate; aperture rounded, at the open end of the tubular chamber. U. Carboniferous (Moscovian); USA: Oklahoma; Texas.

Remarks: Species recorded as this genus from the L. Carboniferous of the Moscow Basin are said to have a granular wall or a multilayered one, but unless these were originally porcelaneous, they are not congeneric.

VIDALINA Schlumberger, 1900

Plate 322, figs. 9-14

Type species: Vidalina hispanica Schlumberger, 1900; OD(M).

Vidalina Schlumberger, 1900 (*2771), p. 459, 460.
Arvidaloum Rhumbler, 1913 (*2621), p. 388 (err. emend.).

Test discoidal, up to 1.5 mm in diameter, subspherical proloculus followed by gradually enlarging, undivided tubular second chamber of up to fifteen planispirally enrolled and evolute whorls, additional lamellae added over the earlier part of the test with each successive whorl, resulting in a thickened umbo in which the spiral suture is obscured, later whorls increasing more rapidly in height, so that additional wall layers are added more slowly, outer part of the test is thinner and the spiral suture more distinct; wall calcareous, porcelaneous; aperture at the open end of the tube. U. Cretaceous (Cenomanian to Santonian); Spain; France; Greece.

Subfamily CORNUSPIROIDINAE Saidova, 1981

Cornuspiroidinae Saidova, 1981 (*2696), p. 29.

Test planispirally coiled, tubular chamber in later stage flaring and test flabelliform, or may be spreading and branching in the plane of coiling. Holocene.

CORNUSPIRELLA Cushman, 1928

Plate 323, fig. 1

Type species: Cornuspira diffusa Heron-Allen and Earland, 1913 (*1469), p. 272; OD.

Cornuspirella Cushman, 1928 (*748), p. 4.

Test flattened, globular proloculus followed by planispirally enrolled and evolute undivided tubular second chamber as in *Cornuspira*, later whorls rapidly enlarging and finally uncoiling, flaring, branching, or spreading in the original plane of coiling; wall calcareous, porcelaneous, may have transverse growth wrinkles and may have longitudinal striae; aperture narrow, elongate, at the end of the flattened tubular branches. Holocene; N. Atlantic.

CORNUSPIROIDES Cushman, 1928

Plate 323, figs. 2 and 3

Type species: Cornuspira striolata Brady, in Tizard and Murray, 1882 (*3198), p. 713; OD.

Cornuspiroides Cushman, 1928 (*748), p. 3.

Test large, flabelliform, early portion with globular proloculus followed by an undivided tubular second chamber in numerous planispiral whorls that gradually enlarge at first, later whorls enlarging more rapidly, flaring and uncoiling, as test becomes wide, flattened, and flabelliform; wall calcareous, imperforate, porcelaneous, milky white in color, surface with distinct transverse growth lines that are strongly arched in the flabelliformn stage of growth, also may have numerous fine longitudinal striae; aperture a narrow elongate slit at the open end of the flattened tube. Holocene; Atlantic.

Subfamily MEANDROSPIRINAE Saidova, 1981

Meandrospirinae Saidova, 1981 (*2696), p. 28.

Test free, proloculus followed by coiled tubular undivided chamber that may be streptospiral or planispiral, simultaneously winding back and forth in short zigzag bends. L. Permian (Artinskian) to Holocene.

FLECTOSPIRA Crespin and Belford, 1957

Plate 323, figs. 16-19

Type species: Flectospira prima Crespin and Belford, 1957; OD.

Flectospira Crespin and Belford, 1957 (*691), p. 76.

Test discoidal, proloculus followed by enrolled undivided tubular second chamber that bends back and forth in zigzags while coiling planispirally as in *Meandrospira*, coiling evolute so that earlier whorls and bends remain visible at the exterior; wall calcareous, imperforate, porcelaneous, surface smooth; aperture large, rounded, at the open end of the tube L. Permian (Artinskian); Western Australia.

MEANDROSPIRA Loeblich and Tappan, 1946

Plate 323, figs. 4-8 and 11-15

Type species: Meandrospira washitensis Loeblich and Tappan, 1946; OD.

Meandrospira Loeblich and Tappan, 1946 (*1879), p. 248.
Streblospira Crespin and Belford, 1957 (*691), p. 75; type species: *Streblospira meandrina* Crespin and Belford, 1957; OD.
Citaella Premoli Silva, 1964 (*2468A), p. 658; type species: *Citaella iulia* Premoli Silva, 1964; OD.

Test small, proloculus followed by spirally wound tubular undivided second chamber, bending back and forth in involute zigzag bends that enroll planispirally so that the loops bend at the umbilicus, only those of the final whorl visible from the exterior; wall calcareous, imperforate, porcelaneous; aperture terminal, simple. L. Permian (Artinskian) to Holocene; North America; Europe; N. Africa; Australia.

MEANDROSPIRANELLA Salaj, 1969

Plate 324, fig. 10

Type species: Meandrospiranella samueli Salaj, in Salaj et al., 1967 (*2710), p. 122 (species available, 1967, but genus not available until 1969); OD.

Meandrospiranella Salaj, 1969 (*2704), p. 1294.
Meandrospiranella Salaj, in Salaj et al., 1967 (*2710), p. 122 (name not available, ICZN Art. 13 (b), type species not designated).

Test free, small, elongate, proloculus followed by elongate, undivided tubular second chamber that coils streptospirally in short zigzag bends in a *Meandrospira*-like stage of about five whorls, later somewhat irregular and uncoiling; wall calcareous, imperforate, porcelaneous; aperture terminal, simple. M. Triassic (Anisian) to U. Cretaceous (Cenomanian); Czechoslovakia; Romania; USA: Texas.

Subfamily CALCIVERTELLINAE Loeblich and Tappan, 1964

Calcivertellinae Loeblich and Tappan, 1964 (*1910), p. C443.

Attached, tubular test may branch over the surface of the attachment. L. Carboniferous (Visean) to M. Jurassic.

APTERRINELLA Cushman and Waters, 1928

Plate 324, fig. 4

Type species: Tolypammina grahamensis Harlton, 1928 (*1423), p. 305; OD.

Apterrinella Cushman and Waters, 1928 (*858), p. 64.

Test attached, up to 10 mm in length, proloculus encircled by one or two whorls of the rapidly enlarging undivided tubular second chamber, that later is uncoiled and rectilinear or winds about the surface of the substrate; wall calcareous, imperforate, porcelaneous, surface papillate to spinulate; aperture semicircular against the attachment at the open end of the chamber. U. Carboniferous (Namurian to Stephanian), Virgilian to M. Jurassic (Dogger); USA: Texas, Oklahoma, New Mexico; Czechoslovakia; Germany.

CALCITORNELLA Cushman and Waters, 1928

Plate 324, figs. 5 and 6

Type species: Calcitornella elongata Cushman and Waters, 1928; OD.

Calcitornella Cushman and Waters, 1928 (*857), p. 45.

Test attached, elongate, and may exceed 1 mm in length, globular proloculus encircled by elongate, undivided tubular second chamber that is planispirally enrolled for up to three or four whorls, then uncoils in zigzag bends that commonly overlap the early part of the test so that it can only be seen from the attached side; wall calcareous, imperforate, porcelaneous, surface rough; aperture at the open end of the tubular chamber. U. Carboniferous (Stephanian), Virgilian; USA: Texas; Romania; Bulgaria.

CALCIVERTELLA Cushman and Waters, 1928

Plate 324, fig. 1

Type species: Calcivertella adherens Cushman and Waters, 1928; OD.

Calcivertella Cushman and Waters, 1928 (*857), p. 48.

Test attached, globular proloculus partially encircled by gradually enlarging tubular undivided second chamber that later uncoils, growing in numerous closely appressed zigzag bends and finally rectilinear; wall calcareous, imperforate, porcelaneous; aperture at the open end of the tube. U. Carboniferous (Stephanian), Virgilian; USA: Texas.

CARIXIA Macfadyen, 1941

Plate 324, fig. 11

Type species: Carixia langi Macfadyen, 1941; OD.

Carixia Macfadyen, 1941 (*1966), p. 27.

Test attached, of numerous undivided tubes of constant diameter that may radiate from a central point, and anastomose over the substrate; wall calcareous, imperforate; apertures at the open end of the tubes. L. Jurassic (L. Lias); England; Germany.

HEDRAITES Henbest, 1963

Plate 325, figs. 1–4

Type species: Hedraites plummerae Henbest, 1963; OD.

Hedraites Henbest, 1963 (*1457), p. 32.

Test attached and tubiform, proloculus surrounded by enrolled undivided tubular chamber, megalospheric test with less than one whorl and microspheric one with up to three whorls, tube then bends abruptly to grow away from the juvenarium, variously wandering across the substrate or doubling back or crossing earlier parts of the tube; wall calcareous, porcelaneous, surface of the juvenarium smooth, in the adult with deep closely spaced fine pits, thus differing from the otherwise similar *Apterrinella* that has a papillate or spinulate surface. L. Permian; Texas.

PLANIINVOLUTA Leischner, 1961

Plate 324, figs. 7–9

Type species: Planiinvoluta carinata Leischner, 1961; OD.

Planiinvoluta Leischner, 1961 (*1820), p. 11.

Test flattened, probably originally attached, discoidal to centrally inflated on the unattached side, globular proloculus followed by nonseptate planispirally enrolled second chamber, coiling evolute against the attachment, involute above; wall calcareous, probably imperforate; aperture at the open end of the tube. U. Triassic (Rhaetic); Austria; Burma.

Remarks: The original description indicated that the wall was calcareous and perforate, but the line drawings were not conclusive as to the porosity. Possibly *Planiinvoluta* has a pitted surface like that of *Hedraites* that in tangential section may suggest perforations. The genus was placed in the Calcivertellinae by Loeblich and Tappan (1964, ***1910**, p. C444) and is retained therein, pending additional study of the wall character.

PLUMMERINELLA Cushman and Waters, 1928

Plate 324, figs. 2 and 3

Type species: Plummerinella complexa Cushman and Waters, 1928; OD.

Plummerinella Cushman and Waters, 1928 (*857), p. 49.

Test attached, proloculus followed by gradually enlarging undivided tubular second chamber that first coils about the proloculus, then bends back and forth in zigzag bends while coiling as in *Meandrospira*, although remaining attached, the tubular chamber enlarging more rapidly in the later part and finally spreading widely; wall calcareous, imperforate, porcelaneous, unattached side may be rough in appearance and show little of the test structure, although this is well shown on the formerly attached side of subsequently detached specimens. U. Carboniferous (Stephanian), Virgilian to Permian; USA: Texas; Australia.

RAMOVSIA Kochansky-Devidé, 1973

Plate 325, figs. 5–7

Type species: Ramovsia limes Kochansky-Devidé, 1973; OD.

Ramovsia Kochansky-Devidé, 1973 (*1712), p. 463.

Dorudia Jenny and Jenny-Deshusses, 1978 (*1610), p. 8; type species: *Dorudia dorudensis* Jenny and Jenny-Deshusses, 1978 = *Ramovsia limes* Kochansky-Devidé, 1973; OD.

Test attached, an undivided tubular chamber attached to one side of an upright support, probably algal, or may completely surround the support, proloculus unknown, the low tubular chamber extending along the length of the support and may be overlapped by a similar longitudinal chamber that in section is separated by a clear layer, either due to doubling back of the original tubular chamber or representing overgrowth by a different individual; wall calcareous, porcelaneous, both inner and outer surfaces smooth. L. Permian (Asselian) to U. Permian (Djulfian); Yugoslavia: Croatia; Iran.

TREPEILOPSIS Cushman and Waters, 1928

Plate 324, fig. 12

Type species: Turritellella grandis Cushman and Waters, 1927 (***854**), p. 149; OD.

Trepeilopsis Cushman and Waters, 1928 (*857), p. 38.

Volvotextularia G. Termier and H. Termier, 1947 (*3135), table p. 146, 147, 271 (name not available, ICZN Art. 13 (a)(i), no description).

Volvotextularia G. Termier and H. Termier, 1950 (*3136), p. 33, 39; type species: *Volvotextularia polymorpha* G. Termier and H. Termier, 1950; OD.

Test attached, commonly to algae or brachiopod spines, globular proloculus followed by undivided tubular second chamber that may first coil about the proloculus and later uncoil or wind in a high spire about the attachment; wall calcareous, imperforate, originally porcelaneous, commonly recrystallized and microgranular; aperture a large opening at the end of the tubular chamber. L. Carboniferous (Visean) to L. Permian (Artinskian); North America; Europe; N. Africa; Asia; Australia.

Family HEMIGORDIOPSIDAE
A. Nikitina, 1969

Hemigordiopsidae Brönnimann, Whittaker, and Zaninetti, 1978 (*410), p. 71 (nom. correct.).

Hemigordiopsiidae A. Nikitina, 1969 (*2257), p. 65 (nom. imperf.).

Gordiospiridae Saidova, 1981 (*2696), p. 28.

Test free, proloculus followed by undivided enrolled tubular second chamber, coiling streptospiral in at least the early stage but may later become planispiral. L. Carboniferous (Visean) to Holocene.

Subfamily HEMIGORDIOPSINAE
A. Nikitina, 1969

Hemigordiopsinae Loeblich and Tappan, 1982 (*1917), p. 30, nom. transl. ex family Hemigordiopsiidae.

Gordiospirinae Saidova, 1981 (*2696), p. 28.

Test free, proloculus followed by undivided tubular second chamber that is streptospirally coiled at least in early stage, later may be planispiral, involute, or evolute. L. Carboniferous (Visean) to Holocene.

AGATHAMMINA Neumayr, 1887

Plate 326, figs. 1-8

Type species: Serpula pusilla Geinitz, in Geinitz and Gutbier, 1848 (***1214**), p. 6; SD Cushman, 1927 (***746**), p. 188.

Agathammina Neumayr, 1887 (*2252), p. 171.

Test ovate, globular proloculus followed by enrolled undivided tubular second chamber of few gradually enlarging whorls, coiling in five planes as in *Quinqueloculina* but without septation; wall calcareous, imperforate, porcelaneous, surface may show transverse growth wrinkles; aperture terminal, simple at the end of the tubular chamber. U. Carboniferous (Namurian) to U. Permian (Zechstein); central Europe.

GORDIOSPIRA Heron-Allen and Earland, 1932

Plate 327, figs. 1-3

Type species: Gordiospira fragilis Heron-Allen and Earland, 1932; OD(M).

Gordiospira Heron-Allen and Earland, 1932 (*1479), p. 254.

Test discoidal, proloculus followed by enrolled undivided tubular second chamber, early coiling streptospiral, later planispiral, second chamber not a complete tube, as the lateral walls overlap the preceding whorl that becomes the chamber floor; wall calcareous, imperforate, milky white, porcelaneous, thin, and delicate, surface with transverse growth wrinkles; aperture a broad arch at the open end of the tube. Holocene; S. Atlantic; Arctic; Antarctic.

HEMIGORDIOPSIS Reichel, 1945

Plate 326, figs. 21-25

Type species: Hemigordiopsis renzi Reichel, 1945; OD.

Hemigordiopsis Reichel, 1945 (*2544), p. 528.

Gansudiscus K. L. Wang and X. F. Sun, 1973 (*3342), p. 157, 176; type species: *Gansudiscus luquensis* Wang and Sun, 1973; OD.

Hemigordius (Hemigordiopsis) J. Z. Sheng and Y. He, 1983 (*2896A), p. 58 (nom. transl.).

Test globular, spherical proloculus followed by enrolled undivided tubular second chamber, early coiling streptospiral, later planispiral, strongly involute, so that only the final whorl is visible from the exterior, chambers low and very broad, extending to the umbilicus on each side; wall calcareous, imperforate, porcelaneous, appearing dark in thin section, very thick, the wall thickness greatly exceeding the height of the chamber lumen. L. Permian to M. Permian; E. Mediterranean: Cyprus; Iran; China.

Remarks: Although *Hemigordiopsis* previously has been regarded as congeneric with *Hemigordius*, it differs in the very thick wall, robust, globular and uncompressed test, and wholly involute coiling.

HEMIGORDIUS Schubert, 1908

Plate 326, figs. 13-20

Type species: Cornuspira schlumbergeri Howchin, 1895 (*1562), p. 195 (as *schlumbergi*); OD.

Cornuspira (Hemigordius) Schubert, 1908 (*2815), p. 381.
Hemigordius Cushman, 1928 (*747), p. 161 (nom. transl.).
Hemigordiella Marie, in Deleau and Marie, 1961 (*927), p. 75; type species: *Hemigordius calcarea* Cushman and Waters, 1928 (*857), p. 44; OD.

Test discoidal, proloculus followed by enrolled undivided tubular second chamber, early whorls streptospiral, later planispiral and evolute; wall calcareous, imperforate, porcelaneous, surface smooth; aperture at the open end of the tubular chamber. L. Carboniferous (U. Visean), Chesterian to U. Carboniferous (Stephanian), Virgilian; Germany; Czechoslovakia; Iran; China; USA: Texas, Kentucky.

Remarks: Numerous species have been placed in *Hemigordius* that are correctly referred to *Hemigordiopsis* or to the Archaediscidae or Involutinidae, differing from the present genus in the character of the wall.

NODOGORDIOSPIRA Trifonova, 1977

Plate 326, figs. 9-12

Type species: Nodogordiospira conversa Trifonova, 1977; OD.

Nodogordiospira Trifonova, 1977 (*3223), p. 58.
Nodogordiospira Trifonova, in Budarov and Trifonova, 1974 (*446), p. 62 (name not available, ICZN Art. 13 (a)(i), no description).

Test discoidal, proloculus followed by enrolled undivided tubular second chamber, early one or two whorls streptospiral, later somewhat irregularly planispiral, with up to five whorls in the adult, evolute; wall calcareous, recrystallized but probably originally porcelaneous, surface with numerous transverse growth constrictions; aperture at the open end of the tube. M. Triassic (Ladinian); Bulgaria.

ORTHELLA E. V. Bykova, 1956

Plate 327, figs. 4-7

Type species: Orthella paalzowi E. V. Bykova, in Kiparisova et al., 1956; OD.

Orthella E. V. Bykova, in Kiparisova et al., 1956 (*1689), p. 19.

Test elongate, globular proloculus followed by streptospirally enrolled undivided tubular second chamber, no true chambers but tube may be alternately wider and narrower, enrolled portion somewhat elongate as in *Agathammina*, later uncoiling and rectilinear, tapering toward the aperture; wall calcareous, imperforate; aperture simple, rounded, terminal. U. Triassic (Rhaetian) to U. Jurassic (U. Oxfordian); USSR; Austria.

ORTHOVERTELLA Cushman and Waters, 1928

Plate 327, figs. 8 and 9

Type species: Orthovertella protea Cushman and Waters, 1928; OD.

Orthovertella Cushman and Waters, 1928 (*857), p. 45.

Test elongate, proloculus followed by tubular undivided and streptospirally enrolled second chamber of nearly constant diameter throughout, final stage uncoiled and rectilinear; wall calcareous, porcelaneous, surface smooth; aperture at the open end of the tube. Pennsylvanian (Moscovian to Stephanian), Desmoinesian to Missourian; USA: Texas.

Subfamily SHANITINAE Loeblich and Tappan, 1986

Shanitinae Loeblich and Tappan, 1986 (*1929), p. 343.

Test as in the Hemigordiopsinae but chamber interior with vertical pillars. U. Permian.

SHANITA Brönnimann, Whittaker, and Zaninetti, 1978

Plate 327, figs. 10-13

Type species: Shanita amosi Brönnimann et al., 1978; OD.

Shanita Brönnimann, Whittaker, and Zaninetti, 1978 (*410), p. 73.

Shanita Altiner and Zaninetti, 1977 (*30), p. 1 (name not available, ICZN Art. 13 (a)(i), no description).

Test large, up to 4.0 mm in diameter, subglobular, biumbilicate, proloculus followed by undivided enrolled second chamber that is streptospirally coiled in the early stage, then becomes planispiral, completely involute, with very wide and low chamber lumen that may be undivided in the early whorls, but in at least the later ones has numerous vertical pillars in alternating rows from umbilicus to umbilicus, or pillars may be more irregularly distributed; wall calcareous, thick, imperforate, recrystallized but probably originally porcelaneous; aperture terminal, slitlike, possibly subdivided by the pillars into shorter slits. U. Permian (Murgabian to Dzhulfian): Burma; Oman; Thailand; China; Turkey; Iran.

Family BAISALINIDAE Loeblich and Tappan, 1986

Baisalinidae Loeblich and Tappan, 1986 (*1929), p. 344.

Test discoidal to globular, proloculus followed by early streptospirally enrolled and later planispiral tubular chamber, later whorls have short protrusions from the wall that form pseudochambers, more advanced taxa developing complete septa and distinct chambers; wall calcareous, porcelaneous. L. to U. Permian (Ufimian, Murgabian).

BAISALINA Reytlinger, 1965

Plate 328, figs. 5-8

Type species: Baisalina pulchra Reytlinger, 1965; OD.

Baisalina Reytlinger, 1965 (*2607), p. 64.

Test globular to ovoid, proloculus followed by streptospirally enrolled tubular second chamber that increases slowly in height but more rapidly in breadth in later whorls, later whorls with short thick protrusions from the chamber roof that partially subdivide the whorls into pseudochambers, up to ten per whorl; wall calcareous, porcelaneous, appearing microgranular and brownish to dark in thin section, commonly recrystallized. U. Permian (Ufimian); USSR: Transcaucasus; Burma.

NIKITINELLA Sosnina, 1983

Plate 328, figs. 1-4

Type species: Nikitinella septata Sosnina, 1983, OD.

Nikitinella Sosnina, 1983 (*3040), p. 37.

Test small, up to 0.78 mm in diameter, lenticular, with broadly rounded periphery, globular proloculus and streptospirally enrolled early whorls, later whorls planispiral, short infoldings of the outer wall result in a few simple septa in each of the outer whorls, coiling involute, but chamber lumen restricted to the equatorial region, umbilical area filled by massive deposits; wall calcareous, light, probably originally porcelaneous but strongly recrystallized, lateral deposits appear radially crystalline, light to gray in section; aperture basal. U. Permian (Murgabian); USSR: Siberia.

PSEUDOBAISALINA Sosnina, 1983

Plate 328, figs. 9-11

Type species: Pseudobaisalina mirifica Sosnina, 1983; OD.

Pseudobaisalina Sosnina, 1983 (*3040), p. 35.

Test nautiloid to globular, up to 1.4 mm in diameter, proloculus followed by five to six involutely coiled whorls, with changing axis of coiling, septa long, curved, formed by infolding of the outer wall; wall calcareous, thin in early whorls, thicker in later ones, appearing light and homogeneous in thin section, strongly recrystallized, weakly developed axial thickenings present laterally; aperture basal. U. Permian (Murgabian): USSR: Primorye Territory.

SEPTAGATHAMMINA J. X. Lin, 1984

Plate 830, figs. 13-16

Type species: Septagathammina hubeiensis J. X. Lin, 1984; OD.

Septagathammina J. X. Lin, 1984 (*1855), p. 144, 329.

Test ovoid, globular proloculus followed by streptospirally enrolled tubular second chamber, nonseptate at first, but later with incomplete septa formed by thickenings extending inward from the outer wall; wall calcareous, appearing to have a thin dark outer layer and thicker less dense inner layer; aperture at the open end of the tube. Upper part of L. Permian; China: Xintan, Hubei; Indonesia: Sumatra.

Family FISCHERINIDAE Millett, 1898

Fischerinidae Cushman, 1927 (*742), p. 40, nom. transl. ex subfamily Fischerininae.
Wiesnerellidae Saidova, 1981 (*2696), p. 30.
Fischerinellidae Mikhalevich, 1983 (*2111), p. 104 (nom. imperf. as Fisherinellidae) nom. transl. ex subfamily Fischerinella.

Proloculus and flexostyle followed by an enrolled tubular portion with few chambers per whorl; wall calcareous, porcelaneous. M. Jurassic to Holocene.

Subfamily FISCHERININAE Millett, 1898

Fischerininae Millett, 1898 (*2142), p. 611.
Trisegmentininae Wiesner, 1920 (*3373), p. 17, 18.
Planispirinellinae Wiesner, 1931 (*3375), p. 58, 60, 69, 110.

Coiling planispiral, evolute, or involute; aperture at the open end of the tube. M. Jurassic to Holocene.

DOLOSELLA Danich, 1969

Plate 328, figs. 12-17

Type species: Dolosella multifida Danich, 1969; OD.

Dolosella Danich, 1969 (*889), p. 86.

Test discoidal, globular proloculus followed by up to thirteen narrow planispiral whorls, about three or four chambers per whorl, chambers slightly enlarged at the base and decrease slightly in diameter distally, resulting in slight indentations of the periphery; wall calcareous, imperforate, white and porcelaneous; aperture terminal, simple, semicircular. M. Jurassic (U. Bajocian) to U. Jurassic (L. Kimmeridgian); USSR: Moldavian SSR, Dagestan; England.

Remarks: *Dolosella dorsetensis* n. sp., is here proposed for the specimens described as "*Cornuspira* sp." (Gordon, 1965, *1276, p. 838, textfigs. 4-7) from the U. Jurassic (Oxfordian) Nothe Clay, Corallian Beds, of the Dorset Coast of England. The holotype is that figured by Gordon (figs. 6, 7; BMNH). It differs from *D. multifida* Danich in the larger size and fewer and thicker whorls.

FISCHERINA Terquem, 1878

Plate 329, figs. 1-3

Type species: Fischerina rhodiensis Terquem, 1878; OD(M).

Fischerina Terquem, 1878 (*3145), p. 80 (non *Fischerina* Stuckenberg, 1904).

Test discoidal, globular proloculus followed by enrolled nonseptate tubular chamber of about one whorl, then by two or more whorls with up to eight chambers each that are separated by radial to slightly curved sutures, chambers partially overlapping the earlier whorl on both sides of the symmetrical test; wall calcareous, thin and imperforate, porcelaneous, smooth; aperture at the open end of the final chamber, arcuate in form, as the lateral chamber walls overlap the previous whorl. U. Pliocene to Holocene; Mediterranean.

PLANISPIRINA Seguenza, 1880

Plate 329, figs. 4-6

Type species: Planispirina communis Seguenza, 1880; SD Dollfus, 1888 (*966), p. 859, 862.

Planispirina Seguenza, 1880 (*2839), p. 310.

Test large, up to 2 mm in diameter, discoidal, auriculate in outline, laterally compressed, biumbilicate, periphery carinate, globular proloculus followed by a few rapidly enlarging planispiral whorls, about three chambers per whorl in the later stage, septa oblique, curved backward at the periphery; wall calcareous, imperforate, porcelaneous, thick, commonly obscuring the early whorls; aperture at the open end of the final chamber, a high subtriangular opening, with a height nearly equal to the test radius. Pliocene to Holocene; cosmopolitan.

PLANISPIRINELLA Wiesner, 1931

Plate 329, figs. 13-16

Type species: Hauerina exigua Brady, 1879 (*338), p. 267; OD.

Planispirinella Wiesner, 1931 (*3375), p. 69.

Test discoidal, flattened, globular proloculus followed by planispirally coiled narrow second chamber, later with about three chambers per whorl, septa oblique, very thin, external sutures obscured by the thickened wall; wall calcareous, imperforate, porcelaneous, thick, as additional lamellae cover the central part of the test with each successive whorl to leave only a much restricted chamber lumen; aperture a high slitlike opening in the face of the final chamber. Holocene; Pacific; Australia.

SUBFISCHERINA McCulloch, 1977

Plate 329, fig. 17

Type species: Subfischerina galapagosensis McCulloch, 1977; OD.

Subfischerina McCulloch, 1977 (*1961), p. 587.

Test small, about 0.27 mm in diameter, discoidal, periphery rounded, small globular proloculus followed by long tubular undivided, planispirally coiled and evolute second chamber of over three whorls, final one or two whorls with two chambers per whorl; wall calcareous, imperforate, porcelaneous; aperture rounded at the open end of the final chamber. Holocene; Pacific: Galapagos.

TRISEGMENTINA Wiesner, 1920

Plate 329, figs. 7-9

Type species: Trisegmentina compressa Wiesner, 1931 (*3375), p. 70 (syn.: *Hauerina compressa* d'Orbigny of Sidebottom, 1904, non *Hauerina compressa* d'Orbigny, 1846 = *Trisegmentina sidebottomi* Cushman, 1933, p. 165; see ICZN Art. 70 (c)); SD Wiesner, 1931.

Trisegmentina Wiesner, 1920 (*3373), p. 18.

Test discoidal, compressed, globular proloculus followed by tubular planispirally enrolled second chamber of about one volution in length and then with two or three rapidly enlarging chambers per whorl, coiling evolute, sutures radial, slightly curved; wall calcareous, imperforate, porcelaneous, surface smooth; aperture at the end of the final chamber, slightly constricted by a thickened rim. Holocene; Mediterranean.

Remarks: Wiesner (1920) did not designate a type species, but in 1931 he designated "*Hauerina compressa* Sidebottom" as the type species; as a deliberately misidentified type species, it should be known as *Trisegmentina compressa* Wiesner, 1931 (see ICZN Art. 70 (c); also discussed by Loeblich and Tappan, 1955, *1890, p. 16).

Subfamily FISCHERINELLINAE Saidova, 1981

Fischerinellinae Loeblich and Tappan, 1982 (*1917), p. 30, nom. corr. pro subfamily Fischerinella.
Fischerinella Saidova, 1981 (*2696), p. 29 (nom. imperf.).

Coiling trochospiral, evolute on spiral side and involute on opposite side. Holocene.

FISCHERINELLA Loeblich and Tappan, 1962

Plate 329, figs. 10-12

Type species: Fischerina helix Heron-Allen and Earland, 1915 (*1472), p. 591; OD.

Fischerinella Loeblich and Tappan, 1962 (*1906), p. 108.

Test conical, globular proloculus followed by spiral chamber of nearly a complete whorl, then with gradually enlarging trochospirally enrolled chambers, progressively more numerous per whorl, up to four or five in the final one, all whorls visible from the convex spiral side, only those of the final whorl visible from the flattened to concave umbilical side, sutures radial; wall calcareous, imperforate, porcelaneous; aperture ovate at the open end of the final chamber. Holocene; E. Africa: Kerimba Archipelago; Indonesia; Malay Peninsula; Australia.

Subfamily ZOYAELLINAE Saidova, 1981

Zoyaellinae Saidova, 1981 (*2696), p. 29.

Early coiling streptospiral, later planispiral, with numerous chambers per whorl. Holocene.

ZOYAELLA Loeblich and Tappan, 1962

Plate 329, figs. 18-20

Type species: Ceratina trochamminoides Goës, 1894 (*1257), p. 122; OD.

Zoyaella Loeblich and Tappan, 1962 (*1906), p. 109 (nom. subst. pro *Ceratina* Goës, 1894).
Ceratina Goës, 1894 (*1257), p. 122 (non *Ceratina* Latreille, 1802, nec Menge, 1868); type species: obj.: OD.

Test discoidal, proloculus followed by streptospirally enrolled tubular second chamber, later planispiral and evolute, with up to twelve chambers in the final whorl; wall calcareous, imperforate, porcelaneous; aperture a high arch at the open end of the final chamber. Holocene; N. Atlantic: Azores.

Subfamily GLOMULININAE Saidova, 1981

Glomulininae Saidova, 1981 (*2696), p. 30.

Test with proloculus followed by streptospirally enrolled tubular chamber, later chambers one-half coil in length. Holocene.

GLOMULINA Rhumbler, 1936

Plate 330, figs. 14-16

Type species: Glomulina fistulescens Rhumbler, 1936; OD.

Glomulina Rhumbler, 1936 (*2623), p. 198.

Test globular, proloculus followed by streptospirally enrolled undivided tubular second chamber, later chambers one-half coil in length; wall calcareous, imperforate, porcelaneous; aperture rounded, at the end of the last chamber. Holocene; Baltic Sea.

Remarks: *Glomulina* was originally described as having secondary apertures on projections around the periphery, but these appear due to parasitism or injury.

Subfamily NODOBACULARIELLINAE Bogdanovich, 1981

Nodobaculariellinae Bogdanovich, in Subbotina, Voloshinova, and Azbel', 1981 (*3083), p. 62.

Wiesnerellinae Saidova, 1981 (*2696), p. 30.

Test planispiral to trochospiral in early stage, chambers one-half coil in length, later may uncoil; aperture a slit at the open end of the final chamber, bordered by an everted lip. Pliocene to Holocene.

NODOBACULARIELLA Cushman and Hanzawa, 1937

Plate 330, figs. 1 and 2

Type species: Nodobaculariella japonica Cushman and Hanzawa, 1937; OD.

Nodobaculariella Cushman and Hanzawa, 1937 (*823), p. 41.

Test somewhat elongate, flattened, broad, with carinate periphery, proloculus followed by tubular planispiral chamber, then by rapidly widening chambers of one-half coil in length, rarely three chambers per whorl, coiling evolute to slightly overlapping in the later whorls, final chamber uncoiled and rectilinear; wall calcareous, imperforate, porcelaneous, surface of the final whorl may have narrow longitudinal costae; aperture elongate, terminal on the final chamber, with a bordering everted lip. Pliocene to Holocene; Pacific: Ryukyu Islands; Atlantic: E. coast USA.

VERTEBRALINA d'Orbigny, 1826

Plate 330, figs. 17-19

Type species: Vertebralina striata d'Orbigny, 1826; OD(M).

Vertebralina d'Orbigny, 1826 (*2303), p. 282.

Test flattened, broad, and somewhat elongate, early chambers slightly trochospiral and involute, final chamber uncoiled and rectilinear; wall calcareous, imperforate, porcelaneous, surface with numerous closely spaced longitudinal costae; aperture terminal, a narrow elongate slit with smooth and thickened bordering lip, slightly turned toward the side with the umbilical view of the coil. Holocene; Atlantic; Pacific; Mediterranean.

WIESNERELLA Cushman, 1933

Plate 330, figs. 11-13

Type species: Planispirina auriculata Egger, 1893 (*1048), p. 245; OD.

Wiesnerella Cushman, 1933 (*769), p. 33.

Test flattened, ovate in outline, periphery carinate, early stage planispirally enrolled to low trochospiral, whorls overlapping more on one side than the opposite; wall calcareous, imperforate, porcelaneous, surface smooth; aperture a broad opening at the end of the final chamber, slightly turned toward the more evolute side of the test, bordered by a broad everted lip. Holocene; Atlantic; Gulf of Mexico.

Family NUBECULARIIDAE Jones, 1875

Nubeculariidae Avnimelech and Reiss, in Avnimelech, Parness, and Reiss, 1954 (*98), p. 838, nom. corr. pro family Nubecularida.

Nubecularida Jones, in Griffith and Henfrey, 1875 (*1300), p. 319.

Nubecularina Lankester, 1885 (*1790), p. 846.

Nubecularinae Delage and Hérouard, 1896 (*926), p. 122.

Test free or attached, planispiral or irregularly coiled, at least in the early stage, later may be spreading or branched; wall calcareous, porcelaneous, may have outer agglutinated coating; aperture simple, rounded, slitlike or cribrate. M. Triassic (Anisian) to Holocene.

Subfamily NODOPHTHALMIDIINAE
Cushman, 1940

Nodophthalmidiinae Cushman, 1940 (*787), p. 179.

Early portion planispiral, later uncoiling and rectilinear; wall porcelaneous, surface smooth to costate; aperture terminal. M. Triassic (Anisian) to Holocene.

GHEORGHIANINA Loeblich
and Tappan, 1986
Plate 330, figs. 20–23

Type species: Nodophthalmidium anae Gheorghian, 1980 (***1234**), p. 40; OD.

Gheorghianina Loeblich and Tappan, 1986 (*1929), p. 344.

Test elongate, narrow, proloculus followed by tubular second chamber that is planispirally enrolled for about one whorl, then uncoils and extends for a distance about equal the diameter of the coil, may have up to four elongate pyriform rectilinear chambers, each tapering toward the apertural neck; wall calcareous, imperforate, porcelaneous, but commonly silicified in preservation in the Triassic limestones, surface smooth to ornamented with a few high and elongate costae; aperture terminal, rounded, at the end of a tapering neck and bordered by a phialine lip. M. Triassic (Anisian-Ladinian boundary) to U. Triassic (Carnian); Romania; Bulgaria.

Remarks: *Gheorghianina* differs from *Nodophthalmidium* in the very elongate pyriform chambers and simple rounded aperture and differs from *Nodobacularia* in the second chamber forming a complete whorl before uncoiling; it differs from the similar *Circinatiella* in lacking an agglutinated covering, in having more elongate chambers and in the longitudinal surface costae of at least the type species.

NODOPHTHALMIDIUM Macfadyen, 1939
Plate 331, figs. 5–12 and 15–18

Type species: Nodobacularia compressa Rhumbler, 1906 (***2619**), p. 38; OD.

Nodophthalmidium Macfadyen, 1939 (***1965**), p. 167.
Sarmatiella Bogdanovich, 1952 (***268**), p. 217; type species: *Sarmatiella costata* Bogdanovich, 1952; OD.
Foraminella Bogdanovich, 1960 (***269**), p. 19 (non *Foraminella* Sowerby, 1835 nec Levinsen, 1909); type species: *Foraminella obscura* Bogdanovich, 1960; OD.

Test elongate, narrow, a globular to ovate proloculus followed by narrow and elongate planispirally enrolled second chamber of one-half to one coil in length, then with a few uncoiled and rectilinear pyriform to flasklike or elongate tubular chambers; wall calcareous, imperforate, porcelaneous, thick; aperture terminal and may be somewhat produced, ovate to slitlike, or infolding of the apertural rim in the later stage may produce a triradiate to cruciform opening. Paleogene to Holocene; Adriatic; Mediterranean; USSR: Caucasus, Kuban.

Remarks: Although *Foraminella* was described as having numerous openings on mamillate projections from the rectilinear chambers, these appear to be parasitic borings, as was noted previously (Loeblich and Tappan, 1964, ***1910**, p. C456).

STELLARTICULINA Papp
and Schmid, 1978
Plate 331, figs. 19–23

Type species: Lingulina mutabilis d'Orbigny, 1846 (***2309**), p. 61; OD.

Stellarticulina Papp and Schmid, 1978 (*2337), p. 56.

Test elongate, narrow, globular proloculus followed by a cornuspirine second chamber of one planispiral whorl, and then by four to six elongate to pyriform uncoiled, rectilinear chambers; wall calcareous, opaque, porcelaneous, surface may be ornamented with two to fourteen prominent longitudinal costae; aperture terminal, rounded, bordered by a lip and with teeth that project into the opening. Miocene (Tortonian); Austria; Poland; Czechoslovakia; Romania.

Subfamily NODOBACULARIINAE
Cushman, 1927

Nodobaculariinae Cushman, 1927 (*742), p. 36.
Nubeculininae El-Nakhal, 1985 (*1106A), p. 109.

Early portion planispiral, later uncoiling and rectilinear; porcelaenous wall with outer agglutinated coating; aperture terminal. L. Jurassic (Liassic) to Holocene.

CIRCINATIELLA Loeblich and Tappan, 1986

Plate 330, figs. 3-10

Type species: Lagenammina pyriformis Tappan, 1940 (***3120**), p. 94; OD.

Circinatiella Loeblich and Tappan, 1986 (***1929**), p. 344.

Test elongate, globular proloculus followed by second chamber that spirals around it and then turns outward in an elongate neck, later chambers pyriform and rectilinear, separated by elongate stolonlike necks; wall calcareous, imperforate, porcelaneous, with agglutinated external layer on the chambers, but not extending over the necks; aperture terminal, rounded. Cretaceous (Albian to Cenomanian); USA: Texas, Oklahoma.

Remarks: The species was originally described from isolated chambers as a species of *Lagenammina*. On the basis of specimens with the early coil, the species later was transferred to *Nodophthalmidium* (Loeblich and Tappan, 1946, ***1879**, p. 249), and then suggested possibly to be conspecific with *Nubecularia nodulosa* Chapman (Loeblich and Tappan, 1964, ***1910**, p. C455) and transferred to *Nodobacularia*. As no specimens of Chapman's species have been found with the early coil of the present genus, they are no longer regarded as congeneric.

NODOBACULARIA Rhumbler, 1895

Plate 331, figs. 1-4

Type species: Nubecularia tibia Jones and Parker, 1860 (***1619**), p. 455; OD(M).

Nodobacularia Rhumbler, 1895 (***2616**), p. 87.

?*Pseudonubeculina* Bartenstein and Brand, 1949 (***153**), p. 670; type species: *Nubecularia nodulosa* Chapman, 1891 (***521**), p. 573; OD.

Test elongate, globular proloculus followed by planispiral coil of two narrow elongate chambers, later uncoiled and rectilinear, with a few elongate pyriform chambers that taper to the neck; wall calcareous, imperforate, porcelaneous, incorporating rare agglutinated particles; aperture terminal, rounded, at the end of the narrow elongate neck. L. Jurassic (Lias) to L. Cretaceous (Gault); England; Germany.

Remarks: *Pseudonubeculina* tentatively is included herein, as neither the original descriptions of the type species nor the genus indicated the nature of the early stage, all specimens obtained having been broken at the base. Topotypes of Chapman's species that we have examined also show a broken neck at the base of the earliest preserved chamber.

NUBECULINA Cushman, 1924

Plate 331, figs. 13 and 14

Type species: Sagrina divaricata Brady, 1879 (***338**), p. 276; OD.

Nubeculina Cushman, 1924 (***725**), p. 52.

Test elongate, narrow, proloculus followed by enrolled second chamber, and then by a rectilinear to slightly irregular series of chambers separated by stolonlike necks; wall calcareous, imperforate, porcelaneous, milky white, and may incorporate some agglutinated particles at the exterior; aperture terminal on a tubular neck, with phialine lip that has a few teeth projecting inward from the rim. Holocene; Pacific.

Subfamily MEANDROLOCULININAE Bogdanovich, 1981

Meandroloculininae Bogdanovich, in Subbotina, Voloshinova, and Azbel', 1981 (***3083**), p. 62.

Proloculus followed by cornuspirine second chamber, later chambers elongate and added in a zigzag pattern, with final chambers tending to become rectilinear. Miocene.

MEANDROLOCULINA Bogdanovich, 1935

Plate 331, figs. 24-27

Type species: Meandroloculina bogatschovi Bogdanovich, 1935; OD.

Meandroloculina Bogdanovich, 1935 (***266**), p. 695.

Test elongate, flattened, proloculus followed by planispirally enrolled early chambers, later chambers uncoiled, and grow alternately from side to side in a zigzag manner, may finally become rectilinear, chambers elongate, subpyriform, widest at the base and tapering toward the aperture; wall calcareous, imperforate, porcelaneous, thick, chamber arrangement and sutures scarcely discernable at the surface; aperture terminal, rounded, bordered by an everted lip. Miocene (L. Sarmatian); USSR: Trans-Caucasus.

Subfamily NUBECULINELLINAE Avnimelech and Reiss, 1954

Nubeculinellinae Avnimelech and Reiss, in Avnimelech, Parness and Reiss, 1954 (*98), p. 838.

Test attached, early stage coiled, later uncoiled or may be irregular: wall porcelaneous. U. Jurassic (Oxfordian) to Holocene.

Remarks: The family group name based on *Nubeculinella* is valid, although the type genus has been shown to be a junior isotypic synonym of *Vinelloidea.*

CALCITUBA von Roboz, 1884

Plate 332, figs. 4-7

Type species: Calcituba polymorpha von Roboz, 1884; OD.

Calcituba von Roboz, 1884 (*2637), p. 420.

Test attached, commonly to algae, consisting of somewhat irregular and elongate chambers in a uniserial or branching series, tapering toward the aperture; wall calcareous, porcelaneous: aperture terminal, rounded, may be present on more than one chamber. Holocene; Adriatic Sea; Gulf of Mexico.

CORNUSPIRAMIA Cushman, 1928

Plate 332, figs. 8-13

Type species: Nubecularia antillarum Cushman, 1922 (*721), p. 58; OD.

Cornuspiramia Cushman, 1928 (*748), p. 4.

Rhizonubecula J. Le Calvez, 1935 (*1796), p. 96; type species: *Rhizonubecula adherens* J. Le Calvez, 1935; OD.

Test attached, a globular to ovate proloculus followed by spirally wound tubular second chamber of one volution or more and by irregularly uncoiled to branching, somewhat elongate, cylindrical to pyriform later chambers, attached side flattened, free surface convex, with a somewhat spreading marginal keel attached to the substrate beyond the chamber lumen; wall calcareous, imperforate, porcelaneous; aperture terminal, against the attachment. Holocene; Gulf of Mexico; Caribbean; Mediterranean.

HECHTINA Bartenstein and Brand, 1949

Plate 334, figs. 3-5

Type species: Hechtina praeantiqua Bartenstein and Brand, 1949; OD.

Hechtina Bartenstein and Brand, 1949 (*153), p. 669.

Test free or attached to other foraminifers, up to about 0.9 mm in diameter, subglobular to somewhat flattened, proloculus followed by irregularly enrolled early stage, later chambers more regularly and streptospirally coiled, and finally planispiral, about three to six chambers per whorl, attached specimens tending to uncoil in the later stage; wall calcareous, imperforate, porcelaneous; aperture areal, circular to elliptical in the face of the final chamber and approximately in the plane of coiling. L. Cretaceous (Valanginian to Aptian); Germany; England; Romania.

NUBECULINITA Seiglie, 1964

Plate 333, figs. 1-5

Type species: Nubeculinita inhaerens Seiglie, 1964; OD.

Nubeculinita Seiglie, 1964 (*2843), p. 503.

Test attached, elongate, tiny, up to 0.3 mm in length, ovoid proloculus followed by two to three whorls of elongate ovate chambers of a half coil in length, later uncoiling and with two to four elongate, rectilinear, and uniserial chambers; wall calcareous, imperforate, milky white; aperture consists of one or more terminal openings. Holocene; Caribbean: Venezuela.

NUBECULOPSIS Collins, 1958

Plate 332, figs. 16-18

Type species: Nubeculopsis queenslandica Collins, 1958; OD.

Nubeculopsis Collins, 1958 (*646), p. 375.

Test attached, globular proloculus followed by enrolled arcuate to reniform chambers, two to four per whorl, later chambers tending to uncoil; wall porcelaneous, surface rough; aperture a terminal arch in the early stage, later a broad opening bordered by a lip, occupying the full width of the chambers, the original figures appearing to show teeth projecting into the opening. Holocene; Coral Sea: Great Barrier Reef.

SINZOWELLA Cushman, 1933

Plate 334, figs. 1 and 2

Type species: Nubecularia novorossica var. *deformis* Karrer and Sinzow, 1877 (***1655**), p. 283; OD.

Sinzowella Cushman, 1933 (***769**), p. 33.

Test attached, elongate, up to 10 mm in length, globular proloculus followed by enrolled cornuspirine early stage, later with irregular to globular chambers in an irregular mass or strongly overlapping earlier chambers; wall calcareous, imperforate, porcelaneous, thick; aperture rounded to elongate and ovate, bordered by a thickened lip, commonly more than one per chamber, and apertures remaining open on many chambers in the adult stage. Miocene (Sarmatian); USSR: Moldavian SSR, Bessarabia.

VINELLOIDEA Canu, 1913

Plate 333, figs. 9-12

Type species: Vinelloidea crussolensis Canu, 1913; OD(M).

Vinelloidea Canu, 1913 (***480**), p. 276.

Nubeculinella Cushman, 1930 (***757**), p. 133; type species: *Nubeculinella bigoti* Cushman, 1930 = *Vinelloidea crussolensis* Canu, 1913; OD.

Test attached, globular proloculus followed by enrolled tubular second chamber of one-half to one and a half whorls, later chambers ovate to irregular in outline, uniserial, but winding over the surface of the attachment; wall calcareous, imperforate, milky white, and porcelaneous; aperture a semicircular opening against the substrate. U. Jurassic (Oxfordian); France.

Remarks: Voight (1973, ***3306**, p. 665) showed that *Vinelloidea* Canu is a senior synonym of *Nubeculinella*. Described originally as a cheilostome bryozoan colony attached to a belemnite fragment, the entire specimen was regarded as the "holotype." Since instead it consists of a number of overlapping individuals of a multilocular foraminifer, we here designate as lectotype the specimen with early coil followed by uncoiled chambers, shown at the center left of Canu's pl. 2, fig. 3 and reillustrated at the center right of Voight's pl. 1, fig. 2.

WEBBINA d'Orbigny, 1839

Plate 332, figs. 14 and 15

Type species: Webbina rugosa d'Orbigny, 1839 (***2305**), p. 126; SD(SM).

Webbina d'Orbigny, 1839 (***2304**), p. 26.

Webbum Rhumbler, 1913 (***2621**), p. 444; type species: obj.; SD Loeblich and Tappan, 1964 (***1910**), p. C448.

Arwebbum Rhumbler, 1913 (***2621**), p. 445 (err. emend.).

Test attached, elongate ovate proloculus followed by a few ovate and inflated chambers, attached surface flattened, upper surface convex, a fimbriate peripheral keel against the attachment; wall calcareous, thin, milky white, imperforate, surface smooth or with faint transverse growth wrinkles; aperture terminal, with bordering lip. Holocene; Atlantic; Pacific: Timor Sea.

Subfamily NUBECULARIINAE Jones, 1875

Nubeculariinae Chapman, 1901 (***533**), p. 169, nom. corr. pro subfamily Nubecularinae.

Nubecularinae Brady, 1884 (***344**), p. 61, nom. imperf.; nom. transl. ex family Nubecularida.

Test attached, early stage coiled, later may be irregular; wall porcelaneous with agglutinated outer coating. Jurassic to Holocene.

GYMNESINA Colom, 1959

Plate 333, figs. 6-8

Type species: Gymnesina glomerosa Colom, 1959; OD.

Gymnesina Colom, 1959 (***650**), p. 16.

Test elongate, large, up to 5 mm in length, attached to large mineral grains, globular proloculus followed by four to five ovoid chambers in a planispiral whorl about 0.8 mm in diameter, flattened early stage having only a thin membranous layer against the attachment, later uncoiled, with pyriform chambers in an irregular series, or may branch at the ends, free surface convex or more commonly the thin delicate wall is largely obscured by the very coarse particles to which it attaches; wall calcareous, white, porcelaneous;

aperture terminal, rounded, branching specimens commonly with two apertures, or rarely three. Holocene; S. Spain: Alboran Sea; N. Morocco; Balearic Islands.

NUBECULARIA Defrance, 1825

Plate 332, figs. 1-3

Type species: Nubecularia lucifuga Defrance, 1825; OD(M).

Nubecularia Defrance, 1825 (*922), p. 210.

Test attached, proloculus followed by cornuspirine coil in early stage, later whorls with few chambers and may tend to uncoil, depending on the nature of the substrate, final stage may grow free of the attachment; wall calcareous, imperforate, and commonly incorporates a small amount of foreign material; aperture an elongate slit against the attachment, becoming rounded with toothlike infoldings of the rim when the final chamber grows free. Jurassic to Holocene; cosmopolitan.

Subfamily SPIRIAMPHORELLINAE Senowbari-Daryan and Zaninetti, 1986

Spiriamphorellinae Senowbari-Daryan and Zaninetti, 1986 (*2871), p. 81.

Test free, early stage as in *Ophthalmidium*, later partly uncoiled; wall thick, originally porcelaneous, preserved as micritic calcite, no perforations; aperture terminal. U. Triassic (Carnian).

SPIRIAMPHORELLA Borza and Samuel, 1977

Plate 386, figs. 9-14

Type species: Spiriamphorella carpathica Borza and Samuel, 1977; OD.

Spiriamphorella Borza and Samuel, 1977 (*309), p. 110.

Amphorella Borza and Samuel, 1977 (*309), p. 100 (non *Amphorella* Lowe, 1852 nec Daday, 1887, nec Léger, 1892); type species: *Amphorella bicamerata* Borza and Samuel, 1977; OD.

Test elongate, small, about 0.3 mm to 0.4 mm in length, rounded proloculus followed by tubular planispirally enrolled and evolute chamber and finally with a broad uncoiled chamber; wall calcareous, originally porcelaneous, preserved as micritic calcite; aperture terminal, rounded, bordered by a funnel-like collar. U. Triassic (Carnian): Czechoslovakia; Bulgaria.

Subfamily COSTIFERINAE Senowbari-Daryan and Zaninetti, 1986

Costiferinae Senowbari-Daryan and Zaninetti, 1986 (*2871), p. 81.

Test free, uncoiled, somewhat irregular, chambers as in *Nubecularia*; wall calcareous, thick, with longitudinal costae; aperture terminal, simple. U. Triassic (Norian).

COSTIFERA Senowbari-Daryan, 1983

Plate 387, figs. 1-5

Type species: Costifera cylindria Senowbari-Daryan, 1983; OD.

Costifera Senowbari-Daryan, 1983 (*2868), p. 208.

Test of numerous flasklike chambers in an arcuate series or with successive chambers added at a 90° angle from that preceding, narrow tubular chamber lumen surrounded by a much broader cylindrical chamber, the tubular portion being continuous from one flasklike chamber to the next; wall calcareous, porcelaneous, micritic, surface ornamented with longitudinal ribs that are separated from the chamber lumen by the wall; aperture rounded, surrounded by the flaring rim of the flasklike chamber. U. Triassic (Norian): Italy: Sicily.

SICULOCOSTA Senowbari-Daryan and Zaninetti, 1986

Plate 832, figs. 1-9

Type species: Costifera battagliensis Senowbari-Daryan, 1983 (*2868), p. 211.

Siculocosta Senowbari-Daryan and Zaninetti, 1986 (*2871), p. 82.

Siculocosta Senowbari-Daryan, Ciarapica, Cirilli, and Zaninetti, 1985 (*2870), p. 302, 304 (name not available, ICZN Art. 13(a)(i), no description).

Test with somewhat pyriform chambers in an arcuate series, similar to *Costifera* in appearance but chambers with hollow longitudinal ribs formed by outfoldings of the chamber wall; wall calcareous, surface with longitudinal costae; aperture terminal, rounded, bordered by a thickened phialine lip. U. Triassic (Norian); Italy: Sicily.

Family OPHTHALMIDIIDAE Wiesner, 1920

Ophthalmidiidae Cushman, 1928 (*747), p. 159, nom. corr. pro family Opthalmidiidae.

Opthalmidiidae Cushman, 1927 (*742), p. 36 (nom. imperf.), nom. transl. ex subfamily Ophthalmidiinae.

Ophthalmidiinae Wiesner, 1920 (*3373), p. 17 (subfamily).

Test free, proloculus and undivided coiled second chamber or flexostyle followed by chambers that commonly are one-half coil in length. M. Triassic (Anisian) to Holocene.

CORNULOCULINA Burbach, 1886

Plate 334, figs. 13-18

Type species: Hauerina inconstans Brady, 1879 (*338), p. 268: SD Loeblich and Tappan, 1964 (*1910), p. C448.

Cornuloculina Burbach, 1886 (*451), p. 497.

Hauerinella Schubert, 1921 (*2823), p. 162; type species: obj.; OD(M).

Test discoidal, flattened, globular proloculus followed by cornuspirine tubular second chamber of up to three whorls, chamber lacking a floor so that the outer wall rests on the previous whorl rather than forming a complete tube, then with loosely coiled chambers a half coil or slightly less in length, resulting in two and a half to three chambers per whorl, peripheral margin carinate so that new chambers are added against the keel and a thin solid plate separates the chamber lumen of successive whorls; wall calcareous, porcelaneous; aperture a slitlike opening at the end of the final chamber. Holocene; Atlantic and Pacific.

Remarks: Azbel' (1971, *103, p. 53) incorrectly indicated *Ophthalmidium orbiculare* Burbach, 1886, as the type species for *Cornuloculina*. No type was originally designated for the genus by Burbach, and the original description included discussion of Brady's species as well as others; thus Loeblich and Tappan's designation of *Hauerina inconstans* Brady as type of the genus must stand. *Ophthalmidium orbiculare* is the type species of *Praeophthalmidium* Knauff, 1966.

EDENTOSTOMINA Collins, 1958

Plate 334, figs. 6-9

Type species: Miliolina cultrata Brady, 1881 (*339), p. 45; OD.

Edentostomina Collins, 1958 (*646), p. 370.

Test compressed, ovate in outline, rapidly enlarging elongate and narrow chambers of one-half coil in length, planispirally enrolled, all chambers visible from both sides of the test; wall calcareous, porcelaneous, surface smooth, striate or pitted, periphery may be carinate; aperture terminal, simple, rounded to oval, with an everted lip and may be produced on a short neck. Holocene; Indo-Pacific.

EOOPHTHALMIDIUM Langer, 1968

Plate 335, figs. 1-4

Type species: Praeophthalmidium (Eoophthalmidium) tricki Langer, 1968; OD.

Praeophthalmidium (Eoophthalmidium) Langer, 1968 (*1789), p. 591.

Eoophthalmidium Zaninetti and Brönnimann, 1969 (*3434), p. 718 (nom. transl.).

Test lenticular, globular proloculus followed by cornuspirine tubular undivided second chamber forming about one whorl, then with gradually shortened chambers of one to one-half whorls in length, coiling involute; wall thick, that of later whorls completely overlapping the early ones to produce a thick umbonal region, chamber lumen restricted to the peripheral area of the test, composition of the fossil test is siliceous, probably due to replacement of an originally porcelaneous calcareous wall; aperture terminal, rounded, with thickened rim, projecting somewhat above the periphery as a result of the strongly thickened chamber floor that distally restricts the chamber diameter. M. Triassic (Anisian); Turkey.

Remarks: Although regarded originally as a subgenus of *Praeophthalmidium* and later considered by some as a synonym of *Ophthalmidium*, *Eoophthalmidium* differs from the evolutely coiled typical representatives of those genera in the involute coiling and thickened umbonal region.

GSOLLBERGELLA Zaninetti, 1979

Plate 335, figs. 11-16

Type species: Agathamminoides gsollbergensis Zaninetti, 1969, ***3424**, p. 699 = *Agathammina spiroloculiformis* Oraveczné Scheffer, 1968 (***2302**), p. 91; OD.

Gsollbergella Zaninetti, 1979 (***3427**), p. 73 (nom. nov. pro *Agathamminoides* Zaninetti, 1969).

Agathamminoides Zaninetti, 1969 (***3424**), p. 698 (non *Agathamminoides* Vangerow, 1964); type species: obj.; OD.

Test fusiform, globular proloculus followed by cornuspirine undivided second chamber of one whorl and then by chambers one-half coil in length in a quinqueloculine arrangement, individual chambers separated only by slight thickenings of the wall rather than by distinct septa; wall calcareous, imperforate, porcelaneous; aperture simple, terminal. U. Triassic (Carnian); Austria; Hungary; Italy.

HYDRANIA Senowbari-Daryan, 1983

Plate 387, figs. 6-10

Type species: Hydrania dulloi Senowbari-Daryan, 1983; OD.

Hydrania Senowbari-Daryan, 1983 (***2868**), p. 206.

Test quadrangular in outline, ovate in section, planispirally enrolled and evolute or partially involute, successive chambers added in planes approximately 90° apart, chambers tubular, circular in section at the extremities, flattened to oval centrally where they are appressed to the earlier whorls; aperture terminal, circular, surrounded by a broadly flared collar. U. Triassic (Carnian); Greece; Yugoslavia; Austria.

KARABURUNIA Langer, 1968

Plate 335, figs. 5-7

Type species: Karaburunia rendeli Langer, 1968; OD.

Karaburunia Langer, 1968 (***1789**), p. 591.

Test small, up to 0.55 mm in length, ovate to flasklike in outline, proloculus followed by two chambers per whorl, earliest whorl planispiral, later whorls slightly less than 180° apart but varying so that successive chambers have a distinctly sigmoidal alignment as seen in section, final pair of chambers approximately 180° apart, chamber lumen ovate but chamber wall extending laterally halfway around the test so that the wall is much thickened perpendicular to the plane of coiling; wall thick, imperforate, probably originally porcelaneous; aperture simple, rounded, terminal, produced on an elongate neck, bordered by an everted lip. M. Triassic (U. Anisian); Turkey.

Remarks: Although the early whorl is indicated to be planispiral, the sectioned specimens do not show whether the first whorl consists of a single undivided chamber as in most ophthalmidiids or if all whorls have two chambers.

OPHTHALMIDIUM Kübler and Zwingli, 1870

Plate 334, fig. 12

Type species: Oculina liasica Kübler and Zwingli, 1866 (***1749**), p. 11; OD.

Ophthalmidium Kübler and Zwingli, 1870 (***1750**), p. 46 (nom. subst. pro *Oculina* Kübler and Zwingli, 1866).

Oculina Kübler and Zwingli, 1866 (***1749**), p. 11 (non *Oculina* Lamarck, 1816); type species: obj.; OD.

Test rounded to oval in outline, flattened, globular proloculus followed by narrow tubular flexostyle of up to one-half whorl in length, later chambers broader at the base and tapering toward the aperture, from one-half to one coil in length, coiling planispiral or slightly deviating from this, chambers with distinct floors and lateral extensions that in involute tests partially or completely overlap earlier whorls, and in evolute tests form platelike connections between successive whorls; wall calcareous, porcelaneous, of varied thickness; simple round aperture produced at the end of a neck, may have a phialine lip but lacks a tooth. U. Triassic (Carnian) to U. Jurassic (Kimmeridgian); cosmopolitan.

OPHTHALMINA Rhumbler, 1936

Plate 336, figs. 1-4

Type species: Ophthalmina kilianensis Rhumbler, 1936; OD.

Ophthalmina Rhumbler, 1936 (*2623), p. 217.

Test discoidal, sides flattened, periphery rounded, globular proloculus followed by closely appressed nonseptate cornuspirine planispiral coil and then by two rapidly enlarging chambers per whorl; wall calcareous, imperforate, porcelaneous; aperture simple, at the open end of the final chamber. Holocene; N. Germany.

PARAOPHTHALMIDIUM Samuel and Borza, 1981

Plate 389, figs. 9 and 10

Type species: Paraophthalmidium carpathicum Samuel and Borza, 1981; OD.

Paraophthalmidium Samuel and Borza, 1981 (*2725), p. 68.

Test elongate ovate or amphora shaped, up to 0.4 mm in length, early stage planispirally enrolled or with slight oscillation of the plane of coiling, involute to evolute, chambers a half-coil in length, in up to five whorls; wall calcareous, porcelaneous; aperture terminal, circular, may be produced on a neck and has a wide bordering lip. U. Triassic (Carnian): Czechoslovakia.

PRAEOPHTHALMIDIUM Knauff, 1966

Plate 335, figs. 8-10

Type species: Ophthalmidium orbiculare Burbach, 1886 (***451**), p. 499; OD.

Praeophthalmidium Knauff, 1966 (*1709), p. 100.

Test flattened, circular to ovoid in outline, globular proloculus followed by planispirally enrolled second chamber of one to four volutions in length, later chambers each extend for an entire volution or slightly more, somewhat widened at the base and tapering toward the aperture, chambers slightly extended away from the coil distally so that the test becomes somewhat elongate and the outline teardrop-like, chamber lumen of successive chambers separated by thin platelike shell material; wall calcareous, imperforate, porcelaneous: aperture at the open end of the tube. L. Jurassic (Hettangian to Pliensbachian); Germany.

Remarks: Variously regarded as a synonym of *Cornuloculina* or *Ophthalmidium*. *Praeophthalmidium* differs in having adult chambers of a full whorl in length, whereas *Cornuloculina* and *Ophthalmidium* have two to four chambers per whorl.

SPIROPHTHALMIDIUM Cushman, 1927

Plate 334, figs. 10 and 11

Type species: Spiroloculina acutimargo Brady, 1884 (***344**), p. 154; OD.

Spiropthalmidium Cushman, 1927 (*742), p. 37, 39 (nom. imperf.).

Spirophthalmidium Paalzow, 1932 (*2323), p. 99 (nom. corr.).

Test free, flattened, ovate to fusiform, periphery carinate, globular proloculus followed by undivided cornuspirine enrolled second chamber, and then by two chambers per whorl, planispiral, the chamber lumen narrow, that of successive chambers separated by platelike shell material like that of the peripheral keel; wall calcareous, imperforate, porcelaneous; aperture rounded to ovate, at the open end of the final chamber. Holocene; cosmopolitan.

Family DISCOSPIRINIDAE Wiesner, 1931

Discospirinidae Saidova, 1981 (*2696), p. 34, nom. transl. ex subfamily Discospiriniinae.

Krumbachininae Wiesner, 1920 (*3373), p. 17 (see ICZN Art. 40 (b); based on junior synonym, replaced before 1961).

Discospiriniinae Wiesner, 1931 (*3375), p. 60, 73 (subfamily: nom. imperf.)

Discospirininae Loeblich and Tappan, 1961 (*1902), p. 291 (subfamily; nom. corr.).

Test discoid, proloculus followed by cornuspirine coil of several volutions, later chambers one-half coil in length and finally annular, may be subdivided into chamberlets by incomplete vertical partitions arising from the floor of the chamber; aperture a row of pores at the margin of the final chamber. M. Miocene to Holocene.

DISCOSPIRINA Munier-Chalmas, 1902

Plate 336, figs. 5-7

Type species: Orbitolites tenuissimus Carpenter, 1870 (***489**), p. 8 = *Pavonina italica* Costa, 1856 (***686**), p. 178; OD.

Discospirina Munier-Chalmas, 1902 (*2211), p. 353.

Cyclophthalmidium Lister, in Lankester, 1903 (*1791), p. 108; type species: obj.; OD.

Krumbachina Wiesner, 1920 (*3373), p. 14; type species: obj.; OD(M).

Test discoid, flattened, nucleoconch slightly elevated above the general test surface and consists of a globular proloculus and planispirally enrolled narrow tubular undivided second chamber of one and a half whorls, later chambers gradually shortened to about one whorl, early whorls separated by a flat calcareous plate as in *Ophthalmidium*, later chambers abruptly higher, flaring and closely appressed to form a flabelliform stage, earlier flaring chambers subdivided by three or four vertical partitions but increase in number in later chambers, peneropliform stage followed by more enveloping and finally annular chambers with many partitions arising from the chamber floor but not reaching the chamber roof, leaving a continuous connection just beneath the outer wall, chamberlets connected with those of the previous and following annular chambers and to the exterior by small slitlike openings, sutures flush to slightly limbate; wall calcareous, imperforate, porcelaneous; aperture a single row of slitlike openings around the periphery, alternating in position with the inner partitions, those of earlier chambers remaining as intercameral foramina. M. Miocene to Holocene; Mediterranean; Atlantic.

Superfamily MILIOLACEA Ehrenberg, 1839

Miliolacea Loeblich and Tappan, 1961 (*1902), p. 289, nom. corr. pro superfamily Miliolidea.
Miliolidea Glaessner, 1945 (*1250), p. 116, nom. transl. ex family Miliolina.
Miliolicae Easton, 1960 (*1044), p. 65, 76.
Milioloidea Souaya, 1965 (*3043), p. 307.

Test coiled, commonly with two, less frequently three or more, chambers per whorl arranged in varying planes about the longitudinal axis, later may become involute or may uncoil, advanced forms may have secondary partitions within the chambers. U. Triassic (Norian) to Holocene.

Family MILIOLECHINIDAE Zaninetti, Ciarapica, Cirilli, and Cadet, 1985

Miliolechinidae Zaninetti, Ciarapica, Cirilli, and Cadet, 1985 (*3437), p. 331.

Early stage quinqueloculine, later chambers hemispherical as seen in section, each bearing one or more large hollow spines; wall calcareous, porcelaneous, imperforate; aperture unknown. U. Triassic (Norian).

MILIOLECHINA Zaninetti, Ciarapica, Cirilli, and Cadet, 1985

Plate 831, figs. 1-3

Type species: Miliolechina stellata Zaninetti et al., 1985; OD.

Miliolechina Zaninetti, Ciarapica, Cirilli, and Cadet, 1985 (*3437), p. 331.

Test small, appearing roughly spherical in form, with numerous coarse spinelike projections, early stage quinqueloculine, later chambers irregularly added, but apparently milioline in arrangement, chamber lumen hemispherical in section, each chamber bearing elongate hollow tubulospines that open into the chamber cavity; wall calcareous, porcelaneous, imperforate; aperture not observed. U. Triassic (Norian); Yugoslavia: Bosnia.

Family SPIROLOCULINIDAE Wiesner, 1920

Spiroloculinidae Loeblich and Tappan, 1982 (*1917), p. 30 (nom. transl.).
Spiroloculininae Wiesner, 1920 (*3373), p. 17, 18 (subfamily).
Cribrolinoidinae Haynes, 1981 (*1437), p. 158 (subfamily).
Palaeomiliolinidae Haynes, 1981 (*1437), p. 167.

Proloculus followed by reduced cornuspirine flexostyle of approximately a whorl or slightly less in length, at least in the microspheric generation, followed by two chambers per whorl; simple wall may be smooth, striate, or costate; aperture terminal, rounded to elongate, open or with simple to bifid tooth. M. Jurassic (Bajocian) to Holocene.

ADELOSINA d'Orbigny, 1826

Plate 337, figs. 1-19

Type species: Adelosina laevigata d'Orbigny, 1826; SD Cushman, 1917 (*708), p. 73.

Adelosina d'Orbigny, 1826 (*2303), p. 303.
Serpula (Retorta) Walker and Boys, 1784 (*3336), p. 3 (nom. reject., ICZN Op. 558).
Pollontes de Montfort, 1808 (*2176), p. 247 (nom. reject., ICZN Op. 692, China, 1964 (*587), p. 26); type species: *Pollontes vesicularis* de Montfort, 1808.

Uniloculina d'Orbigny, 1839 (*2304), p. 161; type species: *Uniloculina indica* d'Orbigny, 1839; OD(M).
Praequinqueloculina Lak, 1982 (*1770), p. 14; type species: *Praequinqueloculina honghensis* Lak, 1982; OD.

Test of the microspheric generation quinqueloculine in the early stage, megalospheric test with proloculus followed by planispirally enrolled and involute second chamber with distal end produced in a neck, third chamber with a 90° change in plane of coiling, later chambers quinqueloculine in both generations, with planes of coiling 130° to 160° apart, three to four chambers visible at the exterior of the adult, chambers complete with floor and not merely lying against the previous chambers; wall calcareous, imperforate, porcelaneous, surface smooth, striate or costate; aperture terminal, rounded, produced on a neck, with a simple or bifid tooth. Miocene to Holocene; cosmopolitan.

CRIBROLINOIDES Cushman and LeRoy, 1939

Plate 338, figs. 1-11

Type species: Quinqueloculina disparilis d'Orbigny var. *curta* Cushman, 1917 (*708), p. 49; OD.

Cribrolinoides Cushman and LeRoy, 1939 (*829), p. 15.

Test with microspheric test quinqueloculine in the early stage, megalospheric generation with large globular proloculus followed by planispirally enrolled and involute second chamber, forming a complete whorl as in *Adelosina*, but adult quinqueloculine in both generations; wall calcareous, imperforate, porcelaneous, surface may be ornamented with longitudinal costae; aperture terminal, with simple tooth in the juvenile stage, later bifid, and bifid tips later fusing to form a ring that may attach in numerous places around the periphery and form a complex cribrate opening. Pliocene to Holocene; Indo-Pacific region.

CRIBROSPIROLOCULINA McCulloch, 1977

Plate 338, figs. 15 and 16

Type species: Cribrospiroloculina samoaensis McCulloch, 1977; OD.

Cribrospiroloculina McCulloch, 1977 (*1961), p. 549.

Test ovate in outline, sides flattened to concave, periphery bluntly rounded, chambers one-half coil in length, widest at the base that curves to occupy much of the aboral end, tapering toward the aperture and produced as a short tubular neck; wall calcareous, imperforate, surface granular in appearance; aperture terminal on the short neck, multiple, with a trematophorelike plate in the opening. Holocene; Pacific; off Samoa.

FLINTIA Schubert, 1911

Plate 338, figs. 12-14

Type species: Spiroloculina robusta Brady, 1884 (*344), p. 150; OD(M).

Flintia Schubert, 1911 (*2819), p. 124.

Test ovate in outline, robust, sides flattened to concave, periphery broadly rounded, with carinate angles, proloculus followed by chambers one-half coil in length, planispiral; wall calcareous, imperforate, porcelaneous; aperture a low ovate opening at the end of the final chamber, with a short and broad bifid tooth. Holocene; Caribbean; Gulf of Mexico.

INAEQUALINA Łuczkowska, 1971

Plate 339, figs. 1-6

Type species: Spiroloculina inaequilateralis Schlumberger, 1893 (*2766), p. 60; OD.

Inaequalina Łuczkowska, 1971 (*1938), p. 440.
Heterospiroloculina McCulloch, 1977 (*1961), p. 549; type species: *Heterospiroloculina bikiniensis* McCulloch, 1977; OD.

Test planoconvex to concavoconvex, ovate in outline, globular to ovate proloculus followed by spirally wound second chamber of one complete whorl, later chambers one-half coil in length, regularly added on alternate sides, in two planes of coiling, 140° to 170° apart, so that one side of the test is flattened to concave and the opposite side convex, proloculus and all chambers visible from both sides, chambers quadrangular in section, closely appressed, somewhat produced toward the aperture; wall calcareous, imperforate, porcelaneous, surface smooth or the angles of the test may be carinate; aperture at the somewhat produced end of the final chamber, slitlike to rounded, without a tooth. Miocene to Holocene; cosmopolitan.

KALOSHA Boltovskoy, 1978

Plate 336, figs. 12-15

Type species: Kalosha oceanica Boltovskoy, 1978; OD.

Kalosha Boltovskoy, 1978 (*295), p. 66.

Test small, ovate in outline, up to 0.2 mm in greatest dimension, compressed, oval proloculus followed by planispirally coiled elongate tubular chambers one-half coil in length, forming three to five whorls, chambers widest near their base at the narrower part of the test, curving distally over the end of the test and tapering toward the aperture on its opposite margin, sutures slightly depressed; wall calcareous, imperforate, hyaline, may have some exogenous material on the surface; aperture a narrow slit at the end of the final chamber, near the narrower part of the test. L. Pliocene; S. Atlantic; Pacific; Indian Ocean.

NEOSPIROLOCULINA McCulloch, 1977

Plate 338, figs. 17 and 18

Type species: Neospiroloculina espirituensis McCulloch, 1977; OD.

Neospiroloculina McCulloch, 1977 (*1961), p. 549.

Test circular to ovate in outline, flattened, proloculus followed by chambers a half coil in length, increasing rapidly in breadth as added and extending beyond the midline of the test at the apertural end; wall calcareous, imperforate, porcelaneous, surface smooth to longitudinally costate; aperture terminal, rounded to ovate, without a tooth. Holocene; Pacific: off Mexico; Galapagos Islands.

NUMMULOPYRGO Hofker, 1983

Plate 339, figs. 7-14

Type species: Pseudopyrgo globulus Hofker, 1976 (*1525), p. 112 (see ICZN Art. 70 (c); non *Biloculina globulus* Bornemann, 1855, *305); OD.

Nummulopyrgo Hofker, 1983 (*1531), p. 26 (nom. subst. pro *Pseudopyrgo* Hofker, 1976).

Pseudopyrgo Hofker, 1976 (*1525), p. 110 (non *Pseudopyrgo* Rasheed, 1971); type species: obj., OD.

Test globular, two hemispherical chambers visible externally, with slightly depressed suture; megalospheric test with large proloculus followed by narrow tubular flexostyle, axis of coiling oblique to that of the later biloculine chambers, microspheric test with flexostyle of more than one volution, followed by narrow evolute nummuloloculine chambers of one-half coil each, a large enveloping chamber with plane perpendicular to that of the earlier chambers, and finally by biloculine chambers that also may be in a different plane of coiling; wall calcareous, porcelaneous, that of early planispiral chambers thin, biloculine chambers with thicker wall, surface smooth; aperture areal, crescentic, nearly closed by a broad flat lip. Holocene; N. Atlantic, off France; Cuba; Virgin Islands; Puerto Rico.

Remarks: Although Hofker cited the type species as *Biloculina globulus* Bornemann, 1855 (*305), p. 349 (a German Oligocene Rupelian species), he stated that the new genus was differentiated on the basis of a distinct character of the initial chambers, as shown in sectioned specimens figured by Schlumberger (1891, *2764, p. 575; numbered p. 188 in a reprint edition) from the Recent, Gulf of Gascogne. The apertural views of the Oligocene and Recent specimens are not alike, and although no sections have been shown of the Oligocene form, they appear not to be conspecific. As a deliberately misapplied name for the type species (see ICZN Art. 70 (c)), the present type species is to be cited as *Pseudopyrgo globulus* Hofker, 1976 = *Nummulopyrgo globulus* (Hofker). The specimen figured by Schlumberger (1891, pl. 12, figs. 97-100) and reillustrated here is designated as lectotype for *N. globulus* (Hofker).

PALAEOMILIOLINA Antonova, 1959

Plate 336, figs. 8-11

Type species: Spirophthalmidium monstruosum E. V. Bykova, 1948 (*462), p. 102; OD.

Palaeomiliolina Antonova, 1959 (*48), p. 20.

Palaeomiliolina Bogdanovich, 1952 (*268), p. 41, 47, 86 (name not available, ICZN Art. 13 (a)(i), no description).

Palaeomiliolina Antonova, 1958 (*47), p. 915 (name not available, ICZN Art. 13 (b), described, no type designated).

Palaeomiliolina Loeblich and Tappan, 1964 (*1910), p. C462 (non Antonova, 1959); type species: *Spirophthalmidium occultum* Antonova, 1958 (*47), p. 52; OD.

Test elongate, flattened, globular proloculus followed by spirally wound second chamber of one complete whorl, distally tending to uncoil, succeeding chambers lie in the same plane or may be somewhat off center and occasionally double back, chambers widest at the base and tapering distally, extending beyond the former test margin at the apertural end to produce a rapidly elongating test; wall thick, calcareous, imperforate, porcelaneous; aperture terminal, rounded, at the end of the projecting neck. M. Jurassic (Bajocian) to U. Jurassic (Kimmeridgian); USSR: Kazakh; Caucasus.

Remarks: As the publication of Antonova (1959) then had not been seen by them, Loeblich and Tappan (1964, ***1910**, p. C462) designated *Spirophthalmidium occultum* Antonova, 1958 as the type species of *Palaeomiliolina*. However, Antonova had validated the genus in 1959 (***48**) by citation of *Spirophthalmidium monstruosum* E. V. Bykova as type species.

PIPPINIA McCulloch, 1977

Plate 338, figs. 19-22

Type species: Pippinia galapagosensis McCulloch, 1977; OD.

Pippinia McCulloch, 1977 (***1961**), p. 571.

Test planoconvex, rounded to ovate in outline, chambers one-half coil in length but hemispherical rather than tubular, nearly completely overlapping previous chambers on the strongly convex side of the test, leaving two chambers visible in the young stage but later with final chamber completely overlapping others on that side, coiling evolute on the flattened or slightly convex side where all earlier chambers remain visible; wall calcareous, imperforate, porcelaneous, white, surface smooth; aperture terminal, rounded, facing the flattened side of the test, with a broad spatulate tooth or flap. Holocene; Galapagos Islands.

PLANISPIRINOIDES Parr, 1950

Plate 340, figs. 6-18

Type species: Miliolina bucculenta Brady, 1884 (***344**), p. 170; OD.

Planispirinoides Parr, 1950 (***2363**), p. 287.

?*Pseudospirilina* Saidova, 1975 (***2695**), p. 162; type species: *Pseudospirilina abyssalica* Saidova, 1975; OD.

Pseudospirillina Saidova, 1981 (***2696**), p. 31 (err. emend., see ICZN Art. 32 (a), Art. 33 (b)(iii)).

Test subglobular, proloculus followed by cornuspirine stage with planispiral undivided tubular second chamber, later chambers one-half coil in length, triloculine, the planes of coiling being perpendicular to that of the earlier stage; wall calcareous, imperforate, porcelaneous, surface smooth; aperture an elongate slit near the base of the final chamber, with a broad flaplike tooth occupying the lower rim. Holocene; Atlantic; Antarctic; Australia; S. Indian Ocean: Kerguelen Island.

Remarks: *Pseudospirilina* was described as having early chambers arranged as in *Miliolinella* and later triloculine. However, no sections were given to show the early chamber arrangement, and the two figures of the type species are not oriented to show the nature of the later chamber arrangement. The illustration appears to show areal pores above the aperture, such as occur in *Involvohauerina*, but these are not mentioned, and the aperture is stated to be interiomarginal and covered by a plate that is fastened to the surface of the preceding chamber. Pending additional information, *Pseudospirilina* appears to be close to *Planispirinoides*.

RECTOSPIROLOCULINA McCulloch, 1977

Plate 340, fig. 1

Type species: Rectospiroloculina duncanensis McCulloch, 1977; OD.

Rectospiroloculina McCulloch, 1977 (***1961**), p. 550.

Test elongate, globular proloculus followed by planispirally wound tubular cornuspirine chamber, then with chambers one-half coil in length added in a single plane, latest chambers elongate pyriform and uncoiled in a rectilinear or slightly curved series; wall calcareous, imperforate, porcelaneous, thin, surface smooth; aperture terminal, simple, rounded, on the tapering end of the final chamber. Holocene; Pacific: Galapagos; off Mexico.

SPIROLOCULINA d'Orbigny, 1826

Plate 340, fig. 2-5

Type species: Spiroloculina depressa d'Orbigny, 1826; SD Cushman, 1917 (***708**), p. 29.

Spiroloculina d'Orbigny, 1826 (***2303**), p. 298.

Test ovate to fusiform in outline, with flattened sides and truncate periphery, microspheric proloculus followed by planispirally wound tubular second chamber of one whorl in length, later part of microspheric test and all of megalospheric test with chambers one-half coil in length added in a single plane; wall calcareous, imperforate, porcelaneous; aperture at the open end of the final chamber, with simple or bifid tooth, commonly slightly produced on a short neck. U. Cretaceous (Santonian) to Holocene; cosmopolitan.

Family HAUERINIDAE Schwager, 1876

Hauerinidae Steinmann, 1881 (*3065), p. 41 (nom. corr.).
Hauerinidee Schwager, 1876 (*2829), p. 483 (nom. imperf.).
Hauerinina Lankester, 1885 (*1790), p. 846.
Hauerinae Delage and Hérouard, 1896 (*926), p. 124.
Schlumbergerinidae Mikhalevich, 1980 (*2108), p. 56.
Spiroglutinidae Mikhalevich, 1983 (*2111), p. 100.
Sigmoilinitidae Mikhalevich, 1983 (*2111), p. 121 (nom. imperf. as Sigmoilitinidae; nom. transl. ex subfamily).
Triloculinidae Mikhalevich, 1983 (*2111), p. 130, nom. transl. ex subfamily Triloculininae.
Falsotubinellidae Bogdanovich and Mikhalevich, in Mikhalevich, 1983 (*2111), p. 102.
Pyrgoidae Mikhalevich, 1983 (*2111), p. 134.
Agglutinellidae El-Nakhal, 1985 (*1106A), p. 105.

Test with proloculus followed by two chambers per whorl, rarely with intervening flexostyle; chambers added in one to five or more planes of coiling; less commonly the adult test may have more than two chambers per whorl or may be uncoiled and rectilinear; aperture at the open end of the final chamber, and may have a simple to complex tooth or trematophore. Jurassic to Holocene.

Remarks: The Miliolidae are recognized as a separate family, characterized by the numerous perforations or pseudopores in the wall. Of other family group names available, that based on *Hauerina* has priority for the present family (see ICZN Art. 78 (f)(iv)).

Subfamily SIPHONAPERTINAE Saidova, 1975

Siphonapertinae Saidova, 1975 (*2695), p. 164.
Agglutinellinae El-Nakhal, 1985 (*1106A), p. 106.

Test with chambers a half coil in length and with quinqueloculine chamber arrangement as in the Miliolinae; wall calcareous, imperforate, porcelaneous, with an outer layer of agglutinated quartz grains; aperture terminal, rounded, with a simple to bifid tooth, or may have a trematophore. Eocene to Holocene.

AGGLUTINELLA El-Nakhal, 1983

Plate 341, figs. 1-4

Type species: Agglutinella soriformis El-Nakhal, 1983; OD.

Agglutinella El-Nakhal, 1983 (*1105), p. 129.

Test ovate in outline, chambers one-half coil in length, early stage quinqueloculine, later stage pseudotriloculine with only three chambers visible from the exterior; wall calcareous, imperforate, porcelaneous, with outer agglutinated cover; aperture terminal and may be slightly produced on the final chamber, circular to elliptical, bordered by a nonagglutinated porcelaneous lip and with a simple to bifid tooth. Eocene to Holocene; Red Sea; Philippines; Pakistan; Panama.

AMMOMASSILINA Cushman, 1933

Plate 341, figs. 5-7

Type species: Massilina alveoliniformis Millett, 1898 (*2142), p. 609; OD.

Ammomassilina Cushman, 1933 (*769), p. 32.

Test large, up to 1.4 mm in length, chambers one-half coil in length, early stage quinqueloculine, later chambers added on opposite sides of the test in a single plane; wall calcareous, imperforate, porcelaneous, with surface layer of agglutinated quartz particles; aperture at the end of the final chamber, multiple, with a trematophore. Holocene; Pacific; Fiji; Malay Archipelago.

DENTOSTOMINA Carman, 1933

Plate 341, figs. 15-17

Type species: Dentostomina bermudiana Carman, 1933; OD.

Dentostomina Carman, 1933 (*481), p. 31.

Test ovate in outline, chambers one-half coil in length, in quinqueloculine arrangement throughout; wall calcareous, imperforate, porcelaneous, outer layer containing agglutinated quartz grains; aperture terminal, circular with crenulate margin, provided with a long narrow bifid tooth. Holocene; Atlantic: Bermuda; West Indies: Cuba.

PSEUDOFLINTINA Saidova, 1981

Plate 341, figs. 8–11

Type species: Miliolina triquetra Brady, 1879 (***338**), p. 268; OD.

Pseudoflintina Saidova, 1981 (***2696**), p. 31.

Test large, about 1.0 mm in diameter, flattened, subtriangular in outline, early chambers one-half coil in length and in quinqueloculine arrangement, later more loosely coiled, planispiral and with three straight, cylindrical to pyriform chambers per whorl: wall imperforate, porcelaneous, with outer coarsely agglutinated layer except immediately adjacent to the aperture; aperture rounded, at the constricted end of the final chamber, with a short simple tooth. Holocene: N. and S. Pacific.

SCHLUMBERGERINA Munier-Chalmas, 1882

Plate 341, figs. 18–21

Type species: Schlumbergerina areniphora Munier-Chalmas, 1882: OD.

Schlumbergerina Munier-Chalmas, 1882 (***2205**), p. 424.

Test with elongate tubular chambers one-half coil in length, added in more than five planes from the earliest stage, slightly inflated, sutures depressed; wall agglutinated; aperture at the end of the final chamber, directed laterally, provided with a trematophore with numerous rounded openings. Holocene; Gulf of Mexico; Pacific.

SIPHONAPERTA Vella, 1957

Plate 341, figs. 12–14

Type species: Siphonaperta macbeathi Vella, 1957; OD.

Siphonaperta Vella, 1957 (***3285**), p. 19.

Test ovate in outline, chambers one-half coil in length, quinqueloculine, five chambers visible from the exterior; wall calcareous, imperforate, porcelaneous, with an agglutinated outer coating; aperture rounded, terminal on the final chamber, may be bordered by a smooth porcelaneous rim, provided with a narrow, simple tooth. Miocene to Holocene; Atlantic; Pacific; Europe.

Subfamily HAUERININAE Schwager, 1876

Haueríninae Brady, 1884 (***344**), p. 62, nom. transl. ex family Hauerinidee.

Quinqueloculininae Cushman, 1917 (***708**), p. 41 (placed on Official List of Family-Group names in Zoology, ICZN Op. 692, China, 1964 (***587**), p. 261.

Massilininae Thalmann, 1941 (***3162**), p. 682.

Quinqueloculininea Saidova, 1981 (***2696**), p. 31 (super-subfamily).

Test with two chambers per whorl, five or more chambers visible externally in the adult; early chamber arrangement quinqueloculine, later chambers may be added in fewer or more than five planes; chamber interior not subdivided; aperture at the end of the final chamber, rounded, or with flap, simple or complex tooth. Jurassic to Holocene.

Remarks: Although other names have been recognized for the present subfamily, if taxa with simple, bifid, and flaplike apertural tooth and with cribrate aperture are combined in the same subfamily, the name based on *Hauerina* has priority (see ICZN Art. 78 (f)(iv)).

AXIOPOLINA Neagu, 1984

Plate 342, figs. 1–3

Type species: Axiopolina granumfestucae Neagu, 1984; OD.

Axiopolina Neagu, 1984 (***2239**), p. 82

Test elongate ovate in outline, chambers one-half coil in length, quinqueloculine, five to seven visible from the exterior, chambers complete with floors; aperture circular to oval, produced on a neck, and provided with a simple or rarely bifid tooth. L. Cretaceous (U. Berriasian to Valanginian); Romunia.

Remarks: Resembles *Quinqueloculina* in the chamber arrangement, presence of chamber floors, and apertural tooth but differs in the aperture being rounded and produced on a neck.

CYCLOFORINA Łuczkowska, 1972

Plate 342, figs. 4–9

Type species: Quinqueloculina contorta d'Orbigny, 1846 (***2309**), p. 298; OD.

Cycloforina Łuczkowska, 1972 (***1939**), p. 367.

Test quinqueloculine, always five chambers visible from the exterior, chambers one-half coil in length, added against the previous whorl without a separate chamber floor; wall calcareous, imperforate, porcelaneous; aperture circular at the produced end of the final chamber, with a short bifid or simple tooth. Jurassic to Holocene; cosmopolitan.

DANUBIELLA Neagu, 1968

Plate 343, figs. 1-6 and 13

Type species: Danubiella cernavodensis Neagu, 1968; OD.

Danubiella Neagu, 1968 (*2235), p. 569.

Test rounded to lituiform in outline, sides flattened, periphery subacute, rounded, early stage with chambers one-half coil in length and quinqueloculine, later planispiral with three chambers per whorl and may uncoil with about two rectilinear chambers; wall calcareous, imperforate, surface smooth; aperture in the early stage in the form of an inverted *Y*, later with an elongate areal slit. L. Cretaceous (Barremian); Romania.

DERVENTINA Neagu, 1968

Plate 343, figs. 9-12

Type species: Derventina filipescui Neagu, 1968; OD.

Derventina Neagu, 1968 (*2235), p. 569.

Test discoidal, sides flattened, up to about 0.89 mm in diameter, periphery rounded, early stage with two chambers per whorl in quinqueloculine arrangement, later planispiral with two to two and a half chambers per whorl and coiling axis perpendicular to that of the early stage; wall calcareous, imperforate; aperture at the open end of the final chamber, with crenulate or denticulate margin. L. Cretaceous (Barremian); Romania.

FLINTINELLA Didkovsky, 1960

Plate 343, figs. 7 and 8

Type species: Flintinella volhynica Didkovsky, 1960; OD.

Flintinella Didkovsky, 1960 (*956), p. 1433.

Test discoidal, subcircular in outline, sides flattened, periphery rounded, early stage with two chambers per whorl in quinqueloculine arrangement, later chambers relatively shorter and three to six per whorl in up to five whorls, coiling partially involute; wall calcareous, porcelaneous, surface smooth; aperture an elongate opening at the end of the final chamber, with somewhat thickened rim, and containing an elongate simple apertural tooth. U. Miocene (M. Sarmatian); USSR: Ukraine.

HAUERINA d'Orbigny, 1839

Plate 343, figs. 14 and 15

Type species: Hauerina compressa d'Orbigny, 1846 (***2309**), p. 119; SD(SM).

Hauerina d'Orbigny, 1839 (***2304**), p. xxxviii.

Miliola (Hauerina) Carpenter et al., 1862 (***494**), p. 81 (nom. transl.).

Test discoidal, periphery subacute, sides flattened, early chambers in quinqueloculine arrangement, later planispiral with three chambers per whorl; wall calcareous, porcelaneous; aperture multiple, of numerous pores in a trematophorelike plate at the end of the final chamber. Eocene to Holocene; cosmopolitan.

HETERILLINA Munier-Chalmas and Schlumberger, 1905

Plate 343, figs. 16-19

Type species: Heterillina guespellensis Schlumberger, 1905; SD Cushman, 1928 (***747**), p. 150.

Heterillina Munier-Chalmas and Schlumberger, in Schlumberger, 1905 (*2777), p. 131.

Heterillina Munier-Chalmas and Schlumberger, 1883 (***2212**), p. 862 (name not available, ICZN Art. 12 (a), nom. nud.).

Test rounded to ovate in outline, sides flattened, periphery subacute, chambers one-half coil in length, in a quinqueloculine arrangement in the early stage, later planispiral and evolute, with successive chambers added on opposite sides as in *Spiroloculina;* wall calcareous, imperforate, porcelaneous; aperture multiple, consisting of pores in a somewhat convex trematophore in the end of the final chamber. M. Eocene to Oligocene; France.

ISTRILOCULINA Neagu, 1984

Plate 342, figs. 10-15

Type species: Pyrgo eliptica Yovcheva, 1962 (***3420**), p. 52, 57; OD.

Istriloculina Neagu, 1984 (***2239**), p. 86.

Test elongate ovate to subglobular, early stage quinqueloculine, later pseudotriloculine to biloculine, chambers without floors, sutures depressed; wall calcareous, imperforate, porcelaneous; aperture a high elliptical opening with a simple elongate narrow tooth in the early stage, later with tooth irregularly undulating or expanding terminally. L. Cretaceous (U. Berriasian to L. Aptian); Bulgaria; Romania.

LACHLANELLA Vella, 1957

Plate 344, figs. 14-16

Type species: Quinqueloculina (Lachlanella) cooki Vella, 1957; OD.

Quinqueloculina (Lachlanella) Vella, 1957 (***3285**), p. 24.

Lachlanella Luczkowska, 1972 (***1939**), p. 351, 367 (nom. transl.).

Test elongate ovate, chambers one-half coil in length, quinqueloculine, five chambers visible from the exterior, subquadrate in section, slightly eccentric, the base of each chamber covering the end of the test, and the straight apertural end of the chamber resulting in the aperture being on one margin, chambers without a floor and lying against the previous whorl; wall calcareous, imperforate, porcelaneous; aperture large, with subparallel sides and everted rim, provided with a long slender tooth with short bifid termination. Oligocene (Rupelian) to Holocene; cosmopolitan.

MASSILINA Schlumberger, 1893

Plate 344, figs. 1-7

Type species: Quinqueloculina secans d'Orbigny, 1826 (***2303**), p. 303; SD Cushman, 1917 (***708**), p. 56.

Massilina Schlumberger, 1893 (***2766**), p. 76.

Decussoloculina Neagu, 1984 (***2239**), p. 81: type species: *Decussoloculina mirceai* Neagu, 1984; OD.

Test ovate in outline, slightly flattened and fusiform in section, early chambers quinqueloculine, later added in a single plane on alternate sides as in *Spiroloculina*, chambers with floors, periphery rounded to carinate; wall calcareous, imperforate, porcelaneous; aperture terminal, ovate, provided with a short to elongate and slightly protruding tooth that may be bifid at the tip. L. Cretaceous to Holocene; cosmopolitan.

Remarks: Although described as quinqueloculine, the illustrated sections of *Decussoloculina* show a tendency to become planispiral in the later stage.

MASSILINOIDES McCulloch, 1977

Plate 345, figs. 10-13

Type species: Massilinoides hancocki McCulloch, 1977; OD.

Massilinoides McCulloch, 1977 (***1961**), p. 521.

Test ovate in outline, slightly flattened, with truncate periphery, early chambers in quinqueloculine arrangement, later added in a single plane on alternate sides as in *Spiroloculina*: wall calcareous, imperforate, porcelaneous, surface with longitudinal striae; aperture terminal, rounded, with a simple to bifid tooth that may attach at the sides to result in a multiple aperture. Holocene; Gulf of California.

Remarks: *Massilinoides* differs from *Massilina* in having rectangular chambers and a bluntly truncate periphery as does *Lachlanella*: it differs from *Lachlanella* in the later planispiral chamber arrangement.

MOESILOCULINA Neagu, 1984

Plate 342, figs. 24-26

Type species: Quinqueloculina danubiana Neagu, 1968 (***2235**), p. 567; OD.

Moesiloculina Neagu, 1984 (***2239**), p. 83.

Test ovate in outline, chambers one-half coil in length, quinqueloculine, with distinct floors; wall calcareous, porcelaneous, commonly with one or more carinae resulting in an angular section; aperture oval, elongate or elliptical, produced on a neck and bordered by a lip, and with a thin perforated trematophore. L. Cretaceous (Barremian to L. Aptian); Romania.

Remarks: The generic diagnosis indicated the presence of a trematophore in well-preserved specimens, but this has not been illustrated in any of the species assigned to *Moesiloculina*.

PLANOMILIOLA de Klasz, Y. Le Calvez, and Rérat, 1964

Plate 345, figs. 1-4

Type species: Planomiliola planispira de Klasz et al., 1964; OD.

Planomiliola de Klasz, Y. Le Calvez, and Rérat, 1964 (*1698), p. 343.

Test large, up to 1.2 mm in diameter, ovate and lobulate in outline, laterally compressed, robust, periphery broadly rounded, biumbilicate, early stage with chambers one-half coil in length in quinqueloculine arrangement, later chambers elongate and subangular with carinate lower border, planispirally enrolled and two to five chambers per whorl; wall calcareous, imperforate, thick, the thick wall masking the early quinqueloculine chamber arrangement; aperture at the end of the final chamber, small, elliptical to reniform, with a short bifid tooth. Miocene (Burdigalian); Gabon.

PODOLIA Serova, 1961

Plate 342, figs. 27-33

Type species: Hauerina lyra Serova, 1955 (*2877), p. 329 (syn.: *Hauerina lyra* Serova, 1953 (*2876), p. 63, name not available, ICZN Art. 13 (a)(i), no description); OD.

Podolia Serova, 1961 (*2878), p. 56.

Test ovate in outline, chambers one-half coil in length, quinqueloculine, and inflated with median ridge; wall calcareous, imperforate, porcelaneous; aperture with narrow straight simple tooth in the early chambers that in the adult stage is accompanied by two lateral hooked supplementary teeth projecting from the sides to result in the characteristic lyre-shaped opening. M. Miocene (U. Tortonian); USSR: Ukraine.

PROEMASSILINA Lacroix, 1938

Plate 342, figs. 16-18

Type species: Massilina rugosa Sidebottom, 1904 (*2908), p. 18; OD.

Proemassilina Lacroix, 1938 (*1767), p. 3.

Test ovate in outline, slightly flattened, periphery broadly rounded, early chambers quinqueloculine, later added in a single plane on alternate sides as in *Spiroloculina;* wall calcareous, imperforate, porcelaneous, rugose surface due to longitudinal striations; aperture terminal, ovate, with an elongate and terminally bifid tooth. Holocene; Mediterranean.

Remarks: Lacroix originally described the genus as having an agglutinated wall, but the type species does not have this, and the other species mentioned are not congeneric.

QUINQUELOCULINA d'Orbigny, 1826

Plate 344, figs. 8-13 and 17-22

Type species: Serpula seminulum Linné, 1758 (*1859), p. 786; SD Parker and Jones, 1859 (*2345), p. 480.

Quinqueloculina d'Orbigny, 1826 (*2303), p. 301 (on Official List of Generic Names in Zoology, ICZN Op. 692, China, 1964, *587, p. 26).

Frumentarium Fichtel and Moll, 1798 (*1124), p. 16 (nom. reject., ICZN Op. 692, China, 1964, *587, p. 26).

Multiloculina Abich, 1859 (*2), p. 105, 150; type species: *Serpula seminulum* Linné, 1758, SD Loeblich and Tappan, 1964 (*1910), p. C458.

Trillina Munier-Chalmas, 1882 (*2205), p. 424; type species: *Triloculina strigillata* d'Orbigny, 1850 (*2312), p. 409; OD.

Rumanoloculina Neagu, 1984 (*2239), p. 83; type species: *Quinqueloculina robusta* Neagu, 1968 (*2235), p. 566; OD.

Test ovate in outline, early chambers quinqueloculine in both microspheric and megalospheric generations, or may be cryptoquinqueloculine, depending on the degree of overlap of successive chambers, chambers one-half coil in length, added in planes of coiling that are 72° apart, successive chambers added 144° apart, commonly with five chambers visible at the exterior, of which four are visible from one side and three from that opposite, chambers with floors at least in the mature stage; wall calcareous, imperforate, porcelaneous; aperture ovate, flush with the surface, provided with a bifid tooth. Cretaceous to Holocene; cosmopolitan.

SCYTHILOCULINA Neagu, 1984

Plate 342, figs. 19-23

Type species: Scythiloculina confusa Neagu, 1984; OD.

Scythiloculina Neagu, 1984 (*2239), p. 77.

Test nearly circular in outline, ovate in section, chambers one-half coil in length, quinqueloculine in arrangement, at least in the early stage, later stage may have more than five chambers visible from the exterior, chambers with floors; wall calcareous, imperforate, porcelaneous; aperture a broad low semicircular opening, bordered with a lip, and provided with a wide flaplike tooth that may be slightly wider distally at the flattened edge. L. Cretaceous (U. Berriasian to L. Aptian); Romania.

TRILOCULINOPSIS Popescu, 1975

Plate 345, figs. 5-9

Type species: Triloculinopsis tenuidomus Popescu, 1975; OD.

Triloculinopsis Popescu, 1975 (***2455**), p. 106.

Test small, up to 0.5 mm in length, ovoid in outline, slightly compressed, chambers one-half coil in length, quinqueloculine, each successively added 120° apart, chamber lumen very narrow, sutures flush, obscure at the surface; wall calcareous, porcelaneous, imperforate, thick, surface smooth; aperture terminal, a narrow curved slit, slightly produced on a short neck. L. Miocene (Aquitanian); Romania.

Subfamily MILIOLINELLINAE Vella, 1957

Miliolinellinae Vella, 1957 (***3285**), p. 20.

Triloculininae Bogdanovich, in Subbotina et al., 1981 (***3083**), p. 57.

Flintininae Saidova, 1981 (***2696**), p. 31.

Flintininea Saidova, 1981 (***2696**), p. 31 (supersubfamily).

Planispirinoidinae Saidova, 1981 (***2696**), p. 30.

Test with chambers one-half coil in length, early stage cryptoquinqueloculine, pseudotriloculine, or cornuspirine and with two or three chambers visible externally, final stage may be planispiral and may have more than two chambers per whorl or may tend to uncoil. L. Cretaceous (Berriasian) to Holocene.

AFFINETRINA Łuczkowska, 1972

Plate 346, figs. 7-11

Type species: Triloculina planciana d'Orbigny, 1839 (***2304**), p. 173; OD.

Affinetrina Łuczkowska, 1972 (***1939**), p. 368.

Test ovate in outline, flattened to ovate in section, chambers one-half coil in length, triloculine in chamber arrangement, three chambers visible from the exterior, chambers without a floor; wall calcareous, imperforate, porcelaneous; aperture a high arch or slit, enclosing a long slender tooth that is terminally inflated or bifid. Miocene to Holocene; cosmopolitan.

BILOCULINELLA Wiesner, 1931

Plate 348, figs. 1-4

Type species: Biloculina labiata Schlumberger, 1891 (***2764**), p. 556; OD.

Biloculinella Wiesner, 1931 (***3375**), p. 69.

Test discoidal to ovate in outline, lenticular in section, chambers one-half coil in length, early chamber arrangement quinqueloculine in the microspheric generation, then cryptoquinqueloculine, and finally biloculine, megalospheric generation biloculine throughout, chambers wide, shallow, and saucerlike, angle at the widest part of the chamber resulting in a rounded to carinate periphery; wall calcareous, imperforate, porcelaneous; aperture terminal, nearly covered by a broad apertural flap, leaving only a thin crescentic opening. Oligocene to Holocene; Mediterranean; Europe; North America; Antarctica.

CRENATELLA Łuczkowska, 1972

Plate 352, figs. 1-5

Type species: Crenatella mira Łuczkowska, 1972; OD.

Crenatella Łuczkowska, 1972 (***1939**), p. 369.

Test nearly circular in outline, periphery broadly rounded, chambers one-half coil in length, early stage pseudotriloculine, later cryptoquinqueloculine with only three chambers visible from the exterior and a tendency for the final pair of chambers to be in the same plane, chambers without a floor; wall calcareous, porcelaneous; aperture a low slit with a distinctly crenulate margin and may have a low miliolinellid tooth or this may be lacking. Miocene; Poland.

CRIBROMILIOLINELLA Saidova, 1981

Plate 348, figs. 16-18

Type species: Triloculina subvalvularis Parr, 1950 (***2363**), p. 296; OD.

Cribromiliolinella Saidova, 1981 (***2696**), p. 31.

Test ovate in outline, rounded to subtriangular in section, cryptoquinqueloculine, chambers one-half coil in length and added 144° apart but sufficiently overlapping so that only three chambers are visible from the exterior; wall calcareous, imperforate, porcelaneous, surface may be finely striate; aperture terminal, with a miliolinelline flap, the opening extending around the flap and up the chamber as an irregularly triradiate opening, the rays of the opening also secondarily bifurcating in well-developed specimens. Holocene; Antarctic: Weddell Sea at 193 m to 456 m; Pacific: Northeast New Zealand at 2,200 m; Caribbean, at 780 m.

CRIBROPYRGO Cushman and Bermúdez, 1946

Plate 347, figs. 1-7

Type species: Cribropyrgo robusta Cushman and Bermúdez, 1946 = *Triloculina aspergillum* Schlumberger, 1892 (***2765**), p. 207; OD.

Cribropyrgo Cushman and Bermúdez, 1946 (***809**), p. 119.

Cribropyrgoides Hofker, 1976 (***1525**), p. 102; type species: *Triloculina aspergillum* Schlumberger, 1892 (***2765**), p. 207 (as "*aspergulum*" in Hofker, 1976, p. 102); OD.

Test large, up to 2.4 mm in length, globular, chamber arrangement as in *Pyrgo*, chambers hemispherical, strongly overlapping the previous one on all margins, successive apertures at opposite ends of the test; wall calcareous, porcelaneous; aperture consisting of multiple irregular openings scattered over much of the terminal part of the chamber. Holocene; Caribbean: off Cuba at 2,150 m.

CRUCILOCULINA d'Orbigny, 1839

Plate 347, figs. 8-12

Type species: Cruciloculina triangularis d'Orbigny, 1839 (***2306**), p. 72; SD(SM).

Cruciloculina d'Orbigny, 1839 (***2304**), p. 182.

Test ovate in outline, subtriangular to distinctly triangular in section, chambers one-half coil in length, added 120° apart as in *Triloculina*; wall calcareous, imperforate, porcelaneous, surface smooth, striate to costate; aperture with a simple flap in the earliest chambers, becoming more complex in later stages, and distinctly cruciform in the adult. Pliocene to Holocene; N. and S. Atlantic; Japan; Mediterannean.

Remarks: Although juvenile specimens of *Cruciloculina* may have an aperture like that of *Triloculina*, the adult tests are readily differentiated and both genera are recognized as valid.

FLINTINA Cushman, 1921

Plate 347, figs. 13-17

Type species: Flintina bradyana Cushman, 1921; OD.

Flintina Cushman, 1921 (***717**), p. 465.

Test rounded to ovate in outline, broadly rounded periphery, early stage with two chambers per whorl in a triloculine arrangement, later tending to become planispiral, with three chambers per whorl; wall calcareous, imperforate, porcelaneous, surface may have fine longitudinal striae and may show transverse growth wrinkles; aperture a large arched opening with a bifid tooth in the early stage, later more complex, a keyhole-shaped opening bridged by the rays of the bifid tooth that then curve to rejoin in a circle, connecting also to an arched bladelike plate that extends inward and attaches to the chamber interior. Holocene; Pacific.

FLINTINOIDES Cherif, 1970

Plate 348, figs. 5-8

Type species: Triloculina labiosa d'Orbigny, 1839 (***2304**), p. 157; OD.

Flintinoides Cherif, 1970 (***573**), p. 152.

Scutuloris (Flintinoides) Cherif, 1973 (***575**), p. 715 (nom. transl.).

Test free, rounded to oval in outline, early stage with chambers in quinqueloculine or pseudotriloculine arrangement, later with three planispirally enrolled chambers per whorl, chambers widest and strongly inflated at the base, somewhat oblique and narrower toward the aperture, strongly overlapping the preceding chambers, periphery broadly rounded; wall calcareous, imperforate, porcelaneous, surface appearing very finely reticulate in SEM; aperture low and broad, a narrow sinuous arch, with a smoothly finished narrow bordering lip but without a true tooth. Holocene; Cuba; S. Atlantic; S. Pacific.

Remarks: As the type specimen of *Triloculina labiosa* was lost, a neotype was designated, illustrated by SEM and described by Y. Le Calvez (1977, ***1805**, p. 110).

IDALINA Schlumberger and Munier-Chalmas, 1884

Plate 348, figs. 9–15

Type species: Idalina antiqua Schlumberger and Munier-Chalmas, 1884 (syn.: *Biloculina antiqua* d'Orbigny, 1850 (***2312**) p. 210, non *Biloculina antiqua* Karrer, 1867; *Triloculina cretacea* d'Orbigny, 1850 (***2312**), p. 210; both d'Orbigny names unavailable, ICZN Art. 12 (a), no description); OD.

Idalina Schlumberger and Munier-Chalmas, 1884 (***2780**), p. 629 (non *Idalina* Norman, 1890).

Test ovoid to fusiform, proloculus followed by chambers one-half coil in length, early stage quinqueloculine, later triloculine, biloculine, and in the adult with completely enveloping chambers, or some of the stages may be lacking in some specimens; wall calcareous, imperforate, porcelaneous, chambers with complete floors; aperture in quinqueloculine stage with simple tooth, in triloculine stage with simple tooth and crenulate margin, biloculine stage has strongly developed crenulations in a terminal aperture, and the adult has a terminal aperture with convex trematophore pierced by numerous irregular openings. U. Cretaceous (Senonian); France.

INVOLVOHAUERINA Loeblich and Tappan, 1955

Plate 349, figs. 1–4

Type species: Involvohauerina globularis Loeblich and Tappan, 1955; OD.

Involvohauerina Loeblich and Tappan, 1955 (***1890**), p. 14.

Test large, up to 2.7 mm in diameter, globular, early stage quinqueloculine, later planispiral and involute with three chambers per whorl, although one paratype was partially evolute on one side, leaving four chambers visible from the exterior; wall calcareous, imperforate, porcelaneous, surface minutely pitted; aperture areal, cribrate, covering a broad area of the lower part of the final chamber, and consisting of numerous irregularly shaped pores that may have narrow bordering rims. Holocene; Atlantic: off Northeast USA at 2,725 m.; Pacific: off British Columbia, Canada, at 3,130 m.

LORETTAOIDES McCulloch, 1977

Plate 349, figs. 18 and 19

Type species: Lorettaoides cartagoensis McCulloch, 1977; OD.

Lorettaoides McCulloch, 1977 (***1961**), p. 581.

Test large, about 1.1 mm in maximum diameter, ovate in outline, strongly compressed, periphery subacute, early chambers apparently quinqueloculine in arrangement, later planispiral with four broad and rapidly enlarging chambers per whorl; wall calcareous, imperforate, porcelaneous, surface smooth and polished; aperture a high narrow and slitlike opening at the end of the final chamber, with the lateral margins curving inward. Holocene: Pacific: Galapagos Islands.

Remarks: The structure of the early part is unknown, as the type species is rare at a single locality and apparently is known from a single specimen.

MANDOROVELLA de Klasz, Y. Le Calvez, and Rérat, 1969

Plate 346, figs. 1–3

Type species: Mandorovella miocenica de Klasz et al., 1969; OD.

Mandorovella de Klasz, Y. Le Calvez, and Rérat, 1969 (***1700**), p. 269.

Test subglobular, about 1.0 mm in diameter, slightly flattened, periphery broadly rounded, early stage milioline with two chambers per whorl, later planispiral with three chambers per whorl; wall calcareous, imperforate, porcelaneous, surface smooth; aperture arcuate at the margin of the final chamber, nearly filled by a broad flat tooth. L. Miocene; Gabon.

Remarks: No sections were illustrated for the type species; whether the early stage is quinqueloculine, triloculine, or has a different organization is unknown, and the systematic allocation may require revision.

MESOPATEORIS McCulloch, 1977

Plate 349, figs. 16 and 17

Type species: Mesopateoris gullensis McCulloch, 1977; OD.

Mesopateoris McCulloch, 1977 (***1961**), p. 527;

Test ovoid in outline, compressed, periphery carinate, early stage quinqueloculine, later planispiral, with three chambers per whorl in the final whorls, chambers widest at the base, tapering toward the aperture; wall calcareous, imperforate, porcelaneous, surface ornamented with numerous longitudinal to slightly oblique fine costae; aperture at the end of the final chamber, circular, bordered by a narrow lip, and with a slender bifid tooth. Holocene: E. Pacific, Santa Barbara Island, off California, at 45 m to 50 m.

MILIOLINELLA Wiesner, 1931

Plate 350, figs. 1-18

Type species: Vermiculum subrotundum Montagu, 1803 (***2168**), p. 1298; OD.

Miliolinella Wiesner, 1931 (***3375**), p. 63, 65, 107.

Renoidea Brown, 1827 (***435**), p. 1; type species: *Renoidea glabra* Brown; name suppressed, 1977, ICZN Op. 1,089.

Pateoris Loeblich and Tappan, 1953 (***1887**), p. 42; type species: *Quinqueloculina subrotunda* (Montagu) forma *hauerinoides* Rhumbler, 1936 (***2623**), p. 206, 217, 226 = *Miliolinella subrotunda* (Montagu); OD.

Scutuloris (Miliolinella) Cherif, 1973 (***575**), p. 711 (err. nom. transl., ICZN Art. 23 (a), (d)).

Pippinoides McCulloch, 1977 (***1961**), p. 571; type species: *Pippinoides perplexa* McCulloch, 1977; OD.

Neophthalmina McCulloch, 1977 (***1961**), p. 580; type species: *Neophthalmina oregonensis* McCulloch, 1977; OD.

Test ovate in outline, flattened, periphery rounded, early stage quinqueloculine, later planispiral, chambers without a floor, added alternately as in *Massilina* or may have slightly more than two chambers in the final whorl, from four or five to as many as seven chambers visible from the exterior; wall calcareous, imperforate, porcelaneous; aperture an arch, terminal on the final chamber, with a broad and low apertural flap. M. Miocene (L. Tortonian) to Holocene; cosmopolitan.

Remarks: This genus has been variously interpreted, and species with a flaplike tooth, a long simple tooth, or without a tooth have been included therein, as well as species that have quinqueloculine, cryptoquinqueloculine, triloculine, and even massiline chamber arrangement. The specimen illustrated by Loeblich and Tappan (1964, ***1910**, p. C467, fig. 355, 1a-c) has a distinct flaplike tooth and two chambers per whorl in a cryptoquinqueloculine arrangement, and closely resembles the original figures of *Vermiculum subrotundum* Montagu, which was described as having a "shell composed of three compartments." However, as the original types have apparently been lost, a neotype was designated for *V. subrotundum* (Ponder, 1974, ***2450**, p. 201) from material in the British Museum. Unlike the original description, the neotype is described as quinqueloculine and in the final stage becomes planispiral, with at least six chambers visible from the exterior. Unfortunately, no sections were made of topotype specimens, the sectioned figures given by Ponder being copies of sections of *Pateoris hauerinoides* (Rhumbler), illustrated by Loeblich and Tappan (1953, ***1887**, textfigs. 1a, b, p. 44), from 3.5 miles off Point Barrow, Alaska, at 42 m. In view of the changed concept of *Miliolinella* as based on the neotype, the species illustrated as *M. subrotunda* by Loeblich and Tappan, 1964 is now referred to the reinstated cryptoquinqueloculine *Triloculinella* Riccio.

NEOPATEORIS Bermúdez and Seiglie, 1963

Plate 350, figs. 19-21

Type species: Neopateoris cumanaensis Bermúdez and Seiglie, 1963; OD.

Neopateoris Bermúdez and Seiglie, 1963 (***212**), p. 102.

Test rounded to subquadrate in outline, flattened, early chambers milioline, later planispiral and with three chambers per whorl in the adult; wall calcareous, imperforate, porcelaneous; aperture at the end of the final chamber, a large rounded opening with bordering lip and with a narrow, terminally bifid tooth. Holocene; Venezuela.

Remarks: The nature of the early chamber arrangement is unknown but may be quinqueloculine. Two of the paratypes figured by Bermúdez and Seiglie (1963, ***212**, pl. 14, figs. 3, 4) do not appear congeneric as they have a broad flaplike tooth like that of *Miliolinella* or *Triloculinella*.

NEVILLINA Sidebottom, 1905

Plate 349, figs. 11-15

Type species: Biloculina coronata Millett, 1898 (***2141**), p. 263; OD(M).

Nevillina Sidebottom, 1905 (***2910**), p. 1.

Test pyriform in outline, early stage triloculine

line, later biloculine, and with adult chambers completely embracing the earlier ones, apertures of successive chambers alternately at opposite ends of the test, reflecting the early milioline arrangement; wall calcareous, imperforate, surface smooth or with transverse wrinkles; aperture terminal, a rounded opening surrounded by radiating slits between five to six arched ribs, the ribs joining in a ring that encircles the central opening. Holocene; Malay Archipelago; Indian Ocean.

PARAHAUERINA McCulloch, 1977

Plate 349, figs. 5–8

Type species: Parahauerina displicata McCulloch, 1977; OD.

Parahauerina McCulloch, 1977 (*1961), p. 235.
Neohauerina McCulloch, 1977 (*1961), p. 234; (type species: *Neohauerina socorroensis* McCulloch, 1977; OD.

Test discoidal, sides flattened, but slightly elevated in the central region, quinqueloculine in early stage, later planispiral with low and elongate chambers increasing very slowly in height as added, more than two chambers per whorl, from two and a half to four in the final whorl; wall calcareous, imperforate, hyaline, surface of later chambers appearing crenulate, with five or six radial to slightly oblique transverse constrictions per chamber; aperture at the end of the final chamber, consisting of numerous prominent pores in an apertural plate, also with a row of grooves perpendicular to and just distal to each suture of the final whorl, probably with sutural pores as in *Polysegmentina*. Holocene; E. Pacific: Galapagos Islands; Gulf of California; off Mexico; off Costa Rica.

PARAHAUERINOIDES McCulloch, 1977

Plate 349, figs. 9 and 10

Type species: Parahauerinoides complanatiformis McCulloch, 1977; OD.

Parahauerinoides McCulloch, 1977 (*1961), p. 236.

Test discoidal, circular to ovate in outline, strongly compressed, planispiral and evolute throughout, early stage not elevated above the level of the later whorls, chambers one-half coil in length, increasing very slowly in height as added, final whorl with two and a half chambers; wall calcareous, imperforate, smooth, hyaline in appearance, with a row of tiny pores and short grooves perpendicular to and just anterior to the sutures of the final whorl as in *Polysegmentina;* aperture at the end of the final chamber, with numerous pores in an ovate convex trematophore. Holocene; Sri Lanka; Philippines.

PRAELACAZINA Hofker, 1959

Plate 346, figs. 12-17

Type species: Biloculina fragilis Hofker, 1927 (***1490**), p. 173.

Praelacazina Hofker, 1959 (*1515), p. 372.

Test elongate ovoid in outline, biloculine in the adult as in *Pyrgo*, early microspheric stage quinqueloculine; wall porcelaneous, with outer agglutinated layer; aperture elongate, crescentic, at the end of the final chamber and provided with a simple to bifid tooth. U. Cretaceous (Maastrichtian); Netherlands.

Remarks: The genus is tentatively recognized on the basis of the two-layered wall. However, the original illustrations appear to show the two wall layers completely filling the chamber lumen, aperture, and intercameral foramina, suggesting that the "agglutinated layer" may only be recrystallized calcite such as is common in Maastrichtian chalks of the southern Netherlands.

PSEUDOMASSILINA Lacroix, 1938

Plate 349, figs. 20–22

Type species: Massilina australis Cushman, 1932 (***762**), p. 32; OD.

Pseudomassilina Lacroix, 1938 (*1767), p. 3.

Test subcircular in outline, flattened, chambers one-half coil in length, early stage quinqueloculine, later planispiral with gradually shorter chambers so that final stage may have more than two chambers per whorl; wall calcareous, imperforate, thin and translucent, with finely pitted surface; aperture at the end of the final chamber, a very elongate narrow slit, with bordering lip but without a tooth. Holocene; central Pacific.

Remarks: The pitted wall surface was described by Lacroix as canaliculate between fine perforations and the wall with distinct layers. The figures given by Lacroix (1938, ***1766**) to illustrate this microstructure (reproduced by Loeblich and Tappan, 1964, *1910, p. C463, fig. 352, *2a, b*) do not indicate the magnification and appear to be too fine a structure to have been resolved in the light microscope. Pending additional studies with the SEM, this surface structure appears questionable.

PSEUDOPYRGO Rasheed, 1971

Plate 351, figs. 17 and 18

Type species: Biloculina milletti Cushman, 1917 (*708), p. 81; OD.

Pseudopyrgo Rasheed, 1971 (*2514), p. 66, pl. 14, fig. 2 (also as *Pseudo-Pyrgo*, p. 42; non *Pseudopyrgo* Hofker, 1976).

Test narrow and elongate, chambers stated to be at first quinqueloculine, then triloculine, and finally biloculine as in *Pyrgo*, laterally compressed between chambers in contrast to the compression through the midpoint of opposing chambers as in *Pyrgo*; wall calcareous, imperforate, porcelaneous; aperture terminal, rounded to ovate, without a tooth, may be bordered by a lip. Holocene; N. and S. Pacific.

Remarks: Rasheed (1971, *2514) and Millett (1898, *2141, p. 268) describe the type species as without a tooth. Cushman (1917, *708) stated that a small bifid tooth is present but this seems questionable.

PSEUDOSIGMOILINA Bartenstein, 1965

Plate 346, figs. 4–6

Type species: Quinqueloculina infravalanginiana Bartenstein, 1962 (*148), p. 141; OD.

Pseudosigmoilina Bartenstein, 1965 (*149), p. 350.

Test elongate ovate to fusiform, chambers one-half coil in length, arrangement quinqueloculine, five chambers visible from the exterior; wall calcareous, imperforate, porcelaneous; aperture terminal, rounded, without a tooth. L. Cretaceous (Berriasian); Switzerland.

Remarks: The genus is poorly known, as no sections have been illustrated to show the internal structure, and the aperture has not been illustrated.

PSEUDOTRILOCULINA Cherif, 1970

Plate 352, figs. 6–14

Type species: Triloculina lecalvezae Kaaschieter, 1961 (*1626), p. 166 (nom. subst. pro *Triloculina laevigata* d'Orbigny, 1826 (*2303), p. 300, name not available, ICZN Art. 12 (a), no description; and nom. subst. for *Triloculina laevigata* Terquem, 1878, *3145, p. 57, providing first description and illustration: non *Triloculina laevigata* Bornemann, 1855); OD.

Triloculina (Pseudotriloculina) Cherif, 1970 (*573), p. 113.

Sinuloculina Łuczkowska, 1972 (*1939), p. 370; type species: *Biloculina cyclostoma* Reuss, 1850 (*2573), p. 382; OD.

Test ovate in outline, periphery broadly rounded, chambers one-half coil in length, early stage cryptoquinqueloculine, later with planes of coiling increasing to 180° to become approximately planispiral or very slightly sinuate as seen in section, chambers lack a floor and broadly overlap preceding chambers so that only two to three are visible from the exterior; wall calcareous, imperforate, porcelaneous; aperture large, rounded, at the end of the final chamber, may be bordered with a thick rim and provided with a protruding bifid tooth. M. Eocene (Lutetian) to Holocene; cosmopolitan.

Remarks: Although the type species was designated as *Triloculina laevigata* d'Orbigny, 1826, this was a nomen nudum, and the name was first validated by Terquem in 1878 based on material from the Pliocene of Rhodes. Thus the species is based on specimens from the Pliocene of Rhodes and not on d'Orbigny's material. However, by the date that Terquem validated this species, it was a homonym of *T. laevigata* Bornemann, 1855. Kaaschieter (1961, *1626) renamed the homonym *Triloculina laevigata* Terquem (non Bornemann), as *T. lecalvezae*, which is the correct name for the type species of *Pseudotriloculina*. However, Kaaschieter illustrated material from the Eocene (Lutetian) of Damery, France. Y. Le Calvez (1970, *1803, p.51) noted that d'Orbigny had figured a specimen under the name of *Triloculina laevigata* from the Lutetian of Valognes, although d'Orbigny's specimen in the Paris Museum was from the Recent Mediterranean, as was that studied by Cherif. Le Calvez illustrated an Eocene fossil specimen from Chaussy under this name. Apparently different authors identify two or more different species as *T. lecalvezae* (or *Pseudotriloculina lecalvezae*). No holotype was designated originally by Terquem, nor has a lectotype been designated subsequently. We therefore designate the specimen figured by Terquem (1878, *3145, pl. 5, fig. 20a, b), from the Pliocene of Rhodes, as the lectotype of *T. laevigata* Terquem and thus of *Pseudotriloculina lecalvezae* (Kaaschieter).

PTYCHOMILIOLA Eimer and Fickert, 1899

Plate 353, figs. 10 and 11

Type species: Miliolina separans Brady, 1881 (***339**), p. 45; SD Cushman, 1928 (***747**), p. 154.

Ptychomiliola Eimer and Fickert, 1899 (***1088**), p. 687.

Test subtriangular in outline, early chambers milioline in arrangement, later planispiral and evolute, with three chambers per whorl, loosely coiled so that small gaps may occur between chambers, or rarely uncoiling with the final chamber extending away from the early part of the test; wall calcareous, imperforate, porcelaneous, surface may be ornamented with numerous longitudinal costae; aperture terminal, rounded, at the slightly constricted end of the final chamber, bordered by a narrow everted lip and provided with a small bifid tooth. Holocene; Pacific.

PYRGO Defrance, 1824

Plate 351, figs. 5–16

Type species: Pyrgo laevis Defrance, 1824; OD(M).

Pyrgo Defrance, 1824 (***921**), p. 273.

Biloculina d'Orbigny, 1826 (***2303**), p. 297; type species: *Biloculina bulloides* d'Orbigny, 1826; SD Cushman, 1917 (***708**), p. 73.

Pseudobiloculina Cherif, 1970 (***573**), p. 131; type species: *Biloculina oblonga* d'Orbigny, 1839 (***2304**), p. 163; OD.

Pyrgoides Hofker, 1976 (***1525**), p. 115; type species: *Biloculina ringens* (Lamarck) var. *denticulata* Brady, 1884 (***344**), p. 143; OD.

Test ovate in outline, compressed through the midpoint of the opposing chambers, periphery angular to carinate, chambers one-half coil in length, microspheric generation with early quinqueloculine to cryptoquinqueloculine arrangement, adult biloculine; wall calcareous, imperforate, porcelaneous; aperture at the end of the final chamber, ovate, with a short bifid tooth. U. Eocene (Priabonian) to Holocene; cosmopolitan.

Remarks: Jurassic and Lower Cretaceous species recorded as *Biloculina* do not appear to be congeneric; the Lower Cretaceous species may belong to *Fissurina*.

PYRGOELLA Cushman and E. M. White, 1936

Plate 351, figs. 1–4

Type species: Biloculina sphaera d'Orbigny, 1839 (***2306**), p. 66; OD.

Pyrgoella Cushman and E. M. White, 1936 (***861**), p. 90.

Test subglobular, early stage with chambers one-half coil in length and pseudotriloculine in arrangement, later biloculine with successive chambers strongly overlapping the preceding ones; wall calcareous, imperforate, porcelaneous; aperture in the early stage with a large triangular tooth, in the adult the tooth is attached at both ends, dividing the *V*-shaped opening into two separate elongate openings, additional straight, sinuate, or *V*-shaped openings may also occur. Pleistocene to Holocene: S. Atlantic; Gulf of Mexico; USA: California.

Remarks: Some Miocene species referred here do not have the multiple aperture characteristic of the genus and are not congeneric.

SISSONIA McCulloch, 1977

Plate 353, figs. 16–18

Type species: Sissonia sanbenitoensis McCulloch, 1977; OD.

Sissonia McCulloch, 1977 (***1961**), p. 572.

Test subtriangular in outline, somewhat compressed and possibly may have been attached to algae in life, as one side of the holotype shows bordering chambers partially embracing an elongate groove that crosses the center of the test, early chambers apparently quinqueloculine, although no sections were made to confirm this, later planispiral with more numerous chambers per whorl, or possibly has three chambers per whorl that are subdivided into two to three chamberlets, sutures depressed, straight and horizontal, periphery rounded, peripheral outline lobulate; wall calcareous, white and porcelaneous, thick, surface with longitudinal to oblique ribs that are not continuous across the sutures; aperture a broad arch at the end of the final chamber, bordered by a narrow lip, but without an apertural flap or tooth. Holocene, at 26 m; off Mexico.

STEIGERINA McCulloch, 1977

Plate 353, figs. 4-6

Type species: Steigerina bubnanensis McCulloch, 1977; OD.

Steigerina McCulloch, 1977 (***1961**), p. 572 (also as *Steigierina*, p. 572).

Test rounded in outline, flattened, early stage with chambers a half coil in length in quinqueloculine arrangement, later with broad and strongly overlapping planispiral chambers that are narrower at the base and widen distally, final whorl may include two and a half chambers as last one is slightly shorter, sutures depressed, periphery rounded; wall calcareous, porcelaneous, thick, surface with longitudinal to oblique ribs; aperture a high arch at the end of the final chamber, with a narrow triangular tooth projecting from its base. Holocene, at 20 m to 40 m; Philippines.

TORTONELLA Didkovsky, 1957

Plate 346, figs. 18-28

Type species: Tortonella bondartschuki Didkovsky, 1957; OD.

Tortonella Didkovsky, 1957 (***953**), p. 1138.

Test subcircular in outline, flattened to biconvex with broadly rounded periphery, early chambers one-half coil in length in a triloculine arrangement, later planispiral, and final whorl with slightly more than two chambers, all chambers inflated, enlarging rapidly as added; wall calcareous, imperforate, porcelaneous; aperture terminal on the final chamber, large and oval with a short flaplike tooth in the early stage, later with progressively more complex tooth that forms a ring in the center of the opening, the ring bridged to the outer rim on four sides, resulting in multiple openings. M. Miocene (Tortonian); USSR: Ukraine.

TRILOCULINA d'Orbigny, 1826

Plate 351, figs. 19-21

Type species: Miliolites trigonula Lamarck, 1804 (***1778**), p. 351; SD Cushman, 1917 (***708**), p. 65.

Triloculina d'Orbigny, 1826 (***2303**), p. 299.

Spidestomella O. G. Costa, 1856 (***686**), p. 370; type species: *Spidestomella globulifera* Costa, 1856; OD(M).

Miliolina Williamson, 1858 (***3379**), p. 83; type species: obj.; SD Galloway, 1933 (***1205**), p. 123.

Test ovate in outline, equilaterally triangular or subtriangular in section, chambers one-half coil in length, early stage cryptoquinqueloculine, at least in the microspheric generation, but this stage may be lacking in the megalospheric generation, later pseudotriloculine or triloculine, only three chambers visible from the exterior, chambers without a floor; wall calcareous, imperforate, porcelaneous; aperture rounded, at the end of the final chamber, with a short bifid tooth. M. Eocene to Holocene; cosmopolitan.

TRILOCULINELLA Riccio, 1950

Plate 353, figs. 1-3, 7-9 and 12-15

Type species: Triloculinella obliquinodus Riccio, 1950; OD.

Triloculinella Riccio, 1950 (***2625**), p. 90.

Scutuloris Loeblich and Tappan, 1953 (***1887**), p. 41; type species: *Scutuloris tegminis* Loeblich and Tappan, 1953; OD.

Quinquinella Vella, 1957 (***3285**), p. 21; type species: *Quinquinella hornibrooki* Vella, 1957; OD.

Test ovate in outline, rounded to ovate in section, periphery rounded, chambers one-half coil in length, arrangement cryptoquinqueloculine to quinqueloculine, the final three to five chambers visible from the exterior; wall calcareous, imperforate, porcelaneous; aperture an arch at the end of the final chamber, largely covered by a broad apertural flap. Oligocene to Holocene; cosmopolitan.

Remarks: The cryptoquinqueloculine nature of numerous taxa with only three chambers visible externally was demonstrated by Bogdanovich (1969, ***272**), who showed this to be common in taxa previously placed in *Miliolinella*. He therefore suggested that the quinqueloculine *Scutuloris* and cryptoquinqueloculine "*Miliolinella*" were synonymous. He noted that the section illustrated as *M. subrotunda* by Loeblich and Tappan (1964, ***1910**, fig. 355, *2*, on p. C467) did not appear to agree with this species. This figure of a sectioned specimen from the Island of Delos, Greece, was reproduced from Sidebottom, 1904 (*2908). We agree with Bogdanovich's assessment of these genera, but would exclude from synonymy *Miliolinella* as based on the neotype of *Miliolinella subrotunda*, which becomes massiline and hauerinoid in chamber arrangement; the section figured by Sidebottom appears to be conspecific with the neotype. *Triloculinella* was also originally described as triloculine in chamber arrangement, but the top view of the holotype indicates the chambers to be added in planes 144° apart, hence the species and the genus based on it are cryptoquinqueloculine.

TRILOCULINELLUS Saidova, 1975

Plate 352, figs. 16 and 17

Type species: Triloculinellus politus Saidova, 1975; OD.

Triloculinellus Saidova, 1975 (*2695), p. 158.

Test ovate in outline, triangular in section, angles sharp, microspheric generation with early stage quinqueloculine, adult triloculine, megalospheric test triloculine throughout; wall calcareous, imperforate, porcelaneous; aperture rounded at the end of the final chamber, with a broad spatulate tooth. Holocene: N. and S. Pacific; off Tasmania.

TRILOCULINOIDES Shchedrina, 1964

Plate 352, figs. 18 and 19

Type species: Triloculinoides magnus Shchedrina, 1964 (nom. imperf. as *T. magnum*); OD.

Triloculinoides Shchedrina, 1964 (*2890), p. 100.

Test ovate in outline, sharply triangular in section, chambers one-half coil in length, triloculine in arrangement; wall calcareous, imperforate, porcelaneous; aperture rounded at the end of the final chamber, with a small bifid tooth in the early stage, the ends enlarging, curving and fusing in later chambers to form a complete ring that is connected both to the base of the tooth and to the opposite margin of the aperture. M. Miocene to Holocene: Australia; Japan Sea; Okhotsk Sea; Greenland Sea.

TSCHOKRAKELLA Bogdanovich, 1969

Plate 354, figs. 1-6

Type species: Miliolina caucasica Bogdanovich, 1947 (*267), p. 23; OD.

Tschokrakella Bogdanovich, 1969 (*273), p. 114.
Tschokrakella Bogdanovich, 1965 (*271), p. 314, 316, 319, 320, 343, 345, and table 3 opp. p. 342 (name not available, ICZN Art. 13(a)(i), no description).

Test narrow, elongate, chambers one-half coil in length, early chambers in quinqueloculine arrangement, then planispiral or with planes slightly more than 180° apart to result in a sigmoid appearance in section, chambers strongly produced at the aperture, resulting in a very elongate test; wall calcareous, porcelaneous, surface smooth to coarsely costate; aperture terminal at the end of the elongate neck, ovate to slitlike, without a tooth. M. Miocene; USSR: N. Caucasus, Azerbaydzhan, Georgia, Dagestan.

VARIDENTELLA Łuczkowska, 1972

Plate 354, figs. 7-12

Type species: Miliolina reussi Bogdanovich, 1947 (*267), p. 21; OD.

Varidentella Łuczkowska, 1972 (*1939), p. 371.

Test ovate in outline, chambers one-half coil in length, early stage quinqueloculine to cryptoquinqueloculine, axis of coiling may change by 90° after the early stage but later return to the original axis, three, four, or five chambers may be visible from the exterior, chambers without a floor; wall calcareous, imperforate, porcelaneous; aperture rounded to slitlike, with narrow to broad tooth, or none. Miocene (Tortonian) to Holocene.

WELLMANELLA Finlay, 1947

Plate 352, fig. 15

Type species: Wellmanella kaiata Finlay, 1947: OD.

Wellmanella Finlay, 1947 (*1130), p. 270.

Test about 1 mm in length, ovate in outline, early stage triloculine or possibly quinqueloculine, with chambers one-half coil in length, later nearly planispiral and with three to four chambers per whorl; wall calcareous, imperforate, porcelaneous, may have fine surface striae; aperture a narrow slit at the open end of the final chamber, bordered at each side by two thin flanges, without a tooth. U. Eocene: New Zealand.

WELLMANELLINELLA Cherif, 1970

Plate 354, figs. 13-17

Type species: Planispirina striata Sidebottom, 1904 (***2908**), p. 21; OD.

Wellmanellinella Cherif, 1970 (*573), p. 154.
Scutuloris (Wellmanellinella) Cherif, 1973 (*575), p. 716 (nom. transl.).

Test ovate in outline, periphery lobulate, laterally compressed, with one side more evolute and flattened, possibly due to attachment, opposite side convex with inflated chambers more embracing, early stage quinqueloculine in arrangement, later chambers rapidly enlarging, planispirally arranged, three chambers per whorl in the adult; wall calcareous, porcelaneous, highly polished, thin and translucent, convex surface with fine longitudinal irregular striae that are less apparent on the flattened side; aperture a broad arched opening at the end of the final chamber, bordered by a narrow everted lip, and with a wide semilunate flaplike tooth. Holocene; Greece; Adriatic.

Subfamily SIGMOILINITINAE Łuczkowska, 1974

Sigmoilinitinae Łuczkowska, 1974 (***1940**), p. 148.
Nummoloculininae Saidova, 1981 (***2696**), p. 32.

Test with two chambers per whorl, early stage with chambers added in planes slightly less than 180° apart, the angle gradually increasing until chambers are added in a single plane, later stage may have more than two chambers per whorl. Eocene to Holocene.

ANCHIHAUERINA McCulloch, 1977

Plate 355, figs. 15 and 16

Type species: Anchihauerina delicatissima McCulloch, 1977; OD.

Anchihauerina McCulloch, 1977 (***1961**), p. 233.

Test ovate in outline, flattened, with narrow elongate chambers one-half coil in length, at first added in a sigmoiline series that is elevated above the general level, later planispiral and evolute; wall calcareous, imperforate, thin, fragile and hyaline, surface of later chambers crenulated, with seven or eight gentle transverse undulations; aperture with two openings in a terminal trematophore. Holocene, from 20 m to 100 m; off Colombia; Mexico; Philippines.

LONGIAPERTINA Seiglie and Bermúdez, 1966

Plate 355, figs. 1-6

Type species: Longiapertina varistriata Seiglie and Bermúdez, 1966; OD.

Longiapertina Seiglie and Bermúdez, 1966 (***2854**), p. 431.

Test small, up to 0.18 mm in length, ovate in outline, slightly flattened, periphery angular and truncate, chambers one-half coil in length, added in a sigmoid series in the early stage, later tending to be added in a single plane, chambers narrower at the base, flaring at the upper end, about seven visible at the exterior; wall calcareous, imperforate, surface ornamented by longitudinal keels at the chamber angles and by oblique costae on the sides; aperture terminal, narrow, elongate, and slitlike, bordered by a distinct lip. U. Eocene; Cuba.

MESOSIGMOILINA S. Y. Zheng, 1981

Plate 356, figs. 1-4

Type species: Pseudosigmoilina minuta S. Y. Zheng, 1979 (***3449**), p. 129, 208; OD.

Mesosigmoilina S. Y. Zheng, 1981 (***3451**), p. 483 (nom. subst. pro *Pseudosigmoilina* S. Y. Zheng, 1979).
Pseudosigmoilina S. Y. Zheng, 1979 (***3449**), p. 129, 207 (non *Pseudosigmoilina* Bartenstein, 1965); type species: obj.; OD.

Test elongate, subfusiform, chambers one-half coil in length, added in a sigmoiline series, lateral extensions of the chamber wall strongly overlapping all earlier chambers but the penultimate one and only two chambers visible from the exterior, chambers with complete floors, not closely appressed and in section may show gaps between chambers; wall calcareous, imperforate, porcelaneous, surface may have longitudinal costae; aperture small, rounded, without a tooth, at the end of a protruding neck that may have a phialine lip. Holocene: China: Xisha Islands.

NUMMOLOCULINA Steinmann, 1881

Plate 355, figs. 17-23

Type species: Biloculina contraria d'Orbigny, 1846 (***2309**), p. 266; OD.

Nummoloculina Steinmann, 1881 (***3065**), p. 31.

Test ovate in outline, discoidal to biconvex, periphery broadly rounded, with two rapidly enlarging chambers per whorl added in planes less than 180° apart to result in an early sigmoid arrangement as seen in section, later with up to five chambers per whorl added in a single plane, lateral wall extensions from each chamber overlap the umbilical region and entirely cover the earliest chambers but do not completely cover the peripheral region of the penultimate chamber, thus sectioned specimens with three to five chambers per whorl show an equal number of lamellae per whorl; wall thick, calcareous, imperforate, porcelaneous, surface smooth and polished; aperture large, semicircular to subtriangular at the end of the final chamber, with a distinct broad flap. M. Miocene (Tortonian) to Holocene; Europe; Atlantic; Pacific.

POLYSEGMENTINA Cushman, 1946

Plate 355, figs. 11-14

Type species: Hauerina circinata Brady, 1881 (***339**), p. 47; OD.

Polysegmentina Cushman, 1946 (***796**), p. 1.

Test discoidal, circular to ovate in outline, laterally compressed, early chambers in sigmoiline arrangement and with more than three chambers per whorl, later planispiral and partially involute, chambers increasing rapidly in breadth and height, and in number up to five to seven per whorl, occasional specimens may tend to uncoil in the final stage, proximal interior of chambers with tiny narrow longitudinal ridges just distal to the sutures, adjacent ridges may coalesce inward to form complete tubes, the interridge areas opening to the exterior as numerous narrow tunnels where the tubular structures merge into longitudinal external ridges that partly cross the chamber; wall calcareous, imperforate, porcelaneous, thick; aperture in the early stage with a tooth that in later chambers rapidly becomes more complex and finally has numerous openings in a narrow and elongate convex trematophore plate. Holocene: Pacific.

Remarks: Although Ponder (1975, ***2451**, p. 5) considered *Polysegmentina* as a synonym of *Hauerina*, it differs in its distinctive openings and ridgelike inner structures. The excellent discussion of the aperture, coiling, sutural, and other morphologic characters (Ponder, 1975) refer to *Polysegmentina* rather than true *Hauerina*, which has an early quinqueloculine rather than sigmoiline stage.

PSEUDOSCHLUMBERGERINA Cherif, 1970

Plate 355, figs. 7-10

Type species: Sigmoilina ovata Sidebottom, 1904 (***2908**), p. 6; OD.

Pseudoschlumbergerina Cherif, 1970 (***573**), p. 145.
Quinqueloculina (Pseudoschlumbergerina) Cherif, 1973 (***574**), p. 94.

Test ovate in outline, slightly compressed in section, two chambers per whorl, added in continually changing planes to result in a sigmoid chamber arrangement of two tightly spiralling series, up to seven chambers visible from the exterior, chambers lack wall extensions over the earlier part of the test like those of *Sigmoilina* or *Nummuloculina*; wall calcareous, porcelaneous, polished; aperture an arched opening at the end of the final chamber, with a simple to bifid tooth. Holocene; Greece.

SIGMELLA Azbel' and Mikhalevich, 1983

Plate 358, figs. 1-4

Type species: Sigmoilina edwardsi Schlumberger, 1887 (***2761**), p. 118 (as *Planispirina edwardsi* on p. 113); OD.

Sigmella Azbel' and Mikhalevich, in Mikhalevich, 1983 (***2111**), p. 121.

Test broadly ovate in outline, slightly flattened in section, periphery subacute, chambers one-half coil in length, but added less than 180° apart, resulting in a sigmoid appearance in section, chambers with floors but lack lateral extensions over earlier chambers like those of *Sigmoilina*, numerous chambers visible from the exterior; wall calcareous, imperforate, porcelaneous, polished, surface smooth; aperture round to oval, may have a small tooth. Oligocene, Holocene; Australia; Atlantic: Canary Islands; Pacific.

SIGMOIHAUERINA S. Y. Zheng, 1979

Plate 358, figs. 5-10

Type species: Hauerina bradyi Cushman, 1917 (***708**), p. 62; OD.

Sigmoihauerina S. Y. Zheng, 1979 (***3449**), p. 134, 209.

Test broadly ovate, chambers one-half coil in length and sigmoiline in arrangement in the somewhat inflated biconvex early stage, later planispiral and strongly compressed, with somewhat shorter but much broader chambers, final whorl commonly has three chambers, chambers with floors; wall calcareous, imperforate, porcelaneous, surface may have fine longitudinal striae; aperture at the end of the final chamber, cribrate. L. Miocene (Burdigalian) to Holocene; cosmopolitan.

Remarks: *Hauerina bradyi* was described by Cushman (1917, ***708**), as occurring in the Gaspar Straits, from Hong Kong, and off the Hawaiian Islands; the synonymy originally included *Hauerina compressa* of Brady, 1884, of Millett, 1898, and of Rhumbler, 1906, as these were distinct from *Hauerina compressa* d'Orbigny. According to Cushman (1946, ***798**, p. 11), the illustrated specimen (Cushman, 1917, ***708**, pl. 23, fig. 2) by error "was of '*H. circinata* H. B. Brady' and was not the type specimen." In neither publication was there an indication as to which was the "type specimen," and none was illustrated as such. After examining all specimens under this name in the Cushman collection (as discussed by Loeblich and Tappan, 1986, ***1929**, p. 344), the specimen illustrated by Brady (1884, ***344**, pl. XI, figs. 12a, b) and deposited in the BMNH was designated as lectotype of *Hauerina bradyi*, the type species of *Sigmoihauerina*.

SIGMOILINA Schlumberger, 1887

Plate 356, figs. 21-24

Type species: Planispirina sigmoidea Brady, 1884 (***344**), p. 197; SD Cushman, 1917 (***708**), p. 60.

Sigmoilina Schlumberger, 1887 (***2761**), p. 118.

Test ovate in outline, biconvex but asymmetrical, chambers one-half coil in length, at first added about 120° apart but the angle gradually increasing so that the chamber arrangement shows a sigmoid curve as seen in section, chambers with broad lateral extensions that overlap the earlier part of the test, resulting in a much thickened wall in the central area and a biloculine appearance from the exterior; wall calcareous, thick, imperforate, porcelaneous; aperture terminal, rounded, with a small tooth. Eocene?, L. Miocene (Burdigalian) to Holocene; cosmopolitan.

SIGMOILINELLA S. Y. Zheng, 1979

Plate 356, figs. 5-7

Type species: Sigmoilinella tortuosa S. Y. Zheng, 1979; OD.

Sigmoilinella S. Y. Zheng, 1979 3(***3449**), p. 130, 208.

Test elongate fusiform, twisted in appearance, subtriangular in section, chambers one-half coil in length, with planes of coiling changing to give a sigmoiline appearance in section, later chambers added in a single plane, three to four visible from each side, chambers with floors, widest at the base and tapering through the middle and later part, terminally produced as a long neck; wall calcareous, imperforate, porcelaneous, surface smooth, or with a few low longitudinal costae; aperture rounded, at the end of the produced neck, bordered by a distinctly thickened rim, and with a short bifid tooth. Holocene; China: Xisha Islands.

SIGMOILINITA Seiglie, 1965

Plate 356, figs. 14-18

Type species: Quinqueloculina tenuis Czjzek, 1848 (***866**), p. 149; OD.

Sigmoilinita Seiglie, 1965 (***2847**), p. 72.

Spiroglutina Mikhalevich, 1983 (***2111**), p. 100; type species: *Spiroloculina asperula* Karrer, 1868 (***1653**), p. 136; OD.

Test ovate to fusiform in outline, flattened, chambers one-half coil in length, at first added in an evolute sigmoiline series, slightly more than 180° apart, the angle gradually decreasing until the later whorls are planispiral, chambers numerous, narrow; wall calcareous, imperforate, porcelaneous; aperture at the produced end of the final chamber, may have a weakly developed tooth. Miocene (Tortonian) to Holocene; cosmopolitan.

Remarks: Described by Seiglie (1965) as quinqueloculine in the early stage, but the illustrated section appears to be sigmoiline in chamber arrangement. *Spiroglutina* was said to be planispiral throughout, but the original figures of the Miocene type species indicate a sigmoid arrangement.

SIGMOINELLA Saidova, 1975

Plate 356, figs. 19 and 20

Type species: Sigmoinella borealis Saidova, 1975; OD.

Sigmoinella Saidova, 1975 (*2695), p. 157.

Test ovoid in outline, robust, chambers one-half coil in length and laterally strongly overlapping the earlier parts of the test, chambers added in planes separated by gradually increased angles, so that they appear in section to form a sigmoid series; wall calcareous, porcelaneous; aperture at the end of the final chamber, largely covered by a broad flap that attaches at its base to the preceding chamber. Holocene; N. Pacific.

Remarks: The genus was described as having a sigmoid chamber arrangement like that of *Sigmoilina*, but no sections have been illustrated for *Sigmoinella*.

SIGMOPYRGO Hofker, 1983

Plate 357, figs. 14–18

Type species: Biloculina vespertilio Schlumberger, 1891 (*2764), p. 174; OD.

Sigmopyrgo Hofker, 1983 (*1531), p. 26.

Test large, up to 1.5 mm in diameter, subglobular, megalospheric test biloculine throughout, microspheric test with numerous chambers one-half coil in length, arranged in varying planes in the early stage to result in a sigmoid series for up to as many as eighteen or nineteen chambers, later chambers planispiral and alternately added on opposite sides as in *Pyrgo*, chambers without floors but added against the previous test surface; wall thick, calcareous, porcelaneous, peripheral margin crenulate; aperture at the end of the final chamber, a broad low sinuate arch, with a similarly broad low flaplike tooth that may be slightly indented in the median plane to appear almost bifid, aperture bordered by an irregularly thickened rim. Holocene; Atlantic; Caribbean; central Pacific.

SPIROSIGMOILINA Parr, 1942

Plate 357, figs. 11–13

Type species: Spiroloculina tateana Howchin, 1889 (*1561), p. 3; OD.

Spirosigmoilina Parr, 1942 (*2360), p. 361.

Test ovate to nearly circular in outline, flattened, numerous narrow and elongate chambers one-half coil in length added in various planes to form a sigmoid series in the inflated early portion but rapidly becoming planispiral and adult chambers added on opposite sides of the test, chambers with floors; wall calcareous, porcelaneous; aperture terminal, with a short simple tooth. Miocene; Australia.

SUBEDENTOSTOMINA McCulloch, 1981

Plate 357, figs. 8–10

Type species: Subedentostomina lavelaensis McCulloch, 1981 (as *S. lavelaenus* on pl. 24, figs. 12a–c); OD.

Subedentostomina McCulloch, 1981 (*1962), p. 35.

Test elongate ovate in outline, compressed and with flattened sides, chambers one-half coil in length and added in various planes, appearing sigmoid in section, chambers broadest at the base where they curve across the aboral end, narrowing toward the aperture, and overlapping more strongly on one side than the other, a varied number being visible from the exterior; wall calcareous, imperforate, porcelaneous, surface polished; aperture at the end of the final chamber, a narrow ovate slit bordered by a narrow lip, without a tooth. Holocene; Caribbean, off Venezuela and Colombia.

Remarks: The external appearance suggests a sigmoiline chamber arrangement, but no sections have been made to show the inner structure.

VERTEBRASIGMOILINA Hofker, 1976

Plate 357, figs. 1-7

Type species: Articulina mexicana Cushman, 1922 (*721), p. 70; OD.

Vertebrasigmoilina Hofker, 1976 (*1525), p. 135.

Test broad and flattened, up to 1.0 mm in length, periphery carinate, proloculus followed by about two whorls of chambers one-half coil in length, in sigmoiline arrangement, later chambers increase rapidly in breadth but not proportionately in length so that later whorls have three chambers per whorl and coiling becomes planispiral, final stage with up to two uncoiled chambers; wall calcareous, porcelaneous, surface smooth and shining or may be faintly striate; aperture at the open end of the final chamber, an elongate slit bordered by an everted lip. Holocene; Gulf of Mexico: off Florida; West Indies.

Subfamily SIGMOILOPSINAE Vella, 1957

Sigmoilopsinae Vella, 1957 (*3285), p. 18.

Chambers one-half coil in length, added in changing planes that in section trace a sigmoid path in the early stage, later becoming planispiral; wall porcelaneous with agglutinated coating. Miocene to Holocene.

SIGMOILOPSIS Finlay, 1947

Plate 356, figs. 8-13

Type species: Sigmoilina schlumbergeri Silvestri, 1904 (*2933), p. 267; OD.

Sigmoilopsis Finlay, 1947 (*1130), p. 270.

Test ovate in outline, chambers one-half coil in length, with rapidly changing planes in the early stage resulting in two spiralling series that appear sigmoid in section, gradually becoming planispiral in the adult, chambers with floors, chamber lumen narrow; wall thick, porcelaneous but enclosing a large quantity of agglutinated quartz particles, sponge spicules, and shell fragments; aperture terminal, rounded, with a small tooth. Miocene to Holocene; Europe; Atlantic; Caribbean; Australia; New Zealand.

Remarks: As no type specimen was originally designated for *Sigmoilina schlumbergeri*, the specimen (BMNH) illustrated by Brady (1884, *344, pl. 8, figs. 1a, b) as *Planispirina celata* (Costa), from Porcupine Station 23, west of Ireland at 630 fathoms, was designated as the lectotype (Loeblich and Tappan, 1964, *1910, p. C466).

Subfamily TUBINELLINAE Rhumbler, 1906

Tubinellinae Rhumbler, 1906 (*2619), p. 25.
Artubinia Rhumbler, 1913 (*2621), p. 352 (err. emend.).
Tubinellinea Saidova, 1981 (*2696), p. 32 (supersubfamily).
Pavoninoidinae Saidova, 1981 (*2696), p. 32.
Poroarticulininae Saidova, 1981 (*2696), p. 32.

Test milioline or spiroloculine in early stage, with chambers one-half coil in length, uncoiled and rectilinear in the adult. M. Eocene to Holocene.

ARTICULARIA Łuczkowska, 1974

Plate 360, figs. 4-11

Type species: Articulina? articulinoides Gerke and Issaeva, in Bogdanovich, 1952 (*268), p. 211; OD.

Articularia Łuczkowska, 1974 (*1940), p. 66.

Test narrow and elongate, early stage ovoid and inflated, consisting of narrow elongate chambers one-half coil in length and in quinqueloculine or cryptoquinqueloculine arrangement, later stage uncoiled and rectilinear, of three to four elongate subpyriform chambers with oval to rounded section; wall calcareous, porcelaneous; aperture in the quinqueloculine stage oval with a short broad tooth, and in the uncoiled chambers is terminal and rounded with an everted lip but without a tooth. U. Miocene (L. Sarmatian); USSR; Poland.

ARTICULINA d'Orbigny, 1826

Plate 359, figs. 8 and 9

Type species: Articulina nitida d'Orbigny, 1826; OD(M).

Articulina d'Orbigny, 1826 (*2303), p. 300.
Ceratospirulina Ehrenberg, 1858 (*1072), p. 11; type species: *Ceratospirulina sprattii* Ehrenberg, 1858; OD(M).
Ceratoloculina Ehrenberg, 1857 (*1071), p. 548 (name not available, ICZN Art. 12 (a), no description).

Test elongate, early ovoid portion consisting of chambers one-half coil in length, quinqueloculine or cryptoquinqueloculine, later with a few cylindrical, ovoid to pyriform rectilinear chambers that may be circular or flattened in section; wall calcareous, porcelaneous, surface smooth to longitudinally costate; aperture terminal, rounded to ovate, bordered by a prominent everted lip. M. Eocene (Lutetian) to Holocene; cosmopolitan.

DOGIELINA Bogdanovich and Voloshinova, 1949

Plate 360, figs. 1-3

Type species: Dogielina sarmatica Bogdanovich and Voloshinova, 1949; OD.

Dogielina Bogdanovich and Voloshinova, 1949 (***274**), p. 185 (non *Dogielina* Raabe, 1959).

Test elongate, early chambers one-half coil in length and quinqueloculine, later chambers may be added in a single plane, final stage with a few elongate rectilinear chambers; wall calcareous, imperforate, porcelaneous, thick, commonly with irregularly pitted surface and spongy structure; aperture terminal, rounded, bordered by numerous tooth-like projections that may bifurcate, arising from the thickened margin of the opening. U. Miocene (Sarmatian); USSR: Transcaucasus.

ISHAMELLA Buzas and Severin, 1982

Plate 358, figs. 11-15

Type species: Ishamella apertura Buzas and Severin, 1982; OD.

Ishamella Buzas and Severin, 1982 (***461**), p. 28.

Test small, about 0.24 mm in length, biloculine, with two closely appressed chambers forming a single whorl, proloculus broadly ovate and widest at the aboral end, second chamber narrower and tubular, the intervening septum being vestigial; wall calcareous, imperforate, translucent, and milky white in color, surface smooth; aperture oval, at the open end of the second chamber, without a tooth. Holocene, lagoonal; USA: Florida.

Remarks: This distinctive form may be a juvenile stage of some other milioline but was relatively common where found and possible relationships are not apparent.

PARRINA Cushman, 1931

Plate 358, figs. 16-20

Type species: Nubecularia bradyi Millett, 1898 (***2141**), p. 261 (nom. subst. pro *Nubecularia inflata* Brady, 1884 (***344**), p. 135, non *Nubecularia inflata* Terquem, 1876); OD.

Parrina Cushman, 1931 (***758**), p. 20 (nom. subst. pro *Silvestria* Schubert, 1921).

Silvestria Schubert, 1921 (***2823**), p. 166 (non *Silvestria* Verhoeff, 1895 nec Brian, 1902); type species: obj.

Erichsenella Tinoco, 1955 (***3197**), p. 19; type species: *Erichsenella kegeli* Tinoco, 1955; OD.

Test elongate, early stage ovoid and chambers one-half coil in length in a quinqueloculine or cryptoquinqueloculine arrangement, later with a few irregular uncoiled chambers; wall calcareous, imperforate, porcelaneous; aperture terminal, bordered by a thickened lip, and commonly with two or more openings that may be produced on short necks on the final chamber. Holocene; W. Pacific: Fiji Islands; Atlantic Ocean: off Brazil.

PAVONINOIDES Bermúdez, 1949

Plate 359, fig. 10

Type species: Pavoninoides panamensis Bermúdez, 1949; OD.

Pavoninoides Bermúdez, 1949 (***202**), p. 58.

Test flabelliform in outline, tiny and ovoid early stage with a few chambers one-half coil in length, three visible from the exterior on one side, later stage uncoiled with rapidly widening chambers that are strongly arched centrally but increase very slowly in height; wall calcareous, porcelaneous, surface with numerous fine pits or pseudopores; aperture terminal, multiple, a single row of pores on the terminal face of the final chamber. U. Eocene; Central America: Panama.

POROARTICULINA Cushman, 1944

Plate 359, figs. 6 and 7

Type species: Poroarticulina glabra Cushman, 1944; OD.

Poroarticulina Cushman, 1944 (***793**), p. 52.

Test elongate, up to 1.85 mm in length,

ovoid early stage with chambers one-half coil in length in quinqueloculine arrangement, later stage uncoiling and rectilinear, with a few elongate cylindrical chambers; wall calcareous, porcelaneous; aperture terminal, rounded, and with a tooth in the early stage, in the rectilinear stage cribrate and covering the protruding end of the final chamber. Miocene; Romania.

RECTOMASSILINA Seiglie, 1964

Plate 359, figs. 12-15

Type species: Rectomassilina triangularis Seiglie, 1964; OD.

Rectomassilina Seiglie, 1964 (*2843), p. 605.

Test small, elongate, proloculus followed by chambers one-half coil in length, quinqueloculine, later chambers added on opposite sides in a single plane, resembling *Massilina*, and finally uncoiled and rectilinear, uniserial chambers may be pyriform in shape and angular in section; wall calcareous, imperforate, porcelaneous; aperture rounded, at a slight inflation of the narrowed end of the final chamber. Holocene; off Northeast Venezuela.

TUBINELLA Rhumbler, 1906

Plate 359, figs. 1-5 and 11

Type species: Articulina funalis var. *inornata* Brady, 1884 (*344), p. 186; SD Cushman, 1928 (*747), p. 151.

Tubinella Rhumbler, 1906 (*2619), p. 25.
Artubinum Rhumbler, 1913 (*2621), p. 352 (err. emend.).
Tubinellina Wiesner, 1931 (*3375), p. 67; type species: *Articulina funalis* Brady, 1884 (*344), p. 185; OD.
Falsotubinella Bogdanovich and Mikhalevich, in Mikhalevich, 1983 (*2111), p. 102; type species: *Falsotubinella funalis* (Brady) subsp. *nitens* Mikhalevich, 1983; OD.

Test small, elongate, may be loosely attached at the base to the substrate by means of an organic adhesive material, early ovoid stage of two closely appressed chambers of one-half coil in length, later uncoiled and rectilinear to slightly arcuate, with short tubular chambers; wall calcareous, imperforate, porcelaneous, surface smooth or longitudinally costate, wall ultrastructure shows an outer layer of longitudinally arranged calcite needles, a middle layer of randomly arranged needlelike crystals, and an inner layer of tangentially aligned crystals; aperture at the open end of the chamber. Pleistocene to Holocene; Indian Ocean; Pacific; Atlantic; West Indies; Antarctic; Mediterranean.

Remarks: *Falsotubinella* was based on a new subspecies of *Tubinella funalis*, but the genus is automatically an objective synonym of *Tubinellina* Wiesner, 1931, as different subspecies of a single species cannot be placed in different genera. We regard both nominal genera as synonyms of *Tubinella*.

Family MILIOLIDAE Ehrenberg, 1839

Miliolidae d'Orbigny, 1839 (*2304), p. xxxix, 160, nom. corr. pro family Miliolina.
Miliolina Ehrenberg, 1839 (*1054), table opp. p. 120.
Miliolida Schultze, 1854 (*2824), p. 52.
Miliolitidae Parker, 1858 (*2343), p. 53.
Miliolidea Reuss and Fritsch, 1861 (*2593), p. 2.
Miliolidee Schwager, 1876 (*2829), p. 476, 483.
Miliolidina Bütschli, in Bronn, 1880 (*421), p. 189.
Milioletta Haeckel, 1894 (*1355), p. 164.
Miliolinidae Rhumbler, 1895 (*2616), p. 86.
Miliolinae Delage and Hérouard, 1896 (*926), p. 122.
Armiliolidia Rhumbler, 1913 (*2621), p. 341 (err. emend.).

Test with chambers one-half coil in length added in one or numerous regular planes; wall calcareous, porcelaneous, imperforate, thick, and with numerous pseudopores that may result in a complex wall structure; aperture terminal. M. Eocene to Holocene.

Subfamily NEAGUITINAE Andersen, 1984

Neaguitinae nom. corr. herein pro subfamily Neaguitesinae.
Neaguitesinae Andersen, 1984 (*35), p. 14 (nom. imperf.).
Texininae Andersen, 1984 (*35), p. 17.

Test with proloculus followed by chambers one-half coil in length added in a single plane, chambers with floors; wall calcareous, porcelaneous, imperforate, but with surface pits or pseudopores; aperture simple, terminal. M. Eocene to Oligocene.

NEAGUITES Andersen, 1984

Plate 360, figs. 12-15

Type species: Spiroloculina byramensis Cushman, 1922 (*719), p. 101; OD.

Neaguites Andersen, 1984 (*35), p. 14.
Texina Andersen, 1984 (*35), p. 17; type species: *Texina ferayi* Andersen, 1984; OD.

Test rounded to ovate in outline, sides

flattened, proloculus followed by two chambers per whorl added in a single plane, later chambers with separate floor and not merely lying against the previous whorl; wall calcareous, porcelaneous, surface with numerous small pits, pseudopores or reticulations; aperture terminal, simple. M. Eocene (Lutetian) to M. Oligocene (Rupelian); USA: Mississippi, Louisiana, Texas.

Remarks: *Neaguites* was described as having a simple aperture and *Texina* as having a cribrate one. However, the last chamber of the holotype of *Texina ferayi* is broken, hence the apertural characters are not shown in the original figures. Topotype specimens do not show a cribrate aperture. The other means of differentiation was based on possible inclusions in the wall of *Texina*, but the illustrated specimens suggest that this may be a result of secondary overgrowth due to diagenesis rather than an intrinsic part of the test structure.

Subfamily MILIOLINAE Ehrenberg, 1839

Miliolinae Rhumbler, 1895 (*2616), p. 87, nom. transl. ex family Miliolina.
Miliolininae Brady, 1881 (*339), p. 43.

Test elongate ovate, proloculus followed by chambers one-half coil in length added in different planes; aperture terminal, with trematophore. Eocene to Holocene.

CRENULOSTOMINA Quilty, 1974

Plate 360, figs. 21-26

Type species: Crenulostomina banksi Quilty, 1974; OD.

Crenulostomina Quilty, 1974 (*2499), p. 45.

Test elongate, up to 0.2 mm in length, subfusiform, proloculus followed by chambers one-half coil in length in quinqueloculine arrangement; wall calcareous, longitudinally costate, surface with small pseudopores; aperture terminal, rounded, with a crenulate margin and a short blunt tooth that projects slightly above the surface. L. Miocene; Australia: Tasmania.

HELENTAPPANELLA Andersen, 1985

Plate 361, figs. 10-12

Type species: Massilina jacksonensis Cushman var. *punctatocostata* Cushman, 1933 (*768), p. 3; OD.

Helentappanella Andersen, 1985 (*36), p. 67 (nom. nov. pro *Tappanella* Andersen, 1984).
Tappanella Andersen, 1984 (*35), p. 10 (non *Tappanella* Gudina and Saidova, 1969); type species: obj.; OD.

Test rounded to ovate in outline, up to 3.0 mm in length, chambers one-half coil in length, quinqueloculine in the early stage, adult planispiral with chambers added on opposite sides as in *Massilina*; wall calcareous, porcelaneous, surface with numerous pseudopores that may be irregularly scattered or may be aligned between narrow longitudinal or slightly oblique costae; aperture terminal, at the end of a slightly produced neck, cribrate. U. Eocene (Bartonian); USA: Mississippi.

Remarks: Differs from *Heterillina* in the pitted surface due to the presence of pseudopores.

MILIOLA Lamarck, 1804

Plate 361, figs. 1-4

Type species: Miliolites saxorum Lamarck, 1804; SD Cushman, 1927 (*744), p. 125.

Miliola Lamarck, 1804 (*1778), p. 349.
Miliolites Lamarck, 1804 (*1778), p. 349; type species: obj.
Saxicoline Deshayes, 1830 (*949), p. 231; (nom. vernac.); type species: obj.
Pentellina Munier-Chalmas, 1882 (*2205), p. 424; type species: obj.; OD.
Saxicolina Sherborn, 1896 (*2900), p. 404 (nom. corr. pro *Saxicoline*).

Test narrow and elongate fusiform, chambers one-half coil in length, quinqueloculine, with separate floor; wall calcareous, porcelaneous, surface pitted by numerous pseudopores and may have longitudinal costae; aperture terminal on the final chamber, cribrate on a trematophore. M. Eocene (Lutetian) to Oligocene (Rupelian); France; Belgium; USA: Mississippi.

PICOUINA Andersen, 1984

Plate 360, figs. 16-20

Type species: Triloculina mississippiensis Cushman, 1935 (*776), p. 25; OD.

Picouina Andersen, 1984 (*35), p. 14.

Test small, elongate fusiform in outline, ovoid in section, chambers one-half coil in length in cryptoquinqueloculine arrangement, may have only three chambers visible from the exterior, but sutures are obscured by surface costae and pits; wall calcareous, porcelaneous, surface with numerous large pits or pseudopores aligned between the longitudinal costae; aperture terminal, rounded, at the produced end of the final chamber. M. Oligocene (Rupelian); USA: Mississippi.

Remarks: *Picouina* was stated to have a terminal cribrate aperture, based on a specimen illustrated in SEM. However, this illustration shows only the numerous costae and pits at the top of the slightly arched final chamber and a simple rounded to ovate opening at one side similar to that illustrated for the holotype.

RUPERTIANELLA Loeblich and Tappan, 1985

Plate 361, figs. 13-19

Type species: Miliolina rupertiana Brady, 1881 (*339), p. 46; OD.

Rupertianella Loeblich and Tappan, 1985 (*1921), p. 52 (nom. subst. pro *Pseudotriloculina* Rasheed, 1971).
Pseudotriloculina Rasheed, 1971 (*2514), expl. pl. 12, figs. 3a-c, also as *Pseudo-triloculina*, p. 39 (non *Pseudotriloculina* Cherif, 1970); obj.; OD.
Rupertianella Towe, 1984 (*3219), p. 894 (nom. nud.).

Test large, up to 1.9 mm in length, elongate ovate in outline, somewhat flattened, periphery rounded to slightly carinate, chambers one-half coil in length in quinqueloculine or cryptoquinqueloculine arrangement, later whorls strongly overlapping so that commonly only two or three chambers are visible from the exterior in the adult, although rarely five may still be present; wall calcareous, porcelaneous and opaque, surface smooth and polished adjacent to the aperture, elsewhere with numerous fine pseudopores indented up to about half the thickness of the wall, and arranged in longitudinal or slightly oblique rows; aperture terminal, a simple narrow and elongate slit bordered by smooth and slightly arched lips that occupy the breadth of the final chamber. Holocene; tropical Pacific, shallow water.

Family RIVEROINIDAE Saidova, 1981

Riveroinidae Loeblich and Tappan, 1982 (*1917), p. 31, nom. transl. ex subfamily Riveroininae.
Riveroininae Saidova, 1981 (*2696), p. 32 (subfamily).
Riveroininea Saidova, 1981 (*2696), p. 32 (supersubfamily).

Test planispiral, chambers one-half coil in length and partly subdivided by a few oblique secondary septa that are inclined toward the apertural end; aperture terminal, a single curved slit. Oligocene to Holocene.

PSEUDOHAUERINA Ponder, 1972

Plate 362, figs. 1-9

Type species: Hauerina occidentalis Cushman, 1946 (*798), p. 9; OD.

Pseudohauerina Ponder, 1972 (*2448), p. 147.

Test ovate to subcircular in outline, lenticular, chambers in the early stage one-half coil in length and quinqueloculine, later chambers planispiral as in *Massilina*, but adult may have more than two chambers to a whorl, interior subdivided by numerous radial septula that project inward from the walls for about one-third the breadth of the chamber; wall calcareous, porcelaneous, thin, surface ornamented with numerous longitudinal striae or costae and with less closely spaced radial indentations that correspond to the internal radial septula; aperture terminal, in the juvenile stage an opening with simple tooth, later chambers may have a ringlike structure attached to the apertural margins, and adult test has a complex convex trematophore with many openings. Oligocene (Balcombian) to Holocene; Atlantic; Pacific.

PSEUDOHAUERINELLA McCulloch, 1981

Plate 361, figs. 8 and 9

Type species: Pseudohauerina dissidens McCulloch, 1977; OD.

Pseudohauerinella McCulloch, 1981 (*1962), p. 6 (nom. subst. pro *Pseudohauerina* McCulloch, 1977); OD.
Pseudohauerina McCulloch, 1977 (*1961), p. 237 (non *Pseudohauerina* Ponder, 1973); type species: obj.; OD.

Test ovate in outline, chambers one-half coil in length, quinqueloculine, although final chambers may be planispiral, interior probably with radial septula as in *Pseudohauerina;* wall calcareous, porcelaneous, surface with fine longitudinal striae and with numerous radial plications, apparently reflecting internal septula; aperture terminal, cribrate. Holocene; Pacific: Galapagos Islands.

Remarks: The presence of internal septula is inferred from the external appearance, as no sections have been made and no specimens are available for sectioning.

RIVEROINA Bermúdez, 1939

Plate 361, figs. 5-7

Type species: Riveroina caribaea Bermúdez, 1939; OD.

Riveroina Bermúdez, 1939 (*199), p. 248.

Test ovate in outline, sides flattened, periphery truncate, chambers one-half coil in length, planispiral, chamber interior subdivided by oblique radial septula that extend almost completely across the chamber lumen; wall calcareous, imperforate, porcelaneous, surface polished, with radial plications corresponding to the internal septula; aperture a low arched slit at the end of the final chamber. Holocene; Caribbean Sea.

Family AUSTROTRILLINIDAE Loeblich and Tappan, 1986

Austrotrillinidae Loeblich and Tappan, 1986 (*1929), p. 345.

Test planispiral to milioline, at least in the early stage, later may have more than two chambers per whorl and may tend to uncoil; wall calcareous, porcelaneous, with coarse alveolar subepidermal mesh produced by transverse or parallel partitions. M. Eocene to L. Miocene.

AUSTROTRILLINA Parr, 1942

Plate 362, figs. 10-14

Type species: Trillina howchini Schlumberger, 1893 (*2767), p. 119, 123; OD.

Austrotrillina Parr, 1942 (*2360), p. 361.

Test elongate ovate, subtriangular in section but with rounded angles, chambers one-half coil in length, quinqueloculine or cryptoquinqueloculine so that only three or four may be visible externally, chambers with floors; wall calcareous, porcelaneous, with thick and finely to coarsely alveolar inner layer producing a subepidermal mesh, alveoli may be simple tubes or more complex, as by fusing inward with adjacent alveoli, outer layer thin and finely pitted, chamber interior undivided; aperture terminal, rounded, with a simple tooth in the early chambers, tooth in the adult branched and attached to the outer rim to form a number of smaller openings. L. Oligocene (Latorffian) to L. Miocene (Burdigalian); Pacific Islands; Australia; India; Sri Lanka; Malaysia; Sarawak; New Guinea; Somaliland; Kenya; Tanzania; Libya; Iraq; Iran; Turkey; Greece; Spain.

BREBINA Barbu, 1965

Plate 363, figs. 1-6

Type species: Brebina transylvanica Barbu, 1965; OD.

Brebina Barbu, 1965 (*132), p. 10.

Test elongate fusiform, curved tubular chambers one-half coil in length added about the elongate axis in eight series, successively about 135° apart, outer part of chambers subdivided into small rectangular chamberlets by numerous short partial septula that cross the outer part of the chambers and are oriented perpendicular to the coiling axis; wall calcareous, porcelaneous; aperture small and rounded, at the end of the final chamber, provided with a tooth. U. Eocene (Priabonian); Romania.

RETICULOGYRA Adams and Belford, 1979

Plate 363, figs. 7-10

Type species: Reticulogyra mirata Adams and Belford, 1979; OD(M).

Reticulogyra Adams and Belford, 1979 (*11), p. 181.

Test nautiloid to lenticular in form, periphery rounded to subacute, proloculus followed by short tube and then by two to three whorls of planispirally coiled chambers, with up to seven chambers in the last whorl, the final chamber may be flaring or tend to uncoil, chambers with complete basal wall; wall calcareous, porcelaneous, and after the first few chambers short parallel and transverse subepidermal partitions result in a subepidermal reticulum; aperture not observed. M. Eocene; New Guinea.

Superfamily ALVEOLINACEA Ehrenberg, 1839

Alveolinidea Voloshinova, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 244.

Fabulariidea Saidova, 1981 (*2696), p. 32.

Test enrolled, commonly about an elongate axis, proloculus may be followed by flexostype in megalospheric generation, planispiral or streptospiral, or milioline with chambers added in varying planes, may uncoil in the adult and may have septulae or pillars; wall porcelaneous, with basal thickening, subepidermal partitions and pillars; aperture multiple. L. Cretaceous to Holocene.

Family FABULARIIDAE Ehrenberg, 1839

Fabulariidae Saidova, 1981 (*2696), p. 32, nom. corr. pro family Fabularina.
Fabularina Ehrenberg, 1839 (*1054), table opp. p. 120.
Fabularidea Reuss, 1862 (*2586), p. 375 (subfamily).
Trematoforininae A. Silvestri, 1937 (*2966), p. 80 (subfamily; name not available, ICZN Arts. 13(a)(i) and 29).
Fabulariinae Loeblich and Tappan, 1961 (*1902), p. 297 (subfamily).
Fabulariinea Saidova, 1981 (*2696), p. 32 (supersubfamily).
Lacazinellinae Saidova, 1981 (*2696), p. 33 (subfamily).

Test with milioline early stage, chambers subdivided by secondary partitions; aperture commonly multiple or may have simple aperture with tooth. U. Cretaceous to U. Eocene (Bartonian), ?Oligocene.

ADRAHENTINA Bilotte, 1978

Plate 363, figs. 11-13

Type species: Adrahentina iberica Bilotte, 1978; OD(M).

Adrahentina Bilotte, 1978 (*239), p. 126.

Test large, up to about 2 mm in diameter, ovoid to subspherical, megalospheric test with large globular proloculus, microspheric early stage not observed, megalospheric proloculus followed by about ten spherical chambers, each completely enveloping the test as added, internally many radial pillars arise from the chamber floor but not all reach the chamber roof, pillars of a thickness about equal to that of the chamber walls; outer wall forming the chamber roof of porcelaneous pellicular calcite, with relatively thick agglutinated layer of quartz particles added as a floor for each new chamber and forming the inner pillars; aperture not observed, probably with a trematophore. U. Cretaceous (Maastrichtian); Spain.

FABULARIA Defrance, 1820

Plate 364, figs. 1-7

Type species: Fabularia discolites Defrance, in Bronn, 1825 (*418), p. 43 = *Nummulites ovata* de Roissy, 1805 (*2645), p. 59; SD(SM) Defrance, in Bronn, 1825, p. 43.

Fabularia Defrance, 1820 (*918), p. 557.

Test ovate, rounded in section to flattened, microspheric proloculus followed by chambers one-half coil in length, quinqueloculine in the early stage, later cryptoquinqueloculine and finally biloculine, megalospheric test with large proloculus and smaller deuteroconch, followed by biloculine chambers, adult planispiral, with two chambers per whorl; wall calcareous, porcelaneous, subepidermal partitions forming a series of peripheral chamberlets that parallel the direction of coiling and are interconnected at the chamber ends by pre- and postseptal openings and in advanced species also by a series of shorter tubes perpendicular to the others; aperture consists of numerous circular and irregularly scattered openings in a small area near the base of the apertural face of the final chamber. M. Eocene (Lutetian) to U. Eocene (L. Bartonian); France; Netherlands; USA: Florida; Jamaica; Australia.

LACAZINA Munier-Chalmas, 1882

Plate 364, figs. 8-12

Type species: Alveolina compressa d'Orbigny, 1850 (*2312), p. 210; OD.

Lacazina Munier-Chalmas, 1882 (*2207), p. 472.

Test large, up to 10 mm in diameter, discoid to ovoid, large megalospheric proloculus followed by chambers one-half coil in length in biloculine arrangement, microspheric test with brief quinqueloculine stage, adult of both generations has completely enveloping biloculine chambers added alternately from pole to pole, interior subdivided by two sets of subepidermal partitions that are respectively radial and concentric in orientation; wall calcareous, porcelaneous, outer wall thin, all post embryonic chambers with basal thickening of the wall; aperture terminal, with a trematophorelike ring bearing numerous irregular openings, the base of the preceding chamber exposed in the center of the ring. U. Cretaceous (Senonian); France; Spain; Israel.

LACAZINELLA Crespin, 1962

Plate 364, figs. 13-15

Type species: Lacazina wichmanni Schlumberger, 1894 (*2768), p. 295; OD.

Lacazinella Crespin, 1962 (*690), p. 337.

Test large, 2 mm to 3 mm in length, ovoid, spherical proloculus followed by chambers added alternately at opposite poles and completely enveloping the earlier chambers, interior with low longitudinal subepidermal partitions that do not reach the chamber floor and that die out in the apertural region where a few pillars immediately underlie the trematophore; wall calcareous, porcelaneous, with basal thickening, surface smooth or with longitudinal striae; aperture with a trematophore at the end of the final chamber. U. Paleocene to Eocene, Oligocene?; New Guinea; Indonesia; Turkey.

PERILOCULINA Munier-Chalmas and Schlumberger, 1885

Plate 365, figs. 1-6

Type species: Periloculina zitteli Munier-Chalmas and Schlumberger, 1885; OD(M).

Periloculina Munier-Chalmas and Schlumberger, 1885 (*2213), p. 308.

Test ovoid, chambers one-half coil in length, early stage of microspheric test quinqueloculine, then successively pseudotriloculine or cryptoquinqueloculine, biloculine, and finally with wholly embracing chambers, megalospheric test may be pseudoquinqueloculine or biloculine in early chamber arrangement, later with chambers embracing previous ones, chambers with floors; wall calcareous, porcelaneous, interior with longitudinal low endoskeletal ridges or partitions that cross the chamber to the opposite wall, surface may have longitudinal grooves or striae; aperture crescentic with denticulate margin in the early stage, in the adult with central trematophore and numerous irregular openings. U. Cretaceous (Senonian); France.

PSEUDOFABULARIA Robinson, 1974

Plate 365, figs. 7-11

Type species: Borelis matleyi Vaughan, 1929 (*3265), p. 377; OD.

Pseudofabularia Robinson, 1974 (*2634), p. 29.

Test globular to ovate and up to 4.0 mm in diameter, megalospheric proloculus followed by undivided second chamber, later stage of both generations with two chambers per whorl, planispirally arranged and appearing biloculine, rarely may have slightly more than two chambers per whorl, interior subdivided by longitudinal partitions that spiral around the testwithin each chamber, those of successive chambers approximately aligned, resulting in up to thirty-three elongate chamberlets in each chamber, preseptal passage extends the entire width of the chamber, and a less well-defined postseptal passage may be present; wall calcareous, porcelaneous; aperture consists of a single row of pores extending from pole to pole along the base of the apertural face. M. Eocene; Jamaica.

PSEUDOLACAZINA Caus, 1979

Plate 366, figs. 1-6

Type species: Pseudolacazina hottingeri Caus, 1979; OD.

Pseudolacazina Caus, 1979 (*514), p. 33.

Test globular to ovate, megalospheric test biloculine throughout, microspheric generation with up to thirteen whorls, the early chambers in quinqueloculine arrangement, later biloculine and finally with wholly embracing chambers so that only the final chamber is visible from the exterior, chambers subdivided by numerous longitudinal partitions that form continuous chamberlets spiralling around the test, those of successive chambers aligned; wall calcareous, porcelaneous; aperture cribrate on a trematophore that is supported by a circle of pillars surrounding the preseptal space. M. Eocene (Biarritzian); Spain.

Remarks: No holotype was designated for the type species, but figures of five specimens were indicated as syntypes. Of these syntypes, the axial section of a microspheric specimen illustrated by Caus (1979, *514, pl. 3, fig. 1) is here designated as lectotype.

Family RHAPYDIONINIDAE Keijzer, 1945

Rhapydioninidae Haynes, 1981 (*1437), p. 171, nom. transl. ex subfamily Rhapydionininae.

Test planispirally or streptospirally coiled and may uncoil in the later stage; embryonal apparatus simple or quinqueloculine, proloculus of megalospheric generation may be followed by flexostyle; test with central thickening pierced by canals and bordered by subepidermal lamellae that attach to it, part of the distal face of the preceding chamber may be free and form a preseptal area that is crossed by irregularly spaced pillars extending from the underlying central thickening to the internal surface of the overlying septum, the pillars intercalated both between the apertures of the final chamber face and between the openings of the central thickening; aperture multiple, on the final chamber face. U. Cretaceous (Cenomanian to Maastrichtian), ?L. Eocene, ?Holocene.

Subfamily RHAPYDIONININAE Keijzer, 1945

Rhapydionininae Keijzer, 1945 (*1668), p. 200.
Chubbininae Dilley, 1973 (*961), p. 413.

As in the family; but free-living. U. Cretaceous (Cenomanian to Maastrichtian), ?L. Eocene, ?Holocene.

CHUBBINA Robinson, 1968

Plate 367, figs. 1-5

Type species: Chubbina jamaicensis Robinson, 1968; OD.

Chubbina Robinson, 1968 (*2633), p. 527.

Test large, up to 8 mm in diameter and about 1.5 mm in thickness, globular or lenticular in early stage, later flaring and peneropline, spherical megalospheric proloculus followed by single undivided tubular chamber, microspheric early stage milioline, later with numerous whorls, at first streptospiral, later planispiral with the number of chambers per whorl increasing to about fifteen, chambers increase rapidly in height as added so that the adult test is uncoiled and flabelliform, interior subdivided by numerous primary and secondary axially aligned septula, central thickening and numerous residual pillars present in the preseptal space as in *Rhapydionina;* wall calcareous, porcelaneous; aperture multiple, with openings scattered uniformly over the apertural face of the final chamber, previous foramina connecting successive chamberlets. U. Cretaceous (Campanian to Maastrichtian); Jamaica; Mexico; Cuba; USA: Florida.

Remarks: As the type species was described on the basis of cotypes, without selection of a holotype, the specimen (BMNH no. P-48049) figured by Robinson (1968, pl. 101, fig. 1) is here designated as lectotype.

CYCLOPSEUDEDOMIA Fleury, 1974

Plate 368, figs. 1-5

Type species: Cyclopseudedomia smouti Fleury, 1974; OD.

Cyclopseudedomia Fleury, 1974 (*1137), p. 313.

Test planispirally enrolled, evolute, flabelliform to discoidal, strongly compressed in the equatorial plane, large megalospheric proloculus followed by flexostyle and then by a short planispiral and involute stage of four to five chambers, adult chambers rapidly becoming semicircular in the flabelliform later stage, microspheric early stage very small and poorly known, adult discoidal, with up to sixty annular chambers, chamber interior subdivided peripherally by radial septula that are continuous from chamber to chamber, horizontal septula form secondary chamberlets in the peripheral region, preseptal space of about one-sixth the height of the chambers but extending for their full breadth, occupied by massive residual pillars; wall calcareous, porcelaneous; aperture not described. U. Cretaceous (Campanian to Maastrichtian); Greece.

MURCIELLA Fourcade, 1966

Plate 366, figs. 7-11

Type species: Murciella cuvillieri Fourcade, 1966; OD.

Murciella Fourcade, 1966 (*1159), p. 149.
Cosinella Reichel, 1936 (*2541), p. 136 (name not available, ICZN Arts. 9 (8), (9); 13 (a)(i), discussion of museum specimens and unpublished manuscript name of Schlumberger).

Test planispiral and involute in early stage, later uncoiling and rectilinear, cylindrical or flattened and flabelliform in the adult, up to about 1.6 mm in length, globular megalospheric proloculus followed by flexostyle and then by planispirally enrolled chambers that increase in number per whorl as added, early coiling involute, later evolute and finally uncoiled, early microspheric test streptospirally enrolled, later planispiral and finally uncoiled and rectilinear, interior subdivided by radial septula perpendicular to the septa and to the outer wall and by horizontal septula subdividing the chamber into secondary chamberlets, preseptal canal occupied by pillars; wall calcareous, porcelaneous; aperture cribrate, with numerous pores in the marginal zone of the apertural face, corresponding in position to the primary and secondary chamberlets. U. Cretaceous (Campanian); Spain; Greece; Yugoslavia.

PSEUDEDOMIA Henson, 1948

Plate 368, figs. 6-8; plate 369, figs. 1-8

Type species: Pseudedomia multistriata Henson, 1948; OD.

Pseudedomia Henson, 1948 (*1460), p. 95.

Praecosinella Emberger et al., 1955 (*1107), p. 113 (name not available, ICZN Art. 13 (a)(i), no description).

Sellialveolina Colalongo, 1963 (*617), p. 3; type species: *Sellialveolina viallii* Colalongo, 1963; OD.

Microspheric test globular to lenticular in the early stage, discoidal in the adult and up to 3.5 mm in diameter, early stage of about six planispiral and involute whorls, the last with over twenty chambers, chambers becoming progressively longer and strongly overlapping the preceding chambers until they become cyclical, chamber interior with central filling in the lower part, leaving open a narrow preseptal space occupied by pillars, increasing from a single pillar in the earliest chambers to many pillars confined to the equatorial plane, secondary partitions parallel to and perpendicular to the septa form small chamberlets; megalospheric test lenticular, up to 2.3 mm in diameter, proloculus followed by flexostyle and then by about seven whorls of up to seven chambers each; wall calcareous, imperforate, porcelaneous; aperture consists of numerous pores in the final chamber face, corresponding in position to the chamberlets. U. Cretaceous (Cenomanian to Maastrichtian); Qatar; Kuwait; Tunisia; Lebanon; Iraq; Israel; Italy; Portugal; Yugoslavia; Greece.

RAADSHOOVENIA van den Bold, 1946

Plate 371, figs. 1-4

Type species: Raadshoovenia guatemalensis van den Bold, 1946; OD.

Raadshoovenia van den Bold, 1946 (*279), p. 123.

Cuvillierinella Papetti and Tedeschi, 1965 (*2335), p. 120; type species: *Cuvillierinella salentina* Papetti and Tedeschi, 1965; OD.

Test elongate, early stage enrolled in various planes, then planispiral and involute with about three whorls, gradually increasing from two chambers per whorl to five chambers in the final whorl, adult uncoiled and rectilinear, with chambers nearly circular in section, massive endoskeleton of subepidermal septula producing marginal chamberlets and central pillars that fuse laterally to form central chamberlets opening into the preseptal space, residual pillars also present in the preseptal space; wall calcareous, imperforate, porcelaneous; aperture cribrate on a trematophore that may be supported by the residual pillars. U. Cretaceous (Campanian), ?L. Eocene; Guatemala; Spain; Italy; Greece.

Remarks: The Eocene age of the Guatemalan material from which the type species was described needs reinvestigation, inasmuch as other species of the genus are restricted to the Upper Cretaceous.

RHAPYDIONINA Stache, 1913

Plate 370, figs. 1-11

Type species: Peneroplis liburnica Stache, 1889 (*3057), p. 89; OD(M).

Rhapydionina Stache, 1913 (*3058), p. 661.

Rhipidionina Stache, 1913 (*3058), p. 661; type species: *Pavonina liburnica* Stache, 1889 (*3057), p. 85; OD(M).

Sutivania Radoičić, 1959 (*2504), p. 87; type species: *Sutivania likvae* Radoičić, 1959; OD.

Test with pronounced dimorphism, conical or cylindrical megalospheric test of circular section, up to 7 mm in length and 1.8 mm in diameter, megalospheric proloculus and enrolled flexostyle followed by four or five chambers in a single planispiral coil, adult uncoiled with up to twenty-five low cylindrical rectilinear chambers; tiny microspheric embryonal stage followed by uniserial, flabelliform and flattened adult, up to 10 mm in length and up to 7 mm in breadth, with strongly arched semicircular chambers, internal structure similar in both generations, peripheral region subdivided by vertical radial septula that may be present even in the coiled megalospheric juvenile stage and are aligned from chamber to chamber leaving a central preseptal space, prominent central thickening beneath the preseptal space extends to the preceding septum and is pierced by canals leading to the apertural openings, residual pillars present in the preseptal space above the central thickening; wall calcareous, imperforate, porcelaneous; aperture multiple, primary aperture a single basal opening in the early coil, later modified to form a circular row of openings at the margin of the central thickening between the radial septula, numerous secondary openings scattered over the central region of the domelike apertural face. U. Cretaceous (U. Cenomanian to Maastrichtian); Yugoslavia; Greece; Italy.

RIPACUBANA Loeblich and Tappan, 1964

Plate 371, figs. 5 and 6

Type species: Conulina conica d'Orbigny, 1839 (***2304**), p. 24; OD.

Ripacubana Loeblich and Tappan, 1964 (***1910**), p. C493 (nom. subst. pro *Conulina* d'Orbigny, 1839).

Conulina d'Orbigny, 1839 (***2304**), p. 24 (non *Conulina* Bronn, 1836); type species: obj.; OD(M).

Test elongate conical, 3 mm in length, early stage unknown as base of single known specimen broken, chambers numerous, low, broad, uniserial and rectilinear, interior subdivided by vertical radial and concentric partitions, sutures nearly horizontal; wall calcareous, porcelaneous?; aperture terminal, cribrate, numerous equidistant pores on the broad upper surface, opening into separate chamberlets. Holocene?, probably Cretaceous; Cuba.

Remarks: Described from beach sands of Cuba, it was regarded as a living species but the type specimen probably is a reworked Cretaceous fossil, perhaps synonymous with *Rhapydionina*. Discovery of additional specimens that can be sectioned is necessary for accurate placement.

Subfamily CRATERITINAE Saidova, 1981

Crateritinae Saidova, 1981 (***2696**), p. 34.

Test attached by a spreading base. Holocene.

CRATERITES Heron-Allen and Earland, 1924

Plate 371, figs. 7 and 8

Type species: Craterites rectus Heron-Allen and Earland, 1924; OD(M).

Craterites Heron-Allen and Earland, 1924 (***1474**), p. 611.

Test club-shaped, attached by a basal expansion, then narrowing slightly in a trunklike region of ten to twelve superimposed layers of polygonal chamberlets that are formed by numerous small vertical partitions, chamberlets increasing in number as the test gradually expands into a subglobular upper portion; wall calcareous, imperforate, porcelaneous?; aperture consisting of numerous rounded openings over the convex upper surface of the test that open into the small chamberlets, those of preceding layers remaining as intercameral foramina. Holocene; Lord Howe Island, South Pacific.

Remarks: The genus is represented by a single known specimen (BMNH ZF-3613) from between tidemarks on Middle Beach, E. side of Lord Howe Island. Additional material for sectioning is required to discern details of the internal structure.

Family ALVEOLINIDAE Ehrenberg, 1839

Alveolinidae Steinmann, 1881 (***3065**), p. 41, nom. corr. pro family Alveolinea.

Alveolinea Ehrenberg, 1839 (***1054**), table opp. p. 120.

Alveolina Eichwald, 1853 (***1084**), p. 2 (subfamily; nom. transl.).

Alveolinida Schultze, 1854 (***2824**), p. 53.

Borelida Schmarda, 1871 (***2781**), p. 165.

Alveolininae Brady, 1884 (***344**), p. 62 (subfamily).

Alveolinina Lankester, 1885 (***1790**), p. 847.

Alveolininae Delage and Hérouard, 1896 (***926**), p. 127.

Alveolinellidae Cushman, 1927 (***742**), p. 58.

Borelidinae Wiesner, 1931 (***3375**), p. 60, 75 (subfamily).

Borelidae Hanzawa, 1932 (***1399**), p. 36, 102.

Alveolinellinae Galloway, 1933 (***1205**), p. 148 (subfamily).

Fasciolitidae Eames et al., 1967 (***1037**), p. 319 (invalid, ICZN Art. 40, prior valid name based on junior synonym not to be replaced after 1960).

Alveolinellidae Saidova, 1981 (***2696**), p. 35.

Alveolinellinae Saidova, 1981 (***2696**), p. 35 (subfamily).

Test free, commonly large, globular, fusiform, or subcylindrical, coiled about elongate axis; proloculus followed by flexostyle, then quinqueloculine in microspheric juvenile stage, adult planispiral; chambers numerous, and divided by secondary partitions or septulae into one or more layers of chamberlets that parallel the direction of coiling; numerous apertures in one or more rows, or rarely fused into a slit. L. Cretaceous (Aptian) to Holocene.

ALVEOLINA d'Orbigny, 1826

Plate 372, figs. 1 and 3-6

Type species: Oryzaria boscii Defrance, in Bronn, 1825 (***418**), p. 44; SD H. Douvillé, 1907 (***984**), p. 585 (ICZN Z.N.(S.) 2356, petition pending).

Alveolina d'Orbigny, 1826 (***2303**), p. 306 (nom. conserv., ICZN Z.N.(S.) 2356, petition pending).

Fasciolites Parkinson, 1811 (***2355**), p. 158 (no species originally included): type species: *Fasciolites elliptica* Sowerby, 1840 (***3045**), p. 329: SD(SM) (nom. reject., ICZN Z.N.(S.) 2356, petition pending).

Alveolites Defrance, 1816 (***917**), p. 136 (non *Alveolites* Lamarck, 1801): type species: *Alveolites larva* Defrance, 1816; OD(M).

Oryzaria Defrance, in Bronn, 1825 (***418**), p. 30: type species: *Oryzaria boscii* Defrance, in Bronn, 1825; OD(M) (nom. reject., ICZN Z.N.(S.) 2356, petition pending).

Flosculina Stache, 1880 (***3056**), p. 199 (name not available, ICZN Art. 12 (a), no description).

Alveolina (Flosculina) Schwager, 1883 (***2832**), p. 102: type species: *Alveolina (Flosculina) decipiens* Schwager, 1883; SD Galloway, 1933 (***1205**), p. 151 (*Flosculina foliacea* Stache, 1880, designated as type species by Yabe and Hanzawa, 1929, ***3410**, p. 180, was a nomen nudum, and not among the species included when the genus was validated by description; *Alveolina subpyrenaica* var. *globosa* Leymerie, 1844, designated by Cushman, 1928, ***747**, p. 226, also was not among the original species included; hence Galloway's designation is valid).

Flosculina (Semiflosculina) Doncieux, 1905 (***968**), p. 124: no species named in original publication; type species: *Alveolina (Flosculina) decipiens* Schwager, 1883; here designated.

Alveolina (Fasciolites) A. Silvestri, 1928 (***2960**), p. 35 (nom. transl.).

Alveolina (Eoalveolinella) A. Silvestri, 1928 (***2960**), p. 35; type species: *Alveolina violae* Checchia-Rispoli, 1905 (***548**), p. 165; OD(M).

Borelis (Fasciolites) Yabe and Hanzawa, 1929 (***3410**), p. 180 (nom. transl.).

Borelis (Alveolina) Yabe and Hanzawa, 1929 (***3410**), p. 181 (nom. transl.).

Borelis (Flosculina) Yabe and Hanzawa, 1929 (***3410**), p. 180 (nom. transl.).

Flosculina (Checchiaites) Sorrentino, 1935 (***3029**), p. 137 (name not available, ICZN Art. 13 (b), no type species designated).

Flosculina (Checchiaites) Thalmann, 1936 (***3155**), p. 312 (validated by designation of type species): type species: *Flosculina daunica* Checchia-Rispoli, 1912 (***550**), p. 108; OD.

Fasciolites (Microfasciolites) Gaemers, 1978 (***1202**), p. 51; type species: *Oryzaria boscii* Defrance, in Bronn, 1825 (***418**), p. 44; OD (nom. reject., ICZN Z.N.(S.) 2356, petition pending).

Test ellipsoidal to fusiform or cylindrical, rarely spherical, coiling irregular in early stage of microspheric generation but regular throughout megalospheric generation, chambers rapidly increasing in width in successive whorls to result in progressive elongation of the test, numerous septula perpendicular to the septum and outer wall form many small chamberlets that alternate in position in successive chambers, several inner whorls may have extreme basal thickening of the wall that fills most of the chamber lumen, preseptal and postseptal passages present; aperture consisting of two rows of openings in the apertural face, alternating in position. U. Paleocene to U. Eocene; Europe; Asia; Africa.

ALVEOLINELLA H. Douvillé, 1907

Plate 373, figs. 1-3

Type species: Alveolina quoyi d'Orbigny, 1826 (***2303**), p. 307 (as *quoii*, nom. imperf.); OD.

Alveolinella H. Douvillé, 1907 (***984**), p. 585.

Alveolina (Alveolinella) A. Silvestri, 1928 (***2960**), p. 35 (nom. transl.).

Test elongate fusiform, increasing in proportionate length with growth, early coiling irregular in both generations, later planispiral, vertical septula forming numerous chamberlets, septula of adjacent chambers aligned, chambers in the adult further subdivided by horizontal floors into two or more layers of main chamberlets and an additional upper row of low chamberlets or attics, preseptal passages at the chamber floor laterally connect adjacent chamberlets of the same chamber, later whorls may also have smaller secondary preseptal passages; aperture multiple, of several longitudinal rows along the apertural face corresponding to the layers of chamberlets, and smaller openings leading into the outer narrower row of attics. Miocene to Holocene; Indo-Pacific.

ARCHAEALVEOLINA Fourcade, 1980

Plate 373, figs. 4-9

Type species: Ovalveolina reicheli De Castro, 1966 (*911), p. 8; OD.

Archaealveolina Fourcade, 1980 (*1160), p. 68.

Test subglobular, small, up to about 1 mm in diameter, globular megalospheric proloculus followed by flexostyle, early coiling irregular with one or two streptospiral volutions, then planispiral with few whorls that expand rather rapidly in height, early whorls with more than three chambers each that increase moderately in number per whorl with growth, septa oblique, sloping backward to the periphery, chambers subdivided by vertical septula aligned from chamber to chamber, preseptal space present; wall relatively thick, aperture a single row of keyhole-shaped openings in a groove near the base of the apertural face, each opening rounded near its base and tapering toward the upper part. L. Cretaceous (Aptian: Gargasian); Spain; Italy; Algeria.

BORELIS de Montfort, 1808

Plate 374, figs. 1-6; plate 375, figs. 1 and 2

Type species: Borelis melonoides de Montfort, 1808 = *Nautilus melo* Fichtel and Moll, 1798 (*1124), p. 123; OD.

Borelis de Montfort, 1808 (*2176), p. 170.

Clausulus de Montfort, 1808 (*2176), p. 178; type species: *Clausulus indicator* de Montfort, 1808 = *Nautilus melo* var. *α* Fichtel and Moll, 1798 (*1124), p. 118; OD.

Melonites Lamarck, 1812 (*1779), p. 122; type species: *Melonites sphaerica* Lamarck, 1816 (*1781), p. 469 = *Nautilus melo* Fichtel and Moll, 1798 (*1124); SD Children, 1823 (*586), p. 155.

Melonia Lamarck, 1822 (*1782) p. 615; type species: *Melonites sphaerica* Lamarck, 1816 (*1781) = *Nautilus melo* var. *δ* Fichtel and Moll, 1798 (*1124); SD Galloway, 1933 (*1205), p. 150.

Neoalveolina A. Silvestri, 1928 (*2960), p. 35; type species: *Alveolina bradyi* A. Silvestri, 1927 (*2959), p. 227 = *Nautilus melo* Fichtel and Moll, 1798; SD Bakx, 1932 (*108), p. 208.

Fasciolites (Borelia) Sorrentino, 1935 (*3029), p. 137 (invalid, ICZN Art. 13 (b), type not designated).

Test small, spherical to fusiform, dimorphism minor, early whorls nautiloid and streptospirally enrolled in both generations, septula aligned from chamber to chamber and may appear Y-shaped in axial section because of the alternately larger and smaller chamberlets and radial displacement of the smaller ones, preseptal passage present; apertures in a single row. U. Eocene to Holocene; Spain; Austria; Romania; Italy; Greece; Turkey; Israel; Iran; Algeria; Libya; Morocco; Egypt; Indonesia; Red Sea; Indian Ocean; tropical Atlantic; Caribbean.

Remarks: The specimen figured by Reichel (1937, *2541, pl. 10, fig. 8) from the middle Miocene (Tortonian) of Transylvania, Romania, was designated as the neotype for *Borelis melo* Fichtel and Moll (Smout, 1963, *3011, p. 265), hence the later designation of a specimen from the Miocene of the Vienna Basin as a neotype for *B. melo* (Rögl and Hansen, 1984, *2639, p. 71, pl. 30, figs. 1, 2) is invalid.

BULLALVEOLINA Reichel, 1936

Plate 375, figs. 3-8

Type species: Alveolina bulloides d'Orbigny, 1839 (*2304), p. 70 (syn.: *Alveolina bulloides* d'Orbigny, 1826, *2303, p. 306, name not available, ICZN Art. 12 (a), nom. nud.); OD.

Bullalveolina Reichel, 1936 (*2540), p. 140.

Test globular, tiny, with maximum diameter of 0.8 mm, early stage streptospirally enrolled and with two chambers per whorl, later planispiral, with rapidly enlarging whorls, septula and chamberlets alternate in position from chamber to chamber, large preseptal passage occupying about one-half the chamber, two to three rows of alveoles may lie in the posterior part of the chambers and communicate through intercameral foramina with the preseptal passage of the preceding chamber; aperture of three or more rows of small openings, the lower row leading into the main chamberlets, upper ones opening into the alveoles. Oligocene (Stampian); France; Italy.

CISALVEOLINA Reichel, 1941

Plate 376, figs. 1-5

Type species: Cisalveolina fallax Reichel, 1941; OD.

Cisalveolina Reichel, 1941 (*2542), p. 137; see also Reichel, 1942 (*2543), p. 255.

Test nautiloid, globular or ovoid, of medium size, 3 mm to 5 mm in maximum diameter, microspheric test streptospiral in the early stage and earliest megalospheric whorls also may be streptospiral, chamberlets produced by septula that alternate in position from chamber to chamber and extend nearly to the apertural face, appearing in face view almost to subdivide the long narrow aperture, large postseptal passages occupy the full height of the chamber, preseptal passage indistinguishable because of the large apertural opening; single aperture large and slitlike, extending from pole to pole, and may have a fluted upper rim. U. Cretaceous (Cenomanian); Italy; Yugoslavia; Greece; Israel; Iran.

FLOSCULINELLA Schubert, 1910

Plate 377, figs. 1-6

Type species: Alveolinella bontangensis L. Rutten, 1912 (*2674), p. 221; SD Cushman, 1928 (*747), p. 226 (as *Flosculina bontangensis*).

Alveolina (Flosculinella) Schubert, in Richarz, 1910 (*2626), p. 533.

Flosculinella Cushman, 1928 (*747), p. 226 (nom. transl.).

Borelis (Flosculinella) Yabe and Hanzawa, 1929 (*3410), p. 180 (nom. transl.).

Test globular in geologically earlier specimens, later ones ovate, about 1 mm in diameter, dimorphism not apparent, early whorls streptospiral, septula aligned from chamber to chamber, producing a layer of main chamberlets in each chamber, later whorls with floors forming a layer of smaller attics, in some the septula may bifurcate upward resulting in two supplementary chambers in the attic layer corresponding to a single main chamberlet. L. Miocene to Holocene; E. Africa; Indonesia; Saipan.

GLOMALVEOLINA Hottinger, 1962

Plate 372, fig. 2; plate 376, figs. 6 and 7

Type species: Alveolina dachelensis Schwager, 1883 (*2832), p. 95 (= *Alveolina* cf. *ovulum* Stache of Schwager, 1883, *2832, p. 95 = *Alveolina primaeva* Reichel, 1936, *2541, p. 88); OD.

Alveolina (Glomalveolina) Hottinger, 1962 (*1543), p. 44, 54.

Alveolina (Glomalveolina) Reichel, 1936 (*2541), p. 80 (name not available, ICZN Art. 13 (b)); type species: "*Alveolina ovulum* Stache, 1880" (name not available, ICZN Art. 12 (a), no description).

Fasciolites (Glomalveolina) Reichel, in Loeblich and Tappan, 1964 (*1910), p. C509 (nom. transl.).

Test small, globular to slightly ovate, dimorphism evident only in the juvenile, both generations with tiny proloculus followed by early streptospiral coiling, adult planispiral, numerous septula resulting in small chamberlets that alternate in position in successive chambers; wall and septula are thicker in the geologically older middle Paleocene species, but thinner with more reduced chamber lumina in upper Paleocene and Eocene species, thickness of basal layer about half the height of the whorl, not flosculinized; aperture multiple, a row of openings at the base of the apertural face, with smaller openings intercalated between these. M. Paleocene to M. Eocene; France; Spain; Italy; Greece; Libya; Egypt; Somalia; Turkey; Syria; Pakistan.

MULTISPIRINA Reichel, 1947

Plate 378, figs. 1 and 2; plate 379, figs. 1-5

Type species: Multispirina iranensis Reichel, 1947; OD.

Multispirina Reichel, 1947 (*2546), p. 2.

Test spherical, large, dimorphism prominent, microspheric test up to 6.5 mm in diameter, each of the numerous apertures in the early stage give rise to a distinct whorl, about six whorls beginning at separate apertures of the megalospheric proloculus, later with up to twelve intercalated spirals in the megalospheric adult, the much larger microspheric test attaining as many as twenty-five separate spirals, hence an equal number of apertural faces, chambers numerous, divided into chamberlets by the septula that are continuous from chamber to chamber, preseptal passages large, no postseptal canal observed; aperture a row of pores at the base of the exposed apertural face of each of the multiple spires. U. Cretaceous (Cenomanian); Iran.

OVALVEOLINA Reichel, 1936

Plate 380, figs. 1-6

Type species: Alveolina ovum d'Orbigny, 1850 (*2312), p. 185; OD.

Ovalveolina Reichel, 1936 (*2541), p. 69.

Test spherical to ovoid, coiling regularly planispiral, chambers short, numerous, septula widely spaced, short, subdividing only the back part of the chamber but continuing below the preseptal passages as low ridges on the floor to the base of the septum where they are continuous from chamber to chamber, chamberlets simple and commonly pyriform in section, preseptal passage large and circular in section; walls and partitions relatively thick; aperture consists of a single row of openings in the apertural face, without accessory openings. L. Cretaceous (Albian) to U. Cretaceous (Cenomanian); France; Spain; Portugal; N. Africa.

PRAEALVEOLINA Reichel, 1933

Plate 381, figs. 1-7

Type species: Praealveolina tenuis Reichel, 1933; OD.

Praealveolina Reichel, 1933 (*2539), p. 270.

Test ovoid to fusiform, large, up to 12 mm in length and 2 mm in diameter, dimorphism prominent, early coiling may be slightly irregular in the microspheric generation, septula appear immediately after the proloculus and are aligned from chamber to chamber, no postseptal passage, several rows of secondary chamberlets corresponding to an increase in the number of apertural pores form cellars below the preseptal passage of the main row of chamberlets in the microspheric generation or may be present in both generations, chamberlets of separate layers within one chamber interconnected by vertical radial passages that extend downward from the preseptal passage; apertures in a regularly arranged single row on the apertural face near the equator but increasing poleward to many rows of openings at the poles without intercalary pores. L. Cretaceous (U. Albian) to U. Cretaceous (Turonian); France; Spain; Portugal; Italy; Libya; Israel; Somalia; Iran; India.

PRAEBULLALVEOLINA Sirel and Acar, 1982

Plate 382, figs. 1-5

Type species: Praebullalveolina afyonica Sirel and Acar, 1982; OD.

Praebullalveolina Sirel and Acar, 1982 (*2988), p. 822.

Test small, ovoid to subspherical, no dimorphism observed, tiny spherical proloculus followed by a few streptospirally coiled whorls with undivided chambers, later whorls with septula and chamberlets alternating in position from chamber to chamber, septula complete from floor to roof of chamber, no postseptal passage, preseptal passage large and well developed, one or rarely two alternating rows of alveoles communicate with the preceding preseptal passage through secondary intercameral foramina; apertural face with one row of primary apertures and intercalated smaller secondary apertures. U. Eocene; Turkey.

QUASIBORELIS Hanzawa, 1967

Plate 379, figs. 6-8

Type species: Borelis gunteri Cole, 1941 (*622), p. 34; OD.

Quasiborelis Hanzawa, 1967 (*1412), p. 21.

Test small, up to 1.5 mm in diameter, nautiloid, proloculus large and globular, whorls few and expanding rapidly, septula continuous from chamber to chamber, chambers subdivided horizontally into tiers of chamberlets by one to five floors, preseptal canal high; aperture a row of openings in the apertural face (possible supplementary openings into the upper layers of chamberlets not described). Paleocene (Danian), Midwayan; USA: Florida.

SENALVEOLINA Fleury, 1984

Plate 383, figs. 1-6

Type species: Senalveolina aubouini Fleury, 1984; OD.

Senalveolina Fleury, 1984 (*1138), p. 183.

Test globular, up to 1.7 mm in diameter, distinct megalospheric and microspheric generations, early coiling streptospiral and test umbilicate, later planispiral and nautiloid, with numerous long low chambers per whorl, whorls at first enlarging very slowly but later whorls may expand more rapidly, spiraling septula aligned from chamber to chamber, crossing the chambers from front to back, leaving only narrow preseptal passages, septula of early whorls straight and simple but those of later chambers may be *Y*- or *H*-shaped, resulting in secondary floors and a second layer of chamberlets; wall calcareous, porcelaneous, walls and septula relatively thick. U. Cretaceous (L. Campanian); Greece.

SIMPLALVEOLINA Reichel, 1964

Plate 380, figs. 7-13

Type species: Praealveolina simplex Reichel, 1936 (***2541**), p. 67; OD.

Praealveolina (Simplalveolina) Reichel, in Loeblich and Tappan, 1964 (***1910**), p. C510.

Test small, ovoid to subspherical, megalospheric test about 1.5 mm to 2 mm in length, rare microspheric tests up to 2.25 mm, gradually increasing from about four chambers in the first whorl to thirteen in the adult, numerous septula aligned from chamber to chamber to form a single layer of chamberlets of oval section, no secondary chamberlets as in *Praealveolina*, preseptal canal of circular section; wall with basal layer thickened toward the poles to occupy almost the full height of the chamber; apertural face low, with a single row of rounded openings extending to the poles, accessory openings in the sutural groove at the posterior border of the chambers. U. Cretaceous (Cenomanian); France; Spain.

Remarks: In the original description of the type species, Reichel (1936, ***2541**) indicated four different specimens as "holotype" of *P. simplex*, an equatorial section of the A2 generation (pl. 8, fig. 9), an axial section of the A1 generation (pl. 8, fig. 5), an axial section of the A2 generation (pl. 8, fig. 8), and an axial section of the B generation (pl. 5, fig. 4 and pl. 8, fig. 12). As apparently none has yet been so indicated, we here designate as lectotype the microspheric individual represented by an axial section and illustrated by Reichel on both pl. 5, fig. 4 and pl. 8, fig. 12.

STREPTALVEOLINA Fourcade, Tardy, and Vila, 1975

Plate 384, figs. 1 and 2

Type species: Streptalveolina mexicana Fourcade et al., 1975; OD.

Streptalveolina Fourcade, Tardy, and Vila, 1975 (***1164**), p. 110.

Test globular, up to 1.3 mm in diameter, large thick-walled megalospheric proloculus followed by flexostyle, then with five streptospirally coiled and involute whorls, even the final whorl remaining slightly asymmetrical, with few chambers, six in the early whorl, up to ten in the final one, septa oblique, sloping back at the periphery, umbilicus slightly depressed, chambers subdivided by partial septula that are continuous from chamber to chamber, preseptal space present; multiple aperture consisting of a row of rounded openings at the base of the apertural face, corresponding to the chamberlets between septula. U. Cretaceous (L. Cenomanian); Mexico.

SUBALVEOLINA Reichel, 1936

Plate 384, figs. 3-6

Type species: Subalveolina dordonica Reichel, 1936; OD.

Subalveolina Reichel, 1936 (***2541**), p. 73.

Test spherical to fusiform, dimorphism prominent, coiling irregular in early whorls of microspheric test, regularly planispiral throughout in megalospheric test, septula alternating from chamber to chamber but the rapid insertion of additional septula with increased test length may obscure this and suggest no definite arrangment, irregular secondary chamberlets below the main floor in polar region, preseptal passage large, no postseptal passages, small alveoli alternate with proximal part of chamberlets and open into the preceding preseptal passage by the smaller intercalated upper row of openings; aperture a row of primary apertures alternating with smaller intercalated apertures. U. Cretaceous (U. Santonian to Campanian); France.

Superfamily SORITACEA Ehrenberg, 1839

Soritacea Haynes, 1981 (***1437**), p. 168, nom. corr. pro superfamily Soritinidea.

Soritinidea Saidova, 1981 (*2696), p. 34 (nom. imperf.), nom. transl. ex family Soritina.
Peneroplidea Saidova, 1981 (*2696), p. 33.
Meandropsinidea Saidova, 1981 (*2696), p. 33.
Orbitolitacea Loeblich and Tappan, 1982 (*1917), p. 31.

Wall porcelaneous, early stage pitted or perforate and less commonly may be perforate throughout growth; chambers planispiral, uncoiling, flabelliform, or cyclical, may be subdivided by interseptal partitions or pillars. U. Permian (U. Djulfian) to Holocene.

Family MILIOLIPORIDAE Brönnimann and Zaninetti, 1971

Milioliporidae Brönnimann and Zaninetti, in Brönnimann et al., 1971 (*415), p. 9.
Altinerinidae Senowbari-Daryan, Ciarapica, Cirilli, and Zaninetti, 1985 (*2870), p. 301 (nom. transl.).

Test free or attached, proloculus followed by tubular chambers arranged in various planes about a longitudinal axis; wall porcelaneous, perforate throughout ontogeny; aperture terminal. U. Permian (U. Djulfian) to U. Triassic (Rhaetian).

Subfamily GALEANELLINAE Zaninetti, Altiner, Dağer, and Ducret, 1982

Galeanellinae Zaninetti et al., 1982 (*3431), p. 97.

Test free, chambers cap shaped, biloculine in arrangement or may be irregular, especially in the adult; wall porcelaneous, outer chambers with large perforations oblique to the test surface that ramify and anastomose in the thickened outer part; aperture terminal, in center of imperforate base. U. Triassic (Carnian to Rhaetian).

BISPIRANELLA Samuel, Salaj, and Borza, 1981

Plate 385, figs. 1-4

Type species: Bispiranella subcarinata Samuel et al., 1981; OD.

Bispiranella Samuel, Salaj, and Borza, 1981 (*2726), p. 88.

Test free, ovate to fusiform in outline, up to 0.6 mm in greatest diameter, slightly biconcave, periphery rounded to subangular, large subspherical proloculus followed by elongate enrolled tubular second chamber of whorls added in planes 90° apart; wall calcareous, porcelaneous; aperture apparently circular at the end of the tubular chamber. U. Triassic (Carnian); Czechoslovakia.

GALEANELLA Kristan, 1958

Plate 385, figs. 5-14

Type species: Galea tollmanni Kristan, 1957 (*1734), p. 291; OD.

Galeanella Kristan, 1958 (*1735), p. 114 (nom. subst. pro *Galea* Kristan, 1957).
Galea Kristan, 1957 (*1734), p. 291 (non *Galea* Meuschen, 1787, nec Meyen, 1833, nec Moerch, 1852); type species: obj.; OD.

Test ovate in outline, planoconvex, commonly bordered by a flange or carina, spherical proloculus followed by a series of tubular chambers that are inflated at the base and narrow toward the aperture, chamber lumen much reduced in diameter by the very thick wall, early chambers two per whorl, enrolled in varying planes and possibly quinqueloculine, planispiral in the adult, coiling partly to wholly involute; wall calcareous, porcelaneous, thick, coarsely perforate, except for the imperforate flattened base and carina; aperture rounded, simple, approximately in the center of the flattened base and may be bordered by radiating grooves. U. Triassic (Norian to Rhaetian); Austria; Yugoslavia; Iran.

Subfamily ALTINERININAE Zaninetti, Ciarapica, Decrouez, and Miconnet, 1984

Altinerininae Zaninetti, Ciarapica, Decrouez, and Miconnet, 1984 (*3438), p. 15.

Test low conical to subspherical?, early enrolled stage trochospiral or streptospiral, evolute, then irregular and uncoiled; wall microgranular, probably originally porcelaneous, outer wall coarsely perforate in the adult; aperture basal to areal. U. Triassic (Norian or L. Rhaetian).

ALTINERINA Zaninetti, Ciarapica, Decrouez, and Miconnet, 1984

Plate 386, figs. 1-6

Type species: Altinerina meridionalis Zaninetti et al., 1984; OD.

Altinerina Zaninetti, Ciarapica, Decrouez, and Miconnet, 1984 (*3438), p. 15.

Test small, up to 0.3 mm in diameter, weakly conical to subspherical?, short early irregular trochospiral or streptospiral evolute coil, with sharp change of about 90° in plane of coiling by the penultimate whorl and final whorl partly covering the umbilicus, chambers oblong, broader than high, septa arcuate, prolonged into the elevated sutures as imperforate crests or spines possibly developed for attachment in the reef environment, although they may be septal remnants of an eroded outer whorl; wall appearing dark in transmitted light, microgranular, perhaps originally porcelaneous, outer wall coarsely perforate in the later stage, septa imperforate; aperture a long areal slit in the regularly coiled part, close to the base of the septum, but becoming areal and terminal after the change in plane of coiling in the adult stage. U. Triassic (Norian or L. Rhaetian): Sicily.

Subfamily ORTHOTRINACRIINAE
Zaninetti, Senowbari-Daryan, Ciarapica, and Cirilli, 1985

Orthotrinacriinae Zaninetti et al., 1985 (*3440), p. 297.

Early stage planispirally enrolled and involute, later evolute, with final chamber tending to uncoil and strongly tapered distally. U. Triassic (Carnian?, Norian to Rhaetian).

ORTHOTRINACRIA Zaninetti, Senowbari-Daryan, Ciarapica, and Cirilli, 1985

Plate 386, figs. 7 and 8

Type species: Galeanella expansa Zaninetti, Altiner, Dağer, and Ducret, 1982 (***3432**), p. 111; OD.

Orthotrinacria Zaninetti, Senowbari-Daryan, Ciarapica, and Cirilli, 1985 (*3440), p. 297.

Test ovate to elliptical, laterally compressed, with globular proloculus followed by planispirally enrolled chambers one-half coil in length, coiling involute, in the final stage tending to uncoil and be evolute, chambers widest proximally and tapering distally, the final chamber with long tubular distal portion, terminally expanding at the everted apertural rim; wall calcareous, porcelaneous, perforate, but commonly recrystallized, surface of the final chamber may be transversely wrinkled; aperture terminal, single, with everted rim. U. Triassic (Carnian?, Norian to Rhaetian); Turkey; Italy: Sicily; Yugoslavia.

Subfamily PSEUDOCUCURBITINAE
Zaninetti, Altiner, Dağer, and Ducret, 1982

Pseudocucurbitinae Zaninetti, Altiner, Dağer, and Ducret, 1982 (*3431), p. 97.

Test free, initial coiled stage followed by amphoralike chambers in more or less rectilinear series; wall porcelaneous, perforated, thick distally, thinning to the imperforate neck of the central terminal aperture, chambers enveloped by thick secondary mass that is perforated like the chamber walls. Triassic (Carnian to Rhaetian).

Remarks: Although the type genus is regarded as a synonymn of *Cucurbita*, the original family group name remains valid (ICZN Art. 40 (a)).

CUCURBITA Jablonský, 1973

Plate 387, figs. 11-13; plate 388, figs. 1-5

Type species: Cucurbita infundibuliformis Jablonský, 1973; OD.

Cucurbita Jablonský, 1973 (*1595), p. 420 (non *Cucurbita* Mergerle MS.; Scudder, 1882; nom. nud.).

Paratintinnina Borza and Samuel, 1977 (*310), p. 143 (name not available, ICZN Art. 13(a)(i), and 13(b); no description of genus, two species described, type species not designated).

Pseudocucurbita Borza and Samuel, 1978 (*311), p. 69; type species: *Pseudocucurbita globosa* Borza and Samuel, 1978 = *Cucurbita infundibuliformis* Jablonský, 1973; OD.

Paratintinnina Samuel and Borza, 1981 (*2725), p. 73; type species: *Paratintinnina tintinniformis* Borza and Samuel, 1977 (*310), p. 143; OD.

Elongate campanulate, flasklike, or amphora-shaped chambers forming a rectilinear to arcuate series, each rounded to apiculate at the base, then may be somewhat constricted, and finally flaring broadly into a wide recurved collar around the aperture; wall porcelaneous, commonly recrystallized as micritic calcite, may be coarsely perforate; aperture large, terminal, rounded, bordered by a broad collar, flange, or lip that may be recurved at the outer edge. U. Triassic (Carnian to Rhaetian); Czechoslovakia; Sicily; Greece.

Remarks: The previous use of *Cucurbita* for a mollusc was only a nomen nudum in a manuscript, hence does not preoccupy the present genus.

URNULINELLA Borza and Samuel, 1977

Plate 388, figs. 6–9

Type species: Urnulinella andrusovi Borza and Samuel, 1977; OD.

Urnulinella Borza and Samuel, 1977 (*309), p. 118.

Test robust, up to 0.8 mm in length, large proloculus followed by up to four, rapidly enlarging, globular to flasklike chambers, rectilinear to somewhat irregularly uniserial; wall calcareous, of micritic calcite, probably originally porcelaneous; aperture terminal, wide, with distinctly recurved flangelike collar. U. Triassic (Carnian); Czechoslovakia; Greece.

Subfamily MILIOLIPORINAE Brönnimann and Zaninetti, 1971

Milioliporinae Zaninetti, Altiner, Dağer, and Ducret, 1982 (*3431), p. 96, nom. transl. ex family Miliolipondae.

Test free or attached, elongate chambers in irregular, quinqueloculine or biloculine arrangement; wall thin, porcelaneous, that of outer chambers thicker and traversed by regularly distributed large perforations that are oblique to the test surface; aperture terminal, simple. U. Triassic (Carnian to Rhaetian).

MILIOLIPORA Brönnimann and Zaninetti, 1971

Plate 389, figs. 1–6

Type species: Miliolipora cuvillieri Brönnimann and Zaninetti, 1971; OD.

Miliolipora Brönnimann and Zaninetti, in Brönnimann, Zaninetti, Bozorgnia, Dashti, and Moshtaghian, 1971 (*415), p. 10.

Test elongate fusiform, up to 0.5 mm in length, proloculus followed by about six or seven tubular chambers, widest at the base and tapering distally, each one-half coil in length in quinqueloculine arrangement; wall calcareous, porcelaneous, thick, with large and uniformly distributed perforations throughout; aperture terminal, at the constricted end of the chamber, successive apertures at opposite ends of the test. U. Triassic (U. Norian to Rhaetian); Austria; Czechoslovakia; Iran.

OPHTHALMIPORA Zaninetti and Brönnimann, 1972

Plate 389, figs. 7 and 8

Type species: Ophthalmipora dolomitica Zaninetti and Brönnimann, 1972; OD.

Ophthalmipora Zaninetti and Brönnimann, 1972 (*3435), p. 615.

Test ovoid in outline, lenticular to flattened in section, up to 0.5 mm in greatest dimension, spherical proloculus followed by tubular chambers one-half coil in length, widest at the base and tapering toward the aperture, coiling planispiral and involute in the early stage, later with change in coiling axis or slight variation in coiling, appearing weakly sigmoid in section; wall calcareous, porcelaneous, coarsely perforate; aperture terminal, simple. U. Triassic (Carnian); Italy.

Subfamily KAMURANINAE Trifonova, 1984

Kamuraninae Trifonova, 1984 (*3225), p. 54.

Test free, proloculus followed by streptospirally enrolled undivided tubular second chamber, later coiling planispiral and involute; wall calcareous, porcelaneous, perforate; aperture terminal, simple. U. Permian (U. Djulfian) to L. Triassic (Campilian).

KAMURANA Altiner and Zaninetti, 1977

Plate 390, figs. 1 and 2

Type species: Kamurana bronnimanni Altiner and Zaninetti, 1977; OD.

Kamurana Altiner and Zaninetti, 1977 (*30), p. 2.

Test free, large, up to 2.5 mm in diameter, spherical to ovoid, globular proloculus followed by undivided enrolled tubular second chamber, plane of coiling may be irregular, oscillating, or sigmoidal; wall calcareous, porcelaneous, coarsely perforate in the adult; aperture terminal, simple. U. Permian (U. Djulfian) to L. Triassic (Campilian); Turkey; Bulgaria.

Family SIPHONOFERIDAE Senowbari-Daryan and Zaninetti, 1986

Siphonoferidae Senowbari-Daryan and Zaninetti, 1986 (*2871), p. 84.

Test consisting of a streptospirally coiled tube, later uncoiled and rectilinear, with surrounding stack of ringlike chambers; wall porcelaneous, nonperforate in early whorls. U. Triassic (Norian).

SIPHONOFERA Senowbari-Daryan, 1983

Plate 388, figs. 10-19

Type species: Siphonofera pilleri Senowbari-Daryan, 1983; OD.

Siphonofera Senowbari-Daryan, 1983 (*2868), p. 214 (also err. cit. as *Siphonophera*, p. 214, and as *Siphonella*, p. 215).

Test small, up to 0.5 mm in length, consisting of a long undivided tube, streptospirally coiled in the early stage, later uncoiled, rectilinear, and surrounded by a stack of ringlike chambers; wall calcareous, micritic; aperture at the open end of the tube, bordered by a flared and umbellate collar that may represent a stage in the development of the ringlike chambers. U. Triassic (Norian); Italy: Sicily.

Family PENEROPLIDAE Schultze, 1854

Peneroplidae Reuss, 1860 (*2581), p. 151, nom. transl. ex subfamily Peneroplida.
Peneroplida Schultze, 1854 (*2824), p. 53 (subfamily).
Cristellarida Schultze, 1854 (*2824), p. 53 (subfamily).
Peneroplideae Reuss, 1860 (*2581), p. 217.
Cristellaridae Reuss, 1860 (*2581), p. 151, 205.
Peneroplidea Reuss and Fritsch, 1861 (*2593), p. 2.
Cristellaridea Reuss and Fritsch, 1861 (*2593), p. 3.
Cristellarideae Gümbel, 1870 (*1337), p. 54.
Peneroplida Schmarda, 1871 (*2781), p. 165.
Cristellarida Schmarda, 1871 (*2781), p. 165.
Peneroplidee Schwager, 1876 (*2829), p. 483.
Cristellaroidi Schwager, 1876 (*2829), p. 477.
Cristellaroidea Schwager, 1877 (*2830), p. 19.
Peneroplidina Bütschli, in Bronn, 1880 (*421), p. 190.
Peneroplidinae Brady, 1884 (*344), p. 62 (subfamily).
Cristellarinae Rhumbler, 1895 (*2616), p. 91 (subfamily).
Peneroplinae Delage and Hérouard, 1896 (*926), p. 124.
Peneroplididae Lister, in Lankester, 1903 (*1791), p. 143.
Peneroplinae Cushman, in Eastman, 1913 (*1043), p. 39 (subfamily).
Spirolininae Cushman, 1927 (*742), p. 54 (subfamily).
Cristellariidae Wedekind, 1937 (*3355), p. 97.
Dendritininae Saidova, 1981 (*2696), p. 33 (subfamily).

Test close coiled in the early stage, later may be uncoiled or chambers may become annular, chamber interior simple and not subdivided into chamberlets; wall porcelaneous, proloculus and a few juvenile chambers may be perforate, but adult test wall imperforate; aperture rounded, slitlike, dendritic, or a series of pores. U. Cretaceous (Coniacian) to Holocene.

ARCHIACINA Munier-Chalmas, 1878

Plate 390, figs. 3-6

Type species: Cyclolina armorica d'Archiac, in Tournouër, 1868 (*3218), p. 376; OD.

Archiacina Munier-Chalmas, in Vasseur, 1878 (*3260), p. 1049 (name available; ICZN Art. 12 (b)(5); also see Munier-Chalmas, 1879, *2204, p. 445).

Test large, up to about 10.0 mm in diameter, flattened and discoid, early chambers broad and low, planispirally enrolled and semi-involute, later chambers increasing rapidly in breadth and test becoming peneropline, adult with as many as eighteen cyclical chambers, interior simple; wall calcareous, porcelaneous, thin, surface smooth; aperture of numerous rounded to oval openings in a single row on the apertural face in the early stage but in two rows on the periphery in the adult. Oligocene (Stampian); France; Romania.

COSCINOSPIRA Ehrenberg, 1839

Plate 390, figs. 7-10

Type species: Coscinospira hemprichii Ehrenberg, 1839; SD Loeblich and Tappan, 1964 (*1910), p. C484.

Coscinospira Ehrenberg, 1839 (*1054), p. 110, 131, table opp. p. 120.

Cribrospirolina Haman, 1972 (*1368), p. 111; type species: *Cribrospirolina distinctiva* Haman, 1972 = *Coscinospira hemprichii* Ehrenberg, 1839; OD.

Test free, spiroline, large, up to 2.2 mm in length, slightly flattened, early stage planispirally enrolled and evolute with numerous chambers per whorl, biumbilicate, later uncoiling with up to six inflated rectilinear chambers, sutures radial and straight to slightly arched in the coiled stage, horizontal in the uncoiled part; wall calcareous, porcelaneous, surface longitudinally finely striate; aperture terminal, cribrate, of numerous rounded pores centered in the terminal face. Holocene; Red Sea; Saudi Arabia.

Remarks: Differs from *Spirolina*, with which it has previously been included, in having a multiple rather than single aperture.

DENDRITINA d'Orbigny, 1826

Plate 391, figs. 1-6

Type species: Dendritina arbuscula d'Orbigny, 1826; SD Cushman, 1927 (***746**), p. 189.

Dendritina d'Orbigny, 1826 (***2303**), p. 285.

Pelorus de Montfort, 1808 (***2176**), p. 22 (nom. suppress., ICZN ZN(S) 2225/4, petition pending; type species: *Nautilus ambiguus* Fichtel and Moll, 1798 (***1124**), p. 62.

Peneroplis (Dendritina) d'Orbigny, 1839 (***2304**), p. 37, 58 (nom. transl.).

Spirolina (Dendritina) Schwager, 1883 (***2832**), p. 91 (nom. transl.).

Meneghinia O. Silvestri, 1889 (***2973**), p. 53 (non *Meneghinia* Fucini, 1931); type species: *Meneghinia nautiliformis* O. Silvestri, 1889; OD(M).

Neopeneroplis Didkovskiy, 1958 (***954**), p. 1252; type species: *Neopeneroplis sarmaticus* Didkovskiy, 1958; OD.

Test planispirally enrolled and involute, numerous chambers per whorl, sutures radial, may be slightly arcuate; wall calcareous, porcelaneous, surface with numerous striae aligned with the direction of coiling; aperture in the adult areal, dendritic, and complexly branched. M. Eocene (Lutetian) to Holocene; Europe; West Indies; Bermuda.

Remarks: Discovery and redescription of the original type specimens of Fichtel and Moll (Rögl and Hansen, 1984, ***2639**) showed *Nautilus ambiguus* to be congeneric with *Dendritina arbuscula* and not a synonym of *Elphidium* as it had been considered by d'Orbigny, 1826, and later workers. Thus a petition was submitted to the ICZN for suppression of *Pelorus* and recognition of *Dendritina* as the valid name for the present genus.

LAEVIPENEROPLIS Šulc, 1936

Plate 392, figs. 1-11

Type species: Peneroplis karreri Wiesner, 1923 (***3374**), p. 95, 96, nom. superfl. = *Peneroplis planatus* var. *laevigatus* Karrer, 1868 (***1653**), p. 153 (non *Peneroplis laevigata* Fornasini, 1904); OD.

Laevipeneroplis Šulc, 1936 (***3085**), p. 161.

Puteolus Hofker, 1950 (***1496**), p. 394 (non *Puteolus* Monterosato, 1888); type species: *Peneroplis proteus* d'Orbigny, 1839 (***2304**), p. 60; OD.

Puteolina Hofker, 1952 (***1501**), p. 450 (nom. subst. pro *Puteolus* Hofker, 1950); type species: obj.; OD.

Palaeopeneroplis Hofker, 1964 (***1516**), p. 57 (also as *Paleopeneroplis*, p. 57, 63); type species: *Palaeopeneroplis inornatus* Hofker, 1964; OD.

Test nautiloid in the early stage, numerous low chambers in a close flat trochospiral or planispiral coil, later uncoiling, laterally compressed and flaring, with chambers progressively broader and more arched although increasing very little in height, interior of chambers undivided, sutures depressed; wall calcareous, porcelaneous, that of earliest chambers perforate, surface of the adult smooth and unornamented other than having very fine pseudopores; aperture in the early coil may consist of a row of pores near the base of the apertural face, becoming centrally arched as the chambers increase in size, then with two rows of pores up the apertural face, and in the final uncoiled stage may have two offset rows of pores or a single row. Miocene to Holocene; cosmopolitan.

Remarks: The genus *Laevipeneroplis* was erected to include species with smooth surface and undivided interior, the type species being designated as *Peneroplis karreri* Wiesner. Wiesner (1923, ***3374**) had proposed a new name for *Peneroplis planatus* var. *laevigatus* Karrer, 1868, believing it to be a junior synonym of *Peneroplis laevigatus* d'Orbigny. However, the latter was a nomen nudum in d'Orbigny, (1826, ***2303**, p. 286) and not validated until Fornasini (1904, ***1153A**) gave a description of the species together with the publication of the illustrations from d'Orbigny's "Planches Inedites." Thus Karrer's name for the species has priority over that of Wiesner, and the type species correctly is cited as *Laevipeneroplis laevigatus* (Karrer).

Although *Puteolina* and *Palaeopeneroplis* were described as more inclusive by Hofker, the type species is congeneric with that of *Laevipeneroplis*, and the genera are regarded as synonymous.

MONALYSIDIUM Chapman, 1900

Plate 391, figs. 9 and 10

Type species: Peneroplis (Monalysidium) sollasi Chapman, 1900; SD Cushman, 1927 (***746**), p. 189.

Peneroplis (Monalysidium) Chapman, 1900 (*529), p. 3.
Monalysidium Cushman, 1927 (*746), p. 189 (nom. transl.).
Dendritina (Monalysidium) Hofker, 1951 (*1497), p. 238 (nom. transl.).

Test small, with relatively large planispiral coil, consisting of about nine ovoid chambers, later uncoiling and rectilinear, with short inflated chambers, sutures distinct and constricted, radial in the coiled stage, horizontal in the rectilinear stage; wall calcareous, porcelaneous, thin, surface smooth, distinctly punctate; aperture terminal, simple, circular, bordered by an everted lip with fimbriate or scalloped margin. Holocene; S. Pacific.

Remarks: No type species was originally designated for *Monalysidium:* in the text *Peneroplis (Monalysidium) sollasi* was indicated as subgen. et. sp. nov. and *P. (M). politus* only as sp. nov., but on the plate description, both were indicated as subgen. et sp. nov. Ellis and Messina (1940, ***1102**, suppl.) regard *Nautilus lituus* Gmelin as the type, as Chapman had stated that the subgenus was "intended to comprise the long delicate crosier-shaped specimens of which *'Nautilus lituus'* Gmelin, is the type." However, "a genus contains only species (abstract concepts), not individual specimens" (R. V. Melville, Secretary, ICZN, personal communication, 26 February, 1985), hence this is not a type designation and the subsequent designation by Cushman, 1927, of *M. sollasi* as type stands.

PENEROPLIS de Montfort, 1808

Plate 391, figs. 7, 8, 11 and 12

Type species: Nautilus planatus Fichtel and Moll, 1798 (*1124), p. 91; OD.

Peneroplis de Montfort, 1808 (*2176), p. 258.
Cristellaria Lamarck, 1816 (*1781), p. 14; type species: *Cristellaria squammula* Lamarck, 1822 (*1782), p. 607, nom. superfl., = *Nautilus planatus* Fichtel and Moll, 1798, obj.; SD Children, 1823 (*586), p. 117 (p. 153).

Test compressed, early stage planispirally enrolled and involute, later chambers rapidly increasing in breadth and strongly arched but of nearly constant height resulting in a flaring test, interior of chambers not subdivided, sutures slightly depressed; wall calcareous, porcelaneous, perforate in the juvenile stage, later imperforate, surface with numerous striae or grooves alternating with fine ribs aligned parallel to the test periphery, fine pseudopores commonly present in the grooves between the surface ribs; aperture in the adult consisting of a linear or alternating series of large, circular to oval or irregular pores, each bordered by a distinct elevated lip. Miocene to Holocene; cosmopolitan.

RENULINA Lamarck, 1804

Plate 393, figs. 1 and 2

Type species: Renulina opercularia Lamarck, 1804; OD(M).

Renulina Lamarck, 1804 (*1778), p. 353 (non *Renulina* de Blainville, 1825, nec Blake, 1876).
Renulites Lamarck, 1804 (*1778), p. 353 (nom. superfl.); type species: obj.; SD Children, 1823 (*586), p. 116 (p. 152).

Test flattened, proloculus followed by tubular chamber of a full whorl in length, chambers then gradually shortened to two or three per whorl, close coiled and planispiral at first, later expanding rapidly in height and breadth, and flaring to form an almost flabelliform test, although the chambers continue to touch the early coil and do not uncoil or become rectilinear, interior of chambers simple and undivided; wall porcelaneous, surface smooth; aperture a single elongate and narrow terminal slit extending across the terminal face of the final chamber. M. Eocene (Lutetian); France.

SPIROLINA Lamarck, 1804

Plate 393, figs. 3 and 4

Type species: Spirolina cylindracea Lamarck, 1804; SD Cushman, 1927 (*744), p. 125.

Spirolina Lamarck, 1804 (*1778), p. 244.
Spirolinites Lamarck, 1804 (*1778), p. 245 (nom. superfl.); type species: obj.; SD Children, 1823 (*586), p. 115 (p. 151).
Peneroplis (Spirolina) d'Orbigny, 1839 (*2304), p. 62 (nom. transl.).
Coscinospira (Spirolina) Ehrenberg, 1839 (*1054), pl. 2 (nom. transl.).
Spirulina Ehrenberg, 1843 (*1061), p. 167 (err. cit.; non *Spirulina* Bory, 1826).

Test large, elongate, crosier shaped, early chambers planispirally enrolled and biumbilicate, later uncoiling and rectilinear, with short barrel-like chambers, interior simple and undivided; wall calcareous, porcelaneous, surface ornamented with numerous longitudinal costae; aperture terminal, rounded. Eocene to Holocene; cosmopolitan in warm seas.

VANDENBROECKIA Marie, 1958

Plate 393, figs. 9-13

Type species: Vandenbroeckia munieri Marie, 1958; OD.

Vandenbroeckia Marie, 1958 (***2040**), p. 128 (nom. imperf. as *Vandenbroekia*).

Vandenbroeckia Ellis and Messina, 1940 (***1102**) [supplement for 1962, no. 1] (nom. corr.).

Test large, compressed, planispirally enrolled in the early stage, chambers rapidly increasing in breadth but very little in height, so that the test becomes flabelliform, later chambers cyclical and the test discoidal, interior of chambers simple and undivided; wall calcareous, porcelaneous, surface may have fine longitudinal striae in the early coiled stage that are radial in the discoidal adult; aperture a row of circular perforations on the periphery. U. Cretaceous (Senonian): France.

Family MEANDROPSINIDAE Henson, 1948

Meandropsinidae Henson, 1948 (***1460**), p. 77.

Meandropsininae Sigal, in Piveteau, 1952 (***2413**), p. 202 (subfamily).

Broekininae Marie, 1958 (***2040**), p. 128 (subfamily; nom. imperf., recte Broeckininae).

Early stage planispirally enrolled; later may be uncoiled and flaring, operculiform, flabelliform, cylindrical, conical, or discoidal; marginal zone of chambers with interseptal pillars or septula; aperture multiple, in one or more rows. U. Cretaceous (Cenomanian) to M. Paleocene.

AYALAINA Seiglie, 1961

Plate 393, figs. 5-8

Type species: Meandropsina? rutteni Palmer, 1934 (***2326**), p. 252; OD.

Ayalaina Seiglie, 1961 (***2842**), p. 346.

Test lenticular, laterally compressed, periphery narrowly rounded, up to 2.2 mm in diameter, involute, but may be slightly depressed centrally, chambers numerous, up to twenty-five in the final whorl, low and wide, increasing rapidly in breadth as added to result in a flaring test, septa strongly arched, interior of chambers subdivided by numerous complete vertical septula, up to sixty or more in the final chambers, commonly aligned from chamber to chamber, secondary septula may be intercalated near the outer walls but do not project into the central region of the chambers and may only cross half the height of the chambers; wall porcelaneous, thin and delicate; aperture consists of numerous areal pores in a row across the base of the apertural face and extending up the center. U. Cretaceous (Campanian to Maastrichtian): Cuba.

BROECKINA Munier-Chalmas, 1882

Plate 394, figs. 1-8; plate 395, figs. 1-3

Type species: Cyclolina dufrenoyi d'Archiac and Haime, in d'Archiac, 1854 (***67**), p. 205; OD.

Broeckina Munier-Chalmas, 1882 (***2206**), p. 471.

Praesorites H. Douvillé, 1902 (***981**), p. 291; type species: *Praesorites moureti* H. Douvillé, 1902; OD.

Orbitolites (Praesorites) Hofker, 1952 (***1502**), p. 105 (nom. transl.).

Test discoidal, megalospheric test up to 4 mm, microspheric one up to 12.5 mm in diameter, early stage planispiral, later chambers annular, early chambers of the microspheric test subdivided internally by rudimentary radial septula, septula less distinct and may be incomplete in the megalospheric test; wall calcareous, porcelaneous, surface ornamented with fine radial striae; megalospheric test consisting of a single row of ovate to slitlike apertural pores in the median plane, in the microspheric test the pores may be centrally constricted and finally form two separate rows, in the adult the pores may be irregular both in shape and arrangement. U. Cretaceous (Cenomanian to Maastrichtian): France; Syria.

Remarks: Although the type species *Cyclolina dufrenoyi* is commonly credited to d'Archaic, the original description (d'Archaic, 1854, *67, p. 205, footnote 2, stated "Nous devons la détermination et la description des rhizopodes, des polypiers et des échinodermes à l'obligeante et savante collaboration de M. Jules Haime." Thus authorship of the type species is credited to d'Archiac and Haime, in d'Archiac (1854).

H. Douvillé (1902, ***981**, p. 306) designated the specimen that he figured on plate 9, fig. 3, as "le type du genre et de l'espece *(Praesorites Moureti).*" This specimen, the holotype, was deposited in the collection of l'Ecole des Mines, Paris, and was studied and redrawn by us in 1953 (Loeblich and Tappan, 1964, ***1910**, fig. 374, *3*, p. C487). Although fragmentary, it shows both the external and internal features of the test. Designation of a lectotype for *Praesorites moureti* by Smout (1963, ***3011**, p. 264) thus is invalid as there is no indication that the holotype has been lost, and if it had been, Smout's specimen could only have been designated as a neotype, not a lectotype.

FALLOTIA H. Douvillé, 1902

Plate 396, figs. 1-9

Type species: Fallotia jacquoti H. Douvillé, 1902; OD.

Fallotia H. Douvillé, 1902 (***981**), p. 298.

Fascispira A. Silvestri, 1940 (***2969**), p. 230; type species: *Fascispira colomi* A. Silvestri, 1940; OD.

Test lenticular, planispirally enrolled and involute, globular proloculus followed by a whorl of about five or six undivided chambers, chambers then increase rapidly in breadth but not in height, with many per whorl, laterally strongly embracing the earlier whorls and may become slightly meandriform at their umbilical extremity, septa oblique, particularly so in later whorls, chambers subdivided by many radially arranged septula, those of successive chambers aligned; wall calcareous, porcelaneous, surface may have fine striae paralleling the septa; aperture multiple, a row of pores at the base of the apertural face. U. Cretaceous (Santonian); France; Spain.

HOTTINGERINA Drobne, 1975

Plate 395, figs. 4-8

Type species: Hottingerina lukasi Drobne, 1975; OD.

Hottingerina Drobne, 1975 (***1006**), p. 244.

Test lenticular, up to 2 mm in diameter, globular proloculus followed by about four to six rapidly enlarging whorls, each with numerous chambers, planispiral and involute in the early stage, later may have a slight umbilical depression and tend to uncoil in the final stage, interior of chambers subdivided by thin subepidermal septula that project downward from the chamber roof; outer wall and septula thin, septa massive; wall calcareous, porcelaneous, surface smooth; aperture simple, a single basal triangular opening, bordered with an everted lip. M. Paleocene; Yugoslavia.

LARRAZETIA Ciry, 1964

Plate 397, figs. 1 and 2; plate 398; plate 399, figs. 1 and 2

Type species: Meandropsina larrazeti Munier-Chalmas, in Schlumberger, 1898 (***2769**), p. 339; OD.

Larrazetia Ciry, 1964 (***606**), p. 194.

Test discoidal to slightly biconvex, large, up to 20 or more mm in diameter, early stage with planispiral equatorial layer of chambers, flanked on both sides in the axis of coiling by a relatively large spherical polar capsule of clear homogeneous calcite, later chambers annular and concentric, a thick equatorial layer of chambers covered on both sides by thin layers of meandriform chambers, chambers of both inner and outer layers subdivided into tiny chamberlets by incomplete vertical septula that allow communication between adjacent chamberlets; wall calcareous, microgranular, imperforate, probably originally porcelaneous; aperture of small pores on the periphery. U. Cretaceous (Campanian to L. Maastrichtian); Spain; France.

MEANDROPSINA Munier-Chalmas, 1898

Plate 399, figs. 3-7

Type species: Meandropsina vidali Schlumberger, 1898 (***2769**), p. 337; SD Cushman, 1928 (***747**), p. 220.

Meandropsina Munier-Chalmas, in Schlumberger, 1898 (***2769**), p. 336.

Cyclomeandropsina Henson, 1950 (***1461**), p. 5, 18 (name not available, ICZN Art. 13 (a)(i), not described).

Test large, discoidal, up to about 17 mm in diameter and 0.5 mm in thickness, early stage planispirally enrolled with rapidly enlarging spire, chambers of almost constant height although rapidly increasing in breadth to become peneropline and finally cyclic, interior subdivided by numerous incomplete vertical septula, aligned in successive chambers, lateral part of chambers becoming very irregular and forming meandriform ridges on the test surface; wall calcareous, imperforate; aperture multiple, of numerous rows of pores on the periphery. U. Cretaceous (Senonian); Spain; Iran.

NUMMOFALLOTIA Barrier and Neumann, 1959

Plate 400, figs. 1-6

Type species: Nonionina cretacea Schlumberger, 1900 (*2771), p. 460 (syn.: *Goupillaudina sanctipetri* Marie, 1958, *2039, p. 869); OD.

Nummofallotia Barrier and Neumann, 1959 (*143), p. 228.

Test lenticular, planispirally enrolled, periphery rounded to subangular, globular proloculus followed by short flexostyle, then with evolutely coiled early whorls of regularly enlarging chambers, adult involute, septa slightly oblique and slope backward at the periphery; wall calcareous, porcelaneous, but with umbonal plug of varied size appearing hyaline and fibrous; aperture triangular at the base of the apertural face and may have been provided with a tooth. U. Cretaceous (Coniacian to Maastrichtian); Spain; France; Netherlands.

Remarks: The umbonal plug that may be detached from the test in preservation was described by Schlumberger (1900, *2771) but was regarded by Barrier and Neumann (1959, *143) as an artifact of preservation due to recrystallization. Bilotte and Decrouez (1979, *241, p. 38) discuss similar fibrous calcite axial "buttons" in *Meandropsina* and *Larrazetia*, concluding that this structure also is of primary origin in *Nummofallotia*.

PASTRIKELLA Cherchi, Radoičić, and Schroeder, 1976

Plate 400, figs. 7 and 8; plate 401, figs. 1-4

Type species: Broeckina (Pastrikella) balcanica Cherchi et al., 1976; OD.

Broeckina (Pastrikella) Cherchi, Radoičić, and Schroeder, 1976 (*561), p. 36 (also err cit. as *Broeckina (Patrikella)*, p. 36).

Test large, discoidal, flat to slightly biconcave, megalospheric test up to 3 mm in diameter, with circular to oval proloculus, flexostyle and undivided crescentic vestibular chamber having numerous openings into the first postembryonal chamber, microspheric test up to nearly 6 mm in diameter, earliest postembryonal chambers arcuate and planispiral, later chambers annular, interior subdivided by regularly arranged septula; wall calcareous, porcelaneous, surface with fine radial striae; aperture multiple, with circular or slitlike pores aligned in the median plane of the test. U. Cretaceous (M. to U. Cenomanian); Yugoslavia; France.

PEROUVIANELLA G. Bizon, J. J. Bizon, Fourcade, and Vachard, 1975

Plate 402, figs. 1-8

Type species: Orbiculina peruviana G. Steinmann, 1930 (*3066), p. 152.

Archaias (Perouvianella) G. Bizon, J. J. Bizon, Fourcade, and Vachard, 1975 (*245), p. 1157.

Test lenticular to discoidal, megalospheric test up to 1.5 mm in diameter, thin-walled proloculus and flexostyle followed by planispiral and involute whorls, rapidly increasing from about twelve chambers in the earliest whorl to twenty or thirty in the next few whorls, rarely may tend to uncoil in the adult, microspheric test larger, may be over 12 mm in diameter, planispiral throughout and chambers never completely annular, interior with radial pillars of triangular section arising from the chamber floor between the apertural foramina to extend about halfway into the chamber, producing small rectangular chamberlets in the lower part of the marginal zone of the chambers, radial pillars of successive chambers aligned, central part of the chambers subdivided by one to three rows of similarly aligned interseptal pillars, sutures weakly depressed; wall calcareous, porcelaneous, relatively thick, surface smooth; intercameral foramina and probably external aperture of rows of small circular pores. U. Cretaceous (Santonian); Peru.

Remarks: No holotype was selected by Steinmann, but Bizon et al. (1975, *245) designated as "holotype" (recte lectotype) Steinmann's specimen (1930, *3066, fig. 185 B-D; Geologisch-Paläontologisches Institut, University of Bonn).

PSEUDOBROECKINELLA Deloffre and Hamaoui, 1969

Plate 403, figs. 1-7

Type species: Pseudobroeckinella soumoulouensis Deloffre and Hamaoui, 1969; OD.

Pseudobroeckinella Deloffre and Hamaoui, 1969 (*930), p. 8.

Test large, discoidal, bilaterally symmetrical, early stage planispirally coiled, chambers rapidly increasing in breadth but very little in height so that test becomes peneropliform, then reniform in outline, and apparently has cyclic chambers in the final stage, septa arched, chambers subdivided by three types of partitions, primary and secondary septula that are vertical to the septa, and transverse septula that parallel the septa, the primary septula being longer than the other partitions and all fusing in the vicinity of the outer walls; wall calcareous, microgranular, imperforate, probably originally porcelaneous; aperture of two rows of circular pores along the midregion of the final chamber face. U. Cretaceous (Santonian); France.

SPIRAPERTOLINA Ciry, 1964

Plate 404, figs. 1 and 2; plate 405, figs. 1-4

Type species: Spirapertolina almelai Ciry, 1964; OD.

Spirapertolina Ciry, 1964 (*607), p. 163.

Test discoidal, about 10 mm in diameter, central region slightly inflated, equatorial chambers at first planispirally arranged and involute, laterally flanked by a series of polar capsules as in *Larrazetia*, with whorl enlarging rapidly, chambers remaining low but progressively broader and septa more oblique until test becomes peneropliform, then reniform, and finally discoidal, the cyclic chambers comprising most of the test, interior of the discoidal chambers coarsely alveolar with abundant interlocular perforations, leaving open only the marginal zones, both spiral and later annular chambers subdivided by increasingly numerous incomplete septula oriented perpendicular to the septa, those of successive chambers alternating in position, equatorial chambers covered by one or two layers of chambers at each side of the test; wall calcareous, imperforate, probably originally porcelaneous; aperture consisting of pores at the test periphery. U. Cretaceous (Santonian); Spain.

Family SORITIDAE Ehrenberg, 1839

Soritidae Galloway, 1933 (*1205), p. 132, nom. corr. pro family Soritina.

Soritina Ehrenberg, 1838 (*1053), p. 200 (name not available, ICZN Art. 29 (a); no available type genus until 1839).

Soritina Ehrenberg, 1839 (*1054), table opp. p. 120.

Orbitolitidae Gray, 1840 (*1288), p. 76.

Soritida Schultze, 1854 (*2824), p. 53.

Orbitulitidea Reuss and Fritsch, 1861 (*2593), p. 2.

Orbitulitideae Gümbel, 1870 (*1337), p. 27.

Orbiculinida Jones, in Griffith and Henfrey, 1875 (*1300), p. 319.

Orbitulitidee Schwager, 1876 (*2829), p. 483.

Orbitulita Marriott, 1878 (*2045), p. 31.

Orbitolitina Bütschli, in Bronn, 1880 (*421), p. 192.

Orbitulitida Haeckel, 1894 (*1355), p. 185.

Praerhapydioninidae Haynes, 1981 (*1437), p. 168.

Test planispiral, at least in early stage, later may be uncoiled, flaring, fusiform, or cylindrical; chambers numerous, interior subdivided by interseptal pillars or septula; aperture generally multiple, may vary in position in ontogeny. U. Cretaceous (Cenomanian) to Holocene.

Subfamily PRAERHAPYDIONININAE Hamaoui and Fourcade, 1973

Praerhapydionininae Hamaoui and Fourcade, 1973 (*1384), p. 361, 375.

Test planispiral, later may be uncoiled and rectilinear to flabelliform; chambers in adult may be cylindrical, annular or flattened; wall calcareous, probably originally porcelaneous, imperforate; aperture generally multiple; may vary in position in ontogeny. U. Cretaceous (Cenomanian) to Oligocene.

CYCLEDOMIA Hamaoui, 1964

Plate 406, figs. 1-9

Type species: Edomia iranica Henson, 1948 (*1460), p. 85.

Cycledomia Hamaoui, 1964 (*1379), p. 438.

Test large, microspheric test apparently cornuspirine at first, then planispiral and involute to pseudoevolute, chambers strongly curved and septa oblique, later flabelliform, and finally evolute and cyclic, resulting in a discoidal, flattened, and biconcave test, megalospheric generation with large spherical proloculus, chambers subdivided by short interseptal septula that are perpendicular to the septa and to the lateral walls and do not reach the center of the chambers, those of successive chambers aligned, central area of chambers with similarly aligned interseptal buttresses, of crescentic transverse section in the midregion but nearly circular in section adjacent to the septa; wall calcareous, microgranular, imperforate, probably originally porcelaneous; aperture of numerous rounded pores on the central part of the apertural face in the area of the interseptal buttresses. U. Cretaceous (U. Cenomanian to L. Turonian); Iran; Israel.

EDOMIA Henson, 1948

Plate 405, figs. 5-8

Type species: Edomia reicheli Henson, 1948; OD.

Edomia Henson, 1948 (*1460), p. 84.

Test large, discoidal, somewhat inflated in the central region, megalospheric test with large spherical proloculus, microspheric test at first cornuspirine, planispiral, and involute, later becoming evolute, with numerous low and very strongly arched chambers per whorl, finally with cyclic chambers of nearly constant thickness, incomplete transverse interseptal septula project inward from the two faces of the test, aligned in successive chambers, central region of the later chambers with irregularly distributed interseptal pillars; aperture of large pores at the center of the septal face, alternating in position with the interseptal pillars. U. Cretaceous (Cenomanian to Turonian); Iran; Israel.

GLOBORETICULINA Rahaghi, 1978

Plate 407, figs. 1-4

Type species: Globoreticulina iranica Rahaghi, 1978; OD(M).

Globoreticulina Rahaghi, 1978 (*2509), p. 42.

Test globular, up to about 1.75 mm in diameter, periphery rounded, chambers broad and low, planispirally enrolled and involute, only the final whorl visible at the exterior, megalospheric test of three to four volutions that increase rapidly in height, microspheric test with three chambers per whorl in the first two whorls, later increasing to about fourteen to sixteen chambers in the final whorl, septa oblique, curved backward toward the periphery, outer part of chambers subdivided by parallel and transverse series of short vertical partitions, appearing like a subepidermal mesh in abraded specimens or in tangential section; wall calcareous, porcelaneous; aperture cribrate. M. Eocene; Iran.

LAMARMORELLA Cherchi and Schroeder, 1975

Plate 407, figs. 5-9

Type species: Lamarmorella sarda Cherchi and Schroeder, 1975; OD.

Lamarmorella Cherchi and Schroeder, 1975 (*562), p. 123.

Test discoidal, early stage planispiral, broad low chambers increasing rapidly in breadth and becoming successively peneropline and finally cyclic, chambers subtriangular in section, narrower toward the periphery, with the sloping distal part of the chamber overlapped by the succeeding chamber, interior subdivided by rudimentary radial septula; wall calcareous, porcelaneous; aperture of numerous circular pores in a single row in the median plane of the test at the periphery, remaining as intercameral pores in the septa of earlier chambers, alternating in position in successive chambers. U. Cretaceous (?Coniacian to Santonian); Italy: Sardinia; France.

MURGELLA Luperto Sinni, 1965

Plate 408, figs. 1-5

Type species: Murgella lata Luperto Sinni, 1965; OD.

Murgella Luperto Sinni, 1965 (*1946), p. 264.

Test large, up to 14.0 mm in length, early stage planispirally coiled, later uncoiling, proloculus of megalospheric generation followed by flexostyle, and then by up to three and a half volutions, increasing from five to eight chambers in the first whorl with up to thirteen in the last coil, septa strongly oblique and chamber interior undivided in the coil, later up to twelve rectilinear and cylindrical to slightly arched chambers subdivided peripherally by numerous thick radially arranged vertical septula, those of successive chambers aligned; microspheric test larger and flattened, a small planispiral coil followed by a flabelliform uncoiled stage of numerous wide and low chambers, vertical septula projecting inward from both flattened sides of the test; wall calcareous, imperforate, porcelaneous; aperture basal and single in the coiled stage, multiple in the uncoiled stage, pores scattered over the apertural face of the megalospheric test and apparently aligned in rows in the microspheric test. U. Cretaceous (Senonian); Italy.

Remarks: *Murgella* was originally placed in the Rhapydionininae but differs in lacking the characteristic central thickening of that group. It was regarded as a synonym of the Cenozoic *Archaias* by De Castro (1971, ***914**, p. 329) but differs in the internal structure; *Archaias* does not have radial septula but has internal pillars. *Murgella* is here regarded as closest to the Praerhapydioninae.

PRAERHAPYDIONINA Van Wessem, 1943

Plate 409, figs. 5-13

Type species: Praerhapydionina cubana Van Wessem, 1943; OD.

Praerhapydionina Van Wessem, 1943 (***3254**), p. 43.

Test elongate, subconical, up to about 1 mm in length, circular in section, early stage planispirally enrolled, later uncoiled and rectilinear, chambers low and arched centrally, interior subdivided by a few inward projecting radial septula; wall calcareous, porcelaneous; aperture terminal, central. Eocene (Lutetian) to Oligocene; Cuba; Iraq; Iran; Spain.

Remarks: According to Hamaoui and Fourcade (1973, ***1384**, p. 366), who examined the types of *P. cubana* in Utrecht, the Cuban material is of Eocene age, rather than U. Cretaceous in age as originally reported.

PSEUDORHAPYDIONINA De Castro, 1971

Plate 408, figs. 6-10

Type species: Rhapydionina laurinensis De Castro, 1965 (***910**), p. 352; OD.

Pseudorhapydionina De Castro, 1971 (***913**), p. 3.

Ouladnailla Emberger, Magné, Reyre, and Sigal, 1955 (***1107**), p. 113 (name not available, ICZN Art. 13 (a)(i), no description).

Test elongate, early chambers in a relatively large planispiral coil of about two volutions, eight chambers in the final whorl, enrolled chambers increasing very rapidly in breadth as added and strongly oblique, later chambers uncoiling and rectilinear, low, centrally arched and of nearly constant diameter, chamber interior subdivided by up to thirty thin radial interseptal partitions but without pillars or thickening in the central area, sutures distinctly depressed; wall calcareous, porcelaneous; aperture terminal, cribrate, openings of earlier chambers remaining as scattered pores over the septa within the ring of radial partitions. U. Cretaceous (U. Cenomanian); Italy; Algeria; Israel.

PSEUDORHIPIDIONINA De Castro, 1971

Plate 409, figs. 14-19

Type species: Rhipidionina casertana De Castro, 1965 (***910**), p. 357; OD.

Pseudorhipidionina De Castro, 1971 (***913A**), p. 3.

Test flabelliform, compressed, early stage planispirally enrolled, chambers increasing rapidly in breadth as added, and volutions enlarging rapidly until the test flares to become peneropliform, then uncoiling, with numerous strongly arched, broad, and very low rectilinear chambers, interior subdivided by numerous short straight vertical septula that arise perpendicular to the two faces of the test and may be inflated at the inner extremity, median region of the chambers undivided; wall calcareous, porcelaneous; aperture cribrate, consisting of a row of pores. U. Cretaceous (Cenomanian); Italy; Israel; Algeria.

SCANDONEA De Castro, 1971

Plate 410, figs. 1-5

Type species: Scandonea samnitica De Castro, 1971; OD.

Scandonea De Castro, 1971 (***913**), p. 5, 16.

Test enrolled, early stage with coiling in various planes, later planispiral and involute, increasing from about four chambers per whorl up to eight to ten in the final whorl, final stage may be uncoiled and rectilinear, with four to five subpyriform chambers of circular cross section, chamber interior subdivided by very short radial vertical partitions that may be thickened at the inner end; wall calcareous, imperforate, porcelaneous, outer wall very thick, that of septa thin; aperture multiple, cribrate. U. Cretaceous (Campanian) to L. Paleocene (Montian); Italy; Yugoslavia; Turkey.

TABERINA Keijzer, 1945

Plate 409, figs. 1-4

Type species: Taberina cubana Keijzer, 1945; OD.

Taberina Keijzer, 1945 (***1668**), p. 200.

Test elongate, up to 1.3 mm in length, globular proloculus followed by two simple low chambers, and then by more numerous chambers in a large early planispiral stage, up to twenty chambers in the final whorl, coiled stage followed by a short final uncoiled stage, all chambers after the first two are subdivided by short interseptal radial partitions that project inward from the outer wall, interseptal pillars occupy the central area of the chambers; wall calcareous, imperforate; aperture cribrate, in the face of the coiled chambers, terminal in the uncoiled ones. L. Paleocene (Danian or Montian); Cuba.

Subfamily ARCHAIASINAE Cushman, 1927

Archaiasinae Cushman, 1927 (***742**), p. 55.

Orbiculininae Schubert, 1921 (***2823**), p. 168; Wiesner, 1920 (***3373**), p. 17 (name not available, ICZN Art. 40 (b)).

Archaiadinae Wiesner, 1931 (***3375**), p. 60, 74, 111 (err. emend.).

Archaiinae Souaya, 1963 (***3042**), p. 240 (err. emend.).

Archaiasininae Saidova, 1981 (***2696**), p. 34.

Test planispiral, later chambers may be annular, subdivided into rectangular chamberlets that do not alternate regularly with those of adjacent chambers; aperture commonly a double row of pores on the periphery. M. Eocene to Holocene.

ANDROSINA Lévy, 1977

Plate 410, figs. 6-10

Type species: Androsina lucasi Lévy, 1977; OD.

Androsina Lévy, 1977 (***1837**), p. 418.

Test flat, up to 3 mm in diameter, early stage planispirally coiled and involute, chambers rapidly increasing in breadth so that test becomes peneropliform, then flabelliform, and finally the broad, low, strongly arched chambers approach but do not become completely annular, interior subdivided by a median equatorial series of flattened pillars, each pillar thickest near its attachment to the septa above and below, partly dividing the chamber cavity in half, numerous short vertical partitions also project inward, perpendicular to the outer wall and alternating in position with the apertures and foramina; wall calcareous, porcelaneous, opaque, surface with numerous fine pseudopores; apertural face flattened, and bearing two or rarely four rows of rounded or oval pores with thick rims. Quaternary to Holocene; Bahamas.

ARCHAIAS de Montfort, 1808

Plate 411, figs. 1-12

Type species: Archaias spirans de Montfort, 1808 = *Nautilus angulatus* Fichtel and Moll, 1798 (***1124**), p. 113; OD.

Archaias de Montfort, 1808 (***2176**), p. 190.

Helenis de Montfort, 1808 (***2176**), p. 194; type species: *Helenis spatosus* de Montfort, 1808 = *Nautilus aduncus* Fichtel and Moll, 1798 (***1124**), p. 115 = *Archaias angulatus* (Fichtel and Moll, 1798); OD(M).

Ilotes de Montfort, 1808 (***2176**), p. 198; type species: *Ilotes rotalitatus* de Montfort, 1808 = *Nautilus orbiculus* Fichtel and Moll, 1798 (***1124**), p. 112 (non *Nautilus orbiculus* Forskål, 1775) = *Archaias angulatus* (Fichtel and Moll, 1798); OD(M).

Orbiculina Lamarck, 1816 (***1781**), p. 14; type species: *Orbiculina nummismalis* Lamarck, 1822 (***1782**), p. 609, no. 1 = *Nautilus orbiculus* Fichtel and Moll, 1798 (***1124**), p. 112; SD Children, 1823 (***586**), p. 117 (p. 153).

Nemophora Conrad, 1865 (***677**), p. 74 (non *Nemophora* Illiger, 1798, nec Huebner, 1825, nec Dahlbom, 1854); type species: *Nummulites (Assilina) floridanus* Conrad, 1846 (***676**), p. 399; OD(M).

Puteolina (Archaias) Hofker, 1952 (***1501**), p. 457 (nom. transl.).

Test compressed, periphery rounded, early stage planispiral and involute, with a thickened central boss, chambers numerous, low and widening rapidly, equitant on the periphery, sutures strongly oblique and curved, later whorls flaring, peneropline, flabelliform or discoid, and chambers cyclical and evolute, interior of all but earliest chambers with cylindrical interseptal pillars, but no internal partitions or septula; wall calcareous, porcelaneous, early chambers perforate, later with surface pits or pseudopores; aperture in the early stage a basal slit, in the adult two to four rows of pores on the truncate apertural face are interspersed between the internal pillars, occupying much or all of the test circumference. Miocene to Holocene; cosmopolitan.

CYCLOPUTEOLINA Seiglie and Grove, 1977

Plate 414, figs. 1-6

Type species: Peneroplis pertusus (Forskål) var. *discoideus* Flint, 1899 (***1139**), p. 304; OD.

Cycloputeolina Seiglie and Grove, in Seiglie, Grove, and Rivera, 1977 (***2858**), p. 864.

Test large, discoidal, proloculus followed by one or two planispiral and involute whorls, resulting in an inflated central part of the test, later chambers widening rapidly so that test becomes reniform and final chambers annular, later planispiral chambers and those following have two sets of alternating subepidermal vertical partitions or intradermal plates; aperture of one or two rows of openings aligned in a median groove, each bordered by a distinct lip. Miocene to Holocene; cosmopolitan.

CYCLORBICULINA A. Silvestri, 1937

Plate 412, figs. 1-6; plate 413, figs. 1-7

Type species: Orbiculina compressa d'Orbigny, 1839 (***2304**), p. 66; OD(M).

Cyclorbiculina A. Silvestri, 1937 (***2966**), p. 88.

Test large, discoidal, proloculus and flexostyle followed by planispiral and involute early stage, producing a thickened central part of the test, chambers rapidly increasing in breadth so that the test becomes flabelliform, reniform, and finally discoidal with annular chambers, interior subdivided by two sets of radial septula or intradermal plates that project inward from the lateral faces of the chambers toward the rows of apertures, partitions may be discontinuous and resemble pillars that fuse at the base with adjacent pillars or partitions may be nearly continuous across the chamber, leaving open only the small foramina between opposing chamberlets; wall calcareous, porcelaneous; aperture of two or three rows of multiple pores in a median groove on the truncate apertural face, each opening bordered by a lip; mature tests have six to ten distinctly broader cyclic chambers with larger chamberlets, formed during a short period of time to serve as reproduction chambers for multiple fission, the brood chambers being partially destroyed during the release of the young embryos; symbiotic algae present in the inner chambers of the vegetative test and are provided to the young embryos at the time of reproduction. Oligocene to Holocene; Atlantic; Caribbean; Gulf of Mexico.

CYCLORBICULINOIDES Robinson, 1974

Plate 414, figs. 7-11

Type species: Cyclorbiculinoides jamaicensis Robinson, 1974; OD(M).

Cyclorbiculinoides Robinson, 1974 (***2635**), p. 288.

Test discoidal, megalospheric test up to 7 mm in diameter, microspheric ones up to 24 mm in diameter and up to 1 mm in thickness at the periphery, subspherical megalospheric proloculus followed by one or more broad and low undivided peneropliform chambers, then with more numerous cyclic chambers, up to about thirty in the microspheric test; later peneropliform chambers and all cyclic ones subdivided by radial subepidermal partitions, attached to both walls but not complete in the equatorial part of the chamber, partitions aligned in successive chambers rather than alternating as in *Cyclorbiculina*, later chambers of large microspheric tests may also have radially arranged buttresses in the thickened equatorial zone of the chambers; wall calcareous, imperforate, porcelaneous, surface smooth but with concentric ridges formed by the elevated septa; aperture of numerous rounded openings in two rows at each margin of the periphery and smaller pores scattered irregularly between the rows, the apertural pores of earlier chambers remaining as intercameral foramina. M. and U. Eocene; Jamaica.

MIOSORITES Seiglie and Grove, 1977

Plate 415, figs. 1-7

Type species: Orbitolites americana Cushman, 1918 (*712), p. 99; OD.

Miosorites Seiglie and Grove, in Seiglie, Grove, and Rivera, 1977 (*2858), p. 866.

Test large, discoidal, biconcave, from 7 mm to 30 mm in diameter, and up to 1.3 mm thick at the periphery, microspheric test with early peneropline stage, megalospheric proloculus followed by reniform second chamber, then with evolute peneropline and reniform stage, chambers cyclic in the later stage, subdivided into chamberlets by pairs of radial septula or pili-intradermal plates that are infolded from the lateral walls to the edge of the median rows of apertural openings, radial septula of successive chambers alternating in position, no internal pillars present; wall calcareous, porcelaneous, surface smooth, without punctae or striae; aperture of one to five rows of rounded to ovate openings in a median peripheral groove. L. to U. Miocene, possibly Pliocene; Jamaica; Cuba; Puerto Rico; Santo Domingo; Mexico; USA: Florida.

PARASORITES Seiglie and Rivera, 1977

Plate 416, figs. 1-9

Type species: Praesorites orbitolitoides Hofker, 1930 (*1492), p. 149; OD.

Parasorites Seiglie and Rivera, in Seiglie, Grove, and Rivera, 1977 (*2858), p. 870.

Test large, discoidal, proloculus and flexostyle followed by a planispiral stage in the microspheric generation and by a peneropline early stage in the megalospheric generation, later chambers rapidly enlarging and test becoming reniform and finally discoidal with annular chambers, chambers subdivided internally by intradermal plates that are thickest adjacent to the lateral walls, their basal part extending across the chamber to fuse with the base of the plate from the opposite side, resulting in nearly complete chamberlets, or when plates projecting from the two sides of the test alternate in position, a Y-like fusion of their bases produces a double series of chamberlets; wall calcareous, porcelaneous, surface smooth, may be punctate; aperture of one or two alternating rows of rounded openings in a groove at the periphery. Pliocene?; Pleistocene to Holocene; Puerto Rico; Dominican Republic; Cuba; USA: Florida; New Guinea.

Subfamily SORITINAE Ehrenberg, 1839

Soritinae Wiesner, 1931 (*3375), p. 60, 74, 111, nom. transl. ex family Soritina.

Orbitulinidea Reuss, 1862 (*2586), p. 320.

Orbitolitinae Brady, 1881 (*339), p. 43.

Orbitolitidinae Wiesner, 1920 (*3373), p. 17.

Proloculus and flexostyle followed by numerous later chambers in arcuate or annular series, stolons connecting those of successive series but chambers of a single series not connected. L. Eocene to Holocene.

AMPHISORUS Ehrenberg, 1839

Plate 417, figs. 1-8

Type species: Amphisorus hemprichii Ehrenberg, 1839; OD.

Amphisorus Ehrenberg, 1839 (*1054), chart opp. p. 120.

Bradyella Munier-Chalmas, 1902 (*2211), p. 353; type species: *Orbitolites duplex* Carpenter, 1883 (*491), p. 561; OD.

Marginopora (Amphisorus) Lacroix, 1940 (*1768), p. 14 (nom. transl.).

Orbitolites (Amphisorus) Smout, 1963 (*3011), p. 266 (nom. transl.).

Test large, discoidal, biconcave with thickened rims, megalospheric proloculus and flexostyle of a half whorl followed by a large deuteroloculus that has numerous apertures, later chambers cyclic and subdivided by septula, microspheric peneropline early stage with about six undivided chambers and up to ten additional spiral chambers with septula before becoming annular, septula alternating and forming lateral chamberlets, leaving a large annular passage in the median plane that is not crossed by the lateral septula, a system of crosswise oblique stolons connects successive chambers; wall calcareous, imperforate, porcelaneous: aperture of numerous pores on the peripheral margin, elongated across the margin, and aligned in two alternating rows, additional supplementary openings in the median plane in the megalospheric test open into the median annular passage, microspheric test may have more elongate and more irregular openings into the annular passage. Miocene to Holocene; Indian, Pacific and Atlantic Oceans, Caribbean.

Remarks: The neotype selected for *Amphisorus hemprichii* by Smout (1963, ***3011**, p. 260) was not illustrated, nor were any sections prepared or illustrated to show the diagnostic internal features of the form represented. Smout stated that the test had two rows of apertures, as does the specimen illustrated by Ehrenberg and specimens regarded as *A. hemprichii* in detailed studies of internal and external characters by Lehmann (1961, ***1818**), Hottinger (1977, ***1549**) and Lévy (1977, ***1837**). As the neotype obviously cannot now be sectioned, we must assume that it was correctly identified, and that the neotype can be equated with the species as generally recognized in the Red Sea. Although *A. hemprichii* as based on the neotype was stated by Smout to be only a "varietal form" of *Sorites orbiculus*, *Amphisorus hemprichii* was shown by Ehrenberg to have a test about twice as thick as that of *S. orbiculus* and to have inflated chamberlets at either side of the median plane, as does the species generally recognized by this name. The two can best be separated on the basis of their internal features.

A specimen from Fiji also was designated as lectotype of *Orbitolites duplex* Carpenter by Smout (1963, ***3011**, p. 280); he stated this to be distinct from *Amphisorus hemprichii*, although the two previously had been regarded as conspecific.

MARGINOPORA Quoy and Gaimard, 1830

Plate 418, figs. 1-8; plate 419, figs. 1-3

Type species: Marginopora vertebralis Quoy and Gaimard, 1830; OD(M).

Marginopora Quoy and Gaimard, in de Blainville, 1830 (***249**), p. 377.

Orbitolites (Marginopora) Yabe and Hanzawa, 1929 (***3410**), p. 140 (nom. transl.).

Test discoidal, large, biconcave with thickened periphery, megalospheric test up to 11 mm in diameter; juvenarium formed before release of the embryo from the parent test consists of proloculus, spiral passage, and larger deuteroloculus with numerous pores; microspheric test up to 30 mm in diameter, with small early planispiral and peneropline stage and later cyclic chambers, subdivided by short vertical septula that project inward for a short distance from the flat sides of the test to form a narrow marginal zone, leaving open a wide central passage that contains irregular or incomplete central partitions or pillars, chamber floor of marginal zone offset a half chamber height from that of the median zone, oblique stolons connect the lateral chamberlets to the chambers above and below, larger specimens commonly have a central hole in the test where the thinner-walled early portion is missing, probably due to resorption by the individual, finally the adult produces four to nine higher, cyclic, and undivided reproduction chambers with a coarsely porous outer margin, up to one hundred fifty new embryos may form in the brood chamber and are released by bursting through the coarsely perforate outer wall; wall calcareous, imperforate, porcelaneous, consisting of about 12.5 percent magnesium calcite; aperture of numerous small circular openings randomly scattered over the peripheral wall, and remaining as intercameral pores that diagonally connect successive chambers; endosymbiotic dinoflagellates present. Miocene to Holocene; Pacific and Indian Oceans.

Remarks: A neotype was designated for *Marginopora vertebralis* by Smout (1963, ***3011**, p. 263) from "Fiji reef, . . . probably Challenger Sta. 172."

ORBITOLITES Lamarck, 1801

Plate 420, figs. 1-10

Type species: Orbitolites complanatus Lamarck, 1801 (nom. imperf. as *O. complanata*); SD H. Douvillé, 1902 (***981**), p. 296.

Orbitolites Lamarck, 1801 (***1775**), p. 376.

Discolites de Montfort, 1808 (***2176**), p. 186; type species: *Discolites concentricus* de Montfort, 1808 = *Orbitolites complanatus* Lamarck, 1801; OD(M).

Test large, discoidal, very slightly biconcave, large proloculus and second chamber forming an inflated nucleoconch, later cyclic chambers subdivided into many chamberlets, those of successive cycles alternating in position, chamberlets of a single cycle not interconnected but those of successive cycles connected by a crosswise oblique stolon system, annular chambers less defined in the later stage and chamberlets separated by thickened oblique walls; aperture of numerous rounded openings in transverse rows crossing the peripheral margin. L. to M. Eocene; France; Spain; Italy; Egypt.

Remarks: Smout (1963, ***3011**, p. 238) interpreted *Orbitolites* very broadly, including in this genus the type species of *Amphisorus, Bradyella, Dohaia, Marginopora, Miosorites, Praesorites,* and *Qataria,* as well as many other species referred elsewhere. This very broad concept, based on external appearance rather than internal anatomy, has not been accepted generally. These species are not only regarded as generically distinct, but most have been placed in different subfamilies and families. Paleocene species previously included here appear to be referrable to *Opertorbitolites.*

SORITES Ehrenberg, 1839

Plate 419, figs. 4-10

Type species: Nautilus orbiculus Forskål, 1775 (***1157**), p. 125 (ICZN, petition pending).

Sorites Ehrenberg, 1839 (***1054**), chart opp. p. 120, p. 134.

Taramellina Munier-Chalmas, 1902 (***2211**), p. 353; type species: *Sorites dominicensis* Ehrenberg, 1839 (***1054**), p. 134; SD Loeblich and Tappan, 1964 (***1910**), p. C496.

Orbitolites (Sorites) Yabe and Hanzawa, 1929 (***3410**), p. 140 (nom. transl.).

Puteolina (Sorites?) Hofker, 1971 (***1520**), p. 21 (nom. transl.).

Test discoidal, thick, megalospheric juvenarium of proloculus, flexostyle and one undivided chamber, then with a few peneroplid chambers, microspheric test peneropline in early stage, later stage of both generations with annular series of small chamberlets that are symmetrical with respect to the equatorial plane, separated by a median annular passage that appears circular in section, crosswise-oblique stolon system connects chamberlets with two chambers of the preceding series and two chambers of the following series, stolons in a single plane; wall calcareous, porcelaneous, smooth; aperture a single row of openings with protruding rims and with figure 8 outline resulting from the crosswise-oblique stolons, shell material may bridge the narrow part of the opening to form two openings; adult test may produce reproductive chambers. Miocene to Holocene; Atlantic; Caribbean; Pacific; Indian Ocean; Red Sea.

Remarks: The original description of *Sorites* included two species, *Sorites orbiculus* and *S. dominicensis* Ehrenberg, the former illustrated and indicated as occurring in the Red Sea and off the coast of Libya and the latter briefly described but not figured and indicated as from "San Domingo." Although *S. dominicensis* later was designated as the type species by Cushman (1927, ***746**, p. 190), the species has not been reported as a living species since Ehrenberg's original description but has been regarded as synonymous with various other taxa.

Loeblich and Tappan (1964, ***1910**, p. C496) stated that *S. dominicensis* = *Orbulites marginalis* Lamarck, 1816 (***1780**, p. 196). Cole (1965, ***636**, p. 21) reported *S. orbiculus* as widely distributed in the Caribbean and Indo-Pacific areas. He further stated (p. 20) that although *S. marginalis* had been reported in the Caribbean, the identifications were incorrect, hence *S. dominicensis* could not be a synonym, adding, "However, *Sorites dominicensis* Ehrenberg from the Recent Caribbean area can be equated reasonably with *Sorites orbiculus* Forskål, 1775. . . . [I]t appears that *Sorites dominicensis* is a junior synonym of *Sorites orbiculus,* thus *S. orbiculus* would be the type of *Sorites.*" This opinion appears to be generally accepted and *Sorites* regarded as a distinct genus, based on *S. orbiculus.* To stabilize this concept, we have submitted a petition to the ICZN to formalize this type designation. *Sorites dominicensis* was regarded as a nomen dubium by Smout

(1963, *3011, p. 265), who selected a neotype for *Nautilus orbiculus* (illustrated only by two poorly reproduced photographs of the exterior, although the aperture cannot be resolved in the edge view). However, *Sorites orbiculus* has been well described and illustrated from the Red Sea by others.

YABERINELLA Vaughan, 1928

Plate 421, figs. 1-5; plate 422, figs. 1-5

Type species: Yaberinella jamaicensis Vaughan, 1928; OD.

Yaberinella Vaughan, 1928 (*3262), p. 7.

Test operculine to discoidal, large, up to 50 mm in diameter, early stage of microspheric test peneropline with broad and low chambers that may become cyclical; large, globular megalospheric proloculus followed by rapidly enlarging chambers in flaring peneropline coil, numerous oblique septula subdivide the chambers into small chamberlets that communicate through a system of stolons in three planes, longitudinal subepidermal tubes are oriented in the direction of shell growth or radial in the cyclic chambers, in the median part of the test larger tubes are oriented oblique to the direction of growth, alternating in orientation from layer to layer, and vertical passages connect these large tubes to the subepidermal ones; wall calcareous, porcelaneous, may be recrystallized, resulting in poor preservation. M. to U. Eocene; Jamaica.

Remarks: According to Hottinger (1969, *1547, p. 745), a slightly off-center equatorial section of a microspheric test appears to indicate a milioline early stage, but the poor preservation prevents its positive recognition. Although Hottinger suggested assignment of *Yaberinella* to the Fabulariidae, it is here retained in the Soritinae pending study of better preserved specimens.

Subfamily OPERTORBITOLITINAE Loeblich and Tappan, 1986

Opertorbitolitinae Loeblich and Tappan, 1986 (*1929), p. 345.

Test with nucleoconch followed by cyclic chambers that are subdivided into chamberlets as in the Soritinae but with thick laminae piled up on the flat or concave sides of the test, laminae may be closely appressed, or may enclose a stolon systm, or may have stolons leading to small vacuoles or chamberlets. U. Paleocene (Ilerdian) to M. Eocene (Lutetian).

OPERTORBITOLITES Nuttall, 1925

Plate 422, figs. 6 and 7; plate 423, figs. 1-5

Type species: Opertorbitolites douvillei Nuttall, 1925; OD.

Opertorbitolites Nuttall, 1925 (*2274), p. 447.

Test lenticular, large, up to 11 mm in diameter, similar to *Orbitolites* in structure, cyclic chambers subdivided both vertically and horizontally into numerous small chamberlets, thick closely appressed laminae completely cover the umbilical region and may produce a compact umbonal thickening, lateral canals may occupy the planes between laminae in some species; wall calcareous, imperforate, porcelaneous. U. Paleocene (Ilerdian) to L. Eocene; Baluchistan; France; Spain; Italy.

SOMALINA A. Silvestri, 1939

Plate 424, figs. 1-4; plate 425, figs. 1-5

Type species: Somalina stefaninii A. Silvestri, 1939; OD(M).

Somalina A. Silvestri, 1939 (*2968), p. 51.

Somalina A. Silvestri, 1938 (*2967), p. 59, 64 (name not available, ICZN Art. 13 (a)(i), not described).

Asterosomalina Meriç, 1965 (*2093), p. 48; type species: *Asterosomalina dizeri* Meriç, 1965; OD.

Test large, up to 30 mm in diameter, discoidal to lenticular, cyclic chambers subdivided into chamberlets as in *Orbitolites*, with crosswise oblique stolon system and possibly lateral stolons also, prominent lateral laminae as in *Opertorbitolites* enclose numerous chamberletlike cavities, stolons connect the cavities to the main equatorial chamber layer; wall calcareous, imperforate, porcelaneous; aperture not described as all known specimens are embedded in limestone. M. Eocene (Lutetian); Somalia; Egypt; Iraq; Iran; Turkey.

Remarks: *Asterosomalina* was separated on the basis of tests that occurred with typical *Somalina* but became triaxial or with four or five rays as seen in section. As other species of *Somalina* and other genera of the

Soritidae also include occasional "twinned" or otherwise divided shells, this twinning appears to be related to conditions of growth.

Subfamily FUSARCHAIASINAE Saidova, 1981

Fusarchaiasinae Saidova, 1981 (*2696), p. 34.

Test fusiform, numerous chambers planispirally enrolled, axially elongate, with interseptal pillars; aperture of multiple openings interspersed between pillars on terminal face. Oligocene-Miocene.

FUSARCHAIAS Reichel, 1952

Plate 426, figs. 1-4

Type species: Fusarchaias bermudezi Reichel, 1952; OD.

Fusarchaias Reichel, 1952 (*2551), p. 459.
Fusarchaias Reichel, 1949 (*2548), p. 148 (name not available, ICZN Art. 13 (a)(i), no description).

Test elongate, up to 3.5 mm in length, fusiform, planispirally enrolled about an elongate axis, whorls enlarging rapidly but never uncoil, chambers numerous, low in the axial plane but higher toward the poles, endoskeleton of interseptal pillars; wall calcareous, porcelaneous; aperture of rows of circular openings on the terminal face that alternate with the pillars in position. Oligocene-Miocene; Cuba.

Family KERAMOSPHAERIDAE Brady, 1884

Keramosphaeridae Lister, in Lankester, 1903 (*1791), p. 143, nom. corr. pro family Keramosphaerina.
Keramosphaerina Lankester, 1885 (*1790), p. 847, nom. transl. ex subfamily Keramosphaerinae.
Keramosphaerinae Brady, 1884 (*344), p. 63 (subfamily).
Keramosphaerinae Delage and Hérouard, 1896 (*926), p. 127.

Test globular, concentric chambers subdivided into chamberlets, stolons connect chamberlets of same series as well as those of successive series; wall calcareous, porcelaneous, imperforate. L. Cretaceous (Berriasian) to U. Cretaceous (Maastrichtian); Miocene, Holocene.

KANAKAIA Hanzawa, 1957

Plate 426, figs. 5-7

Type species: Kanakaia marianensis Hanzawa, 1957; OD.

Kanakaia Hanzawa, 1957 (*1409), p. 38.

Test large, up to 4 mm in diameter, with encrusting layers of chambers as in *Keramosphaera*, horizontal stolons of circular section connect chambers of one series, and oblique stolons about one-half as large connect those of successive layers. Miocene (Aquitanian); Pacific islands: Saipan, Tinian, Rota.

KERAMOSPHAERA Brady, 1882

Plate 426, figs. 8 and 9; plate 427, figs. 1-3

Type species: Keramosphaera murrayi Brady, 1882; OD(M).

Keramosphaera Brady, 1882 (*342), p. 242.
Orbulinaria Rhumbler, 1906 (*2619), p. 23; type species: *Orbulinaria fallax* Rhumbler, in Egger, 1909 (*1051), p. 11; OD(M).
Arbulinarium Rhumbler, 1913 (*2621), p. 347 (err. emend.).

Test globular, up to 2.5 mm in diameter, nature of earliest stage unknown, later with small, inflated, and irregular or meandriform chamberlets added in concentric spherical series, those of a single layer interconnected by short lateral stolons and those of successive series not regularly aligned or alternating; wall calcareous, porcelaneous; aperture of pores at the margin of the chambers, previous ones remaining as intercameral connections between chamberlets of successive concentric layers. Holocene; S. Atlantic; S. Indian Ocean, at about 3,600 m; Pacific off Japan; North Sea.

KERAMOSPHAERINA Stache, 1913

Plate 428, figs. 1-6

Type species: Bradya tergestina Stache, 1889 (*3057), p. 35, 89; OD(M).

Keramosphaerina Stache, 1913 (*3058), p. 659, 666.
Bradya Stache, 1889 (*3057), p. 35, 89 (non *Bradya* Boek, 1873, nec Carter, 1877); type species: obj.
Keramosphaerina (Bradya) Buser, 1965 (*456), p. 130, 132, 133, fig. 1 (err. nom. transl.).

Test globular, commonly 5 mm to 7 mm in diameter and may be up to 12 mm, microspheric test with proloculus and flexostyle, followed by thin-walled quinqueloculine early stage with undivided chambers one-half coil in length, megalospheric test with ovate proloculus and early streptospiral coil of more than two chambers per whorl, all post embryonic chambers with thick wall and streptospiral coiling, resulting in an overall spherical test, radial alignment of chambers visible in well-centered sections but only concentric layering apparent in noncentered sections; wall calcareous, porcelaneous to chalky; small canal-like stolons connect adjacent chambers, the distal openings serving as the aperture. U. Cretaceous (Coniacian to Maastrichtian); Yugoslavia; Italy; Greece.

Remarks: Although the Cretaceous *Keramosphaerina* has been included in *Keramosphaera* by some authors, the initial stage of the deep water living species is not known, and the Cretaceous species with milioline early stage are variously associated with rudistid limestones or even with evidence of a brackish water environment. These ecologic and morphologic features as well as the wide disparity in geologic occurrence suggest that the two genera are not closely related, hence they are regarded here as distinct.

PAVLOVECINA Loeblich and Tappan, n. gen.

Plate 427, figs. 4-8

Type species: Keramosphaera allobrogensis Steinhauser, Brönnimann, and Koehn-Zaninetti, 1969 (***3064**), p. 110; OD.

Test irregularly globular, from 0.7 mm to 3.6 mm in diameter, early stage consists of proloculus and flexostyle, followed by a few chambers in quinqueloculine arrangement, postembryonic chambers numerous, small, irregular, tubular, and without distinct arrangement or layers, although added around the test to produce a roughly globular form; wall calcareous, porcelaneous, embryonic stage thin walled, earliest postquinqueloculine chambers with wall about twice as thick, walls of each chamber complete, hence their contact appears to be double walled; early chambers probably with a single aperture, later ones possibly with several rounded openings at the ends of branches. L. Cretaceous (Berriasian); France, Switzerland.

Remarks: Both Steinhauser et al. (1969, ***3064**) and Pavlovec (1971, ***2373**) contrast the extremely irregular chamber arrangement of the L. Cretaceous species with that of the regularly concentric and radially aligned chambers of the U. Cretaceous *Keramosphaerina*. We regard these differences as of generic importance. The name of the new genus is in recognition of the studies of *Keramosphaerina* made by R. Pavlovec, Ljubljana, Yugoslavia.

Suborder SILICOLOCULININA Resig, Lowenstam, Echols, and Weiner, 1980

Silicoloculinina Resig et al., 1980 (***2568**), p. 211.

Wall imperforate, of secreted opaline silica. U. Miocene to Holocene.

Family SILICOLOCULINIDAE Resig, Lowenstam, Echols, and Weiner, 1980

Silicoloculinidae Resig et al., 1980 (***2568**), p. 211.

Test small, coiled, proloculus followed by chambers of about one-half coil in length, plane of coiling changing as in the miliolines; aperture terminal on the final chamber, appearing as an arched slit because of the broad toothlike flap projecting from one margin. U. Miocene to Holocene.

MILIAMMELLUS Saidova and Burmistrova, 1978

Plate 429, figs. 1-7

Type species: Miliammellus legis Saidova and Burmistrova, in Burmistrova, 1978; OD.

Miliammellus Saidova and Burmistrova, in Burmistrova, 1978 (***453**), p. 169.

Silicoloculina Resig, Lowenstam, Echols, and Weiner, 1980 (***2568**), p. 212; type species: *Silicoloculina profunda* Resig et al., 1980 = *Miliammellus legis* Saidova and Burmistrova, 1978; OD.

Test small, up to 0.5 mm in length, ovoid, chambers in quinqueloculine arrangement as in the miliolids but slightly more than a half coil in length, so that those of successive whorls are offset, chambers widest at their base and narrowing toward the aperture; wall of imperforate opaline silica, thin, homogeneous, insoluble in hydrochloric acid, ultrastructure of inner and outer organic membranes and a median layer of mineralized tubular rods, the mineralized layer consisting of two sheets of a two-dimensional array of rods aligned parallel to the wall surface, separated by a median layer that has a three-dimensional random array of rods in an open mesh, the rods circular to angular in section, test surface smooth; aperture a low arch at the open end of the final chamber, with a broad simple tooth. U. Miocene to Holocene: Bering Sea; Antarctic; N. and central Pacific and Indian Oceans, at abyssal depths below 4,000 m.

Suborder LAGENINA Delage and Hérouard, 1896

Lagenina Hohenegger and Piller, 1975 (*1533), p. 85, nom. corr. pro suborder Lagenidae.
Lagenidae Delage and Hérouard, 1896 (*926), p. 136 (suborder).
Lagenidea Lankester, 1885 (*1790), p. 847 (order).
Lagenaceae Hartog, in Harmer and Shipley, 1906 (*1424), p. 59 (order).
Lagenida Calkins, 1909 (*477A), p. 39 (order).
Nodosalidia Calkins, 1926 (*478), p. 355 (order).
Nodosaridia Kühn, 1926 (*1751), p. 135 (order).
Nodosarioidea Wedekind, 1937 (*3355), p. 86 (order).
Lenticulinacea Wedekind, 1937 (*3355), p. 99 (suborder).
Polymorphinacea Wedekind, 1937 (*3355), p. 103 (suborder).
Robulinacea Wedekind, 1937 (*3355), p. 104 (suborder).
Nodosariida Güvenç p, 1967 (*1349), p. 35 (order).
Rotaliea Mikhalevich, 1980 (*2108), p. 55 (class: partim).
Rotaliata Mikhalevich, 1980 (*2108), p. 56 (subclass: partim).
Nodosarioida Mikhalevich, 1980 (*2108), p. 57 (superorder).
Lenticulinida Mikhalevich, 1980 (*2108), p. 58 (order).
Polymorphinida Mikhalevich, 1980 (*2108), p. 58 (order).
Rotaliicea Saidova, 1981 (*2696), p. 35 (class: partim).
Rotaliicae Saidova, 1981 (*2696), p. 35 (subclass: partim).
Nodosariina Saidova, 1981 (*2696), p. 35 (suborder).
Plectofrondiculariina Saidova, 1981 (*2696), p. 37 (suborder).
Polymorphinina Saidova, 1981 (*2696), p. 38 (suborder).

Wall of monolamellar, optically and ultrastructurally radiate calcite, with crystal *c*-axes perpendicular to surface; crystal units enveloped by organic membranes; primitive taxa without secondary lamination, more advanced forms secondarily lamellar. U. Silurian to L. Devonian; L. Carboniferous to Holocene.

Superfamily ROBULOIDACEA Reiss, 1963

Robuloidacea Loeblich and Tappan, 1984 (*1918), p. 32, nom. transl. ex subfamily Robuloidinae.

Lagenina in which the test wall is not secondarily lamellar or with only a slight tendency in that direction in younger taxa. U. Silurian to L. Devonian; L. Carboniferous to L. Cretaceous (Albian).

Family SYZRANIIDAE Vachard, 1981

Syzraniidae Vachard, in Vachard and Montenat, 1981 (*3250), p. 73.

Test elongate, globular proloculus and tubular later chamber that is undivided or may have pseudosepta; wall calcareous, hyaline, fibrous, may have two layers, finely perforate. U. Silurian (Pridolian) to L. Devonian; L. Carboniferous (Tournaisian) to U. Permian (Djulfian).

RECTOSTIPULINA Jenny-Deshusses, 1985

Plate 429, figs. 8–12

Type species: Rectostipulina quadrata Jenny-Deshusses, 1985; OD.

Rectostipulina Jenny-Deshusses, 1985 (*1611), p. 153.
Stipulina Lys and Marcoux, 1978 (*1955), p. 1417, 1419, 1420, pl. fig. 14 (name not available, ICZN Art. 13 (a)(i), no description); Lys et al., 1980 (*1954), p. 86, pl. 3, figs. 14–16 (name not available, ICZN Art. 13 (b), no species named; no type designated).

Test elongate, may be over 3 mm in length, an undulating long narrow tapering tube of quadrate section and flat to concave sides, base unknown as proloculus not seen in any of the described specimens, interior without septation or pseudoseptation; thick two-layered wall has a dark inner layer of microgranular calcite that is not invariably present and may undergo micritization and a clear outer layer of radial fibrous calcite; tube terminating abruptly at the larger end, and aperture may be merely the open end of the test. U. Permian (Djulfian); Turkey; Cyprus; Greece; Afghanistan; Iran; India; Himalayas; USSR: Armenia.

SYZRANIA Reytlinger, 1950

Plate 430, figs. 1–4

Type species: Syzrania bella Reytlinger, 1950; OD.

Syzrania Reytlinger, 1950 (*2597), p. 92.

Test elongate, up to 1.0 mm in length, globular proloculus followed by tubular undivided chamber that may have occasional slight constrictions due to periodic growth; wall calcareous, thick, with inner finely granular layer and outer hyaline pseudofibrous layer; aperture at the end of the tube. M. Carboniferous (Moscovian) to L. Permian (Asselian); USSR: Russian Platform; Afghanistan; USA: Oklahoma, Kansas, Missouri, Nebraska, Iowa.

TEZAQUINA Vachard, 1981

Plate 430, figs. 5-12

Type species: Tezaquina clivuli Vachard, in Vachard and Montenat, 1981; OD.

Tezaquina Vachard, in Vachard and Montenat, 1981 (*3250), p. 74.

Test small, elongate, about 0.5 mm in length, ovate proloculus followed by tubular stage with slight constrictions or pseudosepta resulting in narrow and elongate pseudochambers; wall calcareous, thick, hyaline, fibrous, finely perforate; aperture terminal. L. Permian (Asselian to Sakmarian); USSR: Donbass, Bashkir; Afghanistan.

TUBORECTA Pronina, 1980

Plate 430, figs. 13-15

Type species: Tuborecta vagranica Pronina, in Petrova and Pronina, 1980; OD.

Tuborecta Pronina, in Petrova and Pronina, 1980 (*2390), p. 59.

Test small, a long narrow straight tube, up to 0.7 mm in length and 0.12 mm in diameter; wall calcareous, of two layers, a thin inner dark and finely granular layer and a thick light and radial outer layer; aperture at the open end of the tube. U. Silurian (Pridolian) to L. Devonian (Lochkovian); USSR.

Remarks: The two-layered wall structure of *Tuborecta* resembles that of other Syzraniidae, although the morphology is simpler.

Family ICHTHYOLARIIDAE Loeblich and Tappan, 1986

Ichthyolariidae Loeblich and Tappan, 1986 (*1928), p. 240.

Palaeonodosariidae Kristan-Tollmann, 1964 (*1739), p. 63 (name not available, ICZN Arts. 13(a)(i) and 29).

Test uniserial, rectilinear to arcuate; rounded, ovate, lenticular or compressed in section, or with flattened sides and truncate margin; wall single layered, primitive taxa not secondarily lamellar, but advanced taxa may show some secondary lamination. L. Permian (Artinskian) to L. Cretaceous (Albian).

AUSTROCOLOMIA Oberhauser, 1960

Plate 430, figs. 16-19 and 24-28

Type species: Austrocolomia marschalli Oberhauser, 1960; OD.

Austrocolomia Oberhauser, 1960 (*2289), p. 37.

Kion Kristan-Tollmann, 1964 (*1739), p. 70 (nom. nud.).

Kion Kristan-Tollmann, 1964 (*1740), p. 63; type species: *Kion canaliculata* Kristan-Tollmann, 1964; OD.

Test elongate, chambers low and cylindrical, gradually enlarging as added, sutures straight and perpendicular to the long axis of the test; wall calcareous, radial, surface with longitudinal costae over the lower part of the chambers but smooth above an abrupt shoulder; aperture simple, rounded, terminal on the smooth and slightly convex upper surface. M. Triassic (Anisian) to U. Triassic (Rhaetian); Austria; Czechoslovakia; Turkey.

BOJARKAELLA V. A. Basov, 1968

Plate 430, figs. 20-23

Type species: Bojarkaella firma V. A. Basov, 1968; OD.

Bojarkaella V. A. Basov, 1968 (*157), p. 114.

Test robust, base with collarlike structure with a smooth or serrate lower margin bordering a wide opening, and a narrower opening at the opposite pole leading into the first and largest complete chamber, then with one or two additional globular uniserial and rectilinear chambers that decrease in size as added, final chamber small and only slightly larger in diameter than the basal collar but with reduced apertural opening; wall calcareous, radial in structure, perforate, thickest in the vicinity of the aperture, primary lamination present but no secondary lamination over the previous parts of the test, surface smooth to finely striate longitudinally; aperture terminal, rounded, flush with the surface of the small terminal chamberlet. M. Jurassic (Dogger) to L. Cretaceous (Berriasian); USSR: N. Siberia; Germany; Poland.

Remarks: Although at first glance the test appears to have a small proloculus and progressively larger chambers with a terminal apertural chamberlet, the orientation as given above was described by Basov on the basis of the chamber contact and lamination as seen in section. Basov suggested that the juvenile individual was attached by the small collarlike structure and later broke free, resulting in the opening at this end as well as at the aperture. The nature of the wall and chamber contact has not been similarly studied for the species of Cretaceous age suggested to belong here, hence the range as given above is that of the type species.

CRYPTOSEPTIDA Sellier de Civrieux and Dessauvagie, 1965

Plate 431, figs. 1-14; plate 432, figs. 1-5

Type species: Cryptoseptida anatoliensis Sellier de Civrieux and Dessauvagie, 1965; OD.

Cryptoseptida Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 50.

Padangia Lange, 1925 (***1788**), p. 228 (non *Padangia* Babor, 1900, nec Werner, 1924); type species: *Padangia perforata* Lange, 1925; SD Galloway, 1933 (***1205**), p. 172.

Langella Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 43 (nom. subst. pro *Padangia* Lange, 1924); type species: *Padangia perforata* Lange, 1925; OD.

Pseudolangella Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 54, 131; type species: *Pseudolangella fragilis* Sellier de Civrieux and Dessauvagie, 1965; OD.

?*Pachyphloides* Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 83, 126; type species: *Pachyphloides oberhauseri* Sellier de Civrieux and Dessauvagie, 1965 = *Lingulina infirmis* Oberhauser, 1960 (***2289**), p. 31; OD.

Neolangella Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 1 (nom. nud.?, or err. cit. pro *Pseudolangella*?).

Test elongate, compressed and ovate to nearly lenticular in section, chambers uniserial and rectilinear, may increase rapidly in size in the early stage, later enlarging very slowly, chambers arched centrally, sutures arched but obscure; wall calcareous, radiate, very thick, with strong primary and secondary lamination, perforations indistinct; aperture terminal, a small oval opening. U. Permian to U. Triassic (Carnian); cosmopolitan.

Remarks: Numerous generic names have been proposed for a group of species based largely on subaxial sections, for some of which the nature of the aperture and wall lamellation are not known. The type species of *Padangia* and *Langella* is based on a non-centered longitudinal section, and neither the nature of the early stage nor the aperture can be determined. Of the taxa here included, *Cryptoseptida* appears to be based on the better specimens, hence as first revisers, we regard it as the valid genus and the remainder as synonyms. *Pachyphloides* is included with question, as the original diagnosis indicated secondary lamination to be weak or absent. The wall structure is obscure in the single off-centered section illustrated, but the thick sides of the test strongly indicate secondary lamination. Jurassic species that have been assigned to some of these genera do not appear to be congeneric.

DENTALINELLA Loeblich and Tappan, 1986

Plate 432, fig. 6

Type species: Dentalinella cuneata Wedekind, 1937; OD.

Dentalinella Loeblich and Tappan, 1986 (***1928**), p. 240.

Dentalinella Wedekind, 1937 (***3355**), p. 94 (name not available, ICZN Art. 13(b), no type species designated, and two species included).

Dentalinella Loeblich and Tappan, 1964 (***1910**), p. C516 (type species designated but genus included in synonymy, hence name not available, ICZN Art. 11 (e)(i), (ii)).

Test elongate, subtriangular in side view, sides flat, triangular in cross section, chambers increasing regularly in breadth and height, rectilinear, sutures straight, slightly oblique, highest on the dorsal face, sloping proximally toward the ventral angle; wall calcareous, radiate, surface with fine narrow longitudinal costae running obliquely across the sides of the test and sloping toward the dorsal margin, with ribs also present on the dorsal face; aperture terminal, slightly produced on a neck at the dorsal angle. L. Jurassic (L. Lias); Germany.

Remarks: *Dentalinella* was validated by Loeblich and Tappan (1986, ***1928**, p. 241) by citation of type species, description, and recognition as a distinct genus, although then erroneously regarding the genus as having been validated in 1964. It resembles *Dentalina* in the asymmetrical uniserial test and ribbed surface but differs in having a triangular section. Wedekind also included *Dentalina matutina* d'Orbigny in *Dentalinella*, but the latter is now the type species of the genus *Mesodentalina*.

FRONDICULINITA Gerke, 1961

Plate 435, figs. 11-14

Type species: Frondicularia (Frondiculina) dubiella Gerke, 1957 (***1222**), p. 45; OD.

Frondiculinita Gerke, 1961 (***1226**), p. 74 (nom. subst. pro *Frondicularia (Frondiculina)* Gerke, 1961).
Frondicularia (Frondiculina) Gerke, 1957 (***1222**), p. 44 (non *Frondiculina* Lamarck, 1816, nec Munster, 1835, nom. nud., nec F. A. Roemer, 1838): type species: obj.: OD.

Test elongate, flattened, bilaterally symmetrical, chambers uniserial and rectilinear, chevron shaped, arched centrally, but later chambers with a downward projecting median lobe on each of the flat sides; wall calcareous, ultrastructure unknown, surface with longitudinal costae; aperture terminal, oval and slitlike. L. Jurassic (M. Lias); USSR: Northwest Siberia.

FRONDINA Sellier de Civrieux and Dessauvagie, 1965

Plate 432, figs. 7-20

Type species: Frondina permica Sellier de Civrieux and Dessauvagie, 1965; OD.

Frondina Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 58, 134.
Tauridia Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 68; type species: *Tauridia pamphyliensis* Sellier de Civrieux and Dessauvagie, 1965; OD.

Test elongate, small, up to 0.7 mm in length, uniserial and rectilinear, ovate to flattened in section, margins rounded, sides of test may flare somewhat or be nearly parallel in the later stage, chambers relatively low and increase slowly in height, sutures slightly arched; wall calcareous, weakly perforate or imperforate, wall finely granular to fibrous radial, surface smooth; aperture terminal, simple, elliptical to faintly arcuate, flush with the surface. U. Permian (Djulfian); Turkey; Iran.

GERKEINA Grozdilova and Lebedeva, 1969

Plate 433, figs. 1 and 2

Type species: Gerkeina komiensis Grozdilova and Lebedeva, in Sosipatrova, 1969; OD.

Gerkeina Grozdilova and Lebedeva, in Sosipatrova, 1969 (***3031**), p. 65.

Test large, lanceolate, elongate, flattened, up to 2.0 mm in length, uniserial and rectilinear, earliest chambers may be very slightly arcuate, enlarging rapidly from the tiny proloculus, later chambers of almost constant breadth, so that test has nearly parallel sides, up to about sixteen or seventeen equitant chambers in the adult, septa arched centrally, sutures flush; wall thick, calcareous, vitreous, radial, apparently not secondarily lamellar; aperture terminal, radiate, surrounded by a thickened area of the wall. M. Permian (Kungurian): USSR: Komi ASSR.

GRILLINA Kristan-Tollmann, 1964

Plate 433, figs. 5-9 and 17-20

Type species: Grillina grilli Kristan-Tollmann, 1964; OD.

Grillina Kristan-Tollmann, 1964 (***1740**), p. 65.
Grillina Kristan-Tollmann, 1964 (***1739**), p. 70 (name not available, ICZN Art. 13 (a)(i), no description).
Geinitzinita Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 77, 121; type species: *Geinitzinita oberhauseri* Sellier de Civrieux and Dessauvagie, 1965; OD.

Test elongate, flaring slightly, sides flattened to concave, elongate hexagonal in section, with angles weak to costate, chambers uniserial and rectilinear, arched centrally, broad and low; wall calcareous, radial, secondary lamination not pronounced, surface smooth to costate at the test angles; aperture terminal, an elongate straight to curved slit or slightly ovate. U. Triassic (Carnian to Rhaetian); Austria, Iran.

Remarks: *Grillina* was defined as having a wall with inner thin microgranular layer and outer thick light, vitreous, and fibrous to radial layer, but no photographs of thin sections have been published.

ICHTHYOLARIA Wedekind, 1937

Plate 433, fig. 12

Type species: Frondicularia bicostata d'Orbigny, 1850 (***2312**), p. 242; OD.

Ichthyolaria Wedekind, 1937 (***3355**), p. 93.
Neospandelina Brotzen, 1963 (***432**), p. 70; type species: obj.: OD.

Test small to medium in size, up to 1.4 mm in length, elongate, flattened, ovate to rhomboid in section, chambers enlarging slowly as added, commonly strongly chevron shaped; wall calcareous, radial, costae when present have a finely granular structure, primary lamination indistinct, no secondary lamination, geologically older species may be indistinctly perforate but younger ones distinctly perforate, apertural region and septa imperforate, surface smooth, longitudinally striate or costate; aperture terminal, oval or elliptical, may be produced on a short neck. U. Permian to U. Jurassic; cosmopolitan.

INVOLUTARIA Gerke, 1957

Plate 435, figs. 6 and 7

Type species: Involutaria triassica Gerke, 1957; OD.

Involutaria Gerke, 1957 (***1222**), p. 33.

Test elongate, circular in section, uniserial, rectilinear, proloculus ovate, followed by very strongly overlapping chambers that are produced terminally, earlier chambers completely enclosed by wall and chamber lumen of later ones, final one to three chambers less overlapping; wall calcareous, radial, finely perforate; aperture terminal, radiate. ?M. Permian to U. Triassic (Carnian); USSR: Krasnodar; Indonesia; Turkey.

LINGULONODOSARIA A. Silvestri, 1903

Plate 433, figs. 13-16; plate 434, figs. 1-11

Type species: Lingulina nodosaria Reuss, 1863 (***2587**), p. 59; SD Galloway, 1933 (***1205**), p. 252.

Lingulonodosaria A. Silvestri, 1903 (***2928**), p. 48.

Lingulinella Gerke, 1952 (***1221**) (not seen; fide Gerke, 1960 (***1225**), p. 29); type species: *Lingulinella arctica* Gerke, 1952 (also see Gerke, 1960, ***1225**, p. 31).

Frondinodosaria Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 60, 133; type species: *Frondinodosaria pyrula* Sellier de Civrieux and Dessauvagie, 1965; OD.

Test small, elongate, uniserial, and rectilinear or slightly arcuate, flattened to ovate in section, proloculus elongate ovate, later chambers inflated, may be slightly higher than wide, sutures straight and horizontal to slightly arched; wall calcareous, indistinctly to finely radiate, without secondary lamellation, perforations very fine or indistinct, surface smooth to faintly striate; aperture terminal, ovate to slightly arcuate and slitlike. L. Permian to L. Cretaceous (Albian); cosmopolitan.

MARGINULINITA K. I. Kuznetsova, 1972

Plate 435, figs. 1-5

Type species: Marginulinita dilatata K. I. Kuznetsova, 1972; OD.

Marginulinita K. I. Kuznetsova, 1972 (***1762**), p. 92.

Test elongate, three to eleven uniserial and rectilinear chambers, slightly compressed laterally, asymmetrical with one margin straight and leading to the slightly produced apertural end, chambers somewhat inflated on the the opposite margin, sutures straight, weakly constricted, slightly oblique, highest on the straight margin of the test, lower on the lobulate margin; wall calcareous, radial, thin, without secondary lamination, surface smooth or more commonly ornamented with six to twelve longitudinal costae of microgranular structure that appear in thin section as granular wedges in the radially built wall; aperture terminal, radiate, with five to eight short incisions surrounding a rounded opening. U. Triassic to L. Cretaceous; cosmopolitan.

MESODENTALINA Norling, 1968

Plate 434, figs. 17-21

Type species: Dentalina matutina d'Orbigny, 1850 (***2312**), p. 242; OD.

Mesodentalina Norling, 1968 (***2262**), p. 40.

Test elongate, arcuate, circular to ovoid in section, proloculus ovoid, commonly with basal spine, later chambers uniserial, asymmetrical, and inflated on the convex margin of the test, sutures straight, flush and obscure in the early stage, final one or two slightly constricted; wall calcareous, fibrous, radiate, perforate, secondarily mesolamellar, with lamellae from each newly added chamber covering at least one previous chamber but not completely covering the test at each instar, surface with ten to twenty-five longitudinal costae that may be discontinuous and may bifurcate or die out distally, running from the convex margin obliquely across the test toward the apertural region on the concave margin, costae appearing in thin section as imperforate microgranular wedges in the radially built wall; aperture terminal, eccentric, produced on a short neck at the straight to concave margin of the test, round, bordered by radial ribs. L. Jurassic; cosmopolitan.

NODOINVOLUTARIA J. X. Lin, 1978

Plate 433, figs. 10 and 11

Type species: Nodoinvolutaria hunanica J. X. Lin, 1978; OD(M).

Nodoinvolutaria J. X. Lin, 1978 (*1852), p. 14.

Test elongate, globular proloculus followed by uniserial and rectilinear chambers that are broad, low, strongly arched centrally, and partially overlap earlier ones, one or more later chambers (the fourth in specimens of the type species) may overlap most earlier ones but are followed by later chambers that are not secondarily lamellar; wall character not described; aperture not described but apparently not produced terminally as in *Involutaria*. L. Permian; China: Hunan Province.

Remarks: Lin credits the genus to Wang (MS), but as there is no evidence in the publication that the description was provided by Wang, the genus is here credited to Lin. The type species is fixed by monotypy, as no other described species were included.

PARALINGULINA Gerke, 1969

Plate 433, figs. 3 and 4

Type species: Lingulina tenera J. G. Bornemann, 1854 (*304), p. 38; OD.

Paralingulina Gerke, 1969 (*1227), p. 50 (nom. nov. pro *Neogeinitzina* Brotzen, 1963).

Neogeinitzina Brotzen, 1963 (*432), p. 70 (non *Neogeinitzina* K. V. Miklukho-Maklay, 1954); type species: obj.; OD.

Test elongate, rectilinear, with prominent longitudinal costae at the test angles, chambers increasing in size as added, slightly inflated, sutures depressed, gently arched on the sides; wall calcareous, nonlamellar, perforations lacking or indistinct, surface smooth, except for the prominent longitudinal costae, and may have one or two low ribs between these; aperture terminal, elongate. L. Jurassic (Pliensbachian) to L. Cretaceous (Valanginian); Europe; Asia.

PRODENTALINA Norling, 1968

Plate 434, figs. 12-16

Type species: Dentalina terquemi d'Orbigny, 1850 (*2312), p. 242 (as *terquiemi*, nom. imperf.); OD.

Prodentalina Norling, 1968 (*2262), p. 34.

Test elongate, similar to *Dentalina*, up to 1.5 mm in length, rounded to oval in section, uniserial, rectilinear, flattened to slightly concave on one side and slightly produced terminally at the aperture, the three to ten chambers inflated and oblique sutures constricted on the convex opposite margin; wall calcareous, fibrous radial, finely perforate except for the imperforate apertural region, no primary or secondary lamination present, surface smooth and unornamented; aperture distinct, terminal, excentric, protruding on a neck, rounded or with radiating grooves or slits. L. Jurassic (L. Lias); cosmopolitan.

PROTONODOSARIA Gerke, 1959

Plate 434, figs. 28 and 29

Type species: Nodosaria proceraformis Gerke, 1952 (*1221), p. 42; OD.

Protonodosaria Gerke, 1959 (*1223), p. 42.

Test small, elongate, up to about 0.8 mm in length, circular in section, uniserial, rectilinear, sutures horizontal, straight to slightly arcuate, flush to weakly depressed in the later stage; wall calcareous, radial, fibrous, each chamber attached to the previous chamber without wall overlap or secondary lamination or with only slight overlap of one or a few chambers, surface smooth; aperture round, terminal, bordered by a thickened ringlike area of the wall. L. Permian (Artinskian) to U. Permian (Djulfian); USSR: Pre-Urals, Siberia; Burma; China.

PSEUDOFRONDICULARIA Thalmann, 1938

Plate 434, figs. 22-27

Type species: Frondicularia carinata Burbach, 1886 (*450), p. 47; OD.

Pseudofrondicularia Thalmann, 1938 (*3158), p. 210 (validated by designation of type species).

Pseudofrondicularia Wedekind, 1937 (*3355), p. 94 (name not available, ICZN Art. 13(b); no type species designated).

Test elongate, large, up to 2 mm in length, flattened to elliptical in section, with protruding median rib on each face of the test, large globular proloculus followed by broad low equitant chambers arched along the median line of the test, chambers increasing very slightly in breadth as added so that test margins are nearly parallel, sutures flush; wall calcareous, surface smooth; aperture terminal, ovate, on a slightly produced neck. L. Jurassic (M. Lias); Germany; Hungary; USSR: Siberia.

PSEUDOTRISTIX
K. V. Miklukho-Maklay, 1960

Plate 435, figs. 8-10

Type species: Tristix (Pseudotristix) tcherdynzevi K. V. Miklukho-Maklay, 1960 (as *T. tcherdynzewi* on pl. 27); OD.

Tristix (Pseudotristix) K. V. Miklukho-Maklay, 1960 (***2137**), p. 156.

Pseudotristix K. V. Miklukho-Maklay, 1958 (***2136**), p. 481, 484 (name not available, ICZN Art. 13(a)(i), no description).

Pseudotristix Loeblich and Tappan, 1964 (***1910**), p. C524 (nom. transl.).

Test elongate, uniserial, and rectilinear, chambers increasing gradually in height as added, trilobate in section, not overlapping previous chambers, sutures nearly horizontal, flush; wall calcareous, radial in structure; aperture terminal, radiate. U. Permian; USSR: Russian platform; Turkey.

Family ROBULOIDIDAE Reiss, 1963

Robuloididae Loeblich and Tappan, 1984 (***1918**), p. 33, nom. transl. ex subfamily Robuloidinae.

Robuloidinae Reiss, 1963 (***2561**), p. 50 (subfamily).

Eocristellariidae Loeblich and Tappan, 1982 (***1917**), p. 31 (name not available, ICZN Art. 13(a)(i), no description).

Eocristellariidae Loeblich and Tappan, 1984 (***1918**), p. 23.

Test uniserial, enrolled, chambers increasing rapidly in height and may flare somewhat, later may uncoil; wall calcareous; aperture slitlike, basal or areal. M. Permian to U. Jurassic (Kimmeridgian).

Remarks: Resembles and may be ancestral to the distinctly secondarily lamellar Vaginulinidae.

CALVEZINA Sellier de Civrieux and Dessauvagie, 1965

Plate 436, figs. 1-9

Type species: Calvezina ottomana Sellier de Civrieux and Dessauvagie, 1965; OD.

Calvezina Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 53.

Marginulinella Sosnina, 1967 (***3034**), p. 69 (non *Marginulinella* Wedekind, 1937); type species: *Marginulinella typica* Sosnina, 1967; OD.

Eomarginulinella Sosnina, 1969 (***3036**), p. 101 (nom. subst. pro *Marginulinella* Sosnina, 1967).

Test elongate, rounded in section, spherical proloculus followed by up to seven or eight uniserial chambers that are weakly trochospirally enrolled or arcuate in the early stage, later uncoiling and rectilinear, irregular and somewhat inflated to result in a lobulate test margin, equitant and overlapping previous chambers laterally, septa arched centrally, sutures flush in the early stage, later ones slightly constricted; wall calcareous, vitreous, radial, thick, lamellar, with lamellae of one chamber extending over two to three preceding chambers, wall slightly thickened at the margin of the aperture; aperture areal, terminal, radial. U. Permian; Turkey; Iran; USSR: S. Primorye Territory.

EOCRISTELLARIA
K. V. Miklukho-Maklay, 1954

Plate 436, fig. 12

Type species: Eocristellaria permica K. V. Miklukho-Maklay, 1954; OD.

Eocristellaria K. V. Miklukho-Maklay, 1954 (***2134**), p. 67.

Test planispirally enrolled, chambers increasing rapidly in breadth but slowly in height, the whorls rapidly enlarging so that test becomes astacoline, apertural face of the chambers extending back toward the globular proloculus; wall calcareous, with outer hyaline radiate layer and inner dark microgranular layer; aperture rounded to stellate in the center or lower part of the apertural face. U. Permian: USSR: Caucasus; Greece.

Remarks: Reiss (1963, ***2561**, p. 50) questioned the presence of the inner granular layer and two-layered wall. Although the nature of the wall cannot be determined from the published illustrations of the type species, it appears distinctly two layered in other species.

FALSOPALMULA Bartenstein, 1948

Plate 436, figs. 10 and 11

Type species: Flabellina tenuistriata Franke, 1936 (***1174**), p. 93; OD.

Falsopalmula Bartenstein, 1948 (***144**), p. 124.

Test elongate, up to 1 mm in length, palmate, flattened, early chambers planispirally enrolled in an astacoline coil, later uncoiled and rectilinear chambers are broad, flattened, and chevron shaped, sutures flush or slightly depressed in the later stage; wall calcareous, translucent, surface with fine longitudinal striae or reticulate; aperture terminal, ovate, slightly produced. L. Jurassic (Toarcian) to M. Jurassic (Bathonian): France; Germany.

PARINVOLUTINA Pelissié and Peybernès, 1982

Plate 436, figs. 13-15

Type species: Parinvolutina aquitanica Pelissié and Peybernès, 1982; OD.

Parinvolutina Pelissié and Peybernès, 1982 (*2377) p. 117; OD.

Test lenticular, planispiral, with umbonal thickening on both sides, about eight chambers in the final whorl, sutures oblique, curving backward at the periphery; wall calcareous, sparitic, and recrystallized in preservation, surface with prominent crests formed by elevated sutures and bordering depressions in the umbonal region; aperture basal. U. Jurassic (U. Kimmeridgian); France.

Remarks: Described originally as belonging to the Involutinidae but that family has an undivided tubular second chamber, whereas the present genus is distinctly chambered. Whether the crests are original surface features or merely remnants of septa of an eroded or otherwise destroyed outer whorl cannot be determined from the figured sections.

ROBULOIDES Reichel, 1946

Plate 437, figs. 1-8

Type species: Robuloides lens Reichel, 1946; OD.

Robuloides Reichel, 1946 (*2545), p. 531.

Pararobuloides K. V. Miklukho-Maklay, 1954 (*2134), p. 65; type species: *Pararobuloides orientalis* K. V. Miklukho-Maklay, 1954; OD.

Neoendothyra Reytlinger, 1965 (*2607), p. 61 (non *Neoendothyra* De Castro, 1966): type species: *Neoendothyra reicheli* Reytlinger, 1965; OD.

Test lenticular to nautiloid, planispiral or very slightly irregular in coiling, about two to three whorls present, seven to nine chambers in the final whorl, umbonal fillings prominent, septa oblique, arched back toward the periphery; wall calcareous, hyaline, very finely perforate, some specimens possibly recrystallized; aperture basal or areal in the lower part of the apertural face. M. Permian to M. Triassic (Ladinian); Greece; Austria; Italy; Yugoslavia; USSR: Transcaucasus, Pamir; Sumatra.

Remarks: Originally described as resembling the Endothyridae or Ozawainellidae. *Neoendothyra* appears to have an undifferentiated wall. Reported originally as microgranular, it has also been questionably considered as agglutinated and may be recrystallized. Later reports of *Neoendothyra* provide little additional information. It resembles *Robuloides* in the basal aperture, oblique sutures, faintly irregular to planispiral coiling, and strong umbonal filling and is here regarded as synonymous.

Family PARTISANIIDAE Loeblich and Tappan, 1984

Partisaniidae Loeblich and Tappan, 1984 (*1918), p. 33.

Early chambers spiralling about a long axis or arranged biserially but with successive chambers added slightly less than 180° apart, resulting in a sigmoid arrangement as seen in section, later may become uniserial; aperture terminal. L. to U. Permian (Murgabian).

Remarks: Morphologically similar to the lamellar Polymorphinidae.

PARTISANIA Sosnina, 1978

Plate 437, figs. 9-14

Type species: Partisania typica Sosnina, 1978; OD.

Partisania Sosnina, 1978 (*3038), p. 41.

Partizania Sosnina and A. P. Nikitina, 1977 (*3041), p. 35 (name not available, ICZN Art. 13 (a)(i), no description).

Test elongate, ovate in outline, slightly compressed and oval in section, early chambers in biserial sigmoid arrangement, later uniserial and rectilinear, apertural surface bluntly rounded, early chambers strongly overlapping laterally and reaching nearly to the proloculus, later ones have slightly less overlap but cover most of the exterior, septa strongly arched as seen in section; wall calcareous, thin, light colored, radial in structure; aperture terminal, central. U. Permian (Murgabian); USSR: S. Primorye Territory.

XINTANIA J. X. Lin, 1984

Plate 832, figs. 10-21

Type species: Xintania obesa J. X. Lin, 1984; OD.

Xintania J. X. Lin, 1984 (*1855), p. 149, 330.

Test fusiform to subconical, early chambers in a high spiral, becoming biserial in the later stage, chambers very high and narrow, overlapping laterally; wall calcareous, with outer radial fibrous layer and inner finely granular layer; aperture terminal, rounded. Upper part of L. Permian; China: Xintan, Hubei Province.

Remarks: Differs from *Partisania* in lacking the later uniserial stage and differs in the early stage appearing spiral rather than sigmoidal in plan.

Superfamily NODOSARIACEA Ehrenberg, 1838

Nodosariacea Loeblich and Tappan, 1961 (*1902), p. 295, nom. corr. pro superfamily Nodosariidea.
Nodosariidea Nørvang, 1957 (*2267), p. 23, nom. transl. ex family Nodosarina.
Lagenidea Glaessner, 1945 (*1250), p. 126.
Lagenicae Easton, 1960 (*1044), p. 65, 78.
Nodosarioidea Ayala-Castañares, 1963 (*101), p. 69.
Polymorphinacea Grigyalis, 1980 (not seen, cited by Grigyalis, 1985, *1308, p. 139).

Wall with primary lamination and with secondary lamination as a result of continued growth. U. Triassic to Holocene.

Family NODOSARIIDAE Ehrenberg, 1838

Nodosariidae Lister, in Lankester, 1903 (*1791), p. 144, nom. corr. pro family Nodosarina.
Nodosarina Ehrenberg, 1838 (*1053), p. 200.
Nodosarida Schultze, 1854 (*2824), p. 53.
Frondicularidae Reuss, 1860 (*2581), p. 151.
Nodosaridae Reuss, 1860 (*2581), p. 151, 178.
Frondicularideae Gümbel, 1870 (*1337), p. 53.
Nodosarideae Gümbel, 1870 (*1337), p. 30.
Nodosarie Schwager, 1876 (*2829), p. 476.
Dentalinoidea Schwager, 1877 (*2830), p. 18.
Nodosaretta Haeckel, 1894 (*1355), p. 164.
Nodosarinae Delage and Hérouard, 1896 (*926), p. 137.
Arnodosaridia Rhumbler, 1913 (*2621), p. 342 (err. emend.).
Nodosariellidae Wedekind, 1937 (*3355), p. 93.
Plectofrondiculariidae Montanaro-Gallitelli, 1957 (*2174), p. 143.
Lingulinidae Grigyalis, 1977 (*1304), p. 11.
Dentalinidae Saidova, 1981 (*2696), p. 36.

Test free, multilocular, or rarely single chambered, chambers uniserial or less commonly biserial in part, arcuate to rectilinear; wall calcareous, hyaline, finely perforate, monolamellar or orthomonolamellar; aperture terminal, commonly radiate or may be rounded, slitlike, or multiple. U. Triassic to Holocene.

Subfamily NODOSARIINAE Ehrenberg, 1838

Nodosariinae Chapman, 1900 (*530), p. 30, nom. corr. pro subfamily Nodosaridea.
Nodosaridea Reuss, 1862 (*2586), p. 334, nom. transl. ex family Nodosarina.
Dentalinidae Schwager, 1877 (*2830), p. 18.
Nodosarinae Brady, 1884 (*344), p. 69.
Glandulonodosariinae A. Silvestri, 1901 (*2925), p. 109.
Dentalininae Grigyalis, 1977 (*1304), p. 12.

Test straight to slightly arcuate, chambers uniserial or less commonly biserial in part; aperture rounded, radiate, or multiple. L. Jurassic to Holocene.

ALFREDOSILVESTRIS Andersen, 1961

Plate 437, figs. 15 and 16

Type species: Alfredosilvestris levinsoni Andersen, 1961; OD.

Alfredosilvestris Andersen, 1961 (*34), p. 71.

Test small, about 0.5 mm to 0.6 mm in length, uniserial and rectilinear, early chambers flattened, arched, and chevron shaped, later ones inflated and oval to circular in secton, slightly produced toward the aperture, sutures depressed, early ones like an inverted V, later straight and horizontal; wall calcareous, thin, hyaline, transparent; aperture terminal, radiate. Holocene; S. Atlantic; Pacific; USA: Louisiana.

AWHEA Vella, 1963

Plate 437, fig. 17

Type Species: Nodosaria sinalata Finlay, 1940 (*1129), p. 452; OD.

Awhea Vella, 1963 (*3288), p. 6.

Test narrow, elongate, up to 2.2 mm in length, uniserial, rectilinear, with large elongate, oval, and apiculate proloculus followed by narrow and elongate subcylindrical chambers, sutures flush or slightly constricted, horizontal; wall calcareous, surface ornamented with about eight longitudinal ribs that may be slightly twisted about the vertical axis; aperture not described, probably terminal. U. Miocene to Pliocene; New Zealand.

BOTULOIDES S. Y. Zheng, 1979

Plate 439, figs. 15–18

Type species: Botuloides pauciloculus S. Y. Zheng, 1979; OD.

Botuloides S. Y. Zheng, 1979 (*3449), p. 141, 210.

Test small, elongate, arcuate, circular to ovate in section, very elongate, tubular, and sausage shaped, apiculate proloculus, of width about 2.5 times the diameter, followed by a slightly shorter second chamber of similar form that partly overlaps the distal end of the proloculus, sutures horizontal, straight, slightly constricted; wall calcareous, thin, transparent, finely perforate, surface smooth; aperture small, round, at the end of a short tubular neck. Holocene; Pacific: Xisha Islands; China.

CHRYSALOGONIUM Schubert, 1908

Plate 438, figs. 1 and 2

Type species: Nodosaria polystoma Schwager, 1866 (*2828), p. 217; OD(M).

Chrysalogonium Schubert, 1908 (*2816), p. 243.

Test elongate, uniserial, rectilinear, early chambers elongate ovate, later ones ovate to subpyriform, sutures straight, horizontal, constricted; wall calcareous, hyaline, perforate, surface smooth; aperture terminal, cribrate. U. Cretaceous (Campanian) to Holocene; Pacific; Atlantic; Caribbean; India; Europe; North America.

CRIBRONODOSARIA Y. Le Calvez, de Klasz, and Brun, 1974

Plate 438, figs. 5 and 6

Type species: Cribronodosaria africana Y. Le Calvez et al., 1974; OD.

Cribronodosaria Y. Le Calvez, de Klasz, and Brun, 1974 (*1808), p. 392 (also err. cit. as *Cribonodosaria*, pl. 3, figs. 1-2).

Test elongate, uniserial, a few closely appressed inflated to subglobular chambers in a rectilinear series, base broken in all specimens observed, sutures straight, horizontal, constricted; wall calcareous, perforate, surface smooth, or with a few pustules or spines in the median region of the chambers; aperture terminal, of numerous angular pores forming a reticular mesh in a domelike trematophore. U. Cretaceous (Maastrichtian); Gabon; Nigeria.

DENTALINA Risso, 1826

Plate 439, fig. 19

Type species: Nodosaria (les Dentalines) *cuvieri* d'Orbigny, 1826 (*2303), p. 255; OD(M).

Dentalina Risso, 1826 (*2628), p. 16.

Nodosaria (les Dentalines) d'Orbigny, 1826 (*2303), p. 254 (name not available, ICZN Art. 11 (b)(i); 11 (g); vernacular).

Nodosaria (Dentalina) d'Orbigny, 1839 (*2304), p. 16 (nom. transl.).

Test elongate, arcuate, uniserial, proloculus apiculate, chambers cylindrical to ovate, enlarging gradually as added, sutures horizontal; wall calcareous, hyaline radial in structure, with secondary lamination, surface with numerous longitudinal costae; aperture terminal, radiate. L. Cretaceous to Holocene; cosmopolitan.

Remarks: *Dentalina* now is restricted to those species with longitudinally costate surface (Loeblich and Tappan, 1986, ***1928**, p. 241).

DENTALINOIDES Marie, 1941

Plate 439, figs. 20 and 21

Type species: Dentalinoides canulina Marie, 1941; OD.

Dentalinoides Marie, 1941 (*2031), p. 207, 256.

Test elongate, straight to slightly arcuate, uniserial, circular in section, sutures horizontal; wall calcareous, hyaline radial in structure, with secondary lamination, perforate, surface smooth; aperture terminal, large, round, slightly eccentric in position and opening toward the concave side of the test. U. Cretaceous (Senonian) to Miocene; Europe; North America.

DENTALINOPSIS Reuss, 1860

Plate 438, figs. 3 and 4

Type species: Dentalinopsis semitriquetra Reuss, 1860 (syn.: *Dentalinopsis subtriquetra* Reuss, 1863, ***2587**, p. 57); OD(M).

Dentalinopsis Reuss, 1860 (*2580), p. 81.

Test narrow, elongate, uniserial, straight to slightly arcuate, early chambers triangular in section or rounded with three longitudinal carinae, final chamber rounded in section, sutures arched on the faces in the angular portion, straight in the globular to ovoid final chamber; wall calcareous, perforate, surface smooth other than the three angles or carinae; aperture terminal, rounded. L. Cretaceous (Hauterivian): Germany.

ENANTIODENTALINA Marie, 1941

Plate 438, figs. 16-23

Type species: Enantiodentalina communis Marie, 1941; OD.

Enantiodentalina Marie, 1941 (***2031**), p. 149, 255.

Paradentalina Uchio, 1960 (***3238**), p. 60; type species: *Enantiodentalina muraii* Uchio, 1953 (***3237**), p. 152; OD.

Test elongate, subcylindrical, straight or slightly arcuate, early chambers biserial, alternation clearly evident on the dorsal edge but less clear on the ventral edge, later uniserial, with straight oblique sutures; wall calcareous, perforate, radial, surface smooth; aperture terminal on the produced dorsal margin of the test. U. Cretaceous (Campanian) to Holocene; Europe; USSR; Japan; Caribbean; USA.

Remarks: The status of *Enantiodentalina* and the correct name for the type species were discussed by Loeblich and Tappan (1986, ***1928**, p. 241-242); *Paradentalina* was shown to be a synonym.

GRIGELIS Mikhalevich, 1981

Plate 441, figs. 1-5

Type species: Nodosaria pyrula d'Orbigny, 1826 (***2303**), p. 253 = *Orthoceras monile* Soldani, 1798 (***3018**), p. 35; OD.

Grigelis Mikhalevich, 1981 (***2110**), p. 25, 39.

Test elongate, delicate, ovate to fusiform proloculus with elongate protruding basal spine that may be up to twice the length of the first chamber, later chambers elongate ovate, separated by long narrow necks that are nearly as long as the chambers, sutures at the base of the succeeding chamber; wall calcareous, hyaline, transparent, surface smooth or chambers following the proloculus may be longitudinally costate; aperture terminal, radiate, at the end of the very narrow elongate neck, giving a petaloid appearance in apertural view. U. Eocene to Holocene; Europe; North America; Atlantic; Pacific; Indian Ocean.

LAEVIDENTALINA Loeblich and Tappan, 1986

Plate 439, figs. 22-24

Type species: Laevidentalina aphelis Loeblich and Tappan, 1986; OD.

Laevidentalina Loeblich and Tappan, 1986 (***1928**), p. 242.

Test elongate, arcuate, proloculus rounded to fusiform, may be apiculate, later chambers uniserial, sutures straight, horizontal to slightly oblique; wall calcareous, optically radial, hyaline, very finely perforate, secondary lamination present, surface smooth and unornamented; aperture terminal, a series of radial slits that are closed at the apex. Cretaceous to Holocene; cosmopolitan.

Remarks: Differs from *Dentalina* and *Mesodentalina* in lacking longitudinal costae, from *Prodentalina* in having secondary wall lamination, and from *Svenia* in the smaller size, thin-walled and delicate test, conical rather than globular proloculus, elongate and inflated chambers that are circular rather than oval in section, oblique rather than horizontal sutures, and the even curvature of the test, rather than the slight sinuate curve in the early stage of *Svenia*.

LAGENOGLANDULINA A. Silvestri, 1923

Plate 438, figs. 10-15

Type species: Glandulina subovata Stache, 1864 (***3054**), p. 185 = *Glandulina annulata* Stache, 1864 (***3054**), p. 184; OD(M).

Lagenoglandulina A. Silvestri, 1923 (***2952**), p. 12.

Test ovate, up to 1.2 mm in length and 0.85 mm in diameter, circular in section, consisting of a few (commonly three) rectilinear chambers, rapidly increasing in breadth as added and strongly overlapping the earlier chambers, earlier septa resorbed at the interior of the test except for minor remnants at the contact with the following chamber; wall calcareous, thick, radial, surface smooth or finely hispid with fine dense short spines; aperture terminal, radiate, at the end of a short cylindrical neck. M. Eocene (L. Lutetian) to L. Miocene (Otaian); New Zealand; Italy; Panama.

Remarks: Hornibrook (1971, *1541, p. 35) restudied Stache's material and determined that *Glandulina subovata, G. annulata,* and other species described by Stache were conspecific; as first reviser, he recognized *G. annulata* for the species and *G. subovata* was placed in synonymy.

LAGENOLINGULINA McCulloch, 1977

Plate 439, fig. 13

Type species: Lagenolingulina angelensis McCulloch, 1977; OD.

Lagenolingulina McCulloch, 1977 (*1961), p. 20.

Test elongate, slightly compressed, ovoid proloculus followed by a few uniserial and rectilinear chambers that are widely separated by long slender tubular necks, chambers with a narrow transverse flange at the widest part of the chamber a short distance above the base and extending laterally as short spines; wall calcareous, thin, translucent, finely perforate, surface smooth; aperture terminal at the end of the elongate tubular neck that is about as long as the main body of the chamber, rounded and bordered by a phialine lip. Holocene; Gulf of California.

MUCRONINA Ehrenberg, 1839

Plate 440, figs. 1-8

Type species: Nodosaria (les Mucronines) *hasta* d'Orbigny, 1826 (*2303), p. 256; SD(SM) Parker, Jones, and Brady, 1865 (*2354), p. 27.

Mucronina Ehrenberg, 1839 (*1054), table opp. p. 120.

Nodosaria (les Mucronines) d'Orbigny, 1826 (*2303), p. 256 (not available; ICZN Art. 11 (b)(i), 11 (g); vernacular).

Nodosaria (Mucronina) Parker, Jones, and Brady, 1865 (*2354), p. 27 (nom. transl.).

Staffia Schubert, 1911 (*2819), p. 78; type species: *Nodosaria tetragona* O. G. Costa, 1855 (*685), p. 116.

Test narrow, elongate, compressed, laterally carinate, chambers uniserial and rectilinear, sutures straight and horizontal; wall calcareous, hyaline, perforate, optically radial, surface ornamented with numerous longitudinal striae and the lateral keels; aperture terminal, produced on a neck. Miocene to Holocene; Adriatic; Italy.

Remarks: Topotypes of *Nodosaria tetragona* from the Pliocene at the Vatican are very close to *Nodosaria hasta* described by d'Orbigny from the Adriatic. They appear to be both congeneric and conspecific. Many of the species described by d'Orbigny were from shore sands, and *N. hasta* may also have been reworked from the Pliocene.

NODOMORPHINA Cushman, 1927

Plate 443, fig. 21

Type species: Nodosaria compressiuscula Neugeboren, 1852 (*2241), p. 59; OD.

Nodomorphina Cushman, 1927 (*739), p. 80.

Test elongate, uniserial, and rectilinear, early stage compressed and rectangular in section, later chambers more inflated and oval to subcircular in section, sutures distinct, straight and horizontal, early ones flush, later slightly constricted; wall calcareous, hyaline, radial, surface with longitudinal costae at the test angles, and additional costae symmetrically intercalated; aperture terminal, rounded to ovate, slightly produced but neither radiate nor with a tooth. Miocene; Romania.

Remarks: Differs from *Amphimorphina* in the simple rather than radiate to cribrate aperture.

NODOSARIA Lamarck, 1812

Plate 438, figs. 24-27

Type species: Nautilus radicula Linné, 1758 (*1859), p. 711; SD(SM) Lamarck, 1816 (*1781), p. 465.

Nodosaria Lamarck, 1812 (*1779), p. 121.

Glandulonodosaria A. Silvestri, 1900 (*2923), p. 4; type species: *Nodosaria ambigua* Neuegeboren, 1856 (*2242), p. 71; OD(M).

Test elongate, multilocular, ovate proloculus followed by uniserial and rectilinear globular to ovate chambers; wall calcareous, hyaline, perforate, surface smooth and unornamented; aperture terminal, radiate or rounded and bordered by radiating grooves, produced on a neck. L. Jurassic to Holocene; cosmopolitan.

PANDAGLANDULINA Loeblich and Tappan, 1955

Plate 439, figs. 3-5

Type species: Pandaglandulina dinapolii Loeblich and Tappan, 1955: OD.

Pandaglandulina Loeblich and Tappan, 1955 (***1891**), p. 7.

Test robust, somewhat elongate, early chambers uniserial but slightly arcuate, increasing rapidly in diameter, later chambers rectilinear and of nearly constant diameter so that the adult test has nearly parallel sides, chambers strongly overlapping previous ones in the early part of the test, later chambers of microspheric generation may be less appressed and more nodosarine in appearance, sutures straight, slightly oblique in the early stage, later horizontal, slightly depressed; wall calcareous, perforate, hyaline, surface smooth; aperture terminal, slightly produced and radiate. Miocene to Holocene; Europe.

PSEUDONODOSARIA Boomgaart, 1949

Plate 439, figs. 6-12

Type species: Glandulina discreta Reuss, 1850 (***2573**), p. 366; OD.

Pseudonodosaria Boomgaart, 1949 (***303**), p. 81.

Rectoglandulina Loeblich and Tappan, 1955 (***1891**), p. 3; type species: *Rectoglandulina appressa* Loeblich and Tappan, 1955; OD.

Test elongate, cylindrical, base tapering or broadly rounded, early chambers strongly overlapping and increasing rapidly in diameter, later ones enlarging more slowly and less closely appressed, final chamber may be somewhat inflated, sutures straight, horizontal, flush; wall calcareous, surface smooth; aperture terminal, radiate, or may be rounded with numerous radiating slits. Cretaceous to Holocene; cosmopolitan.

PYRAMIDULINA Fornasini, 1894

Plate 441, figs. 6-8

Type species: Pyramidulina eptagona Fornasini, 1894 = *Nautilus raphanus* Linné, 1758 (***1859**), p. 711; OD(M).

Pyramidulina Fornasini, 1894 (***1152**), p. 224.

Pseudoglandulina Cushman, 1929 (***753**), p. 87; type species: *Nautilus comatus* Batsch, 1791 (***161**), [p. 1, 4]; OD.

Nodosariella Wedekind, 1937 (***3355**), p. 93; type species: *Nautilus raphanus* Linné, 1758; OD.

Test elongate, multilocular, uniserial and rectilinear, may be up to 5 mm in length, the globular to subcylindrical chambers increasing regularly in size as added, sutures horizontal, constricted; wall calcareous, perforate, surface with distinct longitudinal costae; aperture terminal, at the end of a short neck. Cretaceous to Holocene; cosmopolitan.

Remarks: *Pyramidulina* includes species previously placed in *Nodosaria* but with prominent longitudinal ribs rather than a smooth surface. The genus was credited to Costa by Fornasini, who cited an unpublished manuscript, but as both the illustration and discussion were by Fornasini, the genus must be credited to him. *Pseudoglandulina* was described by Cushman (1929, ***753**), with Batsch's species as type. Parker, Jones, and Brady (1865, ***2353**, p. 226) had restricted *Nautilus comatus* to the elongate specimen illustrated by Batsch (1791, ***161**, figs. 2a, b.); that in fig. 2a therefore is herein designated as lectotype of *Nautilus comatus*. Parker et al. (1865) stated that the shorter form also included by Batsch is in fact *Glandulina glans* d'Orbigny. Selli (1947, ***2862**, p. 83, pl. 3, figs. 3, 6) showed that *Glandulina glans* is a true *Glandulina*, with internal tube and biserial early stage, hence neither congeneric nor conspecific with *N. comatus*, as restricted.

SVENIA Brotzen, 1937

Plate 439, fig. 14

Type species: Nodosaria laevigata Nilsson, 1826 (***2259**), p. 342; OD.

Svenia Brotzen, 1937 (***426**), p. 66.

Test large, elongate, uniserial, with chambers in an arcuate to slightly sinuate series, the curvature of the earliest chambers reversed in the later chambers, chambers increasing gradually in size as added, sutures horizontal; wall calcareous, thick, perforate, surface smooth and unornamented; aperture terminal, radiate, eccentric. U. Cretaceous to Holocene; cosmopolitan.

Remarks: A neotype for the type species was selected by Brotzen (1937). *Svenia* differs from *Dentalina* in the smooth rather than costae surface.

Subfamily LINGULININAE Loeblich and Tappan, 1961

Lingulininae Loeblich and Tappan, 1961 (*1902), p. 298.
Rimulininae R. W. Jones, 1984 (*1615), p. 96.

Test free, compressed, circular, ovate or flattened in section, rectilinear, or may have slightly curved axis in early stage; aperture an elongate terminal slit. L. Cretaceous to Holocene.

DAUCINOIDES de Klasz and Rérat, 1962

Plate 442, figs. 11-15

Type species: Daucinoides circumtegens de Klasz and Rérat, 1962; OD.

Daucinoides de Klasz and Rérat, 1962 (*1703), p. 181.

Test elongate ovate in outline, tapering at the base, chambers uniserial, each completely overlapping the earlier chambers as in *Involutaria;* wall calcareous, finely perforate, surface smooth or striate at the base; aperture terminal, a straight, curved, or zigzag slit. L. Miocene; Gabon; Cameroon; Nigeria.

GONATOSPHAERA Guppy, 1894

Plate 442, figs. 6-8

Type species: Gonatosphaera prolata Guppy, 1894; OD.

Gonatosphaera Guppy, 1894 (*1342), p. 651.

Test uniserial, short and stout, circular in section, with strongly overlapping chambers, sutures straight and horizontal, may be slightly depressed; wall calcareous, finely perforate, radial in structure, surface smooth or may have a low longitudinal keel in the same plane as the aperture; aperture terminal, an elongate narrow straight or slightly curved slit, bordered by distinctly projecting lips that extend laterally into the marginal keel. U. Oligocene to Miocene; Caribbean: Trinidad; Dominican Republic; Germany.

LINGULINA d'Orbigny, 1826

Plate 442, figs. 1-3

Type species: Lingulina carinata d'Orbigny, 1826; SD Cushman, 1913 (*704), p. 61.

Lingulina d'Orbigny, 1826 (*2303), p. 256.

Test elongate, robust, lenticular in section, chambers uniserial and rectilinear, strongly overlapping earlier chambers so that the final one may occupy almost one-third of the test length, sutures horizontal, gently curved, depressed; wall calcareous, finely perforate, radial, lamellar, surface smooth; aperture an elongate terminal slit in the plane of compression. L. Cretaceous to Holocene; cosmopolitan.

NEOLINGULINA McCulloch, 1977

Plate 442, figs. 9 and 10

Type species: Neolingulina viejoensis McCulloch, 1977; OD.

Neolingulina McCulloch, 1977 (*1961), p. 22.

Test small, elongate, two or three rounded to ovoid chambers of nearly equal diameter, ovate in section, sutures straight, horizontal, slightly constricted; wall calcareous, hyaline, transparent, surface smooth; aperture oval, terminal, surrounded by a low rim. Holocene, 40 m to 60 m; off Peru; Korea.

PSEUDOLINGULINA McCulloch, 1977

Plate 439, figs. 1 and 2

Type species: Pseudolingulina advena McCulloch, 1977; OD.

Pseudolingulina McCulloch, 1977 (*1961), p. 24.

Test elongate, flattened, oval in section, uniserial and rectilinear, globular proloculus followed by a few gradually widening, broad, low, and slightly equitant chambers, sutures arched centrally, flush with the surface; wall calcareous, thin, transparent, finely perforate, surface smooth; aperture terminal, a somewhat elongate opening surrounded by radiate grooves. Holocene; W. Pacific: off Bikini Island.

RIMULINA d'Orbigny, 1826

Plate 442, figs. 4 and 5

Type species: Rimulina glabra d'Orbigny, 1826; OD(M).

Rimulina d'Orbigny, 1826 (*2303), p. 257.

Test elongate ovate, a single chamber with subacute margin; wall calcareous, perforate, surface smooth; elongate slitlike aperture extending from the apex for about half the length of one edge, bordered by a low narrow lip. Holocene; Adriatic.

TOLLMANNIA Sellier de Civrieux and Dessauvagie, 1965

Plate 442, figs. 16-24

Type species: Lingulina costata subsp. *tricarinata* Tollmann, 1954 (***3206**), p. 611 = *Lingulina costata* d'Orbigny, 1846 (***2309**), p. 62; OD.

Tollmannia Sellier de Civrieux and Dessauvagie, 1965 (***2867**), p. 92, 145.

Test large, up to 4.5 mm in length, stout and robust, circular to ovate in section, chambers increase rapidly in breadth as added and strongly overlap previous chambers, final chamber comprising one-third to one-half the length of the test, sutures horizontal, straight to slightly curved, moderately depressed; wall calcareous, perforate, radial, surface with fine to coarse longitudinal ribs that may completely cross the chambers or die out distally; aperture terminal, slitlike, or rarely triradiate, bordered by an elevated lip. Oligocene?, Miocene to L. Pliocene; Austria; Italy, Hungary; Venezuela; Taiwan.

Remarks: Although the genus was described as having a triradiate rather than slitlike aperture, the six specimens with triangular aperture found by Tollmann in describing the subspecies are very similar to the co-occurring typical form with slitlike aperture of which Tollmann had 463 specimens. The "subspecies *tricarinata*" appears to represent a few aberrant specimens and is here regarded as a synonym of *Lingulina costata* = *Tollmannia costata*. The genus includes the *Lingulina*-like species characteristic of the Miocene and L. Pliocene that have prominent longitudinal costae and commonly are nearly circular in section.

TORULUMBONINA Patterson, 1987

Plate 834, figs. 4-8

Type species: Frondicularia bikiniensis McCulloch, 1977 (***1961**), p. 6; OD.

Torulumbonina Patterson, 1987 (***2370**), p. 145.

Test elongate, ovate in section, uniserial and rectilinear, chambers increasing in height as added from the globular proloculus, sutures arched across the broad faces of the test, margins rounded; wall calcareous, hyaline, finely perforate, surface smooth; aperture terminal, rounded, surrounded by a ring of low rounded knobs. Pleistocene to Holocene, tropical N. Pacific, western S. Atlantic.

Subfamily FRONDICULARIINAE Reuss, 1860

Frondiculariinae Galloway, 1933 (***1205**), p. 235 (nom. corr.).

Frondicularidea Reuss, 1862 (***2586**), p. 307, 335 (nom. trans. ex family Frondicularidae).

Test flattened, bladelike to palmate, chambers uniserial, rectilinear, and chevron-shaped; aperture rounded to radiate. L. Jurassic to Holocene.

ANNULOFRONDICULARIA Keijzer, 1945

Plate 437, figs. 18-21

Type species: Frondicularia annularis d'Orbigny, 1846 (***2309**), p. 59; OD.

Frondicularia (Annulofrondicularia) Keijzer, 1945 (***1668**), p. 196.

Annulofrondicularia Loeblich and Tappan, 1964 (***1910**), p. C518 (nom. transl.).

Test large, up to 5.0 mm in length, flattened, palmate to subtriangular in outline, globular proloculus followed by a few low and completely encircling early chambers, later chambers very broad, low, and equitant, not completely surrounding the base but strongly overlapping at the margins, sutures slightly thickened, strongly arched at the midline of the test; wall calcareous, perforate, surface smooth to longitudinally striate; aperture terminal on a slight neck. Miocene; Austria; Cuba.

FRONDICULARIA Defrance, 1826

Plate 440, figs. 21-23

Type species: Renulina complanata Defrance, in de Blainville, 1824 (***246**), p. 178; SD Cushman, 1913 (***704**), p. 81.

Frondicularia Defrance, in d'Orbigny, 1826 (***2303**), p. 256.

Pleiona Franzenau, 1888 (***1176**), p. 146, 203 (non *Pleiona* Detrolle, 1864, nec Paetel, 1875); type species: *Pleiona princeps* Franzenau, 1888; OD(M).

Test flattened, palmate to lanceolate, chambers broad, low, equitant, sutures highly arched to angled at the midline of the test; wall calcareous, perforate, thickened in the region of the aperture, surface smooth, aperture terminal, radiate, may be slightly produced. M. Jurassic to Holocene; cosmopolitan.

Remarks: Upper Paleozoic to Lower Jurassic species previously included here are referrable to genera of the Geinitzinidae and Ichthyolariidae. *Pleiona* Franzenau is based on a two-chambered juvenile *Frondicularia*.

PSEUDOTRIBRACHIA Colom, 1982

Plate 438, figs. 7-9

Type species: Pseudotribrachia albiensis Colom, 1982; OD(M).

Pseudotribrachia Colom, 1982 (***652**), p. 452 (also err. cit. as *Pseudotribraquia*, p. 442).

Test elongate, up to 2.0 mm in length, subtriangular in section, one side strongly convex with a median ridge and opposite side strongly concave, resembling *Tribrachia* with one ray much reduced, chambers numerous, equitant, sutures flush, strongly arched centrally in an inverted V; wall calcareous, surface smooth; aperture terminal, a small central rounded opening, produced on a neck. L. Cretaceous (Albian): Spain: Balearic Isles.

TRIBRACHIA Schubert, 1912

Plate 440, figs. 15 and 16

Type species: Tribrachia inelegans Loeblich and Tappan, 1950; SD Loeblich and Tappan, 1950 (***1882**), p. 15.

Tribrachia Schubert, 1912 (***2820**), p. 183.

Test elongate, tapering, triangular to trifoliate in section, sides flat to strongly concave, chambers broad and low, equitant, arched in the center of the three faces of the test and curving steeply downward at the angles; wall calcareous, perforate, surface smooth; aperture terminal, rounded to radiate, may be slightly produced on a neck. M. Jurassic (Callovian) to U. Cretaceous (Senonian); USA: Wyoming, France; Poland.

TRISTIX Macfadyen, 1941

Plate 440, figs. 9-14

Type species: Rhabdogonium liasinum Berthelin, 1879 (***220**), p. 35; OD.

Tristix Macfadyen, 1941 (***1966**), p. 54.

Quadratina ten Dam, 1946 (***885**), p. 65; type species: *Quadratina depressula* ten Dam, 1946; OD.

Test elongate, uniserial, and rectilinear, triangular in section, or rarely quadrangular, sutures distinct, depressed, arched centrally on the flattened test faces, curved toward the base at the test angles; wall calcareous, hyaline, perforate, radial, surface smooth; aperture terminal, radiate and slightly produced. L. Jurassic (Lias) to Eocene; Europe; North America.

Remarks: As an entosolenian tube was known to occur in *Tricarinella*, then considered a synonym of *Tristix*, this genus was placed in the Glandulininae (Loeblich and Tappan, 1964, ***1910**, p. C539). However, a detailed study of the type species of *Tristix* (Norling, 1972, ***2263**, p. 90) showed it to have a nodosarian radiate aperture and to lack an internal tube.

Subfamily PLECTOFRONDICULARIINAE Cushman, 1927

Plectofrondiculariinae Chapman and Parr, 1936 (***542**), p. 143, nom. corr. pro subfamily Plectofrondicularinae.
Plectofrondicularinae Cushman, 1927 (***742**), p. 62.
Dyofrondiculariinae Saidova, 1981 (***2696**), p. 36.
Lankasterinae Saidova, 1981 (***2696**), p. 37 (nom. imperf.).
Lankesterininae Loeblich and Tappan, 1984 (***1918**), p. 33 (nom. correct.).

Test biserial and laterally compressed, at least in the early part, later may be uniserial and rounded in section. U. Triassic to Holocene.

AMPHIMORPHINA Neugeboren, 1850

Plate 443, figs. 7-14

Type species: Amphimorphina haueriana Neugeboren, 1850; OD(M).

Amphimorphina Neugeboren, 1850 (***2240**), p. 125.

Amphimorphinella Keyzer, 1953 (***1678**), p. 274; type species: *Amphimorphinella butonensis* Keyzer, 1953; OD.

Test elongate, may be compressed in the early stage, microspheric test with six to ten biserially arranged chambers in the early stage, later uniserial, megalospheric test uniserial throughout, sutures may be slightly arched in the flattened early stage, straight and horizontal in the later stage with more inflated chambers; wall calcareous, perforate, surface smooth in the early part, later chambers may have longitudinal costae; aperture radiate in the early stage, later cribrate with three to eight openings and may have a small apertural chamberlet. M. Eocene to Holocene; cosmopolitan.

BEHILLIA Haman, 1979

Plate 443, fig. 26

Type species: Paralingulina frailensis McCulloch, 1977 (***1961**), p. 23; OD.

Behillia Haman, 1979 (*1371), p. 1432 (nom. subst. pro *Paralingulina* McCulloch, 1977).

Paralingulina McCulloch, 1977 (***1961**), p. 23 (non *Paralingulina* Gerke, 1969); type species: obj.; OD.

Paralingulinella McCulloch, 1981 (*1962), p. 6 (nom. subst. pro *Paralingulina* McCulloch, 1977); obj.

Test small, elongate, flattened, periphery rounded, globular proloculus followed by three biserially arranged inflated chambers, later chambers uniserial and rectilinear to slightly arcuate, with chambers about twice as broad as high, increasing very slowly in size, chambers arched centrally, recurved at the margins, sutures gently arched, depressed; wall calcareous, hyaline, finely perforate, surface smooth; aperture terminal, a short slit. Holocene; E. Pacific; off Mexico.

Remarks: Apparently the holotype of the type species is the only known specimen of the genus and may be an aberrant example of some other species.

BERTHELINELLA Loeblich and Tappan, 1957

Plate 443, figs. 18–20

Type species: Frondicularia paradoxa Berthelin, 1879 (***220**), p. 33; OD.

Berthelinella Loeblich and Tappan, 1957 (*1897), p. 225.

Test elongate, ovate to palmate in outline, flattened, sides flat, periphery truncate, ovate proloculus followed by two to four pairs of biserially arranged chambers with strongly oblique sutures, later chambers uniserial, rectilinear, low, broad, and chevron shaped, periphery with a thickened carina at each of the four angles; wall calcareous, finely perforate, surface smooth; aperture a terminal slit. U. Triassic (Rhaetian) to L. Jurassic; France; Austria; USA: Alaska.

DYOFRONDICULARIA Asano, 1936

Plate 440, figs. 19 and 20

Type species: Dyofrondicularia nipponica Asano, 1936; OD.

Dyofrondicularia Asano, 1936 (*79), p. 330.

Test elongate, flattened, ovate proloculus with apiculate base followed by broad and low, equitant uniserial chambers, later chambers added alternately at the two sides, reaching only to the test apex so that chamber arrangement is biserial, sutures distinct, flush; wall calcareous, perforate, surface smooth; aperture terminal, radiate. Pliocene; Japan.

LANKESTERINA Loeblich and Tappan, 1961

Plate 443, figs. 22 and 23

Type species: Bolivina frondea Cushman, 1922 (***720**), p. 126; OD.

Lankesterina Loeblich and Tappan, 1961 (*1904), p. 219; OD.

Test small, palmate to rhomboid in outline, strongly compressed, with flattened sides and sharply truncate periphery, chambers low and broad, increasing rapidly in breadth as added, biserial throughout, sutures strongly oblique, gently curved, slightly depressed; wall calcareous, radial, finely perforate, surface smooth; aperture terminal, radiate. U. Eocene to Oligocene; USA.

NUTTALLUS Saidova, 1981

Plate 443, figs. 27–29

Type species: Plectofrondicularia nuttalli Cushman and Stainforth, 1945 (***848**), p. 38; OD.

Nuttallus Saidova, 1981 (*2696), p. 38.

Test large, up to 1.75 mm in length, very narrow, elongate, much compressed biserial early stage with lateral keels, later uniserial chambers with a rib at the midline of one face, finally becoming a third angle, so that the adult test has a triangular section; wall calcareous, perforate, radial, surface smooth or with a few low costae in the early part; aperture terminal, rounded. U. Eocene?, L. Miocene (Burdigalian: *Globigerinatella insueta* zone); Trinidad.

Remarks: The genus was defined by Saidova only as having a test with triangular section; the original description of the type species stated it to be from the Oligocene. However, the types are from the type locality of the Cipero Formation and of early Miocene age.

PARAFRONDICULARIA Asano, 1938

Plate 443, figs. 24 and 25

Type species: Parafrondicularia japonica Asano, 1938; OD.

Parafrondicularia Asano, 1938 (*82), p. 187, 189.

Test elongate, lanceolate, flattened but ovate in section, early chambers biserial, later uniserial, rectilinear, chevron shaped, sutures slightly depressed; wall calcareous, finely perforate, surface with numerous fine longitudinal costae; aperture terminal, radiate. L. Eocene to Holocene; New Zealand; Australia; Japan; Indonesia; USA: California, South Carolina; Mexico.

PLECTOFRONDICULARIA Liebus, 1902

Plate 443, figs. 1-6

Type species: Plectofrondicularia concava Liebus, 1902; SD Cushman, 1928 (*747), p. 238.

Plectofrondicularia Liebus, 1902 (*1843), p. 76.

Test elongate, lanceolate, compressed, with peripheral keel, or truncate margins with additional keels at each angle, chambers in early stage biserially arranged, later uniserial, rectilinear, slightly arched centrally to chevron shaped, sutures thickened, flush; wall calcareous, radial, surface smooth or with a single low median longitudinal rib in the early stage; aperture terminal, radial, or with denticulate elevated rim, the denticles tending to meet centrally to produce a multiple aperture. Oligocene to Pliocene; Germany; USA: Florida, California, Washington; Venezuela; Ecuador; Indonesia.

PROXIFRONS Vella, 1963

Plate 444, figs. 7-9

Type species: Frondicularia advena Cushman, 1923 (*723), p. 141; OD.

Proxifrons Vella, 1963 (*3288), p. 5.

Plectofrondicularia (Proxifrons) Hornibrook, 1971 (*1541), p. 45 (nom. transl.).

Test strongly compressed, broadly palmate in outline, globular proloculus commonly with a median longitudinal rib, followed by small biserially arranged chambers, later with uniserial chevron-shaped chambers increasing rapidly in breadth and strongly overlapping earlier chambers at the margins; wall calcareous, finely perforate, radial, surface smooth; aperture terminal, rounded, or obscurely radiate. Eocene to Holocene: Pacific; New Zealand; Japan; Spain; Italy; Poland; USA: California, Oregon; Mexico; Trinidad.

SIEBERINA Fuchs, 1970

Plate 443, figs. 15-17

Type species: Sieberina virgata Fuchs, 1970; OD.

Sieberina Fuchs, 1970 (*1191), p. 106.

Test small, about 0.4 mm in length, elongate, palmate, flattened, microspheric test with few early chambers in a planispiral coil, later biserial, megalospheric test with one to two pairs of biserial chambers followed by one or two uniserial, rectilinear, broad, low-arched, and equitant chambers; wall calcareous, radially fibrous, nonlamellar, imperforate, surface with narrow parallel, longitudinal ribs; aperture terminal, rounded. L. Jurassic (L. Lias); Austria.

YNEZIELLA Akpati, 1966

Plate 444, figs. 10-13

Type species: Yneziella salsipuedensis Akpati, 1966; OD.

Yneziella Akpati, 1966 (*19), p. 137.

Test small, about 0.4 mm in length, elongate, short biserial early stage of three to five pairs of subglobular to inflated chambers, followed by up to four uniserial and rectilinear chambers, slightly flattened, ovate in section, with broadly rounded periphery; wall calcareous, optically radial, finely perforate, surface smooth to finely striate or spinose; aperture terminal, a slightly arched slit. M. Paleocene; California.

Family VAGINULINIDAE Reuss, 1860

Vaginulinidae Reuss, 1860 (*2581), p. 151.
Vaginulinideae Gümbel, 1870 (*1337), p. 53.
Lenticulinidae Chapman, Parr, and Collins, 1934 (*543), p. 554.
Robulinidae Wedekind, 1937 (*3355), p. 104.
Marginulinellidae Wedekind, 1937 (*3355), p. 94.
Marginulinidae Wedekind, 1937 (*3355), p. 99.

Test enrolled throughout or with early stage partially enrolled or arcuate and later stage uncoiled and rectilinear, ovate in section to flattened and palmate: aperture terminal, radiate or cribrate. U. Triassic to Holocene.

Subfamily LENTICULININAE Chapman, Parr, and Collins, 1934

Lenticulininae Chapman, Parr, and Collins, 1934 (*543), p. 554.

Darbyellininae Saidova, 1981 (*2696), p. 37.

Test lenticular to flattened, ovate to palmate; distinctly coiled, at least in the early stage, later may be uncoiled: aperture at the peripheral angle in enrolled forms, terminal in the uncoiled part, radiate, slitlike or multiple. U. Triassic to Holocene.

CRIBROLENTICULINA Haman, 1978

Plate 445, figs. 1-6

Type species: Cribrolenticulina akersi Haman, 1978; OD.

Cribrolenticulina Haman, 1978 (*1370), p. 90.

Test planispirally enrolled, lenticular and biumbonate in the early stage, later chambers increasing in breadth, flaring, and tending to uncoil, so that the final chamber fails to reach the previous coil, sutures radial, slightly curved, flush; wall calcareous, perforate, hyaline, surface smooth but with a row of tubercles along the sutures that become progressively more prominent in the early coil as secondary lamellae are added at each instar, those on the later septa being very low and poorly defined; aperture at the dorsal angle, cribrate, produced on a short neck. Pliocene; USA: Texas; Mexico: Vera Cruz.

Remarks: The cribrate aperture was reported to occur only on the final chamber, earlier apertures being only simple rounded openings but no sectioned or broken specimens were illustrated to demonstrate this.

CRIBROROBULINA Thalmann, 1947

Plate 445, figs. 7-10

Type species: Robulina serpens Seguenza, 1880 (*2839), p. 143; OD.

Cribrorobulina Thalmann, 1947 (*3167), p. 372 (validated by designation of type species).

Cribrorobulina Selli, 1941 (*2860), p. 90 (name not available, ICZN Art. 13 (b); type species not designated).

Test lenticular, planispirally enrolled, periphery subacute, sutures gently curved near the umbo, then sharply angled about midway to the periphery and becoming strongly oblique; wall calcareous, thick, hyaline radial, perforate, surface smooth; aperture at the upper margin of the terminal face, slightly below the dorsal angle, consisting of numerous small rounded openings. Miocene to Holocene; Europe.

CRISTELLARIOPSIS Rzehak, 1895

Plate 445, figs. 11-15

Type species: Cristellariopsis punctata Rzehak, 1895; OD(M).

Cristellariopsis Rzehak, 1895 (*2682), p. 227.

Test up to 1.0 mm in length, ovate in outline, somewhat compressed, planispiral partial coil of few chambers with nearly radial sutures in the early stage and a carinate periphery, then with a short uncoiled portion and slightly arched sutures; wall calcareous, thick, hyaline radial, coarsely perforate; aperture rounded, terminal, at the end of a short neck. L. Tertiary; Austria.

DAINITELLA Putrya, 1972

Plate 447, figs. 5-8

Type species: Dainitella explanata Putrya, 1972; OD.

Dainitella Putrya, 1972 (*2496), p. 157.

Dainitella Putrya, 1970 (*2495), p. 31, fig. 1(8) (name not available, ICZN Art. 13 (a)(i), no description).

Test elongate, up to 1.75 mm in length, lenticular, planispiral and with subacute periphery in the early stage, later uncoiling and flattened to triangular in section, chambers increasing rapidly in breadth in the early stage, but of nearly constant breadth in the uncoiled stage, sutures gently curved, depressed; wall calcareous, hyaline, single layered; aperture radiate at the dorsal angle. U. Jurassic (Oxfordian to Volgian); USSR: W. Siberia.

DIMORPHINA d'Orbigny, 1826

Plate 444, figs. 14-17

Type species: Dimorphina tuberosa d'Orbigny, 1826; OD(M).

Dimorphina d'Orbigny, 1826 (*2303), p. 264.

Glandulodimorphina A. Silvestri, 1901 (*2924), p. 17; type species: obj.; SD Loeblich and Tappan, 1964 (*1910), p. C516.

Test elongate, early chambers planispiral, close coiled and involute, few per whorl, separated by radial and slightly depressed sutures, later chambers uncoiling and rectilinear, becoming more elongate and slightly inflated and sutures horizontal and slightly constricted; wall calcareous, hyaline, perforate, surface smooth; aperture terminal, radiate, produced on a neck. Miocene to Holocene: Italy.

LENTICULINA Lamarck, 1804

Plate 446, figs. 1-12

Type species: Lenticulites rotulatus Lamarck, 1804; SD Children, 1823 (***586**), p. 153.

Lenticulina Lamarck, 1804 (***1776**), p. 186.

Lenticulites Lamarck, 1804 (***1776**), p. 187; type species: obj.; SD Children, 1823 (***586**), p. 156.

Phonemus de Montfort, 1808 (***2176**), p. 11; type species: *Nautilus vortex* Fichtel and Moll, 1798 (***1124**), p. 33; OD(M).

Pharamum de Montfort, 1808 (***2176**), p. 34; type species: *Nautilus calcar* Linné, 1758 (***1859**), p. 709; OD(M).

Antenor de Montfort, 1808 (***2176**), p. 70; type species: *Antenor diaphaneus* de Montfort, 1808, OD(M).

Oreas de Montfort, 1808 (***2176**), p. 94 (non *Oreas* Huebner, 1807); type species: *Oreas subulatus* de Montfort, 1808 = *Nautilus acutauricularis* Fichtel and Moll, 1798 (***1124**), p. 102; OD(M).

Robulus de Montfort, 1808 (***2176**), p. 214; type species: *Robulus cultratus* de Montfort, 1808; OD(M).

Patrocles de Montfort, 1808 (***2176**), p. 218; type species: *Patrocles querelans* de Montfort, 1808 = *Nautilus vortex* Fichtel and Moll, 1798 (***1124**), p. 30; OD(M).

Clisiphontes de Montfort, 1808 (***2176**), p. 227; type species: *Clisiphontes calcar* de Montfort, 1808, OD(M).

Herion de Montfort, 1808 (***2176**), p. 231; type species: *Herion rostratus* de Montfort, 1808; OD(M).

Rhinocurus de Montfort, 1808 (***2176**), p. 234; type species: *Rhinocurus araneosus* de Montfort, 1808; OD(M).

Lampas de Montfort, 1808 (***2176**), p. 242 (non *Lampas* Meuschen, 1787); type species: *Lampas trithemus* de Montfort, 1808; OD(M).

Robulina d'Orbigny, 1826 (***2303**), p. 287 (err. emend. pro *Robulus*); type species: obj.

Soldania d'Orbigny, 1826 (***2303**), p. 281; type species: *Soldania carinata* d'Orbigny, 1826; SD Loeblich and Tappan, 1964 (***1910**), p. C520.

Cristellaria (Robulina) Stache, 1864 (***3054**), p. 244 (nom. transl.).

Cochlea Zalessky, 1926 (***3423**), p. 93 (non *Cochlea* Costa, 1778, nec Martyn, 1784, nec Hitchcock, 1888); type species: *Cochlea supracolli* Zalessky, 1926; SD Loeblich and Tappan, 1964 (***1910**), p. C514.

Darbyella Howe and Wallace, 1932 (***1569**), p. 23; type species: *Darbyella danvillensis* Howe and Wallace, 1932; OD.

Perisphinctina Wedekind, 1937 (***3355**), p. 105; type species: *Robulina depauperata* Reuss, 1851 (***2574**), p. 70; OD(M).

Perisphinctina Wick, 1939 (***3370**), p. 482 (non *Perisphinctina* Wedekind, 1937; name not available, ICZN Art. 13 (b), no type species cited).

Perisphinctina Thalmann, 1942 (***3165**), p. 513 (non *Perisphinctina* Wedekind, 1937); type species: *Cristellaria (Robulina) articulata* Reuss, 1863 (***2588**), p. 53 (non *Cristellaria articulata* Terquem, 1862); OD.

Lenticulina (Robulus) Bartenstein, 1948 (***145**), p. 42, 52, 56, 58 (nom. transl.).

Darbyellina Harris and Sutherland, 1954 (***1426**), p. 207; type species: *Darbyellina hempsteadensis* Harris and Sutherland, 1954; OD.

Robidzhonia Melnikova and Suleymanov, in Suleymanov, 1969 (***3098**), p. 43; type species: *Robidzhonia prima* Melnikova and Suleymanov, 1969 (non *Cristellaria prima* d'Orbigny, 1850) = *Lenticulina suleymanovi* Loeblich and Tappan, nom. nov.; OD.

Test enrolled, generally planispiral but rare aberrant specimens may be asymmetrical or even trochoid, lenticular, biumbonate, and commonly with umbonal boss, periphery angled to carinate, relatively broad and low chambers increase slowly in size as added or final one or two may tend to flare or uncoil, sutures straight to curved, radial to oblique, may be limbate, flush, or elevated and nodose; wall calcareous, hyaline, perforate radial, secondarily lamellar, surface smooth other than the sutural nodes or elevations and peripheral keel; aperture radiate or slitlike at the peripheral angle, may be slightly produced. Triassic to Holocene; cosmopolitan.

Remarks: The Eocene *Robidzhonia* Melnikova and Suleymanov, 1969 was described as similar to *Lenticulina* but with sacklike protrusions on the periphery. Although illustrated only by sketches of the exterior, the peripheral structure appears in side view to be a simple keel that commences near the proximal margin of each chamber and extends back over the previous portion of the keel; no modifications other than the peripheral keel are shown in the edge view. As transfer to *Lenticulina* makes the type species of *Robidzhonia* a junior subjective synonym of *Cristellaria prima* d'Orbigny, 1850, *R. prima* Melnikova and Suleymanov, 1969 is here renamed *Lenticulina suleymanovi* nom. nov.

LENTICULINELLA Samyschkina, 1983

Plate 446, figs. 16-19

Type species: Lenticulina schutskajae Samyschkina and Saidova, in Samyschkina, 1975 (*2727), p. 64; OD.

Lenticulinella Samyschkina, 1983 (*2728), p. 116.

Test planispiral, semi-involute, up to fourteen chambers per whorl, in one to one and a half whorls, later chambers increasing in breadth so that test flares and tends to uncoil, periphery subacute to carinate, prominent umbonal boss of shell material; wall calcareous, transparent, radial in structure, surface smooth; aperture radiate, at the dorsal angle. Jurassic to U. Cretaceous (Cenomanian): Romania, Germany: USSR: Dagestan, N. Caucasus.

MARGINULINOPSIS A. Silvestri, 1904

Plate 446, figs. 20 and 21

Type species: Cristellaria bradyi Goës, 1894 (*1257), p. 64 (syn.: *Marginulina costata* (Batsch) of Brady, 1884, *344; *Marginulinopsis densicostata* Thalmann, 1937, *3157, p. 348, nom. superfl.); SD Thalmann, 1937 (*3157), p. 348.

Marginulinopsis A. Silvestri, 1904 (*2933), p. 253.
Lenticulina (Marginulinopsis) Bartenstein, 1948 (*145), p. 41, 42, 45–47, 52, 56, 58 (nom. transl.).

Test elongate, early portion close coiled and planispiral, sutures radial and periphery rounded to carinate, later uncoiling, with chambers circular in section and sutures straight, horizontal and slightly depressed; wall calcareous, hyaline, perforate radial, surface with numerous longitudinal costae that may be slightly oblique on the sides but are straight and vertical on the ventral periphery, those of the coil may be broken into nodes at the sutures; aperture terminal, radiate, at the dorsal angle. Jurassic to Holocene; cosmopolitan.

Remarks: The specimen figured by Brady (1884, *344, pl. 65, fig. 11) was cited by Goës (1894) in renaming the species and by Thalmann (1937) who also renamed the same species. The lectotype for *Cristellaria bradyi* Goës, 1894, is the specimen of Brady cited above (BMNH ZF1808), here refigured. It is also the holotype of *Marginulinopsis densicostata* Thalmann, 1937. Although Thalmann stated that Silvestri (1911, *2947, p. 179 footnote) had designated the species figured by Brady as the "generotype," Silvestri did not do so, hence Thalmann was the first to indicate a type species for this genus.

MESOLENTICULINA McCulloch, 1977

Plate 446, figs. 13-15

Type species: Mesolenticulina partidiana McCulloch, 1977; OD.

Mesolenticulina McCulloch, 1977 (*1961), p. 7.

Test enrolled, planispiral, partially evolute, slightly more so on one side, biumbilicate and lacking an umbilical central boss, periphery rounded to subacute, peripheral outline slightly lobulate, sutures strongly arched, weakly depressed; wall calcareous, hyaline, transparent, perforate radial, surface smooth; aperture radiate at the dorsal angle but directed slightly downward from the periphery. Holocene; off Mexico.

NEOLENTICULINA McCulloch, 1977

Plate 447, figs. 9-16

Type species: Neolenticulina chathamensis McCulloch, 1977; OD.

Neolenticulina McCulloch, 1977 (*1961), p. 8.

Test rounded to ovate in outline, compressed, planispirally enrolled, each chamber approximately semicircular in side view, few rapidly enlarging chambers per whorl, ranging from three in the earliest whorl to five in the final one, inflated laterally so that test appears lobulate in edge view, slightly evolute, biumbilicate, sutures nearly straight, depressed, periphery carinate, final chamber uncoiled, with keel present both before and behind the terminal aperture; wall calcareous, hyaline, transparent, perforate radial, surface smooth; aperture multiple, of five or more rounded openings at the dorsal angle, each produced on a short tubular neck, openings of previous chambers marked by a clear triangular area at the periphery just preceding the new chamber. Pliocene to Holocene; cosmopolitan.

PERCULTAZONARIA Loeblich and Tappan, 1986

Plate 448, figs. 1-3

Type species: Cristellaria subaculeata Cushman, 1923 (*723), p. 123; OD.

Percultazonaria Loeblich and Tappan, 1986 (*1928), p. 243.
Gladiaria Wedekind, 1937 (*3355), p. 105 (non *Gladiaria* Wick, 1939; name not available, ICZN Art. 13 (a), no description).
Gladiaria Thalmann, 1941 (*3162), p. 652 (non *Gladiaria* Wick, 1939): type species: *Cristellaria decorata* Reuss, 1855 (*2577), p. 269; OD.

Test elongate, somewhat flattened, early stage close coiled, later uncoiling and rectilinear, chambers broad and low, sutures oblique and curved, periphery subacute to carinate in the coil and on the dorsal margin, rounded on the ventral margin; wall calcareous, hyaline, perforate, optically radial, surface ornamented by strongly elevated sutures that may be costate or broken into a row of nodes, peripheral keel may be spinose, wall between sutures generally smooth or less commonly with small spinules; aperture radiate, terminal at the dorsal angle, produced on a neck. U. Cretaceous (Turonian) to Holocene; cosmopolitan.

Remarks: Differs from *Vaginulinopsis* in the more prominent early coil and in the elevated, costate, and nodose sutural ornamentation.

PRAVOSLAVLEVIA Putrya, 1970

Plate 448, figs. 4-9

Type species: Saracenaria pravoslavlevi Fursenko and Polenova, 1950 (*1201), p. 45; OD.

Pravoslavlevia Putrya, 1970 (*2495), p. 37.

Test elongate, triangular in section with very broad apertural face, angles sharp to carinate, early chambers in a planispiral coil of up to one and a half whorls, later ones broad and low, highest at the dorsal margin, sutures gently curved, flush on the sides, constricted on the apertural face and resulting in a lobulate ventral margin; wall calcareous, perforate, radial; aperture radiate at the dorsal angle. L. Jurassic (Sinemurian) to Miocene (Vindobonian); cosmopolitan.

PSEUDOSARACENARIA Venkachalapathy, 1968

Plate 448, figs. 10-12

Type species: Pseudosaracenaria truncata Venkachalapathy, 1968; OD.

Pseudosaracenaria Venkachalapathy, 1968 (*3289), p. 92.

Test elongate, subtriangular in section with somewhat truncated dorsal margin, early chambers in a partial astacoline coil, then uncoiling with chambers subtriangular in section, the broad flattened apertural face approximately as broad as the lateral sides, margins of the apertural face carinate, chambers may be inflated just above the incised sutures on the test sides, gently inflated on the apertural face of the uncoiled part; wall calcareous, perforate, optically radial; aperture rounded, at the slightly produced dorsal angle. L. Cretaceous (Valanginian); USSR: Crimea.

SARACENARIA Defrance, 1824

Plate 448, figs. 13, 14, 16-18

Type species: Saracenaria italica Defrance, 1824; OD(M).

Saracenaria Defrance, in de Blainville, 1824 (*246), p. 176.
Enantiocristellaria Marie, 1941 (*2031), p. 162, 255; type species: *Cristellaria navicula* d'Orbigny, 1840 (*2307), p. 27; OD.
Lenticulina (Saracenaria) Bartenstein, 1948 (*145), p. 49, 53-56, 58 (nom. transl.).

Test planispirally enrolled in the early stage, later flaring and tending to become rectilinear, triangular in section, apertural face broad and flat, commonly with carinate margins and dorsal angle, sutures curved, depressed; wall calcareous, perforate, optically radial, surface smooth; aperture radiate at the dorsal angle, may be produced on a neck. U. Cretaceous to Holocene; cosmopolitan.

SIPHOMARGINULINA McCulloch, 1981

Plate 448, fig. 15

Type species: Siphomarginulina hybrida McCulloch, 1981; OD.

Siphomarginulina McCulloch, 1981 (*1962), p. 82.

Test elongate, compressed, periphery rounded and noncarinate, early chambers planispirally enrolled, only three to four chambers in the coil, final few chambers uncoiled and rectilinear, sutures radial in the early coil, oblique in the uncoiling part; wall calcareous, hyaline, translucent, finely perforate, surface smooth; aperture rounded at the dorsal angle, produced on a neck and bordered by a distinct lip with crenulate margin. Holocene; Caribbean Sea.

SPINCTERULES de Montfort, 1808

Plate 449, figs. 7 and 8

Type species: Nautilus costatus Fichtel and Moll, 1798 (*1124), p. 47 (non *Nautilus (Orthoceras) costatus* Batsch, 1791) = *Spincterules* *anaglyptus* Loeblich and Tappan, nom. nov. herein; OD(M).

Spincterules de Montfort, 1808 (*2176), p. 222.
Spincterulus de Blainville, 1827 (*248A), p. 268 (err. emend.).

Test lenticular, planispiral and involute, biconvex, close coiled, rapidly enlarging chambers extending to the umbilicus without a central boss, sutures slightly curved, depressed, periphery carinate; wall calcareous, perforate, optically radial, hyaline, surface with numerous low costae radiating from the apertural region to the previous suture, those of earlier chambers being secondarily thickened and more elevated, ribs also may break up into rows of knobs; apertural face smooth, with elevated margins, aperture radiate at the peripheral angle, the slit in the median position on the apertural face being enlarged and ovate in outline. Holocene; off Morocco, Northwest Africa.

Remarks: As *Nautilus costatus* Fichtel and Moll, 1798, type species of *Spincterules*, is a junior homonym of *Nautilus (Orthoceras) costatus* Batsch, 1791, the former is here renamed as *Spincterules anaglyptus*, nom. nov.

TURKMENELLA Bugrova, 1985

Plate 449, figs. 5 and 6

Type species: Turkmenella granata Bugrova, 1985 (*446A), p. 45, 46; (syn.: *Lenticulina tchouenkoi* var. *granata* Balakhmatova, 1965 (*109), p. 130; name not available, ICZN Art. 16, varieties proposed after 1960 excluded from zoological nomenclature); OD.

Turkmenella Bugrova, 1985 (*446A), p. 44.

Test flattened lenticular, planispirally coiled and evolute, periphery carinate, numerous chambers per whorl, increasing slowly in size as added, sutures radial, straight to slightly curved, limbate; wall calcareous, finely perforate, radial in structure, surface smooth except for the limbate and elevated to beaded sutures of the early part, final one or two sutures flush; aperture radiate, somewhat produced at the peripheral angle. Eocene to Holocene; Central Asia; Turkestan; Crimea; Caucasus; Kazakhstan; Georgian SSR; Pacific.

Remarks: *Turkmenella* was proposed with type species "*Lenticulina granata* Balakhmatova, 1965"; however, Balakhmatova originally described the taxon as a variety, and varietal names proposed after 1960 are excluded from zoological nomenclature. Thus the species is correctly attributed to Bugrova, who regarded it as of species rank, and in tabular form (p. 46) gave detailed morphologic characteristics. The specimen figured by Bugrova as lectotype (recte holotype of *T. granata* Bugrova) is the larger of two originally illustrated by Balakhmatova. *Turkmenella* resembles *Mesolenticulina* in the flattened lenticular form and evolute coiling but differs in being completely evolute, in having more numerous chambers per whorl, more prominent shell thickening, and elevated and beaded sutures.

Subfamily PALMULINAE Saidova, 1981

Palmulinae Saidova, 1981 (*2696), p. 37.

Test ovate to palmate, flattened, early stage enrolled or astacoline, later with broad and low equitant uniserial chambers; aperture terminal, rounded to radiate. U. Cretaceous (Cenomanian) to M. Miocene.

FRONDOVAGINULINA Schubert, 1912

Plate 441, figs. 9-11

Type species: Frondicularia inversa Reuss, 1844 (*2569), p. 211; SD Loeblich and Tappan, 1964 (*1910), p. C518.

Frondovaginulina Schubert, 1912 (*2820), p. 179.

Test large, palmate to lanceolate, flattened, fusiform proloculus followed by a few astacoline chambers, later chambers low, broad, and equitant, strongly elevated at the midpoint, sutures strongly arched, slightly depressed; wall calcareous, surface smooth or may have weak and discontinuous ribs, proloculus commonly with a median longitudinal rib; aperture terminal, slightly produced on a neck. U. Cretaceous (Cenomanian to Santonian); Europe; USA: Texas.

KYPHOPYXA Cushman, 1929

Plate 445, figs. 16-18

Type species: Frondicularia christneri Carsey, 1926 (*495), p. 41; OD.

Kyphopyxa Cushman, 1929 (*751), p. 1.

Test large, up to 3 mm in length, broad, flattened, palmate, biserial in the early stage, later with broad low chevron-shaped and equitant chambers in a rectilinear uniserial series, the chambers extending far down the lateral margins of the test, earliest one or two uniserial chambers may be annular and completely surround the earlier biserial stage; wall calcareous, hyaline, perforate radial, surface smooth between the limbate and elevated sutures and carinate on each margin of the truncate periphery; aperture produced on a short neck, radiate. U. Cretaceous (Coniacian to Campanian): USA: Texas, Arkansas, Mississippi, Kansas, Nebraska, California; Venezuela.

NEOFLABELLINA Bartenstein, 1948

Plate 447, fig. 4

Type species: Flabellina rugosa d'Orbigny, 1840 (***2307**), p. 23; OD.

Neoflabellina Bartenstein, 1948 (***144**), p. 122 (nom. subst. pro *Flabellina* d'Orbigny, 1839).

Flabellina d'Orbigny, 1839 (***2304**), p. 42 (non *Flabellina* Voight, 1834, nec Forbes and Hanley, 1851, nec de Gregorio, 1930); type species: obj., SD Cushman, 1927 (***746**), p. 189.

Test large, up to 5 mm in length and 1.8 mm in breadth, palmate to rhomboid in outline, flattened, with subparallel sides and truncate margins that may be carinate, early chambers in a planispiral coil, later flaring and astacoline, finally uniserial and rectilinear with very broad and low inverted *V*-shaped chambers, sutures thickened and elevated; wall calcareous, perforate radial, surface ornamented with coarse perforations and elevated sutures that may break up into nodes; aperture terminal, radiate. U. Cretaceous (U. Turonian) to Paleocene (Danian); cosmopolitan.

PALMULA Lea, 1833

Plate 447, figs. 1-3

Type species: Palmula sagittaria Lea, 1833; OD(M).

Palmula Lea, 1833 (***1793**), p. 219.

Planularia Nilsson, 1826 (***2259**), p. 342 (non *Planularia* Defrance, 1826); type species: *Planularia elliptica* Nilsson, 1826; SD Loeblich and Tappan, 1964 (***1910**), p. C522.

Frondiculina Münster, 1835 (***2201**), p. 444 (name not available, ICZN Art. 12 (a), no description).

Frondiculina F. A. Roemer, 1838 (***2641**), p. 382 (non *Frondiculina* Lamarck, 1816); type species: *Frondiculina obliqua* F. A. Roemer, 1838; SD Loeblich and Tappan, 1964 (***1910**), p. C522.

Test large, elongate, flattened, early stage planispirally enrolled in microspheric generation but only astacoline in the megalospheric generation, later uncoiled and rectilinear, chambers broad and low, strongly arched or chevron shaped, increasing in breadth in the early stage, then of constant size so that test margins are nearly parallel, periphery rounded, sutures flush; wall calcareous, perforate radial, surface smooth; aperture terminal, nearly flush, radiate. Paleocene to M. Miocene; cosmopolitan.

RETICULOPALMULA Loeblich and Tappan, 1986

Plate 449, figs. 1-4

Type species: Flabellina henbesti Bermúdez, 1937 (***194**), p. 142; OD.

Reticulopalmula Loeblich and Tappan, 1986 (***1928**), p. 245.

Test large, about 1 mm in length, palmate, slightly flattened, about six chambers in an early planispiral coil, later chambers uncoiled, rectilinear, broad, low, and equitant, bending about 90° at the midpoint of the test, sutures obscured by the surface ornamentation, periphery with thin irregular or fimbriate keel; wall calcareous, radial, surface with coarse mesh of rounded to irregular areas formed by sharp ridgelike elevations, the mesh completely covering the early part of the test and obscuring the sutures but less prominent on the final one to few chambers where the surface may be smooth, wall coarsely perforate in the intermesh areas; aperture terminal, with slits radiating from the central ovate opening. L. Eocene (Cuisian) to M. Oligocene (Rupelian): Cuba; USA: Alabama, Mississippi, California.

Remarks: Resembles *Palmula* in the planispiral early coil but differs in the prominent surface reticular mesh and coarse perforations.

Subfamily MARGINULININAE Wedekind, 1937

Marginulininae Loeblich and Tappan, 1974 (***1913**), p. 27, 46, nom. corr. pro subfamily Marginulinae.

Marginulinae Nørvang, 1957 (***2267**), p. 83 (nom. imperf.), nom. transl. ex family Marginulinidae.

Menkeninae Church, 1968 (*594), p. 560 (name available, ICZN Art. 13 (d)).
Astacolinae Putrya, 1970 (*2495), p. 39.
Vaginulinopsinae Putrya, 1970 (*2495), p. 41.

Test rounded in section to flattened and palmate, early chambers in slightly arcuate arrangement but lacking a distinct coil, later may be rectilinear. U. Triassic (Rhaetian) to Holocene.

AMPHICORYNA Schlumberger, 1881

Plate 450, figs. 11-15

Type species: Marginulina falx Jones and Parker, 1860 (*1618), p. 302 = *Nautilus scalaris* Batsch, 1791 (*161), p. 1, 4; SD(SM) Brady, 1884 (*344), p. 556.

Amphicoryna Schlumberger, in Milne-Edwards, 1881 (*2149), p. 881.
Plesiocorine Schlumberger, in Milne-Edwards, 1882 (*2150), p. 31 (also as *Plesiocoryna*, p. 31); type species: *Plesiocorine edwardsi* Schlumberger, 1882; OD(M).
Amphicoryne Brady, 1884 (*344), p. 556 (err. emend.).
Lagenonodosaria A. Silvestri, 1900 (*2923), p. 3; type species: *Nodosaria scalaris* (Batsch) var. *separans* Brady, 1884 (*344), p. 510; OD(M).
Nodosariopsis A. Silvestri, 1902 (*2926), p. 52 (non *Nodosariopsis* Rzehak, 1895); type species: *Marginulina falx* Jones and Parker, 1869; obj.: SD Loeblich and Tappan, 1964 (*1910), p. C514.

Test elongate, base commonly apiculate, early chambers in a compressed astacoline coil in the microspheric generation, later uncoiled, with uniserial and rectilinear chambers of circular transverse section, megalospheric generation with large globular proloculus followed by rectilinear globular chambers throughout, sutures flush and oblique in the astacoline coil, straight and constricted in the rectilinear portion; wall calcareous, perforate, optically radial, surface commonly longitudinally striate or with fine costae broken up into rows of small pustules; aperture terminal, radiate, at the end of a pronounced neck with ringlike concentric ridges. Miocene to Holocene: cosmopolitan.

ASTACOLUS de Montfort, 1808

Plate 450, figs. 7-10

Type species: Astacolus crepidulatus de Montfort, 1808 = *Nautilus crepidula* Fichtel and Moll, 1798 (*1124), p. 64; OD.

Astacolus de Montfort, 1808 (*2176), p. 262.
Chrysolus de Montfort, 1808 (*2176), p. 26; type species: obj.; OD.
Crepidulina de Blainville, 1824 (*246), p. 188; type species: *Crepidulina astacolus* de Blainville, 1824 = *Nautilus crepidula* Fichtel and Moll, 1798; obj.; SD Loeblich and Tappan, 1964 (*1910), p. C514.
Cochlidion Zalessky, 1926 (*3423), p. 92; type species: *Cochlidion alexandrae* Zalessky, 1926; OD(M).
Polymorphinoides Cushman and Hanzawa, 1936 (*822), p. 48; type species: *Polymorphinoides spiralis* Cushman and Hanzawa, 1936; OD.
Saccularíella Wedekind, 1937 (*3355), p. 102; type species: *Sacculariella ensis* Wedekind, 1937 (name not available, ICZN Art. 13 (b); type species not available, ICZN Art. 13 (a)(i), no description).
Gladiaria Wick, 1939 (*3370), p. 479 (non *Gladiaria* Thalmann, 1941); type species: *Cristellaria hermanni* Andreae, 1898 (*40), p. 298; OD.
Enantiovaginulina Marie, 1941 (*2031), p. 160; type species: *Cristellaria recta* d'Orbigny, 1840 (*2307), p. 28; OD.
Lenticulina (Astacolus) Bartenstein, 1948 (*145), p. 41, 44, 45, 48, 50, 52, 55, 56, 58 (nom. transl.).

Test elongate to ovate in outline, flattened, chambers numerous, broad and low, added on a slightly curved axis or may be distinctly enrolled in the very early stage, later uncoiling, with strongly oblique, straight to curved or sinuate sutures, periphery rounded to angular; wall calcareous, perforate, radial in structure, surface smooth; aperture radiate, at the dorsal angle. L. Jurassic (Pliensbachian) to Holocene; cosmopolitan.

HEMIROBULINA Stache, 1864

Plate 451, figs. 1-10, 15, and 16

Type species: Cristellaria (Hemirobulina) arcuatula Stache, 1864 (syn. = *Cristellaria (Hemicristellaria) procera* Stache, 1864); SD Galloway, 1933 (*1205), p. 251.

Cristellaria (Hemirobulina) Stache, 1864 (*3054), p. 227.
Cristellaria (Hemicristellaria) Stache, 1864 (*3054), p. 222; type species: *Cristellaria (Hemicristellaria) procera* Stache, 1864; SD Galloway and Wissler, 1927 (*1209), p. 47; obj.
Hemirobulina Sherborn, 1893 (*2899), p. 157 (nom. transl.).
Hemicristellaria Sherborn, 1893 (*2899), p. 157 (nom. transl.).
Enantiomarginulina Marie, 1941 (*2031), p. 163, 255; type species: *Enantiomarginulina dorbignyi* Marie, 1941; OD.
Lenticulina (Hemirobulina) Bartenstein, 1948 (*145), p. 42, 43, 49, 52, 54, 58 (nom. transl.).
Pseudodimorphina McCulloch, 1977 (*1961), p. 9; type species: *Pseudodimorphina galapagosensis* McCulloch, 1977; OD.

Test elongate, circular in section, numerous chambers added in a slight curve at the base, later becoming rectilinear, sutures oblique, may be depressed; wall calcareous, hyaline, perforate radial, surface smooth and unornamented; aperture terminal, at the dorsal angle, may be produced on a neck. U. Cretaceous to Holocene; cosmopolitan.

Remarks: Restudy of Stache's types (Hornibrook, 1971, ***1541**, p. 41) showed that the type species of *Hemicristellaria*, *Cristellaria procera*, and certain other species described by Stache were synonymous with *C. arcuatula*, the type species of *Hemirobulina*. As the latter species has been in common use, Hornibrook, as first reviser, recognized the specific name *arcuatula* for this species and placed the other names in synonymy. Species of *Hemirobulina* previously have been included in *Vaginulinopsis*, *Marginulinopsis*, or *Marginulina*, but based on their type species, *Hemirobulina* differs from *Vaginulinopsis* in the rounded cross section and curved but not distinctly enrolled early stage. It differs from *Marginulina* in having a smooth rather than longitudinally costate wall, differs from *Marginulinopsis* in lacking an early coil, and differs from *Saracenaria* in the rounded rather than triangular transverse section and absence of a peripheral carina.

MARGINULINA d'Orbigny, 1826

Plate 451, figs. 13 and 14

Type species: Marginulina raphanus d'Orbigny, 1826 (non *Nautilus raphanus* Linné, 1758); SD Deshayes, 1830 (***949**), p. 416.

Marginulina d'Orbigny, 1826 (***2303**), p. 258.

Cristellaria (Marginulina) Stache, 1864 (***3054**), p. 211 (nom. transl.).

Ellipsomarginulina A. Silvestri, 1923 (***2951**), p. 265; type species: *Marginulina raphanus* d'Orbigny, 1826; obj.; SD Loeblich and Tappan, 1964 (***1910**), p. C520.

Marginulinella Wedekind, 1937 (***3355**), p. 94; type species: *Nautilus (Orthoceras) costatus* Batsch, 1791 (***161**), pl. i, figs. 1a–g; OD.

Test elongate, circular in section, early stage slightly curved but not completely enrolled, later chambers rectilinear, sutures straight to oblique; wall calcareous, hyaline, perforate radial, surface with prominent longitudinal costae, may have an apiculate base; aperture radiate, terminal, at the dorsal angle and may be produced on a neck. L. Jurassic (Pliensbachian) to Holocene; cosmopolitan.

MENKENINA Church, 1968

Plate 451, figs. 11 and 12

Type species: Menkenina berryi Church, 1968; OD.

Menkenina Church, 1968 (***594**), p. 560.

Test elongate, up to 1.2 mm in length, palmate to lanceolate, flattened, the two sides differing somewhat, similar to a compressed *Vaginulina*, chambers uniserial and rectilinear, of greater breadth than height, gently arched at the midline of the test, most strongly arched on the dorsal side, periphery rounded, sutures arched, incised; wall calcareous, perforate, surface with numerous longitudinal and continuous carinae, the lateral ones forming a thin translucent peripheral flange; aperture terminal, rounded, produced on a cylindrical neck at the dorsal margin, those of earlier chambers resulting in a protruding ridge along the dorsal midline. L. Cretaceous (Barremian); California.

PRISMATOMORPHIA Loeblich and Tappan, 1986

Plate 451, figs. 17–21

Type species: Vaginulina tricarinata d'Orbigny, 1826 (***2303**), p. 258; OD.

Prismatomorphia Loeblich and Tappan, 1986 (***1928**), p. 246.

Test elongate, slender, arcuate, proloculus ovate with apiculate base, followed by uniserial and rectilinear chambers of triangular section, two of the sides flattened as in *Saracenaria* and meeting at the dorsal angle, chambers somewhat inflated on the ventral face, sutures slightly arched at the center of each face of the test; wall calcareous, perforate, radial in structure, surface smooth, except for the prominent and continuous keels at the three angles of the test; aperture at the dorsal angle, triangular but not radiate. L. Pliocene to Holocene; Adriatic Sea; Sicily.

Remarks: *Prismatomorphia* resembles *Saracenaria* in the broad apertural face and chambers of triangular section but differs in the arcuate axis, apiculate proloculus, triangular rather than radiate aperture, and in lacking an early planispiral coil.

VAGINULINOPSIS Silvestri, 1904

Plate 450, figs. 1-6

Type species: Vaginulina soluta Silvestri var. *carinata* Silvestri, 1898 (***2922**), p. 166 = *Vaginulinopsis carinata* (Silvestri, 1898), non *Vaginulinopsis carinata* Kennett, 1967 (syn.: *Vaginulinopsis inversa* (Costa, 1856) var. *carinata* Silvestri, 1904 ex *Marginulina inversa* Costa, 1856, non *Marginulina inversa* Neugeboren, 1851); SD Thalmann, 1937 (***3157**), p. 347.

Vaginulinopsis Silvestri, 1904 (***2933**), p. 251.
Lenticulina (Vaginulinopsis) Bartenstein, 1948 (***145**), p. 42, 45–47, 50, 52, 56, 58 (nom. transl.).

Test elongate, early stage planispirally enrolled and involute, later uncoiled and rectilinear, laterally compressed and ovate to lenticular in section, sutures radial in the early stage, straight, horizontal, and may be slightly depressed in the uncoiled stage; wall calcareous, perforate, optically radial, surface smooth and unornamented; aperture terminal, radiate, at the dorsal angle. U. Triassic (Rhaetian) to Holocene; cosmopolitan.

Subfamily VAGINULININAE Reuss, 1860

Vaginulininae Loeblich and Tappan, 1974 (***1913**), p. 27, 46, nom. corr. pro subfamily Vaginulinidea.
Vaginulinidea Reuss, 1862 (***2586**), p. 366.
Planulariinae Putrya, 1970 (***2495**), p. 41.
Citharininae Saidova, 1981 (***2696**), p. 36.
Citharinellinae Saidova, 1981 (***2696**), p. 36.

Test compressed and bladelike to palmate; chambers in nearly straight series but with oblique sutures; aperture terminal at the peripheral angle or central. L. Jurassic (Pliensbachian) to Holocene.

CITHARINA d'Orbigny, 1839

Plate 452, figs. 1-6

Type species: Vaginulina (Citharina) strigillata Reuss, 1846 (***2571**), p. 106; SD Loeblich and Tappan, 1949 (***1881**), p. 259.

Citharina d'Orbigny, 1839 (***2304**), p. xxxvii.
Vaginulina (Citharina) Reuss, 1846 (***2571**), p. 106 (nom. transl.).
Pseudovaginulina Wedekind, 1937 (***3355**), p. 95 (name not available, ICZN Art. 13(b), no valid type species); type species: *Pseudovaginulina oxyacantha* Wedekind, 1937 (name not available, ICZN Art. 13 (a)(i), no description): OD.
Saccularia Wedekind, 1937 (***3355**), p. 95; type species: *Marginulina inaequistriata* Terquem, 1864 (***3138**), p. 401; OD.
Pseudocitharina Payard, 1947 (***2374**), p. 118; type species: *Marginulina colliezi* Terquem, 1866 (***3140**), p. 430; OD.

Test subtriangular in outline, flattened and with truncate margins, proloculus globular to ovate, later chambers numerous, broad, and low, uniserial, increasing rapidly in breadth and strongly angled back toward the base from the straight to curved dorsal margin, sutures oblique, straight to curved, may be slightly depressed; wall calcareous, perforate, radial in structure, surface with numerous regularly spaced longitudinal ribs, increasing in number as the test widens; aperture rounded to radiate, produced on a short neck at the dorsal angle. L. Jurassic to Paleocene; cosmopolitan.

CITHARINELLA Marie, 1938

Plate 452, figs. 7-10

Type species: Flabellina karreri Berthelin, 1880 (***221**), p. 62; OD.

Citharinella Marie, 1938 (***2030**), p. 99.

Test flattened, rhomboidal to palmate, chambers low, broad, and uniserial, a few early chambers as in *Citharina*, highest on the dorsal margin and sloping sharply back toward the proloculus on the ventral margin but not forming a coil, later chambers overlapping on both margins and becoming chevron shaped, sutures thickened, elevated, or slightly depressed, periphery sharply truncate; wall calcareous, hyaline, perforate, radial in structure, surface with a few discontinuous longitudinal ribs; aperture terminal, radial, slightly produced on a neck. M. Jurassic (Bathonian) to Cretaceous (Campanian); Europe; central Asia; North America.

Remarks: Differs from *Flabellinella* in having very flat sides as in *Citharina*, whereas *Flabellinella* has a rounded periphery and an early stage like *Vaginulina*.

FLABELLINELLA Schubert, 1900

Plate 453, figs. 1 and 2

Type species: Frondicularia tetschensis Matouschek, 1895 (***2059**), p. 143; OD(M).

Flabellinella Schubert, 1900 (*2810), p. 551.

Test elongate, early chambers as in *Vaginulina*, with rounded section, later chambers equitant, slightly flattened and may be depressed in the midregion, of nearly constant breadth as added so that marginal overlap of previous chambers is slight, sutures straight and slightly oblique in the early stage, inverted *V* shaped and moderately depressed in the later stage, periphery rounded to subacute; wall calcareous, perforate radial, surface smooth; aperture terminal, rounded, on a short neck. U. Cretaceous to Eocene (Bartonian); Europe; USA.

PLANULARIA Defrance, 1826

Plate 453, figs. 3-5

Type species: Peneroplis auris Defrance, in de Blainville, 1824 (*246), p. 178; OD(M).

Planularia Defrance, in de Blainville, 1826 (*247), p. 244 (non *Planularia* Nilsson, 1826).

Cristellaria (Planularia) Franke, 1936 (*1174), p. 94 (nom. transl.).

Lenticulina (Planularia) Bartenstein, 1948 (*145), p. 43, 47, 49-51, 53, 58 (nom. transl.).

Test large, broadly ovate, strongly compressed, early stage in a partial coil similar to *Astacolus*, chambers increasing rapidly in breadth and somewhat more in height on the dorsal margin than ventrally so that test flares, later chambers broad and low, highest dorsally and extending back ventrally toward the early chambers, sutures curved, thickened, flush, periphery carinate; wall calcareous, hyaline, perforate radial in structure, surface smooth but may have a prominent longitudinal rib near the dorsal margin and shorter ribs crossing the central part of the early chambers; aperture at the dorsal angle, radiate. Miocene to Holocene; cosmopolitan.

PSILOCITHARELLA Loeblich and Tappan, 1986

Plate 453, figs. 8-10

Type species: Vaginulina leptoteicha Loeblich and Tappan, 1946 (*1879), p. 253; OD.

Psilocitharella Loeblich and Tappan, 1986 (*1928), p. 246.

Test subtriangular in outline, elongate, and strongly compressed, periphery truncate and angles sharp to carinate, globular to fusiform proloculus followed by broad and low chambers, at first in slightly arcuate series, later with straight dorsal margin and slightly lobulate ventral one, sutures weakly depressed, flush or slightly elevated, gently arched, extending farther distally on the dorsal margin and curving back proximally to the ventral margin where the sutures are slightly constricted; wall calcareous, hyaline, perforate, radial in structure, surface of the flat sides smooth and unornamented other than the possibly elevated sutures; aperture at the dorsal angle, produced on a short neck, and bordered with a thickened rim, may be rounded or have a crenulate margin as in an incipient radiate aperture. L. Jurassic (Pliensbachian) to U. Cretaceous (Cenomanian): cosmopolitan.

Remarks: *Psilocitharella* differs from *Citharina* in having a smooth rather than striate or costate surface and differs from *Vaginulina* in the flattened rather than ovate section and truncate rather than rounded periphery.

SARACENELLA Franke, 1936

Plate 453, figs. 11-14

Type species: Marginulina trigona Terquem, 1866 (*3140), p. 435; OD.

Saracenella Franke, 1936 (*1174), p. 87.

Test elongate, triangular in section, early chambers in an arcuate series as in *Vaginulina* but not completely enrolled, sutures highest at the dorsal angle, sloping back proximally at the ventral side, flush on the sides, slightly depressed on the ventral face where the chambers are somewhat inflated; wall calcareous, perforate, radial in structure, surface smooth; aperture at the dorsal angle. L. Jurassic (Pliensbachian) to L. Cretaceous (Albian).

TENTIFRONS Loeblich and Tappan, 1957

Plate 453, figs. 6 and 7

Type species: Tentifrons barnardi Loeblich and Tappan, 1957; OD.

Tentifrons Loeblich and Tappan, 1957 (*1897), p. 225.

Test with early chambers in citharine arrangement, then uncoiled with rectilinear chevron-shaped chambers, sutures elevated and chambers excavated in the early stage, in the adult attached to the substrate, with slightly inflated chambers of irregular outline and depressed sutures; wall calcareous, perforate, radial in structure, surface smooth between the elevated sutures in the early stage, chambers of the attached stage with fistulose projections and a strongly papillate surface; aperture terminal, radiate in the early stage, later consisting of openings on each of the fistulose extensions. U. Cretaceous (Senonian); England.

TENTILENTICULINA Hitchings, 1980

Plate 454, figs. 1-8

Type species: Tentilenticulina latens Hitchings, 1980; OD(M).

Tentilenticulina Hitchings, 1980 (*1486), p. 216.

Test free living in the early stage, later attached within cavities in bioherms, early flattened stage of four or five planispirally enrolled chambers, later with more enveloping chambers and changed direction of growth and may uncoil and become meandrine, the irregular chambers varying in form and position according to the space in which the individual was confined; wall calcareous, perforate, laminated, with fibrous radial structure, surface generally smooth, but occasional small external spines serve for anchorage in the cavities; aperture terminal, large, probably rounded, bordered by slightly thickened wall. U. Jurassic (M. Oxfordian); England.

Remarks: This genus is known only from sections of coral and sponge-bearing limestones and appears to have inhabited cavities within the bioherm.

VAGINULINA d'Orbigny, 1826

Plate 454, figs. 15-17

Type species: Nautilus legumen Linné, 1758 (*1859), p. 711; SD Cushman, 1913 (*704), p. 80.

Vaginulina d'Orbigny, 1826 (*2303), p. 257.
Vaginula Risso, 1826 (*2628), p. 16; obj. OD(M).
Nodosarina (Vaginulina) Carpenter et al., 1862 (*494), p. 164 (nom. transl.).

Test elongate, uniserial, rectilinear to arcuate as in *Dentalina* but laterally compressed, ovate to lenticular in section, dorsal margin commonly straight, ventral margin may be slightly inflated, septa horizontal to slightly oblique, may be thickened and elevated; wall calcareous, perforate, radial in structure, surface smooth, other than the elevated to beaded sutures or may have a few longitudinal costae; aperture radiate at the dorsal angle, may be slightly produced. L. Jurassic to Holocene; cosmopolitan.

Subfamily SPIROLINGULININAE Loeblich and Tappan, 1986

Spirolingulininae Loeblich and Tappan, 1986 (*1928), p. 247.

Test compressed, early stage planispirally enrolled, later uncoiled and rectilinear; aperture terminal and slitlike. L. Cretaceous (Albian); Eocene to Holocene.

ELLIPSOCRISTELLARIA A. Silvestri, 1920

Plate 454, figs. 9-11

Type species: Lingulinopsis sequana Berthelin, 1880 (*221), p. 63; OD(M).

Ellipsocristellaria A. Silvestri, 1920 (*2949), p. 57.

Test planispirally enrolled and involute, broadly ovate in section, periphery rounded, chambers few per whorl, enlarging rapidly and strongly overlapping, sutures slightly curved, flush; wall calcareous, perforate, radial in structure, surface smooth; aperture an elongate slit at the dorsal angle, with somewhat produced borders. L. Cretaceous (Albian); France.

SPIROLINGULINA Sellier de Civrieux and Dessauvagie, 1965

Plate 454, figs. 12-14

Type species: Lingulina polymorpha O. G. Costa, 1861 (*687), p. 46 (syn.: *Lingulinopsis carlofortensis* L. G. Bornemann, 1883 (*308), p. 27); OD.

Spirolingulina Sellier de Civrieux and Dessauvagie, 1965 (*2867), p. 90, 143.

Test elongate, lenticular to ovate in section, somewhat inflated medially, early stage with planispirally enrolled chambers, later chambers strongly overlapping, uniserial, and rectilinear, sutures radial to slightly curved in the enrolled stage, horizontal and sinuate in the rectilinear stage, curving backward slightly at the midline of the sides and at the test margins, periphery carinate to rounded; wall calcareous, perforate, radial in structure, surface smooth; aperture terminal, an elongate slit bordered by low projecting rims. Eocene to Holocene.

Family LAGENIDAE Reuss, 1862

Lagenidea Reuss, 1862 (*2586), p. 305.
Lagenida Carpenter, Parker, and Jones, 1862 (*494), p. 154.
Lagenideae Gümbel, 1870 (*1337), p. 28.
Lagene Schwager, 1876 (*2829), p. 476.
Lagenoidea Schwager, 1877 (*2830), p. 18.
Lagenidae Schulze, 1877 (*2827), p. 29.
Lageninae Brady, 1881 (*339), p. 44 (subfamily).
Lagenina Lankester, 1885 (*1790), p. 847.
Lagenetta Haeckel, 1894 (*1355), p. 164.
Lageninae Delage and Hérouard, 1896 (*926), p. 137.
Reussoolininae R. W. Jones, 1984 (*1615), p. 95 (subfamily).

Test unilocular; wall calcareous, hyaline, radial in structure; aperture terminal, rounded, or radiate, may be produced on a neck. L. Jurassic (Pliensbachian) to Holocene.

CRIBROLAGENA R. W. Jones, 1984

Plate 455, figs. 9-11

Type species: Lagena ampulladistoma Rymer Jones var. *cribrostomoides* Cushman, 1913 (*704), p. 15; OD.

Cribrolagena R. W. Jones, 1984 (*1615), p. 98.

Test small, up to 0.4 mm in length, unilocular, ovate, circular in section; wall calcareous, radial, surface smooth, except for the apiculate and somewhat hispid base; aperture multiple, consisting of a number of large pores on the somewhat produced apertural end. Holocene; W. Pacific.

HYALINONETRION Patterson and Richardson, 1987

Plate 455, figs. 6-8

Type species: Hyalinonetrion sahulense Patterson and Richardson, 1987; OD.

Hyalinonetrion Patterson and Richardson, 1987 (*2372A), in press.

Amphorina d'Orbigny, 1849 (*2310), p. 666 (non *Amphorina* de Quatrefages, 1844); type species: *Amphorina gracilis* O. G. Costa, 1856 (*686), p. 121; (syn.: *Amphorina costai* Andersen, 1961, *34, p. 78, nom. nov. pro *Amphorina gracilis* Costa, 1856, non *Lagena gracilis* Williamson, 1848); SD Cushman, 1928 (*747), p. 193.

Test unilocular, elongate, fusiform, tapering slowly at the base; wall calcareous, hyaline, surface smooth and unornamented; aperture rounded at the end of the long tapering neck, bordered by a smooth everted lip. M. Oligocene (Rupelian) to Holocene; cosmopolitan.

Remarks: *Hyalinonetrion* differs from *Lagena* in having a fusiform test with smooth unornamented surface, elongate neck, and phialine lip. Although the type species of *Amphorina* d'Orbigny, 1849 was regarded as a homonym of *Lagena gracilis* Williamson, 1848 and renamed as *Amphorina costai* Andersen, 1961, it was not a primary homonym. Williamson's species is the type species of *Procerolagena* Puri, 1954, and *Amphorina gracilis* Costa was transferred to *Hyalinonetrion* as *H. gracile* (Costa), hence they are not secondary homonyms either.

LAGENA Walker and Jacob, 1798

Plate 455, figs. 12, 13 and 15-17

Type species: Serpula (Lagena) sulcata Walker and Jacob, in Kanmacher, 1798; SD Parker and Jones, 1859 (*2346), p. 337.

Serpula (Lagena) Walker and Jacob, in Kanmacher, 1798 (*1639), p. 634 (non *Lagena* Bolten, 1798, nec Schumacher, 1817 nec Moerch, 1852, nec Kramer, 1881).
Lagena T. Brown, 1827 (*435), flyleaf, pl. 1, figs. 30, 31 (nom. transl. ex subgenus).
Vermiculum Montagu, 1803 (*2168), p. 517; type species: *Vermiculum perlucidum* Montagu, 1803; SD Cushman, 1928 (*747), p. 193.
Lagenulina Terquem, 1876 (*3144), p. 67; type species: *Lagenulina sulcata* Terquem, 1876; SD Loeblich and Tappan, 1964 (*1910), p. C540.
Capitellina Marsson, 1878 (*2047), p. 122; type species: *Capitellina multistriata* Marsson, 1878; OD(M).
Ectolagena A. Silvestri, 1900 (*2923), p. 4; type species: obj.; SD Loeblich and Tappan, 1964 (*1910), p. C518.
Lagena (Capitellina) Franke, 1925 (*1172), p. 58 (nom. transl.).

Test unilocular, globular to ovate; wall calcareous, hyaline, surface with longitudinal striae or costae; aperture terminal, rounded, produced on a long or short neck and may have a phialine lip. Jurassic to Holocene; cosmopolitan.

OBLIQUINA Seguenza, 1862

Plate 455, figs. 18-20

Type species: Obliquina acuticosta Seguenza, 1862; OD(M).

Obliquina Seguenza, 1862 (*2838), p. 75.

Test unilocular, subovate, asymmetrical; wall calcareous, hyaline, radial in structure, surface with numerous fine striae obliquely crossing the chamber toward the aperture: aperture rounded, at the end of a short neck, located at one side of the test just below the upper end. Miocene; Italy: Sicily.

PROCEROLAGENA Puri, 1954

Plate 455, fig. 2

Type species: Lagena gracilis Williamson, 1848 (***3378**), p. 13; OD.

Procerolagena Puri, 1954 (***2483**), p. 104.

Test unilocular, slender, and very elongate, nearly parallel margins tapering to an apiculate base: wall calcareous, nonperforate, surface smooth but with longitudinal ornamentation ranging from striae to strongly elevated costae; aperture terminal, rounded, at the end of a long slender neck, bordered by an everted lip. Paleocene to Holocene; cosmopolitan.

PYGMAEOSEISTRON Patterson and Richardson, 1987

Plate 455, figs. 3-5

Type species: Lagena hispidula Cushman, 1913 (***704**), p. 14; OD.

Pygmaeoseistron Patterson and Richardson, 1987 (***2372A**), in press.

Test unilocular, globular to ovoid; wall calcareous, hyaline, imperforate, surface smooth to finely hispid, without costae; aperture a small round opening at the end of a narrow elongate neck. U. Cretaceous (Maastrichtian) to Holocene; cosmopolitan.

REUSSOOLINA Colom, 1956

Plate 455, fig. 14

Type species: Oolina apiculata Reuss, 1851 (***2575**), p. 22; OD.

Lagena (Reussoolina) Colom, 1956 (***649**), p. 71.

Reussoolina R. W. Jones, 1984 (***1615**), p. 95 (nom. transl.).

Test unilocular, ovate; wall calcareous, hyaline, optically radial, surface smooth but may have an apiculate base; aperture rounded, bordered by radial grooves, slightly produced but without a distinct neck. L. Jurassic (Pliensbachian) to Holocene; cosmopolitan.

RIMULINOIDES Saidova, 1975

Plate 455, fig. 1

Type species: Rimulinoides elongatus Saidova, 1975; OD.

Rimulinoides Saidova, 1975 (***2695**), p. 177 (also as *Rumulinoides*, p. 177).

Test large, unilocular, cylindrical, tapering slightly at both ends; wall calcareous, hyaline radial in structure, surface smooth other than the radial ornamentation at the base; aperture terminal, of three elongate radiating slits. Holocene; tropical Pacific, at 2,988 m.

TETRAGONULINA Seguenza, 1862

Plate 455, figs. 21 and 22

Type species: Tetragonulina prima Seguenza, 1862; OD(M).

Tetragonulina Seguenza, 1862 (***2838**), p. 53.

Test unilocular, an elongate ovate chamber slightly tapering toward the aperture, subquadrangular in section, with rounded angles; wall calcareous, radial in structure, white and opaque, surface smooth; aperture rounded, at the end of a cylindrical neck. U. Miocene; Italy: Messina district.

Family POLYMORPHINIDAE d'Orbigny, 1839

Polymorphinidae d'Orbigny, 1839 (***2304**), p. xxxix, 131.
Polymorphinideae Reuss, 1860 (***2581**), p. 230.
Polymorphinidea Reuss, 1860 (***2581**), p. 151.
Polymorphinida Jones, in Griffith and Henfrey, 1875 (***1300**), p. 320.
Polymorphinidee Schwager, 1876 (***2829**), p. 479.
Polymorphinina Bütschli, in Bronn, 1880 (***421**), p. 200.
Ramulinina Lankester, 1885 (***1790**), p. 847.
Polymorphinae Delage and Hérouard, 1896 (***926**), p. 138.
Ramulinae Delage and Hérouard, 1896 (***926**), p. 138.
Ramulinidae Lister, in Lankester, 1903 (***1791**), p. 145.
Enantiomorphinidae Marie, 1941 (***2031**), p. 142.

Test with chambers spirally arranged about a vertical axis, strongly overlapping toward the early part of the test; rounded, slitlike, or radiate aperture at the distal end. U. Triassic (Rhaetian) to Holocene.

Subfamily FALSOGUTTULININAE Loeblich and Tappan, 1986

Falsoguttulininae Loeblich and Tappan, 1986 (***1928**), p. 247.

Test with chambers spirally arranged about a vertical axis; aperture terminal, slitlike. L. Cretaceous (Valanginian) to Holocene.

BERTHELINOPSIS Sliter, 1968

Plate 456, figs. 8 and 9

Type species: Berthelinopsis carlsbadensis Sliter, 1968; OD.

Berthelinopsis Sliter, 1968 (*3002), p. 76.

Test small, up to 0.3 mm in length, elongate ovate in outline, flattened, periphery rounded, chambers broad and low, obliquely arranged and extending proximally at the margins, biserial but slightly sigmoid in plan in the early stage; wall calcareous, finely perforate, radial in structure, surface smooth; aperture terminal, an elongate slit in the plane of compression. U. Cretaceous (Campanian); USA: California.

EDHEMIA Aliyulla, 1966

Plate 456, figs. 4-7

Type species: Edhemia edhemi Aliyulla, 1966; OD.

Edhemia Aliyulla, 1966 (*23), p. 142.

Test small, elongate, subtriangular in section or may have distinctly carinate angles, chambers in high-spired arrangement, added in five planes that are 110° to 170° apart, planes of chamber addition in successive whorls slightly varying, finally with only three planes, chambers somewhat elongate, extending proximally at the margins; wall calcareous, finely perforate, surface smooth; aperture a simple terminal slit that may be surrounded by a clear vitreous neck. U. Cretaceous (L. Cenomanian); USSR: Azerbaydzhan.

FALSOGUTTULINA Bartenstein and Brand, 1949

Plate 456, figs. 12-15

Type species: Falsoguttulina wolburgi Bartenstein and Brand, 1949; OD.

Falsoguttulina Bartenstein and Brand, 1949 (*153), p. 671.

Test ovate, slightly flattened, rapidly enlarging and inflated chambers in a low spire, added in planes approximately 120° apart, sutures distinct, depressed; wall calcareous, radial, surface smooth; aperture a moderately curved slit. L. Cretaceous (Valanginian) to U. Cretaceous (Maastrichtian); Germany; Japan.

FISSURIPOLYMORPHINA McCulloch, 1977

Plate 456, figs. 10 and 11

Type species: Fissuripolymorphina aequicellaris McCulloch, 1977; OD.

Fissuripolymorphina McCulloch, 1977 (*1961), p. 214.

Test elongate, subtriangular to subovate in outline, somewhat compressed, periphery rounded, chambers biserially arranged, overlapping at the margins, sutures strongly oblique, depressed; wall calcareous, thin, hyaline, finely perforate, surface smooth; aperture an elongate and narrow terminal slit, bordered by a low lip. Holocene; E. Pacific; Gulf of California.

LINGULOSIGMOMORPHINA Saidova, 1975

Plate 456, fig. 1

Type species: Lingulosigmomorphina sanata Saidova, 1975; OD.

Lingulosigmomorphina Saidova, 1975 (*2695), p. 201.

Test of medium size, up to 0.9 mm in length, ovate in outline, compressed, sides flat, periphery broadly rounded, broad and low chambers added in a sigmoid series, overlapping very strongly at the margins, septa flush; wall calcareous, radial in structure, surface smooth; aperture terminal, slitlike. Holocene; Pacific Ocean, off New Zealand.

PSEUDOPOLYMORPHINOIDES van Bellen, 1946

Plate 456, figs. 21-23

Type species: Pseudopolymorphinoides limburgensis van Bellen, 1946; OD.

Pseudopolymorphinoides van Bellen, 1946 (*182), p. 41.

Test ovate in outline, compressed, chambers added in five planes in the early stage, final chamber terminal, sutures strongly oblique, flush, periphery rounded; aperture an elongate terminal slit. M. Eocene (Lutetian); Netherlands.

TOBOLIA Dain, 1958

Plate 456, figs. 16-19

Type species: Tobolia veronikae Dain, in N. K. Bykova et al., 1958 (err. emend. as *T. veronica* E. V. Bykova, Dain, and Fursenko, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 17); OD.

Tobolia Dain, in N. K. Bykova et al., 1958 (*475), p. 39.

Test globular to ovate in outline, oval in section, chambers added in planes 140° apart as in *Guttulina*, enlarging rapidly and strongly overlapping, sutures flush to slightly depressed; wall calcareous, hyaline, surface smooth; aperture terminal, slitlike, somewhat produced. U. Cretaceous (Maastrichtian); USSR: Siberia.

WALDOSCHMITTIA McCulloch, 1977

Plate 456, figs. 2 and 3

Type species: Waldoschmittia angularis McCulloch, 1977; OD.

Waldoschmittia McCulloch, 1977 (*1961), p. 218 (err. cit. as *Waldoschimittia*, expl. pl. 88, figs. 25-27).

Test palmate in outline, flattened, periphery carinate, early stage with small chambers added in varying planes and possibly sigmomorphine, later chambers biserial and increasing rapidly in height, final chamber comprising one-half to two-thirds the test length, margin lobulate and may have small spinal projection at the proximal tip of each chamber and on the proloculus, sutures oblique, depressed; wall calcareous, hyaline, finely perforate, surface smooth; aperture terminal, an elongate slit bordered by a carinate rim that continues into the peripheral keel of the test. Holocene; E. Pacific, off Mexico.

Subfamily POLYMORPHININAE d'Orbigny, 1839

Polymorphininae Brady, 1881 (*339), p. 44, nom. transl. ex family Polymorphinidae.

Enantiomorphininae Loeblich and Tappan, 1961 (*1902), p. 298.

Guttulininae Kuzina, 1973 (*1761), p. 93.

Test free; chambers biserial or spiralling about a vertical axis, strongly overlapping, interior simple; aperture rounded or radiate. U. Triassic (Rhaetian) to Holocene.

ENANTIOMORPHINA Marie, 1941

Plate 456, figs. 30-32

Type species: Enantiomorphina lemoinei Marie, 1941; OD.

Enantiomorphina Marie, 1941 (*2031), p. 144.

Test elongate ovate, rounded in section, chambers elongate, oblique to the long axis, added in different planes but not biserial, sutures oblique, flush; wall calcareous, radial, surface smooth; aperture terminal, radiate. U. Cretaceous (Senonian); France.

EOGUTTULINA Cushman and Ozawa, 1930

Plate 456, figs. 27-29

Type species: Eoguttulina anglica Cushman and Ozawa, 1930; OD.

Eoguttulina Cushman and Ozawa, 1930 (*835), p. 16.

Test elongate, ovate, rounded in section, elongate chambers inflated at the proximal end, added in planes less than 90° apart, successively added farther from the base in a spiral series, sutures oblique, depressed, resulting in a lobulate margin; wall calcareous, radial, surface smooth; aperture terminal, radiate. U. Triassic (Rhaetian) to L. Cretaceous (Albian); Europe; North America; South America.

EUPOLYMORPHINA McCulloch, 1977

Plate 456, figs. 24-26

Type species: Eupolymorphina hancocki McCulloch, 1977; OD.

Eupolymorphina McCulloch, 1977 (*1961), p. 177.

Test fusiform to palmate in outline, compressed, periphery rounded, large ovate proloculus followed by elongate low chambers in biserial arrangement, each extending proximally at the test margin, sutures strongly oblique, depressed; wall calcareous, hyaline radiate, with a distinctly transparent collar at the aperture, those of previous chambers remaining visible along the test midline, surface smooth, except for a sharp longitudinal rib extending obliquely from the midline of the flat test face across each chamber toward its proximal end; aperture terminal, radiate, produced on the hyaline neck. Holocene; E. Pacific, off Mexico.

FRANCUSCIA McCulloch, 1981

Plate 458, figs. 26 and 27

Type species: Frankia cernuata McCulloch, 1977 (*1961), p. 180; OD.

Francuscia McCulloch, 1981 (*1962A), p. 1 (nom. subst. pro *Frankia* McCulloch, 1977).

Frankia McCulloch, 1977 (*1961), p. 180 (non *Frankia* Brunchorst, 1886); type species: obj.; OD.

Frankinella McCulloch, 1981 (*1962), p. 6 (nom. nov. pro *Frankia* McCulloch, 1977: non *Frankinella* Stewart and Hendrix, 1945); type species: obj.; OD.

Mitrapolymorphina Loeblich and Tappan, 1986 (*1928), p. 248; type species: obj.; OD.

Test elongate, slightly compressed, early chambers biserially arranged and strongly overlapping at the test margins as in *Polymorphina*, final chamber globular, centered or slightly eccentric, produced terminally into a short neck, sutures strongly oblique and depressed in the early stage, final one nearly straight and horizontal, strongly constricted; wall calcareous, hyaline, finely perforate, surface smooth; aperture rounded, terminal on the short cylindrical neck. Holocene: E. Pacific: Gulf of California, Mexico.

GLANDULOPLEUROSTOMELLA A. Silvestri, 1903

Plate 456, fig. 20

Type species: Polymorphina subcylindrica Hantken, 1876 (*1398), p. 60; OD(M).

Glandulopleurostomella A. Silvestri, 1903 (*2929), p. 217.

Test elongate, subcylindrical, base rounded, ovate chambers added in about three planes in the early stage, later chambers biserial and not much embracing, tending to become central in position, sutures distinct, oblique, depressed; wall calcareous, finely perforate, radial in structure, surface smooth; aperture terminal, radiate. Eocene to Pleistocene; cosmopolitan.

GLOBULINA d'Orbigny, 1839

Plate 457, figs. 6 and 7

Type species: Polymorphina (les Globulines) *gibba* d'Orbigny, 1826 (*2303), p. 266; SD Cushman, 1927 (*746), p. 189.

Guttulina (Globulina) d'Orbigny, 1839 (*2304), p. 134.

Polymorphina (les Globulines) d'Orbigny, 1826 (*2303), p. 266 (name not available, ICZN Art. 11 (b)(i); 11 (g): vernacular).

Globulina d'Orbigny, 1846 (*2309), p. 225 (nom. transl. ex subgenus).

Test globular to ovate in form, circular in section, early chambers added in five planes somewhat more than 144° apart, later decreasing to only three planes, strongly overlapping, sutures oblique, flush to slightly depressed; wall calcareous, translucent, perforate, radial, surface smooth or rarely spinose to striate; aperture terminal, radiate, or may be obscured by a fistulose growth with radiating tubular projections that end in small rounded openings. M. Jurassic (Callovian) to Holocene; cosmopolitan.

GORISELLA Dzhanelidze, 1980

Plate 457, figs. 1-5

Type species: Caudina linter Dzhanelidze and Kuzina, in Dzhanelidze, 1970 (*1031), p. 119; OD.

Gorisella Dzhanelidze, 1980 (*1032), p. 123 (nom. subst. pro *Caudina* Dzhanelidze and Kuzina, 1970).

Caudina Dzhanelidze and Kuzina, in Dzhanelidze, 1970 (*1031), p. 119 (non *Caudina* Stimpson, 1853); type species: obj.; OD.

Test large, up to 1.8 mm in length, elongate fusiform, with elongate and slightly inflated chambers added in three planes around a long coiling axis, progressively tending to become more nearly rectilinear, sutures distinct, depressed; wall calcareous, thin, hyaline, finely perforate, surface smooth; aperture produced on a neck, consisting of radially arranged slits that lead through channels to the interior. M. Miocene; USSR: N. Caucasus, Georgian SSR.

GUTTULINA d'Orbigny, 1839

Plate 458, figs. 1-7

Type species: Polymorphina (les Guttulines) *communis* d'Orbigny, 1826 (*2303), p. 266; SD Galloway and Wissler, 1927 (*1209), p. 56.

Guttulina d'Orbigny, 1839 (*2304), p. 132.

Polymorphina (les Guttulines) d'Orbigny, 1826 (*2303), p. 266 (name not available: ICZN Art. 11 (b)(i); 11 (g): vernacular).

Sigmomorpha Cushman and Ozawa, 1928 (*834), p. 17; type species: *Sigmomorpha sadoensis* Cushman and Ozawa, 1928; OD.

Test ovate to elongate, chambers inflated, added spirally in five planes, successive chambers 144° apart and each extending farther distally while strongly overlapping preceding ones proximally, sutures distinct, depressed;

wall calcareous, hyaline, radial, surface smooth; aperture terminal, radiate. M. Jurassic (Bathonian) to Holocene; cosmopolitan.

KREBSINA McCulloch, 1981

Plate 458, figs. 12-15

Type species: Krebsia pilasensis McCulloch, 1977 (***1961**), p. 20; OD.

Krebsina McCulloch, 1981 (***1962**), p. 6 (nom. subst. pro *Krebsia* McCulloch, 1977).

Krebsia McCulloch, 1977 (***1961**), p. 20 (non *Krebsia* Moerch, 1877, nec Guppy, 1895); type species: obj.; OD.

Test small, ovate in outline, flattened, globular proloculus followed by about three pairs of rapidly enlarging and biserially arranged chambers, sutures slightly depressed, internally a nodelike or hooklike projection extends into the chamber from the midpoint of the basal suture but has no apparent relationship to the aperture of the chamber, periphery subacute; wall calcareous, finely perforate, surface smooth; aperture subterminal, an elongate slit with denticulate margins. Holocene, at 20 m to 40 m; Philippines.

METAPOLYMORPHINA McCulloch, 1977

Plate 457, figs. 10-12

Type species: Polymorphina charlottensis Cushman, 1925 (***730**), p. 41; OD.

Metapolymorphina McCulloch, 1977 (***1961**), p. 196.

Test large, up to 3.1 mm in length, somewhat compressed, ovate in section, elongate ovate in outline, base rounded, slightly tapering distally, chambers biserially arranged, earliest ones slightly sigmoid and later more regular, overlapping previous chambers at the test margins, sutures distinct, strongly oblique; wall calcareous, perforate, radial, surface smooth; aperture terminal, radiate, surrounded by a hyaline collar. L. Oligocene to Holocene; Pacific; Japan; New Zealand; Canada: British Columbia; USA: California; Mexico.

PALEOPOLYMORPHINA Cushman and Ozawa, 1930

Plate 458, figs. 18-22

Type species: Polymorphina pleurostomelloides Franke, 1928 (***1173**), p. 121; OD.

Paleopolymorphina Cushman and Ozawa, 1930 (***835**), p. 112.

Pseudopyrulinoides Fuchs, 1967 (***1189**), p. 317; type species: *Pseudopyrulinoides magnus* Fuchs, 1967; OD.

Test elongate, subcylindrical, rounded in section, chambers globular to ovoid, loosely biserial and tending to become cuneate and uniserial with little overlap, sutures oblique, depressed; wall calcareous, radial, finely perforate, surface smooth; aperture terminal, rounded, at the produced narrow end of the final chamber. L. Cretaceous (Albian) to U. Cretaceous (Maastrichtian); Europe.

PEALERINA Lalicker, 1950

Plate 458, figs. 23-25

Type species: Ellisina spatula Lalicker, 1950 (***1773**), p. 18; OD.

Pealerina Lalicker, in Thalmann, 1950 (***3169**), p. 43 (nom. subst. pro *Ellisina* Lalicker, 1950).

Ellisina Lalicker, 1950 (***1773**), p. 18 (non *Ellisina* Norman, 1903); type species: obj.; OD.

Test broad, palmate in outline, flattened, chambers biserially arranged but may be added slightly less than 180° apart, resulting in the test having an arched appearance in cross section, inflated and increasing rapidly in breadth, extending proximally at the margins nearly to the base, sutures strongly oblique, slightly curved, depressed; wall calcareous, finely perforate, surface smooth; aperture terminal, large, ovate, with faintly radiate margin. M. Jurassic (Bathonian); USA: Montana.

POLYMORPHINA d'Orbigny, 1826

Plate 458, figs. 16 and 17

Type species: Polymorphina burdigalensis d'Orbigny, 1826; SD Galloway and Wissler, 1927 (***1209**), p. 53.

Polymorphina d'Orbigny, 1826 (***2303**), p. 265

Rostrolina Schlicht, 1870 (***2756**), pls. 25, 26; type species: obj.; SD Loeblich and Tappan, 1964 (***1910**), p. C530.

Glandulopolymorphina A. Silvestri, 1901 (***2924**), p. 17; type species: obj.; SD Loeblich and Tappan, 1964 (***1910**), p. C530.

Test elongate, fusiform to ovate in outline, weakly compressed, chambers biserially arranged but early ones may be slightly twisted to sigmoid, sutures distinct, flush to depressed; wall calcareous, hyaline, perforate radial, surface smooth; aperture terminal, radiate. L. Paleocene (Danian) to Holocene; cosmopolitan.

POLYMORPHINELLA Cushman and Hanzawa, 1936

Plate 444, figs. 1-6

Type species: Polymorphinella vaginulinaeformis Cushman and Hanzawa, 1936; OD.

Polymorphinella Cushman and Hanzawa, 1936 (*822), p. 46.

Eupolymorphinella McCulloch, 1977 (*1961), p. 179; type species: *Eupolymorphinella elegantula* McCulloch, 1977; OD.

Test ovate in outline, compressed, early stage biserial, with plane of biseriality parallel to the compression, later uniserial, although some chambers may be somewhat cuneate rather than symmetrical, sutures distinct, curved to sigmoid; wall calcareous, finely perforate, surface smooth; aperture radiate at the dorsal angle. U. Paleocene (Landenian) to Pleistocene; Japan; Ryukyu Islands; USA; Mexico; E. Pacific.

PSEUDOPOLYMORPHINA Cushman and Ozawa, 1928

Plate 458, figs. 8-11

Type species: Pseudopolymorphina hanzawai Cushman and Ozawa, 1928; OD.

Pseudopolymorphina Cushman and Ozawa, 1928 (*834), p. 15.

Test elongate ovate in outline, slightly compressed and ovate in section, early chambers added in five planes, later becoming biserial, chambers narrow and elevated, only slightly overlapping, sutures strongly oblique, distinct, depressed; wall calcareous, finely perforate, hyaline radial in structure, surface smooth or rarely finely striate; aperture terminal, radiate. Oligocene to Holocene; cosmopolitan.

PYRULINA d'Orbigny, 1839

Plate 457, figs. 8, 9, and 19-21

Type species: Polymorphina (les Pyrulines) *gutta* d'Orbigny, 1826 (*2303), p. 267, 310; OD(M).

Pyrulina d'Orbigny, 1839 (*2304), p. 267, 310.

Polymorphina (les Pyrulines) d'Orbigny, 1826 (*2303), p. 267, 310 (name not available, ICZN Art. 11 (b)(i); 11 (g); vernacular).

Guttulina (Pyrulina) Cushman and Ozawa, 1928 (*834), p. 15 (nom. transl.).

Pyrulinella Cushman and Ozawa, 1928 (*834), p. 16; type species: *Polymorphina lanceolata* Reuss, 1851 (*2574), p. 83; OD.

Test fusiform, circular in section, base subacuminate to broadly rounded, chambers elongate and weakly to strongly embracing, added in planes about 120° apart in the early stage, later biserial, sutures oblique, curved, flush; wall calcareous, perforate, radial, surface smooth; aperture terminal, radiate. Jurassic to Holocene; cosmopolitan.

PYRULINOIDES Marie, 1941

Plate 457, figs. 22-26

Type species: Pyrulina acuminata d'Orbigny, 1840 (*2307), p. 43; OD.

Pyrulinoides Marie, 1941 (*2031), p. 169, 255.

Test elongate, fusiform, tapering strongly at both extremities, chambers biserially arranged throughout, strongly embracing, enlarging rapidly so that final pair may comprise three-fourths of the test length, sutures oblique, flush; wall calcareous, perforate, radial in structure, surface smooth; aperture terminal, radiate. U. Triassic (Rhaetian) to L. Oligocene; cosmopolitan.

SAGOPLECTA Tappan, 1951

Plate 457, figs. 13-18

Type species: Sagoplecta goniata Tappan, 1951; OD.

Sagoplecta Tappan, 1951 (*3122), p. 14.

Test elongate, subfusiform, subquadrate in section, early chambers biserially arranged, followed by uniserial equitant to subpyramidal chambers overlapping previous chambers most prominently at the test angles, proximal margin of chambers bordered with small lobulate projections that may reflect surface ribs but all species known only from pyritic internal casts; aperture terminal with ovate opening, possibly with radiate margin. U. Triassic (Rhaetian); USA: Alaska.

SIGMOIDELLA Cushman and Ozawa, 1928

Plate 459, figs. 3-7

Type species: Sigmoidella kagaensis Cushman and Ozawa, 1928; OD.

Sigmoidella Cushman and Ozawa, 1928 (*834), p. 18.

Sigmoidella (Sigmoidina) Cushman and Ozawa, 1928 (*834), p. 18; type species: *Sigmoidella (Sigmoidina) pacifica* Cushman and Ozawa, 1928; OD.

Test ovate in outline, slightly compressed and lenticular in section, narrow and elongate chambers added in sigmoid series, successive chambers extending to the test base and overlapping previous chambers on one side of the test, sutures curved, flush to slightly depressed; wall calcareous, perforate, radial, surface smooth; aperture terminal, radiate. M. Eocene to Holocene: Japan; Australia: Victoria; New Zealand; Formosa; Indonesia: Sumatra; Philippines; USA: California, Texas, South Carolina; West Indies: Trinidad.

SIGMOMORPHINA Cushman and Ozawa, 1928

Plate 459, figs. 8-14

Type species: Sigmomorpha (Sigmomorphina) yokoyamai Cushman and Ozawa, 1928; OD.

Sigmomorpha (Sigmomorphina) Cushman and Ozawa, 1928 (***834**), p. 17.

Sigmomorphina Cushman and Ozawa, 1930 (***835**), p. 11, 13 (nom. transl. ex subgenus).

Sigmomorphina (Sigmomorphinoides) Rouvillois, 1960 (***2654**), p. 62; type species: *Sigmomorphina (Sigmomorphinoides) parisiensis* Rouvillois, 1960; OD.

Test elongate ovate, tapering to the aperture, slightly compressed, base rounded, chambers added in a biserial sigmoid series in planes slightly less than 180° apart, chambers broad, low, extending proximally at the sides of the test nearly to the base, sutures depressed; wall calcareous, finely perforate, radial in structure, surface smooth to finely striate longitudinally; aperture terminal, radiate. U. Paleocene (Thanetian) to Holocene; cosmopolitan.

Remarks: The subgenus *Sigmomorphinoides* was based on aberrant specimens with two apertures.

SPIROFRONDICULARIA Schubert, 1902

Plate 459, figs. 15 and 16

Type species: Polymorphina frondicularioides Chapman, 1894 (***524**), p. 716; SD Galloway, 1933 (***1205**), p. 262.

Frondicularia (Spirofrondicularia) Schubert, 1902 (***2811**), p. 16.

Quadrulina Cushman and Ozawa, 1930 (***835**), p. 12, 18; type species: *Polymorphina rhabdogonioides* Chapman, 1894 (***524**), p. 716; OD.

Spirofrondicularia Galloway, 1933 (***1205**), p. 260 (nom. transl. ex subgenus).

Test elongate, tapering both at the base and at the apertural end, rhomboidal to quadrate in section, sides may be slightly excavated, early chambers in quadriserial arrangement, later uniserial, overlapping at the angles, slightly arched on the faces of the test, sutures depressed; aperture terminal, rounded to ovate, with radial border. L. Jurassic?; U. Jurassic (Tithonian) to L. Cretaceous (Aptian): England; USSR: Russian Platform, Precaspian region.

STRIGIALIFUSUS Loeblich and Tappan, 1986

Plate 459, figs. 1 and 2

Type species: Polymorphina regina Brady, Parker, and Jones var. *rutila* Cushman, 1923 (***724**), p. 34; OD.

Strigialifusus Loeblich and Tappan, 1986 (***1928**), p. 248.

Test elongate, up to 1.3 mm in length, narrow, fusiform, base with distinct spine, early chambers added in three planes, later biserial, narrow and high, overlapping very little on the sides and increasing rapidly in size, the final pair occupying more than half the test length, sutures oblique, weakly depressed; wall calcareous, hyaline, radial, surface with fine longitudinal costae; aperture terminal, radiate. M. Oligocene (Rupelian): USA: Mississippi.

Remarks: Differs from *Polymorphina* in the early triloculine chamber arrangement, differs from *Pseudopolymorphina* in lacking an early quinqueloculine stage, and differs from both in the narrow fusiform biserial stage, apiculate base, and prominent longitudinal surface costae.

Subfamily WEBBINELLINAE Rhumbler, 1904

Webbinellinae Rhumbler, 1904 (***2617**), p. 224.

Arwebbina Rhumbler, 1913 (***2621**), p. 346 (err. emend.).

Test polymorphine in early stage, later attached to the substrate and may have final spreading, branching, or irregular chamber against the attachment. L. Jurassic to Holocene.

BULLOPORA Quenstedt, 1856

Plate 459, figs. 17-23 and 26-28

Type species: Bullopora rostrata Quenstedt, 1857 (***2498**), p. 580; SD(SM).

Bullopora Quenstedt, 1856 (*2497), p. 292.
Arpemeroum Rhumbler, 1913 (*2621), p. 444; type species: *Webbina irregularis* d'Orbigny, 1850 (*2312), p. 111; OD.
Placopsum Rhumbler, 1913 (*2621), p. 445; type species: *Webbina breoni* Terquem and Piette, in Terquem, 1862 (*3137), p. 458; SD Galloway, 1933 (*1205), p. 167.
Arplacopsum Rhumbler, 1913 (*2621), p. 445 (err. emend.).

Test attached, consisting of a series of hemispherical chambers of circular to ovate outline, early chambers closely adjacent, later chambers may be separated by stolonlike necks, chambers of microspheric generation may increase rapidly in size, those of the megalospheric generation of more nearly constant diameter; wall calcareous, perforate, surface smooth; aperture at the open end of the stoloniferous necks. L. Jurassic (Lias) to U. Cretaceous (Maastrichtian); cosmopolitan.

HISTOPOMPHUS Loeblich and Tappan, 1949

Plate 459, fig. 25

Type species: Globulina redriverensis Tappan, 1943 (*3121), p. 505 (syn.: *Bullopora irregularis* Lozo, 1944, *1937, p. 559, non *Webbina irregularis* d'Orbigny, 1849); OD.

Histopomphus Loeblich and Tappan, 1949 (*1881), p. 262.

Test large, attached, early chambers polymorphine, later attached with a spreading chamber surrounding the test, leading to an elongate tubular or branching undivided chamber, sutures of early stage flush to slightly depressed; wall calcareous, perforate, surface smooth; aperture rounded or forming a low arch at the ends of the tubular attached chamber. L. Cretaceous (Albian); USA: Oklahoma, Texas.

VITRIWEBBINA Chapman, 1892

Plate 459, fig. 24

Type species: Vitriwebbina sollasi Chapman, 1892; SD Cushman, 1927 (*746), p. 189.

Vitriwebbina Chapman, 1892 (*523), p. 52, 53.

Test attached, a large ovoid initial chamber surrounded by an irregular broad and spreading undivided second chamber; wall calcareous, perforate, surface smooth; aperture consisting of openings at the ends of tubular necklike projections from the margin of the flangelike second chamber. L. Cretaceous (Albian); Europe; North America.

WEBBINELLA Rhumbler, 1904

Plate 460, figs. 1 and 2

Type species: Trochammina (Webbina) irregularis (d'Orbigny) var. *hemisphaerica* Jones, Parker, and Brady, 1866 (*1622), p. 27; SD Cushman, 1918 (*710), p. 61.

Webbinella Rhumbler, 1904 (*2617), p. 228.
Arwebbinum Rhumbler, 1913 (*2621), p. 346 (err. emend.).
Lingulopyrulinoides Saidova, 1975 (*2695), p. 202; type species: *Lingulopyrulinoides crassa* Saidova, 1975 (recte *L. crassus*); OD.

Test attached, early stage probably free, ovate in outline, chambers in polymorphine or pyruline arrangement, low, strongly overlapping the earlier chambers and separated by oblique sutures, later with a narrow to broad keel-like to flangelike chamber attached to the substrate and surrounding the earlier part of the test; wall calcareous, hyaline, perforate radial, surface smooth; aperture terminal, slitlike. L. Cretaceous (Albian) to Holocene; cosmopolitan.

Remarks: *Lingulopyrulinoides* was described as a polymorphinid with biserially arranged chambers and a marginal keel completely surrounding the test but appears to be a *Webbinella* that has been detached from the substrate.

Subfamily EDITHAELLINAE Fuchs, 1967

Edithaellinae Fuchs, 1967 (*1189), p. 320 (as Edithaëllinae).
Vasiglobulininae Poag, 1969 (*2432), p. 48.

Test polymorphinoid in early stage, later attached to a substrate or in cavities produced by dissolution in shell fragments that serve for anchorage of the surficial spines of the test. L. Cretaceous, U. Eocene to Pliocene.

ECHINOPORINA Fuchs, 1967

Plate 460, fig. 3

Type species: Echinoporina erinacea Fuchs, 1967 (nom. imperf. as *E. erinaceus*); OD.

Echinoporina Fuchs, 1967 (*1189), p. 323.

Test attached, small, hemispherical, chamber arrangement unknown, but the globular test is surrounded by a narrow attachment region; wall calcareous, perforate, surface covered with fine spinules; aperture a simple round opening slightly above the attachment. L. Cretaceous (M. Albian): Netherlands.

Remarks: This genus and type species are known from a single specimen and whether unilocular or chambered is unknown. The apparent round aperture also may be the result of breakage.

EDITHAELLA Fuchs, 1967

Plate 460, figs. 4-8

Type species: Edithaella sessilis Fuchs, 1967; OD.

Edithaella Fuchs, 1967 (*1189), p. 320 (as *Edithaëlla*).
Cornusphaera Fuchs, 1967 (*1189), p. 321; type species: *Cornusphaera grandis* Fuchs, 1967; OD.

Test small, from 0.3 mm to 0.5 mm in diameter, commonly free and globular but adult may have an irregular spreading attachment, early chambers trochospirally arranged, final chamber large, inflated, and enveloping; wall calcareous, surface may be finely hispid; aperture probably consists of openings at the ends of the few tubular necklike projections from the final chamber. L. Cretaceous (M. Albian): Netherlands.

GRILLITA Fuchs, 1967

Plate 460, figs. 9-11

Type species: Grillita planispira Fuchs, 1967; OD.

Grillita Fuchs, 1967 (*1189), p. 321.

Test subspherical, with three small elongate early chambers aligned in an arcuate planispiral series, final chamber globular and much larger as in *Edithaella*, sutures slightly depressed, gently curved; wall calcareous, surface with fine spinules; aperture not described, probably consists of openings at the end of short tubular necklike projections as in *Edithaella*. L. Cretaceous (M. Albian); Netherlands.

Remarks: The genus and type species are known from a single specimen.

VASIGLOBULINA Poag, 1969

Plate 460, figs. 12-18

Type species: Globulina alabamensis Cushman and McGlamery, 1939 (*832), p. 46; OD.

Vasiglobulina Poag, 1969 (*2432), p. 48.

Test ovoid, with few embracing and rapidly enlarging chambers added in a high spire in planes about 144° apart, sutures flush; wall calcareous, hyaline, finely perforate, optically radiate, surface smooth, striate, or more commonly covered with long spines that serve for attachment and may penetrate a calcareous substrate such as molluscan shell fragments; aperture consists of a system of tubules radiating from a vestibule at the distal end of the final chamber, opening to the exterior as a circle of pores around a central plug. U. Eocene to Pliocene; USA: Mississippi, Alabama; England; France; Italy; Germany; Austria; USSR: Georgian SSR, Precaucasus.

Subfamily RAMULININAE Brady, 1884

Ramulininae Brady, 1884 (*344), p. 71.

Test free, a series of very irregular chambers that may be closely appressed or widely separated by stolonlike connections. Jurassic to Holocene.

DISCORAMULINA Seiglie, 1964

Plate 461, figs. 1-5

Type species: Discoramulina bollii Seiglie, 1964; OD.

Discoramulina Seiglie, 1964 (*2843), p. 501.

Test attached by means of a discoid proloculus, later with several radiating series of uniserially aligned chambers of hemicircular section, that may continue to be attached to the substrate or may grow free and become cylindrical, sutures straight and flush to slightly depressed; wall calcareous, dorsal surface perforate, attached surface imperforate, may have small lateral projections that adhere to the substrate; aperture rounded, simple, at the end of each uniserial row of chambers. M. Eocene to Holocene; off Venezuela; Cuba; India: Southwest Kutch.

RAMULINA T. R. Jones, 1875

Plate 461, figs. 7 and 8

Type species: Ramulina laevis T. R. Jones, in J. Wright, 1875; OD.

Ramulina T. R. Jones, in J. Wright, 1875 (*3395), p. 88.

Globular or irregular chambers loosely connected by stolonlike necks or a straight or branching tube with chamberlike swellings; wall calcareous, finely perforate, surface smooth to hispid; aperture at the open ends of the stolonlike tubes. Jurassic to Holocene; cosmopolitan.

RAMULINELLA Paalzow, 1932

Plate 461, fig. 6

Type species: Ramulinella suevica Paalzow, 1932; OD(M).

Ramulinella Paalzow, 1932 (***2323**), p. 135.

Globular or somewhat irregular chambers as in *Ramulina* but without regular arrangment, closely appressed rather than separated by stolonlike necks; wall calcareous, finely perforate, surface hispid; aperture rounded at the end of the final chamber. U. Jurassic (Oxfordian); Germany; USA: South Dakota.

SPORADOGENERINA Cushman, 1927

Plate 461, figs. 11 and 12

Type species: Sporadogenerina flintii Cushman, 1927 = *Ramulina proteiformis* Flint, 1899 (***1139**), p. 321; OD.

Sporadogenerina Cushman, 1927 (***741**), p. 95.

Test elongate, early stage with inflated but poorly defined chambers of irregular shape and arrangement, later becoming rectilinear or branching, sutures obscure; wall calcareous, perforate, radial in structure, surface smooth; aperture terminal, radiate in the early stage, later with multiple irregularly placed radiate apertures. Holocene; Gulf of Mexico; Atlantic.

WASHITELLA Tappan, 1943

Plate 461, figs. 9 and 10

Type species: Washitella typica Tappan, 1943; OD.

Washitella Tappan, 1943 (***3121**), p. 515.

Test of irregularly shaped and arranged chambers or these may be arcuate, rectilinear, or variously branched, sutures distinct, slightly constricted; wall calcareous, perforate, radial in structure, surface smooth; aperture simple, rounded, and may be produced on a short conical neck at the end of a series of chambers, commonly with more than one per chamber. L. Cretaceous (Albian) to U. Cretaceous (Cenomanian); USA: Texas, Oklahoma, Wyoming.

Family ELLIPSOLAGENIDAE A. Silvestri, 1923

Ellipsolagenidae, nom. transl. herein ex subfamily.

Test unilocular; aperture with an entosolenian tube. Jurassic to Holocene.

Remarks: Although *Ellipsolagena* is regarded as a synonym of *Fissurina*, the family group name based on it nevertheless retains priority (ICZN Arts. 23 (d); 40 (a)).

Subfamily OOLININAE Loeblich and Tappan, 1961

Oolininae Loeblich and Tappan, 1961 (***1902**), p. 299.
Anturininae R. W. Jones, 1984 (***1615**), p. 99.

Test unilocular, radially symmetrical; rounded to radiate central aperture provided with an entosolenian tube. Jurassic to Holocene.

ANTURINA R. W. Jones, 1984

Plate 462, fig. 1

Type species: Anturina haynesi R. W. Jones, 1984; OD.

Anturina R. W. Jones, 1984 (***1615**), p. 99.

Test globular to ovate; wall calcareous, hyaline, radial, surface smooth; aperture somewhat produced, consisting of radiating slits that do not meet centrally. Holocene; Wales.

Remarks: The genus is tentatively recognized herein, although as yet incompletely described. The original description of the type species is identical to Haynes' (1973, ***1436**, p. 108) description of *"Oolina laevigata"* (non *Oolina laevigata* d'Orbigny), and the holotype is the specimen figured by Haynes. The description stated that the wall is "presumably minutely perforate," that the aperture has a "trematophore with eight radiate grooves," and a "faint trace of an entosolenian tube." Illustrated by SEM, no internal tube is visible, the magnification is insufficient to determine the perforate or imperforate nature of the wall, and the term trematophore was incorrectly used, as it implies the presence of a separate plate bearing multiple openings.

BUCHNERINA R. W. Jones, 1984

Plate 462, figs. 4-6

Type species: Buchnerina iberica R. W. Jones, 1984; OD.

Buchnerina R. W. Jones, 1984 (***1615**), p. 104.

Test unilocular, ovoid, flattened, with one or more peripheral keels, sides flat to gently convex, somewhat depressed just within the marginal keels; wall calcareous, hyaline, surface smooth or finely granulate; aperture terminal, rounded, on a short thick neck, and provided with a short straight entosolenian tube. Pleistocene to Holocene; N. Atlantic.

CUSHMANINA R. W. Jones, 1984

Plate 462, figs. 7-12

Type species: Lagena vulgaris Williamson var. *desmophora* F. W. O. Rymer Jones, 1872 (***1614**), p. 54; OD.

Cushmanina R. W. Jones, 1984 (***1615**), p. 54 (also err. cit. as *Cuschmanina*, p. 117).

Test unilocular, globular to ovate or fusiform, circular in section, with a distinct neck; wall calcareous, hyaline to translucent, surface with prominent longitudinal costae that may continue to the edge of the aperture, each costa bearing one or two rows of large punctae, producing a chainlike appearance; aperture rounded at the end of the neck and bordered by a thickened collar, provided with a short centrally placed entosolenian tube, although this may be absent in some specimens. U. Miocene to Holocene; Europe; USA: California; Atlantic; Pacific.

EXSCULPTINA Patterson and Richardson, 1987

Plate 462, figs. 13-16

Type species: Lagena sidebottomi Earland, 1934 (***1041**), p. 161 (syn.: *Lagena intermedia* Sidebottom, 1912 (***2912**), p. 399, non *Lagena striata* var. *intermedia Rzehak*, 1886); OD.

Exsculptina Patterson and Richardson, 1987 (***2372A**), in press.

Test unilocular, pyriform to conical, circular in section; wall calcareous, hyaline to translucent, nonporous, test surface smooth in the upper part, lower part with numerous incised channels terminating at a ring encircling the base, central part of the base covered with a reticular mesh; aperture round, bordered with a hyaline collar and provided with a straight, ecentral entosolenian tube. Pleistocene to Holocene; Southwest Pacific, to about 4,650 m; N. Pacific: Benham Rise; Antarctic: Scotia Sea, 3,721 m.

FAVULINA Patterson and Richardson, 1987

Plate 463, figs. 1 and 2

Type species: Entosolenia squamosa (Montagu) var. *γ hexagona* Williamson, 1848 (***3378**), p. 20; OD.

Favulina Patterson and Richardson, 1987 (***2372A**), in press.

Test unilocular, subglobular to ovate, circular in section; wall calcareous, translucent, surface covered by elevated ridges forming large polygonal reticulations; aperture rounded on a slightly produced neck that may have a thickened collarlike rim, provided internally with a short straight central entosolenian tube. Miocene to Holocene; cosmopolitan.

GALWAYELLA Patterson and Pettis, 1986

Plate 463, figs. 3 and 4

Type species: Lagena trigonoelliptica Balkwill and Millett, 1884 (***113**), p. 81; OD.

Galwayella Patterson and Pettis, 1986 (***2371**), p. 74.

Trigonulina Seguenza, 1862 (***2838**), p. 74 (non *Trigonulina* d'Orbigny, 1846); type species: *Trigonulina oblonga* Seguenza, 1862; SD Cushman, 1928 (***747**), p. 193.

Galwayella Towe, 1985 (***3220**), p. 64 (name not available, ICZN Art. 13 (a)(i), no description).

Test elongate ovate, triangular in section, sides flattened to convex; wall calcareous, hyaline, surface smooth except for a longitudinal carina at each of the three test angles; aperture terminal, rounded to triangular, without a distinct neck, provided with a short straight entosolenian tube. Miocene (Helvetian) to Holocene; cosmopolitan.

HETEROMORPHINA R. W. Jones, 1984

Plate 463, fig. 15

Type species: Oolina heteromorpha Parr, 1950 (***2363**), p. 304; OD.

Heteromorphina R. W. Jones, 1984 (***1615**), p. 98.

Test ovoid, circular in section; wall calcareous, hyaline, radial, surface smooth and unornamented; aperture terminal and rounded, the neck forming a small apertural chamberlet and provided with an entosolenian tube. Holocene; Atlantic; Pacific.

Remarks: Although described as bilocular and belonging to the Glandulinidae, *Heteromorphina* is here regarded as unilocular but with an apertural chamberlet similar to that of some other Nodosariina. *Nodosaria calomorpha* Reuss, 1866, placed here by R. W. Jones (1984, ***1615**), is probably a juvenile *Dentalina*.

HOMALOHEDRA Patterson and Richardson, 1987

Plate 463, figs. 5-7

Type species: Lagena guntheri Earland, 1934 (***1041**), p. 151; OD.

Homalohedra Patterson and Richardson, 1987 (***2372A**), in press.

Test unilocular but double specimens may occur, ovate to pyriform, circular in section; wall calcareous, hyaline, translucent, surface with a few heavy longitudinal ribs that extend up the wall from a circular ring near the test base to merge into a ringlike collar just below the apertural neck; aperture rounded at the end of the brief smooth neck, provided with a short, straight entosolenian tube. Pleistocene to Holocene; cosmopolitan.

LACULATINA Patterson and Richardson, 1987

Plate 463, figs. 12-14

Type species: Lagena quadrilatera Earland var. *striatula* Earland, 1934 (***1041**), p. 160; OD.

Laculatina Patterson and Richardson, 1987 (***2372A**), in press.

Test unilocular, elongate, quadrate to rectangular in section, with sharp to carinate angles; wall calcareous, hyaline to translucent, finely perforate, surface smooth to finely and discontinuously longitudinally ribbed; aperture rounded on a short neck and provided with a short straight entosolenian tube. Miocene to Holocene; Atlantic; Pacific; Antarctic.

LAGNEA Popescu, 1983

Plate 462, figs. 2 and 3

Type species: Fissurina radiata Seguenza, 1862 (***2838**), p. 70; OD.

Lagnea Popescu, 1983 (***2456A**), p. 272

Solenina R. W. Jones, 1984 (***1615**), p. 121; type species: *Lagenosolenia? tenuistriatiformis* McCulloch, 1977 (***1961**), p. 74; OD.

Test unilocular, flasklike, compressed, periphery broadly carinate, keel commonly with radiating tubules, struts, or reticulations and may extend completely around the periphery to invest the neck as well; wall calcareous, hyaline, radial, surface smooth or variously ornamented with longitudinal striae or fine ribs; aperture round to oval, terminal, at the end of a distinct neck, may have a thickened rim, provided with an entosolenian tube. M. Miocene to Holocene; cosmopolitan.

OOLINA d'Orbigny, 1839

Plate 463, figs. 8-11

Type species: Oolina laevigata d'Orbigny, 1839; SD Galloway and Wissler, 1927 (***1209**), p. 50.

Oolina d'Orbigny, 1839 (***2306**), p. 18.

Ovulina Ehrenberg, 1845 (***1065**), p. 358 (err. emend.; non *Ovulina* Schultze, 1854, nec Gruber, 1884).

Cenchridium Ehrenberg, 1845 (***1065**), p. 317, 357; type species: *Cenchridium sphaerula* Ehrenberg, 1845; OD.

Entosolenia Williamson, 1848 (***3378**), p. 16; type species: *Entosolenia lineata* Williamson, 1848; SD Cushman, 1927 (***746**), p. 190.

Test unilocular, globular to ovate; wall calcareous, hyaline, radial, surface smooth or with very fine longitudinal striae, base may be apiculate; aperture rounded, slightly produced on a short neck and may be surrounded by radial grooves. Jurassic to Holocene; cosmopolitan.

PRISTINOSCEPTRELLA Patterson and Richardson, 1987

Plate 464, figs. 1-3

Type species: Pristinosceptrella hispida Patterson and Richardson, 1987; OD.

Pristinosceptrella Patterson and Richardson, 1987 (***2372**), p. 219.

Test unilocular, globular, circular in section; wall calcareous, translucent, perforate, surface pustulose to hispid; aperture round to radiate at the end of a distinct and relatively narrow and elongate neck, provided with an entosolenian tube. Pleistocene to Holocene; Southwest Atlantic.

Remarks: Differs from *Oolina* in the distinct neck and hispid surface, differs from *Pseudoolina* in the round rather than fissurine aperture, and differs from *Lagenosolenia* in being globular rather than compressed.

VASICOSTELLA Patterson and Richardson, 1987

Plate 464, figs. 4–7

Type species: Lagena vulgaris Williamson var. *helophoromarginata* F. W. O. Rymer Jones, 1872 (*1614), p. 61; OD.

Vasicostella Patterson and Richardson, 1987 (*2372), p. 220, 224.

Test unilocular, flasklike, compressed, periphery carinate; wall calcareous, hyaline, perforate, surface longitudinally nodose, costate, or punctate; aperture round to oval, bordered with a slight lip and provided with a central entosolenian tube. Pleistocene to Holocene; Mediterranean; Atlantic; Pacific.

Subfamily ELLIPSOLAGENINAE A. Silvestri, 1923

Ellipsolageninae A. Silvestri, 1923 (*2951), p. 265.

Test unilocular; aperture slitlike, bilaterally symmetrical, provided with an entosolenian tube. U. Cretaceous to Holocene.

DUPLELLA Patterson and Richardson, 1987

Plate 465, figs. 1 and 2

Type species: Duplella apexadina Patterson and Richardson, 1987; OD.

Duplella Patterson and Richardson, 1987 (*2372), p. 217.

Test unilocular, ovate in outline, slightly compressed, ovoid in section; wall calcareous, translucent, surface smooth; aperture symmetrical, consisting of two elongate slits, one at each side of the test apex and separated by a narrow bridge, the straight central entosolenian tube is bifurcated just beneath the openings so that both connect with the tube. Pleistocene to Holocene; S. Atlantic: Rio Grande Rise.

FISSURINA Reuss, 1850

Plate 465, figs. 5–9

Type species: Fissurina laevigata Reuss, 1850; OD(M).

Fissurina Reuss, 1850 (*2573), p. 366.

Hyaleina O. G. Costa, 1856 (*686), p. 366; type species: obj.; SD Loeblich and Tappan, 1964 (*1910), p. C540.

Ellipsolagena A. Silvestri, 1923 (*2951), p. 265, 268; type species: *Lagena acutissima* Fornasini, 1889 (*1150), p. 1, OD(M).

Ellipsofissurina A. Silvestri, 1923 (*2951), p. 265; type species: *Fissurina laevigata* Reuss, 1850, obj.; SD Loeblich and Tappan, 1964 (*1910), p. C541.

Test rounded to ovate in outline, oval to lenticular in section, periphery may have one or more keels; wall calcareous, hyaline, finely perforate, surface smooth, with random or regularly aligned punctae; aperture terminal, ovate to slitlike, within a slightly depressed fissure at the test apex, provided internally with an entosolenian tube that may be central or may curve toward one side of the test and may be attached to the inner wall. Cretaceous to Holocene; cosmopolitan.

LAGENOSOLENIA McCulloch, 1977

Plate 465, figs. 10 and 11

Type species: Lagenosolenia soulei McCulloch, 1977; OD.

Lagenosolenia McCulloch, 1977 (*1961), p. 49.

Test ovate to elongate, flasklike, compressed and ovate to lenticular in section, may be laterally carinate; wall calcareous, hyaline to opaque, finely perforate, surface smooth, may have one or more peripheral keels; aperture ovate to slitlike, produced on a neck, provided with a central entosolenian tube and may be bordered by a phialine lip. Holocene; Pacific; Atlantic.

PALLIOLATELLA Patterson and Richardson, 1987

Plate 465, figs. 12–14

Type species: Palliolatella avita Patterson and Richardson, 1987; OD.

Palliolatella Patterson and Richardson, 1987 (*2372), p. 219.

Test unilocular, elongate ovate, compressed, carinate, commonly with more than one keel;

wall calcareous, hyaline to translucent, surface smooth and unornamented other than by the lateral carinae; aperture terminal, rounded to ovate on a neck and partially enclosed by a hood formed by a widened expansion of the main carina, entosolenian tube present. U. Cretaceous (Campanian) to Holocene; Germany; Mediterranean; Atlantic; USA; Pacific; Antarctic.

PSEUDOOLINA R. W. Jones, 1984

Plate 465, figs. 3 and 4

Type species: Pseudoolina fissurinea R. W. Jones, 1984; OD.

Pseudoolina R. W. Jones, 1984 (***1615**), p. 119.

Test unilocular, globular to ovate, nearly circular in section; wall calcareous, hyaline, optically radial, perforate, surface smooth to costate; aperture terminal, without a distinct neck, elliptical to slitlike, bordered by equally developed lips on the slightly produced margins, and provided with a flared entosolenian tube that is attached to the inner dorsal wall of the test. Pleistocene to Holocene; cosmopolitan.

Subfamily PARAFISSURININAE R. W. Jones, 1984

Parafissurininae R. W. Jones, 1984 (***1615**), p. 126.

Test unilocular; aperture asymmetrically placed, provided with an entosolenian tube. M. Eocene to Holocene.

Remarks: Although originally defined as a subfamily of the granular-walled Pleurostomellidae, the presently included genera have a hyaline radial wall, and the revised subfamily is placed in the Ellipsolagenidae.

CURSINA Patterson and Richardson, 1987

Plate 466, figs. 1 and 2

Type species: Cursina adornata Patterson and Richardson, 1987; OD.

Cursina Patterson and Richardson, 1987 (***2372A**), in press.

Test unilocular, subglobular to slightly ovate in section with complete peripheral keel; wall calcareous, hyaline, surface with a coarse reticulum of raised ridges; aperture subterminal, an elongate slit just ventral to the projecting keel, ventral margin of the aperture bordered by a short spatulate lip, provided internally with a long entosolenian tube that attaches to the inner dorsal wall and extends nearly to the base of the test. Pleistocene to Holocene; Atlantic.

IRENITA R. W. Jones, 1984

Plate 466, figs. 3 and 4

Type species: Lagena cornigera Buchner, 1940 (***444**), p. 514; OD.

Irenita R. W. Jones, 1984 (***1615**), p. 116 (also err. cit. as *Irenia*, p. 120, and as *Iremita*, p. 91).

Test unilocular, ovate, compressed, the dorsal side terminally produced and spreading in a hoodlike structure over the aperture; wall calcareous, hyaline, periphery with a single or double, smooth or chainlike keel or may have a double keel in part of the test and a single one elsewhere; aperture broad and crescentic, subterminal between the asymmetrically developed lips, the dorsal border produced and the ventral one shorter, entosolenian tube fastened to the midline of the dorsal wall in the upper part, then turns to one edge and continues into the lower half of the test. Pleistocene? to Holocene; Mediterranean; Southwest Pacific.

PARAFISSURINA Parr, 1947

Plate 466, figs. 5-9

Type species: Lagena ventricosa A. Silvestri, 1904 (***2931**), p. 10; OD.

Parafissurina Parr, 1947 (***2362**), p. 123.

Test unilocular, slightly compressed, peripheral margin rounded to weakly carinate; wall calcareous, surface smooth; aperture crescentic, subterminal, the dorsal margin projecting beyond the opening in a hoodlike extension, entosolenian tube curved and attached to the inner dorsal wall. M. Eocene to Holocene; cosmopolitan.

PSEUDOFISSURINA R. W. Jones, 1984

Plate 466, figs. 12-14

Type species: Pseudofissurina mccullochae R. W. Jones, 1984; OD.

Pseudofissurina R. W. Jones, 1984 (***1615**), p. 118.

Test small, rounded to ovate in outline, slightly compressed, but with low convex sides and carinate periphery, commonly tricarinate, with the median keel being most prominent; wall calcareous, perforate, hyaline radial, surface smooth and unornamented other than the peripheral keels; aperture subterminal, crescentic, one margin somewhat produced but does not form a hood like that of *Parafissurina*, internally provided with a long entosolenian tube attached to the dorsal wall and extending back nearly to the base of the chamber before flaring terminally. Oligocene to Holocene; cosmopolitan.

PSEUDOSOLENINA R. W. Jones, 1984

Plate 466, figs. 10 and 11

Type species: Pseudosolenina borealis R. W. Jones, 1984; OD.

Pseudosolenina R. W. Jones, 1984 (*1615), p. 120.

Test ovate in outline, produced at the apertural end, compressed, carinate, the single broad keel continuous with the margin of the neck; wall calcareous, hyaline, optically radial, surface smooth, possibly imperforate; aperture subterminal, crescentic, margins inequally developed but without a hood and with a straight entosolenian tube attached to the dorsal wall. U. Pleistocene to Holocene; Atlantic.

VENTROSTOMA Schnitker, 1970

Plate 466, figs. 15–19

Type species: Lagena fovigera Buchner, 1940 (*444), p. 541; OD.

Ventrostoma Schnitker, 1970 (*2786), p. 46.

Arthurina R. W. Jones, 1984 (*1615), p. 104 (also err. cit. as *Arthuria*, p. 95); type species: *Lagena depressa* Chaster, 1892 (*546), p. 62 (syn.: *Lagena cymbula* Heron-Allen and Earland, 1913 (*1470), p. 90); OD.

Test free, ovate to reniform in outline, slightly flattened and asymmetrical, commonly with flat to concave ventral side and convex dorsal side, periphery may be rounded or have a thickened rim; wall calcareous, hyaline, finely perforate, surface smooth but may have a rounded scarlike structure near the aboral end of the test on the dorsal side; aperture rounded, eccentrically located on the concave ventral side, commonly in a slight depression or constriction of the test, provided with an entosolenian tube that arches inward across the chamber lumen to attach to the dorsal side and continues down the wall toward the aboral end. U. Miocene to Holocene; England; Ireland; Italy; USA: North Carolina.

WALTERPARRIA R. W. Jones, 1984

Plate 467, figs. 1–4

Type species: Lagena millettii Chaster, 1892 (*546), p. 61; OD.

Walterparria R. W. Jones, 1984 (*1615), p. 129.

Test unilocular, subcircular to ovate in outline, compressed, may be carinate; wall calcareous, hyaline, surface smooth; aperture subterminal and rounded to slitlike, the two borders inequally developed and expanding to form a flared and almost circular flange of suckerlike appearance, an entosolenian tube may be attached to the dorsal wall and may flare at its inner end. Holocene; British Isles; Atlantic; Pacific; Mediterranean.

WIESNERINA R. W. Jones, 1984

Plate 466, figs. 20–22

Type species: Lagena unguis Heron-Allen and Earland, 1913 (*1470), p. 86; OD.

Wiesnerina R. W. Jones, 1984 (*1615), p. 124.

Test unilocular, ovate to elongate, moderately compressed, carinate; wall calcareous, hyaline, surface smooth; aperture rounded to elliptical, subterminal, at the junction of carina and chamber body, the carina projecting above the opening on the dorsal margin, entosolenian tube attached to the dorsal wall and may flare within. Pleistocene to Holocene; Atlantic; Pacific; Mediterranean.

Subfamily SIPHOLAGENINAE Patterson and Richardson, 1987

Sipholageninae Patterson and Richardson, 1987 (*2372), p. 224.

Test unilocular; wall calcareous, of two discrete layers; aperture terminal, rounded, and may have an entosolenian tube. U. Oligocene to Holocene.

BIFARILAMINELLA Patterson and Richardson, 1987

Plate 467, figs. 13-15; plate 831, fig. 4

Type species: Lagena advena Cushman, 1923 (*723), p. 6; OD.

Bifarilaminella Patterson and Richardson, 1987 (*2372A), in press.

Test free, circular in section, globular, but produced into a neck at one pole; wall calcareous, translucent, of two discrete layers, the inner wall layer imperforate, with shagreenate surface, outer wall finely costate longitudinally, the fine costae bifurcating and anastomosing to maintain a nearly constant spacing, costae interconnected by narrow bars that leave small openings between them, a few much more elevated and flangelike costae present on the apertural neck, grading into the low costae at their base; base of the test with a ring of short blunt spines; aperture terminal, subtrigonal with short notches at the angles, at the end of the long neck that comprises about one-third the length of the test. U. Oligocene to Holocene; cosmopolitan.

PYTINE Moncharmont Zei and Sgarrella, 1978

Plate 467, figs. 5-9

Type species: Pytine parthenopeia Moncharmont Zei and Sgarrella, 1978; OD.

Pytine Moncharmont Zei and Sgarrella, 1978 (*2166), p. 2.

Test unilocular, ovate to pyriform, circular in section, with distinct neck; wall calcareous, hyaline, optically radial, translucent, double, with inner thicker, smooth layer and outer layer consisting of long flat strips or ribs supported by pillars perpendicular to the wall surfaces; elongate apertural neck is an extension from the inner wall layer, and the outer layer may not continue onto the neck, or only a few of the longitudinal ribs of the outer layer may continue up the neck to the ringlike apertural rim, the longitudinal ribs on the neck connected and supported by transverse plates that occupy the position of the pillars of the main chamber wall; aperture rounded, at the end of the elongate neck. Pleistocene to Holocene; Mediterranean; Pacific.

SIPHOLAGENA Moncharmont Zei and Sgarrella, 1980

Plate 467, figs. 10-12

Type species: Lagena benevestita Buchner, 1940 (*444), p. 445; OD.

Sipholagena Moncharmont Zei and Sgarrella, 1980 (*2167), p. 1 (nom. subst. pro *Buchneria* Moncharmont Zei and Sgarrella, 1977).

Buchneria Moncharmont Zei and Sgarrella, 1977 (*2165), p. 5 (non *Buchneria* Borner, 1952); type species: obj., OD.

Test unilocular, ovate to pyriform, circular in section, with elongate neck; wall calcareous, perforate, optically radial, of two layers separated by numerous solid pillars perpendicular to the wall, inner wall layer entire, although it may have elongate tubercles at the innermost surface, outer layer ranging from one perforated with large teardroplike openings in diagonal alignment to a coarsely perforate or spongy structure; aperture terminal, rounded, on a neck that arises from the inner wall and continues as an elongate external tube, may flare terminally or have a cylindrical collar, internally with a short straight entosolenian tube. Pleistocene to Holocene; Mediterranean, Atlantic; Pacific.

Family GLANDULINIDAE Reuss, 1860

Glandulinidae Reuss, 1860 (*2581), p. 151.

Test uniserial, biserial, or polymorphine; aperture terminal, radial, or slitlike, with an entosolenian tube. U. Triassic (Carnian), Jurassic to Holocene.

Subfamily GLANDULININAE Reuss, 1860

Glandulininae Loeblich and Tappan, 1961 (*1902), p. 299, nom. corr. pro subfamily Glandulinidea.

Glandulinidea Reuss, 1862 (*2586), p. 307, nom. transl. ex family Glandulinidae.

Glandulinea Hantken, 1876 (*1398), p. 41.

Laryngosigminae Saidova, 1981 (*2696), p. 39.

Test uniserial, biserial, or polymorphine; aperture terminal, radial, or slitlike, with entosolenian tube. U. Triassic (Carnian), Jurassic to Holocene.

BARNARDINA S. H. Taylor, Patterson, and H. W. Choi, 1985

Plate 468, figs. 12 and 13

Type species: Barnardina thanetana S. H.

Taylor et al., 1985 (syn.: *Barnardina thanetana* Haynes, 1981, *1437, Key fig. 9.7 (18/19), non fig. 20; name not available, ICZN Art. 13(a)(i), no description; = *Glandulina? laevigata* d'Orbigny of Haynes, 1958, *1434, p. 14, pl. 5, figs. 1, 1a–e, non *G. laevigata* d'Orbigny, 1826); OD.

Barnardina S. H. Taylor, Patterson, and H. W. Choi, 1985 (*3132), p. 20 (validated by provision of description for type species).

Burnardina Haynes, 1981 (*1437), p. 198 (name not available, ICZN Art. 13 (b), type species not described).

Test fusiform, broadest near the lower third of the final chamber, chambers strongly overlapping, microspheric test with triserially arranged chambers from the apiculate base, later chambers uniserial and rectilinear, megalospheric test with large proloculus and uniserial throughout; wall calcareous, surface smooth and unornamented; aperture terminal, radiate, with a short straight entosolenian tube. U. Paleocene (Thanetian); England.

DAINITA Loeblich and Tappan, 1964

Plate 468, figs. 8–11

Type species: Mariella sibirica Dain, in N. K. Bykova et al., 1958 (*475), p. 41; OD.

Dainita Loeblich and Tappan, 1964 (*1910), p. C537 (nom. subst. pro *Mariella* Dain, 1958).

Mariella Dain, in N. K. Bykova et al., 1958 (*475), p. 41 (non *Mariella* Nowak, 1916, nec Mörch, 1865 = err. pro *Mariaella* Gray, 1855, nec Soyka, 1958); type species: obj.; OD.

Test elongate, subfusiform, slightly compressed and ovoid in section, early stage with triserially arranged chambers, later biserial, chambers increasing rapidly in height, strongly embracing; wall calcareous, radial, finely perforate, surface smooth; aperture terminal, radiate, a surface groove reflecting the position of an entosolenian tube attached to the wall and extending from the aperture of the final chamber to the position of the aperture of the previous chamber. L. Cretaceous (Hauterivian to Barremian) to U. Cretaceous (Maastrichtian); USSR: W. Siberia; Germany.

ENTOSIGMOMORPHINA McCulloch, 1977

Plate 468, figs. 6 and 7

Type species: Entosigmomorphina angelensis McCulloch, 1977; OD.

Entosigmomorphina McCulloch, 1977 (*1961), p. 177.

Test palmate, flattened, periphery rounded, biserial and sigmoidal arrangement of broad and low chambers that increase rapidly in breadth but very little in height, sutures strongly oblique, depressed; wall calcareous, hyaline and translucent, finely perforate, surface smooth; aperture terminal, radiate, somewhat elongate, bordered by a narrow hyaline collar and provided with a short, narrow, and tapering central entosolenian tube. Holocene; Gulf of California, at 60 m.

ESOSYRINX Loeblich and Tappan, 1953

Plate 468, figs. 14–16

Type species: Pseudopolymorphina curta Cushman and Ozawa, 1930 (*835), p. 105; OD.

Esosyrinx Loeblich and Tappan, 1953 (*1887), p. 85.

Test ovate in outline, flattened, ovoid in section, chambers few, of nearly equal breadth and height and regularly biserial throughout, sutures distinct, depressed, oblique; wall calcareous, surface smooth, a clear hyaline band surrounds the aperture just below the opaque collar; aperture terminal, radiate, provided with a short straight entosolenian tube. Holocene; Atlantic; Pacific.

EUGLANDULINA McCulloch, 1977

Plate 468, fig. 19

Type species: Euglandulina inusitata McCulloch, 1977; OD.

Euglandulina McCulloch, 1977 (*1961), p. 13.

Test elongate ovate, circular in section, chambers uniserial, rectilinear, and strongly embracing throughout, although possibly only the megalospheric generation is known, sutures slightly depressed, horizontal; wall calcareous, opaque, surface smooth to finely striate; aperture terminal, radiate, with a narrow entosolenian tube attached to one wall for up to half the chamber height. Holocene; Pacific: off Philippine Islands.

GLANDULINA d'Orbigny, 1839

Plate 468, figs. 1–5

Type species: Nodosaria (les Glandulines) *laevigata* d'Orbigny, 1826 (*2303), p. 252; SD Cushman, 1927 (*746), p. 189.

Nodosaria (*Glandulina*) d'Orbigny, 1839 (*2304), p. 12 (described as subgenus but used in the text in the generic sense).

Nodosaria (les Glandulines) d'Orbigny, 1826 (*2303), p. 252 (name not available, ICZN Art. 11 (b)(i), 11 (g); vernacular).

Glandulina d'Orbigny, 1846 (*2309), p. 30 (nom. transl. ex subgenus).

Atractolina von Schlicht, 1870 (*2756), p. 69; type species: obj.; SD Loeblich and Tappan, 1964 (*1910), p. C537.

Psecadium Neugeboren, 1856 (*2242), p. 99; type species: *Psecadium ellipticum* Neugeboren, 1856; SD Galloway, 1933 (*1205), p. 244.

Test elongate, ovate, tapering at each end, circular in section, microspheric generation with tiny and biserially arranged early chambers and uniserial and rectilinear later chambers, megalospheric test uniserial throughout, chambers increasing rapidly in size as added, strongly overlapping previous chambers, septa commonly resorbed, possibly as each new chamber is added or at the time of reproduction, leaving only a single open internal cavity, external sutures distinct, flush; wall calcareous, radial, commonly opaque except for a narrow hyaline and translucent band just below the aperture, surface smooth or less commonly finely striate; aperture terminal, radiate, provided with a short, straight entosolenian tube. Paleocene to Holocene; cosmopolitan.

GLANDULINOIDES Hu, 1977

Plate 468, figs. 17 and 18

Type species: Glandulinoides yunnanensis Hu, in He [Ho] and Hu, 1977; OD.

Glandulinoides Hu, in He [Ho] and Hu, 1977 (*1447), p. 15.

Test small, elongate, uniserial, rectilinear, circular in section, chambers wider than high, enlarging rapidly, final chamber comprising one-third or more of the test length, sutures distinct, straight, flush; wall calcareous, perforate; aperture terminal, radiate, with entosolenian tube. U. Triassic (Carnian); China: Yunnan Province; USSR: N. Siberia.

Remarks: *Rectoglandulina guttula* Gerke (1961, ***1225A**, p. 16, pl. 1, fig. 8, pl. 5, figs. 4–6; 1961, ***1226**, pl. 112, figs. 4–6) from the Carnian of Siberia is referrable to *Glandulinoides.*

GLOBULOTUBA Collins, 1958

Plate 468, figs. 23 and 24

Type species: Globulotuba entosoleniformis Collins, 1958; OD.

Globulotuba Collins, 1958 (*646), p. 385.

Test fusiform in outline, circular in section, chambers few, in a rapidly enlarging triserial series, final one occupying up to three-fourths the test length, sutures oblique, flush to slightly depressed; wall calcareous, hyaline, with translucent ring surrounding the aperture just beneath the collar; aperture terminal, radiate, with short, narrow, somewhat curved entosolenian tube. Holocene: Australia.

GLOBULOTUBOIDES McCulloch, 1977

Plate 469, figs. 18 and 19

Type species: Globulotuboides orbiculus McCulloch, 1977 (nom. imperf. as *orbicula*); OD.

Globulotuboides McCulloch, 1977 (*1961), p. 182.

Test subfusiform, circular in section, chambers enlarging rapidly as added, strongly overlapping, early chambers added in five planes, later biserial, sutures oblique, flush to slightly depressed; wall calcareous, thin, hyaline, surface smooth, with clear and transparent collar just beneath the region of the aperture; aperture terminal, radiate, with a slightly eccentric and curved narrow entosolenian tube. Holocene: W. Pacific: off Korea, at about 45 m.

LARYNGOSIGMA Loeblich and Tappan, 1953

Plate 468, figs. 20–22

Type species: Laryngosigma hyalascidia Loeblich and Tappan, 1953; OD.

Laryngosigma Loeblich and Tappan, 1953 (*1887), p. 83.

Test elongate ovate, somewhat compressed, chambers biserial and sigmoid, added in planes slightly less than 180° apart, sutures oblique, curved, flush, internal septa subsequently resorbed; wall calcareous, hyaline, optically radial, surface smooth; aperture terminal, radiate, with a short straight entosolenian tube. Holocene: Atlantic: Arctic: Antarctic: Pacific: Australia.

PHLEGERIA Loeblich and Tappan, 1963

Plate 469, figs. 1 and 2

Type species: Phlegeria hyalina Loeblich and Tappan, 1963; OD.

Phlegeria Loeblich and Tappan, 1963 (*1909), p. 212.

Test narrow, elongate, tapering at each end, chambers in a uniserial and slightly arcuate series, strongly overlapping previous chambers, the final one occupying about one-half the test length, sutures curved, strongly oblique as seen from the side, earlier septa resorbed internally; wall calcareous, hyaline, finely perforate, surface smooth; aperture terminal, radiate, eccentric in position and at the straighter test margin, provided with a slender entosolenian tube that projects inward from the aperture. Holocene; Gulf of Mexico; Atlantic.

RIMALINA Pérébaskine, 1946

Plate 469, figs. 6 and 7

Type species: Rimalina pinatensis Pérébaskine, 1946; OD.

Rimalina Pérébaskine, 1946 (***2381**), p. 359.

Test ovate in outline, lenticular in edge view, planispirally enrolled with broad low chambers, later somewhat flaring, sutures radial, arched, flush; wall calcareous, hyaline, surface smooth; aperture radiate at the dorsal angle, with an elongate slit extending from the margin of the opening to an expansion at the base of the apertural face, the margins of the slit closed in part, suggesting that it represents an attached entosolenian tube like that of *Siphoglobulina*, in part broken open at the surface. U. Cretaceous (U. Campanian); France.

SIPHOGLOBULINA Parr, 1950

Plate 469, figs. 3-5

Type species: Siphoglobulina siphonifera Parr, 1950; OD.

Siphoglobulina Parr, 1950 (***2363**), p. 332.

Test ovate in outline, circular in section, early chambers added in three planes, each added farther from the base but strongly overlapping, sutures oblique, gently curved, flush; wall calcareous, hyaline, surface smooth; aperture radiate, with narrow entosolenian tube attached to the ventral wall of the chamber and expanding terminally near the base of the chamber, tube also opened to the exterior in part. Paleogene to Holocene; Australia; Antarctica.

TAPPANELLA Gudina and Saidova, 1969

Plate 469, figs. 8-10

Type species: Tappanella arctica Gudina and Saidova, 1969 (***1333**), p. 1110 (syn.: *Glandulina laevigata* d'Orbigny of Gudina, 1966 (***1329**), p. 29, non *Glandulina laevigata* d'Orbigny, 1839); OD.

Tappanella Gudina and Saidova, 1969 (***1333**), p. 1110.

Test elongate ovate, fusiform or subcylindrical, tapering at both ends, circular in section, chambers enlarging rapidly as added and strongly embracing, biserially arranged for most of growth but terminally uniserial, final chamber comprising over one-half the test length, sutures oblique in early stage, final one or two nearly horizontal, slightly depressed, inner septa may be resorbed in later growth or during reproduction; wall calcareous, optically radial, white to cream colored, with clear and translucent collar just beneath the apertural rim; aperture terminal, radiate, commonly with a short, straight, central entosolenian tube. Pleistocene to Holocene; USSR: Northwest Siberia; Japan; Alaska; Greenland; Sweden.

Remarks: Originally stated to differ from *Glandulina* in having an entosolenian tube and in the absence of septal resorption, but both features were shown to vary in both *Tappanella* and *Glandulina* (S. H. Taylor et al., 1985, ***3132**). *Tappanella* differs from *Glandulina* in the much more extensive biserial stage, depressed sutures, and few uniserial chambers.

TOMACULOIDES Loeblich and Tappan, 1963

Plate 469, figs. 11-13

Type species: Tomaculoides lucidus Loeblich and Tappan, 1963 (as *lucidum*); OD.

Tomaculoides Loeblich and Tappan, 1963 (***1909**), p. 213.

Test elongate, subcylindrical, and sausage shaped, slightly curved, chambers very narrow and elongate, each added farther from the base, overlapping on one side but more regularly spaced on the opposite hence apparently sigmoid, sutures oblique to nearly longitudinal, flush, septa resorbed with growth so that test interior is not subdivided; wall calcareous, hyaline, thin, transparent, finely perforate, surface smooth and unornamented; aperture terminal, radiate, with a short cylindrical entosolenian tube. Holocene; Gulf of Mexico.

TRICARINELLA ten Dam and Schijfsma, 1945

Plate 469, figs. 20-23

Type species: Rhabdogonium excavatum Reuss, 1863 (*2587), p. 91; OD.

Tricarinella ten Dam and Schijfsma, 1945 (*888), p. 233.

Test lanceolate in outline, triradiate in section, each ray with nearly parallel sides and rounded angles, broad and low uniserial and rectilinear chambers strongly arched at the midpoint of each side, curving back toward the base at the test angles, sutures strongly arched on the sides of the test, slightly depressed; wall calcareous, hyaline, surface smooth; aperture terminal, triradiate, with an entosolenian tube. L. Cretaceous (Albian); Europe.

Remarks: Previously regarded as a synonym of *Tristix*, but the latter has a radiate rather than triradiate aperture and lacks the entosolenian tube of *Tricarinella*.

Subfamily ENTOLINGULININAE Saidova, 1981

Entolingulininae Saidova, 1981 (*2696), p. 39.

Test biserial to uniserial, with chambers in a curved to rectilinear series; aperture terminal, slitlike to ovoid, with entosolenian tube. Pleistocene to Holocene.

ALLANHANCOCKIA McCulloch, 1977

Plate 469, figs. 14-17

Type species: Allanhancockia luculenta McCulloch, 1977; OD.

Allanhancockia McCulloch, 1977 (*1961), p. 205.

Test ovate in outline, compressed, lenticular to ovate in section, chambers biserially arranged, low and broad, strongly arched back at the margins nearly to the test base, sutures gently curved, strongly oblique, flush; wall calcareous, hyaline, with a transparent band adjacent to the sutures and just below the aperture; aperture elongate, slitlike, extending to the base of the final chamber against the penultimate one, provided with a short entosolenian tube. Holocene; Pacific.

BOMBULINA Mikhalevich, 1983

Plate 470, figs. 1-5

Type species: Glandulina spinata Cushman, 1935 (*778), p. 8; OD.

Bombulina Mikhalevich, 1983 (*2111), p. 170.

Bombulina Mikhalevich, 1978 (*2106), p. 70, 72 (name not available, ICZN Art. 13 (a)(i), no description).

Test elongate, ovate, circular in section, uniserial throughout, chambers strongly embracing and distal wall of earlier chambers resorbed as in *Glandulina*, sutures horizontal, flush, may be somewhat obscure; wall calcareous, optically radial, surface finely hispid; aperture terminal, rounded at the end of a short neck, bordered by a phialine lip and provided internally with a long entosolenian tube. Holocene; Caribbean: off Puerto Rico; off South America, from Trinidad to Surinam.

BRICEIA McCulloch, 1977

Plate 470, figs. 9-11

Type species: Briceia complectilis McCulloch, 1977; OD.

Briceia McCulloch, 1977 (*1961), p. 5.

Test auriculate in outline, compressed but with rounded periphery, fusiform proloculus followed by later chambers in partial coil, chambers progressively higher and extending farther from the base on the dorsal margin but reaching back to the proloculus on the ventral margin, sutures straight, radial, flush; wall calcareous, thin, hyaline, and translucent, finely perforate, surface smooth; aperture at the dorsal angle, ovate, slightly elongate in the plane of coiling, with an entosolenian tube extending back across the chamber lumen nearly to the dorsal wall, somewhat flared terminally. Holocene; Pacific: off the Philippine Islands.

ENTOLINGULINA Loeblich and Tappan, 1961

Plate 470, figs. 22-24

Type species: Lingulina aselliformis Buchner, 1942 (*445), p. 121; OD.

Entolingulina Loeblich and Tappan, 1961 (*1904), p. 250.

Test elongate, flattened, periphery rounded, chambers uniserial and rectilinear, arched at the midline of the flat sides, overlapping earlier chambers, sutures gently arched, slightly constricted; wall calcareous, hyaline, finely perforate, surface smooth; aperture terminal, ovate, in a slight groove at the distal end, provided with a short cylindrical entosolenian tube that nearly crosses the final chamber. Holocene; Europe; Antarctic.

ENTOMORPHINOIDES McCulloch, 1977

Plate 470, figs. 6-8

Type species: Entomorphinoides carlae McCulloch, 1977; OD.

Entomorphinoides McCulloch, 1977 (***1961**), p. 208.

Test elongate, ovate, compressed, biserial, with plane of biseriality sigmoid in plan for most of the test length, chambers increasing rapidly in height, final one terminal and appearing rectilinear, sutures distinct, curved, strongly oblique, constricted, internal septa resorbed with growth; wall calcareous, hyaline, with opaque longitudinal bands along the periphery, surface smooth; aperture terminal, an elongate slit, leading into a funnel-like entosolenian tube that narrows rapidly, then bends sharply to a circular opening directed toward one wall. Holocene; E. Pacific: off Mexico; Galapagos Islands.

ENTOPOLYMORPHINA McCulloch, 1977

Plate 470, figs. 12 and 13

Type species: Entopolymorphina simulata McCulloch, 1977; OD.

Entopolymorphina McCulloch, 1977 (***1961**), p. 176.

Test elongate, flattened, ovate in section, biserial throughout, chambers enlarging rapidly as added, the final one occupying nearly half the test length, sutures depressed, early ones very strongly oblique to almost vertical, later ones more nearly horizontal; wall calcareous, hyaline, finely perforate, surface smooth; aperture a short terminal slit, provided with a short tapering entosolenian tube. Holocene; Mexico; Korea.

Remarks: The "hypotype" [recte paratype], figured by McCulloch as fig. 11, pl. 91, does not appear to be congeneric as the test is subtriangular in section and the early chamber arrangement appears like that of *Guttulina*.

METALINGULINA McCulloch, 1977

Plate 470, figs. 19-21

Type species: Metalingulina belluliformis McCulloch, 1977 (also as *bellatuliformis*, p. 21); OD.

Metalingulina McCulloch, 1977 (***1961**), p. 21; OD.

Test elongate, compressed, with a few rectilinear, rapidly enlarging and very strongly embracing chambers with a carinate lower border, septa resorbed with growth, external sutures nearly straight and horizontal, constricted; wall calcareous, translucent, finely perforate, surface smooth, except for the carinate lower margin of the chambers just above the sutures, and an apiculate projection at the lateral margins; aperture terminal, slitlike to ovate, with an entosolenian tube that is directed downward then bends at right angles toward the wall at one margin and bends again to parallel the outer wall nearly to the base of the chamber. Holocene; Pacific: Bikini Atoll; Galapagos Islands; Gulf of California; USA: off California.

OBLIQUILINGULINA S. Y. Zheng, 1979

Plate 470, figs. 14-18

Type species: Obliquilingulina oblonga S. Y. Zheng, 1979; OD.

Obliquilingulina S. Y. Zheng, 1979 (***3449**), p. 146, 212.

Test of moderate size, up to 0.34 mm in length, elongate, sides nearly parallel, slightly compressed and elliptical in section, chambers few, large, biserially arranged but tending to become uniserial in the adult, sutures oblique, depressed; wall calcareous, thin, translucent, finely perforate, surface smooth; aperture terminal, an elongate to ovate slit, provided with a long straight entosolenian tube. Holocene; China: Xisha Islands, at 6 m depth.

OOLITELLA Makiyama and Nakagawa, 1941

Plate 470, figs. 25-27

Type species: Oolitella irregularis Makiyama and Nakagawa, 1941; OD.

Oolitella Makiyama and Nakagawa, 1941 (***1987**), p. 242, 243.

Test irregular in growth, somewhat elongate, chambers inflated, globular to subpyriform, uniserial but slightly arcuate; wall calcareous, thin, finely perforate, no surface ornamentation; aperture terminal, rounded, may be slightly produced, with a short entosolenian tube. Pleistocene: Japan.

Subfamily SEABROOKIINAE Cushman, 1927

Seabrookiinae Cushman, 1927 (*742), p. 86.

Test compressed, each chamber completely enveloping earlier formed ones, added with successive apertures at opposite poles; aperture terminal, oval to slitlike, and may have thickened lip. U. Cretaceous (Maastrichtian) to Holocene.

SEABROOKIA Brady, 1890

Plate 470, figs. 28-30

Type species: Seabrookia pellucida Brady, 1890; OD(M).

Seabrookia Brady, 1890 (*346), p. 570.

Milletia J. Wright, 1889 (*3396), p. 448 (name not available, ICZN Art. 12 (a), no description; non *Milletia* Duncan, 1889).

Millettia Sherborn, 1893 (*2899), p. 206 (nom. corr. pro *Milletia* J. Wright, 1889; not available, no description; non *Millettia* Schubert, 1911).

Cerviciferina Goddard and Jensen, 1907 (*1253), p. 305; type species: *Cerviciferina hilli* Goddard and Jensen, 1907; OD.

Test circular to ovate or pyriform in outline, compressed, planoconvex in end view, enrolled, earliest whorl with three chambers, later chambers one-half coil in length, each later chamber completely enveloping the earlier ones to which one wall adheres; wall calcareous, hyaline, perforate, radial in structure, surface smooth except for peripheral keel that may be somewhat fimbriate; aperture a terminal slit, bordered by a lip, with thick entosolenian tube, apertures of successive chambers at opposite ends of the test. U. Cretaceous (Maastrichtian) to Holocene; Atlantic; Pacific; Cuba; Netherlands; France; USA: California; New Jersey.

Suborder ROBERTININA Loeblich and Tappan, 1984

Robertinina Loeblich and Tappan, 1984 (*1918), p. 35.

Conorbida Hofker, 1951 (*1498), p. 307 (suborder; invalid, ICZN Art. 39, based on *Conorbis* Hofker, 1951, non *Conorbis* Swainson, 1840).

Rotaliea Mikhalevich, 1980 (*2108), p. 55 (class; partim).

Rotaliata Mikhalevich, 1980 (*2108), p. 56 (subclass; partim).

Robertinoida Mikhalevich, 1980 (*2108), p. 59 (superorder).

Robertinida Mikhalevich, 1980 (*2108), p. 59 (order).

Ceratobuliminida Mikhalevich, 1980 (*2108), p. 59 (order).

Robertinicae Saidova, 1981 (*2696), p. 62 (subclass).

Test planispirally to trochospirally enrolled; chambers provided with internal partition that attaches near apertural foramen; wall of hyaline, perforate, ultrastructurally and optically radiate aragonite (orthorhombic crystal form of calcium carbonate), the hexagonal prisms with c-axis normal to the wall surface and basal pinacoid parallel to the surface, prisms in bundles surrounded by organic sheaths; extremely fine wall perforations may be localized in pore fields. M. Triassic to Holocene.

Superfamily DUOSTOMINACEA Brotzen, 1963

Duostominacea Loeblich and Tappan, 1974 (*1913), p. 29, 47, nom. transl. ex family Duostominidae.

Oberhauserellacea Fuchs, 1975 (*1194), p. 221.

Test enrolled, planispiral to high trochospiral, nonlamellar, possibly originally aragonitic but commonly poorly preserved, wall appearing granular and may incorporate some foreign matter; aperture single or double, interiomarginal. M. Triassic (Anisian) to L. Jurassic (Hettangian).

Family DUOSTOMINIDAE Brotzen, 1963

Duostominidae Brotzen, 1963 (*432), p. 76.

Variostomidae Kristan-Tollmann, 1963 (*1738), p. 152 (nom. imperf.).

Variostomatidae Loeblich and Tappan, 1964 (*1910), p. 29.

Test low to high spired; two interiomarginal apertures in the final chamber separated by a short tenon. M. Triassic (Anisian) to U. Triassic (Rhaetian).

DIPLOTREMINA Kristan-Tollmann, 1960

Plate 471, figs. 1-3

Type species: Diplotremina astrofimbriata Kristan-Tollmann, 1960; OD.

Diplotremina Kristan-Tollmann, 1960 (*1736), p. 64.

Test trochospiral, with strongly convex spiral side and flat, concave, or convex and deeply umbilicate opposite side, umbilical depression with radial extensions along the sutures to a fimbriate termination about half the distance to the periphery, sutures curved backward at the periphery on the spiral side, radial on the umbilical side; wall calcareous, finely granular, perforate; aperture double, interiomarginal, primary opening about midway between the umbilicus and periphery, a chamber flap or tenon separating it from the second and umbilically placed opening. M. Triassic (Anisian) to U. Triassic (Norian); Austria; Hungary; Bulgaria; Poland; Yugoslavia; China; USA.

DUOSTOMINA Kristan-Tollmann, 1960

Plate 471, figs. 4-7

Type species: Duostomina biconvexa Kristan-Tollmann, 1960; OD.

Duostomina Kristan-Tollmann, 1960 (*1736), p. 68.

Test lenticular, biconvex, trochospirally coiled, all chambers visible on the spiral side, only the nine of the last whorl visible on the umbonate opposite side, periphery subacute, a median internal plate obliquely divides the chamber into halves, and an oblique bridge extends across the chamber from front to back near the ventral side from the inner margin of the median plate, the two partitions cutting off an umbilical cavity, a dorsal cavity, and a ventral one, the chamber subdivisions communicating through small openings above the partition near the dorsal wall; wall calcareous, aperture interiomarginal, double, primary opening situated midway between the umbilicus and periphery, a short flap or tenon separating it from the second nearly umbilical opening, each bordered by a thickened and radially grooved lip. M. Triassic (Anisian) to U. Triassic (Rhaetian); Austria; Italy; Yugoslavia; Bulgaria; Hungary; China.

VARIOSTOMA Kristan-Tollmann, 1960

Plate 471, figs. 8-10

Type species: Variostoma spinosum Kristan-Tollmann, 1960; OD.

Variostoma Kristan-Tollmann, 1960 (*1736), p. 55.

Test trochospiral, moderate to high spired, all chambers visible on the spiral side, opposite side involute and deeply umbilicate, umbilical margin lobulate; wall calcareous, finely microgranular with an organic matrix, sporadically and finely perforate, nonlamellar; primary aperture simple, rounded to oval, or with fimbriate margin, separated from the umbilicus by a flap. M. Triassic (Anisian) to U. Triassic (Norian); Austria; China; USA.

Family ASYMMETRINIDAE Brotzen, 1963

Asymmetrinidae Brotzen, 1963 (*432), p. 76.

Test nearly planispiral, but may be slightly asymmetrical; with a single interiomarginal lobulate aperture. U. Triassic (Carnian to Rhaetian).

ASYMMETRINA Kristan-Tollmann, 1960

Plate 471, figs. 11-13

Type species: Asymmetrina biomphalica Kristan-Tollmann, 1960; OD.

Asymmetrina Kristan-Tollmann, 1960 (*1736), p. 74.

Test lenticular, planispirally enrolled and involute or slightly asymmetrical, biumbilicate, sutures radial, weakly depressed, periphery subacute; wall calcareous, perforate; aperture equatorial, interiomarginal, against the periphery of the previous whorl, with numerous radial grooves around the margin. U. Triassic (Rhaetian); Austria.

Remarks: Described from a single specimen of the type species, the genus is as yet poorly known.

INVOLVINA Kristan-Tollmann, 1960

Plate 472, figs. 1-3

Type species: Involvina obliqua Kristan-Tollmann, 1960; OD.

Involvina Kristan-Tollmann, 1960 (*1736), p. 76.

Test lenticular, biconvex, umbilical region closed to umbonate, periphery subacute, chambers in a low trochospiral coil or tending to become planispiral, six to seven chambers in the final whorl, sutures depressed, oblique, curving backward at the periphery; wall calcareous, coarsely granular and may include some agglutinated quartz grains, perforate; aperture a large oval equatorial opening that may extend slightly more on one side, bordered by a thickened and somewhat crenulate rim. U. Triassic (Rhaetian); Austria.

PLAGIOSTOMELLA
Kristan-Tollmann, 1960
Plate 472, figs. 4-6

Type species: Plagiostomella inflata Kristan-Tollmann, 1960; OD.

Plagiostomella Kristan-Tollmann, 1960 (*1736), p. 73.

Test enrolled in a low trochospiral and tending to become planispiral, few chambers per whorl, sutures radial, flush and slightly curved, umbilicus closed and filled with shell material, periphery rounded; wall calcareous, perforate; aperture nearly equatorial but slightly at one side of the median plane, a low arch with border marked by low radial striae. U. Triassic (Carnian); Austria.

Remarks: The genus is known from a single specimen of the type species.

Family OBERHAUSERELLIDAE
Fuchs, 1970

Oberhauserellidae Fuchs, 1970 (*1191), p. 112.

Low trochospiral test, chambers somewhat inflated dorsally; aperture single, an interiomarginal slit. M. Triassic (Anisian) to L. Jurassic (Hettangian).

KRIKOUMBILICA He, 1984
Plate 473, figs. 1-8

Type species: Krikoumbilica pileiformis He, 1984 (also as *pileformis* on p. 430); OD.

Krikoumbilica He, 1984 (*1446), p. 426, 430.

Test of medium size, up to 0.43 mm in diameter, enrolled in a low to moderate trochospiral coil, all chambers visible and sutures oblique on the spiral side, only the eight to ten chambers of the final whorl visible around the broad circular umbilicus on the flat umbilical side where the sutures are radial and slightly depressed, periphery subacute; wall calcareous, microgranular; aperture an interiomarginal arch. M. Triassic (Anisian and Ladinian); China: Guizhou Province.

OBERHAUSERELLA Fuchs, 1967
Plate 472, figs. 7-14 and 21-35

Type species: Globigerina mesotriassica Oberhauser, 1960 (*2289), p. 42; OD.

Oberhauserella Fuchs, 1967 (*1190), p. 148.

Kollmannita Fuchs, 1967 (*1190), p. 142; type species: *Globigerina ladinica* Oberhauser, 1960 (*2289), p. 43; OD.

Praegubkinella Fuchs, 1967 (*1190), p. 157; type species: *Praegubkinella kryptumbilicata* Fuchs, 1967 (syn.: *Praegubkinella turgescens* Fuchs, 1967; *Praegubkinella alta* Fuchs, 1967); OD.

Schlagerina Fuchs, 1967 (*1190), p. 154; type species: *Schlagerina angustiumbilicata* Fuchs, 1967; OD.

Test in a low trochospiral coil of few whorls, about four to five inflated and rapidly enlarging chambers in the final whorl, final chamber comprising one-fourth to one-third of the umbilical side, spiral side convex, umbilical side with depressed umbilicus, periphery rounded, peripheral outline lobulate, sutures depressed, curved backward at the periphery on the spiral side, nearly radial on the umbilical side; wall calcareous, perforate, hyaline, optically radial, aragonitic, surface smooth; aperture at the base of the last chamber on the umbilical side, consisting of two low indentations of the basal suture, separated by a tenon or umbilical flap. M. Triassic (Anisian) to L. Jurassic (Hettangian); Austria; Bulgaria; Poland; China.

SCHMIDITA Fuchs, 1967
Plate 472, figs. 15-20

Type species: Schmidita hedbergelloides Fuchs, 1967; OD.

Schmidita Fuchs, 1967 (*1190), p. 146.

Test enrolled in a low trochospiral, spiral side flat to weakly convex, umbilical side with depressed umbilicus, periphery rounded, chambers increasing gradually in size, subglobular, sutures radial, slightly curved, depressed; wall calcareous, hyaline, surface smooth; aperture a low interiomarginal umbilical-extraumbilical slit on the umbilical side. U. Triassic (L. Carnian to Rhaetian); Austria.

Superfamily CERATOBULIMINACEA
Cushman, 1927

Ceratobuliminidea Myatlyuk, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 273, nom. transl. ex subfamily.

Ceratobuliminacea Dain, in Subbotina et al., 1981 (*3083), p. 92 (nom. correct.).

Test trochospiral, chambers subdivided by an internal partition; wall aragonitic, perforate, optically radial; aperture in the face or interiomarginal, intercameral foramen formed by resorption. L. Jurassic (Pliensbachian) to Holocene.

Family CERATOBULIMINIDAE Cushman, 1927

Ceratobuliminidae Glaessner, 1937 (*1248), p. 27, nom. transl. ex subfamily Ceratobulimininae.

Test trochospiral, primary aperture interiomarginal, commonly closed as new chamber added, intercameral foramen produced by resorption above the internal partition that subdivides the chambers. L. Jurassic (Pliensbachian) to Holocene.

Subfamily CERATOBULIMININAE Cushman, 1927

Ceratobulimininae Cushman, 1927 (*742), p. 84.
Lamarckininae Dain, in Subbotina et al., 1981 (*3083), p. 93.

Primary aperture interiomarginal or may diverge and one slit extend up the apertural face; coiling predominantly dextral, later stage may tend to uncoil. M. Jurassic (Bajocian) to Holocene.

CANCRISIELLA Dain, 1980

Plate 474, figs. 17-21

Type species: Ceratocancris ambitiosus Dain, 1972 (***876**), p. 176; OD.

Cancrisiella Dain, 1980 (*879), p. 101.

Test trochospiral, with few rapidly enlarging chambers in up to three whorls, planoconvex, ovate in outline, septal face folded into two lobes, a smaller proximal one and a larger distal one that attaches near the umbilicus and nearly closes it, bent internal plate extends from the septum to the preceding whorl but does not reach the dorsal wall; wall calcareous, radial, surface smooth; aperture umbilical, slitlike, with ovate intercameral foramen above the internal plate at the umbilical margin of the septum. U. Jurassic (L. Kimmeridgian) to L. Cretaceous (Albian); USSR: E. slope of the Urals, Kazakh SSR.

CERATOBULIMINA Toula, 1915

Plate 473, figs. 9-13

Type species: Rotalina contraria Reuss, 1851 (***2574**), p. 76; OD(M).

Ceratobulimina Toula, 1915 (*3215), p. 654.
Fissistomella Clodius, 1922 (*615), p. 141; type species: obj.; SD Loeblich and Tappan, 1964 (*1910), p. C766.

Test ovate in outline, robust, trochospirally enrolled, spiral side slightly convex, opposite side deeply umbilicate, coiling dextral, with few rapidly enlarging whorls, sutures curved on the spiral side, straight and radial on the umbilical side, periphery broadly rounded; wall calcareous, of lamellar, optically radial aragonite, hyaline, finely perforate, organic lining in the pore tubes and between wall lamellae, surface smooth and polished; aperture interiomarginal, umbilical, an elongate slit within a groove that extends up the apertural face, internal partition attached to the posterior side of the apertural slit, bending around the aperture and crossing the chamber to attach to the spiral wall. L. Cretaceous (Albian) to Holocene; cosmopolitan.

CERATOBULIMINOIDES Parr, 1950

Plate 475, figs. 1-3

Type species: Ceratobuliminoides bassensis Parr, 1950; OD.

Ceratobuliminoides Parr, 1950 (*2363), p. 358.

Test auriculate in outline, biconvex but somewhat compressed, chambers broad, low, and inflated, trochospirally coiled with rapidly enlarging whorl, sutures curved to sinuate, slightly depressed, periphery rounded, peripheral outline lobulate, a distinct depression in the posterior of each chamber on the spiral side a short distance from the periphery may possibly represent a relict internal partition like that of *Ceratobulimina:* wall calcareous, surface smooth and polished; aperture a long narrow slit in a large depression extending up the apertural face on the umbilical side, a short distance inward from and parallel to the peripheral margin. Holocene; S. Australia; Tasmania.

Remarks: McGowran (1966, ***1968**, p. 85) states that "examination of the holotype and only specimen of the type species, *Ceratobuliminoides bassensis* Parr, suggests that there are no toothplates. . . . [Hence] Parr's (1950) comparison of *Ceratobuliminoides* with *Heronallenia* is supported." As differences from *Heronallenia* also appear important, *Ceratobuliminoides* is herein retained tentatively in the Ceratobulimininae, pending study of additional material.

CERATOCANCRIS Finlay, 1939

Plate 474, figs. 1-9

Type species: Ceratobulimina (Ceratocancris) clifdenensis Finlay, 1939; OD.

Ceratobulimina (Ceratocancris) Finlay, 1939 (***1127**), p. 117.
Ceratocancris Finlay, 1947 (***1130**), p. 286 (nom. transl.).

Test ovoid, biconvex, umbilicate, periphery rounded, low trochospiral coil of about two rapidly expanding whorls, sutures gently curved on the spiral side, nearly radial around the open umbilicus on the umbilical side, the lower chamber margin with a distinct notch at each end of a thin-walled bulging triangular area at the base of the apertural face, the notch nearest the periphery lying at the last contact of the final chamber with the preceding whorl, the umbilical notch marks the position of attachment of an internal partition to the internal wall of the apertural face but not to the dorsal chamber wall, an accessory internal partition attached to the surface of the previous whorl extends obliquely downward and inward from the upper end of the aperture; wall calcareous, aragonitic, thin, with an organic base; aperture a narrow interiomarginal, umbilical slit at the base of the apertural face on the umbilical side, between the two notches at the ends of the bulging triangular area, a secondarily formed areal intercameral foramen lies in the preceding septum just above the upper end of the triangular area. M. Eocene to L. Miocene; cosmopolitan.

CERATOLAMARCKINA Troelsen, 1954

Plate 473, figs. 14-20

Type species: Ceratobulimina tuberculata Brotzen, 1948 (***429**), p. 124; OD.

Ceratobulimina (Ceratolamarckina) Troelsen, 1954 (***3226**), p. 452.
Ceratolamarckina Loeblich and Tappan, 1964 (***1910**), p. C769 (nom. transl.).

Test in a low trochospiral coil of few rapidly enlarging and inflated chambers, periphery broadly rounded, sutures depressed, curved and oblique on the spiral side, radial around the open umbilicus of the opposite side, chamber subdivided by an internal partition that just reaches the dorsal chamber wall but is not attached to it, serrate free edge of the partition curved down toward the aperture; wall calcareous, aragonitic, surface smooth and polished but may have low tubercles around the umbilicus; aperture a wide interiomarginal and wholly umbilical slit, extending from the point of attachment of the final chamber to the previous whorl, across the umbilicus at the base of the bulge of the apertural face, to the very small notch at the opposite end of the bulge at the position of the lower end of the internal partition, primary aperture closed as a new chamber is added and a large ovate intercameral foramen is produced by resorption above the internal partition in the septal face, the bulge of the apertural face also being replaced by a thin plate that extends from the umbilicus to the partition at the base of the intercameral foramen. L. Cretaceous (Albian) to Paleocene; Europe; North America.

CEROBERTINELLA Myatlyuk, 1980

Plate 474, figs. 10-12

Type species: Cerobertinella dossoriensis Fursenko and Myatlyuk, 1980 (***1200**), p. 109; OD.

Cerobertinella Myatlyuk, 1980 (***2222**), p. 109.

Test elongate, ovate in outline, compressed, chambers in slightly trochospiral arrangement but whorl enlarging rapidly in breadth to result in a flaring test, chambers extending back to the early coil on the spiral side but leaving an elongate open umbilicus on the opposite side; wall calcareous, thin, finely perforate, optically radial; aperture interiomarginal, a broad slit at the basal margin of the final chamber. L. Cretaceous (Aptian to Albian); USSR: Kazakh SSR.

Remarks: *Cerobertinella* was originally described in the Robertinidae but appears closer to the Ceratobuliminidae, although no internal partitions have been reported. A study of the internal structure is necessary for positive placement.

LAMARCKINA Berthelin, 1881

Plate 475, figs. 4-10

Type species: Pulvinulina erinacea Karrer, 1868 (***1653**), p. 187; OD.

Lamarckina Berthelin, 1881 (***222**), p. 555.

Megalostomina Rzehak, 1891 (*2681), p. 6; type species: *Megalostomina fuchsi* Rzehak, 1895 (*2682), p. 228 (syn.: *Discorbina fuchsii* Rzehak, 1888 (*2679), p. 228; *Megalostomina fuchsi* Rzehak, 1891 (*2681), p. 6; no description in either reference, hence name not available, ICZN Art. 12 (a)); SD(SM).

Test planoconvex or inequally biconvex, trochospiral, coiling dextral, chambers enlarging rapidly and becoming progressively broader and lower, final chamber strongly overlapping and comprising about one-half the area on the deeply umbilicate umbilical side, internal partition present as in *Ceratobulimina* but where it attaches to the septal face the toothplate bends sharply to form a triangular structure, sutures radial, periphery subacute to carinate; wall calcareous, aragonitic, finely perforate, surface smooth and polished on the umbilical side, may be pustulose on the spiral side; aperture interiomarginal, umbilical, closed by a thin plate as the next chamber is added, and a septal foramen is formed by resorption. U. Cretaceous (Turonian) to Holocene; cosmopolitan.

PAULINA Grigyalis, 1977

Plate 474, figs. 13-16

Type species: Paulina furssenkoi Grigyalis, 1977; OD.

Paulina Grigyalis, 1977 (*1305), p. 149.

Test planoconvex, circular in outline, trochospiral, spiral side convex with all whorls visible and only a few crescentic chambers per whorl, only the four to five chambers of the final whorl visible around the small open umbilicus on the umbilical side, sutures curved and limbate on the spiral side, radial and depressed on the umbilical side, periphery carinate; wall calcareous, aragonitic, lamellar, finely perforate, surface may be somewhat pitted on the spiral side, smooth and polished on the umbilical side; aperture slitlike, umbilical, with a median loop, intercameral foramen oval, near the base of the septum above a short transverse intercameral plate. M. Jurassic (Bajocian) to U. Jurassic (Kimmeridgian); Poland; England; USSR: Lithuania.

ROGLICIA van Bellen, 1941

Plate 473, figs. 21 and 22

Type species: Roglicia sphaerica van Bellen, 1941; OD(M).

Roglicia van Bellen, 1941 (*181), p. 1000.

Test subglobular, trochospiral, chambers increasing rapidly in size as added, all chambers visible and sutures curved and limbate on the spiral side, only those of the final whorl visible and sutures slightly depressed on the umbilical side, periphery broadly rounded; wall calcareous, thick, surface with fine pustules on the spiral side on all but the final one or two chambers; aperture large, rounded, interiomarginal, with a thickened border, and covered by a thin apertural plate. Eocene; Yugoslavia: Dalmatia.

RUBRATELLA Grell, 1956

Plate 475, figs. 15-18

Type species: Rubratella intermedia Grell, 1956; OD.

Rubratella Grell, 1956 (*1295), p. 760.

Test small, with only one trochospiral whorl, four to seven chambers in the adult agamont, one to five in the smaller gamont adult, chambers lunate, broad and low, four in the final whorl, sutures strongly curved on the evolute spiral side, radial and straight on the involute umbilical side, umbilicus closed, chambers subdivided internally by a radial partition extending inward from the peripheral wall and dividing the chamber lumen into anterior and posterior halves, on the spiral side the anterior half remains visible around the proloculus as new chambers are added but only a small wedgelike part of the posterior half is visible adjacent to the periphery, whereas on the umbilical side only the posterior half remains visible as later chambers overlap the anterior half, peripheral outline lobulate; wall calcareous, mineralogy and optical characters unknown, posterior umbilical half of chamber wall perforate, anterior spiral half imperforate; aperture a large open interiomarginal umbilical arch on the umbilical side, the two halves of a chamber connected by a small foramen in the internal partition; cytoplasm with numerous orange-red refringent xanthosomes, agamont generation heterokaryotic, the two to eight nuclei commonly including one vegetative nucleus and five generative nuclei with only the latter involved in asexual reproduction, entire protoplast escapes from the test following nuclear division but prior to the cytoplasmic separation into young gamonts; gamont generation uninucleate, sexual reproduction plastogamic, individual gamonts joining by their umbilical surfaces for the formation of amoeboid gametes and zygotes. Holocene: France.

SAINTCLAIROIDES McCulloch, 1981

Plate 473, figs. 23-25

Type species: Saintclairoides marlysae McCulloch, 1981; OD.

Saintclairoides McCulloch, 1981 (*1962), p. 182.

Test auriculate in outline, a flat trochospiral coil of a single rapidly enlarging whorl of seven to eight chambers, spiral side flat with gently curved, flush, and thickened sutures, chambers slightly inflated and sutures depressed and nearly radial on the centrally excavated umbilical side, periphery narrowly carinate, presence of internal partition not known; wall calcareous, hyaline, mineralogy and optical character unknown, finely perforate, pustulose in the umbilical area; aperture interiomarginal on the umbilical side, possibly extending in a groove up the apertural face. Holocene: Caribbean: off Aruba Island.

Remarks: Although tentatively recognized, accurate systematic placement of this genus must await additional information concerning the wall, possible internal partition, and aperture.

VELLAENA Srinivasan, 1966

Plate 475, figs. 19-22

Type species: Vellaena zealandica Srinivasan, 1966; OD.

Vellaena Srinivasan, 1966 (*3050), p. 254.

Test lenticular, trochospiral, with few whorls, chambers enlarging rapidly in breadth so that test is somewhat flaring, on the strongly convex spiral side all chambers are visible and the sutures strongly curved and limbate, a hooklike sutural branch midway between the periphery and umbo probably reflecting attachment of an internal partition, only the chambers of the final whorl visible on the umbilical side where the sutures are depressed and radial, periphery acutely angled to carinate; wall calcareous, aragonitic by X-ray determination, surface smooth and polished, with translucent band adjacent to the periphery on the umbilical side; aperture umbilical and interiomarginal, extending in a groove up the apertural face, covered by a plate as the new chamber is added, small areal ovate intercameral foramen produced by resorption a short distance above the base of the septum. U. Eocene (Runagan) to L. Oligocene (Whaingaroan); New Zealand.

ZELAMARCKINA Collen, 1972

Plate 475, figs. 11-14

Type species: Zelamarckina excavata Collen, 1972; OD.

Zelamarckina Collen, 1972 (*644), p. 380 (nom. imperf. as *Zelamarkina*).

Test trochospiral and sinistrally coiled in two to three slowly enlarging whorls, sutures elevated, curved and oblique on the convex spiral side, only the final whorl and radial depressed sutures visible around the open umbilicus on the opposite side, periphery carinate; wall aragonitic, surface rough and sutures strongly elevated on the spiral side, umbilical side smooth and glossy; aperture interiomarginal, umbilical-extraumbilical and slitlike, closed as later chambers added, intercameral foramen near the base of the septum just beneath the attachment of the internal plate. U. Pliocene (Mangapanian Stage); New Zealand.

Remarks: The original spelling of a zoological name is to be retained unless there is evidence in the publication of an inadvertent error, ICZN Art. 32 (c)(ii). In the present instance, Collen not only named the genus for the similarity to *Lamarckina* (which he incorrectly spelled *Lamarkina*), but also referred to *Ceratolamarkina* [sic] (correctly *Ceratolamarckina*). Thus the generic name *Zelamarkina*, as a patronymic based on the name of Lamarck, is to be corrected as *Zelamarckina*.

Subfamily REINHOLDELLINAE Seiglie and Bermúdez, 1965

Reinholdellinae Seiglie and Bermúdez, 1965 (*2852), p. 164.

Test trochospiral, a series of secondary chamberlets surrounding the umbilicus and produced by the internal partition that subdivides the chambers; aperture interiomarginal, near the periphery on the umbilical side, secondary foramen present in the internal pillarlike partition. L. Jurassic (Pliensbachian) to L. Cretaceous (Aptian).

CHALILOVELLA Poroshina, 1985

Plate 477, figs. 1-6

Type species: Chalilovella faveolata Poroshina, 1985; OD.

Chalilovella Poroshina, 1985 (*2459), p. 97.

Test planoconvex to biconvex, trochospiral, with one and a half to four whorls and up to sixteen chambers in the final whorl, sutures curved, thickened, umbilicus closed with an umbilical plug, periphery with narrow keel; wall calcareous, finely perforate, surface smooth to sculptured; aperture a small basal arch near the periphery on the umbilical side, extending as a slit around the umbilical end of the chamber where it connects to a looplike opening that later is closed by a porous plate as the next chamber is added, the arched opening remaining as an intercameral foramen. L. Cretaceous (Hauterivian to L. Aptian); USSR: Southeast Caucasus.

LAMARCKELLA Kaptarenko-Chernousova, 1956

Plate 476, figs. 1-6

Type species: Lamarckella media Kaptarenko-Chernousova, 1956 (*1646); OD.

Lamarckella Kaptarenko-Chernousova, 1956 (*1646), p. 159; also see 1956 (*1647), p. 54.

Test trochospirally enrolled, lenticular to planoconvex, spiral side somewhat more convex, few chambers per whorl, umbilicus closed, sutures limbate, curved backward at the periphery on the spiral side, slightly curved and may be depressed on the umbilical side, periphery subacute, chamber interior divided by a transverse inner septum; wall calcareous, finely perforate; primary aperture has a sharp bend and extends from the inner margin of the last chamber toward its center, those of earlier chambers secondarily closed, resulting in a short clear area perpendicular to the septum and beginning near its midpoint on the umbilical side, intercameral foramen developed by resorption as an oblique ovate slit a short distance above the base of the septal face. L. Jurassic (Aalenian) to M. Jurassic (Bajocian); USSR: Ukraine.

PSEUDOLAMARCKINA Myatlyuk, 1959

Plate 476, figs. 19-25

Type species: Pulvinulina rjasanensis Uhlig, 1883 (*3240), p. 772; OD.

Pseudolamarckina Myatlyuk, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 278.

Reinholdella (Pseudolamarckina) Dain, 1967 (*874), p. 47 (nom. transl.).

Test trochospiral, planoconvex, chambers low and lunate and sutures arched and limbate on the spiral side, chambers subtriangular and sutures radial and depressed on the umbilical side, chambers subdivided by an internal plate parallel to the plane of coiling, umbilicus closed, periphery acute; wall calcareous, aragonitic, thin, finely perforate; aperture interiomarginal, extraumbilical-umbilical, with a short looplike extension up the apertural face near the posterior margin of the chamber, intercameral foramen rounded, located above the attachment of the internal plate. M. Jurassic to L. Cretaceous (Valanginian); Europe; USSR.

PSEUDOSIPHONINELLA Poroshina, 1986

Plate 836, figs. 1-9

Type species: Siphoninella antiqua Gorbachik, 1966 (*1267), p. 134; OD.

Pseudosiphoninella Poroshina, 1986 (*2460), p. 105.

Test lenticular, trochospirally enrolled, final one to few chambers tending to uncoil, chambers enlarging rapidly as added, about seven or eight in the final whorl, sutures slightly depressed, curved, periphery carinate; wall calcareous, whether calcite or aragonite not indicated, surface smooth; aperture beginning as a low arch against the previous suture on the umbilical side, continuing as a slit to the center of the apertural face, the umbilical part of the aperture being closed by a porous plate that leaves only a rounded to oval areal opening in the center of the septal face, porous plate present in all chambers, short, narrow, and curved with a free margin and approximately parallel to the periphery. U. Jurassic (Tithonian) to L. Cretaceous (Valanginian); USSR: Crimea, Azerbaydzhan.

REINHOLDELLA Brotzen, 1948

Plate 476, figs. 7-18

Type species: Discorbis dreheri Bartenstein, in Bartenstein and Brand, 1937 (***151**), p. 192; OD.

Reinholdella Brotzen, 1948 (***429**), p. 126.

Valanginella Dain, 1980 (***880**), p. 106; type species: *Lamarckina tatarica* Romanova, in Balakhmatova and Romanova, 1960 (***112**), p. 111; OD.

Test trochospiral, biconvex to planoconvex, periphery subacute, sutures oblique and may be limbate on the evolute spiral side, sutures radial and depressed around the closed umbilicus on the involute umbilical side, chamber partially subdivided internally by a transverse curved or hooklike intracameral plate that generally parallels the peripheral margin, those of earlier chambers not resorbed but remain intact; wall calcareous, aragonitic, finely perforate, surface smooth; aperture interiomarginal, near the umbilicus on the umbilical side, closed by a porous plate as new chambers are added, oval intercameral foramen produced by resorption in the septum above the intracameral plate. L. Jurassic (U. Pliensbachian) to L. Cretaceous (Aptian); Europe; USSR: W. Siberia, Azerbaydzhan.

Remarks: Brotzen's original description of the genus indicated the type species as "*Asterigerina dreheri* Bartenstein," but erroneously cited the type specimen as that illustrated by ten Dam and Reinhold (1941, ***887A**, p. 10, fig. 1). He later corrected this, stating that the type species should have been cited as *Discorbis dreheri* Bartenstein, 1937 (Brotzen, 1949, ***430**). The small original illustrations of *D. dreheri* show nothing of the central area or the presence of the intracameral plate, and, as noted also by Hofker (1952, ***1503**, p. 21), the figures given by ten Dam and Reinhold show a very broad stellate central pattern nearly reaching the periphery, although their figure of a section correctly shows the toothplates to be short, hooklike, and limited to the umbilical third of the test. Ohm (1967, ***2292**, p. 106) noted that the holotype of *D. dreheri* is nearly destroyed and that extant paratypes represent two different species. The specimen illustrated by us (Loeblich and Tappan, 1964, ***1910**, p. C775, fig. 637, *2*) was one of numerous topotypes sent to us by Bartenstein. In view of the unrecognizable state of the holotype, and the ambiguous nature of the "paratypes" (see ICZN Art. 75, (b) to (d) and Recommendation 75A), the topotype that we illustrated in the *Treatise* (USNM No. 383567), from the Dogger *a*. *Opalinus* Schichten, Hambühren, WA 2, Germany, is here designated as neotype of *Reinholdella dreheri*.

Valanginella was said to differ in having a closed umbilicus and a stellate pattern resulting from the internal partitions; as both features are characteristic also of *Reinholdella*, *Valanginella* is regarded as a junior synonym.

Family EPISTOMINIDAE Wedekind, 1937

Epistominidae Wedekind, 1937 (***3355**), p. 115.

Test with predominantly sinistral trochospiral coiling, chambers subdivided by an internal partition that attaches to the dorsal lip of the aperture; aperture a slit on peripheral margin, closed by clear shell material in older chambers. L. Jurassic to Holocene.

Subfamily EPISTOMININAE Wedekind, 1937

Epistomininae Loeblich and Tappan, 1961 (***1902**), p. 317, nom. transl. ex family Epistominidae.

Test coiled in low trochospire or may uncoil in later stage, flat or curved internal partition attached to lip of aperture, and proximal margin may attach to the ventral chamber wall; slitlike aperture in lateromarginal or peripheral position. L. Jurassic to Holocene.

EPISTOMINA Terquem, 1883

Plate 477, figs. 7-26; plate 478, figs. 6-9

Type species: Epistomina regularis Terquem, 1883 (***3148**), p. 379; SD Galloway and Wissler, 1927 (***1209**), p. 60.

Epistomina Terquem, 1883 (***3149**), p. 37.

Brotzenia Hofker, 1954 (***1505**), p. 169; type species: *Rotalia spinulifera* Reuss, 1863 (***2587**), p. 93; OD.

Voorthuysenia Hofker, 1954 (***1505**), p. 169; type species: *Epistomina tenuicostata* Bartenstein and Brand, 1951 (***154**), p. 327; OD.

Hiltermannia Hofker, 1954 (***1505**), p. 169; type species: *Epistomina chapmani* ten Dam, 1948 (***886**), p. 166; OD.

Epistomina (Brotzenia) Salaj, 1984 (***2708**), p. 585 (nom. transl.).

Kapturenkoella Antonova and G. K. Kasimova, in G. K. Kasimova and Antonova, 1985 (***1659**), p. 93; type species: *Lamarckella epistominoides* Kaptarenko-Chernousova, 1959 (*1649), p. 95; OD.

Test trochospiral, lenticular to planoconvex, chambers increasing gradually in size, internal partition slightly curved, present in all chambers or may be resorbed during later development, extending from the margin of the apertural opening nearly or completely to the base of the chamber against the previous whorl, sutures slightly curved, commonly limbate to strongly elevated, periphery angular to carinate; wall calcareous, aragonitic, finely perforate, surface smooth to strongly sculptured; aperture lateromarginal, adjacent to the peripheral keel on the umbilical side, closed with shell material as the new chamber is added, later formed intercameral foramen oblique, oval and areal or may be interiomarginal. L. Jurassic to L. Cretaceous (Albian); cosmopolitan.

EPISTOMINITA Grigyalis, 1960

Plate 478, figs. 10-12

Type species: Epistominita sudaviensis Grigyalis, 1960; OD.

Epistominita Grigyalis, 1960 (*1302), p. 98.

Brotzenia (Epistominita) Kasimova, 1975 (*1657), textfig. 1 on p. 238 (nom. transl.).

Test trochospiral, close coiled, biconvex, chambers enlarging gradually, sutures radial, slightly depressed, internal partition flat, one margin attached to the dorsal lip of the aperture and the other attached to the chamber wall on the umbilical side, resulting in the appearance of supplementary sutures and supplementary chambers; wall calcareous, aragonitic, finely perforate, surface smooth; aperture a lateromarginal slit on the umbilical side of the test as in *Epistomina*, closed by test material as a new chamber is added, intercameral foramen areal. U. Jurassic (Oxfordian) to L. Cretaceous; USSR: N. Caucasus; Azerbaydzhan; Lithuania.

HOEGLUNDINA Brotzen, 1948

Plate 478, figs. 1-5

Type species: Rotalia elegans d'Orbigny, 1826 (*2303), p. 272; OD.

Hoeglundina Brotzen, 1948 (*429), p. 92.

Epistomina (Hoeglundina) Salaj, 1984 (*2708), p. 584 (nom. transl.).

Test trochospiral, close coiled, biconvex, chambers enlarging gradually, eight or nine in the final whorl, internal partition flat, earlier ones resorbed as new chambers are added so that only the final chamber contains an intact partition, sutures curved backward at the periphery on the spiral side, straight and oblique on the umbilical side, periphery subacute, carinate; wall calcareous, aragonitic, radial, lamellar, finely perforate, surface smooth; aperture lateromarginal and slitlike, parallel to the peripheral keel and opening on the umbilical side, those of earlier chambers commonly closed by shell material, may have a secondary interiomarginal aperture, intercameral foramen interiomarginal. Paleocene to Holocene; cosmopolitan.

MIRONOVELLA Dain, 1970

Plate 479, figs. 1-5

Type species: Mironovella mjatliukae Dain, 1970; OD.

Mironovella Dain, 1970 (*875), p. 72.

Test lenticular, early coiling trochospiral, later nearly planispiral and evolute, chambers enlarging slowly as added, narrow internal partition extending into the chamber from the apertural border but not reaching the opposite wall, aligned perpendicular to the axis of coiling, earlier plates resorbed leaving intact only those of the later chambers, septa curved, thickened, and elevated on the spiral side, nearly radial and depressed on the umbilical side, peripheral margin bicarinate; wall calcareous, aragonitic, perforate, optically radial, surface with elevated sutures and peripheral keels and may be papillate; aperture nearly peripheral, slightly on the umbilical side of the peripheral carina, an elongate oval slit bordered by a distinct lip, those of earlier chambers filled with shell material, intercameral foramen rounded, areal but near the base of the septum. U. Jurassic (Kimmeridgian) to L. Cretaceous (Hauterivian); USSR; Poland; Germany; England.

PSEUDOEPISTOMINELLA Kuznetsova, 1958

Plate 478, figs. 13-15

Type species: Pseudoepistominella mirusa Kuznetsova, in N. K. Bykova et al., 1958; OD.

Pseudoepistominella Kuznetsova, in N. K. Bykova et al., 1958 (*475), p. 48.

Test ovate in outline, slightly compressed, biumbonate, early stage in a low trochospiral coil, later planispiral and evolute, numerous chambers per whorl, increasing more rapidly in breadth than height, the final ones extending back toward the early coil, small diagonal internal partition present, sutures curved, oblique, thickened and elevated, periphery subacute; wall calcareous, white, probably aragonitic, surface generally smooth, except for the thickened and elevated sutures and the knobs or pustules in the umbilical region on both sides of the test; aperture a small interiomarginal equatorial arch, intercameral foramen oval and areal, situated about one-third the distance from the base of the septal face, probably not present on the final chamber, both openings bordered by a thickened lip. L. Cretaceous (Barremian): USSR: Caucasus.

Remarks: The original illustrations are of a specimen with broken final chamber, showing both basal and areal openings and the short oblique internal partition. Probably a peripheral opening also is associated with this partition, but additional material must be studied for verification.

RECTOEPISTOMINOIDES Grigyalis, 1960

Plate 479, figs. 18–20

Type species: Rectoepistominoides scientis Grigyalis, 1960; OD.

Rectoepistominoides Grigyalis, 1960 (*1302), p. 102.

Test elongate, somewhat compressed, early chambers in an incomplete whorl, later uncoiling and rectilinear, sutures distinct, depressed, oblique in the uncoiled stage, internal partition attached to the wall on the umbilical side as in *Epistominoides*, resulting in supplementary chamberlets and sutures; wall calcareous, finely perforate, surface smooth; aperture peripheral, slitlike, bordered by a distinct lip. U. Jurassic (Oxfordian): Lithuania.

Subfamily GARANTELLINAE Grigyalis, 1977

Garantellinae Grigyalis, 1977 (*1305), p. 148.

Test close coiled, planoconvex, internal partition curved and diagonally placed; aperture ovate and areal. L. Jurassic (Aalenian) to L. Cretaceous (Hauterivian).

GARANTELLA Kaptarenko-Chernousova, 1956

Plate 479, figs. 6–11 and 15–17

Type species: Garantella rudia Kaptarenko-Chernousova, 1956; OD.

Garantella Kaptarenko-Chernousova, 1956 (*1646), p. 159; also see 1956 (*1647), p. 55; 1959 (*1649), p. 102.

Test trochospiral, planoconvex to inequally biconvex, umbilicus closed, internal partition curved and with folded margin, sutures oblique, curved, thickened and elevated on the spiral side, nearly radial, flush to elevated, but somewhat obscure on the umbilical side; wall calcareous, perforate; aperture an areal slit paralleling the sutures on the umbilical side of the final chamber, those of previous chambers closed with shell material. L. Jurassic (Aalenian) to L. Cretaceous (Hauterivian); Europe; USSR: Ukraine; Madagascar.

SUBLAMARCKELLA Antonova, 1958

Plate 479, figs. 12–14

Type species: Sublamarckella terquemi Antonova, 1958; OD.

Sublamarckella Antonova, 1958 (*46), p. 68.

Reinholdella (Sublamarckella) Kasimova, 1975 (*1657), p. 236 (nom. transl.).

Test trochospiral, planoconvex to biconvex, chambers few, enlarging rapidly as added, internal partition curved, sutures thickened and elevated, curved and oblique on the spiral side, straight and radial on the umbilical side, umbilicus closed, periphery angular, carinate; wall calcareous, perforate, surface smooth to pebbly; aperture broad, ovate, and areal, in the middle of the chamber wall on the umbilical side, earlier apertures closed with shell material, giving a stellate appearance to the central region of the umbilical side. L. Jurassic (Aalenian) to M. Jurassic (Bajocian); USSR: N. Caucasus.

Subfamily EPISTOMINOIDINAE Saidova, 1981

Epistominoidinae Saidova, 1981 (*2696), p. 63.

Test nearly planispiral, internal partition ondary foramen present in the internal pillarlike partition. L. Jurassic (Pliensbachian) to L. Cretaceous (Aptian).

CHALILOVELLA Poroshina, 1985

Plate 477, figs. 1-6

Type species: Chalilovella faveolata Poroshina, 1985; OD.

Chalilovella Poroshina, 1985 (***2459**), p. 97.

Test planoconvex to biconvex, trochospiral, with one and a half to four whorls and up to sixteen chambers in the final whorl, sutures curved, thickened, umbilicus closed with an umbilical plug, periphery with narrow keel; wall calcareous, finely perforate, surface smooth to sculptured; aperture a small basal arch near the periphery on the umbilical side, extending as a slit around the umbilical end of the chamber where it connects to a looplike opening that later is closed by a porous plate as the next chamber is added, the arched opening remaining as an intercameral foramen. L. Cretaceous (Hauterivian to L. Aptian); USSR: Southeast Caucasus.

LAMARCKELLA
Kaptarenko-Chernousova, 1956

Plate 476, figs. 1-6

Type species: Lamarckella media Kaptarenko-Chernousova, 1956 (***1646**); OD.

Lamarckella Kaptarenko-Chernousova, 1956 (***1646**), p. 159; also see 1956 (***1647**), p. 54.

Test trochospirally enrolled, lenticular to planoconvex, spiral side somewhat more convex, few chambers per whorl, umbilicus closed, sutures limbate, curved backward at the periphery on the spiral side, slightly curved and may be depressed on the umbilical side, periphery subacute, chamber interior divided by a transverse inner septum; wall calcareous, finely perforate; primary aperture has a sharp bend and extends from the inner margin of the last chamber toward its center, those of earlier chambers secondarily closed, resulting in a short clear area perpendicular to the septum and beginning near its midpoint on the umbilical side, intercameral foramen developed by resorption as an oblique ovate slit a short distance above the base of the septal face. L. Jurassic (Aalenian) to M. Jurassic (Bajocian); USSR: Ukraine.

PSEUDOLAMARCKINA Myatlyuk, 1959

Plate 476, figs. 19-25

Type species: Pulvinulina rjasanensis Uhlig, 1883 (***3240**), p. 772; OD.

Pseudolamarckina Myatlyuk, in Rauzer-Chernousova and Fursenko, 1959 (***2531**), p. 278.

Reinholdella (Pseudolamarckina) Dain, 1967 (***874**), p. 47 (nom. transl.).

Test trochospiral, planoconvex, chambers low and lunate and sutures arched and limbate on the spiral side, chambers subtriangular and sutures radial and depressed on the umbilical side, chambers subdivided by an internal plate parallel to the plane of coiling, umbilicus closed, periphery acute; wall calcareous, aragonitic, thin, finely perforate; aperture interiomarginal, extraumbilical-umbilical, with a short looplike extension up the apertural face near the posterior margin of the chamber, intercameral foramen rounded, located above the attachment of the internal plate. M. Jurassic to L. Cretaceous (Valanginian); Europe; USSR.

PSEUDOSIPHONINELLA Poroshina, 1986

Plate 836, figs. 1-9

Type species: Siphoninella antiqua Gorbachik, 1966 (***1267**), p. 134; OD.

Pseudosiphoninella Poroshina, 1986 (***2460**), p. 105.

Test lenticular, trochospirally enrolled, final one to few chambers tending to uncoil, chambers enlarging rapidly as added, about seven or eight in the final whorl, sutures slightly depressed, curved, periphery carinate; wall calcareous, whether calcite or aragonite not indicated, surface smooth; aperture beginning as a low arch against the previous suture on the umbilical side, continuing as a slit to the center of the apertural face, the umbilical part of the aperture being closed by a porous plate that leaves only a rounded to oval areal opening in the center of the septal face, porous plate present in all chambers, short, narrow, and curved with a free margin and approximately parallel to the periphery. U. Jurassic (Tithonian) to L. Cretaceous (Valanginian); USSR: Crimea, Azerbaydzhan.

REINHOLDELLA Brotzen, 1948

Plate 476, figs. 7-18

Type species: Discorbis dreheri Bartenstein, in Bartenstein and Brand, 1937 (***151**), p. 192; OD.

Reinholdella Brotzen, 1948 (***429**), p. 126.

Valanginella Dain, 1980 (***880**), p. 106; type species: *Lamarckina tatarica* Romanova, in Balakhmatova and Romanova, 1960 (***112**), p. 111; OD.

Test trochospiral, biconvex to planoconvex, periphery subacute, sutures oblique and may be limbate on the evolute spiral side, sutures radial and depressed around the closed umbilicus on the involute umbilical side, chamber partially subdivided internally by a transverse curved or hooklike intracameral plate that generally parallels the peripheral margin, those of earlier chambers not resorbed but remain intact; wall calcareous, aragonitic, finely perforate, surface smooth; aperture interiomarginal, near the umbilicus on the umbilical side, closed by a porous plate as new chambers are added, oval intercameral foramen produced by resorption in the septum above the intracameral plate. L. Jurassic (U. Pliensbachian) to L. Cretaceous (Aptian); Europe; USSR: W. Siberia, Azerbaydzhan.

Remarks: Brotzen's original description of the genus indicated the type species as "*Asterigerina dreheri* Bartenstein," but erroneously cited the type specimen as that illustrated by ten Dam and Reinhold (1941, ***887A**, p. 10, fig. 1). He later corrected this, stating that the type species should have been cited as *Discorbis dreheri* Bartenstein, 1937 (Brotzen, 1949, ***430**). The small original illustrations of *D. dreheri* show nothing of the central area or the presence of the intracameral plate, and, as noted also by Hofker (1952, ***1503**, p. 21), the figures given by ten Dam and Reinhold show a very broad stellate central pattern nearly reaching the periphery, although their figure of a section correctly shows the toothplates to be short, hooklike, and limited to the umbilical third of the test. Ohm (1967, ***2292**, p. 106) noted that the holotype of *D. dreheri* is nearly destroyed and that extant paratypes represent two different species. The specimen illustrated by us (Loeblich and Tappan, 1964, ***1910**, p. C775, fig. 637, *2*) was one of numerous topotypes sent to us by Bartenstein. In view of the unrecognizable state of the holotype, and the ambiguous nature of the "paratypes" (see ICZN Art. 75, (b) to (d) and Recommendation 75A), the topotype that we illustrated in the *Treatise* (USNM No. 383567), from the Dogger *α*, *Opalinus* Schichten, Hambühren, WA 2, Germany, is here designated as neotype of *Reinholdella dreheri*.

Valanginella was said to differ in having a closed umbilicus and a stellate pattern resulting from the internal partitions; as both features are characteristic also of *Reinholdella*, *Valanginella* is regarded as a junior synonym.

Family EPISTOMINIDAE Wedekind, 1937

Epistominidae Wedekind, 1937 (***3355**), p. 115.

Test with predominantly sinistral trochospiral coiling, chambers subdivided by an internal partition that attaches to the dorsal lip of the aperture; aperture a slit on peripheral margin, closed by clear shell material in older chambers. L. Jurassic to Holocene.

Subfamily EPISTOMININAE Wedekind, 1937

Epistomininae Loeblich and Tappan, 1961 (***1902**), p. 317, nom. transl. ex family Epistominidae.

Test coiled in low trochospire or may uncoil in later stage, flat or curved internal partition attached to lip of aperture, and proximal margin may attach to the ventral chamber wall; slitlike aperture in lateromarginal or peripheral position. L. Jurassic to Holocene.

EPISTOMINA Terquem, 1883

Plate 477, figs. 7-26; plate 478, figs. 6-9

Type species: Epistomina regularis Terquem, 1883 (***3148**), p. 379; SD Galloway and Wissler, 1927 (***1209**), p. 60.

Epistomina Terquem, 1883 (***3149**), p. 37.

Brotzenia Hofker, 1954 (***1505**), p. 169; type species: *Rotalia spinulifera* Reuss, 1863 (***2587**), p. 93; OD.

Voorthuysenia Hofker, 1954 (***1505**), p. 169; type species: *Epistomina tenuicostata* Bartenstein and Brand, 1951 (***154**), p. 327; OD.

Hiltermannia Hofker, 1954 (***1505**), p. 169; type species: *Epistomina chapmani* ten Dam, 1948 (***886**), p. 166; OD.

Epistomina (Brotzenia) Salaj, 1984 (***2708**), p. 585 (nom. transl.).

Kaptarenkoella Antonova and G. K. Kasimova, in G. K. Kasimova and Antonova, 1985 (***1659**), p. 93; type species: *Lamarckella epistominoides* Kaptarenko-Chernousova, 1959 (*1649), p. 95; OD.

Test trochospiral, lenticular to planoconvex, chambers increasing gradually in size, internal partition slightly curved, present in all chambers or may be resorbed during later development, extending from the margin of the apertural opening nearly or completely to the base of the chamber against the previous whorl, sutures slightly curved, commonly limbate to strongly elevated, periphery angular to carinate; wall calcareous, aragonitic, finely perforate, surface smooth to strongly sculptured; aperture lateromarginal, adjacent to the peripheral keel on the umbilical side, closed with shell material as the new chamber is added, later formed intercameral foramen oblique, oval and areal or may be interiomarginal. L. Jurassic to L. Cretaceous (Albian); cosmopolitan.

EPISTOMINITA Grigyalis, 1960

Plate 478, figs. 10-12

Type species: Epistominita sudaviensis Grigyalis, 1960; OD.

Epistominita Grigyalis, 1960 (*1302), p. 98.

Brotzenia (Epistominita) Kasimova, 1975 (*1657), textfig. 1 on p. 238 (nom. transl.).

Test trochospiral, close coiled, biconvex, chambers enlarging gradually, sutures radial, slightly depressed, internal partition flat, one margin attached to the dorsal lip of the aperture and the other attached to the chamber wall on the umbilical side, resulting in the appearance of supplementary sutures and supplementary chambers; wall calcareous, aragonitic, finely perforate, surface smooth; aperture a lateromarginal slit on the umbilical side of the test as in *Epistomina*, closed by test material as a new chamber is added, intercameral foramen areal. U. Jurassic (Oxfordian) to L. Cretaceous; USSR: N. Caucasus; Azerbaydzhan; Lithuania.

HOEGLUNDINA Brotzen, 1948

Plate 478, figs. 1-5

Type species: Rotalia elegans d'Orbigny, 1826 (*2303), p. 272; OD.

Hoeglundina Brotzen, 1948 (*429), p. 92.

Epistomina (Hoeglundina) Salaj, 1984 (*2708), p. 584 (nom. transl.).

Test trochospiral, close coiled, biconvex, chambers enlarging gradually, eight or nine in the final whorl, internal partition flat, earlier ones resorbed as new chambers are added so that only the final chamber contains an intact partition, sutures curved backward at the periphery on the spiral side, straight and oblique on the umbilical side, periphery subacute, carinate; wall calcareous, aragonitic, radial, lamellar, finely perforate, surface smooth; aperture lateromarginal and slitlike, parallel to the peripheral keel and opening on the umbilical side, those of earlier chambers commonly closed by shell material, may have a secondary interiomarginal aperture, intercameral foramen interiomarginal. Paleocene to Holocene; cosmopolitan.

MIRONOVELLA Dain, 1970

Plate 479, figs. 1-5

Type species: Mironovella mjatliukae Dain, 1970; OD.

Mironovella Dain, 1970 (*875), p. 72.

Test lenticular, early coiling trochospiral, later nearly planispiral and evolute, chambers enlarging slowly as added, narrow internal partition extending into the chamber from the apertural border but not reaching the opposite wall, aligned perpendicular to the axis of coiling, earlier plates resorbed leaving intact only those of the later chambers, septa curved, thickened, and elevated on the spiral side, nearly radial and depressed on the umbilical side, peripheral margin bicarinate; wall calcareous, aragonitic, perforate, optically radial, surface with elevated sutures and peripheral keels and may be papillate; aperture nearly peripheral, slightly on the umbilical side of the peripheral carina, an elongate oval slit bordered by a distinct lip, those of earlier chambers filled with shell material, intercameral foramen rounded, areal but near the base of the septum. U. Jurassic (Kimmeridgian) to L. Cretaceous (Hauterivian); USSR; Poland; Germany; England.

PSEUDOEPISTOMINELLA Kuznetsova, 1958

Plate 478, figs. 13-15

Type species: Pseudoepistominella mirusa Kuznetsova, in N. K. Bykova et al., 1958; OD.

Pseudoepistominella Kuznetsova, in N. K. Bykova et al., 1958 (*475), p. 48.

Test ovate in outline, slightly compressed, biumbonate, early stage in a low trochospiral coil, later planispiral and evolute, numerous chambers per whorl, increasing more rapidly in breadth than height, the final ones extending back toward the early coil, small diagonal internal partition present, sutures curved, oblique, thickened and elevated, periphery subacute; wall calcareous, white, probably aragonitic, surface generally smooth, except for the thickened and elevated sutures and the knobs or pustules in the umbilical region on both sides of the test; aperture a small interiomarginal equatorial arch, intercameral foramen oval and areal, situated about one-third the distance from the base of the septal face, probably not present on the final chamber, both openings bordered by a thickened lip. L. Cretaceous (Barremian); USSR: Caucasus.

Remarks: The original illustrations are of a specimen with broken final chamber, showing both basal and areal openings and the short oblique internal partition. Probably a peripheral opening also is associated with this partition, but additional material must be studied for verification.

RECTOEPISTOMINOIDES Grigyalis, 1960

Plate 479, figs. 18-20

Type species: Rectoepistominoides scientis Grigyalis, 1960; OD.

Rectoepistominoides Grigyalis, 1960 (*1302), p. 102.

Test elongate, somewhat compressed, early chambers in an incomplete whorl, later uncoiling and rectilinear, sutures distinct, depressed, oblique in the uncoiled stage, internal partition attached to the wall on the umbilical side as in *Epistominoides*, resulting in supplementary chamberlets and sutures; wall calcareous, finely perforate, surface smooth; aperture peripheral, slitlike, bordered by a distinct lip. U. Jurassic (Oxfordian); Lithuania.

Subfamily GARANTELLINAE Grigyalis, 1977

Garantellinae Grigyalis, 1977 (*1305), p. 148.

Test close coiled, planoconvex, internal partition curved and diagonally placed; aperture ovate and areal. L. Jurassic (Aalenian) to L. Cretaceous (Hauterivian).

GARANTELLA

Kaptarenko-Chernousova, 1956

Plate 479, figs. 6-11 and 15-17

Type species: Garantella rudia Kaptarenko-Chernousova, 1956; OD.

Garantella Kaptarenko-Chernousova, 1956 (*1646), p. 159; also see 1956 (*1647), p. 55; 1959 (*1649), p. 102.

Test trochospiral, planoconvex to inequally biconvex, umbilicus closed, internal partition curved and with folded margin, sutures oblique, curved, thickened and elevated on the spiral side, nearly radial, flush to elevated, but somewhat obscure on the umbilical side; wall calcareous, perforate; aperture an areal slit paralleling the sutures on the umbilical side of the final chamber, those of previous chambers closed with shell material. L. Jurassic (Aalenian) to L. Cretaceous (Hauterivian); Europe; USSR: Ukraine; Madagascar.

SUBLAMARCKELLA Antonova, 1958

Plate 479, figs. 12-14

Type species: Sublamarckella terquemi Antonova, 1958; OD.

Sublamarckella Antonova, 1958 (*46), p. 68.

Reinholdella (Sublamarckella) Kasimova, 1975 (*1657), p. 236 (nom. transl.).

Test trochospiral, planoconvex to biconvex, chambers few, enlarging rapidly as added, internal partition curved, sutures thickened and elevated, curved and oblique on the spiral side, straight and radial on the umbilical side, umbilicus closed, periphery angular, carinate; wall calcareous, perforate, surface smooth to pebbly; aperture broad, ovate, and areal, in the middle of the chamber wall on the umbilical side, earlier apertures closed with shell material, giving a stellate appearance to the central region of the umbilical side. L. Jurassic (Aalenian) to M. Jurassic (Bajocian); USSR: N. Caucasus.

Subfamily EPISTOMINOIDINAE Saidova, 1981

Epistominoidinae Saidova, 1981 (*2696), p. 63.

Test nearly planispiral, internal partition attaching to outer wall only on one side of the test giving an appearance of biseriality or may have a stellate arrangement of secondary chamberlets about the umbilicus; broad apertural face with peripheral primary aperture and inner areal foramen, both equatorial in position. M. Jurassic to L. Eocene.

EPISTOMINOIDES Plummer, 1934

Plate 479, figs. 21-23

Type species: Saracenaria wilcoxensis Cushman and Ponton, 1932 (***843**), p. 54; OD.

Epistominoides Plummer, 1934 (***2426**), p. 602.

Test biconvex, early chambers in slightly trochospiral to planispiral coil, later chambers enlarging rapidly so that test flares and tends to uncoil, periphery carinate, internal partition curved, surrounding the areal intercameral foramen, with proximal margin attached to the chamber wall on the umbilical side, producing a supplementary suture; wall calcareous, finely perforate, surface smooth; aperture peripheral, slitlike, asymmetrical, with more elevated bordering lip on one side, oval intercameral foramen in the upper third of the septal face. M. Jurassic to L. Eocene; Europe; North America.

Superfamily CONORBOIDACEA Thalmann, 1952

Conorboidacea Loeblich and Tappan, nom. transl. herein ex family.

Test a low to high trochospiral, later stage with reduced number of chambers per whorl, and finally may become uniserial; aperture a low interiomarginal umbilical slit in trochospiral taxa, becoming terminal and central in the uniserial stage; a prominent hemicylindrical toothplate projecting inward from the aperture as a columellalike structure that even in the uniserial stage changes in orientation from chamber to chamber, reflecting the ancestral coiled state. L. Cretaceous (U. Aptian) to U. Cretaceous (Maastrichtian).

Family CONORBOIDIDAE Thalmann, 1952

Conorboididae Thalmann, 1952 (***3172**), p. 984.

Conorbidae Hofker, 1951 (***1498**), p. 414 (invalid, ICZN Art. 39; based on *Conorbis* Hofker, 1951, non *Conorbis* Swainson, 1840).

Conorboidinae Reiss, 1963 (***2561**), p. 58 (subfamily).

As for the superfamily. L. Cretaceous (U. Aptian) to U. Cretaceous (Maastrichtian).

COLOMIA Cushman and Bermúdez, 1948

Plate 480, figs. 10-13

Type species: Colomia cretacea Cushman and Bermúdez, 1948; OD.

Colomia Cushman and Bermúdez, 1948 (***811**), p. 12.

Test elongate, conical in the early stage or throughout, or later stage may have nearly parallel sides, microspheric generation with a whorl of three chambers, then biserial, and finally uniserial for the major part of the test, megalospheric test with much reduced early stage of a few biserial chambers, and then uniserial, commonly with numerous low dishlike chambers, but in some species the later chambers are higher and slightly inflated, sutures in the uniserial stage straight and horizontal and may be incised, flush, or elevated; wall calcareous, aragonitic, hyaline, relatively thick, finely perforate, surface smooth to finely hispid; aperture in the early stage as in *Conorboides*, becoming an arcuate slit in the uniserial chambers, those of successive chambers changing about 65° in orientation, reflecting the earlier trochospiral coiling, internally a scroll-shaped toothplate extends from one margin of the slitlike aperture across the chamber lumen to the preceding septum. U. Cretaceous (Turonian to Maastrichtian); Germany; Austria; USA: California; Cuba; Australia: Victoria.

CONORBOIDES Hofker, 1952

Plate 480, figs. 1-9

Type species: Conorbis mitra Hofker, 1951 (***1500**), p. 357; OD.

Conorboides Hofker, in Thalmann, 1952 (***3171**), p. 14 (nom. subst. pro *Conorbis* Hofker, 1951).

Conorbis Hofker, 1950 (***1495**), p. 68, 76 (name not available, ICZN Art. 13 (b); no type species).

Conorbis Hofker, 1951 (***1500**), p. 357 (non *Conorbis* Swainson, 1840); type species: obj.; OD.

Nanushukella Tappan, 1957 (***3124**), p. 218; type species: *Nanushukella umiatensis* Tappan, 1957; OD.

Test a low to moderately high trochospiral, planoconvex and umbilicate, periphery subacute, few chambers per whorl, increasing rapidly in size as added, appearing low and crescentic and sutures strongly oblique on the spiral side, sutures radial and final chamber nearly hemispherical and strongly overlapping earlier chambers of the final whorl on the umbilical side, a central pillarlike internal toothplate extending from the edge of the aperture along the coiling axis to the opposite wall of the chamber; wall calcareous, of aragonite as shown by X-ray determination, perforate, surface smooth; aperture a low interiomarginal umbilical slit, partially covered by a broad short flap that may have a fimbriate margin, openings of previous chambers may remain partially open along the sutures. L. Cretaceous (Albian): Europe; North America.

STEDUMIA Bertram and Kemper, 1982

Plate 480, figs. 14-17

Type species: Stedumia lindertensis Bertram and Kemper, 1982; OD.

Stedumia Bertram and Kemper, 1982 (***226**), p. 488.

Test small, to about 0.6 mm in length, elongate, early trochospiral stage with three chambers in a whorl and three to six total, later stage of four to five inflated uncoiled chambers, septa straight, constricted; wall aragonitic, optically and ultrastructurally radial, surface covered with small pustules; aperture terminal and slightly eccentric in the uncoiled stage, produced on a short tubular neck and provided with a toothplate that bisects the opening and connects within to the aperture of the previous chamber. L. Cretaceous (U. Aptian to L. Albian); Germany.

Superfamily ROBERTINACEA Reuss, 1850

Robertinacea Loeblich and Tappan, 1961 (***1902**), p. 317, nom. transl. ex family Robertinidae.

Robertinidea Saidova, 1981 (***2696**), p. 62.

Robertinoidea Tappan and Loeblich, 1982 (***3128**), p. 539.

Test with chambers in predominantly dextral low to high trochospiral coil, or may be nearly planispiral; interior of chambers divided by double transverse partition resulting from infolding of the wall that forms small supplementary chambers on one or both sides of test or with primary and secondary chambers in distinct series; aperture interiomarginal or elongate loopshaped or both and may have additional areal or sutural supplementary openings, septal foramen homologous with part of the primary aperture. Paleocene to Holocene.

Family ROBERTINIDAE Reuss, 1850

Robertinidae Reuss, 1850 (***2573**), p. 375.

Alliatinidae Haynes, 1981 (***1437**), p. 227, 232.

As for the superfamily. Paleocene to Holocene.

Subfamily ALLIATININAE McGowran, 1966

Alliatininae McGowran, 1966 (***1968**), p. 95.

Robertinidae with nearly planispiral coiling. L. Eocene (Ypresian) to Holocene.

ALLIATINA Troelsen, 1954

Plate 481, figs. 1-8

Type species: Cushmanella excentrica di Napoli Alliata, 1952 (***2229**), p. 105; OD.

Alliatina Troelsen, 1954 (***3226**), p. 464.

Pseudononionella S. Y. Zheng, in S. Y. Zheng, Cheng, Wang, and Fu, 1978 (***3453**), p. 62, 77; type species: *Pseudononionella variabilis* S. Y. Zheng, in S. Y. Zheng et al., 1978; OD.

Test almost planispiral but slightly asymmetrical and tending to coil dextrally, partially evolute, chambers enlarging rapidly and test somewhat flared, internal partition inverted *V* shape, folding around the apertural opening, oblique and attached to the inside of the apertural face on the margin toward the umbilical side, opposite free margin extending inward from the aperture where both parts attach to the previous septum below the septal foramen and diverge toward the side walls of the test, partitions of earlier chambers partially resorbed with growth, sutures nearly radial, slightly curved, depressed, periphery rounded: wall calcareous, aragonitic, finely perforate, optically radial, surface smooth; aperture a small oblique oval areal opening in the chamber face, and an interiomarginal equatorial slit at the base of the chamber, interiomarginal opening closed as new chamber is added and areal opening enlarged as an intercameral foramen. Pliocene to Holocene; Europe; North America; China: Shandong Province; Pacific.

ALLIATINELLA D. J. Carter, 1957

Plate 481, figs. 9-17 and 21-23

Type species: Alliatinella gedgravensis D. J. Carter, 1957; OD.

Alliatinella D. J. Carter, 1957 (***496**), p. 82.

Fawcettia McCulloch, 1977 (***1961**), p. 377; type species: *Fawcettia panayensis* McCulloch, 1977; OD.

Subcushmanella McCulloch, 1977 (*1961), p. 380; type species: *Subcushmanella differens* McCulloch, 1977; OD.
?*Subcerobertina* McCulloch, 1977 (*1961), p. 376; type species: *Subcerobertina simplissima* McCulloch, 1977; OD.

Test auriculate in outline, somewhat compressed and biconcave, resembling *Alliatina* but distinctly trochospiral, small accessory chambers developed over the sutures on the umbilical side, reflecting the position of attachment of the internal partition, asymmetrical internal partition of inverted V shape, crossing the chamber obliquely to attach to the interior wall of the septal face where its position is marked externally by a groove from the areal opening to the proximal chamber margin near the umbilicus, then extending back to attach to the base of the previous septum, sutures distinct, white in color, later ones slightly depressed, periphery broadly rounded; wall aragonitic, finely perforate, lamellar; aperture a low interiomarginal and equatorial slit, with a rounded areal aperture as in *Alliatina* but slightly offset toward the umbilical side, aperture sealed in the final chamber by a thin calcareous plate that is resorbed when new chamber is added to leave a functional areal foramen. Pliocene to Holocene; England, Italy; Pacific: Philippine Islands; off Mexico.

Remarks: *Subcerobertina* appears to be a young specimen of *Alliatinella*, although the position of the aperture was not observed; the furrow on the apertural face may indicate the position of a resorbed internal partition.

CEROBERTINA Finlay, 1939

Plate 481, figs. 18-20

Type species: Cerobertina bartrumi Finlay, 1939; OD.

Cerobertina Finlay, 1939 (*1127), p. 118.

Test ovate to auriculate in outline, dextrally coiled and trochospiral in the early stage, later uncoiling as chambers increase rapidly in breadth, internal partition partially subdivides the chambers to form relatively large supplementary chamberlets around the umbilicus on the umbilical side, sutures distinct, curved on the spiral side, nearly straight on the umbilical side, periphery rounded; wall aragonitic, perforate, surface smooth; aperture an interiomarginal slit that extends into a furrowlike depression up the center of the apertural face on the umbilical side. L. Eocene (Ypresian) to Holocene; New Zealand; Malay Archipelago; Antarctic.

CUSHMANELLA Palmer and Bermúdez, 1936

Plate 482, figs. 1-4

Type species: Nonionina brownii d'Orbigny, 1839 (*2304), p. 45; OD.

Cushmanella Palmer and Bermúdez, 1936 (*2330), p. 252.

Test nearly planispiral, involute, somewhat compressed, rapidly enlarging chambers result in an auriculate outline, one or more small supplementary chambers at the umbilical end of each chamber on both sides of the test, tubular internal partition attached to the inside wall at the upper and lateral margins of the areal aperture, free edges of the partition infolded at each side of the lower rim of the aperture, with branches from the tubular partition opening at the lateral accessory aperture, external sutures gently curved, depressed; wall calcareous, finely perforate except for a clear oval imperforate equatorial area just above the aperture on the apertural face; aperture consists of an areal slit and an interiomarginal equatorial opening, with supplementary sutural slitlike openings on both sides of test opening into the supplementary chambers. Holocene: Caribbean.

GEMINOSPIRA Makiyama and Nakagawa, 1941

Plate 482, figs. 5-12

Type species: Geminospira simaensis Makiyama and Nakagawa, 1941; OD.

Geminospira Makiyama and Nakagawa, 1941 (*1987), p. 243.
Geminospiroides McCulloch, 1977 (*1961), p. 381; type species: *Geminospiroides bubnanensis* McCulloch, 1977; OD.

Test elongate, flattened, early chambers in a trochospiral coil, later uncoiled, arcuate, and asymmetrical with chambers highest on the dorsal margin, a series of secondary chamberlets on the ventral margin alternating in position with the primary chambers and extending back toward the proloculus on the inside of the curve, sutures distinct, flush on the spiral side, depressed on the umbilical side, periphery rounded; wall aragonitic, finely perforate, surface smooth; aperture an interiomarginal slit at the base of the final chamber, slightly on the umbilical side of the median plane, connecting with an elongate groove that extends up the apertural face on the umbilical side and terminates in an areal ovate opening near the upper margin of the face, the areal opening remaining as an intercameral foramen when the next chamber is added. Pliocene to Holocene; Japan; Philippine Islands.

PSEUDOBULIMINA Earland, 1934

Plate 482, figs. 13-21

Type species: Bulimina chapmani Heron-Allen and Earland, 1922 (*1473), p. 130 (syn.: *Bulimina seminuda* Terquem of Chapman, 1914, non Terquem, 1882); OD(M).

Pseudobulimina Earland, 1934 (*1041), p. 133.

Test ovate in outline, trochospiral and commonly dextrally coiled, chambers enlarging rapidly in a somewhat flaring whorl, internal partition extends from the margin of the hooklike aperture in the apertural face and is enrolled to produce a small vestibule into which lead the two openings, one part of the partition crossing the chamber to attach to the wall on the spiral side and forming a smaller closed chamberlet adjacent to the spiral suture and over the previous basal aperture and part of the vertical one, hence opening only into the previous chamber cavity, internal partition partially resorbed as later chambers are added; wall calcareous, surface smooth; aperture an interiomarginal slit, and a second hooklike slit extending up the center of the apertural face from the base of the chamber on the umbilical side, the two diverging slits separated by a subtriangular flap directed toward the umbilicus, both opening into the area enclosed by the inner partition, septal foramen produced by resorption that enlarges the earlier openings. M. Eocene (Lutetian), Claibornian; Holocene; Antarctic; Pacific; North America.

SIDEBOTTOMINA Seiglie, 1964

Plate 482, figs. 22 and 23

Type species: Cassidulina bradyi Norman var. *elongata* Sidebottom, 1905 (*2909), p. 17; OD.

Sidebottomina Seiglie, 1964 (*2843), p. 510.

Test elongate, slightly arcuate, large globular proloculus followed by low, biserially arranged chambers that increase slowly in size as added, sutures of primary chambers curved, slightly depressed, and nearly horizontal, those separating the secondary chamber series oblique; wall calcareous, transparent, surface smooth; aperture a broad and high arch at the base of the terminal face, present only on one series of chambers, the secondary series lacking a primary aperture but with numerous small sutural apertures. Holocene; Greece: Island of Delos; Venezuela.

Remarks: *Sidebottomina* is tentatively placed in the Alliatininae, although no information is available as yet concerning the wall mineralogy or internal structures.

Subfamily ROBERTININAE Reuss, 1850

Robertininae Sigal, in Piveteau, 1952 (*2413), p. 220, nom. transl. ex family Robertinidae.

Robertinidae with test in a high trochospiral coil. Paleocene to Holocene.

ROBERTINA d'Orbigny, 1846

Plate 483, figs. 1-4

Type species: Robertina arctica d'Orbigny, 1846; OD(M).

Robertina d'Orbigny, 1846 (*2309), p. 202.

Test predominantly dextrally coiled in a high trochospiral, numerous broad and low chambers subdivided by transverse partition formed by infolding of the outer wall, sutures oblique, slightly depressed; wall aragonitic, hyaline, optically radial, very finely perforate, surface smooth; aperture elongate, looplike, extending up the face of the final chamber, a small supplementary triangular opening on the opposite side of the test at the junction of the inner partition and previous septum, supplementary openings of earlier chambers closed as a new chamber is added. Paleocene to Holocene; Europe; North America; New Zealand; Atlantic; Pacific; Arctic; Antarctic.

ROBERTINOIDES Höglund, 1947

Plate 483, figs. 5–14

Type species: Bulimina normani Goës, 1894 (*1257), p. 47; OD.

Robertinoides Höglund, 1947 (*1487), p. 222.

Test predominantly dextrally coiled in a high trochospiral, chambers somewhat inflated, internally subdivided by a transverse partition produced by infolding of the outer wall, the proximal chamberlet covering the previous aperture and opening into the preceding main chamber and not into that of the same instar, sutures oblique, depressed; wall aragonitic, hyaline, very finely perforate, surface smooth; aperture consisting of two slitlike openings, one interiomarginal at the proximal margin of the chamber, the other diverging from the chamber margin and directed up the apertural face, small supplementary triangular opening also present on the opposite side of the test at the junction of the internal partition and previous septum. L. Eocene to Holocene.

Suborder GLOBIGERININA Delage and Hérouard, 1896

Globigerinina Loeblich and Tappan, 1984 (*1918), p. 37, nom. corr. pro suborder Globigerinidae.

Globigerinidae Delage and Hérouard, 1896 (*926), p. 141 (suborder).

Globigerinidea Lankester, 1885 (*1790), p. 847 (order).

Globigerinidae Hartog, in Harmer and Shipley, 1906 (*1424), p. 59 (order).

Globigerinida Calkins, 1909 (*477A), p. 39 (order).

Heterohelicida Fursenko, 1958 (*1199), p. 24 (order).

Globigerinida Blow, 1979 (*259), p. 835 (suborder).

Globigerinea Mikhalevich, 1980 (*2108), p. 59 (class).

Globorotaliida Mikhalevich, 1980 (*2108), p. 59 (order).

Hantkeninida Mikhalevich, 1980 (*2108), p. 59 (order).

Rotaliicea Saidova, 1981 (*2696), p. 35 (class; partim).

Rotaliicae Saidova, 1981 (*2696), p. 35 (subclass; partim).

Planktonic in habit; test wall of perforate hyaline calcite, optically radiate, preferred crystal orientation with *c*-axis normal to surface; primary lamination bilamellar, secondary lamination due to addition of shell material during formation of new chamber; surface crust may develop at time of gametogenesis. M. Jurassic (Bathonian) to Holocene.

Superfamily HETEROHELICACEA Cushman, 1927

Heterohelicacea Grigyalis, 1978 (*1306), p. 9, nom. corr. pro superfamily Heterohelicidea.

Heterohelicidea Aliyulla, 1977 (*24), p. 197, nom. transl. ex family Heterohelicidae.

Test biserial or triserial, at least in early stage, may be reduced to uniserial but more commonly shows chamber proliferation in the later stage; aperture a low to high arch at the base of the final chamber or terminal in the uniserial stage. L. Cretaceous (Aptian) to Holocene.

Family GUEMBELITRIIDAE Montanaro Gallitelli, 1957

Guembelitriidae El-Naggar, 1971 (*1103), p. 431 (nom. transl. ex subfamily).

Guembelitriinae Montanaro Gallitelli, 1957 (*2174), p. 136 (subfamily).

Early stage trochospiral, triserial, or biserial, later may show serial reduction or proliferation. L. Cretaceous (Albian) to Holocene.

CHILOGUEMBELITRIA Hofker, 1978

Plate 484, figs. 3–14

Type species: Chiloguembelitria danica Hofker, 1978; OD.

Chiloguembelitria Hofker, 1978 (*1527), p. 60.

Jenkinsina Haynes, 1981 (*1437), p. 313, 342; type species: *Guembelitria stavensis* Bandy, 1949 (*115), p. 124; OD.

Test high trochospiral, triserial, chambers globular and inflated; wall calcareous with very fine pores scattered over the surface but having an almost imperforate appearance, surface finely pustulose but lacks pore mounds; aperture a small arch at the base of the final chamber, bordered by an upper lip that may be slightly more produced on the margin farther from the test axis. Paleocene (Danian) to Oligocene; USA: Alabama, Louisiana; Australia; New Zealand; S. Pacific; S. Atlantic.

Remarks: Study with the SEM of topotypes of the type species of both genera as well as other species assigned to these, showed *Jenkinsina* to be a synonym of *Chiloguembelitria* (Loeblich and Tappan, 1986, *1928, p. 249).

CORROSINA Thalmann, 1956

Plate 484, figs. 1 and 2

Type species: Corrosina pupoides Nyirő, 1954; OD.

Corrosina Thalmann, 1956 (*3175), p. 372.
Corrosina Nyirő, 1954 (*2286), p. 68, 71, 73 (name not available, ICZN Art. 13(b); type species not designated).

Test small, up to 0.29 mm in length, triserial, chambers inflated, sutures depressed; wall calcareous, hyaline, perforate, surface rough; apertural opening twisted in the form of a curved slit extending from the base of the final chamber. U. Oligocene (Chattian); Hungary.

Remarks: In the original description *Corrosina* was compared to both *Bulimina* and *Guembelitria;* it was regarded as a synonym of *Turrilina* by Loeblich and Tappan (1964, ***1910**, p. C543). However, the roughened surface, and the curved slit aperture differentiate it from *Turrilina.* The type specimens are not preserved, and no later studies have been made of the type species. The roughened appearance may indicate pore mounds or other sculpture, and the description of the aperture is suggestive of *Gallitellia* or *Chiloguembelitria* rather than *Guembelitria.*

GALLITELLIA Loeblich and Tappan, 1986

Plate 485, figs. 1-3

Type species: Guembelitria? vivans Cushman, 1934 (*775), p. 105; OD.

Gallitellia Loeblich and Tappan, 1986 (*1928), p. 249.

Test tiny, elongate, chambers globular and enlarging rapidly as added, triserial throughout or with chamber proliferation in the final stage, sutures deeply depressed, margins lobulate; wall calcareous, hyaline, thin, and translucent, surface smooth to grainy in appearance at high magnification, very fine pores sparsely scattered over the surface and not elevated on pore mounds; aperture a simple rounded and umbilical arch at the base of the final chamber, without a lip. Pleistocene to Holocene; N. and S. Pacific; Indian Ocean; Gulf of Mexico.

Remarks: Differs from *Guembelitria* and *Chiloguembelitria* in the very thin, hyaline, smooth, and sparsely perforate wall, occasional chamber proliferation in the adult, and simple open aperture that has no bordering lip, and differs from the former also in lacking pore mounds. The middle Cretaceous *Guembelitriella* also has chamber proliferation but differs in the finely pustulose surface with pores interspersed between the pustules and in the low arched aperture with bordering lip.

GUEMBELITRIA Cushman, 1933

Plate 485, figs. 8-12

Type species: Guembelitria cretacea Cushman, 1933; OD.

Guembelitria Cushman, 1933 (*769), p. 37 (as *Gümbelitria*)

Test subconical, chambers globular and inflated, triserial throughout, sutures distinct, depressed; wall calcareous, optically radial, finely and irregularly perforate, with each pore elevated on a pore mound; aperture an interiomarginal arch at the base of the final chamber, with an imperforate bordering lip. L. Cretaceous (Albian) to U. Cretaceous (Maastrichtian); cosmopolitan.

GUEMBELITRIELLA Tappan, 1940

Plate 486, figs. 1-5

Type species: Guembelitriella graysonensis Tappan, 1940; OD.

Guembelitriella Tappan, 1940 (*3120), p. 115.

Test small, triserial in the early stage as in *Guembelitria* but becoming multiserial in the adult, chambers inflated and globular, sutures distinct, depressed; wall calcareous, optically radial, surface finely pustulose, with fine pores interspersed between the pustules; aperture an interiomarginal arch at the base of the final chamber and in the later stage of chamber proliferation more than one aperture may occur per chamber. U. Cretaceous (L. Cenomanian); USA: Texas, Oklahoma.

Remarks: *Guembelitriella esphirae* Suleymanov, 1971 (***3101**) was described from the U. Eocene of N. Turkmen SSR, central Asia, but whether the wall has pore mounds like

Guembelitria or pustules with intervening pores but without pore mounds as in *Guembelitriella* and *Chiloguembelitria* is not known. Other known occurrences are only from the mid-Cretaceous.

WOODRINGINA Loeblich and Tappan, 1957

Plate 485, figs. 4-7

Type species: Woodringina claytonensis Loeblich and Tappan, 1957; OD.

Woodringina Loeblich and Tappan, 1957 (*1893), p. 39.

Test subtriangular in outline, chambers inflated and globular, with single early whorl of three chambers followed by biserially arranged chambers; wall calcareous, optically radial, finely perforate, surface smooth; aperture a low interiomarginal slit, bordered above by a small lip. L. Paleocene (Danian); USA: Alabama.

Family HETEROHELICIDAE Cushman, 1927

Heterohelicidae Cushman, 1927 (*742), p. 59.
Gümbelinidae Wedekind, 1937 (*3355), p. 112.
Heterohelicida Copeland, 1956 (*680), p. 188.

Aperture symmetrical, ranging from a low slit to a high arch at the base of the final chamber, becoming terminal in uniserial taxa. L. Cretaceous (Aptian) to Paleocene.

Subfamily HETEROHELICINAE Cushman, 1927

Heterohelicinae Cushman, 1927 (*742), p. 59.
Spiroplectinae Cushman, 1911 (*702), p. 4 (replaced prior to 1961, as type genus then regarded as junior synonym: see ICZN Art. 40 (b)).
Gümbelininae Cushman, 1927 (*742), p. 59.
Ventilabrellinae Maamouri and Salaj, 1974 (*1956), p. 139 (name not available, ICZN Art. 13 (a)(i): no description).
Pseudotextulariinae Maamouri and Salaj, 1974 (*1956), p. 139; Soliman, 1974 (*3020), p. 205 (name not available, ICZN Art. 13 (a)(i); no description).
Tesseraellinae Aliyulla, 1977 (*24), p. 203.
Ventilabrellinae Maamouri and Salaj, 1978 (*1957), p. 103.
Pseudotextulariinae Maamouri and Salaj, 1978 (*1957), p. 104.

Early stage biserial or may be planispirally coiled, later stage biserial or with chamber proliferation. L. Cretaceous (Aptian) to Paleocene.

HETEROHELIX Ehrenberg, 1843

Plate 487, figs. 1-6

Type species: Textilaria americana Ehrenberg, 1843; OD(M).

Heterohelix Ehrenberg, 1843 (*1059), p. 429.

Test with early chambers in a tiny planispiral coil, at least in the microspheric generation, later with biserially arranged inflated to globular chambers, final one to two pairs of chambers subtriangular in outline with a short blunt spine at the outer angle of the chamber, sutures depressed; wall calcareous, perforate, ornamented with numerous fine longitudinal striae; aperture a high narrow arch at the base of the last chamber. U. Cretaceous (Santonian to Campanian); cosmopolitan.

Remarks: *Heterohelix* appears to be transitional between the globular chambered *Spiroplecta* and *Lunatriella* whose chambers are laterally much elongated or tubulospinate. As noted by Frerichs and Gaskill (1978, *1182, p. 143), the type species of *Heterohelix* is *Textilaria americana* Ehrenberg, 1843 (*1059) by original monotypy (hence Cushman's, 1927, *746, p. 190, designation of *Spiroplecta americana* as the type of *Heterohelix* is invalid). *Textilaria americana* was first illustrated by Ehrenberg (1854, *1068, pl. 32 I, fig. 4a), and similar specimens were illustrated by Frerichs and Gaskill. The latter authors regarded Ehrenberg's pl. 32 I, figs. 13, 14 of *Spiroplecta americana* to be the microspheric generation of *Heterohelix americana*.

LUNATRIELLA Eicher and Worstell, 1970

Plate 487, figs. 7-12

Type species: Lunatriella spinifera Eicher and Worstell, 1970; OD.

Lunatriella Eicher and Worstell, 1970 (*1081), p. 117.

Test elongate, early chambers subglobular, inflated, and biserially arranged, later chambers more elongate and cuneate to nearly uniserial and rectilinear, the final one or more chambers commonly with an elongate tubulospinelike lateral projection, sutures depressed; wall calcareous, of optically radial calcite, finely perforate; aperture a high interiomarginal arch with narrow bordering lip in the early biserial chambers, in later uniserial chambers the aperture is terminal and the bordering lips merge to form a trough with lateral buttresses that connects directly to the preceding chamber. U. Cretaceous (Turonian to Campanian); USA: Kansas, Colorado, South Dakota; Italy: Sicily; USSR: Azerbaydzhan.

PLANOGLOBULINA Cushman, 1927

Plate 488, figs. 1-10

Type species: Guembelina acervulinoides Egger, 1902 (***1049**), p. 36 (as *Gümbelina*); OD.

Planoglobulina Cushman, 1927 (***739**), p. 77.

Platystaphyla Masters, 1976 (***2055**), p. 325; type species: *Planoglobulina brazoensis* S. E. Martin, 1972 (***2051**), p. 82; OD.

Test flabelliform, early biserial stage with rapidly enlarging chambers followed by a proliferation of chambers in the same plane, chambers inflated, subglobular, sutures distinct, depressed; wall calcareous, hyaline, perforate, surface with medium to coarse but discontinuous longitudinal costae that parallel the margins of the chambers, lateral cameral flanges with bordering rims may merge and become continuous ridges on the later chambers; arched basal apertures in the adult commonly at both sides of the multiseriate chambers. U. Cretaceous (U. Maastrichtian): cosmopolitan.

Remarks: A neotype (USNM 170316) was designated for *Planoglobulina acervulinoides* (Egger) from the type locality by S. E. Martin, 1972 (***2051**), p. 81.

PSEUDOPLANOGLOBULINA Aliyulla, 1977

Plate 488, figs. 11-13

Type species: Pseudoplanoglobulina nakhitschevanica Aliyulla, 1977: OD.

Pseudoplanoglobulina Aliyulla, 1977 (***24**), p. 204.

Test subtriangular in outline, chambers globular, biserial in the early stage, later with some chamber proliferation but only one or two rows of three chambers each, no cameral flanges present, sutures distinct, depressed; wall calcareous, finely perforate, surface may appear smooth in the light microscope or on worn specimens, but very fine and closely spaced irregular costae are present; arched basal apertures on both outer chambers in the multiserial stage. U. Cretaceous (Turonian to Campanian); Azerbaydzhan SSR; USA: Texas, Oklahoma, Arkansas, Nebraska, Kansas, Mississippi.

Remarks: *Ventilabrella austinana* Cushman is here transferred to *Pseudoplanoglobulina* as *P. austinana* (Cushman).

PSEUDOTEXTULARIA Rzehak, 1891

Plate 487, figs. 13-18

Type species: Cuneolina elegans Rzehak, 1891: OD(M).

Pseudotextularia Rzehak, 1891 (***2681**), p. 4.

Pseudotextularia Rzehak, 1886 (***2678**), p. 6 (nom. nud.).

Bronnibrownia Montanaro Gallitelli, 1955 (***2172**), p. 215, 220, 222 (name not available, ICZN Art. 13 (a)(i), no description).

Bronnimannella Montanaro Gallitelli, 1956 (***2173**), p. 35; type species: *Guembelina plummerae* Loetterle, 1937 (***1930**), p. 33 (as *Gümbelina*); OD.

Pseudotextularia (Bronnimanella) Dabagyan and Mykita, 1971 (***869**), p. 13, pl. 3, fig. 1 (nom. transl.; err. cit.).

Test subtriangular in outline, with biserially arranged, inflated chambers compressed parallel to the line of junction between the two series of chambers so that the test appears broader in apertural or edge view than from the sides with the zigzag suture between chambers, sutures depressed; wall calcareous, finely perforate, surface with longitudinal, slightly irregular to discontinuous fine to medium coarse costae; aperture a broad low to medium arched basal opening bordered by a narrow lip. U. Cretaceous (Maastrichtian); cosmopolitan.

Remarks: A neotype (Natural History Museum, Vienna, Geol.-Palaeont. Coll. MI-465) was designated (S. Nash, 1981, ***2231**, p. 74) for *Pseudotextularia elegans* (Rzehak) from the type locality.

RACEMIGUEMBELINA Montanaro Gallitelli, 1957

Plate 489, figs. 1-7

Type species: Guembelina fructicosa Egger, 1902 (***1049**), p. 35 (as *Gümbelina*); OD.

Racemiguembelina Montanaro Gallitelli, 1957 (***2174**), p. 142.

Pseudotextularia (Racemiguembelina) Berggren, 1962 (***190**), p. 22 (nom. transl.).

Test subconical, microspheric early stage may be planispiral and later stage biserial, regularly enlarging globular chambers proliferate in the later stage in a plane perpendicular to the earlier plane of growth, forming an open cone only partially joined by a bridgelike coverplate, sutures depressed; wall calcareous, hyaline, surface with longitudinal irregular to discontinuous imperforate costae, alternating with distinctly perforate areas of the wall, coverplate over the apertures with much finer perforations; aperture consists of broad arched interiomarginal openings directed toward the umbilicus on all chambers in the final whorl, apertures may be partially covered by the bridgelike cover plate that extends from one apertural face to another in the same series of chambers, each coverplate bordered by large infralaminal accessory apertures. U. Cretaceous (Maastrichtian); cosmopolitan.

SPIROPLECTA Ehrenberg, 1844

Plate 490, figs. 1-8 and 12-17

Type species: Spiroplecta americana Ehrenberg, 1844 (non *Textilaria americana* Ehrenberg, 1843); (syn.: *Heterohelix navarroensis* Loeblich, 1951, ***1875,** p. 107); OD(M).

Spiroplecta Ehrenberg, 1844 (***1062**), p. 75.

Guembelina Egger, 1902 (***1049**), p. 31 (as *Gümbelina*: non *Gümbelina* Kuntze, 1895); type species: *Textularia globulosa* Ehrenberg, 1839 (***1054**), p. 135; SD Cushman, 1927 (***746**), p. 190.

Tesseruella Aliyulla, 1977 (***24**), p. 204; type species: *Guembelina pseudotessera* Cushman, 1938 (***785**), p. 14; OD.

Test with early chambers in a planispiral coil, at least in the microspheric stage, later biserial, chambers globular and inflated, sutures depressed; wall calcareous, perforate, commonly ornamented with fine longitudinal striae; aperture a symmetrical arch at the base of the final chamber. L. Cretaceous (Aptian) to Paleocene; cosmopolitan.

Remarks: With redescription by Frerichs and Gaskill (1978, ***1182,** p. 143) of *Textilaria americana* (type species of *Heterohelix*) as having prominently subtriangular to laterally apiculate chambers, the distinction between *Heterohelix* and the globular-chambered *Spiroplecta* appears sufficient for recognition of both. Ehrenberg's figure (1854, ***1068,** pl. 32 II, fig. 25) was designated by Cushman as the "genotype" of *Spiroplecta*. This specimen was later stated to be the lectotype of the species (Loeblich, 1951, ***1875,** p. 108). When regarded as congeneric with *Heterohelix*, *Spiroplecta americana* becomes a secondary junior homonym of *Textilaria americana* Ehrenberg, 1843 (the type species of *Heterohelix*) and is then correctly known as *Heterohelix navarroensis* Loeblich, 1951. However, if both genera are recognized as distinct, as they are herein, they are no longer secondary homonyms and the present type species is correctly cited as *Spiroplecta americana*.

VENTILABRELLA Cushman, 1928

Plate 489, figs. 8 and 9

Type species: Ventilabrella eggeri Cushman, 1928; OD.

Ventilabrella Cushman, 1928 (***748**), p. 2.

Test subtriangular to flabelliform in outline, laterally compressed, chambers globular to pyriform, those of early stage biserially arranged, later with chamber proliferation in the plane of biseriality, sutures distinct, depressed; wall calcareous, hyaline, perforate, surface with longitudinal discontinuous and somewhat irregular low costae; arched basal apertures on both margins of many chambers in the multiseriate stage, cameral flanges present, and these and the cameral ridges may be merged on the final series of chambers. U. Cretaceous (Santonian to Maastrichtian); cosmopolitan.

Remarks: A neotype for *Ventilabrella eggeri* Cushman (USNM No. 170308) from the Taylor Marl of Texas was designated by S. E. Martin (1972, ***2051,** p. 86).

Subfamily GUBLERININAE Aliyulla, 1977

Gublerininae Aliyulla, 1977 (***24**), p. 202.

Test with tiny initial coil or biserial in early stage, later biserial series may diverge or test may become uniserial. L. Cretaceous (Albian) to Paleocene.

BIFARINA Parker and Jones, 1872

Plate 491, figs. 4-8

Type species: Dimorphina saxipara Ehrenberg, 1854 (***1068**), pl. 32; OD.

Bifarina Parker and Jones, 1872 (***2352**), p. 198.
Tubitextularia Šulc, 1929 (***3084**), p. 150; type species: *Pseudotextularia bohemica* Šulc, 1929; OD.
Rectoguembelina Cushman, 1932 (***763**), p. 6 (as *Rectogümbelina*); type species: *Rectogümbelina cretacea* Cushman, 1932; OD.
Neoguembelina Pandey, 1981 (***2333**), p. 108; type species: *Rectoguembelina alabamensis* Cushman, 1940 (***788**), p. 65; OD.

Test small, elongate, with early biserial stage of inflated chambers, followed by a few cuneate chambers and finally uniserial and rectilinear with more elongate and slightly inflated to ovate chambers, sutures depressed; wall calcareous, optically radial, surface smooth; aperture an interiomarginal arch in the biserial stage, becoming terminal in the uniserial stage, and may be produced on a short neck. L. Cretaceous (Albian) to Paleocene; Europe; North America; Africa.

Remarks: Paleocene species were referred to *Neoguembelina* by Pandey (1981) on the basis that they were biserial in the early stage, whereas Cretaceous species had an early planispiral coil. None of the Cretaceous species that we have seen show such a coil, and none has been illustrated for the type species of *Bifarina* or *Rectoguembelina*.

GUBLERINA Kikoïne, 1948

Plate 490, figs. 9-11

Type species: Gublerina cuvillieri Kikoïne, 1948 = *Ventilabrella ornatissima* Cushman and Church, 1929 (***817**), p. 512; OD.
Gublerina Kikoïne, 1948 (***1687**), p. 26.

Test compressed, flabelliform, early stage planispiral, later biserial and increasing rapidly in breadth, the two series of chambers diverging to leave a broad nonseptate central area that later is partially occupied by chamber proliferation, sutures depressed; wall calcareous, finely perforate, ornamented with longitudinal costae and nodes, most prominently in the early stage; aperture an arch at the base of the final chamber. U. Cretaceous (Santonian to Maastrichtian); cosmopolitan.

SIGALIA Reiss, 1957

Plate 491, figs. 1-3

Type species: Guembelina deflaensis Sigal, 1952 (***2917**), p. 36; OD.
Sigalia Reiss, 1957 (***2555**), p. v.

Test subtriangular in outline, compressed, biserial throughout, sutures moderately inflated but not globular, terminal face appearing truncate because of the elevated and beaded sutures; wall calcareous, surface with low and discontinuous ribs and distinctly perforate between the raised and strongly beaded sutures; aperture an arch at the base of the final chamber. U. Cretaceous (Coniacian to Santonian); cosmopolitan.

Remarks: The specimen shown in the top two figures of fig. 41 of Sigal (1952, ***2917**) was designated as the lectotype of *Sigalia deflaensis* (Sigal) by Salaj and Samuel (1963, ***2715**, p. 100), who restricted the genus as entirely biserial. However, both Reiss (1957, ***2555**) and Dowsett (1984, ***1004**, p. 133) noted that occasional chamber proliferation might occur and regarded the raised and beaded sutures as most characteristic of the genus.

Subfamily PSEUDOGUEMBELININAE Aliyulla, 1977

Pseudoguembelininae Aliyulla, 1977 (***24**), p. 200.

Test biserial, primary aperture at base of final chamber, supplemental sutural apertures present along the zigzag suture. U. Cretaceous (Coniacian to Maastrichtian).

PSEUDOGUEMBELINA Brönnimann and Brown, 1953

Plate 491, figs. 11-15

Type species: Guembelina excolata Cushman, 1926 (***736**), p. 20; OD.
Pseudoguembelina Brönnimann and Brown, 1953 (***393**), p. 150.

Test subtriangular in outline, microspheric early stage may have tiny planispiral coil, remainder of test biserial, chambers somewhat inflated, sutures depressed; wall calcareous, low, and somewhat oblique imperforate longitudinal costae parallel the test periphery, intercostal surface perforate; aperture an interiomarginal arch, with secondary sutural apertures along the median zigzag suture between pairs of chambers, partially covered by very finely perforate tubular to flaring flaplike projections and may be bordered by a distinct imperforate lip. U. Cretaceous (Maastrichtian); cosmopolitan.

STRIATAELLA Aliyulla, 1977

Plate 491, figs. 9 and 10

Type species: Textilaria striata Ehrenberg, 1839 (*1054), p. 135; OD.

Striataella Aliyulla, 1977 (*24), p. 200.

Test with tiny planispiral early microspheric stage, later biserial, chambers globular, inflated, sutures depressed and peripheral outline strongly lobate in the later stage; wall calcareous, finely perforate in the area between the imperforate, low and intermittant to continuous longitudinal costae; aperture a broad arch with lateral flanges and may be bordered by a narrow lip, an accessory median sutural aperture present on the last chamber. U. Cretaceous (Coniacian to Maastrichtian); cosmopolitan.

Remarks: A neotype for *Striataella striata* (Ehrenberg) was selected from Ehrenberg's original material from the type locality at Moen, Denmark (Masters, 1980, *2057, p. 101, pl. 1, figs. 10, 11).

Family CHILOGUEMBELINIDAE Reiss, 1963

Chiloguembelinidae Reiss, 1963 (*2561), p. 55.

Test biserial and somewhat twisted; aperture asymmetrical, extending up the face of the final chamber, bordered at one side by a produced flaplike extension of the margin, so that aperture faces one of the flat sides of the test. L. Paleocene to Holocene.

CHILOGUEMBELINA Loeblich and Tappan, 1956

Plate 493, figs. 1-9

Type species: Guembelina midwayensis Cushman, 1940 (*788), p. 65; OD.

Chiloguembelina Loeblich and Tappan, 1956 (*1892), p. 340.

Chiloguembelinella El-Naggar, 1971 (*1103), p. 449; type species: *Chiloguembelina subtriangularis* J. P. Beckmann, 1957 (*171), p. 91; OD.

Test subtriangular in outline, narrow to flaring, chambers slightly inflated, biserial throughout or with a tendency to be slightly twisted, sutures distinct, depressed; wall calcareous, finely perforate, optically radial, surface granulate, aperture a simple arched opening, with inturned narrow bordering rim on one margin but without an internal plate connecting to the previous aperture, opposite margin produced into a broad flap, so that aperture is directed toward one of the flat sides of the test, but with neither an infolded margin nor internal plate. L. Paleocene (Danian) to Oligocene; cosmopolitan.

LATEROSTOMELLA de Klasz and Rérat, 1962

Plate 492, figs. 1-16

Type species: Laterostomella guembeliniformis de Klasz and Rérat, 1962; OD.

Laterostomella de Klasz and Rérat, 1962 (*1703), p. 177.

Streptochilus Brönnimann and Resig, 1971 (*402), p. 1288; type species: *Bolivina tokelauae* Boersma, in Kierstead et al., 1969 (*1686), p. 329 = *Bolivina globulosa* Cushman, 1933 (*771), p. 80; OD.

?*Pseudoheterohelix* Aliyulla, 1977 (*24), p. 205; type species: *Guembelina pumilia* Subbotina, 1950 (*3077), p. 94; OD.

Test elongate, tapering, chambers inflated, biserial, sutures depressed, slightly oblique; wall calcareous, finely perforate, although pores may become enlarged by dissolution, surface commonly granulate, pustulate, or finely cancellate, pustules of earlier chambers may fuse into longitudinal ridges; aperture a slightly eccentric high arch at the base of the last chamber, rarely with a lower and more symmetrical aperture that may divide into two openings, collarlike apertural border has one margin turned inward as an internal plate that connects with the proximal margin of the collar of the previous aperture. ?Paleocene, U. Eocene to Holocene; Pacific Ocean; USSR: Caucasus; Indian Ocean; Red Sea; Atlantic Ocean; Gabon; Sierra Leone; Gulf of Mexico; Cuba.

Remarks: *Laterostomella* was originally placed in the Bolivinitidae but is a planktonic taxon. *Pseudoheterohelix* was defined for Danian to Oligocene Chiloguembelinidae with a symmetrical aperture. However, Poore and Gosnell (1985, *2453, p. 1) demonstrated that the apertural symmetry varies in different species of *Streptochilus* = *Laterostomella*. Although details of the aperture of *Pseudoheterohelix pumilia* have not been illustrated, it appears externally similar to other species of *Laterostomella*.

Superfamily PLANOMALINACEA Bolli, Loeblich, and Tappan, 1957

Planomalinacea Loeblich, and Tappan, 1982 (*1917), p. 33, nom. transl. ex subfamily Planomalininae.

Test planispiral but may tend to become trochospiral; aperture equatorial and interiomarginal with bordering lip, those of earlier chambers may partly remain open as relict apertures after new chambers are added. L. Cretaceous (Barremian) to U. Cretaceous (Maastrichtian).

Family GLOBIGERINELLOIDIDAE Longoria, 1974

Globigerinelloididae Longoria, 1974 (*1933), p. 76.
Globigerinelloididae Longoria-Treviño, 1974 (*1936), p.1741-B (name not available, ICZN Art. 13 (a)(i), no description).

Test planispiral, chambers globular to radially elongate; aperture at the base of the chamber face and equatorial in position, lateral portions of primary aperture may remain open as new chambers are added, forming relict openings around the umbilical region. L. Cretaceous (Aptian) to U. Cretaceous (Maastrichtian).

Subfamily GLOBIGERINELLOIDINAE Longoria, 1974

Globigerinelloidinae Loeblich and Tappan, 1982 (*1917), p. 33, nom. transl. ex family Globigerinelloididae.

Test planispiral, chambers globular throughout and not radially elongate. L. Cretaceous (Aptian) to U. Cretaceous (Maastrichtian).

BIGLOBIGERINELLA Lalicker, 1948

Plate 493, figs. 10-12

Type species: Biglobigerinella multispina Lalicker, 1948; OD.

Biglobigerinella Lalicker, 1948 (*1772), p. 624.

Test planispirally enrolled, nearly involute, biumbilicate, chambers globular and few per whorl, later ones broadening perpendicular to the plane of coiling, with final stage developing a multiple aperture and two opposing chambers on opposite sides of the median plane, sutures depressed, periphery rounded; wall calcareous, perforate, radial in structure, surface smooth, hispid or pitted; aperture an interiomarginal equatorial arch, later divided into two openings, and finally with one on each of the two opposed terminal chambers. U. Cretaceous (Campanian); cosmopolitan.

BLOWIELLA Kretzschmar and Gorbachik, 1971

Plate 493, figs. 13-18

Type species: Planomalina blowi Bolli, 1959 (*288), p. 260.; OD.

Blowiella Kretzschmar and Gorbachik, in Gorbachik, 1971 (*1269), p. 135.

Test small, planispirally coiled, slightly evolute and biumbilicate, chambers globular, enlarging rapidly, four to five in the final whorl, sutures radial, depressed, periphery broadly rounded, peripheral outline lobulate; wall calcareous, finely perforate, known specimens with strong calcareous overgrowths obscuring the original surface; aperture a low interiomarginal and equatorial opening, bordered by a narrow rim, may have poorly developed relict apertures. L. Cretaceous (Aptian to Albian); cosmopolitan.

Remarks: Differs from *Globigerinelloides* in the simple globular and rapidly enlarging chambers and few chambers per whorl.

GLOBIGERINELLOIDES Cushman and ten Dam, 1948

Plate 494, figs. 6 and 7

Type species: Globigerinelloides algeriana Cushman and ten Dam, 1948; OD.

Globigerinelloides Cushman and ten Dam, 1948 (*818), p. 42.
Planomalina (Globigerinelloides) Berggren, 1962 (*190), p. 44 (nom. transl.).

Test planispirally enrolled, biumbilicate, involute to evolute, lobulate in outline, chambers globular to somewhat elongate in partially evolute species, sutures depressed; wall calcareous, perforate, optically radial; aperture equatorial and interiomarginal, bordered by a narrow imperforate lip, broad and low to moderately arched, the lateral portions remaining open as relict supplementary apertures around the umbilicus when new chambers are added. L. Cretaceous (Aptian) to U. Cretaceous (Maastrichtian); cosmopolitan.

Subfamily EOHASTIGERINELLINAE Loeblich and Tappan, 1984

Eohastigerinellinae Loeblich and Tappan, 1984 (*1918), p. 38.
Eohastigerinellinae Loeblich and Tappan, 1982 (*1917), p. 33 (nom. nud.).

Test planispiral, chambers globular in the early stage, later radially elongate. U. Cretaceous (Coniacian to Santonian).

Remarks: Differs from the subfamily Globigerinelloidinae in the presence of distinctly radially elongate chambers.

EOHASTIGERINELLA Morozova, 1957

Plate 494, figs. 4 and 5

Type species: Hastigerinella watersi Cushman, 1931 (*760), p. 86; OD.

Eohastigerinella Morozova, 1957 (*2188), p. 1112.
Schackoina (Eohastigerinella) El-Naggar, 1971 (*1103), p. 437 (nom. transl.).
Hastigerinoides (Eohastigerinella) Gorbachik and Moullade, 1973 (*1273), p. 2663 (nom. transl.).

Test planispirally enrolled and involute, biumbilicate, early chambers globular and inflated, later ones radially elongate, and final one or two chambers clavate, sutures distinct, depressed; wall calcareous, moderately coarsely perforate, radial, surface pitted; aperture equatorial, an interiomarginal arch bordered with a distinct lip, lateral extremities of the aperture commonly remaining open as relict supplementary apertures around the umbilicus as new chambers are added. U. Cretaceous (Coniacian to Santonian): USA: Texas; Alabama.

HASTIGERINOIDES Brönnimann, 1952

Plate 494, figs. 1-3

Type species: Hastigerinella alexanderi Cushman, 1931 (*760), p. 87; OD.

Hastigerinella (Hastigerinoides) Brönnimann, 1952 (*373), p. 52.
Hastigerinoides Bolli, Loeblich, and Tappan, 1957 (*292), p. 24 (nom. transl.).
Globigerinelloides (Hastigerinoides) Moullade, 1964 (*2195), p. 60 (nom. transl.).
Schackoina (Hastigerinoides) El-Naggar, 1971 (*1103), p. 437 (nom. transl.).

Test planispirally enrolled and involute, biumbilicate, early chambers globular and inflated, later ones radially elongate, and those of the final whorl long and tapering, resembling tubulospines; wall calcareous, finely perforate; aperture a low interiomarginal equatorial arch bordered by a distinct lip, lateral part of the aperture remaining open as relict supplementary apertures around the umbilicus on each side as new chambers are added. U. Cretaceous (Coniacian to Santonian); USA: Texas; Caribbean.

Family PLANOMALINIDAE Bolli, Loeblich, and Tappan, 1957

Planomalinidae Sigal, 1958 (*2919), p. 263, nom. transl. ex subfamily.
Planomalininae Bolli, Loeblich, and Tappan, 1957 (*292), p. 21 (subfamily).

Test planispiral, biumbilicate, periphery carinate, sutures strongly arched; aperture a low equatorial opening. L. Cretaceous (Albian) to U. Cretaceous (Cenomanian).

PLANOMALINA Loeblich and Tappan, 1946

Plate 494, figs. 8 and 9

Type species: Planomalina apsidostroba Loeblich and Tappan, 1946 = *Planulina buxtorfi* Gandolfi, 1942 (*1211), p. 103; OD.

Planomalina Loeblich and Tappan, 1946 (*1879), p. 257.
Globigerinelloides (Planomalina) Sigal, in Collignon et al., 1979 (*645), p. 218, 226 (nom. transl.).

Test planispiral, partly evolute, biumbilicate, about eight to ten chambers in the final whorl, sutures broadly curved, thickened, elevated and nodose, peripheral outline lobulate, peripheral angle carinate; wall calcareous, finely perforate, radial in structure, ornamented by the thickened and nodose sutures and peripheral keel; aperture a basal equatorial arch with bordering lip, the opening extending to either side, where part of previous apertures and the bordering lip may remain exposed as relict apertures as the new chambers are added. L. Cretaceous (U. Albian) to U. Cretaceous (L. Cenomanian); Europe; N. and E. Africa; USA: Texas, California; Atlantic; Caribbean.

Remarks: Although Robaszynski and Caron (1979, *2630, p. 43) state that the stratigraphic range is Upper Albian ("Vraconnian"), the type locality of *P. apsidostroba* (type species of the genus but a synonym of *P. buxtorfi*) was in the Main Street Limestone in Johnson Co., Texas, a formation containing the ammonite *Plesioturrilites brazoensis* (Roemer), whose first occurrence now is regarded as marking the Albian-Cenomanian boundary. *P. buxtorfi* also occurs in the underlying Paw Paw Formation of the Fort Worth region of Texas (that we also regard as lowest Cenomanian); furthermore it has been recorded (as *P. almadenensis* Cushman and Todd) in the Cenomanian of California, as well as in the upper Albian Weno and Georgetown Formations of central Texas.

Family SCHACKOINIDAE Pokorný, 1958

Schackoinidae Pokorný, 1958 (*2447), p. 348.

Test trochospiral to nearly planispiral, chambers with one or more hollow tubulospines; aperture equatorial and may have broad lip. L. Cretaceous (Barremian) to U. Cretaceous (Maastrichtian).

LEUPOLDINA Bolli, 1957

Plate 494, figs. 14 and 15

Type species: Leupoldina protuberans Bolli, 1957; OD.

Leupoldina Bolli, 1957 (*286), p. 275.
Schackoina (Leupoldina) Gorbachik and Moullade, 1973 (*1273), p. 2663 (nom. transl.).

Test irregular in form, in a low trochospiral coil, early chambers small and subglobular, then rapidly enlarging, becoming radially elongate and tapering distally, chambers of the final whorl clavate, the final one or two chambers commonly with two bulbous projections, one on each side of the median plane, sutures distinct, depressed; wall calcareous, perforate, surface smooth, pitted or hispid; aperture interiomarginal and equatorial, with a narrow bordering lip, final chamber may have an aperture at each side of the median plane. L. Cretaceous (M. Barremian) to U. Cretaceous (Cenomanian); Trinidad; Mexico; France; Tunisia.

SCHACKOINA Thalmann, 1932

Plate 494, figs. 10–13

Type species: Siderolina cenomana Schacko, 1897 (*2740), p. 166; OD.

Hantkenina (Schackoina) Thalmann, 1932 (*3151), p. 288.
Schackoina Cushman, 1933 (*766), p. 267 (nom. transl.).

Test small, with early low trochospiral stage, later nearly planispiral, early chambers globular, later ones radially elongate and laterally compressed, one or more elongate tubulospines extending from the midline of each chamber on the periphery, biumbilicate, sutures depressed; wall calcareous, very finely perforate, optically radial, surface slightly hispid; aperture a low interiomarginal and equatorial arch bordered by a distinct lip, part of the lateral extensions of the aperture into the umbilicus may remain as relict apertures. L. Cretaceous (Albian) to U. Cretaceous (Maastrichtian); cosmopolitan.

Superfamily ROTALIPORACEA Sigal, 1958

Rotaliporacea Loeblich and Tappan, 1982 (*1917), p. 33, nom. transl. ex family Rotaliporidae.
Hedbergelloidea Longoria and Gamper, 1975 (*1934), p. 65.

Test trochospirally enrolled; primary aperture extraumbilical-umbilical, bordered by a lip, advanced taxa with secondary sutural apertures on the umbilical side of the test. L. Cretaceous (Hauterivian) to U. Cretaceous (Maastrichtian).

Family HEDBERGELLIDAE Loeblich and Tappan, 1961

Hedbergellidae Fuchs, 1971 (*1192), p. 35, nom. transl. ex subfamily Hedbergellinae.
Praeglobotruncanidae Ion, 1983 (*1583), p. 101.

Test trochospirally coiled, primary aperture interiomarginal, extraumbilical-umbilical, with prominent apertural lip, apertures of earlier chambers remain visible around the umbilical region; no sutural secondary apertures. L. Cretaceous (Hauterivian) to U. Cretaceous (Maastrichtian).

Subfamily HEDBERGELLINAE Loeblich and Tappan, 1961

Hedbergellinae Loeblich and Tappan, 1961 (*1902), p. 309.

Test trochospiral, chambers globular and inflated, no peripheral keel. L. Cretaceous (Hauterivian) to U. Cretaceous (Maastrichtian).

ASTEROHEDBERGELLA Hamaoui, 1964

Plate 494, figs. 16–18

Type species: Hedbergella (Asterohedbergella) asterospinosa Hamaoui, 1964; OD.

Hedbergella (Asterohedbergella) Hamaoui, 1964 (*1380), p. 133.

Test in a low trochospiral coil, early chambers globular, increasing rapidly in size, those of the final whorl pyriform to subconical and may terminate in a tubulospine, resulting in a stellate peripheral outline, umbilical side deeply excavated centrally, sutures radial, depressed, periphery angular but lacking an imperforate carinal band; wall calcareous, radiate, finely perforate, surface smooth to finely hispid but without costellae; aperture a low interiomarginal arch, extraumbilical-umbilical, bordered by a narrow lip. U. Cretaceous (M. to U. Cenomanian); Israel.

COSTELLAGERINA S. W. Petters, El-Nakhal, and Cifelli, 1983

Plate 495, figs. 1-6

Type species: Rugoglobigerina bulbosa Belford, 1960 (*177), p. 94; OD.

Costellagerina S. W. Petters, El-Nakhal, and Cifelli, 1983 (*2391), p. 248.

Test with low to medium trochospiral coil of few, rapidly enlarging, spherical chambers per whorl, sutures radial, depressed, periphery rounded, peripheral margin lobulate; wall calcareous, hyaline, optically radial, finely perforate, surface with meridionally aligned pustules and costellae resulting from fusion of adjacent pustules; aperture a low interiomarginal, umbilical to slightly extraumbilical arch, with a narrow bordering lip. U. Cretaceous (Cenomanian to Campanian); cosmopolitan.

HEDBERGELLA Brönnimann and Brown, 1958

Plate 495, figs. 7-15

Type species: Anomalina lorneiana d'Orbigny var. *trochoidea* Gandolfi, 1942 (*1211), p. 98; OD.

Hedbergella Brönnimann and Brown, 1958 (*395), p. 16.

Praeglobotruncana (Hedbergella) Banner and Blow, 1959 (*124), p. 18 (nom. transl.).

Planogyrina Zakharova-Atabekyan, 1961 (*3422), p. 50; type species: *Globigerina gaultina* Morozova, 1948 (*2186), p. 41 = *Globigerina planispira* Tappan, 1940 (*3120), p. 122; OD.

Praehedbergella Gorbachik and Moullade, 1973 (*1273), p. 2662; type species: *Globigerina tuschepsensis* Antonova, in Antonova et al., 1964 (*50), p. 59; OD.

Test with globular and gradually enlarging chambers in a low trochospiral coil, narrow umbilicus on the umbilical side, sutures radial, depressed; wall calcareous, finely perforate, optically radial, surface smooth to hispid, without a poreless margin; aperture an interiomarginal, umbilical-extraumbilical arch, with a narrow lip or flap. L. Cretaceous (Hauterivian) to U. Cretaceous (Maastrichtian); cosmopolitan.

WHITEINELLA Pessagno, 1967

Plate 496, figs. 1-15

Type species: Whiteinella archaeocretacea Pessagno, 1967; OD.

Whiteinella Pessagno, 1967 (*2387), p. 298.

Whiteinella Pessagno, 1966 (*2386), p. 631 (name not available, ICZN Art. 13 (a)(i), no description).

Hedbergellita Maslakova, 1983 (*2053), p. 29; type species: *Whiteinella baltica* Douglas and Rankin, 1969 (*973), p. 197; OD.

Test in low trochospiral coil, chambers globular, five to seven in the final whorl, increasing gradually in size, sutures radial, depressed; wall calcareous, finely perforate, surface pustulose, especially on earlier chambers; aperture an interiomarginal, umbilical-extraumbilical arch, bordered by a wide apertural flap or porticus that extends into the umbilicus, those of successive chambers overlapping but not attached to previous flaps. U. Cretaceous (M. Cenomanian to M. Turonian); cosmopolitan.

Remarks: *Hedbergellita* was said to differ from *Whiteinella* in having a porous margin but is similar to the type species and others retained in *Whiteinella*. Carinate species are not congeneric.

Subfamily ROTUNDININAE Bellier and Salaj, 1977

Rotundininae Bellier and Salaj, 1977 (*184), p. 319 (family group name valid, ICZN Art. 40, although type species considered to be a subjective synonym).

Rotundininae Bellier and Salaj, 1974 (*183), p. 23 (name not available, ICZN Art. 13 (a)(i), not described).

Praeglobotruncaninae Loeblich and Tappan, 1982 (*1917), p. 33 (name not available, ICZN Art. 13 (a)(i), not described).

Test trochospiral, periphery subangular, with keel or imperforate carinal band; wall surface smooth to pustulose or hispid; aperture an interiomarginal extraumbilical-umbilical arch with bordering lip and lacking secondary sutural apertures. L. Cretaceous (Albian) to U. Cretaceous (Coniacian).

Remarks: Differs from the subfamily Hedbergellinae in the presence of an imperforate carinal band or peripheral keel.

FALSOTRUNCANA Caron, 1981

Plate 497, figs. 1-4

Type species: Falsotruncana maslakovae Caron, 1981: OD.

Falsotruncana Caron, 1981 (***483**), p. 66.

Test in low trochospiral coil, compressed, chambers petaloid, sutures radial, slightly curved, depressed on the spiral side, radial and depressed around the shallow umbilicus on the umbilical side, peripheral margin truncate to narrowly rounded, with imperforate carinal band bordered in the earlier chambers of the final whorl by two low pustulose keels, peripheral outline lobulate; wall calcareous, perforate, rare perforations may occur in the generally imperforate carinal band, surface of earlier chambers pustulose, especially on the spiral side; primary aperture interiomarginal, umbilical-extraumbilical, nearly equatorial, bordered with a thin lip but lacking portici or umbilical extensions. U. Cretaceous (M. Turonian to L. Coniacian); Tunisia; Germany; USA: California; USSR: Caucasus.

PRAEGLOBOTRUNCANA

Bermúdez, 1952

Plate 497, figs. 5-16

Type species: Globorotalia delrioensis Plummer, 1931 (***2423**), p. 199; OD.

Praeglobotruncana Bermúdez, 1952 (***205**), p. 52.

Rotundina Subbotina, 1953 (***3079**), p. 164; type species: *Globotruncana stephani* Gandolfi, 1942 (***1211**), p. 130; OD.

Globotruncana (Rotundina) Küpper, 1955 (***1754**), p. 116 (nom. transl.).

Globotruncana (Praeglobotruncana) Küpper, 1956 (***1756**), p. 43 (nom. transl.).

Test trochospiral, biconvex to spiroconvex, umbilicate, periphery subangular with prominent nonporous carinal band that may have numerous pustules in the earlier part of the last whorl but is less distinct on the final chamber, sutures curved on the spiral side, radial on the umbilical side, flush to slightly depressed; wall calcareous, finely and densely perforate, radial in structure, surface smooth to pustulose or nodose, most rugose on the early chambers and keel; aperture an interiomarginal, extraumbilical-umbilical arch that extends to the periphery, bordered by an imperforate lip or flap. L. Cretaceous (U. Albian) to U. Cretaceous (M. Turonian); cosmopolitan.

Subfamily

HELVETOGLOBOTRUNCANINAE

Lamolda, 1976

Helvetoglobotruncaninae Lamolda, 1976 (***1785**), p. 396.

Test trochospiral, primary aperture extraumbilical-umbilical, with portici extending into the umbilicus. U. Cretaceous (Cenomanian to Santonian).

CONCAVATOTRUNCANA

Korchagin, 1982

Plate 498, figs. 1-3

Type species: Rotalia concavata Brotzen, 1934 (***424**), p. 66; OD.

Concavatotruncana Korchagin, 1982 (***1719**), p. 118 (also err. cit. as *Concovatotruncana*, p. 115, 119).

Test trochospiral, biconvex to planoconvex, sutures curved, elevated on the spiral side, radial and depressed around the broad umbilicus that comprises up to one-third the diameter of the umbilical side, peripheral outline lobulate, periphery bicarinate, with intervening imperforate carinal band; primary aperture interiomarginal, extraumbilical-umbilical, with bordering porticus, successive portici cover the umbilicus and are provided with infralaminal accessory apertures. U. Cretaceous (U. Cenomanian to Santonian).

Remarks: *Concavatotruncana* includes species referred to *Dicarinella* by Robaszynski and Caron (1979, ***2631**). However, the type species of *Dicarinella* is unrecognizable and of uncertain stratigraphic occurrence.

HELVETOGLOBOTRUNCANA Reiss, 1957

Plate 498, figs. 4-7

Type species: Globotruncana helvetica Bolli, 1945 (***280**), p. 226.

Helvetoglobotruncana Reiss, 1957 (***2558**), p. 137.

Helvetoglobotruncana Reiss, 1957 (***2557**), p. 3 (name not available, ICZN Art. 13(a)(i), no description).

Test in low trochospiral coil, planoconvex, spiral side flattened, umbilical side inflated, with narrow to moderately wide central umbilicus of about one-third to one-fourth the test diameter, chambers subtriangular, broad and inflated on the umbilical side, sutures radial and slightly depressed or may be elevated on the spiral side, peripheral margin marked by a row of pustules or a single keel, peripheral outline lobulate; primary aperture umbilical-extraumbilical, bordered by a well-developed flap or porticus, those of successive chambers overlapping in a ring about the umbilicus but do not fuse. U. Cretaceous (Turonian to L. Coniacian); cosmopolitan.

Family GLOBULIGERINIDAE Loeblich and Tappan, 1984

Globuligerinidae Loeblich and Tappan, 1984 (*1918), p. 38.
Caucasellidae Longoria-Treviño, 1974 (*1936), p. 1741-B (name not available, ICZN Art. 13(a)(i), no description).
Caucasellidae Longoria, 1974 (*1933), p. 48 (invalid, ICZN Art. 39; based on *Caucasella* Longoria, 1974, non Moissiev, 1934).
Caucasellinae Loeblich and Tappan, 1982 (*1917), p. 34 (subfamily; invalid, ICZN Art. 39).

Test trochoid, few chambers per whorl; wall with some distinctly perforate areas interspersed with imperforate inflational pustules; aperture umbilical, a high arch with bordering lip. M. Jurassic (Bathonian) to L. Cretaceous (Hauterivian).

Remarks: Family group names based on the homonym *Caucasella* Longoria, 1974 (non *Caucasella* Moissiev, 1934) are invalid. The Globuligerinidae has numerous inflational pustules on the surface but lacks true spines such as those of the Globigerinidae; pores are grouped in local areas as in the Favusellidae, but only discrete pustules are present, in contrast to the imperforate reticulum surrounding pore regions in the Favusellidae.

CONOGLOBIGERINA Morozova, 1961

Plate 499, figs. 1-6 and 15-17

Type species: Globigerina (Conoglobigerina) dagestanica Morozova, in Morozova and Moskalenko, 1961; OD.

Globigerina (Conoglobigerina) Morozova, in Morozova and Moskalenko, 1961 (*2191), p. 24.
Conoglobigerina Fuchs, 1973 (*1193), p. 454 (nom. transl.).
Woletzina Fuchs, 1973 (*1193), p. 460; type species: *Globigerina jurassica* Gofman, 1958 (*1259), p. 125; OD.

Test subconical, high trochospiral coil of two to four whorls, three to six rapidly enlarging spherical chambers per whorl, umbilicus small and shallow, peripheral outline lobulate, periphery rounded; wall calcareous, hyaline, surface with rounded to elongate imperforate tubercles that may fuse into short costellae, wall perforate between tubercles; aperture an umbilical arch, with narrow bordering lip. M. Jurassic (Bajocian) to U. Jurassic (Tithonian); USSR: Caucasus, Crimea, Azerbaydzhan, Turkmenia; Poland; Bulgaria; Canada: Nova Scotia, Grand Banks.

GLOBULIGERINA Bignot and Guyader, 1971

Plate 499, figs. 7-14

Type species: Globigerina oxfordiana Grigyalis, 1958 (*1301), p. 110; OD.

Globigerina (Globuligerina) Bignot and Guyader, 1971 (*236), p. 80.
Globigerina (Globuligerina) Bignot and Guyader, 1970 (*235), p. 1 (name not available, ICZN Art. 13 (a)(i), not described).
Globuligerina Fuchs, 1973 (*1193), p. 464 (nom. transl.); type species: *Globuligerina frequens* Fuchs, 1973, p. 465 (nom. superfl.) = *Globigerina oxfordiana* Grigyalis, 1958 = *Globuligerina oxfordiana* (Grigyalis) Bignot and Guyader, 1971 (syn.: *Globuligerina conflicta* Huddleston, 1982, *1572, p. 637, nom. superfl.).
Polskanella Fuchs, 1973 (*1193), p. 456; type species: obj.; OD.
Caucasella Longoria-Treviño, 1974 (*1936), p. 1741-B (name not available, ICZN Art. 13 (a)(i), not described).
Caucasella Longoria, 1974 (*1933), p. 48 (non *Caucasella* Moisseev, 1934); type species: *Globigerina hoterivica* Subbotina, 1953 (*3079), p. 50; OD.

Test high to low trochospiral, with two to four whorls of rapidly enlarging globular chambers, umbilicus small, periphery rounded, peripheral outline lobulate, sutures radial, depressed; wall calcareous, hyaline, radial, finely perforate (about 30 pores per 100 μm^2), surface with imperforate small tubercles and costellae that rarely have a few pores and may appear cancellate; aperture a high umbilical arch, bordered above by a narrow lip. M. Jurassic (Bathonian) to L. Cretaceous (Hauterivian): USSR: Lithuania, Komi ASSR, Turkmen, Dagestan, N. Caucasus, Azerbaydzhan, Crimea; Sweden; France; Germany.

Remarks: In describing the genus *Globuligerina*, Bignot and Guyader (1971, ***236**) listed the type species as "*Globigerina oxfordiana* Grigelis, 1956 emend. Bignot and Guyader, 1966 et 1970 [1971]." This was interpreted as a deliberately misidentified type species by Fuchs (1973, ***1193**) and by Huddleston (1982, ***1572**). If so, the species would be recognized as *Globuligerina oxfordiana* Bignot and Guyader (ICZN Art. 70 (c)), and both *G. frequens* Fuchs and *G. conflicta* Huddleston are superfluous names. However, the "emendation" by Bignot and Guyader consisted merely of a modified description based on SEM illustrations of specimens they identified without question as *G. (Globuligerina) oxfordiana* Grigyalis. Specimens of *Globuligerina oxfordiana* from the Soviet Kostroma region are seen in SEM (Gorbachik, 1983, ***1270**) to be identical with those illustrated by Bignot and Guyader from France, as the latter authors had indicated originally, and as was confirmed by Grigyalis and Gorbachik (1980, ***1309**). Grigyalis and Gorbachik (1980) noted that the specimens described as *Polskanella oxfordiana* by Fuchs, if correctly illustrated, are probably neither conspecific nor congeneric with *Globuligerina oxfordiana*, as they appear to have relict apertures.

According to Grigyalis and Gorbachik (1980, ***1309**, p. 25), the type species of *Caucasella* is referrable to *Globuligerina*. Although *Globuligerina* has been variously placed in the Globigerinidae and Favusellidae, it differs in wall character from both.

Family FAVUSELLIDAE Longoria, 1974

Favusellidae Longoria, 1974 (***1933**), p. 74.
Favusellinae Loeblich and Tappan, 1982 (***1917**), p. 34 (subfamily: nom. transl.).

Test trochospirally coiled, chambers inflated, rounded to ovate; wall cancellate, with abundantly perforated fields bordered by imperforate ridges; primary aperture umbilical to slightly extraumbilical, with an imperforate lip; umbilicus narrow to wide and deep, margin noncarinate. L. Cretaceous (Barremian) to U. Cretaceous (Cenomanian).

FAVUSELLA Michael, 1973

Plate 500, figs. 1-9

Type species: Globigerina washitensis Carsey, 1926 (***495**), p. 44; OD.

Favusella Michael, 1973 (***2097**), p. 212.
Reticuloglobigerina Banner, 1982 (***123**), p. 188, 199; type species: obj.; OD(M).

Test trochospirally coiled, globular chambers rapidly enlarging, four to five in each of the two to three whorls, sutures radial, depressed, umbilicus narrow to wide, periphery broadly rounded, peripheral outline lobulate; wall calcareous, hyaline, optically radial, perforate, without keel or poreless carinal band, surface with a distinct honeycomblike pattern of costellae, few to many tiny pores in each of the rectangular to hexagonal areas, and rare pores on the elevated reticulum; aperture an interiomarginal arch of varied extent, ranging from umbilical to spiroumbilical and bordered by a narrow lip. L. Cretaceous (Barremian) to U. Cretaceous (L. Cenomanian); cosmopolitan.

Remarks: The status of *Reticuloglobigerina* is discussed by Loeblich and Tappan (1984, ***1918**, p. 38).

Family ROTALIPORIDAE Sigal, 1958

Rotaliporidae Sigal, 1958 (***2919**), p. 264.
Ticinellidae Longoria-Treviño, 1974 (***1936**), p. 1741-B (name not available, ICZN Art. 13(a)(i), no description).
Ticinellidae Longoria, 1974 (***1933**), p. 93.

Test trochospirally enrolled, primary aperture umbilical-extraumbilical in position and with bordering lip, secondary sutural apertures on umbilical side open into posterior edge of chambers. L. Cretaceous (Aptian) to U. Cretaceous (Coniacian).

Subfamily TICINELLINAE Longoria, 1974

Ticinellinae Masters, 1977 (***2056**), p. 517 (nom. transl. ex family).

Periphery rounded, noncarinate, and without imperforate carinal band. L. Cretaceous (Aptian) to U. Cretaceous (Coniacian).

BITICINELLA Sigal, 1956

Plate 500, figs. 10-12

Type species: Anomalina breggiensis Gandolfi, 1942 (*1211), p. 102; OD.

Biticinella Sigal, 1956 (*2918), p. 35.

Ticinella (Biticinella) Risch, 1971 (*2627), p. 52 (nom. transl.).

Test with early whorls in a flat trochospiral coil, later whorls planispiral and biumbilicate, involute to partially evolute, sutures radial, depressed, peripheral outline lobulate, peripheral margin rounded and noncarinate; wall calcareous, moderately coarsely perforate; aperture a low and commonly asymmetrical, interiomarginal, umbilical-equatorial arch, parts of successive apertures may remain as relict supplementary apertures on one side of the test, the other side with accessory apertures opening into the posterior part of the chamber and bordered by a lip that is a continuation from that of the primary aperture. L. Cretaceous (U. Albian) to U. Cretaceous (L. Cenomanian); Europe; N. Africa.

CLAVIHEDBERGELLA Banner and Blow, 1959

Plate 500, figs. 13-15

Type species: Hastigerinella subcretacea Tappan, 1943 (*3121), p. 513; OD.

Praeglobotruncana (Clavihedbergella) Banner and Blow, 1959 (*124), p. 8, 18.

Clavihedbergella Loeblich and Tappan, 1961 (*1901), p. 278 (nom. transl.).

Hedbergella (Clavihedbergella) Moullade, 1964 (*2195), p. 60 (nom. transl.).

Test flattened, early globular chambers in a low trochospiral coil, last few chambers radially elongate to subclavate in the plane of coiling, peripheral outline lobulate, rounded peripheral margin with an imperforate band on the globular chambers but absent from the elongate ones; aperture a moderately high interiomarginal umbilical-extraumbilical arch, with imperforate bordering lip, and poorly developed relict apertures remaining in the umbilical area. L. Cretaceous (Aptian) to U. Cretaceous (Coniacian); Europe; North America.

CLAVITICINELLA Banner, 1982

Plate 501, figs. 4-6

Type species: Claviticinella digitalis Banner, 1982 (*123), p. 186, fig. 5.99 (validated by consideration as of specific rank, ICZN Arts. 23 (j), 50 (c)(i)); OD.

Claviticinella Banner, 1982 (*123), p. 154 (validated by reference to type species, made available by elevation to specific rank, p. 186).

Claviticinella El-Naggar, 1971 (*1103), p. 436 (name not available, ICZN Art. 13(b), type species not available): type species: *Ticinella raynaudi* var. *digitalis* Sigal, 1966 (*2920), p. 202 (name not available, infrasubspecific, ICZN Art. 45 (e), (f)(iv)); OD.

Test low trochospiral, with chambers radially elongate to subclavate, sutures constricted, periphery rounded; wall calcareous, perforate; primary aperture interiomarginal, an arch with bordering lip extending from the periphery to the umbilicus, secondary sutural aperture at the proximal side of the chamber, sutural apertures remaining open as new chambers are added. L. Cretaceous (U. Albian); Madagascar.

TICINELLA Reichel, 1950

Plate 501, figs. 1-3

Type species: Anomalina roberti Gandolfi, 1942 (*1211), p. 100; OD.

Globotruncana (Ticinella) Reichel, 1950 (*2550), p. 600.

Ticinella Bermúdez, 1952 (*205), p. 116 (nom. transl.).

Rotalipora (Ticinella) Klaus, 1960 (*1706), p. 800 (nom. transl.).

Hedbergella (Ticinella) Moullade, 1964 (*2195), p. 60 (nom. transl.).

Test trochospiral, biconvex to planoconvex, umbilicate, chambers globular to ovate, sutures curved on the spiral side, radial on the umbilical side, depressed, periphery rounded and without a keel or poreless margin, peripheral outline lobulate; wall calcareous, optically radial, surface smooth, finely perforate, secondary lamellae emphasizing the surface rugosity and obscuring some pores but enlarging others. L. Cretaceous (U.

Aptian) to U. Cretaceous (L. Cenomanian): cosmopolitan.

Subfamily ROTALIPORINAE Sigal, 1958

Rotaliporinae Banner and Blow, 1959 (***124**), p. 8 (nom. transl. ex family).

Test with imperforate carinal band and peripheral keel, commonly resulting in an angular periphery. L. Cretaceous (Albian) to U. Cretaceous (Turonian).

ANATICINELLA Eicher, 1973

Plate 501, figs. 7-14

Type species: Globorotalia? multiloculata Morrow, 1934 (***2192**), p. 200; OD.

Anaticinella Eicher, 1973 [Jan. 12] (***1080**), p. 185.

Pseudoticinella Longoria, 1973 [Sept.] (***1932**), p. 418; type species: obj.; OD.

Test with inflated chambers in a low trochospiral coil of about three whorls, five to nine chambers per whorl, sutures straight to curved, radial, depressed, wide umbilicus partly obscured by an umbilical cover plate, periphery broadly rounded or with weakly developed keel, peripheral outline lobulate; wall calcareous, radial in structure, surface smooth to faintly papillose, perforated by small but abundant and randomly distributed pores but with poreless peripheral band or weak carina; aperture interiomarginal, umbilical-extraumbilical, bordered by a distinct lip that continues into a wide imperforate flap over the umbilicus, an asymmetrical fold in the flap resulting in an accessory umbilical aperture that in successive chambers gradually becomes aligned with the suture, occasional specimens may have two such openings in the later chambers. U. Cretaceous (M. Cenomanian to L. Turonian); USA: South Dakota, Kansas, Texas.

ROTALIPORA Brotzen, 1942

Plate 502, figs. 1-15; plate 833, figs. 1-4

Type species: Rotalipora turonica Brotzen, 1942 = *Globorotalia cushmani* Morrow, 1934 (***2192**), p. 199; OD.

Rotalipora Brotzen, 1942 (***428**), p. 32.

Thalmanninella Sigal, 1948 (***2914**), p. 101; type species: *Thalmanninella brotzeni* Sigal, 1948 = *Globorotalia greenhornensis* Morrow, 1934 (***2192**), p. 199; OD.

Rotalipora (Thalmanninella) Klaus, 1960 (***1706**), p. 800 (nom. transl.).

Globotruncana (Rotalipora) Moullade, 1964 (***2195**), p. 60 (nom. transl.).

Pseudothalmanninella Wonders, 1978 (***3387**), p. 125; type species: *Globotruncana ticinensis* forma *tipica* Gandolfi, 1942 (***1211**), p. 113 [recte *G. ticinensis* Gandolfi]; OD.

Pseudorotalipora Ion, 1983 (***1583**), p. 95; type species: *Rotalipora praemontsalvensis* Ion, 1976 (***1582**), p. 431; OD.

Test trochospiral, biconvex to planoconvex, umbilicate, chambers angular to rhomboid in edge view, sutures elevated, curved, oblique on the spiral side, depressed to flush, straight to curved and radial on the umbilical side, periphery angular with a single keel, peripheral outline entire to lobulate; wall calcareous, finely and densely perforate, optically radial, surface smooth to pustulose, sutures may be thickened to beaded; aperture interiomarginal, extraumbilical-umbilical, bordered by a narrow to wide imperforate lip, accessory apertures along the sutural margin formed by an umbilical flaplike extension from the chamber and bordered by a narrow imperforate lip. L. Cretaceous (M. Albian) to U. Cretaceous (Turonian); cosmopolitan.

Superfamily GLOBOTRUNCANACEA Brotzen, 1942

Globotruncanacea Loeblich and Tappan, 1982 (***1916**), p. 381, nom. transl. ex subfamily Globotruncaninae.

Test trochospiral, chambers globular to angular and may have peripheral imperforate carinal band; primary aperture umbilical, tegilla of successive chambers covering the umbilical area and may have accessory intralaminal and infralaminal apertures. U. Cretaceous (Turonian to Maastrichtian).

Family GLOBOTRUNCANIDAE Brotzen, 1942

Globotruncanidae Morozova, 1957 (***2188**), p. 1111, nom. transl. ex subfamily Globotruncaninae.

Marginotruncanidae Pessagno, 1967 (***2387**), p. 298.

Abathomphalidae Pessagno, 1967 (***2387**), p. 371.

Test trochospiral, chambers angular, periphery truncate or carinate; primary aperture umbilical, covered by a spiral system of tegilla that is provided with accessory intralaminal and infralaminal apertures. U. Cretaceous (Turonian to Maastrichtian).

Subfamily GLOBOTRUNCANINAE Brotzen, 1942

Globotruncaninae Brotzen, 1942 (*428), p. 28.

Primary aperture umbilical, and covered by spiral series of tegilla provided with accessory intralaminal and infralaminal openings; in addition, rarely may have sutural openings on spiral side. U. Cretaceous (Turonian to Maastrichtian).

CONTUSOTRUNCANA Korchagin, 1982

Plate 503, figs. 1-7

Type species: Pulvinulina arca var. *contusa* Cushman, 1926 (***736**), p. 23; OD.

Contusotruncana Korchagin, 1982 (***1719**), p. 119.

Rosita Caron, González Donoso, Robaszynski, and Wonders, in Robaszynski et al., 1984 (***2632**), p. 244; type species: *Globotruncana fornicata* Plummer, 1931 (***2423**), p. 198; OD.

Test trochospiral, with strongly convex spiral side, early chambers globular, later broad, low, and semilunate, with an undulating surface as seen from the spiral side, ovate from the umbilical side, sutures oblique, curved, thickened, elevated, and nodose on the spiral side, radial and depressed around the broad umbilicus that occupies up to one-half the test diameter on the flat to concave umbilical side, peripheral outline entire to lobulate, periphery with two very closely spaced keels separated by narrow imperforate carinal band and may be reduced to a single keel in the final few chambers; wall calcareous, finely perforate, radial, surface smooth between the elevated and nodose sutures and keel of the spiral side, finely pustulose on the umbilical side; aperture interiomarginal and umbilical, portici of successive apertures protruding obliquely into the umbilicus, with a distal accessory aperture beneath each porticus. U. Cretaceous (Santonian to Maastrichtian); cosmopolitan.

GANSSERINA Caron, González Donoso, Robaszynski, and Wonders, 1984

Plate 506, figs. 1-7

Type species: Globotruncana gansseri Bolli, 1951 (***281**), p. 196; OD.

Gansserina Caron, González Donoso, Robaszynski, and Wonders, in Robaszynski et al., 1984 (***2632**), p. 292.

Test in a low to flat trochospiral coil, spiral side flat, umbilical side convex with wide umbilicus that is occupied by portici and tegilla, early chambers globular, later ones rhomboidal in section, sutures strongly curved, elevated and oblique on the spiral side, radial and depressed on the umbilical side, distinct peripheral keel on the edge of the spiral side, the umbilical peripheral margin with a less developed second keel consisting only of a row of pustules or this may be absent, peripheral outline entire to weakly lobulate; wall calcareous, perforate, surface pustulose, particularly on the umbilical side of the test; primary aperture interiomarginal, umbilical, and bordered by a wide porticus, those of successive chambers remaining as accessory apertures, and portici may fuse into tegilla in the later stage. U. Cretaceous (L. to U. Maastrichtian); Trinidad; Spain; Turkey; Egypt; Tunisia; Mid-Pacific.

GLOBOTRUNCANA Cushman, 1927

Plate 504, figs. 1-10; plate 505, figs. 1-5

Type species: Pulvinulina arca Cushman, 1926 (***736**), p. 23; OD.

Globotruncana Cushman, 1927 (***742**), p. 91.

Rosalinella Marie, 1941 (***2031**), p. 237, 256, 258; type species: *Rosalina linneiana* d'Orbigny, 1839 (***2304**), p. 101; OD.

Truncomarginata Korchagin, 1982 (***1719**), p. 117; type species: *Globotruncana linnei* subsp. *bulloides* Vogler, 1941 (***3305**), p. 287 (syn.; *Marginotruncana paraventricosa* Hofker, 1956, ***1509**, p. 326); OD.

Rosalinotruncana Korchagin, 1982 (***1719**), p. 118; type species: *Globotruncana lapparenti* Brotzen, 1936 (***425**), p. 175; OD.

Test high to low trochospiral, umbilicus occupying from one-fourth to one-half the diameter of the flat to concave umbilical side, peripheral margin truncate and bicarinate, keels separated by an imperforate carinal band, keel on the umbilical side less well developed and may be absent from the final few chambers, peripheral outline entire to lobulate; wall calcareous, finely perforate, surface generally smooth on the spiral side, may be pustulose on the umbilical side, particularly on the earlier chambers, sutures curved to straight, elevated on the spiral side and depressed, flush, or elevated on the umbilical side: primary aperture interiomarginal and umbilical, may be bordered by portici in the early stage, later or always with a system of tegilla that cover most of the umbilicus and have both proximal and distal accessory apertures. U. Cretaceous (Santonian to U. Maastrichtian); cosmopolitan.

GLOBOTRUNCANITA Reiss, 1957

Plate 505, figs. 6-9

Type species: Rosalina stuarti de Lapparent, 1918 (*1792), p. 11; OD(M).

Globotruncanita Reiss, 1957 (May) (*2557), p. 3; also see Reiss, 1957 (Oct.) (*2558), p. 136.

Test trochospiral, biconvex, chambers rhomboidal in section, sutures elevated, oblique or radial, straight or curved on the spiral side, depressed or elevated on the umbilical side, periphery with a beaded single keel that is continuous with the sutures on the spiral side, peripheral outline subcircular, polygonal, or lobate; wall calcareous, finely perforate, smooth except for the beaded sutures and peripheral keel and a concentric row of pustules near the umbilicus on the umbilical side; primary aperture interiomarginal, umbilical to slightly extraumbilical, successive apertures covered by portici that may remain free or may coalesce in the umbilicus to leave proximal accessory apertures. U. Cretaceous (Campanian to Maastrichtian; cosmopolitan.

KASSABIANA Salaj and Solakius, 1984

Plate 507, figs. 1-9

Type species: Globotruncana falsocalcarata Kerdany and Abdelsalam, 1969 (*1674), p. 261; OD.

Kassabiana Salaj and Solakius, 1984 (*2716), p. 1201.
Kassabiana Salaj, 1983 (*2707), p. 202 (name not available, ICZN Art. 13 (a)(i), no description).

Test trochospiral, planoconvex, spiral side flat to slightly convex, umbilical side convex, early chambers small and globular, then with triangular outline and peripheral spines, later chambers rectangular to crescentic, of rhomboidal section and slightly excavated on the spiral side, sutures straight, oblique, and elevated on the spiral side, slightly curved and raised around the wide and deep umbilicus on the umbilical side, periphery with a single keel; wall calcareous, perforate, except for the imperforate keel, surface smooth but with peripheral spines and surface pustules on the early chambers, of decreasing importance in later chambers; primary aperture interiomarginal and umbilical, with apertural flaps or portici extending into the umbilicus and having semiarcuate accessory apertures. U. Cretaceous (U. Maastrichtian); Egypt; Iraq; Tunisia; Pakistan.

MARGINOTRUNCANA Hofker, 1956

Plate 503, figs. 8-11

Type species: Rosalina marginata Reuss, 1846 (*2571), p. 36; OD.

Marginotruncana Hofker, 1956 (*1509), p. 319.

Test trochospiral, biconvex to planoconvex, sutures sigmoidal, especially on the umbilical side, curved, elevated and may be beaded on the spiral side, imperforate carinal band between the two peripheral keels, peripheral outline entire to lobulate; wall calcareous, perforate, surface smooth to pustulose; primary aperture interiomarginal and extraumbilical-umbilical, bordered by a triangular porticus, those of successive apertures fusing and may even form true tegilla, infralaminal and occasionally intralaminal accessory apertures present. U. Cretaceous (M. Turonian to Santonian): cosmopolitan.

RADOTRUNCANA El-Naggar, 1971

Plate 507, figs. 10-13

Type species: Globotruncana calcarata Cushman, 1927 (*743), p. 115; OD.

Plummerita (Radotruncana) El-Naggar, 1971 (*1103), p. 434.
Radonita Salaj, 1986 (*2709A), p. 54 (err. cit.?, includes *G. calcarata*).

Test trochospiral, planocovex with flattened spiral side and strongly convex umbilical side, chambers rhomboidal in section, the five to seven chambers of the final whorl each with a tubulospine at the proximal end of the chamber and in the plane of the spiral surface, less frequently a tubulospine may arise at the junction of two adjacent chambers, tubulospines increasing in size and length by lamellar growth, so that earlier ones of the final whorl may be larger than the later ones, umbilicus wide, up to one-half the test diameter, sutures radial to curved, depressed to slightly elevated and may be nodose, periphery with a single keel, peripheral outline polygonal; wall calcareous, densely perforate, surface smooth or with pustules covering the surface of early whorls and present along the sutures and peripheral keel; primary aperture umbilical, bordered by a large flat porticus, those of successive chambers imbricated within the umbilicus and may partially fuse. U. Cretaceous (U. Campanian); cosmopolitan.

RUGOTRUNCANA Brönnimann and Brown, 1956

Plate 506, figs. 8-10

Type species: Rugotruncana tilevi Brönnimann and Brown, 1956; OD.

Rugotruncana Brönnimann and Brown, 1956 (***394**), p. 546.
Globotruncana (Rugotruncana) Banner and Blow, 1959 (***124**), p. 11 (nom. transl.).

Test with a low trochospiral coil, early chambers subglobular and inflated, later chambers slightly compressed, sutures curved on the spiral side and continuous with the peripheral carina, straight, radial, and depressed on the umbilical side, umbilicus wide, periphery with double-keeled imperforate carinal band; wall calcareous, finely perforate, surface strongly pustulose, adjacent pustules may coalesce into short costellae without distinct alignment, although resulting in a rugose surface; primary aperture interiomarginal, umbilical, elongate portici in the early chambers, later with distinctly protruding tegilla provided with accessory apertures. U. Cretaceous (U. Maastrichtian): Cuba; Trinidad.

Remarks: The revised definition of this genus given by Pessagno (1967, ***2387**, p. 368) stated, in part "coarse rugosities or costellae, *always* arranged in a distinctive meridorial [sic] pattern, present on the surface of the test," but does not agree with the characters of the type species. Topotypes of *R. tilevi* (received from N. K. Brown) do not have the meridional alignment of costellae shown in the original drawing. Furthermore, as was correctly shown in the original illustrations, the chambers of *R. tilevi* are much more globular and the costae more widely spaced than in *Globotruncana circumnodifer* subsp. *subcircumnodifer* Gandolfi, hence the two species are not synonymous as had been stated by Pessagno, and *R. tilevi* remains the correct name for the type species of *Rugotruncana.*

SIGALITRUNCANA Korchagin, 1982

Plate 508, figs. 1-7; plate 833, figs. 5-12

Type species: Globotruncana sigali Reichel, 1950 (***2550**), p. 610; OD.

Sigalitruncana Korchagin, 1982 (***1719**), p. 120.
Caronita Salaj and Gašpariková, 1983 (***2712**), p. 598; type species: obj.; OD.
Carpathoglobotruncana Ion, 1983 (***1583**), p. 115; type species: *Marginotruncana pileoliformis* Lamolda, 1977 (***1786**), p. 399; also see Lamolda, 1978 [May] (***1787**), p. 472; OD.

Test a low trochospiral, planoconvex, with arched spiral side and flattened umbilical side, sutures straight to curved, radial, thickened and elevated on the spiral side, sinuate and depressed around the small umbilicus on the umbilical side, peripheral keel formed by two rows of closely spaced pustules in the early part and may grade into a simple imperforate band on the final chamber; wall calcareous, perforate, surface smooth except for the pustulose keel and sutures and early coils on the spiral side; primary aperture extraumbilical-umbilical and with a porticus, the portici of successive chambers overlapping and projecting into the umbilicus, bordering or covering it. U. Cretaceous (Turonian to L. Campanian); cosmopolitan.

Subfamily GLOBOTRUNCANELLINAE Maslakova, 1964

Globotruncanellinae Maslakova, 1964 (***2052**), p. 113.

Test with single keel and with umbilical tegilla and infralaminal accessory apertures. U. Cretaceous (Maastrichtian).

GLOBOTRUNCANELLA Reiss, 1957

Plate 508, figs. 8-10

Type species: Globotruncana citae Bolli, 1951 (***281**), p. 197 = *Globotruncana havanensis* Voorwijk, 1937 (***3323**), p. 195; OD.

Globotruncanella Reiss, 1957 (***2558**), p. 135.
Globotruncanella Reiss, 1957 (***2557**), p. 3 (name not available, ICZN Art. 13 (a)(i), no description).

Test a low trochospiral, planoconvex to concavoconvex, compressed, chambers petaloid, about five in the final whorl, sutures radial, depressed, umbilicus of narrow to medium size, periphery acutely angled, with nonperforate carinal band or true keel, peripheral outline lobulate; wall calcareous, perforate, with pustulose suface and peripheral keel; primary aperture interiomarginal, extraumbilical-umbilical, in early chambers provided with a small triangular porticus, later with a distinct tegillum crossing the umbilicus, and with accessory apertures around the margins. U. Cretaceous (M. to U. Maastrichtian); cosmopolitan.

Remarks: Robaszynski et al. (1984, ***2632**, p. 264) regarded *Globotruncana citae* as a junior synonym of *Globorotalia pschadae* Keller, 1946. However, the holotype of Keller's species shows no surface pustules, and no portici or tegilla, and was stated to be of Senonian age. True *Globotruncanella* is restricted to the Maastrichtian, including the type species, *Globotruncana citae* and its prior synonym *Globotruncana havanensis*. The similarly Maastrichtian specimens figured as *Globotruncanella pschadae* by Robaszynski et al., 1984 (***2632**), pl. 44, fig. 7 and as *Globorotalia pschadae* by Subbotina, 1953 (***3079**), pl. 16, figs. 2-6, should be placed in a distinct species, as they have a much narrower umbilicus and less distinct tegilla than does *Globotruncanella havanensis*.

Subfamily ABATHOMPHALINAE Pessagno, 1967

Abathomphalinae Loeblich and Tappan, 1982 (***1917**), p. 34, nom. transl. ex family Abathomphalidae.

Test trochospiral, umbilical side lacking the wide umbilicus of the Globotruncaninae; early chambers with porticus, later with tegilla, that of the final chamber covering the umbilical area, infralaminal accessory openings present. U. Cretaceous (Maastrichtian).

ABATHOMPHALUS Bolli, Loeblich, and Tappan, 1957

Plate 509, figs. 1-9

Type species: Globotruncana mayaroensis Bolli, 1951 (***281**), p. 198; OD.

Abathomphalus Bolli, Loeblich, and Tappan, 1957 (***292**), p. 43.

Test in a low to flat trochospiral, umbilicate, four to five petaloid chambers per whorl, sutures curved and oblique, depressed to thickened and nodose on the spiral side, depressed and radial around the small umbilicus on the umbilical side, periphery angular to truncate, bicarinate, the two variously spaced keels bordering an imperforate carinal band, keel on the umbilical side may be reduced to a row of short transverse costellae; wall calcareous, perforate, surface with pustules and short costellae in concentric alignment on the spiral side and radial on the umbilical side; primary aperture interiomarginal, extraumbilical-umbilical, and with a porticus, portici of successive chambers coalescing in the early stage, larger in the adult stage and joined only at a few points to form a tegilla having distal accessory apertures. U. Cretaceous (U. Maastrichtian); cosmopolitan.

Family RUGOGLOBIGERINIDAE Subbotina, 1959

Rugoglobigerinidae Loeblich and Tappan, 1982 (***1917**), p. 34, nom. transl. ex subfamily Rugoglobigerininae.
Rugoglobigerininae Subbotina, in Rauzer-Chernousova and Fursenko, 1959 (***2531**), p. 303 (subfamily).
Helvetiellinae Longoria and Gamper, 1984 (***1935**), p. 172 (subfamily).

Test trochospiral, chambers inflated, periphery rounded, not carinate; wall with pustules, costellae, or other rugosities; aperture umbilical, with portici or tegilla. U. Cretaceous (Coniacian to Maastrichtian).

ARCHAEOGLOBIGERINA Pessagno, 1967

Plate 510, figs. 1-10

Type species: Archaeoglobigerina blowi Pessagno, 1967; OD.

Archaeoglobigerina Pessagno, 1967 (***2387**), p. 315.
Fissoarchaeoglobigerina Abdel-Kireem, 1978 (***1**), p. 58 (also as *Fissoarchaeglobigerina*, p. 58); type species: *Fissoarchaeoglobigerina aegyptica* Abdel-Kireem and Abdou, in Abdel-Kireem, 1978; OD.
Kassabella El-Nakhal, 1984 (***1106**), p. 140; type species: *Loeblichella carteri* Kassab, 1976 (***1661**), p. 217; OD.

Test a low to flat trochospire, chambers globular and enlarging rapidly, four to six in the final whorl, sutures radial and depressed, umbilicus wide, occupying one-fourth to one-third of the diameter, periphery rounded, without keel or imperforate carinal band, peripheral outline lobate; wall calcareous, perforate, surface rugose, with irregularly arranged pustules and costellae, never meridionally aligned; primary aperture interiomarginal, umbilical, with tegilla filling the umbilicus and provided with both proximal and distal accessory apertures. U. Cretaceous (Coniacian to U. Maastrichtian): cosmopolitan.

Remarks: As noted in the discussion of *Rugotruncana*, the type species of that genus has two peripheral keels and irregularly arranged costellae, hence *Archaeoglobigerina* is here restricted to those species without keel. It differs from *Rugoglobigerina* in lacking meridional alignment of pustules and costellae.

Both *Fissoarchaeoglobigerina* and *Kassabella* were described as having sutural supplementary apertures on the spiral side, the former said to have tegilla and the latter to have simple apertural lips. However, the presence of true secondary openings appears questionable, and the strongly thickened tegillum reported for *Fissoarchaeoglobigerina* appears to be the result of secondary calcification rather than a characteristic feature of the foraminifer. The "well-developed lip extending into the umbilicus" of *Kassabella* is not shown in the original figures, although the umbilicus appears to show remnants of a tegillum. Both are regarded as synonyms of *Archaeoglobigerina*, pending description of better preserved material.

BUCHERINA Brönnimann and Brown, 1956

Plate 509, figs. 10-12

Type species: Bucherina sandidgei Brönnimann and Brown, 1956; OD.

Bucherina Brönnimann and Brown, 1956 (*394), p. 557.

Test planoconvex, with low trochospiral coil, later commonly with a change in plane of coiling so that the final whorl is in a lower plane, chambers inflated on the spiral side, somewhat flattened on the umbilical side, sutures straight and depressed, umbilicus wide and deep, periphery truncate, with a single keel at the spiral margin; wall calcareous, perforate, surface prominently papillate to hispid and lacking meridional costellae; primary aperture interiomarginal, umbilical, with a delicate tegilla, that commonly is broken out. U. Cretaceous (U. Maastrichtian): Cuba; N. and S. Atlantic; Egypt.

KUGLERINA Brönnimann and Brown, 1956

Plate 511, figs. 1-3 and 7-9

Type species: Rugoglobigerina rugosa subsp. *rotundata* Brönnimann, 1952 (*373), p. 34; OD.

Kuglerina Brönnimann and Brown, 1956 (*394), p. 557.

Helvetiella Longoria and Gamper, 1984 (*1935), p. 174; type species: *Helvetiella helvetia* Longoria and Gamper, 1984; OD.

Test relatively large, up to 0.5 mm in diameter, with moderately high trochospiral coil, chambers globular to somewhat elongate as seen in edge view, enlarging gradually, four to six in the final whorl, sutures radial, depressed, umbilicus about one-fourth the test diameter, periphery rounded, noncarinate, peripheral outline lobulate; wall calcareous, perforate, surface with prominent pustules and rugosities but without regularly aligned costellae; primary aperture umbilical, provided with tegilla and with both proximal and distal accessory apertures. U. Cretaceous (M. to U. Maastrichtian); Trinidad; Tunisia.

Remarks: *Helvetiella* was described as differing from *Rugoglobigerina* in lacking a meridional alignment of rugosities and from *Archaeoglobigerina* in lacking an imperforate carinal band (although none is present in the type species of either) and in the heavily ornamented surface. However, it appears very similar to *Kuglerina* and is here regarded as synonymous.

PLUMMERITA Brönnimann, 1952

Plate 511, figs. 4-6

Type species: Rugoglobigerina (Plummerella) hantkeninoides subsp. *hantkeninoides* Brönnimann, 1952; OD.

Rugoglobigerina (Plummerita) Brönnimann, 1952 (*376), p. 146 (nom. subst. pro *Rugoglobigerina (Plummerella)* Brönnimann, 1952).

Rugoglobigerina (Plummerella) Brönnimann, 1952 (*373), p. 37 (non *Plummerella* de Long, 1942); type species: obj.; OD.

Plummerita Brönnimann and Brown, 1956 (*394), p. 555, 556 (nom. transl.).

Test with inflated triangular chambers in a low to flat trochospire, those of the final whorl radially elongate and ending in a tubulospine, sutures radial, depressed, umbilicus small, periphery rounded to compressed between tubulospines, peripheral outline strongly lobate and stellate; wall calcareous, perforate, surface with rugosities and costellae in meridional alignment; primary aperture interiomarginal, umbilical, provided with tegilla, and having both proximal and distal accessory apertures. U. Cretaceous (Maastrichtian); cosmopolitan.

RUGOGLOBIGERINA Brönnimann, 1952

Plate 511, figs. 13-15

Type species: Globigerina rugosa Plummer, 1927 (*2421), p. 38; OD.

Rugoglobigerina Brönnimann, 1952 (*373), p. 16.

Test in low to flat trochospiral coil of rapidly enlarging globular chambers, biconvex, umbilicate, umbilicus occupying up to one-half the test diameter, periphery rounded, noncarinate; wall calcareous, perforate, surface with pustules, rugosities, and costellae in a meridional pattern; primary aperture interiomarginal, umbilical, with prominent tegilla and large proximal and distal accessory apertures. U. Cretaceous (L. Santonian to Maastrichtian); cosmopolitan.

TRINITELLA Brönnimann, 1952

Plate 511, figs. 10-12

Type species: Trinitella scotti Brönnimann, 1952; OD.

Trinitella Brönnimann, 1952, (*373), p. 56.

Test in flat trochospiral, chambers enlarging rapidly as added, early ones globular, later chambers compressed to rhomboidal in section, imperforate carinal band or faint keel in the final whorl, sutures radial, depressed, peripheral margin rounded to truncate, peripheral outline lobulate; wall calcareous, perforate, surface covered with prominent pustules and costellae in meridional arrangement, less prominent on the final chamber; primary aperture interiomarginal, umbilical, bordered by an imperforate flap, those of successive chambers fusing into a tegillum having both proximal and distal accessory apertures. U. Cretaceous (M. and U. Maastrichtian): cosmopolitan.

Superfamily GLOBOROTALIACEA Cushman, 1927

Globorotaliacea Loeblich and Tappan, 1982 (*1917), p. 34, nom. transl. ex family Globorotaliidae.

Test trochospiral, periphery rounded to carinate; wall finely lamellar, perforate, of optically radial calcite, with inner organic lining and a primary organic membrane calcified on both sides to produce a primary bilamellar structure, but with thicker outer calcite layers; surface smooth, nonspinose, but may be pustulose or pitted, inflational pustules most prominent in the apertural region, pits when present are bordered by ridges and have one or more large pores at the center; primary aperture interiomarginal and extraumbilical-umbilical, may be bordered by an imperforate lip; supplementary sutural apertures and bullae may occur, accompanied by infralaminal accessory apertures. L. Paleocene (L. Danian) to Holocene.

Family EOGLOBIGERINIDAE Blow, 1979

Eoglobigerinidae Blow, 1979 (*259), p. 1203.

Test in low to moderately elevated trochospiral coil, small open umbilicus on umbilical side; wall smooth, nonspinose, and noncancellate, thin, finely perforate; aperture small to large, nearly circular to narrow and elongate, extraumbilical, interiomarginal, without a lip or thickened rim. L. Paleocene (L. Danian).

EOGLOBIGERINA Morozova, 1959

Plate 513, figs. 1-6

Type species: Globigerina (Eoglobigerina) eobulloides Morozova, 1959; OD.

Globigerina (Eoglobigerina) Morozova, 1959 (*2189), p. 1115.

Eoglobigerina Lipps, 1964 (*1871), p. 129 (nom. transl.).

Test tiny, trochospiral, four to six globular chambers visible in the final whorl, sutures radial, depressed, umbilicus small and open, periphery broadly rounded, peripheral outline lobulate; wall calcareous, thin, perforate, with finely pitted surface resulting from the enlarged pores; aperture a low interiomarginal arch situated near the umbilicus. L. Paleocene (L. Danian) to U. Paleocene (Thanetian); cosmopolitan.

GLOBOCONUSA Khalilov, 1956

Plate 512, figs 1-9

Type species: Globoconusa conusa Khalilov, 1956 = *Globigerina daubjergensis* Brönnimann, 1953 (*377), p. 340; OD.

Globoconusa Khalilov, 1956 (*1681), p. 249.

Globastica Blow, 1979 (*259), p. 1231; type species: *Globigerina daubjergensis* Brönnimann, 1953; OD.

Test tiny, low to high trochospiral, spiral side strongly convex, three to four inflated, subglobular, and rapidly enlarging chambers per whorl, umbilicus closed; wall calcareous, perforate, surface pustulose; aperture a small rounded interiomarginal opening near the umbilical area that may be covered by a bulla in the later stage and with one or more tiny sutural secondary openings against the previous whorl on the spiral side. L. Paleocene (Danian); cosmopolitan.

Remarks: Loeblich and Tappan (1964, *1910, p. C670) noted that *Globigerina daubjergensis* was a senior synonym of *Globoconusa conusa*. Blow later (1979, *259, p. 1232, 1386) stated that they were neither conspecific nor congeneric, but based his discussion of *G. conusa* on a reworked specimen from the British Thanetian that he so identified. *Globoconusa conusa* Khalilov, 1956, was described from the Danian of Azerbaydzhan, and Khalilov (1967, *1684, p. 142) explicitly placed "*Globoconusa* Khalilov 1956" and the holotype of *G. conusa* (specimen 242 in the Microfaunal Collections of the Institute of Geology, Akademiya Nauk Azerbaydzhan SSR) in the synonymy of *Globoconusa daubjergensis*. *Globastica* Blow, 1979 is a junior synonym of *Globoconusa* Khalilov, 1956.

PARVULARUGOGLOBIGERINA Hofker, 1978

Plate 513, figs. 7-15

Type species: Globigerina eugubina Luterbacher and Premoli Silva, 1964 (*1950), p. 105 (syn.: *Globorotalia (Turborotalia) longiapertura* Blow, 1979, *259, p. 1085); OD.

Parvularugoglobigerina Hofker, 1978 (*1527), p. 60.

Test tiny, low to flat trochospire of rapidly enlarging subglobular chambers in two and a half whorls, sutures radial to slightly curved, depressed, umbilicus closed, periphery broadly rounded, peripheral outline lobulate; wall calcareous, thin, sparsely perforate, surface very finely pustulose; aperture interiomarginal, ranging from a moderately high extraumbilical arch to a long narrow rimless opening extending up the apertural face in nearly equatorial position. L. Paleocene (L. Danian); Italy; Germany; Spain; USSR: E. of Caspian Sea; Pacific; Caribbean; Atlantic: off Florida.

Remarks: The original descriptions of neither the type species nor the genus correctly described the apertural features. The high narrow opening was first well illustrated in SEM by Smit (1977, *3003).

POSTRUGOGLOBIGERINA Salaj, 1986

Plate 512, figs. 10-13

Type species: Postrugoglobigerina hariana Salaj, 1986; OD.

Postrugoglobigerina Salaj, 1986 (*2709), p. 52.

Test small, trochospiral, with small umbilicus, chambers globular, sutures depressed; wall calcareous, finely and irregularly perforate, suface rough in appearance with abundant irregularly distributed pustules that may also be perforate, pustules few to absent on the final chamber; aperture interiomarginal, umbilical, a narrow slit, without a lip. L. Paleocene (L. Danian); Northwest Tunisia.

Family GLOBOROTALIIDAE Cushman, 1927

Globorotaliidae Cushman, 1927 (*742), p. 91.

Globorotaliinae Chapman and Parr, 1936 (*542), p. 145 (subfamily; nom. transl.).

Truncorotaliinae Subbotina, 1971 (*3081), p. 69 (subfamily).

Planorotalitinae Banner, 1982 (*123), p. 203 (subfamily).

Globorotaliini Fordham, 1986 (*1149A), p. 53 (tribe; nom. transl.).

Truncorotaliini Fordham, 1986 (*1149A), p. 53, 56 (tribe; nom transl.).

Obandyellini Fordham, 1986 (*1149A), p. 53, 56 (tribe; name not available, ICZN Art. 13(a)(i), no description).

Turborotaliini Fordham, 1986 (*1149A), p. 53, 56 (tribe; name not available, ICZN Art. 13(a)(i), no description).

Test trochospiral, subglobular to lenticular, or compressed; wall surface smooth to moderately pustulose, nonmuricate and nonspinose, surface of the adult may have a secondarily formed thick calcite crust; aperture interiomarginal, umbilical-extraumbilical, with rim or flaplike lip. Paleocene to Holocene.

ASTROROTALIA Turnovsky, 1958

Plate 514, figs. 1-5

Type species: Globorotalia (Astrorotalia) stellaria Turnovsky, 1958 = *Globorotalia palmerae* Cushman and Bermúdez, 1937 (***806**), p. 26; OD.

Globorotalia (Astrorotalia) Turnovsky, 1958 (***3234**), p. 81.

Test lenticular, a flat trochospiral coil of slightly inflated chambers enlarging gradually as added, early ones subglobular, later becoming radially elongate, final whorl with a peripheral spine from the midpoint of each chamber, sutures radial to slightly curved, depressed, umbilicus shallow, periphery with a weak keel, peripheral outline stellate; wall calcareous, coarsely perforate, smooth to pustulose; aperture a low interiomarginal extraumbilical-umbilical arch. U. part of L. Eocene (Ypresian); Cuba; Turkey.

BERGGRENIA F. L. Parker, 1976

Plate 514, figs. 6-11

Type species: Globanomalina praepumilio F. L. Parker, 1967 (***2341**), p. 148; OD.

Berggrenia F. L. Parker, 1976 (***2342**), p. 258.

Test tiny, coiled in a low to flat trochospiral, chambers globular to ovate, five to eight in the final whorl, sutures radial, depressed, periphery rounded, peripheral outline lobulate; wall calcareous, thin, very finely perforate, with more and slightly larger pores on the spiral side, including some along the spiral suture, surface smooth and nonspinose; aperture a low interiomarginal umbilical-extraumbilical arch with a narrow bordering lip. M. Pliocene to Holocene; Caribbean; Pacific.

CLAVATORELLA Blow, 1965

Plate 517, figs. 1-8

Type species: Hastigerinella bermudezi Bolli, 1957 (***284**), p. 112; OD.

Clavatorella Blow, 1965 (***257**), p. 366.

Globorotalia (Clavatorella) Blow, 1969 (***258**), p. 357 (nom. transl.).

Astrorotalia (Clavatorella) El-Naggar, 1971 (***1103**), p. 442 (nom. transl.).

Protentella (Clavatorella) Srinivasan and Kennett, 1975 (***3051**), p. 155 (nom. transl.).

Test in an evolute low trochospiral coil, early chambers globular, those of final whorl radially elongate to clavate, sutures distinct, depressed, umbilicus broad and shallow, periphery rounded, peripheral outline lobulate; wall calcareous, coarsely perforate, surface finely cancellate, except for the smooth, thin, and very finely perforate umbilical flaps extending into the umbilicus, those of successive chambers coalescing; aperture a low interiomarginal opening extending from the umbilicus to the periphery, the finely perforate projecting lip continuous with the umbilical flaps. Upper part of Lower Miocene (Aquitanian) to Holocene; Trinidad; Venezuela; Indian Ocean.

GLOBOROTALIA Cushman, 1927

Plate 515, figs. 4-6 and 16-22; plate 516, figs. 1-11

Type species: Pulvinulina menardii (d'Orbigny) var. *tumida* Brady, 1877 (***335**), p. 535; OD.

Globorotalia Cushman, 1927 (***742**), p. 91.

Planorotalia Morozova, 1957 (***2188**), p. 1110; type species: *Planulina membranacea* Ehrenberg, 1854 (***1068**), p. 25; OD.

Globorotalia (Fohsella) Bandy, 1972 (***117**), p. 297; type species: *Globorotalia praefohsi* Blow and Banner, 1966 (***260**), p. 295; OD.

Globorotalia (Menardella) Bandy, 1972 (***117**), p. 297; type species: *Rotalia menardii* Parker, Jones, and Brady, 1865 (***2354**), p. 20 (syn. *Rotalia menardii* d'Orbigny, 1826 (***2303**), p. 273, name not available, ICZN Art. 12 (a), no description); OD.

Globorotalia (Hirsutella) Bandy, 1972 (***117**), p. 298 (non *Hirsutella* Cooper and Muir-Wood, 1951); type species: *Rotalina hirsuta* d'Orbigny, 1839 (***2305**), p. 131; OD.

Obandyella Haman et al., 1981 (***1376**), p. 1265 (nom. subst. pro *Globorotalia (Hirsutella)* Bandy, 1972); type species: *Rotalina hirsuta* d'Orbigny, 1839, obj.; OD.

Test lenticular, trochospiral, close coiled, chambers gradually enlarging, periphery carinate; wall calcareous with closely spaced fine cylindrical pores, peripheral keel and apertural lip imperforate, surface generally smooth, pustulose in the umbilical and apertural areas, adult may develop a thickened calcite crust over the exterior; aperture a forward directed interiomarginal slit or arch, umbilical-extraumbilical, and bordered by a rim or lip. Miocene to Holocene; cosmopolitan.

Remarks: The various subgenera proposed for *Globorotalia* on the basis of postulated lineages are contemporaneous and are not morphologically distinct, hence are synonymized herein. *Planorotalia* was proposed for compressed Cretaceous and Paleocene species of "*Globorotalia*" under the misconception that the type species was from the Cretaceous of Germany. However, Ehrenberg's specimens were from Cattolica Eraclea, southern Sicily, and are of Pliocene age (according to Italian geologic maps; Hay, 1962, ***1431**, p. 1393). A topotype was illustrated by Loeblich and Tappan (1964, ***1910**, p. C667, fig. 533, 5). McGowran, in Luterbacher (1964, ***1949**, p. 639), invalidly proposed *Globorotalia pseudomenardii* Bolli "as new type-species of *Planorotalia*," but type fixation by original designation takes precedence, and cannot be changed by a later author (ICZN Art. 68 (a), (b)).

The previous designation of a lectotype for the type species of *Globorotalia (Menardella)* was set aside by ICZN Opinion 1234, under the plenary powers, and the specimen illustrated by Stainforth et al. (1978, ***3062**, pl. 1, fig. 1) from the upper Miocene (Tortonian) of Italy, was then fixed as the neotype of *Globorotalia menardii* (Melville, 1982, ***2090**, p. 253).

IGORINA Davidzon, 1976

Plate 515, figs. 7-15

Type species: Globorotalia tadjikistanensis N. K. Bykova, 1953 (***470**), p. 86; OD.

Igorina Davidzon, 1976 (***895**), p. 197.

Test trochospirally enrolled, compact, biconvex, commonly with more convex umbilical side, five to nine chambers in the final whorl, arched backward at the periphery on the spiral side, sutures flush to slightly depressed and oblique, chambers subtriangular on the umbilical side, and sutures radial and straight to gently curved, umbilicus small to absent, periphery subangular, outline weakly lobulate; wall calcareous, surface smooth to weakly and finely pustulose; aperture a low interiomarginal slit midway between the umbilicus and periphery but may extend to the small umbilicus. U. Paleocene to L. Eocene, cosmopolitan.

NEOACARININA P. R. Thompson, 1973

Plate 518, figs. 1-5

Type species: Neoacarinina blowi P. R. Thompson, 1973; OD.

Neoacarinina P. R. Thompson, 1973 (***3196**), p. 470.

Test large, subglobular, trochospiral, close coiled, and compact, with globular chambers increasing rapidly in size and strongly embracing, somewhat flattened on the spiral side, three to four per whorl, sutures straight, depressed, umbilicus small, periphery broadly rounded; wall calcareous, finely perforate, densely hispid, the coarse short spinules terminally bifurcate or multifurcate, and more than one spinule may arise from a single base; aperture a low umbilical-extraumbilical interiomarginal opening bordered by a narrow lip, aperture and umbilicus may be covered by a perforate but nonhispid bulla in the final stage of growth. Pleistocene; Indian Ocean; Pacific; N. Atlantic.

NEOGLOBOQUADRINA Bandy, Frerichs, and Vincent, 1967

Plate 514, figs. 12-14; plate 515, figs. 1-3

Type species: Globigerina dutertrei d'Orbigny, 1839 (***2304**), p. 84; OD.

Neogloboquadrina Bandy, Frerichs, and Vincent, 1967 (***119**), p. 152.

Test subglobular, low trochospiral, subglobular chambers enlarging rapidly as added, five to six in the final whorl, sutures radial and straight to slightly curved, depressed, umbilicus open, moderately broad and deep, periphery broadly rounded; wall calcareous, uniformly perforate, smooth in the early stage, without spines, later becoming thickened and pitted as secondary layers of calcite are added, the pore pits distinct in tropical specimens; aperture interiomarginal, at first extraumbilical-umbilical but may tend to become umbilical in the adult, bordered with a subtriangular toothlike lip in the early stage, but this may be absent in adult chambers. L. Miocene to Holocene; cosmopolitan.

PARAGLOBOROTALIA Cifelli, 1982

Plate 519, figs. 1-9

Type species: Globorotalia opima subsp. *opima* Bolli, 1957 (***284**), p. 117; OD.

Paragloborotalia Cifelli, 1982 (*602), p. 114.
Globorotalia (Jenkinsella) Kennett and Srinivasan, 1983 (*1673), p. 171; type species: *Globigerina siakensis* LeRoy, 1939 (*1825), p. 262; OD.

Test trochospiral, slightly flattened spiral side, about two and a half whorls and about four to five globular chambers in the final whorl, sutures radial, depressed, periphery rounded, peripheral outline lobulate; wall calcareous, perforate, surface pustulose, cancellate, with a pore in the center of the fields between the polygonal ridges; aperture a low interiomarginal, umbilical to extraumbilical arch, bordered by a rim. U. Oligocene (Chattian) to M. Miocene (Serravallian); cosmopolitan.

PLANOROTALITES Morozova, 1957

Plate 518, figs. 6-11

Type species: Globorotalia pseudoscitula Glaessner, 1937 (*1247), p. 32; OD.

Planorotalites Morozova, 1957 (*2188), p. 1112.

Test small, planoconvex to biconvex, low trochospiral coil, early chambers globular, later ones conical to flattened, umbilicate, pseudoumbilicus shallow and poorly defined or narrow where umbilical shoulders are better defined, peripheral margin may be carinate; wall calcareous, perforate, with narrow tubular pores, may have imperforate peripheral band or weakly developed keel, surface smooth and polished to slightly hispid; aperture small, low to slightly arched, interiomarginal, umbilical-extraumbilical, bordered with an imperforate lip. L. Paleocene (Danian) to M. Eocene; cosmopolitan.

TRUNCOROTALIA Cushman and Bermúdez, 1949

Plate 520, figs. 1-9

Type species: Rotalina truncatulinoides d'Orbigny, 1839 (*2305), p. 132; OD.

Globorotalia (Truncorotalia) Cushman and Bermúdez, 1949 (*813), p. 35.
Truncorotalia Bermúdez, 1961 (*206), p. 1331 (nom. transl.).
Globorotalia (Globoconella) Bandy, 1975 (*118), p. 56; type species: *Globorotalia conomiozea* Kennett, 1966 (*1671), p. 235; OD.

Test low trochospiral, planoconvex, spiral side flat with curved and flush sutures, umbilical side strongly convex and subconical with straight and depressed sutures, umbilicus open and deep, umbilical shoulder acutely angled, periphery subacute to carinate, peripheral outline circular; wall calcareous, finely perforate, surface densely pustulose, particularly in the umbilical region, although final chamber may be smooth; aperture interiomarginal, a low to high umbilical-extraumbilical arch with a thin rimlike lip. U. Miocene (Messinian) to Holocene; cosmopolitan.

Remarks: As the original specimen of *Rotalina truncatulinoides* is not preserved in the MNHN, Paris, a neotype was designated by Blow (1969, *258, p. 403) as a specimen in the BMNH that originally had been identified by H. B. Brady as *Pulvinulina micheliana*, collected by the Challenger Expedition off Gomera, Canary Islands. As this specimen was neither from the original material nor locality, it was rejected and a neotype designated by LeCalvez (1974, *1804, p. 76) from the topotypes in d'Orbigny's original material from the Ile de Ténériffe (MNHN, Paris, Coll. no. FO 353).

TURBOROTALIA Cushman and Bermúdez, 1949

Plate 519, figs. 10-12

Type species: Globorotalia centralis Cushman and Bermúdez, 1937 (*806), p. 26 = *Globigerina cerroazulensis* Cole, 1928 (*620), p. 217 (as *cerro-azulensis*); OD.

Globorotalia (Turborotalia) Cushman and Bermúdez, 1949 (*813), p. 42.
Turborotalia N. K. Bykova, Vasilenko, Voloshinova, Myatlyuk, and Subbotina, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 303 (nom. transl.).

Test globose to inflated, trochospiral, closely coiled, chambers ovate, somewhat flattened on the slightly convex spiral side, umbilical side strongly convex, umbilicus closed, sutures radial, slightly depressed, periphery broadly rounded, without a keel or poreless margin; wall calcareous, finely perforate, surface appearing finely cancellate because of the perforations but otherwise smooth; aperture a curved low interiomarginal arch, umbilical-extraumbilical, with bordering lip. M. Eocene (Lutetian) to U. Eocene (Jacksonian); cosmopolitan.

Remarks: Toumarkine and Bolli (1970, *3217, p. 132) noted that the type species of *Turborotalia, Globorotalia centralis* Cushman and Bermúdez, 1949, is conspecific with *Globigerina cerroazulensis* Cole, 1928.

Family TRUNCOROTALOIDIDAE Loeblich and Tappan, 1961

Truncorotaloididae (nom. transl. herein ex subfamily).
Truncorotaloidinae Loeblich and Tappan, 1961 (*1902), p. 309 (subfamily).
Acarininae Subbotina, 1971 (*3081), p. 68 (nom. imperf.: subfamily).
Globigerapsidae Blow, 1979 (*259), p. 1117.
Truncorotaloidini Fordham, 1986 (*1149A), p. 53 (tribe: nom. transl.).

Test trochospiral, at least in the early stage; surface with inflational pustules or muricae; primary aperture interiomarginal, sutural supplementary apertures may be present on spiral side. M. Paleocene to U. Eocene.

ACARININA Subbotina, 1953

Plate 521, figs. 1-12

Type species: Acarinina acarinata Subbotina, 1953 = *Globigerina nitida* L. T. Martin, 1943 (*2050), p. 25; OD.

Acarinina Subbotina, 1953 (*3079), p. 219.
Truncorotaloides (Acarinina) McGowran, in Luterbacher, 1964 (*1949), p. 645; also see McGowran, 1968 (*1970), p. 190 (nom. transl.).
Pseudogloboquadrina Jenkins, 1966 (*1605), p. 1122: type species: *Globoquadrina primitiva* Finlay, 1947 (*1130), p. 291; OD.
Turborotalia (Acarinina) Samuel, 1972 (*2723), p. 196 (nom. transl.).
Globorotalia (Acarinina) Blow, 1979 (*259), p. 900 (nom. transl.).

Test subglobular, close coiled, low trochospiral, four to five subglobular to ovate rapidly enlarging chambers per whorl, sutures depressed, poorly defined pseudoumbilicus; wall calcareous, perforate, surface pustulose or muricate; aperture an interiomarginal, extraumbilical arch. U. Paleocene to M. Eocene; cosmopolitan.

GLOBIGERAPSIS Bolli, Loeblich, and Tappan, 1957

Plate 521, figs. 13-17

Type species: Globigerapsis kugleri Bolli et al., 1957; OD.

Globigerapsis Bolli, Loeblich, and Tappan, 1957 (*292), p. 33.

Test trochospirally coiled in the early stage but with later change in coiling, so that the final chamber is deflected onto the umbilical side and obscures the umbilicus, chambers globular, enlarging rapidly, generally four per whorl, sutures depressed; wall calcareous, perforate, surface of closely packed muricae forming a murical sheath that suggests a thickened outer wall; primary aperture probably interiomarginal in the early stage, in the adult with multiple arched sutural apertures. M. Eocene; cosmopolitan.

Remarks: Originally defined as having a large and embracing final chamber bordered by two or more sutural secondary apertures, but nonbullate, the genus later was considered a synonym of the similar but bullate *Globigerinatheka* (Proto Decima and Bolli, 1970, *2482, p. 888; Bolli, 1972, *291, p. 110), as both type species were found to have bullate and nonbullate individuals. Blow (1979, *259, p. 865, 1133) recognized both genera on the basis of differences in wall structure, the present genus having a muricate wall in contrast to the typically spinose one in the early stage of *Globigerinatheka*, subfamily Porticulasphaerinae. This distinction is accepted here. Although Blow (1979, p. 1133) also included *Orbulinoides* as a synonym, that genus has a truly spinose wall in the early stage, hence we recognize it as a separate genus in the Porticulasphaerinae.

MOROZOVELLA McGowran, 1968

Plate 521, figs. 18-23

Type species: Pulvinulina velascoensis Cushman, 1925 (*728), p. 19; OD.

Truncorotaloides (Morozovella) McGowran, 1968 (*1970), p. 189, 190.
Truncorotaloides (Morozovella) McGowran, in Luterbacher, 1964 (*1949), p. 636, 641, 645 (published as a synonym; unavailable, ICZN Art. 11 (e)(ii)).
Morozovella Berggren, 1971 (*191), p. 60, 74, 76 (nom. transl.).
Globorotalia (Morozovella) Blow, 1979 (*259), p. 972 (nom. transl.).

Test planoconvex, trochospirally enrolled with flattened spiral side and strongly convex umbilical side, chambers conical in form, enlarging rapidly as added, umbilical shoulder low to high and angular, well to poorly defined pseudoumbilicus, periphery angular to carinate: wall calcareous, perforate, surface smooth to pustulose, umbilical shoulder may be pustulose or distinctly hispid, peripheral keel imperforate and pustulose; aperture a low interiomarginal, umbilical-extraumbilical arch with well developed lip. M. Paleocene to M. Eocene; cosmopolitan.

MURICOGLOBIGERINA Blow, 1979

Plate 522, figs. 1-7

Type species: Globigerina soldadoensis Brönnimann, 1952 (*374), p. 157; OD.

Muricoglobigerina Blow, 1979 (*259), p. 1118.

Test trochospirally enrolled, spiral side low to high convex, umbilical side with distinct umbilical depression, chambers globular to subangular and may be laterally compressed, sutures depressed, periphery broadly rounded to truncate: wall calcareous, perforate, surface muricate, especially on the umbilical side of the test, muricae may be closely packed in the later stage to produce a murical sheath; primary aperture interiomarginal, umbilical, no true supplementary or accessory openings present, although small sutural openings occur rarely on the spiral side, no bullae present. U. Paleocene (Thanetian) to U. Eocene (Priabonian): cosmopolitan.

TESTACARINATA Jenkins, 1971

Plate 523, figs. 1-5

Type species: Globorotalia inconspicua Howe, 1939 (*1568), p. 85; OD.

Globorotalia (Testacarinata) Jenkins, 1971 (*1606), p. 110.
Testacarinata Banner, 1982 (*123), p. 164, 194, 203 (nom. transl.).

Test small, enrolled in a low trochospire, planoconvex to inequally biconvex, chambers flattened on the spiral side in the early stage, strongly convex and angular on the umbilical side, six to seven chambers in the final whorl, final chamber globular, sutures radial, depressed, umbilicus open and deep, broad and somewhat truncate periphery with angular but noncarinate peripheral shoulder, peripheral outline angularly lobate: wall calcareous, perforate, surface with numerous strongly developed pustules, commonly larger and spinulelike at the peripheral angle and umbilical shoulder, adjacent spinules occasionally may fuse to result in the false appearance of a keel on the peripherally produced chambers; aperture a small, high interiomarginal arch, extending from the umbilicus about half the distance to the periphery, those of earlier chambers may be visible in the open umbilicus. M. Eocene (Lutetian) to U. Eocene (L. Bartonian); USA: Louisiana; New Zealand; Northwest Europe.

TRUNCOROTALOIDES Brönnimann and Bermúdez, 1953

Plate 523, figs. 6-8

Type species: Truncorotaloides rohri Brönnimann and Bermúdez, 1953; OD.

Truncorotaloides Brönnimann and Bermúdez, 1953 (*390), p. 817.

Test trochospiral, early chambers globular, later becoming conical with angular margins, spiral side flat to slightly convex, sutures straight, radial, depressed, umbilical side strongly convex, umbilicus deep and open, periphery broadly rounded to subacute, peripheral outline lobulate; wall calcareous, finely perforate, surface strongly pustulose, particularly in the region of the umbilicus; aperture a high interiomarginal, extraumbilical arch with distinct lip, small secondary sutural openings on the spiral side. M. Eocene; Caribbean; North America; Europe.

Family PULLENIATINIDAE Cushman, 1927

Pulleniatinidae Loeblich and Tappan, 1984 (*1918), p. 41, nom. transl. ex subfamily Pulleniatininae.
Pulleniatininae Cushman, 1927 (*742), p. 89 (subfamily).

Test streptospirally enrolled, chambers subglobular; wall perforate, surface smooth to pustulose but nonspinose, may have thickened surface cortex in adult stage; aperture interiomarginal, umbilical-extraumbilical. M. Miocene to Holocene.

GLOBIGERINOPSIS Bolli, 1962

Plate 524, figs. 1-3

Type species: Globigerinopsis aguasayensis Bolli, 1962; OD.

Globigerinopsis Bolli, 1962 (*290), p. 281.

Test trochospiral in the early stage, later streptospirally coiled and turning toward the spiral side, retaining the ventral umbilicus, chambers globular to ovate, increasing rapidly and steadily in size as added, sutures radial, straight to slightly curved, depressed, periphery broadly rounded, peripheral outline slightly lobulate; wall calcareous, finely perforate, surface finely pitted; aperture an interiomarginal, umbilical-extraumbilical arch, becoming spiroumbilical in the later stage and continuing into the spiral suture of the spiral side. M. Miocene: Venezuela; Dominican Republic.

PULLENIATINA Cushman, 1927

Plate 524, figs. 4-12

Type species: Pullenia obliquiloculata Parker and Jones, 1865 (***2351**), p. 368; OD.

Pulleniatina Cushman, 1927 (***742**), p. 90.

Test globular, early stage trochospirally enrolled, streptospiral in the adult, whorls progressively covering the umbilical side, chambers in the early stage spherical, later more embracing, about four to four and a half chambers in the final whorl, sutures distinct and depressed in the juvenile, flush and obscure in the adult, periphery broadly rounded; wall calcareous, perforate, juvenile stage with large pores in distinct pore pits and appearing cancellate, surface later completely covered by a thick smooth cortex that obscures the perforations and sutures, closely spaced pustules may occur both above and below the apertural opening; aperture a broad and low interiomarginal arch, extraumbilical. U. Miocene to Holocene; cosmopolitan.

Family CANDEINIDAE Cushman, 1927

Candeinidae F. L. Parker, 1967 (***2341**), p. 144, nom. transl. ex subfamily Candeininae.

Globigerinitidae Loeblich and Tappan, 1984 (***1918**), p. 41, nom. transl. ex subfamily Globigerinitinae.

Test trochospiral, wall microperforate, surface may be pustulose but is nonspinose. M. Eocene to Holocene.

Subfamily TENUITELLINAE Banner, 1982

Tenuitellinae Banner, 1982 (***123**), p. 202.

Test with inflated chambers in a low trochospiral coil; wall surface pustulose but not spinose, microperforate; aperture interiomarginal, bordered by small lip. M. Eocene to Holocene.

TENUITELLA Fleisher, 1974

Plate 524, figs. 13-17

Type species: Globorotalia gemma Jenkins, 1966 (***1605**), p. 1115; OD.

Tenuitella Fleisher, 1974 (***1135**), p. 1033.

Globorotalia (Tenuitella) Srinivasan and Kennett, 1981 (***3052**), p. 411 (nom. transl.).

Test small, low trochospiral, spiral side flat to slightly convex, chambers globular, increasing rapidly in size as added, four to six in the final whorl, umbilicus narrow, sutures radial, depressed, periphery rounded, noncarinate, peripheral outline lobulate; wall calcareous, extremely finely perforate, surface smooth or may have fine pustules; aperture a low interiomarginal arch, umbilical-extraumbilical, bordered by a narrow lip. M. Eocene (Lutetian) to Holocene; cosmopolitan.

Subfamily GLOBIGERINITINAE Bermúdez, 1961

Globigerinitinae Bermúdez, 1961 (***206**), p. 1261.

Tinophodellini Fordham, 1986 (***1149A**), p. 53, 56 (tribe; name not available, ICZN Art. 13(a)(i), no description).

Test in the early stage as in the Tenuitellinae, later with final chamber ampullate, enlarged, and extending over the umbilical region or may have a separate bulla over the aperture; primary aperture interiomarginal and extraumbilical-umbilical in the early stage, supplementary apertures at the margin of the umbilical extension of the final chamber replacing the primary aperture of earlier chambers. Miocene to Holocene.

ANTARCTICELLA Loeblich and Tappan, n. gen.

Plate 525, figs. 1-4

Type species: Candeina antarctica Leckie and Webb, 1985 (***1810**), p. 66; OD.

Test small, subglobular, rapidly enlarging rounded chambers in low trochospiral coil of one and a half to two and a half whorls, three and a half to five chambers in the final whorl, spiral side with approximately level spire and very slightly depressed radial sutures, umbilical side with slightly depressed sutures around the closed umbilicus, final chamber ampullate, from the spiral side appearing somewhat smaller than the penultimate one but extending over the umbilicus on the opposite side as in *Globigerinita*, numerous small accessory apertures between bridgelike projections occur along the margin, periphery broadly rounded, peripheral outline lobulate; wall calcareous, very thin, finely perforate, smooth except for prominently developed pustules in the region adjacent to the sutures and umbilicus of the umbilical side; aperture of the early stage interiomarginal and umbilical, replaced by the row of small openings along the margin of the ampullate final chamber where this covers the earlier umbilicus. U. Oligocene to M. Miocene: Antarctic: Ross Sea.

Remarks: Originally placed in *Candeina*, the present type species differs in lacking true sutural openings but has small openings along the margin of the ampullate final chamber as in *Globigerinita*. It differs from *Globigerinita* in having numerous small openings between distinctly projecting digitate extensions of the margin of the ampullate chamber and in the distinctly pustulose wall surface adjacent to the sutures and umbilicus.

GLOBIGERINITA Brönnimann, 1951

Plate 525, figs. 5-9

Type species: Globigerinita naparimaensis Brönnimann, 1951; OD.

Globigerinita Brönnimann, 1951 (***370**), p. 18.

Test subglobular, rapidly enlarging globular to ovate chambers in a low trochospiral coil, about four in the final whorl, final chamber becoming ampullate but remaining in the normal trochospiral coil as viewed from the spiral side, although extended over the umbilical region on the umbilical side, sutures radial, depressed, periphery rounded, peripheral outline lobulate; wall calcareous, microperforate, without pore pits, surface smooth; primary aperture in the early stage a low interiomarginal, extraumbilical-umbilical arch, in the adult covered by the strongly overlapping and inflated, ampullate final chamber, a few low small interiomarginal and infralaminal accessory openings on the margin of the ampullate chamber at the overlap of earlier sutures. L. to M. Miocene; Trinidad.

Remarks: Loeblich and Tappan (1957, ***1894**, p. 112) noted that the original description of the type species of *Globigerinita* included both ampullate specimens (like the holotype) and others with simple chambers and distinct umbilical bulla; that genus was emended to include only those with an ampullate final chamber. The original paratypes of *G. naparimaensis* having a distinct bulla were transferred to *Tinophodella ambitacrena*. Both genera were recognized on this basis by Loeblich and Tappan (1964, ***1910**, p. C676, C678). Although the ampullate nature of the holotype was confirmed by Blow (1979, ***259**, p. 470), confusion as to the nature of this genus has continued. It differs from the similarly ampullate *Turborotalita* in the smooth rather than spinose wall.

TINOPHODELLA Loeblich and Tappan, 1957

Plate 525, figs. 10-15

Type species: Tinophodella ambitacrena Loeblich and Tappan, 1957; OD.

Tinophodella Loeblich and Tappan, 1957 (***1894**), p. 113.

Test small to medium in size, globular to ovate, with low trochospiral coil of few, nearly spherical chambers, about four per whorl, sutures distinct, depressed, in the adult an irregular to digitate bulla covers the umbilicus and extends along the sutures, bulla formed as a separate structure and not a modified or ampullate chamber and not in the normal pattern of chamber growth, periphery rounded, peripheral outline lobulate; wall calcareous, minutely perforate, surface with numerous pustules, those of the bulla of somewhat smaller size; aperture interiomarginal, umbilical in position in the early stage, adult chamber with primary aperture covered by the umbilical-sutural bulla that has interiomarginal infralaminal accessory apertures at the margin, the small openings may be terminal on projections along the sutures or may completely border the bulla. L. Miocene to Holocene; cosmopolitan.

Remarks: Specimens that had been referred to *Globigerina glutinata* Egger by Rhumbler (1911, ***2620**, p. 148) and others were assigned to *T. ambitacrena* by Loeblich and Tappan, 1957 (*1894). *Globigerina glutinata* Egger (1893, *1048, p. 371) was described from the vicinity of New Guinea and Australia and the west coast of Africa as having three chambers in the final whorl and a much larger final chamber, although with no indication of a bulla. *Tinophodella ambitacrena* was described from off Brazil in the south Atlantic, has a large and distinct umbilical-sutural bulla, and is probably not conspecific. The repository of Egger's types is unknown.

Subfamily CANDEININAE Cushman, 1927

Candeininae Cushman, 1927 (*742), p. 90.
Candeinini Fordham, 1986 (*1149A), p. 53 (tribe; nom. transl.).

Test in relatively high trochospiral, early stage with umbilical aperture, later chambers more closely coiled and umbilicus closed; aperture consists of a series of rounded openings along the sutures, each with a small bordering lip. Miocene to Holocene.

CANDEINA d'Orbigny, 1839

Plate 526, figs. 1-5

Type species: Candeina nitida d'Orbigny, 1839; OD(M).

Candeina d'Orbigny, 1839 (*2304), p. 107.

Test globose, three to five inflated chambers per whorl in a high trochospiral coil, sutures radial, depressed; wall calcareous, hyaline, radial, microperforate, the extremely fine pores irregularly distributed, surface smooth but at high magnification may appear finely pustulose or pebbly; primary aperture in the early stage a low interiomarginal umbilical slit, later chambers with tiny rounded secondary sutural openings bordered by raised narrow rims at each side of the primary aperture and completely replacing the primary aperture in the adult, sutural openings surround the chambers of the last few whorls on both spiral and umbilical sides of the test. Miocene to Holocene; cosmopolitan.

Remarks: Eocene and Oligocene species that have been described as *Candeina* are not congeneric, as they do not have the smooth and microperforate wall of the present genus and family.

Family CATAPSYDRACIDAE Bolli, Loeblich, and Tappan, 1957

Catapsydracidae Tappan and Lipps, 1966 (*3126), p. 637, nom. transl. ex subfamily Catapsydracinae.
Catapsydracinae Bolli, Loeblich, and Tappan, 1957 (*292), p. 36 (subfamily).
Globorotaloidinae Banner and Blow, 1959 (*124), p. 7 (subfamily).
Globoquadrinidae Blow, 1979 (*259), p. 1294.
Globoquadrinini Fordham, 1986 (*1149A), p. 53 (tribe, nom. transl.).
Globorotaloidini Fordham, 1986 (*1149A), p. 53 (tribe, nom. transl.).

Test trochospiral, wall surface pitted to cancellate but nonspinose. Paleocene to Holocene.

CASSIGERINELLOITA Stolk, 1965

Plate 529, figs. 13-17

Type species: Cassigerinelloita amekiensis Stolk, 1965; OD.

Cassigerinelloita Stolk, 1965 (*3070), p. 264.

Test tiny, trochospiral or possibly slightly streptospiral, with few rapidly enlarging globular chambers, those of the final whorl obscuring chambers of the original whorl, sutures constricted; wall calcareous, finely perforate, optically radial, surface smooth to rugose; aperture an interiomarginal arch against the preceding chamber, bordered by a narrow lip; may have bulla over the umbilical region that may or may not have an infralaminal accessory aperture. Uppermost L. Eocene? to M. Eocene; Nigeria.

Remarks: *Cassigerinelloita* was described as belonging to the Cassigerinellinae, but the chamber arrangement does not appear to be biserial. Blow (1979, *259, p. 759) suggested that it represented "an abortive variant of a ?*Globigerinita* sp.," but it does not show the ampullate final chamber of that genus. The original illustrations suggest a microcancellate wall, hence it is tentatively placed with the Catapsydracidae, many of which also are characterized by the presence of bullae.

CATAPSYDRAX Bolli, Loeblich, and Tappan, 1957

Plate 526, figs. 6-12

Type species: Globigerina dissimilis Cushman and Bermúdez, 1937 (*806), p. 25; OD.

Catapsydrax Bolli, Loeblich, and Tappan, 1957 (*292), p. 36.

Test globular to ovoid, a low trochospiral coil of rapidly enlarging globular chambers, commonly four in the final whorl, sutures radial, depressed, umbilicus open, periphery rounded, peripheral outline lobulate; wall calcareous, coarsely perforate, surface distinctly pitted, with prominent pore pits and pore ridges; primary aperture an interiomarginal, umbilical arch, in the adult may be covered by a single small to moderate sized bulla, one to four infralaminal interiomarginal accessory openings commonly located just above the contact of the bulla and the sutures of the preceding whorl. M. Eocene to M. Miocene; cosmopolitan.

DENTOGLOBIGERINA Blow, 1979

Plate 527, figs. 8-11

Type species: Globigerina galavisi Bermúdez, 1961 (***206**), p. 1,183; OD.

Dentoglobigerina Blow, 1979 (*259), p. 1298.

Test trochospiral, resembling *Catapsydrax* in chamber form and arrangement; wall calcareous, coarsely perforate, with prominent pore pits and pore ridges; aperture interiomarginal, umbilical in position, or may be slightly asymmetrically positioned, with imperforate projecting triangular tooth, those of some earlier chambers also remaining visible in the open umbilicus. L. Eocene (Ypresian) to L. Pliocene; cosmopolitan.

EOCLAVATORELLA

Cremades Campos, 1980

Plate 527, figs. 1-3

Type species: Eoclavatorella benidormensis Cremades Campos, 1980; OD.

Eoclavatorella Cremades Campos, 1980 (*688), p. 209.

Test in a low trochospiral coil, early chambers subspherical, rapidly enlarging as added, about four in the final whorl, later ones ovate and slightly radially elongate, sutures strongly constricted, umbilicus small, periphery rounded, peripheral outline deeply lobulate; wall calcareous, perforate, surface cancellate; aperture interiomarginal, umbilical-extraumbilical, much enlarged in the equatorial plane and extending up the apertural face in a high arch, bordered by a protruding lip. L. Eocene; Spain: Alicante Province.

GLOBICUNICULUS Saito and Thompson, 1976

Plate 528, figs. 1-4

Type species: Globigerinoides mitra Todd, 1957 (***3203**), p. 302; OD.

Globicuniculus Saito and Thompson, in Saito et al., 1976 (*2701), p. 287.

Test with globular early chambers and later ovate to radially elongate chambers in a high trochospiral coil of about four chambers per whorl, sutures distinct, depressed, periphery rounded, peripheral outline strongly lobulate; wall calcareous, coarsely perforate, with pore pits and pore ridges, secondary calcite layers resulting in a pustulose surface on the early whorls, no true spines or spine bases present; primary aperture interiomarginal and umbilical, those of previous chambers remaining open, with smaller secondary sutural openings on the spiral side. L. Miocene (U. Burdigalian) to M. Miocene (Langhian); tropical.

GLOBIGERINOPSOIDES Cita and Mazzola, 1970

Plate 528, figs. 5-12

Type species: Globigerinopsoides algeriana Cita and Mazzola, 1970; OD.

Globigerinopsoides Cita and Mazzola, 1970 (*610), p. 470.

Test globular, trochospiral, spiral side convex, chambers enlarging rapidly, few per whorl, sutures curved to radial, depressed, umbilicus small, periphery rounded; wall calcareous, perforate, with prominent funnel-shaped pore pits and pore ridges producing a cancellate surface; primary aperture interiomarginal, bordered by a beaded rim, umbilical-extraumbilical in the early stage, later more extensive and spiroumbilical, accompanied by secondary sutural apertures on the spiral side. M. to U. Miocene; Algeria.

GLOBOQUADRINA Finlay, 1947

Plate 527, figs. 4-7

Type species: Globorotalia dehiscens Chapman, Parr, and Collins, 1934 (***543**), p. 569; OD.

Globoquadrina Finlay, 1947 (*1130), p. 290.

Test globular to subquadrate, trochospiral, umbilicate, chambers enlarging rapidly in the early whorls, about four to five in the final whorl, sutures radial and depressed, periphery rounded to truncate; wall calcareous, perforate, surface coarsely pitted or cancellate with polygonal ridges, nonspinose; aperture interiomarginal, umbilical, with bordering rim that may become a prominent toothlike flap, those of preceding chambers may be visible within the open umbilicus. M. Eocene to U. Miocene; cosmopolitan.

GLOBOROTALOIDES Bolli, 1957

Plate 529, figs. 1-6

Type species: Globorotaloides variabilis Bolli, 1957; OD.

Globorotaloides Bolli, 1957 (***284**), p. 117.

Test subglobular to somewhat compressed in a low trochospiral coil, about five to six ovate to spherical chambers in the last whorl, final chamber may be inflated and offset to partly or completely cover the umbilicus; wall calcareous, surface distinctly cancellate, with pore pits and ridges; primary aperture an interiomarginal, umbilical-extraumbilical arch that becomes nearly umbilical in the final stage. M. Eocene (U. Lutetian) to U. Miocene; tropical and subtropical, cosmopolitan.

GUEMBELITRIOIDES El-Naggar, 1971

Plate 529, figs. 7-12

Type species: "Globigerinoides" higginsi Bolli, 1957 (***285**), p. 164; OD.

Guembelitrioides El-Naggar, 1971 (***1103**), p. 431.

Test with spherical to ovate chambers in a high trochospiral coil, about four chambers in the final whorl, sutures radial, deeply depressed, umbilicus wide and deep, periphery rounded, peripheral outline distinctly lobate; wall calcareous, coarsely perforate, surface cancellate, with pore pits and ridges, intersections of the ridges crowned by knoblike pustules or mounds; primary aperture a high interiomarginal, umbilical arch, one or more secondary supplementary apertures may occur on the spiral side of the final whorl. Upper L. Eocene (U. Ypresian) to M. Eocene (L. Lutetian); N. and S. Atlantic; Trinidad.

PROTENTELLA Lipps, 1964

Plate 530, figs. 1-6

Type species: Protentella prolixa Lipps, 1964; OD.

Protentella Lipps, 1964 (***1871**), p. 122.

Test small, flattened, biumbilicate, globular chambers increasing rapidly in size as added, early stage in low trochospiral, later planispiral, five to six radially elongate chambers in the final whorl, sutures radial, depressed, periphery rounded, peripheral outline deeply lobulate; wall calcareous, perforate, surface cancellate in appearance with deep circular to polygonal pore pits and steep pore ridges; aperture a high interiomarginal equatorial arch bordered by a thickened lip. L. Miocene (Burdigalian) to M. Miocene (M. to U. Serravalian); USA: California; English Channel.

SUBBOTINA Brotzen and Pożaryska, 1961

Plate 530, figs. 13-15

Type species: Globigerina triloculinoides Plummer, 1927 (***2421**), p. 134; OD.

Subbotina Brotzen and Pożaryska, 1961 (***433**), p. 160.
Eoglobigerina (Subbotina) Blow, 1979 (***259**), p. 1247 (nom. transl.).

Test inflated, trochospiral, with three to four rapidly enlarging globular chambers per whorl, sutures depressed, periphery rounded, peripheral outline lobulate; wall calcareous, perforate, pitted to cancellate, with funnel-like pore pits separated by polygonal ridges, slightly protruding pustules occur at the angles of the polygonal ridges; aperture an asymmetrical umbilical-extraumbilical arch, extending across the umbilicus both posteriorly for a short distance, and anteriorly nearly to the equatorial plane, bordered by a porticus. L. Paleocene (Danian) to L. Oligocene (Latorffian); cosmopolitan.

VELAPERTINA Popescu, 1969

Plate 530, figs. 7-12

Type species: Velapertina iorgulescui Popescu, 1969; OD.

Velapertina Popescu, 1969 (***2454**), p. 105.

Test small, up to about 0.4 mm in diameter, subglobular, with few rapidly enlarging globular chambers in a trochospiral coil of two and a half to three whorls, about four chambers in the final whorl, sutures depressed, periphery broadly rounded, peripheral outline lobulate; wall calcareous, perforate, radial in structure, surface pitted; primary aperture interiomarginal and umbilical in position, secondary sutural apertures present on the spiral side, primary aperture in the adult covered by an umbilical bulla that may continue along the sutures and also cover the secondary openings, infralaminal accessory openings on the bulla margin. Miocene (U. Tortonian); Romania; Czechoslovakia.

Remarks: *Velapertina* was considered by Banner (1982, *123, p. 201) to be a junior synonym of *Globigerinoita* Brönnimann, but the two genera are here recognized as distinct on the basis of their described wall character. *Globigerinoita* has a spiny surface (such as characterizes the Globigerinidae), and *Velapertina* was described as having a pitted surface (like that of the Catapsydracidae). Neither has yet been illustrated by electron microscopy.

Superfamily HANTKENINACEA Cushman, 1927

Hantkeninacea Haynes, 1981 (*1437), p. 343, nom. transl. ex family Hantkeninidae.

Test planispiral or enrolled biserial; chambers globular to elongate; primary aperture equatorial in position, single or multiple; may also have relict or areal secondary apertures. Paleocene to Miocene.

Family GLOBANOMALINIDAE Loeblich and Tappan, 1984

Globanomalinidae Loeblich and Tappan, 1984 (*1918), p. 39.

Test planispirally enrolled or may be slightly asymmetrical, biumbilicate, nearly involute; chambers inflated, subglobular to radially elongate and terminally clavate; wall hyaline, perforate, optically radiate, surface smooth, nonspinose; primary aperture symmetrical and equatorial, with bordering lip. Paleocene to Oligocene.

Remarks: Ancestral to the Hantkeninidae but without tubulospines and having a simple, low aperture.

CLAVIGERINELLA Bolli, Loeblich, and Tappan, 1957

Plate 531, figs. 5 and 6

Type species: Clavigerinella akersi Bolli et al., 1957; OD.

Clavigerinella Bolli, Loeblich, and Tappan, 1957 (*292), p. 30.

Test planispirally enrolled or may be slightly asymmetrical but not trochospiral, involute, biumbilicate, early chambers globular and inflated, later chambers radially elongate and terminally bulbous or clavate, peripheral outline strongly lobulate to digitate; aperture a high narrow equatorial arch extending up the apertural face, bordered laterally by wide flanges that narrow upward to form a narrow lip at the upper margin. M. Eocene; Trinidad.

GLOBANOMALINA Haque, 1956

Plate 531, figs. 1–4, 7 and 8

Type species: Globanomalina ovalis Haque, 1956; OD.

Globanomalina Haque, 1956 (*1418), p. 147 (also as *Globanamalina*, p. 147).

Pseudohastigerina Banner and Blow, 1959 (*124), p. 19; type species: *Nonion micrus* Cole, 1927 (*619), p. 22; OD.

Test small, early chambers in a very low trochospiral coil, planispiral to slightly asymmetrical in the adult, biumbilicate, commonly with some earlier chambers visible in the umbilical region, early chambers enlarging gradually and moderately inflated, later ones enlarging more rapidly and tending to become evolutely coiled, sutures radial, straight to slightly curved, depressed, periphery narrowly to broadly rounded, peripheral outline lobulate; wall calcareous, hyaline, finely perforate, surface smooth to very finely pustulate; aperture interiomarginal, equatorial or slightly to one side of the median plane, may extend to the umbilical area on one or both sides, bordered by a narrow lip, occasional specimens with double aperture consisting of a low opening at each side of the peripheral margin. U. Paleocene to L. Oligocene (Tongrian); cosmopolitan.

Remarks: Both the type species of *Globanomalina* and *Pseudohastigerina* (synonymized by Loeblich and Tappan, 1964, *1910, p. C665), as well as other included species, commonly show evidence of their trochospiral ancestry in asymmetrical early whorls and aperture, although coiling is dominantly planispiral and the aperture equatorial. Illustrated topotype specimens of *Globanomalina ovalis*, received from A. H. M. Haque, as well as illustrated topotypes of *Nonion micrus* show no appreciable differences and are regarded as congeneric.

HASTIGERINELLA Cushman, 1927

Plate 531, figs. 9-12

Type species: Hastigerinella eocanica Nuttall, 1928 (***2275**), p. 376; SD(SM).

Hastigerinella Cushman, 1927 (***742**), p. 87.

Test planispirally coiled, involute, biumbilicate, early chambers spherical, later ones radially elongate and ovate to subcylindrical, sutures radial, depressed, appearing thickened and imperforate in the umbilical region in the later part of the test, as successive chambers fail to completely overlap the lateral apertural flaps of the preceding chamber, periphery lobulate; wall calcareous, finely perforate, pores rounded, surface smooth, without spines or spine bases; aperture interiomarginal, equatorial, a subtriangular opening extending up the apertural face, with wide bordering lip at each side. L. Eocene (uppermost Ypresian) to M. Eocene (Lutetian): Mexico; Trinidad; Atlantic; USSR: Caucasus.

Remarks: The status of *Hastigerinella* Cushman, 1927 was discussed by Charmatz (1963, ***544**, p. 228) and Saito et al. (1976, ***2701**, p. 290). Although Cushman originally designated the type species as "*Hastigerina digitata* Rhumbler," Rhumbler did not describe such a species but had transferred *Globigerina digitata* Brady to *Hastigerina*. As no true species was included originally, the type species became *Hastigerinella eocanica* Nuttall, 1928, by subsequent monotypy. "*Hastigerinella digitata*" as described by Cushman is now *Hastigerinopsis digitiformans* Saito and Thompson.

Family HANTKENINIDAE Cushman, 1927

Hantkeninidae Cushman, 1927 (***742**), p. 64.

Hantkenininae Chapman and Parr, 1936 (***542**), p. 145 (subfamily).

Test planispirally enrolled, chambers rounded to weakly radially elongate, those of the final whorl with a distinct tubulospine arising from the peripheral margin; aperture a high interiomarginal and equatorial opening or may become cribrate. M. to U. Eocene.

ARAGONELLA Thalmann, 1942

Plate 532, figs. 1-6

Type species: Hantkenina mexicana Cushman var. *aragonensis* Nuttall, 1930 (***2276**), p. 284; OD.

Hantkenina (Aragonella) Thalmann, 1942 (***3164**), p. 811, 813.

Hantkenina (Applinella) Thalmann, 1942 (***3164**), p. 812, 814; type species: *Hantkenina dumblei* Weinzierl and Applin, 1929 (***3358**), p. 402; OD.

Aragonella Bolli et al., 1957 (***292**), p. 26 (nom. transl.).

Applinella Bolli et al., 1957 (***292**), p. 26 (nom. transl.).

Test flattened, stellate in outline, planispiral, biumbilicate, early chambers globular, rapidly becoming radially elongate and ovate, those of the final whorl with thick elongate tubulospines that may have multifurcate terminations, tubulospines arise from the chamber midpoint on the periphery, but increased chamber overlap may result in the tubulospines appearing near the anterior margin of the chamber; wall calcareous, coarsely and regularly perforate but perforations absent at the base of the smooth and nonperforate tubulospines; aperture a high and narrow equatorial arch bordered by a simple lip. M. Eocene (Lutetian); cosmopolitan.

CRIBROHANTKENINA Thalmann, 1942

Plate 532, figs. 7-9

Type species: Hantkenina (Cribrohantkenina) bermudezi Thalmann, 1942 = *Hantkenina inflata* Howe, 1928 (***1565**), p. 14; OD.

Hantkenina (Cribrohantkenina) Thalmann, 1942 (***3164**), p. 812, 815.

Cribrohantkenina Cushman, 1946 (***799**), p. 38 (nom transl.).

Test planispirally enrolled, close coiled, biumbilicate, chambers inflated and subglobular with prominent peripheral hollow tubulospine arising from the forward margin of the chambers, tubulospine may be overlapped by the succeeding chamber, sutures radial, distinct, depressed; wall calcareous, finely perforate except for the imperforate apertural face and tubulospines, surface smooth; aperture interiomarginal and equatorial in the early stage with bordering flangelike lips, later accompanied by multiple areal secondary openings, each with a protruding narrow lip bordering the rounded to irregular opening, well-developed specimens may have a protruding pore plate covering the apertural face, with imperforate wall between the apertural openings, multiple openings may be filled by secondary shell deposition in gerontic individuals. U. Eocene; cosmopolitan.

HANTKENINA Cushman, 1924

Plate 533, figs. 1-4

Type species: Hantkenina alabamensis Cushman, 1924; OD.

Hantkenina Cushman, 1924 (***726**), p. 1 (also err. cit. as *Hantkenia*, p. 1; non *Hantkenia* Fischer, 1885, nec Prever, 1902).

Hantkenina (Sporohantkenina) Bermúdez, 1937 (***195**), p. 151; type species: *Hantkenina brevispina* Cushman, 1924 (***726**), p. 2; OD.

Hantkenina (Hantkeninella) Thalmann, 1942 (***3164**), p. 817 (name not available, ICZN Art. 13 (a)(i), no description).

Hantkenina (Hantkeninella) Brönnimann, 1950 (***366**), p. 399; type species: *Hantkenina alabamensis* var. *primitiva* Cushman and Jarvis, 1929 (***827**), p. 16; OD.

Sporohantkenina Bolli et al., 1957 (***292**), p. 26 (nom. transl.).

Hantkeninella Bolli et al., 1957 (***292**), p. 26 (nom. transl.).

Test planispirally enrolled, involute, biconvex, and biumbilicate, chambers globular, most chambers of the final whorl with a single long hollow tubulospine arising slightly anterior to the chamber midpoint on the periphery and in the plane of coiling, tubulospines with tiny distal opening, sutures depressed, radial; wall calcareous, hyaline, finely perforate except for the apertural flanges and tubulospines, surface of tubulospines with many slight, longitudinal, and faintly spiralling grooves; primary aperture interiomarginal, equatorial, extending up the apertural face, bordered laterally by two broad and imperforate apertural flanges that expand near the base and constrict the vertical part of the opening, leaving a slitlike horizontal component beneath, the flanges joining in a narrow bordering lip at the top of the apertural opening. Upper M. Eocene (Lutetian) to U. Eocene (Bartonian); cosmopolitan.

Family CASSIGERINELLIDAE Bolli, Loeblich, and Tappan, 1957

Cassigerinellidae Loeblich and Tappan, 1982 (***1917**), p. 34, nom. transl. ex subfamily Cassigerinellinae.

Cassigerinellinae Bolli, Loeblich, and Tappan, 1957 (***292**), p. 30 (subfamily).

Test planispiral in early stage, later enrolled biserial; primary aperture interiomarginal, equatorial in planispiral stage, extraumbilical and alternating from side to side in later biserial stage. U. Eocene to L. Miocene.

CASSIGERINELLA Pokorný, 1955

Plate 533, figs. 11-14

Type species: Cassigerinella boudecensis Pokorný, 1955 = *Cassidulina chipolensis* Cushman and Ponton, 1932 (***844**), p. 98; OD.

Cassigerinella Pokorný, 1955 (***2444**), p. 136.

Test robust, chambers globular, early stage planispirally enrolled, then with biserially arranged chambers, the plane of biseriality same as that of the earlier planispiral coil, sutures radial, depressed, periphery broadly rounded, peripheral outline lobulate; wall calcareous, perforate, surface smooth, later stage may have secondary calcite crust resulting in a finely pustulose surface; aperture a low to high, asymmetrical, extraumbilical arch, alternately on opposite sides of the median plane and always facing the plane of biseriality, bordered by a rimlike protruding apertural flange that may be beaded, previous foramen identical to the final aperture, no toothplate present. U. Eocene to lower M. Miocene; cosmopolitan.

Remarks: Rögl (1985, ***2637A**, p. 319) and Li (1986, ***1842A**, p. 61) regard *C. boudecensis* as differing from *C. chipolensis* in having a papillose (with pore cones or pore mounds) rather than a smooth surface. However, Saito and Biscaye (1977, ***2700**, p. 321) found both smooth and pustulose specimens of *C. chipolensis* co-occurring, and regarded the latter as developing a secondary calcite crust similar to that of other planktonic foraminifers.

RIVEROINELLA Bermúdez and Seiglie, 1967

Plate 533, figs. 5–10

Type species: Riveroinella martinezpicoi Bermúdez and Seiglie, 1967; OD.

Riveroinella Bermúdez and Seiglie, 1967 (***213**), p. 177.

Test small, compressed lenticular, biumbilicate, chambers inflated, ovoid, increasing rapidly in size as added, planispirally coiled in the early stage, later biserial with enrolled plane of biseriality as in *Cassigerinella*, about four to five chambers in the final whorl, sutures radial to curved, depressed, periphery subacute, peripheral outline lobulate; wall calcareous, of calcite by X-ray determination, finely perforate, surface smooth; aperture an elongate curved slit extending up the apertural face nearly to the periphery of the final chamber, bordered by a distinctly protruding flangelike rim with a serrate margin. L. Oligocene to L. Miocene: Puerto Rico; W. Atlantic; E. Pacific.

Remarks: In a restudy of the type species by X-ray and SEM, Saito and Biscaye (1977, ***2700**, p. 322) demonstrated its morphology and correct relationship, although regarding the genus as a synonym of *Cassigerinella*. However, the compressed lenticular test and the very high and slitlike aperture are regarded as distinctive generic characters of planktonic taxa, hence *Riveroinella* is recognized herein.

Superfamily GLOBIGERINACEA Carpenter, Parker, and Jones, 1862

Globigerinacea Loeblich and Tappan, 1961 (***1902**), p. 307, nom. corr. pro superfamily Globigerinidea.
Globigerinidea Morozova, 1957 (***2188**), p. 1110, nom. transl. ex family Globigerinida.
Globigerinaceae Banner and Blow, 1959 (***124**), p. 4.
Globigerinoidea Tappan and Loeblich, 1982 (***3128**), p. 541.

Test trochospiral but later chambers may be enveloping; wall perforate, with numerous small pores or fewer larger ones, surface may be covered with narrow elongate nonlamellar monocrystalline spines with calcite *c*-axis running lengthwise of the spine; aperture interiomarginal, umbilical, umbilical-extraumbilical, or equatorial, and relatively large secondary sutural apertures also may occur. Eocene to Holocene.

Family GLOBIGERINIDAE Carpenter, Parker, and Jones, 1862

Globigerinidae Schulze, 1877 (***2827**), p. 29, nom. corr. pro family Globigerinida (nom. conserv., ICZN Op. 552).
Orbulinida Schultze, 1854 (***2824**), p. 52.
Globigerinida Carpenter et al., 1862 (***494**), p. 171.
Globigerinidee Schwager, 1876 (***2829**), p. 479.
Globigerinidea Schwager, 1877 (***2830**), p. 20.
Globigerininae Bütschli, in Bronn, 1880 (***421**), p. 200.
Orbulinetta Haeckel, 1894 (***1355**), p. 164.
Orbulinidae Galloway, 1933 (***1205**), p. 326.
Turborotalitidae Hofker, 1976 (***1524**), p. 47.

Test trochospiral in early stage, later may become planispiral, or final spherical chamber may completely enclose the early spire; wall strongly perforate, surface may be covered with thin elongate nonlamellar and monocrystalline spines not directly connected to the wall but set into holes within it that may be readily dislodged; adult stage may develop a thick outer calcite crust or cortex over the test; aperture interiomarginal, umbilical, extraumbilical, spiroumbilical, or equatorial and may be accompanied by large sutural supplementary openings on the spiral side, or aperture may consist only of large areal pores. M. Eocene to Holocene.

Subfamily GLOBIGERININAE Carpenter, Parker, and Jones, 1862

Globigerininae Cushman, 1927 (***742**), p. 87, nom. corr. pro subfamily Globigerinae.
Globigerinae Carpenter, Parker, and Jones, 1862 (***494**), p. 181 (nom. imperf.).
Globigerinina Jones, in Griffith and Henfrey, 1875 (***1300**), p. 320.
Globigerinidae Schwager, 1877 (***2830**), p. 20.
Sphaeroidinellinae Banner and Blow, 1959 (***124**), p. 5.
Globigerinini Fordham, 1986 (***1149A**), p. 53 (tribe; nom. transl.).

As for the family, with test trochospiral throughout. U. Eocene to Holocene.

BEELLA Banner and Blow, 1960

Plate 534, figs. 1–4

Type species: Globigerina digitata Brady, 1879 (***338**), p. 286; OD.

Globorotalia (Beella) Banner and Blow, 1960 (***125**), p. 26.
Beella Loeblich and Tappan, 1964 (***1910**), p. C669 (nom. transl.).
Globigerina (Beella) Blow, 1969 (***258**), p. 323 (nom. transl.).
Schackoinella (Beella) El-Naggar, 1971 (***1103**), p. 440 (nom. transl.).

Test trochospirally coiled, spiral side strongly convex, early chambers globular and increasing rapidly in size as added, those of the final whorl radially elongate and subconical, sutures radial, depressed, umbilicus open, periphery rounded, peripheral outline lobulate to stellate; wall calcareous, perforate, pores may be grouped in clusters, surface between the pores covered by irregular ridges or costellae that may represent spine bases; aperture umbilical in position, a wide open arch, bordered by a recurved lip but without porticus or umbilical teeth. U. Miocene (Tortonian) to Holocene; tropical to temperate, cosmopolitan.

BOLLIELLA Banner and Blow, 1959

Plate 534, figs. 5-8

Type species: Hastigerina (Bolliella) adamsi Banner and Blow, 1959; OD.

Hastigerina (Bolliella) Banner and Blow, 1959 (***124**), p. 12.

Bolliella Loeblich and Tappan, 1964 (***1910**), p. C665 (nom. transl.).

Globigerinella (Bolliella) Srinivasan and Kennett, 1975 (***3051**), p. 157 (nom. transl.).

Hantkenina (Bolliella) El-Naggar, 1971 (***1103**), p. 444 (nom. transl.).

Test large, chambers enrolled in a low to flat trochospire, final whorl tending to become planispiral, evolute, and uncoiling, early chambers globular, later ones ovoid and radially elongate, the five to six in the final whorl tending to become very elongate and distally tapering, sutures distinct, depressed, peripheral outline stellate; wall calcareous, densely perforated by large circular pores separated by smooth interpore areas, surface with elongate spines on rounded and elevated spine bases, spines proximally round in section, and distally become triradiate in section; aperture interiomarginal, a symmetrical equatorial arch with narrow recurved bordering lip. U. Pleistocene to Holocene; Indo-Pacific.

GLOBIGERINA d'Orbigny, 1826

Plate 535, figs. 1-7

Type species: Globigerina bulloides d'Orbigny, 1826; SD Parker, Jones, and Brady, 1865 (***2354**), p. 36.

Globigerina d'Orbigny, 1826 (***2303**), p. 277.

Rhynchospira Ehrenberg, 1845 (***1065**), p. 358; type species: *Rhynchospira indica* Ehrenberg, 1845; OD(M).

Pylodexia Ehrenberg, 1858 (***1072**), p. 28; type species: *Pylodexia tetratrias* Ehrenberg, 1858; SD Cushman, 1927 (***745**), p. 489.

Test globose, trochospirally enrolled, chambers spherical to ovate but not radially elongate, enlarging rapidly as added, commonly only three to five in the final whorl, sutures distinct, depressed, umbilicus open, periphery rounded, peripheral outline lobulate; wall calcareous, perforate, with cylindrical pores, surface in life has numerous long slender spines of circular cross section that are broken on dead or fossil shells, the short blunt spine remnants resulting in a hispid wall surface; primary aperture a high umbilical arch that may be bordered by an imperforate rim or narrow lip, no secondary apertures. U. Eocene to Holocene; cosmopolitan.

GLOBIGERINELLA Cushman, 1927

Plate 535, figs. 8-12

Type species: Globigerina aequilateralis Brady, 1879 (***338**), p. 285 (not = *Globigerina siphonifera* d'Orbigny, 1839, ***2304**, p. 83); OD.

Globigerinella Cushman, 1927 (***742**), p. 87.

Test with low trochospiral coil in the early stage, later nearly planispiral and evolute, globular to ovate chambers enlarging rapidly, about four to six in the final whorl, sutures radial, depressed, periphery rounded, peripheral outline lobulate; wall calcareous, densely perforate, with numerous circular pores in slight depressions of the surface, interpore areas smooth and set with numerous fine elongate spines that are circular in section at the base, shorter spines remain circular in section but more elongate ones become triradiate distally, with smooth and unbarbed surface; aperture interiomarginal, a large open equatorial arch that may be asymmetrical with respect to the plane of coiling, without a bordering lip. U. Oligocene to Holocene; tropical to subtemperate, cosmopolitan.

Remarks: Differs from *Hastigerina* in lacking distally pointing barbs on the numerous delicate spines and in the living individual lacking the frothy bubblelike capsule of cytoplasm characteristic of *Hastigerina*.

As noted by Saito et al. (1976, ***2701**, p. 281), the lectotype selected for *Globigerina siphonifera* by Banner and Blow (1960, ***125**,

p. 22) is probably conspecific with *G. aequilateralis*, but differs from the specimen originally illustrated by d'Orbigny. As there is some doubt as to the provenance of this specimen, hence as to its validity as a lectotype, Saito et al. maintained the original name for the present type species. We concur in this.

GLOBIGERINOIDES Cushman, 1927

Plate 536, figs. 1-6

Type species: Globigerina rubra d'Orbigny, 1839 (***2304**), p. 82; OD.

Globigerinoides Cushman, 1927 (***742**), p. 87.
Globigerina (Globigerinoides) Moullade, 1964 (***2195**), p. 60 (nom. transl.).

Test with globular to ovate rapidly enlarging discrete chambers in a low to high trochospiral coil, few chambers per whorl, sutures radial, depressed, umbilicus open, periphery rounded, peripheral outline lobulate; wall calcareous, coarsely perforate and spinose, pores at the base of shallow pits, the smooth spines circular in section and set on slightly raised spine bases; primary aperture a large interiomarginal umbilical arch, one or more secondary sutural openings present on the spiral side at the intersection of the spiral and radial sutures. Uppermost Oligocene to Holocene; cosmopolitan.

GLOBIGERINOIDESELLA El-Naggar, 1971

Plate 536, figs. 7 and 8

Type species: Globigerina fistulosa Schubert, 1910 (***2817**), p. 323; OD.

Globigerinoidesella El-Naggar, 1971 (***1103**), p. 451, 476.

Test large, trochospiral, early chambers spherical, few per whorl, increasing rapidly in size as added, one or more chambers of the final whorl compressed and radially extended, numerous fistulose extensions present at the peripheral margin, sutures radial, curved, depressed, umbilicus open, peripheral margin lobulate to radiate; wall calcareous, densely perforate, surface with distinct polygonal pore pits; primary aperture interiomarginal and umbilical, with imperforate bordering rim, large arched supplementary apertures along the spiral suture on the spiral side. L. Miocene to Holocene; tropical to subtropical, cosmopolitan.

Remarks: This late evolutionary development differs from typical *Globigerinoides* in the compressed and radially elongate lobulate to fistulose chambers of the final whorl.

GLOBIGERINOITA Brönnimann, 1952

Plate 537, figs. 1-6

Type species: Globigerinoita morugaensis Brönnimann, 1952; OD.

Globigerinoita Brönnimann, 1952 (***375**), p. 26.
Globigerinanus Ouda, 1978 (***2314**), p. 358; type species: *Globigerinanus sudri* Ouda, 1978; OD.

Test globose, trochospiral, spherical to ovate chambers enlarging rapidly, about three to four in the final whorl, sutures radial, depressed, umbilicus probably open in the early stage but covered by an umbilical bulla in the adult, periphery rounded, peripheral outline slightly lobulate; wall calcareous, perforate, surface hispid; primary aperture umbilical, one or more secondary sutural apertures present on the spiral side, in the final stage primary aperture and umbilicus are covered by an umbilical bulla that may have two to three infralaminal accessory openings at the margin, less commonly the supplementary spiral apertures also may be covered by bullae. L. Miocene (U. Burdigalian) to M. Miocene (Vindobonian); Egypt; Trinidad; Venezuela; USA: Virginia.

Remarks: Resembles *Globigerinoides*, but adult test has an umbilical bulla covering the primary aperture and rarely may have bullae over the supplementary apertures. The nature of the wall is uncertain; *Globigerinoita* was said to be spinose, and *Globigerinanus* was described originally as pitted, cancellate, or hispid. However, neither genus has been illustrated by electron microscopy, and published drawings do not show sufficient detail to determine whether this is a truly spinose wall, reflected by broken spine bases that give a hispid appearance, or if it was originally cancellate or pitted, requiring transfer to the Catapsydracidae.

GLOBOTURBOROTALITA Hofker, 1976

Plate 537, figs. 7-15

Type species: Globigerina rubescens Hofker, 1956 (***1511**), p. 234; OD.

Globoturborotalita Hofker, 1976 (***1524**), p. 52 (also err. cit. as *Globoturborotalia*, p. 52)

Globigerina (Zeaglobigerina) Kennett and Srinivasan, 1983 (*1673), p. 42; type species: *Globigerina woodi* Jenkins, 1960 (*1604), p. 352; OD.

Test trochospiral, globular chambers closely appressed and enlarging rapidly, few per whorl, sutures radial to curved, depressed, periphery rounded, peripheral outline lobulate; wall calcareous, perforate, pores with distinct pore pits resulting in a cancellate surface but also with true spines of circular cross section; aperture umbilical, a small to high arch bordered by a distinct rim. U. Oligocene to Holocene; cosmopolitan.

Remarks: Differs from *Globigerina* in having a cancellate wall in addition to the simple spines and differs from *Globigerinoides*, which has a similar wall, in lacking sutural supplementary apertures on the spiral side.

PROSPHAEROIDINELLA Ujiié, 1976

Plate 538, figs. 1-4

Type species: Sphaeroidinella disjuncta Finlay, 1940 (*1129), p. 467; OD.

Prosphaeroidinella Ujiié, 1976 (*3242), p. 9.

Test trochospiral, about three to five rapidly enlarging globular chambers per whorl, sutures radial, deeply incised on the umbilical side and later also on the spiral side, periphery rounded, peripheral outline slightly lobate; wall calcareous, thick, coarsely perforate, surface cancellate in the early stage, secondary deposition in the pits of the honeycomb structure later forming a calcite crust but surface remaining irregular and wall never as thick as the smooth surfaced cortex of *Sphaeroidinella* and *Sphaeroidinellopsis*; aperture interiomarginal, umbilical, a broad slit to low arch but without supplementary sutural openings. L. Miocene (Burdigalian) to M. Miocene (Tortonian); temperate to subtropical, western N. and S. Pacific.

SPHAEROIDINELLA Cushman, 1927

Plate 539, figs. 1-5

Type species: Sphaeroidina dehiscens Parker and Jones, 1865 (*2351), p. 369; OD.

Sphaeroidinella Cushman, 1927 (*742), p. 90.

Test large, ovoid, with rapidly enlarging and strongly embracing globular chambers in a compact trochospiral coil, commonly three chambers in the final whorl, umbilicus deep, sutures depressed in the early stage, flush and obscured by the surface cortex in the adult, periphery broadly rounded; wall calcareous, coarsely perforate in the juvenile stage as in *Globigerinoides*, in the adult covered by a thick, smooth and glossy secondarily deposited cortex that reduces the pore size at the surface, cortex extended at the chamber margins to form a projecting crenulated flange; primary aperture interiomarginal, umbilical in the juvenile, in the adult reduced to a slit in the thickened cortex, with a crenulate bordering lip that is continuous with the intercameral cortex flanges, one or two sutural supplementary apertures present on the spiral side. L. Pliocene to Holocene; tropical to subtropical, cosmopolitan.

SPHAEROIDINELLOPSIS Banner and Blow, 1959

Plate 539, figs. 14-16

Type species: Sphaeroidinella dehiscens (Parker and Jones) subsp. *subdehiscens* Blow, 1959 (*256), p. 195; OD.

Sphaeroidinellopsis Banner and Blow, 1959 (*124), p. 15.

Test with rapidly enlarging globular chambers in a low trochospiral coil, few per whorl, about three to four in the final whorl, periphery broadly rounded; wall calcareous, perforate, early stage as in *Globoturborotalita*, adult with a heavy, smooth, and shiny cortex, as in *Sphaeroidinella*, that obscures some pores and reduces the pore diameter of others; aperture interiomarginal, umbilical, without supplementary sutural apertures. L. Miocene (Langhian) to L. Pliocene (Piacenzian); cosmopolitan.

Remarks: Kennett and Srinivasan (1983, *1673, p. 204) regarded *Sphaeroidinellopsis subdehiscens* as a junior synonym of *Globigerina seminulina* Schwager, 1866, but the neotype of Schwager's species (designated and figured by Banner and Blow, 1960, *126, p. 24, pl. 7, fig. 2) has more chambers in the final whorl, less rapid chamber size increase, and lacks the prominent cortex of *S. subdehiscens*, hence we regard the two species as distinct.

TURBOROTALITA Blow and Banner, 1962

Plate 538, figs. 5-11

Type species: Truncatulina humilis Brady, 1884 (*344), p. 665; OD.

Turborotalita Blow and Banner, in Eames et al., 1962 (*1036), p. 122.

Test inflated, subglobular, coiled in a low to flat trochospire, chambers rounded to ovate, enlarging gradually as added, early stage umbilicate but final chamber ampullate and extended over the umbilicus on the umbilical side, sutures radial, depressed, periphery rounded, peripheral outline lobulate; wall calcareous, thin, finely perforate, finely spinose but spines may be broken; primary aperture in the early stage a low interiomarginal, extraumbilical-umbilical arch, in the final stage replaced by small accessory infralaminal apertures at the umbilical margin of the ampullate chamber that covers the umbilicus and previous apertures. U. Miocene (Messinian) to Holocene; Atlantic; Pacific.

Remarks: Previously *Turborotalita* was included with the similarly ampullate *Globigerinita* in the Globigerinitinae, or variously placed in the Globorotaliinae or Globigerininae. The presence of elongate spines was shown by Bé (1967, ***165**, p. 5) and with SEM by Holmes (1984, ***1535**, p. 102) for *Turborotalita humilis* (Brady), *T. quinqueloba* (Natland), and *T. cristata* (Heron-Allen and Earland). The previously reported pustules in the present genus are actually spine bases, these spinose structures even appearing to form chamber prolongations in *T. cristata*. Similar chamber shape has appeared in various unrelated groups, but wall characters, including porosity and spinosity, are considered to be a better indication of relationship. So far as known, true *Globigerinita* is not spinose.

Subfamily PORTICULASPHAERINAE Banner, 1982

Porticulasphaerinae Banner, 1982 (*123), p. 205.

Early stage trochospiral, later with change in coiling direction or with enveloping final chamber; aperture in the early stage umbilical, sutural supplementary apertures absent in the trochospiral stage but may occur in the final enveloping stage, openings may be covered by bullae. M. to U. Eocene.

GLOBIGERINATHEKA Brönnimann, 1952

Plate 539, figs. 6–13

Type species: Globigerinatheka barri Brönnimann, 1952; OD.

Globigerinatheka Brönnimann, 1952 (*375), p. 27.

Test globular, early chambers spherical to ovate, trochospirally coiled, later chambers with changed direction of coiling so that the final chamber completely covers the former umbilical side of the test, sutures distinct, depressed; wall calcareous, perforate, with pore pits, interpore ridges, and long acicular spines that may be retained in well-preserved specimens, no muricate sheath present; primary aperture interiomarginal, umbilical, later covered by the final enveloping chamber that has supplementary apertures along the margin, true bullae covering the supplementary apertures are bordered by multiple infralaminal openings. M. Eocene (M. Lutetian) to U. Eocene (Priabonian); cosmopolitan.

Remarks: *Globigerapsis* was regarded as a synonym of *Globigerinatheka* by Proto Decima and Bolli (1970, ***2482**, p. 888) as both may or may not have sutural bullae. However, we agree with Blow (1979, ***259**, p. 865, 1133) in separating these genera on the basis of the spinose wall of *Globigerinatheka* and muricate one of *Globigerapsis* (now placed in the Truncorotaloididae).

INORDINATOSPHAERA Mohan and Soodan, 1967

Plate 539, figs. 17-23

Type species: Inordinatosphaera indica Mohan and Soodan, 1967; OD.

Inordinatosphaera Mohan and Soodan, 1967 (*2162), p. 24.

Test subglobular, early ovoid chambers in a trochospiral coil that may be slightly flattened on the spiral side, later chambers strongly enveloping, about three per whorl, sutures flush to slightly depressed; wall calcareous, hyaline, optically radial, perforate, with pore pits; aperture interiomarginal and umbilical in the early stage, later with multiple sutural supplementary apertures, covered by elongate meandriform bullae formed in more than one series and bordered by numerous infralaminal accessory apertures. M. Eocene (Lutetian); India: W. Kutch.

ORBULINOIDES Cordey, 1968

Plate 540, figs. 1-7

Type species: Porticulasphaera beckmanni Saito, 1962 (***2699**), p. 222; OD.

Orbulinoides Cordey, 1968 (July 2) (*682), p. 371.
Orbulinoides Blow and Saito, 1968 (Sept. 25) (*261), p. 360; type species: obj.; OD.

Test spherical, early subglobular chambers in a trochospiral coil, increasing regularly in size as added, five to six per whorl, final chamber strongly inflated, turned sharply to completely overlap the umbilical side of the earlier stage, sutures radial on the spiral side, depressed; wall calcareous, perforate, hyaline, optically radial, surface finely spinose, at least in the early stage; primary aperture single and interiomarginal in the early stage, adult with numerous small arched openings at the base of the final chamber and a few smaller supplementary sutural openings on the spiral side. Upper M. Eocene (M. Lutetian); cosmopolitan.

Remarks: Blow (1979, *259, p. 1133) included *Porticulasphaera beckmanni* in *Globigerapsis* and thus regarded the genus *Orbulinoides* as a synonym. However, both are here recognized, as the early stage of *P. beckmanni* is distinctly spinose, with long *Globigerina*like spines, whereas the early stage of *Globigerapsis* is muricate and not spinose.

PORTICULASPHAERA Bolli, Loeblich, and Tappan, 1957

Plate 540, figs. 8-15

Type species: Globigerina mexicana Cushman, 1925 (*727), p. 6; OD.

Porticulasphaera Bolli, Loeblich, and Tappan, 1957 (*292), p. 34.

Test spherical, early rapidly enlarging globular chambers in a trochospiral coil, later with change in direction of coiling so that the final chamber covers the previous umbilicus but is not truly streptospiral, sutures depressed, peripheral outline lobulate; wall calcareous, perforate, pores within pore pits, surface with Globigerinacean spines that may be preserved in the early stage and not muricate; primary aperture lacking in the adult test, the final chamber having a few large arched supplementary apertures with distinct raised rim. M. Eocene (Lutetian) to U. Eocene (Bartonian); cosmopolitan.

Remarks: The genus was originally described from specimens incorrectly identified as *Globigerina mexicana*. The holotype of *G. mexicana* was redescribed by Blow and Saito (1968, *261, p. 357), and the genus was emended on this basis by Blow (1979, *259, p. 869).

Subfamily ORBULININAE Schultze, 1854

Orbulininae Cushman, 1927 (*742), p. 89, nom. transl. ex family Orbulinida.
Orbulinini Fordham, 1986 (*1149A), p. 53 (tribe, nom. transl.).

Final chamber strongly enveloping and may enclose most or all of early formed part of test. L. Miocene (Burdigalian) to Holocene.

CANDORBULINA Jedlitschka, 1934

Plate 542, figs. 1-6

Type species: Candorbulina universa Jedlitschka, 1934 (syn.: *Orbulina suturalis* Brönnimann, 1951 (*372), p. 135): OD(M).

Candorbulina Jedlitschka, 1934 (*1602), p. 20.

Test spherical, early stage trochospirally enrolled as in *Globigerina*, final chamber much larger, spherical, and enveloping the umbilical side of the trochospiral part, trochospiral coil flush with the surface or protruding somewhat above that of the spherical chamber, sutures flush to slightly depressed; wall calcareous, perforate, surface with elongate spines, attached by a boss to the surface, spines may be cylindrical and circular in section or may become triangular or triradiate distally; aperture interiomarginal and umbilical in the early trochospiral stage, replaced in the final stage by a series of large sutural supplementary openings at the contact of the early whorl and final chamber, and may have additional areal supplementary openings. M. Miocene (Helvetian to Tortonian); cosmopolitan.

Remarks: When regarded as congeneric with *Orbulina*, Jedlitschka's species from the Miocene of Czechoslovakia becomes a junior subjective synonym of *Orbulina universa* d'Orbigny, and Brönnimann, 1951 (*372) included *C. universa* Jedlitschka (non *Orbulina universa* d'Orbigny) in the synonymy of *Orbulina suturalis* Brönnimann. However, he selected a holotype from the Trinidad specimens. *Candorbulina* differs from *Orbulina* in having an incomplete globular final chamber attached to the umbilical side of the early trochospiral stage that commonly projects above the surface, whereas in *Orbulina* the early trochospiral stage is isolated within the completely spherical final chamber but held in place by the elongate spines that project through the outer chamber wall. As the two genera are here regarded as distinct, Jedlitschka's name is reinstated. The rare living "*Orbulina suturalis*" described by Vilks and Walker (1974, *3293, p. 7) as having spines of simple rounded section probably is unrelated to the Miocene *Candorbulina* but may be a developmental stage of *Globigerinoides* (Desai and Banner, 1985, *948, p. 87).

GLOBIGERINATELLA Cushman and Stainforth, 1945

Plate 543, figs. 1-3

Type species: Globigerinatella insueta Cushman and Stainforth, 1945; OD.

Globigerinatella Cushman and Stainforth, 1945 (*848), p. 68.

Test subglobular to ovoid, early chambers trochospirally enrolled, final chamber embracing and covering the umbilical side of the test, sutures slightly depressed; wall calcareous, perforate, surface pustulose; primary aperture in the early stage interiomarginal, umbilical, covered by the final embracing chamber, later chambers have secondary sutural and areal openings, each bordered by distinct thickened lips, the secondary openings may be covered by small areal bullae and by spreading and irregular sutural bullae, the bullae provided with numerous infralaminal accessory apertures. L. Miocene (Burdigalian) to lower M. Miocene (Serravallian); Caribbean; N. Africa.

ORBULINA d'Orbigny, 1839

Plate 541, figs. 1-11

Type species: Orbulina universa d'Orbigny, 1839; OD(M).

Orbulina d'Orbigny, 1839 (*2304), p. 2.

Coscinosphaera Stuart, 1866 (*3076), p. 328; type species: *Coscinosphaera ciliosa* Stuart, 1866; OD(M).

Biorbulina Blow, 1956 (*255), p. 69; type species: *Globigerina bilobata* d'Orbigny, 1846 (*2309), p. 164; OD.

Test spherical, early stage with up to fifteen globular and trochospirally arranged chambers, four to five per whorl, those of first whorl slightly compressed, final chamber spherical and enveloping, early trochospiral stage may be completely free within the spherical chamber but is held in place by long spines that perforate the outer chamber wall; wall calcareous, perforate, with two pore classes, the more numerous smaller ones interspersed among the fewer considerably larger pores, earliest whorl nonspinose and without sutural apertures, later chambers and adult test with long monocrystalline spines arising from a terraced base, spines proximally circular in section, distally becoming triangular and finally triradiate, the triradiate spines being far more common on the test, spines from enclosed earlier chambers that penetrate the outer wall lack the terraced base at the outer surface, wall of earlier chambers very thin and delicate and may be resorbed in later growth, perhaps in relation to the reproductive cycle, the dissolution proceeding first along the sutures and earliest chambers; primary aperture in the young stage interiomarginal, umbilical, with irregular imperforate bordering lip, final chamber with sutural supplementary openings, the larger series of pores possibly also representing an areal aperture. Base of M. Miocene (Serravallian) to Holocene; cosmopolitan.

Remarks: *Biorbulina* has been recognized as distinct by some workers, but Vilks and Walker (1974, *3293, p. 7) noted that the triradiate spines of *Biorbulina bilobata* are identical to those of *Orbulina universa*. *Biorbulina* appears to represent only occasional aberrant specimens. In contrast, living "*Orbulina suturalis*" has spines of circular section throughout and may be a stage of *Globigerinoides*.

POLYPERIBOLA Liska, 1980

Plate 542, figs. 7-11

Type species: Polyperibola christiani Liska, 1980; OD.

Polyperibola Liska, 1980 (*1874), p. 136.

Test subspherical, early globular chambers enlarging rapidly as added, in a trochospiral coil of two to three whorls, final chamber added in a different plane and overlaps the umbilical side of the previous test, bullae and supplementary chambers cover the sutures of the spiral side, and tend to obscure the early whorls, sutures distinct, depressed; wall calcareous, of optically radial calcite, thin, finely perforate, surface of the trochospiral part of the test lightly pustulose (possibly representing broken spine bases), wall of supplementary chambers and bullae thinner, smoother, more finely perforate and more vitreous in appearance than that of the primary chambers; primary aperture slitlike in the early stage, adult with numerous strongly arched sutural apertures at the margin of the final chamber, bullae and supplementary chambers may have similar arched infralaminal openings, all openings bordered by narrow imperforate rims, no sutural supplementary apertures present on the spiral side. M. Miocene (Tortonian); Trinidad and Tobago; Cyprus.

PRAEORBULINA Olsson, 1964

Plate 543, figs. 4-6

Type species: Globigerinoides glomerosa subsp. *glomerosa* Blow, 1956 (***255**), p. 64; OD.

Praeorbulina Olsson, 1964 (***2297**), p. 770.

Test spherical, early globular to ovate chambers in a trochospiral coil, chambers enlarging rapidly as added, three to four per whorl, much enlarged final chamber turned to the umbilical side and embracing the early whorls, sutures flush to depressed; wall calcareous, coarsely perforate and appearing coarsely cancellate because of the deep pore pits; primary aperture in early stage is a large semicircular interiomarginal umbilical opening, apertures of the trochospiral chambers covered by the final enveloping chamber that has only small crescentic and slitlike sutural supplementary openings. Upper L. Miocene (U. Langhian) to lower M. Miocene (L. Serravallian); tropical to temperate, cosmopolitan.

Family HASTIGERINIDAE Bolli, Loeblich, and Tappan, 1957

Hastigerinidae Saito, Thompson, and Breger, 1976 (***2701**), p. 282, nom. transl. ex subfamily Hastigerininae.

Hastigerininae Bolli, Loeblich, and Tappan, 1957 (***292**), p. 29 (subfamily).

Hastigerinini Fordham, 1986 (***1149A**), p. 53 (tribe; nom. transl.).

Early stage trochospiral, later streptospiral or planispiral, chambers globular to clavate or even terminally furcate; wall densely perforate or with pores localized and separated by intervening nonperforate areas, surface spinose, the elongate spines arising from basal collars at the test surface; aperture interiomarginal and equatorial, or may become spiroumbilical. M. Miocene to Holocene.

HASTIGERINA Thomson, 1876

Plate 544, figs. 1-9

Type species: Hastigerina murrayi Thomson, in Murray, 1876 = *Nonionina pelagica* d'Orbigny, 1839 (***2306**), p. 27; OD(M).

Hastigerina Thomson, in Murray, 1876 (***2214**), p. 534.

Globigerina (Hastigerina) Bütschli, in Bronn, 1880 (***421**), p. 202 (nom. transl.).

Test large, juvenile stage with low trochospiral coil, adult planispiral and involute, biumbilicate, spherical to ovate chambers increasing gradually in size as added, five to six in the final whorl, sutures radiate, depressed, periphery broadly rounded, peripheral outline lobulate; wall calcareous on a thick organic matrix, densely perforate, surface smooth, massive elongate spines of triradiate section throughout their length are concentrated in the peripheral regions of the chambers, spine bases are large rounded triangular mounds with triradiate sockets, blade edges of the spines in the area of newly formed chambers have numerous closely spaced, distally pointing, bifurcate barbs, possibly providing support for the newly forming chambers as these are added, or perhaps aiding in the capture and securing of prey, the barbs gradually disappearing in older parts of the test; aperture a wide and high interiomarginal, equatorial arch that extends to the umbilicus on both sides, bordered by a thin lip; spines shed during gametogenesis, internal septa largely resorbed as are the apertural border and up to 75 percent of the final chamber wall to facilitate egress of the gametes, thereby producing a kummerform final chamber; in life the test is surrounded by a prominent cytoplasmic bubble capsule that breaks apart at gametogenesis. U. Miocene (Messinian) to Holocene; tropical to temperate, cosmopolitan.

HASTIGERINOPSIS Saito and P. R. Thompson, 1976

Plate 545, figs. 1-8

Type species: Hastigerinopsis digitiformans

Saito and P. R. Thompson, in Saito et al., 1976; OD.

Hastigerinopsis Saito and P. R. Thompson, in Saito et al., 1976 (*2701), p. 284.

"*Bulava indica*" Boltovskoy, 1976 (May) (*294), p. 301 (name not available, ICZN Art. 13 (c)).

Test in a low trochospiral coil in the early stage, later streptospiral, early chambers globular, later radially elongate and clavate with a bulbous terminal enlargement or the final one or two chambers may bifurcate and have two bulbous ends, sutures depressed, radial, peripheral margin strongly lobulate or digitate; wall calcareous, finely perforate, with widely spaced circular pores, surface smooth except for the long spines of triradiate transverse section and occasional lateral barbs and the occasional spine bases with triradiate central depression that are concentrated at the bulbous ends of the chambers; aperture an interiomarginal, extraumbilical-umbilical arch in the early stage, gradually becoming more extensive to reach the periphery or become spiroumbilical in the adult. M. and U. Miocene, Pleistocene (Calabrian) to Holocene: cosmopolitan, tropical to warm subtropical.

Remarks: *Hastigerinopsis* was proposed for the taxon previously known as *Hastigerinella* Cushman but whose originally designated type species was not valid. *Hastigerinella* is now based on the first valid species included, an Eocene species, and the present genus was proposed for the distinct Quaternary species.

"*Bulava indica*" (originally in quotation marks) was described from isolated broken chambers by Boltovskoy, without stating whether these names were proposed as a genus and species and with question as to its foraminiferal affinity. The description noted the presence of an occasional "triradial slit-like pore" on the knobs at the spherical ends of the chambers. These appear to be identical to the spine bases of the triradiate spines characteristic of *Hastigerinopsis* (such as *H. digitiformans*), of which "*Bulava*" is a synonym.

ORCADIA Boltovskoy and Watanabe, 1982

Plate 543, figs. 7-12

Type species: Hastigerinella riedeli Rögl and Bolli, 1973 (***2638**), p. 567; OD.

Orcadia Boltovskoy and Watanabe, 1982 (*297), p. 6.

Test tiny, gradually enlarging, spherical chambers in a low trochospiral coil, about four and a half to five in the final whorl, the last somewhat displaced toward the umbilical side, sutures radial, gently curved, depressed, periphery rounded, peripheral outline lobulate; wall calcareous, thin, finely perforate with widely spaced pores, surface smooth in the proximal part of the chambers, and spines concentrated near the periphery, the more delicate simple spines of rounded section interspersed between larger spines of triangular section; aperture interiomarginal, a low umbilical-extraumbilical arch with a narrow but distinctly recurved bordering lip. Pleistocene to Holocene; Caribbean; N. Atlantic: Denmark Strait; Antarctic and Subantarctic S. Atlantic.

Suborder ROTALIINA Delage and Hérouard, 1896

Rotaliina Loeblich and Tappan, 1961 (***1902**), p. 219, nom. corr. pro suborder Rotalidae.

Rotalidae Delage and Hérouard, 1896 (***926**), p. 143 (suborder).

Chilostomellidea Lankester, 1885 (***1790**), p. 847 (order).

Rotalidea Lankester, 1885 (***1790**), p. 847 (order).

Nummulinidea Lankester, 1885 (***1790**), p. 848 (order).

Nummulitidae Delage and Hérouard, 1896 (***926**), p. 147 (suborder).

Chilostomellidae Delage and Hérouard, 1896 (***926**), p. 138 (suborder).

Tinoporinae Calkins, 1901 (***477**), p. 109 (suborder).

Nummulitidea Lister, in Lankester, 1903 (***1791**), p. 146 (suborder).

Rotaliaceae Hartog, in Harmer and Shipley, 1906 (***1424**), p. 59 (order).

Cheilostomellaceae Hartog, in Harmer and Shipley, 1906 (***1424**), p. 59 (order; nom. imperf.).

Nummulitaceae Hartog, in Harmer and Shipley, 1906 (***1424**), p. 59 (order).

Chilostomellida Calkins, 1909 (***477A**), p. 39 (order).

Rotalida Calkins, 1909 (***477A**), p. 39 (order).

Nummulitida Calkins, 1909 (***477A**), p. 39 (order).

Rotaliaridia Kühn, 1926 (***1751**), p. 152 (order).

Rotaliacea Wedekind, 1937 (***3355**), p. 85, 115 (suborder).

Nummulitacea Wedekind, 1937 (***3355**), p. 119 (suborder).

Nummulitinidea Copeland, 1956 (***680**), p. 188 (order).

Buliminida Fursenko, 1958 (***1199**), p. 24 (order).

Rotaliida Fursenko, 1958 (***1199**), p. 23 (order).

Cassidulinida Voloshinova, in Voloshinova et al., 1970 (***3319**), p. 74 (order).

Rotaliida Burmistrova, 1974 (***452**), p. 134 (order).

Orbitoidida Bashkirov and Antonishin, 1974 (***155**), p. 17, 21 (order).

Rotaliea Mikhalevich, 1980 (*2108), p. 55 (class; partim).
Rotaliata Mikhalevich, 1980 (*2108), p. 56 (subclass; partim).
Rosalinida Mikhalevich, 1980 (*2108), p. 58 (order).
Chilostomellida Mikhalevich, 1980 (*2108), p. 59 (order).
Orbitoidida Portnaya, 1981 (*2461), p. 39 (suborder).
Rotaliicea Saidova, 1981 (*2696), p. 35 (class; partim).
Rotaliicae Saidova, 1981 (*2696), p. 35 (subclass; partim).
Discorbina Saidova, 1981 (*2696), p. 43 (suborder).
Anomalinina Saidova, 1981 (*2696), p. 49 (suborder).
Nonionida Saidova, 1981 (*2696), p. 51 (order).
Nonionina Saidova, 1981 (*2696), p. 51 (suborder).
Elphidiina Saidova, 1981 (*2696), p. 53 (suborder).
Turrilinina Saidova, 1981 (*2696), p. 54 (suborder).
Buliminina Saidova, 1981 (*2696), p. 56 (suborder).
Eouvigerinina Saidova, 1981 (*2696), p. 58 (suborder).
Stilostomellina Saidova, 1981 (*2696), p. 59 (suborder).
Bolivinitida Saidova, 1981 (*2696), p. 59 (order).
Cassidulinitida Saidova, 1981 (*2696), p. 62 (order).

Test multilocular, typically enrolled but may be reduced to biserial or uniserial or may be encrusting with proliferated chambers; chambers simple or subdivided by secondary partitions, and median and lateral chambers may be differentiated; wall calcareous, of perforate hyaline lamellar calcite (hexagonal crystal form of calcium carbonate), formed by calcification at each side of an organic membrane, may be optically radial or granular (hyaline oblique), surface smooth, papillate, costate, striate, or cancellate; aperture simple or with internal toothplate, entosolenian tube or hemicylindrical structure; internal canal systems or stolon systems may occur. Triassic to Holocene.

Superfamily BOLIVINACEA Glaessner, 1937

Bolivinacea Loeblich and Tappan, nom. transl. herein ex subfamily.

Test biserial, at least in the early stage, later may become uniserial; aperture a high loop to an areal slit, provided with a toothplate. U. Cretaceous (Turonian) to Holocene.

Family BOLIVINIDAE Glaessner, 1937

Bolivinidae Hofker, 1951 (*1498), p. 48, nom. transl. ex subfamily Bolivininae.
Bolivininae Glaessner, 1937 (*1249), p. 420 (subfamily).
Gabonitidae Odébodé, 1987 (*2291A), p. 151.

Test biserial, at least in the early stage, later may become uniserial; aperture a high loop-shaped opening, provided with a toothplate. U. Cretaceous (Turonian) to Holocene.

Remarks: The Gabonitidae was proposed to include genera that lack a toothplate, but as the type species of *Gabonita* has a distinct toothplate (see Plate 548, figs. 1 and 7) this family name is included in synonymy.

AFROBOLIVINA Reyment, 1959

Plate 546, figs. 1-7

Type species: Afrobolivina afra Reyment, 1959; OD.

Afrobolivina Reyment, 1959 (*2594), p. 19.

Test large, elongate, ovate to lanceolate in side view, rounded to ovate in section, chambers broad and low, biserial throughout, septa nearly horizontal, flush or slightly indented, outer part of chamber lumen subdivided by up to twelve imperforate vertically oriented struts or partial partitions, that extend up from the chamber floor and are reflected at the surface of the test as deep vertical indentations, proximal margin of the chambers commonly with lobes that project back over the preceding chambers between the vertical indentations; wall calcareous, perforate, with coarser pores at the basal part of the chambers and finer ones distally, the finest pores irregularly distributed on the chamber roof, surface ornamented with anastomosing imperforate longitudinal costae; aperture basal to areal, loop shaped, without a lip but with a folded internal toothplate that has a long and narrow free part, toothplate extending inward from the apertural opening along the chamber wall to attach to the margin of the preceding foramen. U. Cretaceous (Campanian to Maastrichtian) to basal Paleocene: Gabon; Nigeria; Cameroun; Senegal; Angola.

ALTISTOMA de Klasz and Rérat, 1962

Plate 546, figs. 8-12

Type species: Altistoma scalaris de Klasz and Rérat, 1962; OD.

Altistoma de Klasz and Rérat, 1962 (*1703), p. 180.

Test elongate, rapidly widening, ovoid in section, chambers biserially arranged, or possibly with a very short triserial early stage, strongly overlapping so that the final pair occupies over half the test length, sharp angle at proximal margin of chambers results in a distinct shoulder that may have a faintly lobulate lower margin, sutures straight, somewhat oblique, depressed; wall calcareous, finely perforate, surface smooth; aperture a high symmetrical arch in a depression in the final chamber face, toothplate not known. M. Eocene to L. Miocene; Egypt; Gabon.

BOLIVINA d'Orbigny, 1839

Plate 547, figs. 1-4

Type species: Bolivina plicata d'Orbigny, 1839; SD Cushman, 1911 (***702**), p. 31.

Bolivina d'Orbigny, 1839 (***2306**), p. 60.

Grammostomum Ehrenberg, 1839 (***1054**), table opp. p. 120; type species: *Grammostomum tenue* Ehrenberg, 1839; SD Cushman, 1927 (***745**), p. 488.

Proroporus Ehrenberg, 1844 (***1062**), p. 75; type species: *Proroporus lingua* Ehrenberg, 1844; OD(M).

Clidostomum Ehrenberg, 1845 (***1065**), p. 310, 358; type species: *Clidostomum polystigma* Ehrenberg, 1845; OD.

Textularia (Gromostomum) Schwager, 1883 (***2832**), p. 114 (nom. transl.; err. cit.).

Bolivina (Proroporus) Yabe and Hanzawa, 1929 (***3410**), p. 155 (nom. transl.).

Test elongate, ovoid to triangular in outline, somewhat compressed, chambers broad and low, biserial throughout, rarely the final chamber may be nearly central in position, infolding of the perforate outer wall along the basal margin of the chambers commonly results in proximally directed digitate overlaps of the preceding chamber but without imperforate septula like those of *Afrobolivina*, septa flush to slightly depressed, obscured by the surface ornamentation; wall calcareous, hyaline, optically radial, perforate, surface ornamented with irregularly anastomosing imperforate costae, or costae may have an occasional pore; aperture a narrow loop at the base of the apertural face, bordered by a thickened and imperforate rim on one margin, the other margin continuing within as an internal folded toothplate with narrow attached part extending to the previous foramen and broad and short free part projecting through the opening as a long tooth, the two parts changing orientation in successive chambers. U. Cretaceous (Maastrichtian) to Holocene; cosmopolitan.

BOLIVINELLINA Saidova, 1975

Plate 547, figs. 5-7

Type species: Bolivinellina pescicula Saidova, 1975; OD.

Bolivinellina Saidova, 1975 (***2695**), p. 301.

Bolivinellina Burmistrova, 1974 (***452**), p. 132, 134 (name not available, ICZN Art. 13 (a)(i), no description).

Test elongate, narrow, oval in section, chambers narrow and high, slightly inflated, biserial throughout, sutures oblique, slightly depressed; wall calcareous, hyaline, optically radial, distal part of chambers clear, translucent and poreless, wall perforate only in the proximal chamber half, coarser pores concentrated nearest the sutures; aperture a basal loop-shaped opening with narrow lip and an internal toothplate with narrow free part. Pliocene to Holocene; Pacific; Indian Ocean; Atlantic; Gulf of Mexico; Mediterranean.

BRIZALINA O. G. Costa, 1856

Plate 548, figs. 9-12

Type species: Brizalina aenariensis O. G. Costa, 1856; OD(M).

Brizalina O. G. Costa, 1856 (***686**), p. 296.

Bolivina (Brizalina) Haynes, 1973 (***1436**), p. 128 (nom. transl.).

Test elongate, lanceolate, compressed, periphery acute to carinate, biserial throughout, chambers broad and low, sutures oblique; wall calcareous, hyaline, optically radial, finely perforate, may be basally apiculate, surface smooth or may have low and narrow imperforate longitudinal costae, most prominently on the early half of the test; aperture a basal loop that extends up the apertural face, with bordering lip and internal tooth plate, triangular attached part of the toothplate extending within to the previous foramen and denticulate, narrow and elongate free part projecting through the apertural opening. U. Cretaceous (Campanian) to Holocene; cosmopolitan.

GABONITA Dieni, 1974

Plate 548, figs. 1-8

Type species: Gabonella elongata de Klasz and Meijer, in de Klasz et al., 1960 (***1701**), p. 171; OD.

Gabonita Dieni, 1974 (***957**), p. 1096 (nom. subst. pro *Gabonella* de Klasz et al., 1960).

Gabonella de Klasz, Marie, and Meijer, 1960 (***1701**), p. 167 (non *Gabonella* Uvarov, 1940); type species: obj.; OD.

Test elongate, slightly compressed, ovoid to rhomboid in section, biserial, with plane of biseriality twisted and contact of chambers oblique, chambers broad, low, and may be arched, basal part of chambers with strong reentrant, leaving a prominant ridge above the depressed sutures; wall calcareous, very finely perforate, radial in structure, surface smooth; aperture a low arch with narrow bordering lip on one side attached to the penultimate chamber and small siphonlike toothplate attached to the apertural face rather than being free, changing in orientation in successive chambers. U. Cretaceous (Coniacian to Maastrichtian); Gabon; Angola; Cameroun.

GRIMSDALEINELLA Bolli, 1959

Plate 549, figs. 6-10

Type species: Grimsdaleinella spinosa Bolli, 1959; OD.

Grimsdaleinella Bolli, 1959 (*287), p. 1.

Test flattened, spherical proloculus followed by very broad and low biserially arranged chambers, with lateral spinose projections that curve downward or outward, sutures strongly oblique, depressed; wall calcareous, finely perforate, surface smooth to striate; aperture a loop at the base of the asymmetrical final chamber face, no bordering lip and no toothplate known. U. Cretaceous (Turonian to Coniacian); Trinidad.

LATIBOLIVINA Srinivasan, 1966

Plate 549, figs. 1-5

Type species: Bolivina anastomosa Finlay, 1939 (*1128), p. 320; OD.

Latibolivina Srinivasan, 1966 (*3050), p. 240 (also err. cit. as *Latibollvina*, p. 241).

Test small, broad, and oval to rhomboidal in outline, laterally compressed, periphery acutely angled, chambers broad and low, biserially arranged, sutures obscured by the surface ornamentation; wall calcareous, finely perforate, surface with heavy sculpture of anastomosing longitudinal costae that obscures the sutures, median rib or ribs may be more prominent than the lateral ones; aperture a narrow and elongate loop, with bordering lip and an internal toothplate like that of *Brizalina*. U. Eocene to Holocene; cosmopolitan.

LOXOSTOMOIDES Reiss, 1957

Plate 549, figs. 11-16

Type species: Bolivina applinae Plummer, 1927 (*2421), p. 69 (nom. imperf., as *applini*); OD.

Loxostomoides Reiss, 1957 (*2555), p. 241.

Bolivina (Loxostomoides) Reyment, 1959 (*2594), p. 16 (nom. transl.).

Test elongate, narrow, oval in section, chambers low, broad, and arranged biserially in the early stage, later chambers higher, cuneate, and uniserial, lower margin of the chambers with slight proximally directed projections overlapping and obscuring the depressed sutures; wall calcareous, hyaline, optically radial, perforate, pores smaller to absent in the distal part of the chamber wall, longitudinal surface ribs in the early part of the test reduced to the chamber overlaps of the later chambers; aperture a basal loop in the early stage, areal but slightly eccentric in the uniserial stage, with narrow bordering lip and an internal toothplate like that of *Brizalina*. U. Cretaceous (Senonian) to Paleocene; cosmopolitan.

LUGDUNUM Saidova, 1975

Plate 550, figs. 1-4

Type species: Bolivina hantkeniana Brady, 1881 (*339), p. 58; OD.

Lugdunum Saidova, 1975 (*2695), p. 308.

Test ovate to subtriangular in outline, lenticular in section, periphery carinate, chambers moderately inflated, biserially arranged, increasing in proportionate breadth as added, sutures straight to oblique, depressed; wall calcareous, finely perforate, thin, hyaline, optically radial, surface smooth to longitudinally costate, with short, fine ribs, peripheral keel may be entire or may be interrupted at each suture and have a serrate margin; aperture basal to areal, large and oval, with a thick bordering lip and an internal folded or *U*-shaped toothplate, attached part broad and triangular, free part narrow, one angle showing through the aperture as a short tooth. Holocene; Pacific; Atlantic.

TAPPANINA Montanaro Gallitelli, 1955

Plate 550, figs. 5-8

Type species: Bolivinita selmensis Cushman, 1933 (*770), p. 58; OD.

Tappanina Montanaro Gallitelli, 1955 (*2171), p. 190.

Test small, biserial, slightly twisted, sides flattened, angles carinate, adult test rectangular to rhomboidal in section, sutures in the early stage flush, later ones depressed, with chambers inflated and carinate just distal to the sutures; wall calcareous, optically radial, finely perforate, surface smooth except for the elevated and nodose lateral carina and basal margins of the chambers; aperture at the base of the final chamber narrow and elongate, with one margin produced as an elevated lip and the other bending inward to form a folded toothplate, free part of the toothplate showing through the aperture as a small tooth. U. Cretaceous (Coniacian) to L. Eocene; cosmopolitan.

Family BOLIVINOIDIDAE Loeblich and Tappan, 1984

Bolivinoididae Loeblich and Tappan, 1984 (***1918**), p. 42.
Bolivinoididae Loeblich and Tappan, 1982 (***1917**), p. 32 (name not available, ICZN Art. 13(a)(i), no description).

Test biserial; wall calcareous, perforate, optically radiate; surface with heavy longitudinal costae that may bifurcate, interior surface tuberculate; aperture a high interiomarginal slit, tending to become areal in position, provided with an internal toothplate. U. Cretaceous (Santonian) to Paleocene.

BOLIVINOIDES Cushman, 1927

Plate 551, figs. 3-9

Type species: Bolivina draco Marsson, 1878 (***2047**), p. 157; OD.

Bolivinoides Cushman, 1927 (***740**), p. 89.

Test large, robust, rhomboidal in outline, flaring, laterally compressed to lenticular in section, chambers broad and low, increasing rapidly in breadth as added, biserial throughout, basal margin of the chambers may have short and proximally directed projections over the preceding septa that merge into the longitudinal costae, sutures oblique, slightly depressed, commonly obscured by the surface ornamentation; wall calcareous, optically radiate, finely perforate, with dense and evenly distributed pores, surface with strong tubercles and longitudinal costae that may bifurcate distally; aperture an elongate narrow opening, basal in the early stage and areal in later chambers, with smooth border and short internal toothplate, the broad, roughly triangular free part protruding through the opening as a long tooth. U. Cretaceous (U. Santonian) to Paleocene; cosmopolitan.

Superfamily LOXOSTOMATACEA Loeblich and Tappan, 1962

Loxostomatacea Loeblich and Tappan, nom. corr. herein.
Loxostomidea Saidova, 1981 (***2696**), p. 60 (nom. imperf.; nom. transl. ex family).

Test biserial, at least in early stage, later may tend to become uniserial; wall calcareous, hyaline, optically radial or granular; aperture basal to terminal, no toothplate. U. Cretaceous (Senonian) to Holocene.

Family LOXOSTOMATIDAE Loeblich and Tappan, 1962

Loxostomatidae Loeblich and Tappan, 1964 (***1910**), p. 17, 33, nom. corr. pro family Loxostomidae.
Loxostomidae Loeblich and Tappan, 1962 (***1906**), p. 110 (nom. imperf.).
Loxostominae Saidova, 1981 (***2696**), p. 60 (subfamily; nom. imperf.).
Aragoniinae Saidova, 1981 (***2696**), p. 60 (subfamily).

Test biserial, at least in early stage, later may tend to become uniserial; aperture a low interiomarginal opening in the biserial stage, a terminal slit in the uniserial stage. U. Cretaceous (Santonian) to M. Eocene.

ARAGONIA Finlay, 1939

Plate 551, figs. 1 and 2

Type species: Aragonia zelandica Finlay, 1939; OD.

Aragonia Finlay, 1939 (***1128**), p. 318.

Test rhomboidal in outline, compressed to fusiform in section, biserial throughout, chambers increasing rapidly in breadth as added, sutures oblique, thickened, and elevated; wall calcareous, optically granular, apparently lacking pores, surface ornamented by limbate and elevated sutures and marginal keel and may have diagonally placed longitudinal costae; aperture a small opening at the base of the apertural face, no toothplate. L. Paleocene (Danian) to M. Eocene (Lutetian); North America; Caribbean; Italy; Morocco; New Zealand.

LOXOSTOMUM Ehrenberg, 1854

Plate 552, figs. 1-8

Type species: Loxostomum subrostratum Ehrenberg, 1854; SD Cushman, 1927 (***745**), p. 490.

Loxostomum Ehrenberg, 1854 (***1068**), p. 22.

Loxostoma Howe, 1930 (*1566), p. 329 (err. emend.: non *Loxostoma* Bivona-Bernardi, 1838).
Bolivinitella Marie, 1941 (*2031), p. 189; type species: *Bolivinita eleyi* Cushman, 1927 (*740), p. 91; OD.
Siphogaudryina (Bolivinitella) Hofker, 1957 (*1512), p. 73 (nom. transl.).

Test elongate, compressed, quadrangular in section, sides flat to concave, margins truncate and carinate, chambers biserially arranged and increasing in relative breadth as added, later chambers arched over the midline with a tendency to become nearly uniserial, sutures strongly curved, flush to elevated, thickened, merging into the lateral carinae; wall calcareous, hyaline, optically radial, finely perforate, surface smooth to finely costate; aperture basal in the early stage, later terminal, slitlike to ovoid, with bordering lip that may have a faintly denticulate margin, no toothplate. U. Cretaceous (Senonian) to Paleocene; France; England; Ireland; USA: Arkansas, Texas.

TRACHELINELLA
Montanaro Gallitelli, 1956

Plate 550, figs. 9-12

Type species: Bolivina watersi Cushman, 1927 (*740), p. 88; OD.

Trachelinella Montanaro Gallitelli, 1956 (*2173), p. 38.
Trakelina Montanaro Gallitelli, 1955 (*2172), p. 215 (name not available, ICZN Art. 13 (a)(i), no description).

Test elongate, somewhat compressed, enlarging gradually, chambers biserially arranged but may be twisted about the axis up to about 90°, periphery subacute to carinate, sutures arched, depressed; wall calcareous, finely perforate, surface with prominent transverse and arched ribs paralleling the sutures just above the lower edge of the chambers, may fuse laterally into the marginal carinae; aperture terminal, rounded to ovate, with a short neck and lip, no toothplate. U. Cretaceous (Campanian to Maastrichtian); USA: Texas, Mississippi.

ZEAUVIGERINA Finlay, 1939

Plate 552, figs. 16-19

Type species: Zeauvigerina zelandica Finlay, 1939; OD.

Zeauvigerina Finlay, 1939 (*1126), p. 541.

Test elongate, flaring slightly, moderately compressed, oval in section, chambers biserially arranged, increasing gradually in relative height as added, final chamber nearly central in position with thick elongate neck, sutures straight and depressed, nearly horizontal; wall calcareous, optical character unknown because of prevalent recrystallization, surface rough and pustulose, with thick secondary layer of calcite; aperture terminal on the produced neck, with a broad phialine lip, no toothplate present, intercameral foramina interiomarginal and arched, suggesting that the aperture is terminal only on the final chamber or that earlier necks with terminal apertures were resorbed and foramina secondarily developed. U. Cretaceous to M. Eocene; cosmopolitan.

Family BOLIVINELLIDAE Hayward, 1980

Bolivinellidae Hayward, in Hayward and Brazier, 1980 (*1440), p. 108.

Test biserial, later chambers increasing rapidly in breadth so that test becomes broad and palmate; aperture cribrate, obscured by pustules on apertural surface, no toothplate. Eocene to Holocene.

BOLIVINELLA Cushman, 1927

Plate 553, figs. 1-9

Type species: Textularia agglutinans d'Orbigny var. *folium* Parker and Jones, 1865 (*2351), p. 370, 420; OD.

Bolivinella Cushman, 1927 (*739), p. 79.
Textularia (Bolivinella) Yabe and Hanzawa, 1929 (*3410), p. 155 (nom. transl.).
Geminaricta Cushman, 1936 (*781), p. 61; type species: *Bolivinella virgata* Cushman, 1929 (*752), p. 33; OD.

Test compressed, flabelliform to subquadrate in outline, biserial throughout, globular proloculus followed by small early chambers, later ones increasing rapidly in breadth but more slowly in height to result in a flaring test, lateral margin of a few to most pairs of chambers may be produced into spinose projections, terminal face of the chambers truncate, sutures thickened and limbate, later ones strongly recurved laterally, periphery angular; wall calcareous, finely perforate, surface ornamented by the nonperforate limbate sutures that may be broken up into nodes, and paired longitudinal costae along the median line of the test may be continuous or broken up into short segments, terminal face of the chambers ornamented with radiating rows of tiny pustules; aperture cribrate, consisting of four to ten tiny openings near the base of the apertural face and may have a somewhat larger opening at the base; reproduction plastogamic, microspheric test (smaller proloculus) appears to be the schizont generation, as only that with larger proloculus undergoes plastogamy (the gamont) and may be found fused in pairs or with the central part of the apertural region having been resorbed during the reproductive process, suggesting that the gametes of *Bolivinella* may be few, large and amoeboid as are those of *Spirillina*. Eocene to Holocene; tropical to subtropical shallow water, inner shelf, cosmopolitan.

Remarks: The holotype of *Bolivinella virgata* Cushman from the Miocene of Southwest France and the type species of *Geminaricta* was shown by Hayward and Poignant (1985, ***1442**, p. 251) to be a true *Bolivinella* and generically distinct from late Oligocene specimens later referred to the species by Cushman in proposing the genus *Geminaricta*. The Oligocene specimens differ from *Bolivinella* in apertural character, toothplate, and uniserial later stage and were redescribed as *Rectobolivina sanctipauli* Hayward and Poignant.

QUASIBOLIVINELLA Quilty, 1981

Plate 552, figs. 9-15

Type species: Quasibolivinella taylori Quilty, 1981; OD.

Quasibolivinella Quilty, 1981 (***2502**), p. 87.

Test flattened, flaring, and palmate to subquadrate in outline, chambers broad and low, biserial throughout, globular proloculus may be basally apiculate and is completely surrounded by the first biserial pair of chambers, later chambers increasing rapidly in breadth but very little in height as added, sutures strongly oblique, flush; wall calcareous, perforate, surface smooth or may have a median longitudinal ridge, apertural face with fine pustules; aperture cribrate on the face of the final two chambers; plastogamic reproduction results in gamont test with wide area of the apertural face resorbed. U. Eocene to U. Miocene (Tortonian); Australia; New Zealand.

Family TORTOPLECTELLIDAE Loeblich and Tappan, 1985

Tortoplectellidae Loeblich and Tappan, 1985 (***1925**), p. 113.

Test free, biserial throughout, although plane of biseriality may be slightly twisted with continued growth; wall calcareous, optically hyaline oblique, perforate granular in structure; aperture an areal loop-shaped slit that runs obliquely up the apertural face. Holocene; Pacific Ocean; Indian Ocean.

TORTOPLECTELLA Loeblich and Tappan, 1985

Plate 553, figs. 10-15

Type species: Textularia crispata Brady, 1884 (***344**), p. 359; OD.

Tortoplectella Loeblich and Tappan, 1985 (***1925**), p. 113.

Test free, flaring in side view, quadrangular in section but rhomboid rather than rectangular, sides flattened, the distinctly angular posterior and lateral chamber margins resulting in a serrate test outline; chambers biserially arranged throughout; sutures slightly depressed; wall calcareous, hyaline oblique (optically granular), very thin, distinctly and coarsely perforate except for a narrow imperforate region adjacent to the aperture, perforations irregularly arranged and of varied size, wall surface smooth and polished; aperture an areal slit, commencing a slight distance above the base of the rhomboid apertural face near one edge and extending obliquely upward across the apertural face toward its midpoint, bordered by a distinct lip but not elevated on a neck. Holocene; Raine Island, Torres Straits, Coral Sea, at about 283 m; Rongelap, Marshall Islands, at 80 m to 300 m; W. Indian Ocean, off Mozambique, from 0.5 m to 3.7 m.

Superfamily BOLIVINITACEA Cushman, 1927

Bolivinitacea Grigyalis, 1978 (***1306**), p. 9 (nom. corr.).
Bolivinitidea Saidova, 1975 (***2695**), p. 299 (nom. transl. ex subfamily).

Test biserial, sides flattened, and edges truncate; aperture a high opening in the face of the final chamber, one border sharply bent inward to become an internal toothplate. M. Miocene to Holocene.

Family BOLIVINITIDAE Cushman, 1927

Bolivinitidae Glaessner, 1936 (*1245), p. 127, nom. transl. ex subfamily Bolivinitinae.
Bolivinitinae Cushman, 1927 (*742), p. 61 (subfamily).

Test biserial, sides flattened, and edges truncate, angles of the test carinate; aperture a high opening in the face of the final chamber, one border sharply bent inward to become an internal toothplate. M. Miocene to Holocene.

ABDITODENTRIX Patterson, 1985

Plate 554, figs. 1-5

Type species: Abditodentrix asketocomptella Patterson, 1985 = *Bolivinita pseudothalmanni* Boltovskoy and Giussani de Kahn, 1981 (***296**), p. 44; OD.

Abditodentrix Patterson, 1985 (***2368**), p. 138 (also as *Abitodentrix*, p. 140).
Abditodentrix Towe, 1984 (***3219**), p. 318 (name not available, ICZN Art. 13 (a)(i), no description).

Test elongate, saggitiform, sides flattened, edges truncate, biserial throughout, chambers enlarging gradually, sunken and concave on the sides, sutures elevated on the flat sides of the test and constricted laterally to result in serrate test margins; wall calcareous, hyaline, optically radial, perforate with pores of medium size, surface highly ornamented by elevated reticulations, prominent on the early part of the test and flat sides but not present on the apertural face; aperture basal, ovoid, extending up the apertural face, without a bordering lip but with an internal folded toothplate at one side of the opening, free part reduced and not projecting, one side of the folded toothplate terminating midway in the chamber, toothplates of successive chambers alternating in orientation. Pliocene to Holocene; Southwest Atlantic.

BOLIVINITA Cushman, 1927

Plate 554, figs. 6-10

Type species: Textilaria quadrilatera Schwager, 1866 (***2828**), p. 253; OD.

Bolivinita Cushman, 1927 (***740**), p. 90.
Textularia (Bolivinita) Yabe and Hanzawa, 1929 (***3410**), p. 158 (nom. transl.).

Test elongate, cuneiform in outline, compressed, sides flat, margins truncate and flaring in the microspheric generation, slowly diverging to subparallel in the megalospheric one, angles carinate, proloculus commonly apiculate, chambers of somewhat greater breadth than height, biserial in arrangement, sutures oblique, flush on the flat sides, slightly indented on the margins; wall calcareous, thin, optically radial, perforate, completely covered with fine pores but with some interspersed larger ones, surface smooth, slightly nodose or with a few short longitudinal ribs in the early stage, secondary calcite encrustation may form a thin veneer or may be localized as domelike mounds around the pores; aperture basal, elliptical, extending up the apertural face, one margin bending inward to form a folded toothplate that extends back to the previous foramen, free part of the toothplate narrow and projecting through the aperture, continuing as a rim bordering the opening. M. Miocene to Holocene; Atlantic; Pacific; Indo-Pacific.

Superfamily CASSIDULINACEA d'Orbigny, 1839

Cassidulinacea Loeblich and Tappan, 1961 (***1902**), p. 313, nom. transl. ex family Cassidulinidae.
Cassidulinoidea Ayala-Castañares, 1963 (***101**), p. 101.
Islandiellidea Saidova, 1981 (***2696**), p. 60.
Cassidulinidea Saidova, 1981 (***2696**), p. 61.
Cassidulinitidea Saidova, 1981 (***2696**), p. 62.

Test enrolled biserial or may be secondarily uncoiled; wall calcareous, perforate, optically radial or granular; aperture an interiomarginal slit, or may become terminal, may have bordering lip or flap, and may have toothplate. Paleocene to Holocene.

Family CASSIDULINIDAE d'Orbigny, 1839

Cassidulinidae d'Orbigny, 1839 (***2304**), p. xxxix, 123.
Cassidulinidea Reuss and Fritsch, 1861 (***2593**), p. 3.
Cassidulina Lankester, 1885 (***1790**), p. 847.
Cassiduline Delage and Hérouard, 1896 (***926**), p. 140.
Cassidulinida Copeland, 1956 (***680**), p. 188 (err. emend.).
Islandiellidae Loeblich and Tappan, 1964 (***1910**), p. C556.
Cassiclulinidae Saidova, 1981 (***2696**), p. 60 (err. cit.).
Reissiidae Saidova, 1981 (***2696**), p. 61.
Ehrenberginidae Saidova, 1981 (***2696**), p. 62.

Test with biserially arranged chambers or derived from such, axis of biseriality enrolled in a planispiral coil, at least in early stage, later may uncoil. Paleocene to Holocene.

Subfamily CASSIDULININAE d'Orbigny, 1839

Cassidulininae Brady, 1884 (*344), p. 69, nom. corr. pro subfamily Cassidulinida.
Cassidulinida Schultze, 1854 (*2824), p. 52 (subfamily, nom. transl. ex family).
Cassidulinae Brady, 1881 (*339), p. 44.
Cassidulineae Calkins, 1901 (*477), p. 108.
Bradynellinae Saidova, 1981 (*2696), p. 60.
Cassisphaerininae Saidova, 1981 (*2696), p. 61.
Lemininae Saidova, 1981 (*2696), p. 61.
Islandiellininae Saidova, 1981 (*2696), p. 61 (nom. imperf.; nom. transl. ex family).
Cassidulinoidinae Saidova, 1981 (*2696), p. 61.
Cassilamellinae Saidova, 1981 (*2696), p. 61 (nom. imperf.).
Islandiellinae Loeblich and Tappan, 1982 (*1917), p. 33 (nom. corr. pro subfamily Islandiellininae).

Test biserial and enrolled in the early stage, coiling generally involute but may become evolute and may uncoil in the later stage. Paleocene to Holocene.

ANTICLEINA Saidova, 1975

Plate 555, fig. 9

Type species: Anticleina antarctica Saidova, 1975; OD.

Anticleina Saidova, 1975 (*2695), p. 330.

Test subglobular to ovoid in outline, periphery broadly rounded, sides somewhat compressed, chambers biserially arranged, with plane of biseriality planispirally enrolled and zigzag suture at the periphery, chambers meet at the center of each side, without a clear umbonal thickening, sutures radial, slightly depressed; wall calcareous, optically granular, surface smooth; aperture double, a long interiomarginal slit along the base of the apertural face and a second shorter supplementary areal aperture paralleling the primary one about midway between the base of the chamber and the periphery. Holocene; Antarctic region of the Pacific.

CASSIDULINA d'Orbigny, 1826

Plate 555, figs. 1-8

Type species: Cassidulina laevigata d'Orbigny, 1826; OD(M).

Cassidulina d'Orbigny, 1826 (*2303), p. 282.
Entrochus Ehrenberg, 1843 (*1059), p. 408; type species: *Entrochus septatus* Ehrenberg, 1843; OD(M).
Selenostomum Ehrenberg, 1858 (*1072), p. 12; type species: not designated, two species named, neither ever figured (= *Cassidulina*, fide Cushman, 1944, *794, p. 158, after examination of type specimens).
Lernina Khusid, 1973 (*1685), p. 107 (name not available, ICZN Art. 13 (a)(i), no description.
Lernina Saidova, 1975 (*2695), p. 325; type species: *Lernina micae* Saidova, 1975; OD.

Test lenticular to flattened and ovoid, periphery subangular to carinate, chambers biserially arranged and plane of biseriality planispirally enrolled, commonly with umbonal boss of clear calcite, sutures radial to oblique, straight to curved, flush; wall calcareous, hyaline, optically granular, perforate, surface smooth, polished; aperture a narrow arched slit at the base of the apertural face and parallel to the peripheral margin, partially closed by an apertural plate, no internal toothplate. U. Eocene to Holocene; cosmopolitan.

CASSIDULINELLA Natland, 1940

Plate 554, figs. 11-14

Type species: Cassidulinella pliocenica Natland, 1940; OD.

Cassidulinella Natland, 1940 (*2232), p. 568, 570 (non *Cassidulinella* Suzin, in Voloshinova and Dain, 1952).

Test flattened to discoidal, chambers biserially arranged and plane of biseriality enrolled as in *Cassidulina* in the early stage, later flaring with chambers becoming very broad, low, and strongly arched, final chamber occupies nearly half the test circumference, sutures curved, depressed; wall calcareous, thin, finely perforate; aperture an elongate slit at the base of the final chamber face and paralleling the periphery, no marginal flap or toothplate. L. Miocene (L. Burdigalian) to U. Pliocene; USA: California; Gabon.

CASSIDULINOIDES Cushman, 1927

Plate 555, figs. 10-13

Type species: Cassidulina parkeriana Brady, 1881 (*339), p. 59; OD.

Cassidulinoides Cushman, 1927 (*742), p. 84.

Test elongate, robust, lituoline in form, periphery rounded, chambers biserially arranged, with plane of biseriality planispirally coiled in the early stage, and later biserial chambers with plane uncoiling, chambers with small triangular overlap onto the opposite side at the periphery, sutures slightly depressed; wall calcareous, optically radial, perforate; aperture in the adult subterminal and loop shaped to terminal and ovate, with small folded toothplate. Pleistocene to Holocene.

EVOLVOCASSIDULINA Eade, 1967

Plate 555, figs. 14-18

Type species: Cassidulina orientalis Cushman, 1922 (*722), p. 129; OD.

Evolvocassidulina Eade, 1967 (*1033), p. 431.

Test free, elongate, early stage lenticular to subglobular, chambers biserially arranged, with the plane of biseriality in the early stage enrolled as in *Cassidulina*, some shallow water individuals enrolled throughout growth, whereas individuals in deeper water have uncoiled later stage and more elongate chambers; wall calcareous, optically granular, perforate, surface smooth; aperture subterminal, oval to an elongate loop bordered by a narrow lip, with a small spatulate tooth arising from the base of the face adjacent to the previous chamber and protruding from the aperture. U. Eocene to Holocene.

Remarks: *Cassidulina orientalis* was briefly described (Cushman, 1922) in the text of a discussion of *Cassidulina bradyi*. Reference was made to an earlier publication (Cushman, 1919, *714, p. 606) in which specimens from New Zealand had been identified as *C. bradyi* that were now regarded as specifically distinct. No holotype was designated for *Cassidulina orientalis*, and the type specimens for the 1919 article on New Zealand species had not been isolated from the original faunal slides. One of the seven specimens of *Cassidulina orientalis* Cushman, 1922, now isolated from this faunal slide, was designated as lectotype and illustrated (Loeblich and Tappan, 1985, *1924, p. 106), the remaining specimens becoming paralectotypes.

FAVOCASSIDULINA Loeblich and Tappan, 1957

Plate 556, figs. 1-6

Type species: Pulvinulina favus Brady, 1877 (*335), p. 535; OD.

Favocassidulina Loeblich and Tappan, 1957 (*1897), p. 230.

Test lenticular, prominent surface reticulations obscure the sutures, but sectioned or dissected specimens show the chambers to be biserially arranged and planispirally enrolled as in *Islandiella*, alternate chambers extending to the umbilicus on opposite sides, periphery acutely angled; wall calcareous, primary wall indistinctly optically radial, as the calcite crystals are dendritic in form and occur in bundles, inner and outer surface of the wall covered by a microgranular veneer, the variation in wall structure resulting in thick walls appearing optically granular, finely perforate, surface covered with secondarily formed honeycomb network of narrow elevated ridges forming polygonal open areas, the polygonal mesh becoming more prominent with lamellar growth, area immediately adjacent to the aperture smooth to radially grooved but without the polygonal mesh; aperture an elongate, slightly curved slit paralleling the chamber margin, anterior margin with a narrow lip, toothplate at the posterior margin, its slightly protruded external portion forming a narrow cristate tooth that fuses with the lip at the upper end of the aperture but leaves a gap between these at the lower end, internally a small primary tongue arises from the septal wall nearest the anterior end of the preceding apertural foramen as in *Islandiella*. M. Miocene to Holocene; Pacific Ocean; Indian Ocean.

Remarks: The detailed wall structure and apertural anatomy of the type species were described by Nomura (1984, *2261, p. 94).

GLOBOCASSIDULINA Voloshinova, 1960

Plate 557, figs. 1-23

Type species: Cassidulina globosa Hantken, 1876 (*1398), p. 64; OD.

Globocassidulina Voloshinova, 1960 (*3316), p. 58.

Cassilongina Voloshinova, 1960 (*3316), p. 58; type species: *Cassidulina oblonga* Reuss, 1850 (*2573), p. 376; OD.

Smyrnella I. A. Basov, 1974 (*156), p. 153, 155, 160 (name not available, ICZN Art. 13 (a)(i), no description).

Sphaeroislandyella Burmistrova, 1974 (*452), p. 131; as *Sphaeroislandiella*, p. 132 (name not available, ICZN Art. 13 (a)(i), no description).

Bradynella Burmistrova, 1974 (*452), p. 131, 132, 135 (name not available, ICZN Art. 13 (a)(i), no description).

Cassidulinitella Saidova, 1975 (*2695), p. 329; type species: *Cassidulinitella salebrosa* Saidova, 1975; OD.

Smyrnella Saidova, 1975 (*2695), p. 331; type species: *Cassidulina subglobosa* Brady var. *subcalifornica* Drooger, 1953 (*1011), p. 140; OD.

Sphaeroislandiella Saidova, 1975 (*2695), p. 342; type species: *Sphaeroislandiella notalnella* Saidova, 1975; OD.

Bradynella Saidova, 1975 (*2695), p. 344; type species: *Cassidulina subglobosa* Brady, 1881 (*339), p. 60; OD.

Test globular to lenticular, periphery rounded to acute, and may be carinate, chambers biserially arranged and enrolled, with zigzag suture along the periphery, sutures radial to oblique, slightly depressed: wall calcareous, optically granular, perforate, surface smooth and polished or less commonly with low reticulations or papillae: aperture oval, slitlike or curved, extending up the apertural face at an angle to the base, apertural toothplate on posterior side, with cristate tooth projecting through the opening and with external apertural ridge. U. Eocene to Holocene; cosmopolitan.

HETEROCASSIDULINA McCulloch, 1977

Plate 556, figs. 7-9

Type species: Heterocassidulina erecta McCulloch, 1977; OD.

Heterocassidulina McCulloch, 1977 (***1961**), p. 400.

Test elongate, flattened to lenticular in section, early chambers biserially arranged and enrolled as in *Cassidulina*, later chambers arched, low and much broader as in *Cassidulinella* but flaring and uncoiling, sutures radial to oblique in the early stage, later nearly horizontal but arched centrally, slightly depressed: wall calcareous, distinctly perforate, optical character unknown, surface smooth: aperture an elongate slit paralleling the periphery at the base of the final chamber, toothplate not reported. Holocene: E. Pacific, USA: off Catalina Island, California.

ISLANDIELLA Nørvang, 1959

Plate 558, figs. 1-20; plate 559, figs. 1-9

Type species: Cassidulina islandica Nørvang, 1945 (***2266**), p. 41: OD.

Islandiella Nørvang, 1959 (***2268**), p. 26.

Cassilamellina Voloshinova, 1960 (***3316**), p. 59: type species: *Cassidulina californica* Cushman and Hughes, 1925 (***826**), p. 12; OD.

Planocassidulina Gudina, 1966 (***1329**), p. 69; type species: *Cassidulina norcrossi* Cushman, 1933 (***773**), p. 7: OD.

Cassandra Gudina and Saidova, in Gudina et al., 1968 (***1334**), p. 226: type species: *Cassidulina inflata* Gudina, 1966 (***1329**), p. 63; OD.

Cassidulita Sellier de Civrieux, 1969 (***2864**), p. 156; type species: *Cassidulina norcrossi* Cushman subsp. *australis* Phleger and F. L. Parker, 1951 (***2404**), p. 27; OD.

?*Rosaella* Saidova, 1975 (***2695**), p. 345: type species: *Rosaella rosae* Saidova, 1975; OD.

Discoislandiella Saidova, 1975 (***2695**), p. 346; type species: *Cassidulina smechovi* Voloshinova, in Voloshinova and Dain, 1952 (***3818**), p. 90: OD.

Test lenticular to subglobular, periphery rounded to carinate, chambers biserially arranged with plane of biseriality planispirally enrolled, alternate chambers reaching to the umbilical region on one side leaving only a small triangular part of the chamber visible at the periphery on the opposite side, sutures flush to slightly depressed, limbate, clear shell material in the umbonal region; wall calcareous, hyaline, optically radial, finely perforate with distinct pore tubules, surface smooth and polished; aperture an elongate interiomarginal opening, with a toothplate on the posterior side and a secondary tongue on the anterior side, primary tongue of the toothplate connecting to the previous foramen and cristate tooth protruding from the aperture. Paleocene to Holocene: cosmopolitan.

LERNELLA Saidova, 1975

Plate 559, fig. 10

Type species: Lernella auri Saidova, 1975 = *Cassidulina inflata* LeRoy, 1944 (***1826**), p. 37: OD.

Lernella Saidova, 1975 (***2695**), p. 327.

Test oval to elongate, periphery rounded, chambers inflated, biserially arranged and enrolled as in *Cassidulina*, sutures radial, flush to depressed: wall calcareous, optically granular, finely perforate, surface smooth and polished: aperture an arched narrow slit extending from the base of the final chamber, partially concealed by a large apertural plate from the lower rim. Oligocene to Holocene; Pacific.

PARACASSIDULINA Nomura, 1983

Plate 560, figs. 1-4

Type species: Globocassidulina nipponensis Eade, 1969 (***1034**), p. 65 = *Cassidulina orientale* [sic] Cushman, 1925 (***729**), p. 37, non *Cassidulina orientalis* Cushman, 1922; OD.

Paracassidulina Nomura, 1983 (***2260**), p. 94.

Test free, compressed, slightly elongate in side view, low chambers biserially arranged and strongly recurved, plane of biseriality enrolled as in *Cassidulina*, later stage may uncoil; wall calcareous, optically granular, finely perforate, surface smooth: aperture a long narrow interiomarginal slit, parallel to the periphery of the preceding chamber. Miocene to Holocene; USA: Tennessee; Japan.

Remarks: *Cassidulina orientale* Cushman, 1925 (recte *orientalis*, as *Cassidulina* is feminine) is a primary junior homonym of *Cassidulina orientalis* Cushman, 1922, hence was renamed by Eade. The holotype is USNM Coll. No. 20279.

PSEUDOCASSIDULINOIDES de Klasz and Rérat, 1963

Plate 559, figs. 11-13

Type species: Pseudocassidulinoides galoa de Klasz and Rérat, 1963; OD.

Pseudocassidulinoides de Klasz and Rérat, 1963 (*1704), p. 78.

Test ovate in outline, compressed, oval in section, periphery rounded, chambers slightly inflated, enlarging rapidly as added, biserially arranged with plane of biseriality planispirally coiled, whorl tending to flare in the final stage although not completely uncoiled, chambers extending to the umbilicus on one side and only a small triangular part visible on the opposite side, sutures slightly depressed; wall calcareous, thin, finely perforate, wall structure unknown, surface smooth; aperture a semicircular to reniform areal slit, terminal in position, presence or absence of toothplate unknown. L. Miocene; Gabon.

Remarks: Resembles *Cassidulinoides* in the tendency to uncoil and terminal aperture but never becomes completely uncoiled, and the aperture is not as closely related to the basal suture.

STICHOCASSIDULINA Stone, 1946

Plate 559, figs. 16-18

Type species: Stichocassidulina thalmanni Stone, 1946; OD.

Stichocassidulina Stone, 1946 (*3071), p. 59.

Test subglobular, periphery rounded, chambers inflated, biserial, enrolled and involute as in *Islandiella*, sutures depressed; wall calcareous, finely perforate, wall structure unknown, surface smooth; aperture a large looplike opening in the apertural face, perpendicular to the basal suture, partially obscured by a toothlike plate, with numerous small secondary sutural openings on all sutures. U. Eocene; Peru.

SUBSIDEBOTTOMINA McCulloch, 1977

Plate 559, figs. 14 and 15

Type species: Subsidebottomina parviformis McCulloch, 1977; OD.

Subsidebottomina McCulloch, 1977 (*1961), p. 402.

Test elongate ovate in outline, flattened, chambers biserially arranged, early ones in planispiral coil as in *Cassidulina*, later uncoiling with chambers projecting farther distally on the outer margin and extending back toward the early coil on the other margin, sutures oblique, nearly straight, flush to slightly depressed; wall calcareous, thin, hyaline, finely perforate, optical character not described; aperture an elongate slit near the base of the apertural face, nature of apertural margins or toothplate not reported. Holocene: Pacific: off Bikini Atoll.

TAKAYANAGIA Nomura, 1983

Plate 560, figs. 5-10

Type species: Cassidulina delicata Cushman, 1927 (*738), p. 168; OD.

Takayanagia Nomura, 1983 (*2260), p. 52.

Test lenticular, compressed, periphery subacute to carinate, chambers biserially arranged, with planispirally enrolled plane of biseriality, commonly four pairs of chambers in the final whorl, alternate chambers extending to the closed umbilicus on one side, leaving only a small triangular portion visible near the periphery of the opposite side, sutures curved; wall calcareous, hyaline, optically radial, surface smooth and polished; aperture interiomarginal, a long narrow slit along the periphery of the preceding chamber, bordered by a small apertural ridge or lip. L. Pliocene to Holocene; Pacific margins; Caribbean.

Subfamily EHRENBERGININAE Cushman, 1927

Ehrenbergininae Cushman, 1927 (*742), p. 84.
Reissiinae Saidova, 1981 (*2696), p. 61.

Test with enrolled biserially arranged chambers but later may tend to uncoil, test compressed perpendicular to the plane of biseriality; aperture interiomarginal or may be subterminal. U. Eocene to Holocene.

BURSEOLINA Seguenza, 1880

Plate 560, figs. 11-18

Type species: Burseolina calabra Seguenza, 1880; OD(M).

Burseolina Seguenza, 1880 (*2839), p. 138.
Cassisphaerina Burmistrova, 1974 (*452), p. 131, 132 (name not available, ICZN Art. 13(a)(i), no description).

Cassisphaerina Saidova, 1975 (*2695), p. 336; type species: *Cassisphaerina globula* Saidova, 1975; OD.
Cushmanulla Saidova, 1975 (*2695), p. 336; type species: *Cassidulina pacifica* Cushman, 1925 (*731), p. 53; OD.

Test globular to subglobular, periphery broadly rounded to angular, chambers biserially arranged, low and broad, with test compressed perpendicular to the plane of biseriality, sutures flush; wall calcareous, optically granular, finely perforate, surface smooth or with coarse reticular meshwork of low ridges; aperture an elongate narrow slit at an angle up the apertural face, lower margin with imperforate apertural flap and a poorly developed toothplate on the upper apertural margin. U. Eocene to Holocene; cosmopolitan.

EHRENBERGINA Reuss, 1850

Plate 561, figs. 14-16

Type species: Ehrenbergina serrata Reuss, 1850; OD(M).

Ehrenbergina Reuss, 1850 (*2573), p. 377.

Test biserial and enrolled but evolute and tending to uncoil, compressed perpendicular to the plane of coiling, lenticular in section, dorsal margin convex, ventral inner side flattened or with median furrow, chambers broad and low, overlapping broadly at the midline of the periphery, lateral margins carinate to spinose, sutures slightly depressed; wall calcareous, finely perforate, optically granular, surface smooth, pustulate or with ridges, radiating grooves may surround the aperture on the apertural face; aperture a curved elongate slit perpendicular to the base of the apertural face and paralleling the peripheral margin, with internal toothplate. Eocene to Holocene; cosmopolitan.

REISSIA Loeblich and Tappan, 1964

Plate 561, figs. 1-4

Type species: Ehrenbergina hystrix Brady, 1881 (*339), p. 60; OD.

Reissia Loeblich and Tappan, 1964 (*1911), p. 28.

Test with chambers biserially arranged, the plane of biseriality planispirally enrolled in the early part, then uncoiling as in *Cassidulinoides* but with test compressed perpendicular to the plane of biseriality as in *Ehrenbergina*, sutures strongly oblique, curved, slightly depressed; wall calcareous, optically radial, commonly with lateral spines and flangelike carinae that are most prominent in the early stage, later chambers nearly smooth, apertural face may have grooves radiating from the aperture; aperture a large curved opening, with broad apertural flap protruding from the inner margin of the opening, against the previous chamber. Holocene, deep water, at 3,000 m to 4,500 m; N. and S. Pacific.

Subfamily ORTHOPLECTINAE Loeblich and Tappan, 1984

Orthoplectinae Loeblich and Tappan, 1984 (*1918), p. 43.
Orthoplectinae Loeblich and Tappan, 1982 (*1917), p. 33 (name not available, ICZN Art. 13(a)(i), no description).

Test elongate, arcuate, with irregularly spiralling internal column, probably a modification of a toothplate, that results in irregular septation; not recognizably enrolled or biserial; aperture subterminal, elongate, just above the base of the final chamber. Holocene.

Remarks: Differs from other subfamilies of the Islandiellidae in the elongate uncoiled test and absence of distinct chambers and septa.

ORTHOPLECTA Brady, 1884

Plate 561, figs. 8-10

Type species: Cassidulina (Orthoplecta) clavata Brady, 1884; OD(M).

Cassidulina (Orthoplecta) Brady, 1884 (*344), p. 355, 428.
Orthoplecta Cushman, 1927 (*742), p. 84 (nom. transl.).

Test elongate, narrow, slightly arcuate, sides nearly parallel, circular to oval in section, no regular chamber arrangement but possibly derived from an enrolled biserial ancestry, with spiralling internal column resulting in irregular septation where it touches the external wall, sutures flush; wall calcareous, finely perforate, optically radial, surface smooth; aperture subterminal, ovate, just above a sutural junction. Holocene; Pacific.

Family CASSIDULINITIDAE Saidova, 1981

Cassidulinitidae Saidova, 1981 (*2696), p. 62.
Cassidulinitinae Saidova, 1981 (*2696), p. 62 (subfamily).

Test with biserial series of chambers arranged in a trochospire, alternate chambers extending to the umbilicus on the flattened umbilical side; aperture a high slit near the midregion of the final chamber face on the umbilical side. Pliocene.

CASSIDULINITA Suzin, 1952

Plate 561, figs. 17-19

Type species: Cassidulinita prima Suzin, in Voloshinova and Dain, 1952;

Cassidulinita Suzin, in Voloshinova and Dain, 1952 (*3318), p. 102.

Cassidulinella Suzin, in Voloshinova and Dain, 1952 (*3318), p. 102 (quoting Suzin, 1937 ms., non *Cassidulinella* Natland, 1940).

Test tiny, up to 0.15 mm in diameter, planoconvex, chambers biserially arranged, with plane of biseriality in a trochospiral coil, each side of the test showing one series of chambers nearly completely, but with only small triangular portions of the alternate chambers visible where they slightly overlap the periphery, all whorls visible on the strongly convex spiral side, only those of the final whorl visible on the flat umbilical side, sutures depressed, periphery rounded; wall calcareous, very finely perforate, surface smooth; aperture crescentic, in a depression on the umbilical side of the final chamber, extending from the umbilicus up the apertural face and bordered by a rimlike thickening. Pliocene: USSR: N. Caucasus.

Remarks: Known only from the original description of the type species. *Cassidulinita* is still incompletely described. Neither wall composition, optical character, nor apertural features such as are characteristic of other Cassidulinacea are known for *Cassidulinita*. Although placed tentatively in the Ceratobuliminidae (Loeblich and Tappan, 1964, ***1910**, p. C767) "pending clarification of wall features," there is no evidence of an internal partition, hence the "biserial" chamber arrangement probably does not reflect such internal structures. In spite of the incomplete knowledge of the genus and type species, it has been the basis of a separate subfamily, family, superfamily, and order, all monotypic (Saidova, 1981, ***2696**, p. 62).

Superfamily EOUVIGERINACEA Cushman, 1927

Eouvigerinacea Loeblich and Tappan, 1984 (*1918), p. 42, nom. corr. pro superfamily Eouvigerinidea.

Eouvigerinidea Saidova, 1981 (*2696), p. 58, nom. transl. ex subfamily Eouvigerininae.

Test commonly biserial or uniserial, may have initial planispiral coil; wall calcareous, perforate, optically radiate; aperture provided with hemicylindrical internal toothplate. L. Cretaceous (Albian) to U. Eocene, Pliocene.

Family LACOSTEINIDAE Sigal, 1952

Lacosteinidae Loeblich and Tappan, 1982 (*1917), p. 33, nom. transl. ex subfamily Lacosteininae.

Lacosteininae Sigal, in Piveteau, 1952 (*2413), p. 220 (subfamily).

Elhasaeliinae Hamam, 1976 (*1365), p. 454 (subfamily; nom. imperf.).

Elhasaellinae Loeblich and Tappan, 1984 (*1918), p. 43 (subfamily, nom. corr.).

Spirobolivinidae Saidova, 1981 (*2696), p. 59.

Spirobolivininae Saidova, 1981 (*2696), p. 59 (subfamily).

Elhasaellidae Loeblich and Tappan, 1984 (*1918), p. 43.

Test planispirally enrolled in the early stage, then abruptly changing to an elongate growth axis with two to four chambers per whorl; aperture a high interiomarginal arch with an internal toothplate. U. Cretaceous (Campanian) to U. Eocene, Pliocene.

ELHASAELLA Hamam, 1976

Plate 486, figs. 6-12; plate 580, figs. 10-12

Type species: Elhasaella alanwoodi Hamam, 1976; OD.

Elhasaella Hamam, 1976 (*1365), p. 454.

Jordania Hamam and Haynes, 1977 (*1367), p. 212; type species: *Jordania arabica* Hamam and Haynes, 1977 = *Elhasaella alanwoodi* Hamam, 1976; OD.

Ruseifaella Hamam, 1978 (*1366), p. 16; type species: *Ruseifaella jordanensis* Hamam, 1978 = *Elhasaella alanwoodi* Hamam, 1976; OD.

Test tiny, elongate, planispiral initial stage of less than a single whorl, then biserial with changed axis of growth and finally uniserial, chambers inflated, enlarging gradually as added, sutures distinctly constricted; wall calcareous, perforate, surface covered with numerous minute short spines; aperture terminal, rounded, bordered by a distinct neck. U. Cretaceous (Campanian to Maastrichtian); Jordan.

FELSINELLA Conato, 1964

Plate 561, figs. 20-22

Type species: Felsinella diaphana Conato, 1964; OD.

Felsinella Conato, 1964 (*654), p. 286.

Test elongate, narrow, subcylindrical, early chambers in a tiny planispiral whorl of four to five chambers, followed by a high trochospiral stage of three to four chambers per whorl rapidly reduced to two per whorl, chambers in later stage relatively high and slightly inflated, sutures straight, weakly depressed; wall calcareous, optically radial, finely perforate, surface smooth; aperture ovate, extending up the depressed face of the final chamber, margins inturned and without a lip but with a simple, broad, and bandlike internal toothplate that twists about the axis of coiling and projects slightly through the apertural opening. L. Pliocene: Italy.

LACOSTEINA Marie, 1945

Plate 561, figs. 11-13

Type species: Lacosteina gouskovi Marie, 1945; OD.

Lacosteina Marie, 1945 (*2032), p. 295.

Test small, elongate, robust, early chambers planispirally enrolled, later in a high trochospire of few volutions, axis of later coiling perpendicular to that of the early planispire, three to four chambers per whorl in the final stage, sutures slightly curved, oblique, depressed; wall calcareous, finely perforate, surface smooth; aperture a loop at the inner margin of the final chamber, presence or absence of toothplate unknown. U. Cretaceous (Campanian); Morocco; USA: Alaska, California.

Remarks: Hofker (1970, *1519, p. 8) described as *L. gouskovi* specimens from the Maastrichtian of West Africa that have an initial trochospiral coil, the axis of the early trochospire being at a slight angle to that of the later stage, and a distinct toothplate shown in section. However, these specimens appear to belong to *Caucasina,* which occurs widely in the Upper Cretaceous, and not to *Lacosteina.*

SPIROBOLIVINA Hofker, 1956

Plate 561, figs. 5-7

Type species: Bolivinopsis pulchella Cushman and Stainforth, 1947 (*849), p. 78; OD.

Spirobolivina Hofker, 1956 (*1510), p. 915.

Test elongate, flattened, early chambers planispirally coiled, with rapidly enlarging chambers forming about one and a half volutions, about nine chambers in the last whorl, followed by a 90° change in the axis of coiling and biserial later chambers, sutures strongly oblique; wall calcareous, thin, finely perforate, aperture loop shaped, with *Bolivina*like toothplate, those of successive chambers changing orientation by 180°. Paleocene to U. Eocene, Pliocene; Ecuador; S. Atlantic.

Family EOUVIGERINIDAE Cushman, 1927

Eouvigerinidae Loeblich and Tappan, 1961 (*1902), p. 300, nom. transl. ex subfamily Eouvigerininae.

Eouvigerininae Cushman, 1927 (*742), p. 63 (subfamily).

Test biserial with tendency to become nearly uniserial in later stage; aperture produced on a neck with phialine lip and internal bandlike toothplate. L. Cretaceous (Albian) to U. Cretaceous (Maastrichtian), ?M. Eocene.

EOUVIGERINA Cushman, 1926

Plate 562, figs. 1-7

Type species: Eouvigerina americana Cushman, 1926 = *Loxostomum aculeatum* Ehrenberg, 1854 (*1068), p. 22; OD.

Eouvigerina Cushman, 1926 (*735), p. 4.

Test elongate, triangular in outline, subquadrate in section, biserial throughout but may be slightly twisted, early chambers low and closely appressed, later ones becoming higher and more loosely biserial and may have a sharply angular to distinctly carinate shoulder, final chamber may be nearly centrally located, sutures depressed; wall calcareous, finely perforate, surface smooth to finely pustulose, pore mounds secondarily developed around the perforations may have distinct carinae at the chamber shoulder; aperture in the adult stage terminal on a short neck, surrounded by a phialine lip and provided internally with a simple narrow bandlike toothplate. L. Cretaceous (U. Albian) to U. Cretaceous (Maastrichtian); ?M. Eocene (Lutetian); cosmopolitan.

LABIOSTOMA de Klasz, Y. Le Calvez, and Rérat, 1964

Plate 562, figs. 12-15

Type species: Labiostoma cretacea de Klasz, Y. Le Calvez, and Rérat, 1964; OD.

Labiostoma de Klasz, Y. Le Calvez, and Rérat, 1964 (*1699), p. 236.

Test small, elongate, circular in section, globular early chambers in loosely biserial arrangement, becoming cuneate and finally uniserial in the later stage, sutures depressed; wall calcareous, finely perforate, surface smooth; aperture oval, terminal on a short neck, bordered with a thick low rim, presence or absence of toothplate unknown. U. Cretaceous (Senonian); Gabon.

Superfamily TURRILINACEA Cushman, 1927

Turrilinacea Loeblich and Tappan, 1984 (*1918), p. 42, nom. corr. pro superfamily Turrilinidea.
Turrilinidea Saidova, 1981 (*2696), p. 54, nom. transl. ex subfamily Turrilininae.

Test trochospiral or triserial, later may become biserial or uniserial; wall calcareous, hyaline, perforate, may be either optically radiate or optically granular in structure; aperture simple, may have small simple toothplate or none. M. Jurassic (Bathonian) to Holocene.

Family TURRILINIDAE Cushman, 1927

Turrilinidae Loeblich and Tappan, 1961 (*1902), p. 300, nom. transl. ex subfamily Turrilininae.
Turrilininae Cushman, 1927 (*742), p. 65 (subfamily).
Praebuliminidae Loeblich and Tappan, 1982 (*1917), p. 33 (name not available, ICZN Art. 13(a)(i); no description).
Praebuliminidae Loeblich and Tappan, 1984 (*1918), p. 43.

Test a high trochospiral coil of three or more chambers per whorl but may later be reduced to biserial or uniserial; wall calcareous, perforate, optically radial or granular; aperture an arch with simple internal toothplate or may become terminal and may be cribrate. M. Jurassic (Bathonian) to M. Oligocene.

CUNEUS Voloshina, 1974

Plate 562, fig. 16

Type species: Tritaxia minuta Marsson, 1878 (*2047), p. 162 (syn.: *Bulimina marssoni* Cushman and F. L. Parker, 1940, *840, p. 46, nom. nov. pro *Tritaxia minuta* Marsson, 1878, non *Bulimina minuta* Hantken, 1883, nom. superfl.); OD.

Cuneus Voloshina, 1974 (*3313), p. 18.

Test pyramidal in form, triserial throughout but may be slightly twisted, triangular in section, sides flat to slightly excavated, sutures oblique, flush; wall calcareous, transparent, finely perforate, surface smooth; aperture a narrow loop extending up the apertural face from the base of the final chamber. U. Cretaceous (Coniacian) to Paleocene; cosmopolitan in boreal regions.

Remarks: Differs from *Pyramidina* in lacking a tendency toward uniseriality and in the basal rather than areal aperture.

NEOBULIMINA Cushman and Wickenden, 1928

Plate 562, figs. 8-11

Type species: Neobulimina canadensis Cushman and Wickenden, 1928; OD.

Neobulimina Cushman and Wickenden, 1928 (*862), p. 12.

Test elongate, enlarging gradually, ovate in section, chambers subglobular, inflated, early chambers in triserial arrangement, later biserial but slightly twisted, sutures distinct, depressed, nearly horizontal; wall calcareous, finely perforate, surface smooth; aperture a loop-shaped opening extending up the terminal face, toothplate not described. L. Cretaceous (Albian) to U. Cretaceous (Maastrichtian); cosmopolitan.

PRAEBULIMINA Hofker, 1953

Plate 563, figs. 1-5

Type species: Bulimina ovulum Reuss, 1844 (*2569), p. 215 (non *Bulimina ovula* d'Orbigny, 1839) = *Bulimina reussi* Morrow, 1934 (*2192), p. 195; OD.

Praebulimina Hofker, 1953 (*1504), p. 27.
Praebulimina Hofker, 1951 (*1498), p. 144 (name not available, ICZN Art. 13 (b), type not designated).
Praebulimina Thalmann, 1952 (*3172), p. 979; type species: "*Praebulimina* sp." (name not available, ICZN Art. 13 (b); type species not available).

Test ovoid, inflated, chambers triserially arranged as in *Bulimina*, sutures distinct, depressed; wall calcareous, finely perforate, appearing thick and opaque, surface smooth; aperture a loop at the base of the final chamber, a simple internal toothplate bordering one side of the opening and extending within to the margin of the previous apertural foramen. M. Jurassic (Bathonian) to U. Cretaceous (Maastrichtian); cosmopolitan.

PSEUDOUVIGERINA Cushman, 1927

Plate 563, figs. 6-9

Type species: Uvigerina cristata Marsson, 1878 (*2047), p. 150; OD.

Pseudouvigerina Cushman, 1927 (*739), p. 81.

Test small, subpyramidal, triangular in section with rounded to bicarinate angles, chambers moderately inflated, triserial throughout, early chambers closely appressed, later ones with increased relative height; wall calcareous, perforate, surface smooth to pustulose but may have one or two low longitudinal carinae at the angles; aperture terminal, rounded, bordered by a low collarlike rim and with a narrow internal columellar toothplate. U. Cretaceous (Campanian to Maastrichtian); Europe; North America; USSR; Egypt.

PYRAMIDINA Brotzen, 1948

Plate 563, figs. 10-12

Type species: Bulimina? curvisuturata Brotzen, 1940 (*427), p. 29; OD.

Pyramidina Brotzen, 1948 (*429), p. 62.

Pyramidina Brotzen, 1940 (*427), p. 29 (name not available, ICZN Art. 13 (b), type not designated).

Test pyramidal, subtriangular in section with flattened sides, chambers triserial in arrangement, broad and low, increasing in relative breadth as added, later chambers progressively more overlapping at the midline and tending to become nearly central, sutures oblique, flush to slightly depressed; wall calcareous, finely perforate, surface smooth; aperture a high loop-shaped opening at the base of the final chamber, tending to close at the base and become nearly terminal, with only a suture connecting to the chamber base. U. Cretaceous (Santonian) to U. Eocene (Ludian); Europe; North America.

RECTOBULIMINA Marie, 1956

Plate 563, figs. 13 and 14

Type species: Rectobulimina carpentierae Marie, 1956; OD.

Rectobulimina Marie, 1956 (*2037), p. B249.

Test narrow and elongate, triserial in the early stage, later biserial and finally uniserial; wall calcareous, perforate; aperture terminal, rounded to oval, flush with the surface, presence or absence of internal toothplate unknown. U. Cretaceous (Maastrichtian); Belgium.

Remarks: Tentatively recognized herein, although the base may be trochoid rather than triserial, and details of the wall structure and apertural features are unknown.

SITELLA Voloshina, 1974

Plate 563, figs. 15-19

Type species: Bulimina laevis Beissel, 1891 (*174), p. 66; OD.

Sitella Voloshina, 1974 (*3313), p. 19.

Test elongate, subfusiform, high spired, chambers elongate, slightly inflated, rapidly enlarging and strongly overlapping, four to five per whorl, sutures depressed to flush; wall calcareous, hyaline, finely perforate, optically granular, surface smooth and may appear polished; aperture in the shape of an inverted *T*, one slit extending along the base of the apertural face and from its midpoint a broader slit extends a short distance up the apertural face, bordered on each side by a narrow rim, a narrow internal toothplate arising from the distal margin of the aperture extends within to attach at the previous foramen. U. Cretaceous (Coniacian to Maastrichtian); Germany; Czechoslovakia; Sweden; France; England; USSR; Caucasus, W. Siberia; USA: New Jersey, Texas, Arkansas.

SPOROBULIMINA Stone, 1949

Plate 564, figs. 1 and 2

Type species: Sporobulimina perforata Stone, 1949; OD.

Sporobulimina Stone, 1949 (*3072), p. 82.

Test elongate, robust, circular to oval in section, inflated chambers triserially arranged, with a slight tendency to become biserial in the adult, sutures slightly depressed; wall calcareous, finely perforate, surface smooth; primary aperture a narrow elongate slit extending from the base of the final chamber about one-half the height of the apertural face, supplementary apertures consist of numerous oval to irregular openings extending from the distal side of the primary aperture over much of the depressed terminal face of the chamber, each bordered with a narrow lip. U. Cretaceous (Senonian) to M. Eocene; Peru; Gabon; Kazakh SSR.

SPOROBULIMINELLA Stone, 1949

Plate 564, figs. 3 and 4

Type species: Sporobuliminella stainforthi Stone, 1949; OD.

Sporobuliminella Stone, 1949 (*3072), p. 81.

Test globular, closely coiled in a low trochospiral, with four very broad and low, rapidly enlarging chambers per whorl, sutures strongly oblique, depressed; wall calcareous, perforate, surface smooth; primary aperture a low interiomarginal slit with narrow lip, with numerous circular supplementary openings covering a broad circular and pustulose region from the primary aperture at the base of the chamber to its distalmost part, supplementary openings each bordered by a low raised lip. U. Cretaceous; Peru.

TURRILINA Andreae, 1884

Plate 564, figs. 5–7

Type species: Turrilina alsatica Andreae, 1884; OD(M).

Turrilina Andreae, 1884 (***38**), p. 120.

Test elongate, trochospirally enrolled in the early stage, later triserial, with rapidly enlarging and inflated chambers strongly overlapping those preceding, spiral suture nearly horizontal, intercameral sutures nearly vertical, depressed; wall calcareous, finely perforate, optically granular in an Eocene species, although the Oligocene type species is optically radial, surface smooth; aperture an ovate opening parallel to the basal suture, wider near the midpoint and bordered by an elevated narrow lip, a part of the lip near the test axis bends downward to continue as a simple columnar toothplate joining the aperture to the previous foramen. L. Eocene to M. Oligocene; France; Denmark; Netherlands; Poland.

Family TOSAIIDAE Saidova, 1981

Tosaiidae, nom. transl. herein, ex subfamily Tosaiinae.
Tosaiinae Saidova, 1981 (***2696**), p. 55 (subfamily).

Test triserial or with tendency to become biserial in the adult; wall calcareous, optically granular; aperture without toothplate. M. Miocene to Holocene.

TOSAIA Takayanagi, 1953

Plate 564, figs. 8–12

Type species: Tosaia hanzawai Takayanagi, 1953; OD.

Tosaia Takayanagi, 1953 (***3111**), p. 30.

Test small, flaring, chambers globular and inflated and sutures depressed in the adult, three chambers per whorl in the early stage but later may be reduced to two per whorl; wall calcareous, hyaline, finely perforate, optically granular, surface smooth and polished; aperture a short curved slit near the base of the apertural face, with narrow bordering lip on the upper margin but no internal toothplate. M. Miocene to Holocene; Japan; Pacific; off Panama; Egypt.

Family STAINFORTHIIDAE Reiss, 1963

Stainforthiidae Loeblich and Tappan, 1984 (***1918**), p. 43, nom. transl. ex subfamily Stainforthiinae.
Stainforthiinae Reiss, 1963 (***2561**), p. 53 (subfamily).
Hyalovingulinidae Hofker, 1956 (***1511**), p. 45 (name not available, ICZN Art. 29 (a), not based on included genus).

Test triserial in early stage, later twisted biserial, or may be biserial throughout, chambers relatively high; aperture a high loop in the apertural face, one margin produced and the other infolded and continuous with the internal toothplate. Eocene to Holocene.

CASSIDELINA Saidova, 1975

Plate 565, figs. 1–3

Type species: Cassidelina profunda Saidova, 1975; OD.

Cassidelina Saidova, 1975 (***2695**), p. 313.
Cassidellina Burmistrova, 1974 (***452**), p. 131, 132 (name not available, ICZN Art. 13 (a)(i), no description).

Test elongate fusiform, circular to oval in section, initial end pointed and commonly with a basal spine, inflated chambers in a twisted biserial arrangement, increasing rapidly in relative height as added, final pair occupying over half the test length, sutures slightly oblique, depressed; wall calcareous, optically radial, perforate, pores of medium size, surface smooth; aperture a broadly oval interiomarginal opening occupying most of the apertural face, one margin with a low rim, the other bending inward to form an internal toothplate like that of *Stainforthia*, spoonlike in form and nearly closing the apertural opening, the free part almost reaching the opposite apertural rim but not protruding above the apertural level. Pliocene to Holocene; Europe; North America; Atlantic; Pacific.

GALLIHERINA Kleinpell and Tipton, 1980

Plate 565, figs. 4 and 5

Type species: Bulimina uvigerinaformis Cushman and Kleinpell, 1934 (***828**), p. 5; OD.

Galliherina Kleinpell and Tipton, 1980 (***1708**), p. 75.

Test elongate, tapered at the base, rounded in section, inflated chambers triserially arranged and gradually enlarging, sutures depressed; wall calcareous, finely perforate, surface with narrow and elevated longitudinal costae, generally not continuous across the sutures; aperture elongate, arcuate, bordered with a slight lip and extending from the apex nearly to the base of the final chamber face, toothplate not known. M. to U. Miocene (Luisian to Mohnian); California.

HOPKINSINA Howe and Wallace, 1932

Plate 565, figs. 6–8

Type species: Hopkinsina danvillensis Howe and Wallace, 1932 (syn.: *Virgulina recta* Cushman var. *howei* Cushman, 1936, ***781**, p. 47); OD.

Hopkinsina Howe and Wallace, 1932 (***1569**), p. 61.

Test elongate, narrow, chambers slightly inflated, increasing in size as added, early stage triserial, later biserial, sutures depressed, oblique; wall calcareous, perforate, surface longitudinally striate or with low costae; aperture terminal, ovate, slightly produced, bordered with a lip, presence or absence of a toothplate unknown. Eocene to Holocene; North America; Europe.

MANDJINA de Klasz and Rérat, 1963

Plate 566, figs. 1–4

Type species: Mandjina excavata de Klasz and Rérat, 1963; OD.

Mandjina de Klasz and Rérat, 1963 (***1705**), p. 116.

Test irregularly ovate in outline, rounded in section, spherical proloculus followed by somewhat twisted, biserially arranged, rapidly enlarging, and irregularly shaped chambers, with angular lower margin just above the deeply constricted sutures; surface smooth; aperture a slightly arched slit extending up the apertural face in a slight depression, one margin being somewhat more elevated than the other. U. Eocene; Gabon.

Remarks: Neither the character of the wall nor presence or absence of a toothplate is known.

STAINFORTHIA Hofker, 1956

Plate 565, figs. 9–12

Type species: Virgulina concava Höglund, 1947 (***1487**), p. 257; OD.

Stainforthia Hofker, 1956 (***1510**), p. 908.

"*Neogümbelina*" Reiss, 1957 (***2557**), p. 4 (name not available, ICZN Art. 11 (c), 13 (a)(i), no description, published as synonym of *Stainforthia*).

Test narrow, fusiform, rounded in section, inflated and globular to ovate chambers increasing in height as added, triserially arranged in the early stage at least in the microspheric generation, later in a twisted biserial arrangement, final chambers more loosely biserial, sutures oblique, distinct, depressed; wall calcareous, hyaline, finely perforate, optically radial, surface smooth to longitudinally striate, proloculus may have one or more long apical spines; aperture a loop in the face of the final chamber, with narrow incurved lip at one margin, and the opposite margin bent inward to form a broad folded toothplate that partially closes the opening, lower part of toothplate attached to the preceding chamber wall and long free part with serrate margin. Eocene to Holocene; cosmopolitan.

VIRGULINOPSIS Hofker, 1956

Plate 566, figs. 5–11

Type species: Bolivina cubana Bermúdez, 1935 (***193**), p. 196; OD.

Virgulinopsis Hofker, 1956 (***1511**), p. 47.

Test elongate, early chambers form a short triserial stage, later biserial, slightly compressed and ovate in section, chambers increasing rapidly in height as added, sutures distinct, depressed, margins lobulate; wall calcareous, finely perforate but with poreless apertural face, surface striate to narrowly costate; aperture elongate, at the base of the chamber in the early stage, nearly terminal in the adult, flaring toothplate with folded and irregularly lobed attached part and folded narrow free part with fimbriate margin. Holocene; Caribbean.

VIRGULOPSIS Finlay, 1939

Plate 566, figs. 12 and 13

Type species: Virgulopsis pustulata Finlay, 1939; OD.

Virgulopsis Finlay, 1939 (***1128**), p. 321.

Test elongate, enlarging gradually, oval in section, chambers subglobular, triserial in the early stage, later biserial, sutures straight, depressed; wall calcareous, finely perforate, surface finely pustulose to reticulate; aperture a curved loop extending up the apertural face in a slight depression, may be bordered by a low rim, presence or absence of toothplate unknown. U. Oligocene (Chattian) to Holocene; New Zealand.

VIRGULOPSOIDES McCulloch, 1977

Plate 566, figs. 14 and 15

Type species: Virgulopsoides razaensis McCulloch, 1977; OD.

Virgulopsoides McCulloch, 1977 (***1961**), p. 254.

Test elongate, rounded to subquadrate in section, inflated chambers triserially arranged in the early stage, later biserial and twisted about the longitudinal axis, sutures distinct, depressed; wall calcareous, distinctly perforate, hyaline, surface smooth; aperture a curved loop or slit extending slightly obliquely up the apertural face from its base, bordered by a narrow rim, with one margin incurved to form a narrow toothplate. Holocene; Gulf of Mexico.

Superfamily BULIMINACEA Jones, 1875

Buliminacea Loeblich and Tappan, 1961 (***1902**), p. 299, nom. corr. pro superfamily Buliminidea.
Buliminidea Glaessner, 1945 (***1250**), p. 134, nom. transl. ex family Buliminida.
Buliminicae Easton, 1960 (***1044**), p. 65, 79.
Buliminoidea Ayala-Castañares, 1963 (***101**), p. 69.
Millettiidea Saidova, 1981 (***2696**), p. 57.

Test forming a high trochospiral coil or may be modified to triserial, later stage may be reduced to biserial or uniserial; wall calcareous, perforate, hyaline, optically radial; aperture a high, loop-shaped interiomarginal opening, internal toothplate connected to the apertural margin and may extend within to attach to the margin of the previous chamber foramen. U. Cretaceous (Turonian) to Holocene.

Family SIPHOGENERINOIDIDAE Saidova, 1981

Siphogenerinoididae Loeblich and Tappan, 1982 (***1917**), p. 33, nom. transl. ex subfamily Siphogenerinoidinae.

Test triserial or biserial to uniserial; aperture with toothplate. U. Cretaceous (Turonian) to Holocene.

Subfamily SIPHOGENERINOIDINAE Saidova, 1981

Siphogenerinoidinae Saidova, 1981 (***2696**), p. 60.
Rectobolininae Saidova, 1981 (***2696**), p. 59 (nom. imperf.; recte Rectobolivininae).

Test biserial in early stage, later may be uniserial; aperture terminal with bordering lip or rim and internal siphonlike toothplate that generally changes in orientation by 180° in successive chambers. U. Cretaceous (Turonian) to Holocene.

CLAVELLOIDES de Klasz and Rérat, 1962

Plate 566, figs. 27 and 28

Type species: Clavelloides tenuistriatus de Klasz and Rérat, 1962 (as *tenuistriata*); OD.

Clavelloides de Klasz and Rérat, 1962 (***1703**), p. 182.

Test large, up to 2.5 mm in length, elongate and tapering, elongate ovate proloculus followed by broad and low arched uniserial chambers, slightly overlapping at the margins, sutures horizontal, slightly depressed; wall calcareous, structure unknown, surface with numerous fine low longitudinal costae; aperture terminal, elliptical, in a slight depression of the apertural face, internal columellar process connecting aperture and foramina of successive chambers. L. to M. Eocene; Gabon.

Remarks: Neither the wall structure nor the character of the internal siphon is known in detail.

EULOXOSTOMUM McCulloch, 1977

Plate 566, figs. 19-23

Type species: Loxostoma instabile Cushman and McCulloch, 1942 (***831**), p. 221 = *Bolivina bradyi* Asano, 1938 (***83**), p. 603; OD.

Euloxostomum McCulloch, 1977 (***1961**), p. 262 (also err. cit. as *Euloxostumum*, p. 262).

Test elongate, narrow, compressed, chambers broad, low, and enlarging rapidly, early stage biserial, later chambers much higher, then cuneate and finally uniserial and appearing rhomboid, chambers produced laterally near their base into a short spine, sutures depressed; wall calcareous, distinctly perforate, thin, translucent, surface smooth, laterally carinate; aperture an elongate terminal slit in the adult, with distinct bordering lip and a prominent internal siphonlike toothplate visible through the hyaline wall. Pliocene to Holocene; Pacific, off Mexico; off California; Japan.

Remarks: Differs from *Loxostomina* in the smooth surface, laterally apiculate chambers, and keel. The original description of the type species *(L. instabile)* cited two specimens as holotype, that figured on pl. 27, fig. 15, and that on pl. 28, fig. 1, although the text indicated that the type specimen was No. AHF 47; all specimens were said to be from the locality off Guadelupe Island, Mexico. Later, McCulloch (1977, *1961, p. 262) invalidly selected an additional specimen as a neotype "from the same population as the specimens previously designated as the holotype and paratypes."

HILTERMANNELLA Bertels, 1971

Plate 566, figs. 16–18

Type species: Hiltermannia kochi Bertels, 1970; OD.

Hiltermannella Bertels, 1971 (*219), p. 104 (nom. subst. pro *Hiltermannia* Bertels, 1970).
Hiltermannia Bertels, 1970 (*218), p. 169 (non *Hiltermannia* Hofker, 1954); type species: obj.; OD.

Test elongate, laterally compressed, oval in section, margins rounded, broad, low, and inflated chambers in sinuate biserial arrangement, chambers of a single pair about 160° apart, with successive chambers on a single side added in planes about 60° apart, later chambers proportionately higher, and final chamber tending to become central in position, as if uniserial, sutures curved, oblique, depressed, resulting in a lobulate periphery; wall calcareous, finely perforate, surface smooth; aperture comma shaped, arising from the base of the apertural face, bordered by a narrow lip, and provided internally with a simple toothplate. U. Cretaceous (M. Maastrichtian); Argentina.

HOPKINSINELLA Bermúdez and Fuenmayor, 1966

Plate 567, figs. 1-5

Type species: Uvigerina auberiana d'Orbigny var. *glabra* Millett, 1903 (*2147), p. 268; OD.

Hopkinsinella Bermúdez and Fuenmayor, 1966 (*209), p. 508.

Test tiny, elongate, flattened ovate in section, biserial throughout but with tendency for final chamber to become terminal, chambers increasing in relative height as added, sutures oblique, depressed; wall calcareous, hyaline, no perforations evident at × 7000 magnification, surface smooth; aperture looplike at the base of the final chamber face, on a short neck and bordered above with a narrow lip, may become subterminal and free of the base but completely surrounded by the recurved lip. U. Miocene to Holocene: Malay Archipelago; Sahul Shelf off Northwest Australia; Pacific: Tonga Island; USA: E. coast; Trinidad; Venezuela; Greece: Delos Island.

LOXOSTOMINA Sellier de Civrieux, 1969

Plate 567, figs. 6–10

Type species: Bolivina mayori Cushman, 1922 (*721), p. 27; OD.

Loxostomina Sellier de Civrieux, 1969 (*2864), p. 159 (non *Loxostomina* Saidova, 1975).
Loxostomella Saidova, 1975 (*2695), p. 311; type species: obj.; OD.

Test narrow, elongate, slightly compressed and ovate in section, early stage biserial, later with cuneate chambers and finally uniserial, chambers progressively higher as added, sutures oblique in the early stage, horizontal in the uniserial stage, slightly depressed; wall calcareous, perforate, hyaline, optically radial, surface ornamented with very fine longitudinal costae; aperture terminal in the adult, oval, with a narrow lip, provided with an internal subcylindrical toothplate that extends from the aperture to the previous foramen, those of successive chambers changing orientation by 180°, one border being produced as a tooth. Eocene to Holocene; cosmopolitan.

PARABRIZALINA Zweig-Strykowski and Reiss, 1976

Plate 566, figs. 24–26

Type species: Bolivina porrecta Brady, 1881 (*339), p. 57; OD.

Brizalina (Parabrizalina) Zweig-Strykowski and Reiss, 1976 (*3456), p. 100.

Test narrow and elongate, slightly flattened and oval in section, biserial, chambers moderately inflated, increasing rapidly in relative height, with later chambers cuneate and tending to become centered and uniserial, sutures oblique, depressed; wall calcareous, hyaline and transparent, optically radial, finely perforate, surface smooth; aperture basal in the juvenile stage, terminal in the adult, elliptical, with distinct bordering lip and internal siphonlike toothplate, the free part protruding through the apertural opening. Holocene; N. and S. Atlantic; Caribbean; West Indies; Red Sea.

Remarks: Resembles *Loxostomina* but differs in the surface being smooth rather than having fine longitudinal striae.

RECTOBOLIVINA Cushman, 1927

Plate 567, figs. 11-17

Type species: Sagrina bifrons Brady, 1881 (*339), p. 64; OD.

Rectobolivina Cushman, 1927 (*742), p. 68.

Siphogerina (Rectobolivina) Yabe and Hanzawa, 1929 (*3410), p. 159 (nom. transl.; err. cit. pro *Siphogenerina*).

Test elongate, slightly compressed and oval in section with median groove on the flat sides of the test, chambers broad and low, biserial in the early stage, later uniserial and rectilinear with chambers slightly arched at the midline of the test, sutures straight in the juvenile stage, later ones arched, depressed; wall calcareous, finely perforate, optically radiate, surface smooth or with longitudinal costae at the borders of the median sulcus, accompanied by additional longitudinal costae in the later part of the test; aperture in the adult a broad circular opening bordered by a projecting lip, provided with a twisted hemicylindrical toothplate that is folded at both edges, those of successive chambers 180° apart in orientation. M. Eocene to Holocene; cosmopolitan.

SAGRINELLA Saidova, 1975

Plate 567, figs. 18-21

Type species: Sagrinella guinai Saidova, 1975; OD.

Sagrinella Saidova, 1975 (*2695), p. 309.

Brizalina (Pseudobrizalina) Zweig-Strykowski and Reiss, 1976 (*3456), p. 109; type species: *Bolivina lobata* Brady, 1881 (*339), p. 58; OD.

Test elongate, slightly compressed and oval in section, chambers broad, low, and biserially arranged in the early stage, later becoming relatively higher, loosely biserial and finally uniserial, chambers sharply angled about one-third the distance from the basal suture, with a prominent ridge or carina at the angle resulting in a serrate outline, terminal face convex, sutures depressed, strongly oblique; wall calcareous, optically radial, chamber angle variously pustulose or carinate, perforate, with large pores in the lower part of the chambers below the carinate angle; aperture large, oval, areal to terminal, with bordering lip and a hemicylindrical toothplate that changes orientation about 180° in successive chambers. Holocene; tropical and subtropical Atlantic; Pacific; Timor Sea.

SAIDOVINA Haman, 1984

Plate 568, figs. 7-10

Type species: Bolivina karreriana Brady, 1881 (*339), p. 58; OD.

Saidovina Haman, 1984 (*1372), p. 419 (nom. subst. pro *Loxostomina* Saidova, 1975).

Loxostomina Saidova, 1975 (*2695), p. 311 (non *Loxostomina* Sellier de Civrieux, 1969); type species: obj.; OD.

Test elongate, tapering at the base, ovate in section, margins bluntly rounded, chambers biserially arranged, increasing in relative height as added, final chamber nearly central in position as if uniserial, sutures deeply depressed, slightly oblique; wall calcareous, optically radial, finely perforate, surface with closely spaced low longitudinal ribs that may be irregular and anastomose, base produced into short proximally directed spines; aperture large, areal, oval, with prominent lip, and with spoutlike toothplate having a subcylindrical attached part and narrow free part that shows through the aperture as a tooth. Pliocene to Holocene; Atlantic; North America; Pacific.

SIPHOGENERINOIDES Cushman, 1927

Plate 568, figs. 1-6

Type species: Siphogenerina plummerae Cushman, 1926 (*733), p. 18; OD.

Siphogenerinoides Cushman, 1927 (*742), p. 63.

Test small, elongate, slender, both microspheric and megalospheric generations with biserial early stage and uniserial and rectilinear later stage, chambers broad and low, closely appressed, sutures straight and horizontal in the adult; wall calcareous, perforate, surface with ten to twelve low and continuous longitudinal costae; aperture terminal, elliptical to reniform, bordered by a prominent and everted lip, and provided with an internal spoutlike toothplate that attaches at the concave side of the aperture, extending back to connect to the previous foramen, toothplates change in orientation by 180° in successive chambers. U. Cretaceous (Turonian) to U.

Paleocene; North America; South America; Africa; Mideast.

SPIROLOXOSTOMA Conato, 1964

Plate 568, figs. 11-16

Type species: Spiroloxostoma croarae Conato, 1964; OD.

Spiroloxostoma Conato, 1964 (*654), p. 284.
Vsevolodia Kantorová, 1975 (*1644), p. 87; type species: *Vsevolodia czechoviczi* Kantorová, 1975; OD.

Test small, elongate, oval in section, proloculus large, globular, chambers in a twisted biserial arrangement, early ones broad and low, increasing in height as added, final chamber tending to become terminal and produced, sutures oblique, depressed; wall calcareous, optically radial, finely and densely perforate, surface ornamented by short longitudinally aligned irregular ridges and nodes; aperture in the early stage an arch at the base of the chamber with a small lip at one margin, later becoming circular and areal and finally terminal, bordered by a lip and with a projecting tooth, internally the toothplate forms a narrow ridge running along the inside of the chamber wall to connect successive foramina. L. Miocene to L. Pliocene; Italy; Czechoslovakia.

Subfamily TUBULOGENERININAE Saidova, 1981

Tubulogenerininae, nom. corr. herein.
Tabulogenerininae Saidova, 1981 (*2696), p. 56 (nom. imperf.).
Siphogenerininae Loeblich and Tappan, 1982 (*1917), p. 33 (name not available, ICZN Art. 13 (a)(i), no description).
Siphogenerininae Loeblich and Tappan, 1984 (*1918), p. 44.

Test triserial in early stage, later may be biserial and finally uniserial, rarely uniserial throughout but with triserial ancestry reflected internally by the hemicylindrical toothplates that change orientation by 120° in successive chambers, as in the uniserial stage of those with triserial base; aperture terminal, rounded, with short neck or thickened rim. U. Cretaceous (Turonian) to Holocene.

Remarks: Differs from the probably ancestral Siphogenerinoidinae in the less well-developed biserial stage and ovate rather than arcuate or reniform aperture.

AMPLECTOPRODUCTINA Patterson, 1986

Plate 835, figs. 1-4

Type species: Amplectoproductina carnatolintra Patterson, 1986; OD.

Amplectoproductina Patterson, 1986 (*2369), p. 190.

Test elongate, tapering, uniserial, circular in section, sutures straight, slightly constricted; wall calcareous, hyaline, nonperforate, surface with numerous longitudinal costae that are continuous from chamber to chamber; aperture terminal, circular, bordered by an elevated rim, internally provided with a vertical hemicylindrical toothplate that is oriented 120° from that of the preceding chamber, the toothplate closing toward the base of the chamber to form a complete tube. Pliocene to Pleistocene; western S. Atlantic.

BITUBULOGENERINA Howe, 1934

Plate 569, figs. 1 and 2

Type species: Bitubulogenerina vicksburgensis Howe, 1934; OD.

Bitubulogenerina Howe, 1934 (*1567), p. 420.

Test small, flaring, short triserial early stage followed by biserially arranged and inflated chambers, sutures distinct, depressed; wall calcareous, perforate, surface smooth or pustulose, commonly with a transverse keel at the widest part of each chamber a short distance above its base, keel may be irregular to somewhat nodose or tubulose; aperture large, terminal, oval, surrounded by a distinct lip, toothplate siphonlike. M. Eocene (Lutetian) to M. Miocene (Tortonian); USA: Mississippi, Louisiana; France; Italy; Gabon; Nigeria.

ORTHOKARSTENIA Dietrich, 1935

Plate 569, figs. 3-16

Type species: Orthocerina ewaldi Karsten, 1858 (*1656), p. 114; OD.

Orthokarstenia Dietrich, 1935 (*959), p. 80.
Siphogenerita Furrer, 1961 (*1198), p. 271; type species: *Siphogenerinoides clarki* Cushman and Campbell, 1936 (*816), p. 91; OD.

Test narrow, elongate, enlarging gradually from a rounded base, microspheric generation with early triserial stage followed by a short biserial stage, megalospheric generation with proloculus followed immediately by biserial stage, both generations with chambers subcylindrical and somewhat inflated in the uniserial adult, lower chamber margin crenulated, sutures distinct, depressed, overlapped by the chamber crenulations; wall calcareous, finely perforate, surface smooth or with fine longitudinal striae or low costae; aperture terminal, elliptical to reniform, with short neck and distinct lip and provided with spoutlike internal toothplate that extends to the previous foramen, those of successive chambers changing orientation by 120° to 180°, spout may terminate in a small opening adjacent to the concave side of the aperture but not connected to it. U. Cretaceous (Turonian to Maastrichtian): North America; South America; Africa.

RECTUVIGERINA Mathews, 1945

Plate 569, figs. 28 and 29

Type species: Siphogenerina multicostata Cushman and Jarvis, 1929 (*827), p. 14; OD.

Rectuvigerina Mathews, 1945 (*2058), p. 590, 598, 601.
Uvigerina (Rectuvigerina) Glaçon and Sigal, 1974 (*1244), p. 220 (nom. transl.).

Test elongate, rounded in section, early chambers triserial, later uniserial, and may have intervening biserial stage, sutures oblique in the early stage, horizontal and straight in the uniserial part; wall calcareous, perforate, surface with longitudinal costae that may be continuous across the sutures or discontinuous and may terminate in short spines; aperture terminal on a neck, rounded, and with a phialine lip, internal siphonlike toothplate connecting successive apertural foramina. U. Eocene to Holocene; cosmopolitan.

SAGRINA d'Orbigny, 1839

Plate 569, figs. 17-22

Type species: Sagrina pulchella d'Orbigny, 1839; OD(M).

Sagrina d'Orbigny, 1839 (*2304), p. 144.
Sagruina Bronn and Roemer, 1853 (*422), p. 92 (err. emend.).

Test small, flaring, subtriangular in outline, oval in section, short early triserial stage, later biserial with inflated chambers that are distinctly angular at the widest part and overhang a deeply recessed lower margin a short distance above the previous suture; wall calcareous, finely perforate, surface ornamented with numerous low and longitudinal costae that are not continuous from one chamber to the next and may end in short spinules at the angular chamber margin; aperture terminal, ovate, large, occupying a large area of the terminal face, bordered by a low narrow lip, and with broad hemicylindrical internal toothplate. Holocene; Atlantic; West Indies; Cuba; Red Sea.

SAGRINOPSIS Sellier de Civrieux, 1969

Plate 569, figs. 23-27

Type species: Siphogenerina advena Cushman, 1922 (*721), p. 35; OD.

Sagrinopsis Sellier de Civrieux, 1969 (*2864), p. 151.

Test small, up to 0.45 mm in length, elongate, compressed, narrowly oval in section, chambers broad, low, and oblique in the early stage, triserial at first, then biserial and finally uniserial and rectilinear, with chambers becoming proportionately somewhat higher, moderately inflated, widest near the base and slightly narrower distally, sutures oblique and straight in the early part, gently curved and arched at the midline in the uniserial part; wall calcareous, hyaline, transparent, optically radial, finely perforate, surface pustulose, knobby and spinose in the early stage, ornamentation in the later chambers restricted to the widest part of the chambers a short distance above the preceding suture; aperture terminal, oval, bordered with an everted lip and provided with an internal siphonlike toothplate that connects to the previous apertural foramen. Miocene to Holocene; Atlantic; Pacific; Venezuela; Cuba.

SHASTRINA Huddleston and Kalia, 1981

Plate 570, figs. 12-14

Type species: Shastrina udbodhaka S. N. Singh and Kalia, 1970; OD.

Shastrina Huddleston and Kalia, 1981 (*1575), p. 653 (validated by designation of type species).
Shastrina S. N. Singh and Kalia, 1970 (*2980), p. 167 (name not available, ICZN Art. 13(b) and 68(a)(i); type not designated).

Test small, about 0.4 mm to 0.5 mm in length, early stage triserial, with rapidly enlarging and moderately inflated chambers, later biserial, chambers of greater relative height and test of slightly reduced diameter, adult with one to three uniserial chambers, oval in section, sutures depressed; wall calcareous, optically radial, coarsely perforate, surface hispid; aperture an interiomarginal loop in the early stage, terminal and elongate ovate in the adult, no toothplate. M. Eocene (Lutetian); India: Rajasthan.

Remarks: Although originally described as a planktonic genus in the Guembelitriinae, *Shastrina* appears closer to *Tritubulogenerina* and other Tubulogenerininae.

SIPHOGENERINA Schlumberger, 1882

Plate 570, figs. 4-11

Type species: Siphogenerina costata Schlumberger, 1883 (*2759), p. 26; SD Cushman, 1927 (*746), p. 190.

Siphogenerina Schlumberger, in Milne-Edwards, 1882 (*2150), p. 51.

Ellipsosiphogenerina A. Silvestri, 1902 (*2927), p. 101; type species: obj.; SD Loeblich and Tappan, 1964 (*1910), p. C569.

Uvigerina (Siphogenerina) Glaçon and Sigal, 1974 (*1244), p. 223 (nom. transl.).

Rectuvigerinella Saidova, 1975 (*2695), p. 316; type species: *Siphogenerina raphanus* (Parker and Jones) var. *tropica* Cushman, 1926 (*733), p. 6; OD.

Test elongate, large, robust, short triserial early microspheric stage or biserial megalospheric one, later uniserial, with closely appressed subcylindrical chambers and straight and slightly depressed horizontal sutures; wall calcareous, hyaline, finely perforate, optically radial, surface with heavy and generally continuous longitudinal costae; aperture terminal, rounded, with a short neck and phialine lip, provided with internal siphonlike toothplate, those of successive chambers changing orientation by about 120°. Eocene to Holocene; cosmopolitan.

TRANSVERSIGERINA Mathews, 1945

Plate 570, figs. 15 and 16

Type species: Siphogenerina raphanus (Parker and Jones) var. *transversus* Cushman, 1918 (*711), p. 64; OD.

Rectuvigerina (Transversigerina) Mathews, 1945 (*2058), p. 599.

Transversigerina Lamb and Miller, 1984 (*1784), p. 11 (nom. transl.).

Test elongate, robust, early stage triserial, later uniserial, with horizontal sutures arched between adjacent costae; wall calcareous, perforate, surface with eight to twelve continuous, broad, and platelike longitudinal costae; aperture terminal, rounded, may be on a short neck, and bordered with a narrow lip, provided internally with siphonlike toothplate. U. Oligocene to U. Miocene; Western Hemisphere.

TRITUBULOGENERINA Howe, 1939

Plate 570, figs. 1-3

Type species: Tritubulogenerina mauricensis Howe, 1939; OD.

Tritubulogenerina Howe, 1939 (*1568), p. 69.

Test tiny, ovoid, circular in section, triserial throughout, chambers enlarging rapidly, slightly inflated, sutures moderately depressed; wall calcareous, perforate, surface pustulose; aperture terminal, large, circular, bordered by a narrow lip. M. Eocene to U. Eocene; USA: Louisiana.

TUBULOGENERINA Cushman, 1927

Plate 570, figs. 19-21

Type species: Textularia (Bigenerina) tubulifera Parker and Jones, 1863 (*2349), p. 94; OD.

Tubulogenerina Cushman, 1927 (*739), p. 78.

Test elongate, subconical, rounded to oval in section, short early triserial stage, then biserial and finally uniserial, with closely appressed subcylindrical chambers that may appear nodose, terminal face convex, sutures straight and horizontal, deeply constricted; wall calcareous, surface nodose or ornamented with very fine irregular to anastomosing longitudinal ribs; aperture a long narrow slit in the center of the terminal face, with one margin slightly elevated and the other depressed, provided with a broad internal hemicylindrical toothplate. M. Eocene (Lutetian) to Oligocene; Europe; North America; Australia.

UNICOSIPHONIA Cushman, 1935

Plate 570, figs. 17 and 18

Type species: Unicosiphonia crenulata Cushman, 1935; OD.

Unicosiphonia Cushman, 1935 (*777), p. 81.

Test elongate, cylindrical, uniserial and rectilinear throughout, early chambers broad and low, later ones of increased height, overlapping at the periphery, sutures straight to scalloped, slightly depressed; wall calcareous, finely perforate, surface with distinct longitudinal costae that die out in the adult, later chambers with prominent and proximally directed projections resulting in a crenulate lower margin; aperture terminal, rounded, in a depressed area of the terminal face, bordered by a narrow lip and provided with an internal siphonlike toothplate. Late Tertiary; Atlantic.

Family BULIMINIDAE Jones, 1875

Buliminidae Eimer and Fickert, 1899 (*1088), p. 608, nom. corr. pro family Buliminida.
Buliminida Jones, in Griffith and Henfrey, 1875 (*1300), p. 320.
Buliminidee Schwager, 1876 (*2829), p. 479.
Buliminidea Schwager, 1877 (*2830), p. 19.
Buliminidae Schwager, 1877 (*2830), p. 19 (subfamily).
Bulimininae Brady, 1881 (*339), p. 44 (subfamily).
Buliminina Lankester, 1885 (*1790), p. 847.
Buliminae Rhumbler, 1895 (*2616), p. 89 (subfamily).
Buliminae Delage and Hérouard, 1896 (*926), p. 140.
Globobulimininae Hofker, 1951 (*1498), p. 148 (subfamily).
Globobuliminidae Hofker, 1956 (*1510), p. 908.

Test a high trochospiral of not more than three chambers per whorl, later may be reduced to biserial; aperture a loop in the apertural face, with distinct platelike toothplate that extends backward from the aperture to the previous foramen. L. Paleocene (Danian) to Holocene.

BULIMINA d'Orbigny, 1826

Plate 571, figs. 1-3

Type species: Bulimina marginata d'Orbigny, 1826; SD Cushman, 1911 (***702**), p. 76.

Bulimina d'Orbigny, 1826 (*2303), p. 269.

Test elongate ovate to subcylindrical, chambers triserially arranged, but later ones may be nearly centered as if tending to become uniserial, septa distinct, depressed; wall calcareous, finely to coarsely perforate, optically radial, surface smooth, but lower margin of chambers may be carinate, fimbriate, or spinose; aperture a loop extending up the face from the base of the last chamber, a free border having an elevated rim, and a fixed border continuous with an internal folded toothplate that attaches to the inside chamber wall below the aperture, and has a smooth to dentate, flaring to enrolled and almost tubular free shank. Paleocene to Holocene; cosmopolitan.

GLOBOBULIMINA Cushman, 1927

Plate 571, figs. 4-12 and 17-19

Type species: Globobulimina pacifica Cushman, 1927; OD.

Globobulimina Cushman, 1927 (*742), p. 67.
Bulimina (Desinobulimina) Cushman and Parker, 1940 (*839), p. 19; type species: *Bulimina auriculata* Bailey, 1851 (*106), p. 12; OD.
Cuvillierella Rahaghi, 1977 (*2508), p. 166; type species: *Cuvillierella saubriguensis* Rahaghi, 1977; OD.

Test ovate in outline, circular in section, triserial, with rapidly enlarging and strongly overlapping inflated chambers, later chambers may partially or completely overlap the preceding ones, sutures strongly oblique, slightly depressed; wall calcareous, finely perforate, thin, surface smooth; aperture loop shaped, with doubly folded tongue joined to one margin of the opening, the free upper part partially filling the opening and forming a projecting fanlike to comblike tip, internal part of the toothplate forming a trough that leads into the chamber then bends to the anterior corner of the aperture, attached at both ends, lower part of the trough contacting the free tip of the tongue of the previous chamber and connecting the aperture and foramen. L. Paleocene (Danian) to Holocene; cosmopolitan.

Remarks: As apertural characters appear to be more important generically than are either the degree of chamber overlap or the occasional closing of the base of the aperture so that it appears areal, both *Desinobulimina* and *Cuvillierella* are regarded as synonyms of *Globobulimina*. The type species of both *Desinobulimina* and *Cuvillierella* may become biserial in the adult.

PRAEGLOBOBULIMINA Hofker, 1951

Plate 571, figs. 13-16

Type species: Bulimina pyrula d'Orbigny var. *spinescens* Brady, 1884 (***344**), p. 400; OD.

Praeglobobulimina Hofker, 1951 (*1498), p. 248.

Test elongate ovate, rounded in section, triserial, chambers somewhat inflated and strongly overlapping, sutures strongly oblique to nearly vertical, depressed; wall calcareous, optically radial, perforate, surface smooth, or may have tiny spines at the base of the chambers; aperture a high narrow curved slit, extending from the base of the final chamber, toothplate consists of a simple folded tongue that connects the aperture and preceding foramen, with fixed shank attached to the chamber wall below the aperture and wide free shank that may be dentate joined to the wall at the anterior end of the aperture, a small free tip protruding through the opening. U. Paleocene (Thanetian) to Holocene; cosmopolitan.

PROTOGLOBOBULIMINA Hofker, 1951

Plate 572, figs. 1-6

Type species: Bulimina pupoides d'Orbigny, 1846 (*2309), p. 185; OD.

Protoglobobulimina Hofker, 1951 (*1498), p. 252.

Test triserial, rounded in section, rapidly enlarging globular to ovate chambers that do not strongly overlap earlier ones as in *Praeglobobulimina*, sutures depressed; wall calcareous, thin, optically radial, finely perforate, with interspersed elongate larger pores, surface smooth; aperture loop shaped, with bordering rim, toothplate straight and troughlike throughout or may end in a slightly protruding fanlike free part. M. Miocene (Tortonian) to Holocene; cosmopolitan.

Remarks: Papp and Schmid (1985, *2338, p. 69) regard *Bulimina pupoides* as a synonym of *B. pyrula* d'Orbigny, but the latter appears closer to *Globobulimina* than to the present genus.

Family BULIMINELLIDAE Hofker, 1951

Buliminellidae Hofker, 1951 (*1498), p. 121.

Buliminellinae N. K. Bykova, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 323 (subfamily).

Test a high trochospiral, with numerous chambers per whorl; aperture loop shaped, with internal toothplate connecting successive apertures. L. Paleocene (Danian) to Holocene.

BULIMINELLA Cushman, 1911

Plate 572, figs. 7-11

Type species: Bulimina elegantissima d'Orbigny, 1839 (*2306), p. 51; OD.

Buliminella Cushman, 1911 (*702), p. 88.

Test elongate, a high trochospiral coil of only two to three whorls of numerous very broad low chambers, intercameral sutures slightly curved, perpendicular to the spiral suture and almost paralleling the long axis of the test, slightly depressed; wall calcareous, optically radial, perforate, surface smooth, rarely striate; aperture a loop in the depressed face of the final chamber, broadest at the upper end, with high and denticulate rim, simple and ridgelike internal toothplate connecting the aperture to the previous foramen. M. Eocene (Lutetian) to Holocene; cosmopolitan.

BULIMINELLITA Cushman and Stainforth, 1947

Plate 572, figs. 12 and 13

Type species: Buliminellita mirifica Cushman and Stainforth, 1947; OD.

Buliminellita Cushman and Stainforth, 1947 (*849), p. 78.

Test elongate, about three to five wide and low chambers per whorl in a high trochospiral coil, chambers fewer and less broad than in *Buliminella*, intercameral sutures strongly oblique and depressed, final chamber may be nearly central in position; wall calcareous, optically radial, finely perforate, with evenly distributed pores, surface smooth; aperture in the early stage loop shaped as in *Buliminella*, but becoming terminal, rounded, and produced on a neck in the adult, tubular toothplate visible within the apertural opening, continuing within to attach to the side of the previous foramen. U. Eocene to L. Pliocene; Ecuador; USA: California; Italy.

QUADRATOBULIMINELLA de Klasz, 1953

Plate 572, figs. 19 and 20

Type species: Quadratobuliminella pyramidalis de Klasz, 1953; OD.

Quadratobuliminella de Klasz, 1953 (*1696), p. 435.

Test trochospiral, flaring, subquadrate in section, about four slightly inflated chambers per whorl, sutures depressed; wall calcareous, perforate, surface smooth; aperture a short slit at the base of the final chamber, toothplate not described. L. Paleocene (Danian) to U. Paleocene (Montian); Germany; France; USA: California.

Family UVIGERINIDAE Haeckel, 1894

Uvigerinidae Galloway and Wissler, 1927 (*1209), p. 74, nom. corr. pro family Uvigerinida.

Uvigerinida Haeckel, 1894 (*1355), p. 185.

Test triserial to biserial in early stage, later may be biserial or tend to become uniserial, although commonly with oblique sutures; aperture terminal on a neck, internal toothplate connecting aperture and foramina of successive chambers. Paleocene to Holocene.

Subfamily UVIGERININAE Haeckel, 1894

Uvigerininae Cushman, 1913 (*704), p. 91, nom. transl. ex family Uvigerinida.

Test triserial, at least in the early stage, chambers rounded and inflated; aperture terminal, with neck and phialine lip and provided with internal siphonlike toothplate. L. Eocene (Ypresian) to Holocene.

ATWILLINA Kleinpell and Tipton, 1980

Plate 572, figs. 14-18

Type species: Siphogenerina pseudococoaensis Cushman and Kleinpell, 1934 (***828**), p. 13; OD.

Atwillina Kleinpell and Tipton, 1980 (***1708**), p. 77.

Tiptonina Lamb and Miller, 1984 (***1784**), p. 10; type species: *Siphogenerina nodifera* Cushman and Kleinpell, 1934 (***828**), p. 13; OD.

Test elongate, stout, circular in section, long triserial stage with depressed and oblique sutures, later chambers more loosely triserial, final one or two tending to become uniserial; wall calcareous, perforate, with narrow, elevated, and widely spaced longitudinal costae that commonly are continuous across the sutures but tend to die out early on the final chamber; aperture rounded, terminal, on a short and smooth cylindrical neck. M. Oligocene to L. Miocene; USA: California, Texas, Louisiana.

Remarks: The toothplate has not been described for either *Atwillina* or *Tiptonina*. Lamb and Miller (1984, ***1784**, p. 10) cite the range of the monotypic *Tiptonina* as M. to U. Oligocene and illustrate as a "topotype" a specimen from the "upper Oligocene Lower Santos Shale . . . Chico Martinez Creek, California." However, the holotype of *S. nodifera*, the type species of *Tiptonina*, is "from the [lower] Miocene, 160+ feet stratigraphically above base of Temblor Formation, Carneros Creek, California," from both a different locality and horizon; either the species described by Lamb and Miller is distinct from that of Cushman and Kleinpell or the genus has a longer range than indicated. We regard it as congeneric with *Atwillina*.

CIPEROZEA Vella, 1961

Plate 573, figs. 1-3

Type species: Siphogenerina ongleyi Finlay, 1939 (***1127**), p. 111; OD.

Ciperozea Vella, 1961 (***3286**), p. 481.

Estorffina Kleinpell and Tipton, 1980 (***1708**), p. 79; type species: *Siphogenerina mayi* Cushman and F. L. Parker, 1931 (***836**), p. 10; OD.

Test elongate, robust, with elongate triserial stage and oblique sutures, final one to two chambers cuneate to nearly uniserial; wall calcareous, coarsely perforate, numerous low longitudinal costae on the main part of each chamber stopping abruptly as a blunt spine at the widest part of the chamber a short distance above the preceding suture, giving the chambers an overhanging appearance; aperture terminal, rounded, on a short neck. M. Oligocene (Rupelian) to M. Miocene (Tortonian); New Zealand; Trinidad; USA: California; W. Atlantic: off North Carolina.

Remarks: A toothplate has not been reported for either *Ciperozea* or *Estorffina*.

EUUVIGERINA Thalmann, 1952

Plate 572, figs. 21-25

Type species: Uvigerina aculeata d'Orbigny, 1846 (***2309**), p. 191; OD.

Euuvigerina Thalmann, 1952 (***3172**), p. 974 (validated by designation of type species).

Euuvigerina Hofker, 1951 (***1498**), p. 217 (name not available, ICZN Art. 13 (b), type species not designated).

Test elongate, triserial, chambers inflated, sutures depressed; wall calcareous, perforate, surface with numerous fine spines; aperture terminal, rounded, on a tubular neck and bordered by a phialine lip, a narrow ribbonlike and twisted toothplate extends within from the aperture to fasten against the previous foramen. M. Eocene to Holocene; cosmopolitan.

HOFKERUVA Vella, 1961

Plate 573, figs. 4-9 and 20

Type species: Hofkeruva (Hofkeruva) mata Vella, 1961; OD.

Hofkeruva (Hofkeruva) Vella, 1961 (***3286**), p. 473.

Hofkeruva (Laminiuva) Vella, 1961 (*3286), p. 474; type species: *Hofkeruva (Laminiuva) tutamoea* Vella, 1961; OD.

Hofkeruva (Trigonouva) Vella, 1961 (*3286), p. 476; type species: *Hofkeruva (Trigonouva) zeacuminata* Vella, 1961; OD.

Beckina Kleinpell and Tipton, 1980 (*1708), p. 78; type species: *Beckina hornadayi* Kleinpell and Tipton, 1980; OD.

Laimingina Kleinpell and Tipton, 1980 (*1708), p. 80; type species: *Siphogenerina smithi* Kleinpell, 1938 (*1707), p. 304; OD.

Test elongate, triserial throughout, rounded to subtriangular in section, chambers inflated and sutures depressed; wall calcareous, perforate, surface with thin longitudinal costae that are narrower than the intervening spaces covering the chambers to the base of the apertural neck but commonly are not continuous across the sutures; aperture rounded, at the end of a short tubular neck, with phialine lip, a simple ribbonlike toothplate runs through the neck and to the preceding foramen. L. Oligocene (Latorffian) to L. Pliocene (Pontian); New Zealand; USA: California; probably cosmopolitan.

MINIUVA Vella, 1961

Plate 573, figs. 11-13

Type species: Miniuva minima Vella, 1961; OD.

Miniuva Vella, 1961 (*3286), p. 480.

Test elongate, small, up to 0.3 mm in length, irregularly triserial in the early stage, with inflated chambers and constricted and oblique sutures, final chamber slightly compressed and tending to become uniserial; wall calcareous, perforate, surface with narrow and irregular longitudinal costae that are not continuous over the sutures; aperture terminal, rounded, at the end of a short neck, bordered with a narrow lip. M. Miocene (Helvetian); New Zealand.

Remarks: No information is available as to the presence of a toothplate in *Miniuva*.

NEOUVIGERINA Thalmann, 1952

Plate 573, figs. 14-17

Type species: Uvigerina asperula var. *ampullacea* Brady, 1884 (*344), p. 579; OD.

Neouvigerina Thalmann, 1952 (*3172), p. 977 (validated by designation of type species).

Neouvigerina Hofker, 1950 (*1495), p. 67 (name not available, ICZN Art. 13 (a)(i); no description).

Neouvigerina Hofker, 1951 (*1498), p. 206 (name not available, ICZN Art. 13 (b); type species not designated).

Test small, with early triserial stage and later irregularly uniserial, chambers inflated, sutures depressed; wall calcareous, perforate, surface finely hispid; aperture terminal, rounded, on a thin and elongate neck with a phialine lip, and with a narrow ribbonlike toothplate extending within the neck to attach at the side of the preceding foramen. U. Oligocene (Chattian) to Holocene; cosmopolitan.

NORCOTTIA Vella, 1961

Plate 573, fig. 10

Type species: Hopkinsina mioindex Finlay, 1947 (*1130), p. 282; OD.

Norcottia Vella, 1961 (*3286), p. 478.

Test small, elongate, subfusiform in outline, triserial throughout, somewhat trigonal in section in the early stage, later chambers more inflated and increasing in relative height as added, final chamber tapering to the neck; wall calcareous, perforate, surface with fine longitudinal ribs that may appear somewhat pustulose; aperture terminal, rounded, on a short neck and with a phialine lip. M. Miocene (Helvetian to Tortonian); New Zealand.

Remarks: The presence or nature of a toothplate in *Norcottia* is unknown, as specimens commonly are secondarily filled in preservation.

RUATORIA Vella, 1961

Plate 573, figs. 18 and 19

Type species: Ruatoria ruatoria Vella, 1961; OD.

Ruatoria Vella, 1961 (*3286), p. 480.

Test narrow, elongate, small, up to 0.45 mm in length, early stage triserial, later loosely triserial with cuneate chambers and finally somewhat irregularly uniserial, chambers inflated, sutures depressed; wall calcareous, perforate, surface with narrow and widely spaced longitudinal costae that are not continuous over the sutures, the ribs dying out near the midline of the final chamber; aperture rounded, at the end of a short neck that narrows for a distance and then flares terminally to a somewhat irregular lip. L. Miocene (Aquitanian) to M. Miocene (Helvetian); New Zealand.

Remarks: A toothplate has not yet been described for *Ruatoria*.

SIPHOUVIGERINA Parr, 1950

Plate 574, figs. 3 and 4

Type species: Uvigerina porrecta Brady var. *fimbriata* Sidebottom, 1918 (***2913**), p. 147; OD.

Siphouvigerina Parr, 1950 (***2363**), p. 342.

Test elongate, early chambers triserially arranged and closely appressed, later loosely triserial and then biserial, upper chamber surface broadly domed to a carinate margin and sharply undercut chamber base a slight distance above the preceding suture, resulting in a series of umbrellalike and loosely appressed chambers, each attached just above the preceding apertural neck, sutures constricted; wall calcareous, perforate, surface smooth other than the fimbriate carina at the lower border of the chambers; aperture terminal and rounded, at the end of a short tubular neck and bordered with a phialine lip. Holocene: Australia.

Remarks: No information is available as to the presence of a toothplate in *Siphouvigerina*.

UVIGERINA d'Orbigny, 1826

Plate 573, figs. 21-28

Type species: Uvigerina pygmaea d'Orbigny, 1826 (also as *pigmea*, p. 269); SD Parker, Jones, and Brady, 1865 (***2354**), p. 36.

Uvigerina d'Orbigny, 1826 (***2303**), p. 268.

Uvigerina (Uhligina) Schubert, 1899 (***2809**), p. 222 (non *Uhligina*) Yabe and Hanzawa, 1922); type species: *Uvigerina (Uhligina) uhligi* Schubert, 1899; OD(M).

Aluvigerina Hofker, 1951 (***1498**), p. 201 (name not available, ICZN Art. 13 (b): type not designated).

Aluvigerina Thalmann, 1952 (***3172**), p. 970; type species: *Uvigerina pygmaea* d'Orbigny, 1826, obj.; OD.

Uvigerina (Uvigerinoides) N. K. Bykova, 1959 (***471**), text-fig. 3 (name not available, Art. 13 (a)(i), no description).

Norinuva Vella, 1963 (***3288**), p. 10; type species: *Uvigerina peregrina* Cushman, 1923 (***723**), p. 166; OD.

Test elongate, rounded in section, triserial, early chambers closely appressed, later ones inflated, relatively higher and more loosely triserial, sutures distinct, depressed, somewhat oblique; wall calcareous, perforate, surface with longitudinal platy costae or striae; aperture terminal, produced on a neck and bordered with a phialine lip, provided internally with a hemicylindrical toothplate that may bear a winglike projection at one side and that connects the aperture and previous foramen. L. Eocene (Ypresian) to Holocene; cosmopolitan.

UVIGERINELLA Cushman, 1926

Plate 574, figs. 1 and 2

Type species: Uvigerina (Uvigerinella) californica Cushman, 1926; OD.

Uvigerina (Uvigerinella) Cushman, 1926 (***737**), p. 58.

Uvigerinella Cushman, 1927 (***742**), p. 69 (nom. transl.).

Test elongate, ovoid in side view, circular in section, chambers triserial throughout, slightly inflated, increasing in height as added, those of the final whorl more elongate and tending to become uniserial, sutures slightly depressed; wall calcareous, finely perforate, surface smooth; aperture an elongate slit extending from near the base of the final chamber to the apex, with an elevated rimlike lip. L. Miocene (Aquitanian) to M. Miocene (Helvetian); USA: California.

Remarks: A toothplate has not yet been described for *Uvigerinella*.

Subfamily ANGULOGERININAE Galloway, 1933

Angulogerininae Galloway, 1933 (***1205**), p. 377.

Trifarininae Srinivasan, 1966 (***3050**), p. 242.

Test triserial and triangular in the early stage, later reduced to uniserial; aperture terminal, with neck and internal siphonlike toothplate. Paleocene to Holocene.

ANGULOGERINA Cushman, 1927

Plate 574, figs. 5-9

Type species: Uvigerina angulosa Williamson, 1858 (***3379**), p. 67; OD.

Angulogerina Cushman, 1927 (***742**), p. 69.

Test elongate, triserial, and triangular throughout, angles carinate, sutures curved, oblique, and slightly depressed; wall calcareous, finely perforate, optically radial, surface smooth or with a few widely spaced longitudinal costae that may not be continuous over the sutures; aperture terminal, ovate, produced on a neck and bordered by a narrow lip, provided with an internal toothplate like that of *Uvigerina*, a winglike projection of the toothplate just within the chamber is attached to the outer wall and the descending part of the toothplate attached at the side of the preceding foramen. U. Eocene to Holocene; cosmopolitan.

DYMIA N. K. Bykova, 1962

Plate 574, figs. 14 and 15

Type species: Trifarina labrum Subbotina, 1953 (*3078), p. 247; OD.

Dymia N. K. Bykova, 1962 (*473), p. 22 (nom. subst. pro *Candela* N. K. Bykova, 1958).

Candela N. K. Bykova, in N. K. Bykova et al., 1958 (*475), p. 70 (non *Candela* Herrmannsen, 1846); type species: obj.; OD.

Test elongate, early stage triserial, later uniserial, chambers broad, low, and closely appressed, test triangular throughout but with rounded angles, sutures flush, arched on the flat sides and curved back at the angles; wall calcareous, finely perforate, surface smooth; aperture terminal, rounded, elevated on a neck and bordered with a phialine lip. U. Eocene; USSR: Crimea, Ukraine, Mangyshlak.

Remarks: No toothplate has been described for this genus.

KOLESNIKOVELLA N. K. Bykova, 1958

Plate 574, figs. 16–18

Type species: Tritaxia elongata Halkyard, 1919 (*1364), p. 45; OD.

Kolesnikovella N. K. Bykova, in N. K. Bykova et al., 1958 (*475), p. 68.

Test elongate, pyramidal, early stage increasing rapidly in diameter, later with nearly parallel margins, triangular in section throughout but with rounded angles, chambers triserially arranged, with tendency for later chambers to become nearly rectilinear and uniserial, sutures oblique, irregularly lobulate at the lower chamber margin; wall calcareous, perforate, surface smooth; aperture terminal, rounded, on a short neck, with a low bordering lip. Eocene; W. Europe; USSR; West Indies; Cuba; USA: California.

Remarks: No toothplate has been described for this genus.

TRIFARINA Cushman, 1923

Plate 574, figs. 10–13

Type species: Trifarina bradyi Cushman, 1923; OD.

Trifarina Cushman, 1923 (*723), p. 99.

Test elongate, sharply triangular in section and early stage triserial as in *Angulogerina*, later distinctly uniserial and rectilinear, angles sharp to longitudinally carinate, sutures slightly depressed to flush and thickened; wall calcareous, finely perforate, surface smooth; aperture terminal, rounded, surrounded by a low collar and provided with a narrow siphonlike toothplate. Paleocene to Holocene; Atlantic; Pacific; New Zealand; Egypt.

Family REUSSELLIDAE Cushman, 1933

Reussellidae Loeblich and Tappan, 1984 (*1918), p. 44, nom. transl. ex subfamily Reussellinae.

Reussellinae Cushman, 1933 (*766), p. 223 (subfamily; nom. subst. pro Reussiinae).

Reussiinae Cushman, 1927 (*742), p. 68 (subfamily; invalid, ICZN Art. 39; based on *Reussia* Schwager, 1877, non McCoy, 1854).

Compressigenerinae Saidova, 1981 (*2696), p. 57 (subfamily; nom. imperf.).

Fijiellinae Saidova, 1981 (*2696), p. 56 (subfamily).

Test triserial, at least in early stage, later may be reduced to biserial or uniserial; aperture interiomarginal in early triserial stage, terminal in the uniserial stage and may be cribrate. Eocene to Holocene.

ACOSTINA Bermúdez, 1949

Plate 575, figs. 1 and 2

Type species: Chrysalogonium piramidale Acosta, 1940 (*7), p. 4; OD.

Acostina Bermúdez, 1949 (*201), p. 152.

Test elongate, pyramidal, triangular in section, angles carinate, chambers increasing rapidly in breadth but slowly in height as added, uniserial throughout, overlapping previous chambers for about half their height, terminal face domelike, sutures slightly arched at the center of the flattened faces, curving back on the angles; wall calcareous, perforate, surface smooth; aperture cribrate, consisting of numerous small pores at the center of the terminal face and produced on a slight neck. U. Oligocene to Holocene; Cuba; Dominican Republic.

CHRYSALIDINELLA Schubert, 1908

Plate 575, figs. 3-8

Type species: Chrysalidina dimorpha Brady, 1881 (*339), p. 54; OD(M).

Chrysalidinella Schubert, 1908 (*2816), p. 242.

Chrysalidinoides Uchio, 1952 (*3236), p. 154; type species: *Chrysalidinoides pacificus* Uchio, 1952; OD.

Test elongate, early stage pyramidal, later with nearly parallel sides and triangular or rarely quadrangular in section, early chambers triserially arranged and enlarging rapidly, later chambers uniserial and rectilinear, sutures arched on the test faces and curving proximally at the angles, apertural face domed; wall calcareous, optically radial, coarsely perforate, surface smooth; early triserial stage with interiomarginal aperture and a small spoutlike toothplate as in *Reussella*, uniserial stage with a cribrate aperture of numerous rounded pores scattered over the terminal face, each bordered with a small lip and without a toothplate. Eocene to Holocene; Caribbean: Cuba; USA; Kerimba Archipelago; Pacific: Indonesia.

COMPRESSIGERINA Bermúdez, 1949

Plate 575, figs. 15-17

Type species: Uvigerina coartata D. K. Palmer, 1941 (*2329), p. 304 (syn.: *Uvigerina compressa* D. K. Palmer, 1941, *2328, p. 182, non *Uvigerina compressa* Cushman, 1925); OD.

Compressigerina Bermúdez, 1949 (*201), p. 219.

Test elongate, subtriangular in section in the early stage, later flattened and twisted, globular proloculus followed by triserially arranged early chambers, rapidly becoming biserial with inflated chambers and arched sutures, the plane of biseriality twisted about 180° with growth, margins carinate; wall calcareous, optically radial, finely perforate, surface smooth except for the lateral carinae, but early stage may be slightly hispid; aperture terminal, ovate, produced on a slight neck and provided with an internal toothplate. Oligocene to Holocene; Caribbean; Cuba; Dominican Republic.

FIJIELLA Loeblich and Tappan, 1962

Plate 575, figs. 13 and 14

Type species: Trimosina simplex Cushman, 1929 (*754), p. 158; OD.

Fijiella Loeblich and Tappan, 1962 (*1906), p. 109.

Test pyramidal, triserial, and triangular in section throughout, sutures gently arched, limbate, angles carinate; wall calcareous, coarsely perforate, surface smooth other than the limbate sutures and carinate to rarely spinose margins; primary aperture a narrow elongate interiomarginal slit, with terminal rounded supplementary openings on the central part of the terminal face. Holocene; Pacific: Fiji.

REUSSELLA Galloway, 1933

Plate 575, figs. 9-12

Type species: Verneuilina spinulosa Reuss, 1850 (*2573), p. 374; OD.

Reussella Galloway, 1933 (*1205), p. 360 (nom. subst. pro *Reussia* Schwager, 1877).

Reussia Schwager, 1877 (*2830), p. 21 (non *Reussia* McCoy, 1854); type species: obj.; OD(M).

Test pyramidal, triserial, and triangular throughout, angles carinate and may be spinulate, chambers enlarging gradually, sutures curved and oblique; wall calcareous, optically radial, coarsely perforate, surface smooth to pustulose; aperture a slit at the base of the final chamber, with an internal spoutlike toothplate. M. Eocene (Lutetian) to Holocene; cosmopolitan.

VALVOBIFARINA Hofker, 1951

Plate 575, figs. 18-23

Type species: Bifarina mackinnoni Millett, 1900 (*2145), p. 281; OD.

Valvobifarina Hofker, 1951 (*1498), p. 39.

Test elongate, triserial, and triangular in section in the early stage, later twisted biserial and compressed, with chambers cuneate in outline, overhanging and recurved at the carinate lateral margins, sutures arched, oblique and depressed; wall calcareous, coarsely perforate, surface pustulate, margins carinate; aperture terminal, a narrow and elongate slit occupying the full width of the apertural face and bordered by an everted rim. Holocene; Malay Archipelago; Timor Sea.

Family TRIMOSINIDAE Saidova, 1981

Trimosinidae Saidova, 1981 (*2696), p. 56.

Trimosininae Saidova, 1981 (*2696), p. 56 (subfamily).

Mimosininae Saidova, 1981 (*2696), p. 56 (subfamily).

Test triserial, at least in the early stage, later may be reduced to biserial, chambers sharply angled or each may be laterally produced into a distinct spine; aperture consists of a large interiomarginal opening that may be accompanied by a second areal opening. Holocene.

MIMOSINA Millett, 1900

Plate 576, figs. 1-4

Type species: Mimosina histrix Millett, 1900; SD Cushman, 1927 (***746**), p. 190.

Mimosina Millett, 1900 (***2146**), p. 547.

Test triserial in the early stage, later biserial, chambers subglobular and inflated but produced into a prominent spine at the test angles, sutures depressed; wall calcareous, hyaline, optically radial, finely perforate between the fine longitudinal ribs; aperture a wide and low basal arch, with a second ovate opening that is nearly terminal, each bordered by a narrow imperforate lip that also separates the two openings. Holocene: Malay Archipelago; tropical Pacific; Kerimba Archipelago; Atlantic; Caribbean; Mediterranean.

TRIMOSINA Cushman, 1927

Plate 576, figs. 5 and 6

Type species: Trimosina milletti Cushman, 1927 (syn.: *Mimosina spinulosa* var. Millett, 1900, ***2146**, p. 548); OD.

Trimosina Cushman, 1927 (***742**), p. 64.

Test pyramidal, triserial, and triangular throughout, chambers inflated, a vertical carina at the angles produced laterally into a prominent proximally directed spine on each chamber, sutures depressed; wall calcareous, perforate, hyaline, optically radial, surface very finely hispid; aperture a low broad ovate opening parallel to the base of the apertural face, bordered by a narrow lip. Holocene: Malay Archipelago; Timor Sea.

Family PAVONINIDAE Eimer and Fickert, 1899

Pavoninidae Eimer and Fickert, 1899 (***1088**), p. 606.
Pavonininae Cushman, 1927 (***742**), p. 59 (subfamily).

Test biserial in the early stage, later with broad low arched chambers that may produce a flabelliform test; aperture terminal, multiple. U. Eocene to Holocene.

BIFARINELLA Cushman and Hanzawa, 1936

Plate 576, figs. 7-11

Type species: Bifarinella ryukyuensis Cushman and Hanzawa, 1936; OD.

Bifarinella Cushman and Hanzawa, 1936 (***822**), p. 46.

Test elongate, flabelliform, globular proloculus followed by a few biserial chambers, then becoming uniserial, with broad, arched, and flattened chambers that have a thickened, elevated, and commonly nodose lower margin, overhanging laterally so that test margins appear serrated, sutures arched across the flat sides of the test; wall calcareous, optically radial, distinctly perforate, surface smooth except for the nodose lower chamber margins and occasional nodes elsewhere on the chambers; aperture not known, probably consisting only of pores as in *Pavonina*, intercameral foramina large, extending the length of the septal face and separated only by narrow bridges from one side of the test to that opposite. Pleistocene to Holocene: Pacific: Ryukyu Islands; Timor Sea.

FINLAYINA Hayward and Morgans, 1981

Plate 577, figs. 5-12

Type species: Finlayina hornibrooki Hayward and Morgans, 1981; OD.

Finlayina Hayward and Morgans, 1981 (***1441**), p. 439.

Test large, up to 2.0 mm long and 2.5 mm in breadth, flattened, broad and flabelliform, spherical proloculus followed by biserial chambers, the first pair completely encircling the proloculus, then with broad and low chambers expanding rapidly in breadth and curved back at the margins, final stage consists of strongly arched broad and low uniserial chambers occupying approximately a half circle, sutures flush, obscure at the surface, periphery bluntly rounded; wall calcareous, optically radial, perforate, surface smooth; aperture consists of a single row of coarse pores extending across the apertural face, the apertural pores becoming more pronounced and developing a raised border as they become intercameral foramina. U. Eocene to L. Oligocene; Mexico; New Zealand.

PAVONINA d'Orbigny, 1826

Plate 577, figs. 1–4

Type species: Pavonina flabelliformis d'Orbigny, 1826; OD(M).

Pavonina d'Orbigny, 1826 (***2303**), p. 260.

Valvopavonina Hofker, 1951 (***1498**), p. 35 (also as *Valvopovonina*, p. vii); type species: obj.; OD.

Test broadly palmate, flattened, with reduced triserial stage of only three chambers, then biserial, with rapidly broadening chambers, and finally uniserial, with very broad, low, and semicircular chambers increasing rapidly in breadth and strongly curved proximally at the margins, periphery bluntly rounded to truncate and bicarinate on the apertural face, sutures strongly arched, depressed; wall calcareous, optically radial, coarsely perforate, surface smooth to pustulose; aperture not apparent on well-preserved specimens except for coarse perforations on the apertural face like those of the remainder of the test, larger intercameral foramina formed by resorption as new chamber is added. Miocene to Holocene; Atlantic; Pacific; Africa; Madagascar; North America.

Family MILLETTIIDAE Saidova, 1981

Millettiidae Loeblich and Tappan, 1982 (***1917**), p. 33, nom. transl. ex superfamily Millettiidea.

Schubertiinae Reiss, 1963 (***2561**), p. 53 (subfamily; invalid, ICZN Art. 39, based on *Schubertia* A. Silvestri, 1912, non Gistl, 1848).

Early stage biserial, later with a few subcylindrical uniserial chambers subdivided by vertical and horizontal partial partitions into numerous small chamberlets in honeycomblike arrangement; aperture terminal, with phialine lip and internal siphonlike toothplate. Holocene.

MILLETTIA Schubert, 1911

Plate 577, figs. 13–18

Type species: Sagrina tessellata Brady, 1884 (***344**), p. 85; OD.

Millettia Schubert, 1911 (***2819**), p. 89 (non *Millettia* Sherborn, 1893, nom. corr. pro *Milletia* Wright, 1889, name not available, ICZN Art. 12 (a), no description, non *Milletia* Duncan, 1889).

Schubertia A. Silvestri, 1912 (***2948**), p. 68 (nom. subst. pro *Millettia* Schubert, 1911, non Sherborn, 1893, nom. superfl.; non *Schubertia* Gistl, 1848); type species: obj.; OD.

Test elongate, cylindrical, rectilinear to arcuate, circular in section, base rounded, early chambers biserial, later with a few elongate subcylindrical chambers of rapidly increased height, chambers subdivided into chamberlets by longitudinal and horizontal partitions in a honeycomb pattern, the chamberlets arranged in transverse rows; wall calcareous, finely perforate, optically radial, surface with hexagonal pattern formed by the junction of the chamberlet walls and outer wall but otherwise smooth; aperture terminal, rounded, surrounded by a collar and narrow rim, and provided with an internal toothplate. Holocene: Pacific.

Superfamily FURSENKOINACEA Loeblich and Tappan, 1961

Fursenkoinacea Loeblich and Tappan, 1984 (***1918**), p. 45, nom. corr. pro superfamily Fursenkoinidea.

Fursenkoinidea Saidova, 1981 (***2696**), p. 58, nom. transl. ex subfamily Fursenkoininae.

Test triserial, twisted or flattened biserial; wall calcareous, perforate, optically granular (hyaline oblique); aperture loop shaped, with internal toothplate. U. Cretaceous (Cenomanian) to Holocene.

Family FURSENKOINIDAE Loeblich and Tappan, 1961

Fursenkoinidae Saidova, 1981 (***2696**), p. 58, nom. transl. ex subfamily Fursenkoininae.

Virgulininae Cushman, 1927 (***742**), p. 68 (subfamily: invalid, ICZN Art. 39, based on *Virgulina* d'Orbigny, 1826, non Bory de St. Vincent, 1823).

Virgulinidae Hofker, 1951 (***1498**), p. 236 (nom. transl.).

Fursenkoininae Loeblich and Tappan, 1961 (***1902**), p. 314 (subfamily).

Sigmovirgulininae Saidova, 1981 (***2696**), p. 55 (subfamily: nom. imperf.).

Sigmavirgulininae Loeblich and Tappan, 1982 (***1917**), p. 32 (subfamily; nom. corr.).

Test biserial, early chambers added less than 180° apart, resulting in a sigmoid or twisted biserial appearance, later may become uniserial; aperture loop shaped in biserial stage and terminal in uniserial stage. U. Cretaceous (Cenomanian) to Holocene.

Remarks: Although previously the Sigmavirgulininae was recognized for those with sigmoid arrangement of the early biserial chambers, the same early chamber arrangement occurs in *Fursenkoina*, hence only a single family is recognized.

CASSIDELLA Hofker, 1951

Plate 578, figs. 26 and 27

Type species: Virgulina tegulata Reuss, 1846 (*2571), p. 40; OD.

Cassidella Hofker, 1951 (*1498), p. 264.
Praevirgulina Hofker, 1951 (*1499), p. 1 (name not available, ICZN Art. 13 (a)(i), no description).

Test narrow, elongate, ovoid in section, biserial, slightly twisted, early chambers low and closely appressed, later chambers higher, the final pair occupying about one-third the test length, sutures depressed, oblique; wall calcareous, finely perforate, optically granular, surface smooth; aperture a long narrow slit that extends up the face of the final chamber from its base, provided with an internal toothplate. U. Cretaceous to M. Oligocene; cosmopolitan.

Remarks: Topotypes of the type species of *Cassidella* are wholly biserial throughout, hence species with early triserial stage should be assigned elsewhere.

CORYPHOSTOMA Loeblich and Tappan, 1962

Plate 578, figs. 1-3, 13-17

Type species: Bolivina plaitum Carsey, 1926 (*495), p. 26; OD.

Coryphostoma Loeblich and Tappan, 1962 (*1906), p. 111.
Laterostoma Hamaoui, in Arkin and Braun, 1965 (*69), p. 8, 9 (name not available, ICZN Art. 13 (a)(i), no description).
Laterostoma Hamaoui, 1965 (*1381), p. 17 (name not available, ICZN Art. 13 (b); no included species).
Laterostoma Hamaoui, 1979 (*1382), p. 344; type species: *Laterostoma neumannae* Hamaoui, 1979; OD.

Test free, elongate, narrow, rounded to oval in section, early chambers biserially arranged and closely appressed, broad and low, strongly oblique, later chambers higher and cuneate in shape, with a tendency to become uniserial; wall calcareous, finely perforate, optically granular, surface smooth; aperture in the early stage an interiomarginal loop extending up from the base of the final chamber, becoming areal and terminal in the adult, internal toothplate connecting successive foramina and the aperture. U. Cretaceous (Cenomanian) to Holocene; cosmopolitan.

Remarks: The diagnosis for *Laterostoma* appears identical to that for *Coryphostoma*, although the optical nature of the wall was not indicated.

FURSENKOINA Loeblich and Tappan, 1961

Plate 578, figs. 18-25

Type species: Virgulina squammosa d'Orbigny, 1826 (*2303), p. 267; OD.

Fursenkoina Loeblich and Tappan, 1961 (*1902), p. 314 (nom. subst. pro *Virgulina* d'Orbigny, 1826).
Virgulina d'Orbigny, 1826 (*2303), p. 267 (non *Virgulina* Bory de St. Vincent, 1823); type species: obj.; OD(M).
Neobuliminoides McCulloch, 1977 (*1961), p. 247; type species: *Neobuliminoides cedrosensis* McCulloch, 1977; OD.

Test narrow, elongate, rounded to ovate in section, chambers high and narrow, slightly inflated, biserial throughout, although plane of biseriality twists about the test axis, sutures oblique, depressed; wall calcareous, hyaline, optically granular, very finely perforate, surface smooth; aperture narrow, elongate, extending up the face of the final chamber, lower part of the opening may be closed in the adult, leaving only a suture to the base of the chamber and the remaining areal opening comma shaped, toothplate attached to the closed apertural suture, the free folded part projecting through the opening as a denticulate tooth, and the opposite end attached within to the previous apertural foramen. U. Cretaceous to Holocene; cosmopolitan.

NEOCASSIDULINA McCulloch, 1977

Plate 578, figs. 4-6

Type species: Neocassidulina evoluta McCulloch, 1977; OD.

Neocassidulina McCulloch, 1977 (*1961), p. 396.

Test elongate, flattened, ovate in section, chambers biserial and rectilinear throughout, increasing rapidly in height and becoming more inflated as added, later stage with nearly parallel margins, sutures oblique, depressed; wall calcareous, glossy, and opaque, finely perforate, surface smooth; aperture an elongate curved slit extending up the face of the final chamber parallel to the distal margin and bordered by a narrow lip, presence or nature of toothplate unknown. Holocene, at 1,720 m to 2,300 m; Pacific: Bikini Atoll.

RUTHERFORDOIDES McCulloch, 1981

Plate 578, figs. 7-12

Type species: Rutherfordia rotundiformis McCulloch, 1977 (*1961), p. 249; OD.

Rutherfordoides McCulloch, 1981 (*1962), p. 6 (nom. subst. pro *Rutherfordia* McCulloch, 1977).
Rutherfordia McCulloch, 1977 (*1961), p. 249 (non *Rutherfordia* Macgillivray, 1921): type species: obj.; OD.
Hastilina Nomura, 1983 (*2260), p. 80; type species: *Virgulina mexicana* Cushman, 1922 (*722), p. 120; OD.

Test elongate, subfusiform, rounded to oval in section, chambers biserially arranged, axis may be slightly curved but not enrolled in the early stage, chambers strongly oblique, broad and low as seen from the dorsal side but more strongly overlapping and inflated on the ventral side, sutures oblique, flush to slightly depressed; wall calcareous, hyaline, optically granular, finely perforate, surface smooth and polished; aperture an elongate, subterminal loop, extending up the face of the final chamber. Oligocene to Holocene; cosmopolitan.

SIGMAVIRGULINA Loeblich and Tappan, 1957

Plate 579, figs. 1-5

Type species: Bolivina tortuosa Brady, 1881 (*339), p. 57; OD.

Sigmavirgulina Loeblich and Tappan, 1957 (*1897), p. 227.

Test flaring, compressed, biserial throughout, early chambers added slightly more than 180° apart, resulting in a sigmoid alignment of chambers that at first form a tight low spire, later biserial chambers of increasing relative breadth resulting in a widening test and added more nearly in a single plane, periphery acutely angled or carinate, sutures slightly depressed; wall calcareous, of calcite by X-ray determination, optically granular, coarsely perforate, surface smooth or early stage may have short spinules; aperture an elongate oval at the inner margin of the final chamber, surrounded by a lip that grades laterally into the marginal keel, more rarely closed basally so that the opening is subterminal, situated a short distance above the chamber base, and provided with a simple twisted and flaring toothplate. Miocene to Holocene; cosmopolitan.

STUARTIA McCulloch, 1977

Plate 579, figs. 6-8

Type species: Stuartia ruthae McCulloch, 1977; OD.

Stuartia McCulloch, 1977 (*1961), p. 397.

Test elongate, flattened, palmate in outline, biserial, chambers broad and low and sutures strongly oblique on the dorsal side, chambers more strongly overlapping and sutures less oblique on the ventral side where the final pair of chambers comprises about one-half the test, proximal margin of chambers truncated, with a sharp and commonly fimbriate border and with lateral spinelike projections resulting in a serrate margin, sutures depressed; wall calcareous, finely perforate, glossy, surface smooth except for the fimbriate or serrate lower chamber margin; aperture an elongate slit paralleling the margin on the ventral side, extending from the base of the chamber nearly to the test apex. Holocene; Pacific: off Bikini Island, at about 1,700 m to 2,300 m.

SUGGRUNDA Hoffmeister and Berry, 1937

Plate 579, figs. 9-11

Type species: Suggrunda porosa Hoffmeister and Berry, 1937; OD.

Suggrunda Hoffmeister and Berry, 1937 (*1489), p. 29.

Test small, tapering, biserial throughout, chambers broad and low, enlarging gradually as added, lower margin abruptly angled, overhanging the slightly oblique and depressed sutures; wall calcareous, optically granular, finely perforate, somewhat larger pores near the basal margin of the chambers, surface smooth but with pustulose to spinulate lower margin; aperture an asymmetrical hooklike to comma-shaped opening. Miocene; Venezuela; Trinidad; USA: California.

VIRGULOIDES Srinivasan, 1966

Plate 579, figs. 12 and 13

Type species: Virguloides wellmani Srinivasan, 1966; OD.

Virguloides Srinivasan, 1966 (*3050), p. 250.

Test free, narrow, and elongate, oval in section, biserial to loosely biserial, with a tendency to become nearly uniserial, chambers narrow and high, increasing in height as added, final chamber comprising about one-third the test length, sutures slightly depressed, strongly oblique; wall calcareous, surface smooth; aperture terminal, an elongate, curved slit. L. Oligocene; New Zealand; USA: Mississippi.

Family VIRGULINELLIDAE Loeblich and Tappan, 1984

Virgulinellidae Loeblich and Tappan, 1984 (*1918), p. 45.
Virgulinellidae Loeblich and Tappan, 1982 (*1917), p. 33 (name not available, ICZN Art. 13(a)(i), no description).

Test free, triserial to biserial; primary aperture a loop in the terminal face, internal toothplate extending within from the apertural margin to attach near the previous foramen; supplementary sutural apertures partially covered by bridges across the sutures. L. Eocene to Holocene.

Remarks: Differs from the Fursenkoinidae in the presence of sutural apertures that are partially covered by bridges across the sutures.

PSEUDOBULIMINELLA de Klasz, Y. Le Calvez, and Rérat, 1964

Plate 579, figs. 14 and 15

Type species: Pseudobuliminella triserialis de Klasz et al., 1964; OD.

Pseudobuliminella de Klasz, Y. Le Calvez, and Rérat, 1964 (*1699), p. 237.

Test elongate, circular in section, slightly inflated chambers in a high triserial spire, basal chamber margin with numerous small bridgelike projections that overlap the preceding suture, sutures depressed; wall calcareous, perforate, optical character unknown, surface smooth; aperture an elongate slit in the final chamber face, perpendicular to its base. L. to M. Eocene; Gabon; Nigeria.

Remarks: The original description did not indicate the optical character of the wall, whether the chamber projections over the sutures were accompanied by sutural openings, or the presence or nature of a toothplate.

VIRGULINELLA Cushman, 1932

Plate 579, figs. 16–22

Type species: Virgulina pertusa Reuss, 1861 (*2582), p. 362; OD.

Virgulina (Virgulinella) Cushman, 1932 (*764), p. 9.
Virgulinella Yabe and Asano, 1937 (*3404), p. 121 (nom. transl.).

Test elongate, fusiform in plan, oval in section, early stage triserial, later biserial, chambers slightly inflated and strongly overlapping, final pair comprising about two-thirds the test length, lower margin of chambers with numerous narrow bridgelike projections that cross the slightly constricted sutures; wall calcareous, finely perforate, opaque, optically granular; aperture an oblique loop in the apertural face, provided with a reduced toothplate that commences near the previous foramen and attaches to the lower part of the chamber wall, continuing to the lower border of the aperture, with supplementary sutural openings between the sutural bridges. Miocene to Holocene; cosmopolitan.

Superfamily DELOSINACEA Parr, 1950

Delosinacea Loeblich and Tappan, 1984 (*1918), p. 46, nom. corr. pro superfamily Delosinidea.
Delosinidea Saidova, 1981 (*2696), p. 57, nom. transl. ex family Delosinidae.
Caucasinidea Saidova, 1975 (*2695), p. 315.

Test trochospiral or triserial, at least in early stage, later may be biserial or tend toward uniserial; wall of perforate, hyaline oblique lamellar calcite, appearing optically granular, surface smooth or with minor basal spines; aperture a high interiomarginal slit, commonly with internal toothplate or may consist of sutural pores. L. Cretaceous (Barremian) to Holocene.

Family CAUCASINIDAE N. K. Bykova, 1959

Caucasinidae Loeblich and Tappan, 1961 (*1902), p. 314, nom. transl. ex subfamily Caucasininae.

Test trochospiral, at least in the early stage. L. Cretaceous (Barremian) to Holocene.

Subfamily BAGGATELLINAE N. K. Bykova, 1959

Baggatellinae N. K. Bykova, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 325.

Test a low trochospiral throughout; aperture a high curved slit up the final chamber face. M. Eocene to U. Oligocene.

BAGGATELLA Howe, 1939

Plate 580, figs. 1-3

Type species: Baggatella inconspicua Howe, 1939; OD.

Baggatella Howe, 1939 (*1568), p. 79.

Test trochospirally coiled in two to three whorls of four to five inflated chambers each, sutures depressed, oblique on the spiral side, radial on the umbilical side; wall calcareous, perforate, surface smooth; aperture a curved slit extending up the apertural face from the umbilical margin of the final chamber, proximal border curving inward and the distal border projecting as a broad flap. M. Eocene (Lutetian) to U. Oligocene; North America; USSR: Ukrainian Carpathians, Turkmenia.

Subfamily CAUCASININAE N. K. Bykova, 1959

Caucasininae N. K. Bykova, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 328.

Test elongate, with trochospiral early stage, later triserial or biserial; aperture a loop in the apertural face. L. Cretaceous (Barremian) to Holocene.

AEOLOMORPHELLA Loeblich and Tappan, 1964

Plate 580, figs. 4-9

Type species: Aeolomorphella plectilis Loeblich and Tappan, 1964; OD.

Aeolomorphella Loeblich and Tappan, 1964 (*1912), p. 84.

Test elongate, robust, circular to oval in section, early stage with up to six chambers per whorl in a close-coiled low trochospiral, spire later rapidly increasing in height, and reduced to triserial and finally biserial, chambers broad and low, final pair of chambers higher and occupying up to one-third the test height, sutures slightly oblique, depressed; wall calcareous, finely perforate, optically granular, surface smooth; aperture a high loop extending up the apertural face, with the posterior margin folded inward to become a toothplate. U. Cretaceous (Campanian); USA: N. Alaska.

AEOLOSTREPTIS Loeblich and Tappan, 1957

Plate 581, figs. 8-10

Type species: Buliminella vitrea Cushman and Parker, 1936 (*837), p. 7; OD.

Aeolostreptis Loeblich and Tappan, 1957 (*1897), p. 227.

Test ovate in outline, circular in section, base bluntly rounded, early stage in a low trochospiral coil of about three whorls and about six very low lunate chambers per whorl as seen from the test base, then abruptly increasing in chamber height and reduced number per whorl, final whorl of three chambers comprises most of the test height, intercameral sutures strongly oblique, slightly depressed; wall calcareous, finely perforate, optically granular, surface smooth; aperture a small loop at the base of the final chamber face perpendicular to the suture and with a narrow bordering lip at the distal margin. U. Cretaceous (Santonian to Campanian); USA: Mississippi, Texas.

Remarks: Although previously regarded as a synonym of *Caucasina*, *Aeolostreptis* differs in the much broader and more compact test, higher, strongly overlapping and less inflated chambers, and small and relatively low aperture.

CAUCASINA Khalilov, 1951

Plate 580, figs. 13-22

Type species: Caucasina oligocenica Khalilov, 1951 = *Bulimina schischkinskayae* Samoylova, 1947 (*2721), p. 82; OD.

Caucasina Khalilov, 1951 (*1680), p. 58.

Caucasina (Terebro) Yu. P. Nikitina, 1958 (*2258), p. 53 (name not available, ICZN Art. 13(a)(i), no description).

Caucasinella N. K. Bykova, 1959 (*471), p. 73 (name not available, ICZN Art. 13(a)(i), no description).

Caucasinella (Terebra) N. K. Bykova, 1959 (*471), p. 73, textfig. 3 (name not available, ICZN Art. 13(a)(i), no description).

Caucasinella N. K. Bykova, in Myatlyuk et al., 1973 (*2225), p. 55; type species: *Caucasinella pseudoelongata* N. K. Bykova, 1973; OD.

Test elongate, subcylindrical to flaring, base bluntly rounded, early chambers in a low trochospiral coil of four to eight chambers, later stage high spired, reduced to three chambers per whorl although not regularly triserial, chambers may be inflated, intercameral sutures vertical to slightly oblique, flush to depressed; wall calcareous, finely perforate, surface smooth or may have short spines on the proloculus and basal part of early chambers; aperture an elongate narrow loop extending up the face of the final chamber, the posterior margin curving inward in a broad flaplike toothplate, the projecting anterior margin bordered by a narrow raised lip. L. Paleocene (Danian) to U. Miocene (Sarmatian): USSR: Crimea, Caucasus, Ukraine, Azerbaydzhan, Georgia, Armenia, Turkmenia; Austria; Yugoslavia; France; Portugal; Algeria; USA: California.

EPISTOMINITELLA Poroshina, 1966

Plate 581, figs. 11-13

Type species: Epistominitella elongata Poroshina, 1966; OD.

Epistominitella Poroshina, 1966 (***2457**), p. 63 (also err. cit. as *Epistomihitella*, p. 62, and as *Epistominitelln*, p. 65).

Test short, subcylindrical, circular in section, base broadly rounded, chambers trochospirally arranged, about five chambers per whorl in the early stage, rapidly reducing to three and finally to two in the final whorl, chambers progressively higher as added, sutures curved, nearly flush; wall calcareous, finely perforate, optical character unknown, surface finely hispid in the early part, later smooth; aperture curved, slitlike, nearly terminal, provided with a narrow internal toothplate. L. Cretaceous (Barremian to L. Aptian): Azerbaydzhan.

FRANCESITA Loeblich and Tappan, 1963

Plate 581, figs. 1-7

Type species: Virgulina? advena Cushman, 1922 (***722**), p. 120; OD.

Francesita Loeblich and Tappan, 1963 (***1909**), p. 215.

Test elongate, megalospheric test subcylindrical with broadly rounded base, microspheric test slightly flaring from the narrow base, circular to oval in section, triserial in the early stage, later biserial, sutures slightly depressed to flush, oblique; wall calcareous, optically granular, finely perforate, surface smooth; aperture an elongate slit extending from the base of the final chamber up the face, across the top, and about halfway down the opposite side, both margins poreless, one margin being curved inward and the opposite one projecting above like a narrow hood, bordered with a narrow rim. Holocene; N. Atlantic; E. Gulf of Mexico.

TERGRIGORJANZAELLA

N. K. Bykova, 1980

Plate 581, figs. 14-18

Type species: Caucasina? sectile Ter-Grigor'yants, 1965 (***3134**), p. 231: OD.

Tergrigorjanzaella N. K. Bykova, 1980 (***474**), p. 100.

Test elongate, early chambers in a low trochospiral coil of about two whorls of five inflated chambers each, later stage a high trochospiral coil of only three chambers per whorl and showing a slight tendency to become biserial, each chamber with a median thornlike spine that projects laterally, sutures slightly depressed, umbilical area depressed centrally; wall calcareous, thin and translucent, finely perforate; aperture a broad loop at the base of the final chamber, may have a narrow lip. U. Eocene to L. Oligocene; USSR: N. Stavropol, Ustyurt.

Family TREMACHORIDAE Lipps and K. L. Lipps, 1967

Tremachoridae Lipps and K. L. Lipps, 1967 (***1873**), p. 497.
Tremachorinae Saidova, 1981 (***2696**), p. 55 (subfamily).

Test in a low trochospiral coil; primary aperture a low slit with narrow bordering lip, secondary sutural openings slightly produced on short tubelike necks. M. Miocene.

TREMACHORA Lipps and K. L. Lipps, 1967

Plate 581, figs. 19-21

Type species: Tremachora arga Lipps and K. L. Lipps, 1967; OD.

Tremachora Lipps and K. L. Lipps, 1967 (***1873**), p. 497.

Test globular, spherical to ovate inflated chambers trochospirally enrolled, three to four and a half per whorl in three to five whorls that increase rapidly in size as added, sutures depressed, curved; wall calcareous, optically granular, finely perforate, surface smooth; primary aperture a narrow areal slit a short distance above the base of the final chamber and bordered by a thin lip, with numerous circular secondary sutural apertures, each bordered by a narrow lip and somewhat elevated above the general surface on short tubular necks. M. Miocene (Mohnian; Helvetian); USA: California.

Family DELOSINIDAE Parr, 1950

Delosinidae Parr, 1950 (*2363), p. 345.
Delosininae Saidova, 1981 (*2696), p. 57 (subfamily).

Test triserial, high spired; primary apertural opening may be lacking and secondary sutural pores with bordering lip may be present, the large sutural pores opening into subsutural canals that terminate in a spongy area of the final chamber face. Holocene.

DELOSINA Wiesner, 1931

Plate 582, figs. 1-6

Type species: Polymorphina? complexa Sidebottom, 1907 (***2911**), p. 16; OD(M).

Delosina Wiesner, 1931 (*3375), p. 123.

Test elongate, ovate in form, rounded in section, chambers in a high trochospiral coil of three strongly overlapping chambers per whorl, increasing rapidly in height as added, final whorl occupying most of the test length, sutures depressed, strongly oblique; wall calcareous, optically granular, finely perforate, surface smooth; aperture consists of fine pores in an arched spongy area at the base of the apertural face, large secondary sutural openings lead into subsutural canals that terminate in this spongy area. Holocene: Mediterranean; Antarctic; Pacific.

NEODELOSINA McCulloch, 1977

Plate 582, figs. 7-11

Type species: Neodelosina triangularis McCulloch, 1977; OD.

Neodelosina McCulloch, 1977 (***1961**), p. 219 (also err. cit. as *Neodelesina*, p. 218).
Delosinoides McCulloch, 1977 (***1961**), p. 218; type species: *Delosinoides glenni* McCulloch, 1977; OD.

Test elongate, ovate to subquadrangular in section, chambers inflated, elongate, and embracing earlier ones, added somewhat irregularly, arrangement of earlier chambers obscured by the strongly overlapping later ones, sutures depressed; wall calcareous, finely perforate, opaque and highly polished, surface smooth; no primary aperture visible, a few sutural openings recognizable in rare specimens. Holocene, 30 m to 70 m; Peru; Galapagos Islands.

Remarks: The arrangement of chambers, character of openings, and possible presence of subsutural canals as in *Delosina* is not known and cannot be discerned externally on the type specimens.

Superfamily PLEUROSTOMELLACEA Reuss, 1860

Pleurostomellacea Loeblich and Tappan, 1982 (***1917**), p. 32, nom. transl. ex family Pleurostomellidae.

Early stage triserial or biserial, later may be reduced to uniserial with cuneate chambers or with biseriality reflected internally; wall calcareous, perforate, lamellar, optically granular, hyaline oblique in structure; aperture a subterminal straight to curved slit, eccentric and partially covered by a projecting hood or may be terminal and cribrate; internal siphon extends from the aperture to the previous chamber foramen, those of earlier chambers remaining as a columellalike structure that may reflect the ancestral biseriality even within the uniserial chambers. L. Cretaceous (Aptian) to Holocene.

Family PLEUROSTOMELLIDAE Reuss, 1860

Pleurostomellidae Reuss, 1860 (***2581**), p. 151, 203.
Pleurostomellideae Gümbel, 1870 (***1337**), p. 52.
Ellipsoidinidae A. Silvestri, 1923 (***2951**), p. 246, 265.
Pleurostomellida Copeland, 1956 (***680**), p. 188 (err. emend.).

As in the superfamily. L. Cretaceous (Aptian) to Holocene.

Subfamily PLEUROSTOMELLINAE Reuss, 1860

Pleurostomellinae Loeblich and Tappan, 1961 (***1902**), p. 315, nom. corr. pro subfamily Pleurostomellidea.
Pleurostomellidea Reuss, 1862 (***2586**), p. 368, nom. transl. ex family Pleurostomellidae.
Ellipsonodosariinae A. Silvestri, 1901 (***2925**), p. 109.
Ellipsoidininae V. Petters, 1954 (***2392**), p. 39.

Early stage biserial, later uniserial, or may be uniserial throughout: aperture simple. L. Cretaceous (Aptian) to Holocene.

DAUCINA G. Bornemann, 1855

Plate 582, figs. 18 and 19

Type species: Daucina ermaniana G. Bornemann, in Erman, 1855: OD(M).

Daucina G. Bornemann, in Erman, 1855 (*1112), p. 153.

Test elongate, uniserial, circular in section, with slowly enlarging and strongly overlapping chambers, sutures arched, slightly depressed; wall calcareous, surface smooth to longitudinally striate; aperture terminal, trilobate, probably a modification of the arched or toothed aperture of other pleurostomellids. L. Eocene to L. Miocene; Brazil; Angola; Cameroun; Gabon; Nigeria; Senegal.

Remarks: A lectotype for *Daucina ermaniana* (USNM Cushman Coll. 14223) was designated by Loeblich and Tappan (1964, ***1910**, p. C727).

DREPANIOTA Loeblich and Tappan, 1986

Plate 582, figs. 20-22

Type species: Drepaniota pachutaense Loeblich and Tappan, 1986: OD.

Drepaniota Loeblich and Tappan, 1986 (*1928), p. 251.

Test narrow and elongate, arcuate, high and narrow uniserial chambers of nearly circular section, sutures straight, horizontal, slightly depressed; wall calcareous, no pores present, surface smooth; aperture a narrow elongate slit, curving down at the ends, situated slightly at one side of the median line of the test, opposite margin somewhat hoodlike and protruding above the opening, internally provided with a very narrow internal tube that extends from the aperture to the preceding foramen and may be visible through the thin wall of the final chamber. U. Cretaceous (Maastrichtian) to U. Eocene (Priabonian); USA: Alabama; New Jersey.

Remarks: Differs from *Nodosarella* in the high and narrow chambers, strongly curved test, elongate aperture with recurved ends, and absence of an elevated lip.

ELLIPSOBULIMINA A. Silvestri, 1903

Plate 583, figs. 3-5

Type species: Ellipsobulimina seguenzai A. Silvestri, 1903: OD(M).

Ellipsobulimina A. Silvestri, 1903 (*2929), p. 210.

Test ovate to globular, early stage biserial with each biserial pair completely overlapping earlier chambers, later uniserial with chambers completely enveloping the test so that externally it resembles *Ellipsoidina;* wall calcareous, surface smooth; aperture terminal, semilunate, provided with an internal tube that connects successive apertures. M. Miocene (Helvetian) to Holocene: Italy; Cuba.

ELLIPSODIMORPHINA A. Silvestri, 1901

Plate 583, figs. 1 and 2

Type species: Ellipsodimorphina subcompacta Liebus, 1922 (***1845**), p. 57; SD(SM).

Ellipsodimorphina A. Silvestri, 1901 (*2924), p. 16, 18.

Test elongate, circular in section, early chambers biserially arranged, broad and low, with slightly depressed and oblique sutures, later chambers cuneate, then inflated and uniserial, of nearly equal breadth and height, separated by more strongly constricted sutures, final chamber tapering slightly to the aperture: wall calcareous, surface smooth; aperture a terminal arcuate slit. M. Eocene (Lutetian); Czechoslovakia; Austria; Albania.

ELLIPSOGLANDULINA A. Silvestri, 1900

Plate 583, figs. 17-23

Type species: Ellipsoglandulina laevigata A. Silvestri, 1900: OD(M).

Ellipsoglandulina A. Silvestri, 1900 (*2923), p. 12.

Test elongate, flaring, circular in section, uniserial throughout, strongly overlapping chambers increase rapidly in size but never completely envelop the test, final chamber comprising up to two-thirds the test length, sutures nearly straight and horizontal, slightly depressed; wall calcareous, surface smooth; aperture terminal, semilunate, with entosolenian tube connecting successive apertures. U. Cretaceous (Turonian) to Holocene; cosmopolitan.

ELLIPSOIDELLA Heron-Allen and Earland, 1910

Plate 582, figs. 12-14

Type species: Ellipsoidella pleurostomelloides Heron-Allen and Earland, 1910; OD(M).

Ellipsoidella Heron-Allen and Earland, 1910 (*1467), p. 410, 414.

Test elongate, early stage biserial, later tending to become uniserial but with alternating cuneate chambers, rarely completely rectilinear in the final stage, sutures depressed, slightly curved; wall calcareous, perforate, optically granular, surface smooth; aperture subterminal, an arched slit with overhanging hoodlike margin, with internal tube that extends from an expansion just within the aperture through the chamber to attach to the previous apertural foramen. U. Cretaceous (Turonian); Europe.

Remarks: A lectotype (BMNH P4162) was designated from the English Cretaceous material of Heron-Allen and Earland by Loeblich and Tappan (1964, ***1910**, p. C728).

ELLIPSOIDINA Seguenza, 1859

Plate 582, figs. 15-17

Type species: Ellipsoidina ellipsoides Seguenza, 1859; SD Brady, 1868 (***326**), p. 338.

Ellipsoidina Seguenza, 1859 (*2837), p. 12.

Test ovate, circular in section, chambers uniserial and completely enveloping, each attached to the preceding chamber at the base of the test and successive chambers attached at the apertural end by an entosolenian tube; wall calcareous, finely perforate, optically granular, white and opaque in appearance, surface smooth; aperture terminal, an arched to chevronlike slit, provided with an internal tube that connects to the preceding foramen. Eocene to Pliocene; Europe; Caribbean.

ELLIPSOLINGULINA A. Silvestri, 1907

Plate 583, figs. 6-10

Type species: Lingulina impressa Terquem, 1882 (***3147**), p. 38; OD.

Ellipsolingulina A. Silvestri, 1907 (*2938), p. 69.

Test elongate, slightly compressed, oval to fusiform in section, chambers uniserial, overlapping earlier ones, sutures straight, horizontal, weakly depressed; wall calcareous, surface smooth; aperture an arcuate terminal slit with an internal tube. M. Eocene (Lutetian) to Oligocene; France; Italy.

ELLIPSOPOLYMORPHINA A. Silvestri, 1901

Plate 583, figs. 11-16

Type species: Dimorphina deformis (Costa) Fornasini, 1890 (***1151**), p. 471 (non *Glandulina deformis* Costa, 1853) = *Ellipsopolymorphina fornasinii* Galloway, 1933 (***1205**), p. 382; OD(M).

Ellipsopolymorphina A. Silvestri, 1901 (*2924), p. 14.
Ellipsopleurostomella A. Silvestri, 1903 (*2929), p. 209, 216 (nom. superfl.); type species: obj.; OD.

Test elongate, fusiform, rounded in section, chambers strongly overlapping, biserially arranged in the early stage, later uniserial, sutures slightly depressed; wall calcareous, smooth; aperture a terminal curved slit with entosolenian tube connecting the aperture to the foramina of earlier chambers. M. Eocene (Lutetian) to Pliocene; Europe.

Remarks: *Ellipsopleurostomella* was proposed originally as a replacement for *Ellipsopolymorphina*, hence is a superfluous name, with the same type species. Of two species (*labiata* and *schlichti*) mentioned by Silvestri, *Ellipsopleurostomella schlichti* Silvestri was not validated until 1904, hence its designation by Cushman (1933, ***766**) as type species of *Ellipsopleurostomella* is invalid. The neotype designated for *Polymorphina labiata* Schwager, 1866 (***2828**), p. 246, by Srinivasan and Sharma, 1980 (***3053**), p. 59 is an *Ellipsoglandulina* (see plate 583, figs. 22, 23).

NODOSARELLA Rzehak, 1895

Plate 584, figs. 11-14

Type species: Lingulina tuberosa Gümbel, 1870 (***1337**), p. 629; SD Cushman, 1928 (***747**), p. 261.

Nodosarella Rzehak, 1895 (*2682), p. 219.

Ellipsonodosaria A. Silvestri, 1900 (*2923), p. 4; type species: *Lingulina rotundata* d'Orbigny, 1846 (*2309), p. 61; OD(M).

Test elongate, circular in section, chambers inflated, uniserial, and rectilinear throughout, sutures straight, horizontal, depressed; wall calcareous, finely perforate, surface smooth to finely striate; aperture terminal, an arcuate slit with bordering lip, one side may be slightly produced and hoodlike. U. Cretaceous (Maastrichtian) to Holocene; cosmopolitan.

PINARIA Bermúdez, 1937

Plate 584, figs. 19 and 20

Type species: Pinaria heterosculpta Bermúdez, 1937; OD.

Pinaria Bermúdez, 1937 (*196), p. 242.

Test elongate, robust, circular in section, consisting of a few strongly overlapping uniserial and rectilinear chambers, sutures straight, depressed; wall calcareous, smooth; aperture a terminal circlet of small slits, possibly resulting from fusion across an arcuate opening, with apertural tooth and internally provided with an entosolenian tube. Eocene; Cuba.

PLEUROSKELIDION Patterson, 1987

Plate 835, figs. 5-7

Type species: Pleuroskelidion undu Patterson, 1987; OD.

Pleuroskelidion Patterson, 1987 (*2370), p. 143.

Test elongate, tapering to the base, early chambers biserially arranged, later chambers cuneate and tend to become uniserial, slightly compressed, sutures slightly depressed, strongly oblique; wall calcareous, hyaline, finely perforate, surface ornamented by low longitudinal costae that may be continuous from chamber to chamber, costae dying out and may be lacking on the final one or two chambers; aperture subterminal, eccentric, lower margin forming a projecting lip, upper margin an overhanging hoodlike projection of the chamber, an internal tube connecting the aperture with the preceding foramen. Pliocene; Southwest Atlantic.

PLEUROSTOMELLA Reuss, 1860

Plate 584, figs. 1-10

Type species: Dentalina subnodosa Reuss, 1851 (*2575), p. 24 = *Dentalina nodosa* d'Orbigny of Reuss, 1846 (*2571), p. 28 (non d'Orbigny, 1840); SD Cushman, 1911 (*702), p. 49.

Pleurostomella Reuss, 1860 (*2581), p. 203.

Pleurostomellina Schubert, 1911 (*2819), p. 58; type species: *Pleurostomella barroisi* Berthelin, 1880 (*221), p. 30 = *Pleurostomella fusiformis* Reuss, 1860 (*2581), p. 203; SD Cushman, 1928 (*747), p. 261.

Ellipsonodosaria (Ellipsodentalina) Franke, 1928 (*1173), p. 54; type species: *Dentalina subnodosa* Reuss, 1851, obj.; SD Loeblich and Tappan, 1964 (*1910), p. C725.

Clarella Fuchs, 1967 (*1189), p. 333; type species: *Nodosarella articulata* Brotzen, 1936 (*425), p. 139; OD.

Test small, elongate, circular in section, early chambers biserially arranged or cuneate and alternating in position, later uniserial, sutures depressed, oblique in early stage, later nearly horizontal; wall calcareous, finely perforate, optically granular, surface smooth; aperture terminal, with projecting hood on one side and opposite side partially obstructed by two triangular teeth or a bifid tooth. L. Cretaceous (Aptian) to Holocene; cosmopolitan.

Subfamily WHEELERELLINAE Petters, 1954

Wheelerellinae V. Petters, 1954 (*2392), p. 39.

Test with early triserial stage, later uniserial; aperture a terminal curved or hooded slit. U. Cretaceous (Coniacian to Campanian).

BANDYELLA Loeblich and Tappan, 1962

Plate 584, figs. 21 and 22

Type species: Pleurostomella greatvalleyensis Trujillo, 1960 (*3229), p. 345; OD.

Bandyella Loeblich and Tappan, 1962 (*1906), p. 111.

Test short, robust, circular in section, early stage triserial, later biserial, final chambers cuneate in form and uniserial, sutures depressed; wall calcareous, finely perforate, optically granular, surface smooth; aperture subterminal, a crescentic slit overlapped on one margin by a broad hood and a perpendicular short median slit on the opposite side bordered by a triangular tooth at each side. U. Cretaceous (Coniacian to Campanian): USA: California.

WHEELERELLA Petters, 1954

Plate 584, figs. 15-18

Type species: Wheelerella magdalenaensis Petters, 1954; OD.

Wheelerella V. Petters, 1954 (***2392**), p. 38.

Test elongate, compressed, and ovate in section, early stage triserial, later uniserial, with broad and low chambers that show considerable overlap, sutures slightly depressed; wall calcareous, finely perforate, surface smooth; aperture an elongate curved slit with narrow bordering lip, slightly more elevated at the outside of the curve, provided with an internal tube. U. Cretaceous (Coniacian): Colombia.

Subfamily
CRIBROPLEUROSTOMELLINAE
Owen, 1971

Cribropleurostomellinae Owen, 1971 (***2315**), p. 120.

Early stage with cuneate chambers or may be uniserial throughout; aperture cribrate. U. Cretaceous (U. Cenomanian).

CRIBROPLEUROSTOMELLA Owen, 1971

Plate 585, figs. 1-4

Type species: Cribropleurostomella plenus Owen, 1971; OD.

Cribropleurostomella Owen, 1971 (***2315**), p. 120.

Test narrow, elongate, uniserial, rectilinear to slightly arcuate, chambers relatively elongate, sutures depressed; wall calcareous, finely perforate, optically granular, surface smooth; aperture terminal, cribrate, consisting of a series of pores on a somewhat produced neck, an internal siphon connecting the aperture and previous foramina. U. Cretaceous (U. Cenomanian): England.

Superfamily STILOSTOMELLACEA
Finlay, 1947

Stilostomellacea, nom. corr. herein.

Stilostomellidea Saidova, 1981 (***2696**), p. 59 (nom. transl. ex subfamily).

Test uniserial and rectilinear or arcuate; aperture terminal, with phialine lip and with a toothlike projection from one margin. U. Cretaceous (Campanian) to Holocene.

Family STILOSTOMELLIDAE
Finlay, 1947

Stilostomellidae Saidova, 1981 (***2696**), p. 59, nom. transl. ex subfamily Stilostomellinae.

Stilostomellinae Finlay, 1947 (***1130**), p. 275 (subfamily).

As for the superfamily. U. Cretaceous (Campanian) to Holocene.

NODOGENERINA Cushman, 1927

Plate 585, figs. 13-15

Type species: Nodogenerina bradyi Cushman, 1927; OD.

Nodogenerina Cushman, 1927 (***739**), p. 79.

Test narrow, elongate, uniserial, and rectilinear, chambers campanulate in form, widest at the shoulder near the base of the chamber, sharply curving inward to the suture below, upper part of chamber domed, sutures constricted; wall calcareous, finely perforate, hyaline, commonly with a row of small spines at the edge of the chamber shoulder; aperture terminal and ovate, bordered by a somewhat produced lip and with one margin indented as a simple tooth. U. Cretaceous (Campanian) to Holocene; cosmopolitan.

Remarks: The specimen illustrated by Loeblich and Tappan (1964, ***1910**, p. C559, fig. 440, *10*) was incorrectly indicated as the lectotype of *Sagrina virgula* Brady, but is instead the lectotype of *Nodogenerina bradyi* Cushman (= *S. virgula* Brady, 1879 (***338**), p. 8, fig. 21; Brady's figs. 19 and 20 are neither conspecific nor congeneric).

ORTHOMORPHINA Stainforth, 1952

Plate 440, figs. 17 and 18

Type species: Nodogenerina havanensis Cushman and Bermúdez, 1937 (***806**), p. 14; OD.

Orthomorphina Stainforth, 1952 (***3061**), p. 8.

Test uniserial, rectilinear, proloculus globular, later chambers increasing rapidly in height and slowly in breadth, so that they are ovoid in outline, sutures straight, slightly depressed; wall calcareous, finely perforate, surface smooth or with very faint striae, particularly near the sutures; aperture terminal, rounded, with everted rim. Eocene to Holocene; cosmopolitan.

SIPHONODOSARIA A. Silvestri, 1924

Plate 585, figs. 5-7

Type species: Nodosaria abyssorum Brady, 1881 (*339), p. 63; SD(SM) Cushman, 1927 (*742), p. 67.

Siphonodosaria A. Silvestri, 1924 (*2954), p. 18.

Sagrinnonodosaria Jedlitschka, 1931 (*1601), p. 125; type species: obj.; SD Loeblich and Tappan, 1964 (*1910), p. C559.

Test narrow, elongate, uniserial, straight to arcuate, proloculus apiculate or with numerous small spines, chambers subglobular to pyriform with moderate overlap, sutures constricted; wall calcareous, perforate, thick, optically radial, surface smooth; aperture rounded, produced on a slight neck, with bordering phialine and crenulate lip and with a distinct tooth projecting into the aperture at one side. Eocene to Holocene; cosmopolitan.

STILOSTOMELLA Guppy, 1894

Plate 585, figs. 8-12

Type species: Stilostomella rugosa Guppy, 1894; OD.

Stilostomella Guppy, 1894 (*1342), p. 649.

Test short, robust, uniserial, and rectilinear to slightly arcuate, chambers subglobular, enlarging rapidly and strongly overlapping, sutures distinct, constricted; wall calcareous, hyaline, finely perforate, surface finely pustulose to hispid; aperture arcuate to *V*-shaped, as a result of a small toothlike projection from one side, terminal on a short neck, bordered with a distinct lip. Miocene; Trinidad.

Remarks: Differs from *Nodogenerina* in the shorter and more robust form, rounded, more rapidly enlarging and overlapping chambers, and absence of a spinose shoulder at the lower chamber margin.

STRICTOCOSTELLA Patterson, 1987

Plate 834, figs. 9-11

Type species: Ellipsonodosaria modesta Bermúdez var. *prolata* Cushman and Bermúdez, 1937 (*807), p. 109; OD.

Strictocostella Patterson, 1987 (*2370), p. 141.

Test uniserial and rectilinear, circular in section, chambers inflated, strongly overlapping, final chamber appearing pyriform and tapering to the aperture; wall calcareous, hyaline, nonperforate, surface longitudinally costate, the costae continuous from chamber to chamber but commonly dying out on the final chamber; aperture terminal, rounded, bordered by a phialine lip, with a denticulate margin, and one large tooth projecting farther into the opening. Eocene to Holocene; Cuba; Atlantic.

Superfamily ANNULOPATELLINACEA Loeblich and Tappan, 1964

Annulopatellinacea, nom. transl. herein ex family.

As for the family. Miocene to Holocene.

Family ANNULOPATELLINIDAE Loeblich and Tappan, 1964

Annulopatellinidae Loeblich and Tappan, 1964 (*1910), p. C730.

Test conical, proloculus followed by reniform second chamber, then uniserial, with low chambers appearing annular on the convex side, overlapping on flattened side, chambers subdivided by radial tubules that open as pores at the surface. Miocene to Holocene.

ANNULOPATELLINA Parr and Collins, 1930

Plate 586, figs. 1-5; plate 587, figs. 1 and 2

Type species: Orbitolina annularis Parker and Jones, 1860 (*2348), p. 31; OD(M).

Annulopatellina Parr and Collins, 1930 (*2364), p. 92.

Test low and conical, concavoconvex, small globular proloculus followed by an embracing reniform second chamber and then by narrow annular chambers as viewed from the convex side, each chamber completely covering the concave side, chambers subdivided by numerous tiny radiating tubules that open as pores at the surface, anastomosing in a central vesicular region at the center of the concave side; wall calcareous, perforate, optically granular, surface smooth; no visible aperture other than the pores; commonly pairs of tests are joined by their umbilical surfaces, suggesting a plastogamic reproductive cycle. Miocene to Holocene; Australia; Trinidad.

Superfamily DISCORBACEA Ehrenberg, 1838

Discorbacea Loeblich and Tappan, 1964 (*1910), p. C572, nom. corr. pro superfamily Discorbidea.
Discorbidea Smout, 1954 (*3008), p. 81, nom. transl. ex family Discorbina.
Discorbinidea Saidova, 1981 (*2696), p. 43.
Discorbiacea Kalla, 1981 (*1635), p. 246.
Discorboidea Tappan and Loeblich, 1982 (*3128), p. 543.

Test in low trochospiral coil; wall of perforate, hyaline, optically radiate calcite; aperture interiomarginal on the umbilical side of the test, and may be bordered by a nonperforate area or umbilical flap. L. Jurassic (Aalenian) to Holocene.

Family CONORBINIDAE Reiss, 1963

Conorbinidae Loeblich & Tappan, 1984 (*1918), p. 47; nom. transl. ex subfamily.
Conorbininae Reiss, 1963 (*2561), p. 58 (subfamily).
Conorbinidae Hofker, 1954 (*1505), table, p. 167 (name not available, no description, ICZN Art. 13 (a)(i), and included only *Conorboides*).

Test low to high trochospiral, chambers lunate as seen from spiral side, final chamber occupying up to one-half of the umbilical side, periphery angled. U. Jurassic (Oxfordian) to U. Cretaceous (Coniacian).

CONORBINA Brotzen, 1936

Plate 587, figs. 6–8

Type species: Conorbina marginata Brotzen, 1936; OD.

Conorbina Brotzen, 1936 (*425), p. 141.

Test planoconvex, trochospiral, chambers crescentic and sutures oblique as seen from the convex spiral side, wedgelike with nearly radial and slightly curved sutures on the flat umbilical side, up to seven or eight small chambers in each early whorl, later chambers progressively larger and fewer per whorl, periphery acutely angled to carinate; wall calcareous, smooth; aperture a low extraumbilical and interiomarginal slit, in a slight reentrant of the chamber margin. L. Cretaceous (Berriasian) to U. Cretaceous (Coniacian); Europe; North America.

EURYCHEILOSTOMA Loeblich and Tappan, 1957

Plate 587, figs. 9–11

Type species: Eurycheilostoma altispira Loeblich and Tappan, 1957; OD.

Eurycheilostoma Loeblich and Tappan, 1957 (*1897), p. 228.

Test trochospiral, high spired, with concave umbilical side, chambers broad and low, semilunate on the spiral side, decreasing in number per whorl from four to six at first to only three or four, the final chamber comprising about half the umbilical side, final whorl may be abruptly wider and result in a somewhat flaring test, sutures oblique and slightly depressed on the spiral side, curved on the umbilical side; wall calcareous, surface smooth; aperture a broad interiomarginal and umbilical arch on the excavated umbilical side, partially covered by a broad umbilical flap that may have a serrate margin. L. Cretaceous (Albian); USA: Texas.

IULIUSINA Fuchs, 1971

Plate 588, figs. 6–8

Type species: Iuliusina grata Fuchs, 1971; OD.

Iuliusina Fuchs, 1971 (*1192), p. 34.

Test tiny, 0.20 mm in diameter, trochospiral, spiral side evolute and subconical, about two and a half whorls of inflated chambers, four to five chambers in the final whorl, sutures depressed, slightly oblique on the spiral side, radial on the flattened to concave umbilical side, umbilicus open, periphery rounded, outline lobulate; wall calcareous, finely perforate, surface smooth; aperture a small interiomarginal umbilical arch. L. Cretaceous (M. Barremian); Austria.

Remarks: Originally regarded as a member of the planktonic Guembelitriidae, *Iuliusina* is here placed in the Conorbinidae because of the distinctly trochospiral rather than triserial test and low rather than high arched aperture. The original description mentioned neither the character of the wall nor distribution of pores, and although the aperture was said to possibly have a bordering lip, this appears to be uncertain. It differs from *Conorbina* in having an umbilical aperture, radial sutures, and inflated chambers.

NOTOCONORBINA Malumián and Masiuk, 1976

Plate 588, figs. 1-5

Type species: Notoconorbina leanzai Malumián and Masiuk, 1976; OD(M).

Notoconorbina Malumián and Masiuk, 1976 (*2003), p. 399.

Test trochospiral, planoconvex, spiral side strongly convex, early whorls with up to seven chambers, then reduced to fewer chambers per whorl, with about three to three and a half crescentic and rapidly enlarging chambers in the final whorl, final chamber occupying about one-half the umbilical side, sutures oblique, thickened, and elevated on the spiral side, umbilical side flat to slightly concave, involute, sutures nearly radial, depressed and slightly curved, periphery angular, carinate; wall of calcite, spiral side coarsely perforate, umbilical side imperforate, with small pustules just above the aperture on the final chamber; aperture a strongly curved slit arching from the umbilicus toward the periphery and giving the appearance of a valvelike projection from the base of the chamber against the previous whorl. L. Cretaceous; Argentina.

TOPALODISCORBIS Neagu, 1970

Plate 587, figs. 3-5

Type species: Discorbis (Topalodiscorbis) danubiensis Neagu, in Barbulescu and Neagu, 1970; OD.

Discorbis (Topalodiscorbis) Neagu, in Barbulescu and Neagu, 1970 (*133), p. 110 (also err. cit. as *D. (Topolodiscorbis)*, p. 106).

Topalodiscorbis Neagu, 1979 (*2237), p. 276 (nom. transl.).

Test large, up to 2.2 mm in diameter, discoidal, low trochospiral coil, all of the two to two and a half whorls visible on the weakly convex evolute spiral side, chambers rapidly increasing in breadth as added, later ones broad and low, nine to ten in the final whorl, sutures strongly curved and oblique, flat to slightly concave umbilical side partially evolute, part of the penultimate whorl remaining visible around the central umbilical boss, sutures less strongly curved than on the spiral side and slightly depressed, periphery subacute, peripheral outline entire; aperture interiomarginal, a short slit at the base of the final chamber in young individuals, more elongate in large specimens and extending from the umbilical margin along the basal suture about half the distance to the periphery, bordered by a narrow lip and may have a somewhat sinuate margin, previous apertures of the final whorl remain open around the umbilicus. U. Jurassic (U. Oxfordian to L. Kimmeridgian); Romania.

Family PLACENTULINIDAE G. K. Kasimova, Poroshina, and Geodakchan, 1980

Placentulinidae Kasimova, Poroshina, and Geodakchan, 1980 (*1660), p. 121.

Test a low trochospiral coil, without a tubular undivided second chamber, but with few chambers per whorl. L. Jurassic (Aalenian) to U. Cretaceous; Holocene.

Subfamily PLACENTULININAE G. K. Kasimova, Poroshina, and Geodakchan, 1980

Placentulininae Loeblich and Tappan, 1984 (*1918), p. 32, nom. transl. ex family Placentulinidae.

Test a low cone, proloculus followed by two to four or more chambers in the first whorl and lacking a tubular undivided second chamber, chambers lack secondary partitions. L. Jurassic (Aalenian) to M. Jurassic (Callovian).

TRISPIRINA Danich, 1977

Plate 588, figs. 9-17

Type species: Trispirina tirasica Danich, 1977 (also as *tiruca* in fig. expl.); OD.

Trispirina Danich, 1977 (*890), p. 117.

Placentulina G. K. Kasimova, 1978 (*1658), p. 138; type species: *Placentulina terquemi* G. K. Kasimova, 1978; OD.

Test conical, spiral side strongly convex, umbilical side flat to slightly concave, periphery angular to carinate, small rounded proloculus followed by three to five low chambers per whorl, chambers of successive whorls aligned, early chambers rounded, those of later whorls low and crescentic as seen from the spiral side and wedgelike from the umbilical side, no marginal septula like those of *Patellina* but with a hooklike vertical plate midway on the umbilical edge of each chamber that resembles the columella of *Patellina* and probably results similarly from a sharp turn of the final chamber at the apertural end; wall calcareous, hyaline, finely punctate, surface smooth. L. Jurassic (Aalenian) to M. Jurassic (Callovian); USSR: Azerbaydzhan, Moldavian SSR; France.

Subfamily ASHBROOKIINAE Loeblich and Tappan, 1984

Ashbrookiinae Loeblich and Tappan, 1984 (***1918**), p. 32.

Test a low conical spire, proloculus immediately followed by two to four rounded chambers in the first whorl, later whorls may have reduced number of chambers per whorl; chambers with peripheral septula as in *Patellina*. M. Jurassic (Bajocian) to U. Cretaceous, Holocene.

ASHBROOKIA McCulloch, 1977

Plate 589, figs. 5-7 and 11-13

Type species: Ashbrookia ornata McCulloch, 1977; OD.

Ashbrookia McCulloch, 1977 (***1961**), p. 282.

Pseudopatellina S. Y. Zheng, 1980 (***3450**), p. 168, 182 (non *Pseudopatellina* Haque, 1960, nec Kenawy and Nyirö, 1967); type species: *Pseudopatellina compressa* Zheng, 1980; OD.

Exopatellina S. Y. Zheng, 1981 (***3452**), p. 906 (nom. subst. pro *Pseudopatellina* Zheng, 1980); type species: *Pseudopatellina compressa* Zheng, 1980: OD.

Test planoconvex, low trochospiral coil of approximately two whorls, about three strongly overlapping chambers per whorl, without a tubular undivided second chamber like that of *Patellina*, chambers low and crescentic and sutures strongly curved as seen from the convex spiral side, final chamber occupying well over half the periphery and umbilical side, outer margin of the chambers with short radial septula, umbilical margin of the final chamber projecting at the center, and with a curved reentrant at each end; wall calcareous, hyaline, finely punctate; aperture umbilical in position but without the columella structure of the Patellinidae. Holocene; Philippine Islands; China: Zhongsha Islands.

PAALZOWELLA Cushman, 1933

Plate 588, figs. 24-34; plate 589, figs. 1-4

Type species: Discorbina scalariformis Paalzow, 1917 (***2321**), p. 247 = *Rotalina turbinella* Gümbel, 1862 (***1336**), p. 230; OD.

Paalzowella Cushman, 1933 (***766**), p. 234.

Low conical test, trochospirally enrolled, evolute on spiral side, involute on umbilical side, four to five chambers per whorl, sutures indistinct, periphery and spiral suture with elevated flangelike keel; wall calcareous, translucent, very thin, surface may show fine striae; aperture a low interiomarginal bent slit, extending from near the periphery nearly to the umbilicus. M. Jurassic (Bajocian) to U. Jurassic (Oxfordian); Germany; Poland; USSR: Ukraine, Belorussia.

Remarks: The genus previously was placed with the Involutinidae (Loeblich and Tappan, 1964, ***1910**), but the test is subdivided into chambers, rather than having an undivided spiralling tube. The internal structure is not clear. It has been interpreted either as having a single secondary partition per chamber, extending from the umbilical margin into the chamber rather than from the periphery, or as four vertical radial plates projecting from the umbilical region through all whorls. Possibly the indentation in the surface of the final whorl of chambers reflects the alternating position of the septa of the preceding whorl, as the chambers are very low and the whorls tightly appressed.

PALEOPATELLINA Kasimova, Poroshina, and Geodakchan, 1973

Plate 588, figs. 18-23

Type species: Patellina aptica Agalarova, in Dzhafarov, Agalarova, and Khalilov, 1951 (***1030**), p. 47; OD.

Paleopatellina Kasimova, Poroshina, and Geodakchan, in Geodakchan et al., 1973 (***1220**), p. 41.

Test conical, all chambers visible from the convex spiral side, only those of the final whorl visible from the flattened umbilical side.

periphery acutely angled, earliest whorl with small rounded chambers, probably about five, those of later whorls low and crescentic and decreasing to about three per whorl; radial septula project into the chambers for a short distance from the peripheral margin; wall calcareous, hyaline, finely porous, surface smooth; aperture a narrow interiomarginal slit, partially covered by an umbilical flap that resembles the apertural plate of *Patellina*, the bent margin of the apertural wall producing a triradiate central columella rather than the *S*-shaped one of *Patellina*. M. Jurassic to L. Cretaceous (Aptian); USSR: Caucasus, Turkmenia, Carpathians.

PATELLINELLA Cushman, 1928

Plate 589, figs. 14–19

Type species: Textularia inconspicua Brady, 1884 (***344**), p. 357; OD.

Patellinella Cushman, 1928 (***748**), p. 5.

Test conical, planoconvex, trochospiral, earliest whorl with three chambers, later with two chambers per whorl, all visible on the convex spiral side, only the final pair visible on the flat umbilical side; wall calcareous, finely perforate, optically radial; aperture a broad umbilical arch that is not covered by the opposing chamber, only by the next one on the same side. M. Jurassic (Bathonian), Holocene; USSR: Poland; S. Pacific; Japan.

PSEUDOPATELLINELLA
Takayanagi, 1960

Plate 590, figs. 1–6

Type species: Pseudopatellinella cretacea Takayanagi, 1960; OD.

Pseudopatellinella Takayanagi, 1960 (***3112**), p. 121.

Test low trochospiral, spiral side convex and evolute, umbilical side flattened, two chambers per whorl, early ones subglobular and directly opposed, later ones increasing rapidly in breadth, low and crescentic as seen on the spiral side, added slightly more than 180° apart so that the midline of the chambers forms a sigmoid curve, only the final pair of chambers visible on the umbilical side, each occupying half the surface and separated by a straight and slightly depressed suture; wall calcareous, perforate, microstructure unknown, inner surface somewhat undulating but without septula; aperture a narrow slit on the umbilical side, extending up the face of the chamber, those of the final pair remaining visible on the umbilical side. U. Cretaceous; Japan; USSR: Azerbaydzhan.

SUBPATELLINELLA McCulloch, 1977

Plate 589, figs. 8–10

Type species: Subpatellinella symmetrica McCulloch, 1977; OD.

Subpatellinella McCulloch, 1977 (***1961**), p. 285.

Low planoconvex test of ovate outline, two chambers per whorl, all of the five pairs of low chambers visible on the convex spiral side, increasing rapidly in breadth as added, only the final pair visible on the flattened umbilical side where chambers appear hemispherical and somewhat inflated, sutures flush, periphery broadly rounded; wall calcareous, hyaline, and transparent, finely perforate, smooth; aperture a slit extending a short distance up the final chamber face from the umbilical margin, that of the penultimate chamber closed by secondary shell deposition. Holocene; S. Pacific; Galapagos Islands.

Family BAGGINIDAE Cushman, 1927

Bagginidae Haynes, 1981 (***1437**), p. 237, 260, nom. transl. ex subfamily Baggininae.
Valvulineriidae Brotzen, 1942 (***428**), p. 16.
Cancrisidae Haynes, 1981 (***1437**), p. 237, 259.

Trochospiral, test finely perforate but with imperforate area near aperture and umbilicus on umbilical side. L. Cretaceous (Barremian) to Holocene.

Subfamily SEROVAININAE Sliter, 1968

Serovaininae Sliter, 1968 (***3002**), p. 91.

Test trochospiral, periphery broadly rounded, sutures radial on both sides of test; aperture extending from umbilicus to periphery. L. Cretaceous (Barremian) to Paleocene.

OZOURINA de Klasz, Y. Le Calvez, and Rérat, 1969

Plate 590, figs. 7–9

Type species: Ozourina concavospira de Klasz et al., 1969; OD.

Ozourina de Klasz, Y. L. Calvez, and Rérat, 1969 (***1700**), p. 279.

Test planoconvex to concavoconex, trochospirally coiled, with flat to excavated spiral side and strongly convex umbilical side, periphery broadly rounded to the sharp angle at the edge of the spiral side, peripheral outline entire to lobulate, umbilicus closed, sutures sightly curved, depressed; wall calcareous, finely perforate, surface smooth; aperture a thin extraumbilical slit at the base of the last chamber on the umbilical side. Paleocene; Gabon.

ROTAMORPHINA Finlay, 1939

Plate 590, figs. 10-12

Type species: Rotamorphina cushmani Finlay, 1939 (syn.: *Valvulineria teuriensis* Loeblich and Tappan, 1964 (*1910), p. C587, nom. nov. pro *R. cushmani* Finlay, 1939, non *Valvulineria cushmani* Coryell and Embich, 1937): OD.

Rotamorphina Finlay, 1939 (*1128), p. 325.

Test biconvex, trochospiral, chambers enlarging rapidly as added, six to seven per whorl, sutures flush and oblique on the spiral side, depressed and radial on the umbilical side, periphery rounded; wall calcareous, thin, surface smooth; aperture a low extraumbilical-umbilical arch on the umbilical side, covered by an umbilical flap from the final chamber. U. Cretaceous (Campanian); cosmopolitan.

Remarks: As *Rotamorphina* is recognized as a distinct genus rather than a synonym of *Valvulineria*, the type species is no longer a secondary junior homonym of *V. cushmani* Coryell and Embich and is correctly known as *Rotamorphina cushmani*.

SEROVAINA Sliter, 1968

Plate 590, figs. 13-21

Type species: Gyroidina globosa (Hagenow) var. *orbicella* Bandy, 1951 (*116), p. 505; OD.

Serovaina Sliter, 1968 (*3002), p. 91.

Conorbinopsis Myatlyuk, 1983 (*2224), p. 36; type species: *Discorbis barremicus* Myatlyuk, 1953 (*2217), p. 44; OD.

Test trochospiral, biconvex, or may have nearly flat spiral side, umbilicus small and depressed, periphery broadly rounded, chambers enlarging rapidly as added, sutures distinct, depressed, radial, and very slightly curved; wall calcareous, finely perforate, optically radial, surface smooth; aperture an extraumbilical-umbilical interiomarginal slit with a slight lip on the upper border. L. Cretaceous (Barremian) to U. Cretaceous (Campanian to Maastrichtian): cosmopolitan.

Subfamily BAGGININAE Cushman, 1927

Baggininae Cushman, 1927 (*742), p. 77.

Test trochospiral, umbilical area closed; broad area of final chamber adjacent to umbilicus clear and imperforate; aperture interiomarginal. U. Cretaceous (Senonian) to Holocene.

BAGGINA Cushman, 1926

Plate 591, figs. 5-7

Type species: Baggina californica Cushman, 1926; OD.

Baggina Cushman, 1926 (*737), p. 63.

Test subglobular, with low trochospiral coil of few inflated and rapidly enlarging chambers per whorl, final chamber occupying about one-half the umbilical side, umbilicus closed, sutures gently curved, depressed, periphery broadly rounded; wall calcareous, optically radial, perforate but with a broad clear nonperforate area on the umbilical side just above the aperture, surface smooth; aperture a broad umbilical opening at the base of the apertural face. U. Cretaceous to Holocene; cosmopolitan.

CANCRIS de Montfort, 1808

Plate 591, figs. 1-4

Type species: Cancris auriculatus de Montfort, 1808 = *Nautilus auricula* Fichtel and Moll, 1798 (*1124), p. 108; OD.

Cancris de Montfort, 1808 (*2176), p. 267.

Rotalina d'Orbigny, 1839 (*2304), p. 71; type species: *Rotalina sagra* d'Orbigny, 1839, p. 77, pl. 5, figs. 13-15; SD herein.

Pulvinulinella Eimer and Fickert, 1899 (*1088), p. 628 (non *Pulvinulinella* Cushman, 1926); type species: obj.; SD Cushman and ten Dam, 1948 (*819), p. 49.

Test elongate ovate to auriculate in outline, lenticular in section, periphery angled to carinate, chambers increasing rapidly in breadth as added in a flaring trochospiral coil, sutures depressed, arched on the spiral side, nearly radial around the open umbilicus on the opposite side; wall calcareous, optically radial, perforate, but with an imperforate area above the aperture continuing into the imperforate umbilical apertural flap, surface smooth other than the peripheral keel; aperture a low interiomarginal opening on the umbilical side, with a broad apertural flap that begins at the base of the imperforate area extending across the opening to project over the umbilicus. Eocene to Holocene; cosmopolitan.

Remarks: As apparently no type species has been designated previously for *Rotalina* d'Orbigny, we here so designate *Rotalina sagra* d'Orbigny, 1839, one of the originally included species. According to Y. Le Calvez (1977, ***1806**, p. 118), the original type specimen of *Rotalina sagra* is completely broken. A single specimen found in the original d'Orbigny material appeared close to d'Orbigny's figures and was illustrated by SEM (Y. Le Calvez, 1977, ***1806**, p. 118, fig. 1). This specimen (MNHN, Paris) is here designated as the neotype of *Rotalina sagra* d'Orbigny = *Cancris sagra* (d'Orbigny).

CIBICORBIS Hadley, 1934

Plate 591, figs. 8-10

Type species: Cibicorbis herricki Hadley, 1934: OD.

Cibicorbis Hadley, 1934 (***1353**), p. 26.

Test trochospiral, planoconvex, with flattened and partially involute spiral side and involute umbilical side with closed umbilicus, chambers broad and low, increasing rapidly in breadth so that whorls are flaring, triangular in section, inflated and with sharply angled apertural face on the umbilical side, margin of the spiral side carinate, sutures thickened, curved, slightly elevated; wall calcareous, perforate, optical character unknown, surface smooth; aperture an interiomarginal slit on the umbilical side, extending from the umbilicus to the periphery, with a large imperforate apertural flap projecting over the umbilicus. M. Miocene: Cuba; Haiti.

CRIBROBAGGINA McCulloch, 1977

Plate 591, figs. 11-20

Type species: Cribrobaggina socorroensis McCulloch, 1977 (also as *C. sorcorroensis*, p. 342): OD.

Cribrobaggina McCulloch, 1977 (***1961**), p. 342.

Latecella T. C. Cheng and S. Y. Zheng, 1978 (***557**), p. 208; type species: *Discorbina reniformis* Heron-Allen and Earland, 1915 (***1472**), p. 696; OD.

Test ovoid to reniform, oval in section, with a low trochospiral coil of about two whorls, seven chambers in the final whorl although both chambers and sutures are obscure from the exterior, periphery broadly rounded; wall very thick and opaque, very coarsely perforate except for an imperforate area at the base of the apertural face, adjacent to the umbilicus; aperture a low interiomarginal slit. Holocene; Socorro Island, Mexico; China: Xisha Islands; Samoa; Ifalik Atoll; E. Australia; off Mozambique: Cabo Delgado.

Remarks: Examination of the type specimens of *Cribrobaggina socorroensis* showed only an interiomarginal aperture, the reported areal aperture apparently being a misinterpretation of the very coarse wall perforations.

NATLANDIA McCulloch, 1977

Plate 592, figs. 4-6

Type species: Natlandia secasensis McCulloch, 1977; OD.

Natlandia McCulloch, 1977 (***1961**), p. 346.

Test in a low trochospiral coil, sides flattened, spiral side evolute, with seven to eight rapidly enlarging and slightly inflated chambers per whorl, umbilical side involute, inner margin of chambers with small triangular flap that extends into the umbilicus, those of the final whorl closing the umbilicus, sutures straight, radial, and weakly depressed, periphery carinate, peripheral outline lobulate; wall calcareous, hyaline, distinctly perforate on the spiral side, umbilical side with perforations in the outer part of the chambers but with broad triangular imperforate area extending peripherally from the umbilical flap, those of the final whorl covering nearly one-half the umbilical side, imperforate area extending farther along the basal suture of each chamber than toward the apertural face, surface smooth; aperture interiomarginal, a low slit extending from the peripheral keel to the umbilicus beneath the umbilical flap. Holocene; at 28 m, off Panama.

NEOCROSBYIA McCulloch, 1977

Plate 592, figs. 9-11

Type species: Neocrosbyia dissensa McCulloch, 1977; OD.

Neocrosbyia McCulloch, 1977 (*1961), p. 296.

Test auriculate in outline, trochospiral, about two and a half rapidly expanding whorls with eleven chambers in the final whorl, spiral side evolute, umbilical side partly evolute, sutures gently curved, limbate on the spiral side, periphery rounded; wall calcareous, hyaline, spiral side distinctly perforate, umbilical side more finely perforate, apertural face, septa, and thickened sutures of the spiral side nonperforate, umbilical side granulate or pustulose centrally, with a few radial grooves around the umbilicus; aperture a low slit at the base of the last chamber on the umbilical side. Holocene, at 160 m; Galapagos: Albemarle Island (Isabella).

PHYSALIDIA Heron-Allen and Earland, 1928

Plate 592, figs. 7 and 8

Type species: Physalidia simplex Heron-Allen and Earland, 1928; SD Galloway, 1933 (***1205**), p. 337.

Physalidia Heron-Allen and Earland, 1928 (*1475), p. 288.

Test ovate to reniform, with two to four inflated chambers arranged in opposition; wall calcareous, very thin, hyaline, optically radial, perforate, a nonperforate area just below the aperture on the opposing chamber, surface smooth; aperture an equatorial and interiomarginal slit at the base of the final chamber, bordered with a narrow lip on the upper margin. Holocene; Pacific.

PSEUDOCANCRIS McCulloch, 1977

Plate 592, figs. 12-14

Type species: Pseudocancris ecuadorensis McCulloch, 1977; OD.

Pseudocancris McCulloch, 1977 (*1961), p. 346.

Test trochospiral but partially involute on the flattened spiral side as well as the convex umbilical one, about six chambers in the final whorl, chambers inflated on the umbilical side, each having a hyaline imperforate triangular umbilical flap, those from chambers of the final whorl overlapping only slightly and remaining visible around the umbilicus, sutures slightly depressed, radial to curved, periphery carinate, peripheral outline lobulate; wall calcareous, hyaline, perforate, may have an imperforate area on the midregion of the chambers on the umbilical side, surface smooth; aperture interiomarginal at the base of the final chamber, bordered by a narrow lip. Holocene; shallow water, at 38 m off Ecuador.

RUGIDIA Heron-Allen and Earland, 1928

Plate 592, figs. 1-3

Type species: Sphaeroidina corticata Heron-Allen and Earland, 1915 (***1472**), p. 681; OD.

Rugidia Heron-Allen and Earland, 1928 (*1475), p. 289.

Test small, reduced trochospiral, with four subglobular chambers arranged in opposed pairs, all visible externally, sutures depressed; periphery broadly rounded; wall calcareous, optically radial, perforate, surface pustulose and highly rugose; aperture consists of large pores between pairs of chambers on the umbilical side, separated by short pillarlike projections from the final chamber. Holocene; Indian Ocean: Mozambique.

Remarks: A lectotype was designated for *Rugidia corticata* (BMNH ZF 3623) from the original type material (Loeblich and Tappan, 1964, ***1910**, p. C587, fig. 462, *4*).

SAKHIELLA Haque, 1956

Plate 593, figs. 9-11

Type species: Sakhiella nammalensis Haque, 1956; OD.

Sakhiella Haque, 1956 (*1418), p. 155.

Test biconvex, trochospiral but with spiral side nearly completely involute, chambers broad and low, sutures strongly curved, thickened, depressed, periphery carinate; wall calcareous, hyaline, perforate, optically radial, surface smooth; aperture interiomarginal, extending from the umbilicus to the periphery, covered by a distinct umbilical flap. Paleocene; Pakistan: Nammal Gorge.

VALVULINERIA Cushman, 1926

Plate 593, figs. 12-17

Type species: Valvulineria californica Cushman, 1926; OD.

Valvulineria Cushman, 1926 (*737), p. 59.

Test rounded in outline, robust, trochospirally coiled, with about two and a half whorls, periphery broadly rounded, spiral side flattened to moderately convex, umbilical side with depressed umbilicus, chambers enlarging gradually as added, sutures straight to gently curved, thickened, radial and depressed; wall calcareous, optically radial, finely perforate, surface smooth; aperture an interiomarginal, umbilical-extraumbilical arch, with broad thin imperforate apertural flap projecting over the umbilicus and generally covering those from previous chambers but rarely only partially covering them. Paleocene (Danian) to Holocene; cosmopolitan.

VALVULINOIDES Podobina, 1975

Plate 593, figs. 1-8

Type species: Valvulineria umovi Kipriyanova, 1960 (*1690), p. 125; OD.

Valvulinoides Podobina, 1975 (*2434), p. 86.

Test trochospiral, with about two and a half whorls, spiral side flattened, umbilical side convex, eight to nine chambers in the final whorl, periphery subangular, with subangular shoulder on the umbilical side, sutures depressed, oblique, and strongly arched on the spiral side, radial on the umbilical side; wall calcareous, finely perforate, surface smooth; aperture a basal umbilical-extraumbilical slit, extending onto the spiral side, with a valvelike umbilical extension from the last chamber partially covering the aperture. U. Cretaceous (Senonian); USSR: W. Siberian lowland, E. Urals.

Family EPONIDIDAE Hofker, 1951

Eponididae Thalmann, 1952 (*3172), p. 984, nom. corr. pro family Eponidae.

Eponidae Hofker, 1951 (*1498), p. 321 (nom. imperf.).

Pulvinulinidae Hofker, 1951 (*1498), p. 448.

Eponidopsidae Reiss, 1963 (*2561), p. 82.

Test trochospiral, at least in early stage; aperture interiomarginal, extending from periphery to umbilicus on umbilical side, or may be cribrate and areal. Paleocene to Holocene.

Subfamily EPONIDINAE Hofker, 1951

Eponidinae Subbotina, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 269, nom. transl. ex family Eponidae.

Pulvinulininae Schubert, 1921 (*2823), p. 152.

Cribroeponidinae Shchedrina, 1964 (*2891), p. 99.

Alabaminellinae Saidova, 1981 (*2696), p. 47.

Test trochospiral throughout, with interiomarginal primary aperture. Eocene to Holocene.

ALABAMINELLA Saidova, 1975

Plate 593, figs. 18-22

Type species: Eponides weddellensis Earland, 1936 (*1042), p. 57; OD.

Alabaminella Saidova, 1975 (*2695), p. 240.

Alabaminella Khusid, 1973 (*1685), p. 107 (name not available, ICZN Art. 13(a)(i), no description).

Alabaminella Saidova et al., 1974 (*2697), textfig. 1 (name not available, ICZN Art. 13(a)(i), no description).

Test tiny, trochospiral, biconvex, more convex spiral side with broad low chambers and oblique sutures, five to six chambers in the final whorl, umbilical side with depressed and closed umbilicus and depressed and radial sutures, periphery rounded; wall calcareous, hyaline, surface smooth; aperture a minute, slitlike interiomarginal and extraumbilical opening on the umbilical side. Holocene; Antarctic.

Remarks: The description of the aperture is taken from Earland; Saidova described the aperture as extending to the periphery and then continuing parallel to the peripheral margin, apparently basing this on Earland's original figure of the spiral side of *E. weddellensis*. However, this figure apparently is erroneous, as the original description does not mention such an extensive aperture, nor does Saidova's illustration show this. In addition to the type species, Saidova included *Epistominella levicula* Resig in *Alabaminella*, but as it is the type species of *Eilohedra* Lipps, 1965, the latter genus would have priority if the two were congeneric. However, *Eilohedra* has an *L*-shaped aperture, extending along the base of the apertural face and then bending to continue a short distance up the face of the final chamber.

CRIBROGLOBOROTALIA Cushman and Bermúdez, 1936

Plate 594, figs. 14-16

Type species: Cribrogloborotalia marielina Cushman and Bermúdez, 1936; OD.

Cribrogloborotalia Cushman and Bermúdez, 1936 (*805), p. 63.

Test trochospiral, planoconvex, spiral side flattened, umbilical side elevated, apertural face with sharply angular margins and subconical chambers, commonly four chambers per whorl, umbilicus closed, sutures depressed, curved and oblique on the spiral side, nearly radial on the umbilical side; wall calcareous, finely perforate, surface smooth; aperture areal, of numerous rounded pores scattered over the flattened and sharply defined apertural face. Eocene; Cuba; USA: Florida.

DONSISSONIA McCulloch, 1977

Plate 595, figs. 11-13

Type species: Donsissonia florae McCulloch, 1977; OD.

Donsissonia McCulloch, 1977 (***1961**), p. 300.

Test planoconvex with low trochospiral coil of about two and a half gradually expanding whorls, spiral side convex and evolute, with curved and oblique sutures, umbilical side flat to concave and involute, six to seven chambers in the final whorl, sutures straight, radiate, and depressed, central area of the umbilical side excavated and umbilicus small and open, periphery narrowly rounded, peripheral outline weakly lobulate; wall calcareous, hyaline, finely perforate, surface smooth; aperture interiomarginal, extending from the umbilicus nearly to the periphery. Holocene; at 41 m, off Peru.

EPONIDES de Montfort, 1808

Plate 594, figs. 1-13

Type species: Nautilus repandus Fichtel and Moll, 1798 (***1124**), p. 35; OD.

Eponides de Montfort, 1808 (***2176**), p. 127.

Pulvinulus Lamarck, 1816 (***1781**), p. 14; type species: obj.; SD Galloway, 1933 (***1205**), p. 281.

Placentula Lamarck, 1822 (***1782**), p. 620 (non Placentulae Soldani, 1795); type species: *Placentula pulvinata* Lamarck, 1822 = *Nautilus repandus* Fichtel and Moll, 1798; SD Children, 1823 (***586**), p. 157.

Pulvinulina Parker and Jones, in Carpenter, Parker, and Jones, 1862 (***494**), p. 200, 210; type species: obj.; OD.

Eponidopsis Reiss, 1960 (***2560**), p. 16; type species: *Eponides lornensis* Finlay, 1939 (***1126**), p. 522 (first illustrated by Finlay, 1939, ***1127**); OD.

Cribroeponides Shchedrina, 1964 (***2891**), p. 95; type species: *Poroeponides cribrorepandus* Asano and Uchio, in Asano, 1951 (***88**), p. 18; OD.

Podoliella Pishvanova, 1972 (***2412**), p. 225; type species: *Eponides probatus* Krasheninnikov, 1958 (***1728**), p. 228; OD.

Test biconvex, periphery angular to carinate, a low trochospiral coil of about two to three whorls, with about six to seven chambers per whorl, umbilicus closed, sutures curved and limbate on the spiral side, continuing into the peripheral keel, nearly radial on the umbilical side; wall calcareous, optically radiate, finely perforate, sutures and keel imperforate, surface smooth to faintly pustulose; aperture a broad low interiomarginal arch extending from the umbilicus to the periphery, bordered by a narrow lip, and may have a few supplementary areal openings. Eocene to Holocene; cosmopolitan.

Remarks: The neotype designated for *Eponides repandus* (Loeblich and Tappan, 1962, ***1907**, p. 35, 36) became superfluous when the original types of Fichtel and Moll were discovered and the holotype of *E. repandus* was redescribed by Rögl and Hansen (1984, ***2639**, p. 31, 32). Furthermore, as the holotype appears to have a few areal openings in the final septal face that is preserved, *Poroeponides cribrorepandus* Asano and Uchio is congeneric with *Eponides repandus*, and *Cribroeponides* becomes a subjective synonym of *Eponides*.

IOANELLA Saidova, 1975

Plate 595, figs. 4-10

Type species: Truncatulina tumidula H. B. Brady, 1884 (***344**), p. 666; OD.

Ioanella Saidova, 1975 (***2695**), p. 242 (also err. cit. as *Jounella*, expl. pl. 66 [recte 67], fig. 3).

Ioanella Khusid, 1973 (***1685**), p. 107 (name not available, ICZN Art. 13 (a)(i), no description).

Test small, about 0.2 mm in diameter, trochospiral, inequally biconvex, spiral side strongly elevated, about two and a half to three whorls visible, umbilical side with deep narrow umbilicus, five to seven chambers in the final whorl, produced at their umbilical ends, sutures radial, depressed, periphery rounded, peripheral outline lobulate; wall calcareous, perforate, optically radial; aperture an interiomarginal arch near the umbilicus on the umbilical side, with small secondary openings at the produced umbilical ends of the chambers. Holocene, bathyal to abyssal; cosmopolitan.

Remarks: The aperture was not described in the various references to the type species that we have seen; thus the above description is based on Saidova's observations.

POROEPONIDES Cushman, 1944

Plate 595, figs. 1-3

Type species: Rosalina lateralis Terquem, 1878 (*3145), p. 25; OD.

Poroeponides Cushman, 1944 (*792), p. 34.

Test trochospiral, planoconvex to biconvex with strongly elevated spiral side, periphery carinate, sutures curved and oblique on the spiral side, nearly radial on the umbilical side, meeting in the umbilical region at a clear calcite boss but with final few chambers tending to flare and failing to reach the center, resulting in a depressed umbilical region or pseudoumbilicus that may be partially closed by a small umbilical flap from each chamber; wall calcareous, perforate, surface smooth; primary aperture interiomarginal, extending from the umbilicus to the peripheral keel and bordered above by a narrow lip, supplementary rounded areal pores scattered over the apertural face. Pliocene to Holocene; cosmopolitan.

Remarks: Differs from *Eponides* in having an umbilical boss on the umbilical side in the early stage and in the later development of a pseudoumbilicus, in having a lower aperture that extends onto the periphery and numerous areal pores scattered over the entire umbilical side of the final chamber. *Sestronophora* has an open umbilicus in the adult, covered by a perforated plate that extends from the umbilical chamber margins, with only a very few areal pores near the base of the apertural face.

VERNONINA Puri, 1957

Plate 595, figs. 14-16

Type species: Vernonina tuberculata Puri, 1957; OD.

Vernonina Puri, 1957 (*2484), p. 124.

Test planoconvex, low trochospiral coil with convex spiral side, sutures oblique but obscured by the surface ornamentation, umbilical side flattened, sutures straight, slightly oblique to nearly radial and depressed, umbilical region with central plug, periphery angular; wall calcareous, perforate, thickened and with strongly tuberculate surface on the spiral side; aperture interiomarginal, about midway between the umbilicus and the periphery on the umbilical side. U. Eocene; USA: Florida; New Zealand; W. Australia.

VONKLEINSMIDOIDES McCulloch, 1977

Plate 595, figs. 17-19

Type species: Vonkleinsmidoides unica McCulloch, 1977; OD.

Vonkleinsmidoides McCulloch, 1977 (*1961), p. 367.

Test low trochospiral, lenticular, spiral side weakly convex, chambers crescentic, the two rapidly enlarging whorls visible on the spiral side, prominent beads at the junction of spiral and radial sutures being the equatorial remnants of former apertural lips, umbilical side flattened to centrally depressed, partially evolute, nine chambers in the final whorl, sutures curved backward at the periphery, thickened and elevated on the spiral side, depressed on the umbilical side, umbilicus covered with clear shell material, small umbilical flap present at the junction of the umbilical margin and basal suture of the final chamber, flaps of earlier chambers of the final whorl remaining as nodelike elevations around the spiral suture, periphery carinate; wall calcareous, perforate but with imperforate apertural face, sutures, and keel, surface smooth and polished; aperture a low interiomarginal arch with protruding lip on the umbilical side adjacent to the peripheral keel and nearly equatorial, the opening continuing as a spiralling slit around the umbilical margin of the chambers of the final whorl. Holocene; Mexico.

Remarks: The beadlike remnants of the apertural lip on the spiral side originally were described as supplementary openings, but restudy of the type specimen shows that no openings are present. On the umbilical side, the primary opening continues as a spiralling slit at the umbilical margin of the later chambers, but it does not have radial slits along the sutures as had been reported.

Subfamily SESTRONOPHORINAE Saidova, 1981

Sestronophorinae Saidova, 1981 (*2696), p. 47.
Paumotuinae Saidova, 1981 (*2696), p. 47.

Test trochospirally enrolled about an open umbilicus, chambers broad, low, appearing crescentic on the spiral side; aperture an interiomarginal umbilical-extraumbilical arch with additional secondary openings on the umbilical side, may have a perforated plate over the umbilicus. M. Eocene to Holocene.

HOFKERINA Chapman and Parr, 1931

Plate 596, figs. 1-5

Type species: Pulvinulina semiornata Howchin, 1889 (***1561**), p. 14; OD.

Hofkerina Chapman and Parr, 1931 (*541), p. 237.

Test large, up to 2.2 mm in diameter, trochospiral, few strongly inflated and subglobular chambers per whorl, periphery broadly rounded, umbilicus depressed; wall calcareous, thick and laminated, finely perforate, optically radial, spiral side with prominent secondarily thickened irregular pustules; primary aperture a small arched interiomarginal and umbilical opening that may be closed in the final stage, secondary areal and sutural pores present on the apertural face and umbilical region, and additional umbilical openings into chambers of the final whorl may be produced by resorption. Miocene; Australia: Victoria.

NEOCRIBRELLA Cushman, 1928

Plate 596, figs. 6-8

Type species: Discorbina globigerinoides Parker and Jones, 1865 (***2351**), p. 385, 421; OD.

Neocribrella Cushman, 1928 (*748), p. 6.

Test trochospiral with about two whorls of rapidly enlarging subglobular and inflated chambers, sutures nearly radial on both sides, periphery broadly rounded, peripheral outline lobulate; wall calcareous, optically radial, perforate, surface smooth; primary aperture not observed but umbilical region in the adult covered by a large protruding hemispherical plate with numerous rounded to irregular perforations. M. Eocene (Lutetian): France.

Remarks: A lectotype for the type species was designated (Loeblich and Tappan, 1964, ***1910**, p. C680) from Parker and Jones's original material (BMNH P41661).

PAUMOTUA Loeblich, 1952

Plate 596, figs. 11-13

Type species: Eponides terebra Cushman, 1933 (***771**), p. 89; OD.

Paumotua Loeblich, 1952 (*1876), p. 192.

Test trochospiral with about two and a half whorls, planoconvex, spiral side convex, umbilical side flattened and umbilicate, chambers enlarging slowly as added, about nine in the final whorl, sutures flush to slightly depressed, strongly oblique on the spiral side, curved and radial on the umbilical side, periphery subangular; wall calcareous, hyaline, finely perforate, surface smooth; aperture a low interiomarginal arch midway between the umbilicus and periphery, supplementary apertures on the umbilical side consist of one or two rounded to ovate openings per chamber, aligned parallel to the periphery, in line with the primary aperture and progressively larger in later chambers. Holocene; Pacific Ocean: Paumotu Island.

PLANOPULVINULINA Schubert, 1921

Plate 597, figs. 1-10

Type species: Pulvinulina dispansa Brady, 1884 (***344**), p. 687; SD Cushman, 1928 (***747**), p. 273.

Planopulvinulina Schubert, 1921 (*2823), p. 153.

Test probably attached, large and planoconvex, spiral side arched, with few rapidly enlarging chambers, at first trochospirally enrolled, later with more irregular arrangement and chambers of varied size and form, spreading over the attachment surface, sutures depressed, oblique on the spiral side, more nearly radial on the umbilical side; wall calcareous, hyaline, surface strongly tuberculate on the spiral side, the tubercles enlarged on earlier chambers and finer and more widely spaced on the later spreading chambers, wall finely perforate between the tubercles, more extensive perforate area in later chambers; aperture consisting of widely spaced large pores scattered over the umbilical surface and additional openings along the sutures on the umbilical side. Late Tertiary to Holocene; Atlantic.

Remarks: A lectotype was designated and illustrated for *P. dispansa* (Loeblich and Tappan, 1964, ***1910**, p. C683) from among Brady's original syntypes (BMNH ZF 3641, ex ZF2210), from off the coast of Madeira Island.

SESTRONOPHORA Loeblich and Tappan, 1957

Plate 598, figs. 1-11

Type species: Sestronophora arnoldi Loeblich and Tappan, 1957; OD.

Sestronophora Loeblich and Tappan, 1957 (***1897**), p. 229.

Test large, up to 2 mm in diameter, trochospirally coiled and planoconvex, strongly convex spiral side with broad crescentic chambers and thickened, flush, and oblique sutures, somewhat flattened umbilical side with depressed radial sutures around the broad umbilicus that is covered by a series of plates arising from the umbilical margin of each chamber, periphery acute to carinate; wall calcareous, finely perforate, surface smooth; aperture a low slitlike interiomarginal opening on the umbilical side, accompanied by a few supplementary rounded pores near the base of the apertural face, numerous large rounded to irregular accessory openings also pierce the umbilical plate to open into the umbilicus and connect to the various chamber cavities. Pliocene to Pleistocene; USA: California; England.

Remarks: Specimens referred to *Eponides repandus* by Resig (1962, ***2566**) belong instead to *Sestronophora arnoldi* and were obtained from correlative Pleistocene material about 100 km farther south along the California coast from its type locality. *Sestronophora* differs from true *Eponides* in being about twice as large and in having a distinct and wide umbilicus covered by apertural umbilical flaps with accessory openings. Although juvenile specimens may not be distinctive, as in many other taxa, morphologic differences of the adults of *Eponides*, *Poroeponides*, and *Sestronophora* are sufficient to differentiate the three genera.

VONKLEINSMIDIA McCulloch, 1977

Plate 596, figs. 9 and 10

Type species: Vonkleinsmidia elizabethae McCulloch, 1977; OD.

Vonkleinsmidia McCulloch, 1977 (***1961**), p. 366.

Test large, about 3 mm in diameter, low trochospiral coil of few whorls, planoconvex with convex spiral side, seven to eight lunate chambers in the final whorl separated by strongly oblique sutures, umbilical side with strongly sinuate sutures around the open umbilicus, a subtriangular umbilical flap projecting from each chamber, periphery carinate, somewhat elevated on the spiral side; wall calcareous, finely perforate, surface smooth; aperture interiomarginal, extraumbilical, extending somewhat under the umbilical chamber flap, supplementary openings on both sides of the umbilical flap, and numerous smaller sutural openings present along the inner half of the sutures. Holocene: E. Pacific: off California.

Subfamily RECTOEPONIDINAE Saidova, 1981

Rectoeponidinae Saidova, 1981 (***2696**), p. 47.

Early stage trochospirally enrolled, later uncoiling and uniserial, rectilinear and compressed; aperture a terminal slit in the adult, slightly eccentric and offset toward the side of the test that is umbilical in the enrolled portion. Paleocene to U. Eocene.

RECTOEPONIDES Cushman and Bermúdez, 1936

Plate 599, figs. 7-9

Type species: Rectoeponides cubensis Cushman and Bermúdez, 1936; OD.

Rectoeponides Cushman and Bermúdez, 1936 (***804**), p. 31.

Test trochospiral and biconvex in the early stage, periphery carinate, sutures strongly oblique on the spiral side, curved and nearly radial on the opposite side, umbilicus closed, later stage uncoiled and rectilinear, flattened and fusiform in section with broad and low chambers and sinuate and depressed sutures; wall calcareous, finely perforate, surface smooth; aperture subterminal in the adult, an elongate slit set slightly on the umbilical side of the test. Paleocene to U. Eocene; Cuba; Europe.

Family HELENINIDAE, n. fam.

Test in a low trochospiral coil; aperture interiomarginal on the umbilical side and supplementary sutural apertures present on one or both sides. L. Eocene to Holocene.

Type genus: *Helenina* Saunders, 1961.

HELENINA Saunders, 1961

Plate 599, figs. 1-6

Type species: Pseudoeponides anderseni Warren, 1957 (***3351**), p. 39; OD.

Helenina Saunders, 1961 (***2737**), p. 148 (nom. subst. pro *Helenia* Saunders, 1957).

Helenia Saunders, 1957 (***2736**), p. 374 (non *Helenia* Walcott, 1889); type obj.; OD.

Test low trochospiral, both sides flattened, all chambers of the two whorls visible on the flattened spiral side, chambers enlarging gradually, of greater breadth than height, six in the final whorl, sutures curved, oblique, depressed, on the opposite side the somewhat produced umbilical flaps of successive chambers overlap to close the umbilicus, sutures nearly radial, straight to slightly curved, depressed, periphery rounded, peripheral outline slightly lobulate; wall calcareous, finely perforate, surface smooth; aperture an extraumbilical interiomarginal slit, bordered by a lip, supplementary sutural apertural slits present on both sides, those on the umbilical side begin at the back of the umbilical chamber flap and extend nearly to the periphery, and those of the spiral side extend along the intercameral suture but stop a short distance from the periphery at each end. Holocene; Trinidad; USA: Louisiana.

HYDERIA Haque, 1962

Plate 600, figs. 1-3

Type species: Hyderia dubia Haque, 1962; OD.

Hyderia Haque, 1962 (***1421**), p. 23.

Test low trochospiral, spiral side flattened, semi-involute but with part of penultimate whorl visible, umbilical side involute, subglobular chambers enlarging rapidly as added, about four to five in the final whorl, each produced into a broad umbilical flap on the umbilical side, flaps of successive chambers overlapping, sutures gently curved, nearly radial, depressed, periphery broadly rounded, peripheral outline lobulate; wall calcareous, hyaline, coarsely perforate but otherwise smooth; aperture a low interiomarginal slit that opens beneath the umbilical apertural flap, supplementary sutural apertures on both sides produce a sharp notch in the sutures, adjacent to the proximal end of the apertural flap on the umbilical side, and near the midpoint of the sutures on the spiral side. L. Eocene; W. Pakistan.

PSEUDOHELENINA Collins, 1974

Plate 600, figs. 4-6

Type species: Discorbis collinsi Parr, 1932 (***2356**), p. 230; OD.

Pseudohelenina Collins, 1974 (***647**), p. 37.

Test trochospiral, biconvex, all of the two to three whorls visible on the more convex spiral side, chambers enlarging gradually, sutures depressed, oblique and curved back at the periphery, only the six chambers of the final whorl visible and sutures radial and depressed around the deeply indented umbilicus on the flatter umbilical side, the deeply incised sutures giving the appearance of sutural slits around the umbilicus, periphery broadly rounded, peripheral margin lobulate; wall calcareous, hyaline, optically radial, moderately coarsely perforate except for a small clear area on the distal face of the final chamber, surface smooth; primary aperture interiomarginal, umbilical, bordered with a small projecting flap, secondary sutural apertures on the spiral side, subtriangular in outline and extend along the spiral and septal sutures for a short distance, those of early chambers closed secondarily. Pleistocene to Holocene; Australia: Victoria.

Family MISSISSIPPINIDAE Saidova, 1981

Mississippinidae Saidova, 1981 (***2696**), p. 63.

Test in low trochospiral coil, areas of clear shell material paralleling the periphery on one or both sides; primary aperture low and interiomarginal. Eocene to Holocene.

Remarks: Although this family and the included genera previously were placed in the aragonitic Epistominidae, the absence of an internal partition, as well as doubt as to the aragonitic wall, make this assignment unlikely.

Subfamily STOMATORBININAE Saidova, 1981

Stomatorbininae Saidova, 1981 (*2696), p. 63.

Test distinctly trochoid, aperture interiomarginal or areal on the umbilical side. Eocene to Holocene.

SCHLOSSERINA Hagn, 1954

Plate 600, figs. 10-12

Type species: Rosalina asterites Gümbel, 1870 (***1337**), p. 658; OD.

Schlosserina Hagn, 1954 (***1361**), p. 18.

Test trochospiral, biconvex, few chambers per whorl, increasing rapidly in size, final ones somewhat inflated, sutures curved, thickened and elevated on the spiral side, straight and flush to slightly depressed on the umbilical side, periphery carinate; wall calcareous, calcitic, as determined by X-ray powder diffraction film, perforate, surface smooth other than the limbate and elevated sutures, with broad spiralling bands of clear translucent shell material adjacent to the peripheral keel; aperture a low interiomarginal slit at the base of the apertural face, continuing past the umbilicus as a sutural slit at the proximal chamber margin, and large areal pores scattered over the apertural face. Eocene; Europe.

Remarks: As Gümbel's types were lost during World War II, that figured by Hagn from the Eocene of Bavaria was refigured and designated as neotype of *Rosalina asterites* by Loeblich and Tappan (1964, ***1910**, p. C777). Loeblich and Tappan reported that an X-ray determination for *Schlosserina* was dominantly of calcite but with traces of aragonite. Whether the aragonite was of the shell material and the filling of the test was calcite or whether the aragonite was from the filling could not be determined from the available fossil material.

STOMATORBINA Doreen, 1948

Plate 600, figs. 13-15

Type species: Lamarckina torrei Cushman and Bermúdez, 1937 (***806**), p. 21; OD.

Stomatorbina Doreen, 1948 (*971), p. 295.

Test inequally biconvex, in a low trochospiral coil, chambers appearing semilunate and sutures thickened, elevated, curved, and oblique on the spiral side, depressed and nearly radial on the umbilical side, umbilicus wide and shallow, periphery rounded; wall calcareous, finely perforate, thickened by addition of secondary layers over the sutures on the spiral side and on the wall of the umbilical side, the secondary deposition filling the original perforations, surface smooth, with clear bands near the periphery not covered by secondary thickening; aperture a narrow interiomarginal slit partly covered by a triangular umbilical flap, intercameral foramen in earlier chambers corresponds to part of the original aperture, and the umbilical part also may remain open for a few chambers. Eocene to Holocene; Indo-Pacific; Australia; Cuba.

Remarks: The fossil type species was reported to be aragonitic by X-ray determination, but well-preserved Recent *S. concentrica* (Parker and Jones) was determined to be of calcite only (McGowran, 1966, ***1969**, p. 486).

Subfamily MISSISSIPPININAE Saidova, 1981

Mississippininae Saidova, 1981 (***2696**), p. 63.

Test in flattened trochospiral to nearly planispiral coil, clear shell areas adjacent to the periphery on both sides; primary aperture interiomarginal, equatorial. L. Oligocene to Holocene.

MISSISSIPPINA Howe, 1930

Plate 600, figs. 7-9

Type species: Mississippina monsouri Howe, 1930; OD.

Mississippina Howe, 1930 (***1566**), p. 329.

Discopulvinulina (Mississippina) Hofker, 1956 (***1511**), p. 180 (err. nom. transl.).

Test with very low trochospiral to nearly planispiral coiling, biconvex, umbo of thickened shell material on the spiral side, the flatter umbilical side partially evolute, sutures nearly radial, slightly curved, depressed, periphery subacute; wall calcareous, finely perforate throughout with a darker and opaque band just below the peripheral keel on both sides; aperture a narrow interiomarginal slit beginning with an equatorial arch and extending onto the umbilical side along the entire base of the chamber, curving up at the preceding suture, partially covered by a large umbilical flap, flaps of earlier chambers remaining distinct for much of the final whorl before becoming obscured by later shell deposition. L. Oligocene to Holocene; North America; Pacific; Atlantic.

Family BUENINGIIDAE Saidova, 1981

Bueningiidae Loeblich and Tappan, 1982 (*1917), p. 34, nom. transl. ex subfamily Bueningiinae.
Bueningiinae Saidova, 1981 (*2696), p. 45 (subfamily).

Test enrolled, both sides involute; spiral side inflated, umbilical side flattened, with keel and deep umbilicus; aperture umbilical with small lip. L. Miocene to Holocene.

BUENINGIA Finlay, 1939

Plate 601, figs. 1-5

Type species: Bueningia creeki Finlay, 1939; OD.

Bueningia Finlay, 1939 (*1127), p. 122.
Ruttenella Keyzer, 1953 (*1678), p. 279 (non *Ruttenella* van den Bold, 1946); type species: *Ruttenella butonensis* Keyzer, 1953; OD.
Lamarckinita Keyzer, 1955 (*1679), p. 119 (nom. subst. pro *Ruttenella* Keyzer, 1953).

Test small, inflated, both sides involute, umbilical side flattened to concave with deep umbilicus, spiral side convex, four to five inflated chambers per whorl, sutures radial, depressed, periphery broadly rounded, with a thickened to carinate margin on the umbilical side; wall calcareous, hyaline, finely perforate except for the keel, surface smooth; aperture interiomarginal and umbilical, with a small apertural flap. L. Miocene to Holocene; New Zealand; Indonesia; Bikini Atoll.

Family UNGULATELLIDAE Seiglie, 1964

Ungulatellidae Loeblich and Tappan, (nom. transl. herein ex subfamily).
Ungulatellinae Seiglie, 1964 (*2843), p. 509.

Test trochospiral, proloculus followed by undivided tubular chamber of one to two whorls, then with one or two chambers per whorl, or may have two chambers per whorl immediately following the proloculus; aperture a curved or rounded opening at the end of the final chamber. Holocene.

METAPATELLINA McCulloch, 1977

Plate 601, figs. 13-15

Type species: Metapatellina perculta McCulloch, 1977; OD.

Metapatellina McCulloch, 1977 (*1961), p. 281.

Test tiny, up to 0.23 mm in diameter, low conical and trochospiral, early stage with about three chambers per whorl, rapidly decreased to two per whorl, with pairs directly opposed, only the final pair visible on the flattened umbilical side, periphery acute to carinate, the margin turned upward to surround the apex; wall calcareous, coarsely perforate on the spiral side, only the outer area of the chambers perforate on the umbilical side, surface of later chambers on spiral side with prominent spines arising from the peripheral flange and projecting upward at various angles, up to eight or nine from a single chamber; aperture interiomarginal on the umbilical side, with a bordering umbilical flange that projects downward into the opening, and with a strongly produced anterior margin that forms a coil terminally directed toward the periphery. Holocene; E. Pacific: off Mexico, at 369 m.

UNGULATELLA Cushman, 1931

Plate 601, figs. 6 and 7

Type species: Ungulatella pacifica Cushman, 1931; OD.

Ungulatella Cushman, 1931 (*759), p. 81.

Test elongate, high spired, with nearly parallel sides, conical proloculus followed by trochospirally enrolled chambers, each a full whorl in length but with distal margin overlapping the proximal one, and not rectilinear, sutures oblique, flush to slightly depressed, visible from the side toward which the aperture is directed; wall calcareous, coarsely perforate, outer wall surface with tiny pustules except for the clear, smooth, and polished apertural face; aperture a recurved slit extending toward the center of the distal end, at the termination of the final chamber, somewhat resembling the *S*-shaped opening of the Patellinidae. Holocene; Pacific.

UNGULATELLOIDES Seiglie, 1964

Plate 601, figs. 8-12

Type species: Ungulatelloides imperialis Seiglie, 1964; OD.

Ungulatelloides Seiglie, 1964 (***2843**), p. 509.

Test tiny, up to 0.14 mm in diameter, low conical and trochospiral, all chambers visible from the spiral side, only the last pair visible on the umbilical side, proloculus with basal funnel-like projection, followed by undivided spiral chamber of one or two whorls, and then by two chambers per whorl, the last pair with a recurved peripheral carina; wall calcareous, hyaline, transparent, finely perforate, surface smooth other than the marginal carina that commonly has peripheral spinose projections; aperture a broad arched slit on the umbilical side of the final chamber. Holocene; Caribbean: off Venezuela.

Family PEGIDIIDAE Heron-Allen and Earland, 1928

Pegidiidae Cushman, 1933 (***766**), p. 243 (nom. corr.).
Pegididae Heron-Allen and Earland, 1928 (***1475**), p. 288 (nom. imperf.).
Pegidiinae Chapman and Parr, 1936 (***542**), p. 144 (subfamily).
Pegidiida Copeland, 1956 (***680**), p. 188 (err. emend.).

Test trochospirally derived, chambers few, each successive one opposed to or partially enveloping the preceding, early chambers resorbed with growth; aperture a series of tubes that pierce the umbilical wall. Miocene to Holocene.

PEGIDIA Heron-Allen and Earland, 1928

Plate 602, figs. 7-9

Type species: Rotalia dubia d'Orbigny, in Fornasini, 1908 (***1156**), p. 46, pl. 1, fig. 14, validated by publication of d'Orbigny's plates (syn.: *Rotalia dubia* d'Orbigny, 1826 (***2303**), p. 274, name not available, ICZN Art. 12 (a), no description; and *Pegidia papillata* Heron-Allen and Earland, in Heron-Allen and Barnard, 1918 (***1465**), p. 90, name not available, ICZN Art. 12 (a), no description); OD.

Pegidia Heron-Allen and Earland, 1928 (***1475**), p. 290.
Pegidia Heron-Allen and Earland, in Heron-Allen and Barnard, 1918 (***1465**), p. 90 (name not available, ICZN Art. 12 (a), no description).

Test planoconvex to inequally biconvex, reduced trochospiral of two chambers per whorl, rapidly enlarging as added, spiral side domed, umbilical side flattened, periphery with broad thick carina; wall calcareous, thick, finely perforate, optically radial, spiral side strongly tuberculate, umbilical side smooth; aperture consisting of openings of tubular canals along the sutures on the umbilical side. Miocene to Holocene; Indian Ocean: Mauritius, Kerimba Archipelago; W. Pacific Ocean: Caroline Islands, Ifalik Atoll.

SIPHONIDIA Seiglie, 1965

Plate 602, figs. 1-6

Type species: Siphonidia aurantiata Seiglie, 1965 (also as *aurantiaca* on p. 12); OD.

Siphonidia Seiglie, 1965 (***2848**), p. 12.

Test small, up to 0.2 mm in diameter, globose, trochospiral or possibly streptospiral, with few chambers, rapidly increasing in size and strongly overlapping, sutures slightly depressed; wall calcareous, perforate, optically radial, surface smooth; aperture multiple, of a few large rounded pores bordered by a prominent lip, generally covered by an irregular bullalike structure that has infralaminal openings. Holocene; Caribbean: off Venezuela.

SPHAERIDIA Heron-Allen and Earland, 1928

Plate 601, figs. 16-19

Type species: Sphaeridia papillata Heron-Allen and Earland, 1928; OD.

Sphaeridia Heron-Allen and Earland, 1928 (***1475**), p. 294.

Test globular, up to 0.85 mm in diameter, three to four rapidly enlarging and strongly enveloping chambers, two per whorl, septa probably resorbed internally as new chambers form, umbilical region filled by large solid plug that occupies about one-fourth the test surface and is perforated by vertical, tubular, and bifurcating canals; wall calcareous, thick, optically radial, perforate, surface with beads or pustules of clear calcite; aperture consisting of the pores at the ends of the tubular canals. Holocene; Indian Ocean: Kerimba Archipelago; Mauritius.

Family DISCORBIDAE Ehrenberg, 1838

Discorbidae Glaessner, 1945 (*1250), p. 145, nom. corr. pro family Discorbina.

Discorbina Ehrenberg, 1838 (*1053), p. 200.

Cyclospiridae Eimer and Fickert, 1899 (*1088), p. 630 (invalid, ICZN Art. 39; based on *Cyclospira* Eimer and Fickert, 1899, non *Cyclospira* Hall and Clarke, 1894).

Discorbininae Schubert, 1921 (*2823), p. 156 (subfamily).

Discorbisinae Cushman, 1927 (*742), p. 75 (subfamily, nom. transl.).

Discorbinae Galloway, 1933 (*1205), p. 285 (subfamily, nom. corr. pro Discorbisinae).

Discorbinidae Hofker, 1954 (*1505), p. 167 (nom. transl. ex subfamily Discorbininae).

Discorbiinae Hornibrook, 1961 (*1539), p. 97 (subfamily).

Discorbisidae Margerie, Deroo, and Sigal, 1966 (*2029), p. 1550.

Test a low trochospiral, chamber interior subdivided by paries proximus; aperture umbilical, with distinct flap extending over the umbilical region, may have additional openings at opposite end of the flaps. M. Eocene to Holocene.

DISCONORBIS Sellier de Civrieux, 1977

Plate 602, figs. 10-15

Type species: Discorbis bulbosus F. L. Parker, 1954 (*2340), p. 523; OD.

Disconorbis Sellier de Civrieux, 1977 (*2866), p. 16.

Test tiny, concavoconvex, in a high trochospiral coil with strongly convex and evolute spiral side, few inflated chambers per whorl, interior not described, umbilical margin of chambers partially extending into the umbilicus as a narrow flap, sutures depressed, gently curved and slightly oblique on the spiral side, nearly radial on the concave involute umbilical side, umbilicus open, periphery broadly rounded, peripheral outline lobulate; wall calcareous, regularly perforate, but portions of the chambers adjacent to the umbilicus may be nearly imperforate, surface smooth; aperture interiomarginal and extraumbilical with prominent bordering lip. Holocene; Gulf of Mexico; Caribbean.

DISCORBIS Lamarck, 1804

Plate 603, figs. 1-5

Type species: Discorbites vesicularis Lamarck, 1804; OD(M).

Discorbis Lamarck, 1804 (*1776), p. 182.

Discorbites Lamarck, 1804 (*1776), p. 182; type species: obj., OD(M).

Cyclodiscus Ehrenberg, 1839 (*1054), chart opp. p. 120 (err. nom. subst. pro *Discorbis*); type species: obj.

Test trochospiral, planoconvex to inequally biconvex with flattened umbilical side, about two and a half whorls, seven to ten chambers in the final whorl, sutures curved and nearly radial, depressed, periphery rounded to subangular, a triangular alar projection or flap extends from the umbilical margin of each chamber over the umbilical region, forming a small chamberlet beneath, successive flaps may fuse in the central region, internally an imperforate proximal wall (paries proximus) within the chamber adheres to the septum peripherally, expanding as a lobe toward the chamber base where it may or may not attach to the chamber floor, separating the foramen into two parts, the more peripheral in position communicating with the preceding chamber, and the umbilicalmost one opening into the chamber extension beneath the alar projection; wall calcareous, thin, optically radial, finely to coarsely perforate, surface smooth; aperture a low, interiomarginal, extraumbilical arch, a secondary opening at the posterior margin of the umbilical flap leading into the chamberlet and remaining open as new chambers are formed. Eocene to Holocene; cosmopolitan.

NEODISCORBINELLA McCulloch, 1977

Plate 603, figs. 6-11

Type species: Neodiscorbinella circinata McCulloch, 1977; OD.

Neodiscorbinella McCulloch, 1977 (*1961), p. 300.

Discorbinita McCulloch, 1977 (*1961), p. 299; type species: *Discorbinita operosa* McCulloch, 1977; OD.

Test ovate to auriculate in outline, spiral side weakly convex, umbilical side flat to concave, low trochospiral coil of one to one and a half whorls of rapidly enlarging chambers, four to four and a half chambers in the final whorl, an umbilical flap projecting from the margin of each chamber into the open umbilicus, curved and nearly flush sutures may grade imperceptably into the peripheral keel; wall calcareous, hyaline, translucent, distinctly perforate but with imperforate carina; aperture in a small looplike reentrant of the umbilical margin of the final chamber, those of earlier chambers remaining open into the umbilicus. Holocene; Mexico: Guadalupe Island, Fraile Bay, Gulf of California; USA: San Clemente Island, California.

NEOEPONIDES Reiss, 1960

Plate 604, figs. 1-6; plate 605, figs. 1-7

Type species: Rotalina schreibersii d'Orbigny, 1846 (***2309**), p. 154; OD.

Neoeponides Reiss, 1960 (***2560**), p. 17.

Cyclospira Eimer and Fickert, 1899 (***1088**), p. 702 (non *Cyclospira* Hall and Clarke, 1894); type species: *Rotalina schreibersii* d'Orbigny, 1846; OD(M).

Rotorbis Sellier de Civrieux, 1977 (***2866**), p. 31; type species: *Rosalina auberi* d'Orbigny, 1839 (***2304**), p. 94 (as *auberii*); (syn.: *Discorbis mira* Cushman, 1922, ***721**, p. 39); OD.

Test a relatively high trochospiral coil, with two and a half to three whorls, periphery angular to carinate, chambers broad, low, and crescentic and sutures strongly oblique on the elevated spiral side, chambers wedgelike and sutures radial and deeply depressed on the flat to slightly convex umbilical side, with internal paries proximus attached to the chamber floor, extending back to attach against wall of preceding chamber and also extending laterally to the umbilical chamber wall, thereby completely isolating a foliar chamberlet in each chamber beneath an umbilical prolongation or folium from the outer wall, a hooklike forward part resembling that of *Trochulina* and successive foliar chamberlets forming a stellate pattern around the umbilicus, externally reflected by a prominent sutural notch in young tests, in older individuals the foliar extensions may fuse to form a solid umbilical area; wall calcareous, thick, optically radial, both sides distinctly perforate but pores later filled by secondary lamination over the umbonal region of the spiral side, surface smooth, other than the elevated sutures on the spiral side and a few pustules near the umbilicus on the umbilical side; aperture interiomarginal, extraumbilical, with narrow bordering lip or crescentic flap. Miocene to Holocene; cosmopolitan.

Remarks: Topotype specimens of *Neoeponides schreibersii* show the stellate pattern around the umbilicus given in the original figures and represent foliar chamberlets rather than thickening of the sutures as stated by Reiss (1960). These specimens also appear similar in all important respects to *Rosalina auberi* d'Orbigny, the type species of *Rotorbis*, and to *Discorbis mira* Cushman as described by Levy et al. (1980, ***1839**, p. 73), hence *Rotorbis* is regarded as a synonym of *Neoeponides*.

ORBITINA Sellier de Civrieux, 1977

Plate 603, figs. 12-17

Type species: Orbitina carinata Sellier de Civrieux, 1977; OD.

Orbitina Sellier de Civrieux, 1977 (***2866**), p. 28.

Crouchina McCulloch, 1977 (***1961**), p. 296; type species: *Crouchina taguscovensis* McCulloch, 1977; OD.

Test planoconvex, low trochospiral, circular in outline, chambers very broad, low, and crescentic and sutures strongly oblique, slightly curved, and elevated on the convex spiral side, sutures curved and slightly depressed on the flattened to concave umbilical side, with triangular umbilical flap or folium from each chamber surrounding the small open umbilicus and forming small foliar chamberlets, periphery subacute, carinate; wall calcareous, hyaline, translucent, spiral side very finely perforate but perforations imperceptible on the umbilical side, surface smooth other than the elevated sutures and keel on the spiral side; primary aperture interiomarginal, extraumbilical, anterior to the folium, with secondary sutural apertures at the posterior side of the folium. Holocene; Caribbean; E. Pacific: off Galapagos Islands.

Remarks: *Orbitina* is retained in the Discorbidae, as the external appearance strongly suggests the presence of an internal paries proximus that produces the foliar chamberlets, although the internal structure has not been described as yet.

SCHAFERINA McCulloch, 1977

Plate 606, figs. 1-3

Type species: Schaferina annamaryae McCulloch, 1977; OD.

Schaferina McCulloch, 1977 (***1961**), p. 316.

Test small, inflated, biconvex but central part of umbilical side excavated, trochospiral with about two and a half whorls, chambers enlarging rapidly, five per whorl, sutures depressed, curved back toward the periphery on the spiral side, nearly radial on the umbilical side, umbilicus closed, periphery rounded, outline lobulate; wall calcareous, distinctly perforate, surface smooth; aperture interiomarginal, extraumbilical to umbilical, bordered by a straight narrow lip, the slightly projecting lips of previous chambers remaining visible around the umbilical region. Holocene; Galapagos: Tower Island (Genovesa), at 350 m.

Remarks: Apparently only a single specimen is known. The final chamber of the holotype is somewhat displaced to the umbilical side.

SPINODISCORBIS S. H. Taylor, 1986

Plate 606, figs. 4-7

Type species: Spinodiscorbis tasmanensis S. H. Taylor, 1986; OD.

Spinodiscorbis S. H. Taylor, 1986 (***3131**), p. 71.

Test in low trochospiral coil, planoconvex to inequally biconvex, spiral side flattened and evolute, chambers inflated on nearly involute umbilical side, six to seven chambers in the final whorl, umbilical border of the chamber provided with a subtriangular umbilical flap, sutures radial, gently curved, depressed, periphery prominently carinate, the keel grading into spinose projections that become more numerous and compound on later chambers; wall calcareous, optically radial, coarsely perforate on the spiral side, extremely finely perforate on the umbilical side, peripheral keel and spinose projections imperforate; aperture interiomarginal, equatorial but extending farther onto the umbilical side, bordered by a prominent lip that is continuous with the umbilical flap, portion of aperture at the proximal margin of the flap may remain open as relict apertures for much of the final whorl. U. Pliocene to M. Pleistocene; S. Pacific: Tasman Sea.

STREBLOIDES Bermúdez and Seiglie, 1963

Plate 608, figs. 1-5

Type species: Discorbis advena Cushman, 1922 (***721**), p. 40; OD.

Strebloides Bermúdez and Seiglie, 1963 (***212**), p. 166.

Test low trochospiral of two to three whorls, early chambers subglobular, later ones crescentic and sutures depressed and oblique as seen from the spiral side, only the five to six chambers of the final whorl visible on the flattened to concave umbilical side, umbilical flap from each chamber may be terminally expanded and those of successive chambers may somewhat overlap, sutures straight and radial but bend sharply at the margin of the umbilical chamber flap, umbilicus open, periphery rounded, outline lobulate; wall calcareous, thin, translucent, very finely perforate, surface smooth; aperture a narrow interiomarginal opening on the umbilical side. Holocene; USA: Florida; Venezuela; Trinidad.

Remarks: Separated from "*Streblus*" (= *Ammonia*) because of the absence of umbilical pillars, the present genus does not appear closely related to the Rotaliidae and is here transferred to the Discorbidae. The specimen from Dry Tortugas, Florida, illustrated by Cushman (1931, ***761**, pl. 2 fig. 8, USNM Cushman Coll. 2663), is here designated as lectotype of *Strebloides advenus* (Cushman).

TROCHULINA d'Orbigny, 1839

Plate 607, figs. 1-13

Type species: Rotalia turbo d'Orbigny, 1826 (***2303**), p. 274, Modèles, no. 73; SD(SM) Bassett, 1885 (***158**), p. 162.

Trochulina d'Orbigny, in Ehrenberg, 1839 (***1054**), chart opp. p. 120.

Rotalia (les Trochulines) d'Orbigny, 1826 (***2309**), p. 274 (not available, ICZN Art. 11 (b)(i); 11 (g); vernacular).

Discorbina Parker and Jones, in Carpenter et al., 1862 (***494**), p. 200, 203; type species: *Rotalia turbo* d'Orbigny, 1826 (***2303**), p. 274; OD.

Rotorbinella Bandy, 1944 (***114**), p. 372; type species: *Rotorbinella colliculus* Bandy, 1944; OD.

Lamellodiscorbis Bermúdez, 1952 (***205**), p. 39; type species: *Discorbis dimidiata* Jones and Parker, in Carpenter et al., 1862 (***494**), p. 201; OD.

Rotorbinella (Discorbina) Hofker, 1970 (***1519**), p. 37 (nom. transl.).

Test trochospiral, biconvex to planoconvex, chambers slightly inflated, sutures moderately oblique on the spiral side, curved and radial on the umbilical side, foliar extension at the umbilical margin of the chamber, umbilicus filled with one to three large granules or plugs that may fuse with the folium, periphery angular, interior with paries proximus as an arched plate that attaches to the chamber floor and extends both forward and backward to produce a foliar chamberlet at the umbilical margin, dividing the septal foramen into one part that communicates with the main chamber cavity and a second part that opens into the foliar chamberlet; primary aperture interiomarginal, extending from the umbilicus to the peripheral carina, secondary aperture on the umbilical side near the base of the folium, allowing the foliar chamberlet to communicate with the exterior, in species that do not have a completely isolated foliar chamberlet, the secondary aperture may also communicate with the adjacent chamber in front of the paries proximus. M. Eocene to Holocene; cosmopolitan.

Family ROSALINIDAE Reiss, 1963

Rosalinidae Reiss, 1963 (*2561), p. 65.
Rosalininae Reiss, 1963 (*2561), p. 65 (subfamily).

Test trochospiral, may have closed umbilicus or umbonal boss, chamber interior simple; aperture a low arch at the base of the final chamber on the umbilical side. Eocene to Holocene.

GAVELINOPSIS Hofker, 1951

Plate 608, figs. 6-12

Type species: Discorbina praegeri Heron-Allen and Earland, 1913 (***1470**), p. 122; OD.

Gavelinopsis Hofker, 1951 (***1498**), p. 485.
Gavelinopsis Hofker, 1951 (***1500**), p. 359 (name not available, ICZN Art. 13 (a)(i), no description).

Test planoconvex to inequally biconvex, trochospiral, with about two and a half slowly enlarging whorls, on the evolute and convex spiral side chambers are low and crescentic and sutures thickened and flush, whereas on the involute umbilical side the chambers appear subtriangular and sutures radial and depressed around an umbilical plug, chamber interior simple and undivided, periphery carinate; wall calcareous, hyaline, very finely perforate on the umbilical side, no pores visible on the spiral side at × 3000 magnification; aperture a low interiomarginal extraumbilical slit on the umbilical side, surrounded by a narrow lip that is interrupted only at the umbilical margin, adjacent to a narrow and short umbilical flap or folium, a slight notch in earlier sutures reflecting the posterior end of the folium of successive chambers. Oligocene to Holocene; cosmopolitan.

NEOCONORBINA Hofker, 1951

Plate 609, figs. 8-10

Type species: Rosalina orbicularis Terquem, 1876 (***3144**), p. 75 (non *Rosalina orbicularis* d'Orbigny, 1850) = *Discorbina terquemi* Rzehak, 1888 (***2679**), p. 228; OD.

Neoconorbina Hofker, 1951 (***1500**), p. 357.
Rosalina (Neoconorbina) Haynes, 1973 (***1436**), p. 158 (nom. transl.).

Test circular in outline, low conical trochospiral, spiral side convex with all of the three whorls visible, chambers increasing rapidly in breadth from an early subglobular form to become very low and crescentic, final chamber occupying most of the periphery, umbilical side flat to concave, exposing only the three to four chambers of the final whorl around the open umbilicus, umbilical extension from the chambers forms a triangular to platelike folium, sutures curved, strongly oblique on both sides, periphery acutely angled to carinate; wall of calcite, by X-ray powder diffraction film, finely and densely perforate on the spiral side, more coarsely perforate on the umbilical side, surface smooth; aperture at the umbilical margin of the chamber, beneath the folium, with a reentrant at both anterior and posterior margins of the folium. Holocene; cosmopolitan.

Remarks: The columnar toothplate described by Hofker and others in the type species appears to be only a remnant of the forward wall of the chamber where it attaches to the wall of the preceding whorl and not a separate structure. As the original types are not extant, a neotype (MNHN, Paris, no. FG 449) was selected for the type species from Dunkerque, France (Lévy et al., 1975, ***1838**, p. 174).

PLANODISCORBIS Bermúdez, 1952

Plate 609, figs. 11-16

Type species: Discorbina rarescens Brady, 1885 (***344**), p. 651; OD.

Planodiscorbis Bermúdez, 1952 (***205**), p. 651.

Planodiscorbita McCulloch, 1977 (*1961), p. 311; type species: *Planodiscorbita wenmanensis* McCulloch, 1977; OD.

Test planoconvex to concavoconvex, trochospiral, chambers broad, low, and crescentic and all visible on the flat to concave spiral side, subtriangular and strongly overlapping on the gently convex umbilical side, sutures of early chambers thickened and flush, later ones depressed, strongly oblique on the spiral side, curved and nearly radial on the umbilical side, umbilicus closed, periphery carinate; wall calcareous, surface smooth; aperture a low interiomarginal arch in a slight reentrant at the base of the final chamber midway between the umbilicus and periphery on the flattened spiral side. Holocene; Pacific Ocean.

Remarks: A lectotype for Brady's species (BMNH, ZF3648) was designated from Challenger Station 185 by Loeblich and Tappan (1964, *1910, p. C584, fig. 458, 3).

PSEUDOPATELLINOIDES
Krasheninnikov, 1958

Plate 609, figs. 1–4

Type species: Pseudopatellinoides primus Krasheninnikov, 1958; OD.

Pseudopatellinoides Krasheninnikov, 1958 (*1728), p. 241.

Test small, coiled in a high conical trochospiral, spiral side convex, umbilical side flattened and centrally umbilicate, chambers few per whorl, broad, low, and crescentic on the spiral side, only the three of the final whorl visible on the umbilical side, enlarging gradually, sutures curved, oblique and limbate on the spiral side, depressed on the umbilical side, periphery angular and carinate; wall calcareous, optically radial, hyaline, finely perforate; aperture an interiomarginal umbilical arch, forming a reentrant on the basal suture of the final chamber. M. Miocene (U. Tortonian); USSR.

ROSALINA d'Orbigny, 1826

Plate 610, figs. 1–5; plate 611, figs. 1–6

Type species: Rosalina globularis d'Orbigny, 1826; SD Galloway and Wissler, 1927 (*1209), p. 62.

Rosalina d'Orbigny, 1826 (*2303), p. 271.

Turbinolina d'Orbigny, 1839 (*2304), p. 89; type species: obj.; SD Loeblich and Tappan, 1964 (*1910), p. C584.

Pararosalina McCulloch, 1977 (*1961), p. 335; type species: *Pararosalina densitiva* McCulloch, 1977 (also as *densativa* on p. 335, 820, 822); OD.

Test trochospiral, planoconvex to concavoconvex, all of the rapidly enlarging chambers visible on the convex spiral side where the depressed sutures are oblique and curved back at the periphery, on the umbilical side chambers are subtriangular and strongly overlapping, the final chamber occupying about one-third of the circumference, sutures strongly curved, umbilicus open, bordered by a triangular umbilical flap or folium from each chamber of the final whorl, chamber interior simple and undivided, periphery subacute; wall calcareous, with organic inner lining, distinctly perforate, surface smooth; aperture a low interiomarginal arch near the periphery on the umbilical side, with narrow bordering lip, separated by the umbilical folium from a small secondary opening at the preceding suture on the opposite margin, other secondary openings of the final whorl remain open. Eocene to Holocene; cosmopolitan.

ROTORBOIDES Sellier de Civrieux, 1977

Plate 609, figs. 5–7

Type species: Discorbina valvulata (d'Orbigny) var. *granulosa* Heron-Allen and Earland, 1915 (*1472), p. 695; OD.

Rotorboides Sellier de Civrieux, 1977 (*2866), p. 34.

Test trochospiral and planoconvex, periphery broadly rounded, about six to nine chambers in the final whorl, crescentic and with strongly oblique sutures on the spiral side, chambers subtriangular and sutures radial and deeply incised on the umbilical side where each chamber has a triangular folium that extends into the umbilical area, folia of successive chambers fuse to form an umbilical plate that is solid or has only rare perforations, margin of the folium of earlier chambers reflected by a sutural notch, chambers without internal structure; wall calcareous, coarsely perforate on the spiral side, but imperforate adjacent to the sutures, umbilical side imperforate and smooth; aperture an interiomarginal extraumbilical arch, extending nearly to the periphery. Holocene: Atlantic; Pacific: Indian Ocean.

SEMIROSALINA Hornibrook, 1961

Plate 611, figs. 7-9

Type species: Semirosalina inflata Hornibrook, 1961; OD.

Semirosalina Hornibrook, 1961 (*1539), p. 103.

Test small, with trochospiral coil of few whorls and few subglobular chambers per whorl; wall thin, finely perforate; aperture at the umbilical margin of the excavated apertural face, leading into the open umbilicus, partially covered by a broad apertural flap and bordered by a thickened lip. L. Miocene; New Zealand.

Remarks: Differs from *Rosalina* in the smaller size, fewer chambers, inflated rather than flattened test, excavated apertural face, and in only the final aperture opening into the umbilical region rather than having relict umbilical openings from all chambers of the final whorl.

SPIRORBINA Sellier de Civrieux, 1977

Plate 611, figs. 10-12

Type species: Spirorbina simplex Sellier de Civrieux, 1977; OD.

Spirorbina Sellier de Civrieux, 1977 (*2866), p. 35.

Test planoconvex and low trochospiral, spiral side weakly convex, evolute, about two and a half whorls of broad and low semilunate chambers, six in the final whorl, sutures curved, oblique, flush and obscure, final one or two may be slightly depressed, umbilical side flat, partially involute but with much of the penultimate whorl visible in the umbilical region, sutures curved and oblique, flush, obscure, periphery subacute to rounded, noncarinate, peripheral outline circular to ovoid, nonlobulate; wall calcareous, translucent, finely perforate on the spiral side, umbilical side imperforate or with one to a few large pores commonly aligned parallel to the intercameral sutures near the midline of the chambers; aperture a low slit extending from near the periphery along the umbilical chamber margin to the preceding suture and continuing along the spiral suture for much of the final whorl. Holocene: Caribbean Sea, off Venezuela, at 35 m to 45 m.

TRETOMPHALOIDES Banner, Pereira, and Desai, 1985

Plate 613, figs. 1-6

Type species: Discorbina concinna Brady, 1884 (*344), p. 646; OD.

Neoconorbina (Tretomphaloides) Banner, Pereira, and Desai, 1985 (*131), p. 646.

Test with early stage as in *Neoconorbina*, but planktonic gamont generation provided with a globular float chamber over the partially resorbed ventral walls of the spiral stage, balloon chamber with perforate wall and with multiple rimmed apertures in the polar region, imperforate walled inner float chamber fused to the remaining rims of the enrolled chambers and traversed by a broad central tube that extends from the umbilicus of the trochospiral test to the cribrate aperture of the balloon chamber. Holocene: Indian Ocean; Pacific Ocean.

Remarks: Differs from *Tretomphalus* in the early neoconorbine stage, and the extensive internal tube completely traversing the float chamber from the umbilicus of the spiral chambers to the large pores of the balloon chamber. The lectotype of *Discorbina concinna* is from 620 fathoms off Tahiti, Challenger Station 279C, ex BMNH no. 1390.

TRETOMPHALUS Möbius, 1880

Plate 612, figs. 1-11

Type species: Rosalina bulloides d'Orbigny, 1839 (*2304), p. 98; OD(M).

Tretomphalus Möbius, 1880 (*2157), p. 67, 99.

Rosalina (Tretomphalus) Banner, Pereira, and Desai, 1985 (*131), p. 162 (nom. transl.).

Early stage as in *Rosalina* but with benthic microspheric and megalospheric generations alternating with a planktonic megalospheric generation that adds a large and complex globular double-walled float chamber over the resorbed chamber walls of the umbilical side just prior to gamogony, inner float chamber imperforate and fused to the imperforate margins of the spiralling chambers, a short narrow internal tube opening inward into the float chamber and at the opposite end leads into the space beneath the outer balloon chamber, wall of outer balloon chamber perforate, with numerous rounded and rimmed openings scattered in the polar region above the tubular opening of the float chamber; equally biflagellate gametes are produced in the space between the float and balloon chambers and released through the pores of the terminal face, as the pseudopodia of the pelagic parents maintain their tests in contact. Miocene to Holocene: tropical to temperate waters.

Remarks: Sellier de Civrieux (1976, ***2865**, p. 181) and Rückert-Hilbig (1983, ***2666**, p. 42) regarded the type species of *Tretomphalus* as congeneric with *Rosalina squammosa* d'Orbigny and *Tretomphalus* as a senior synonym of *Cymbaloporetta*. However, the neotype of *R. bulloides* (BMNH ZF 4369) designated by Banner et al. (1985, ***131**, p. 164) from plankton off Barbuda, Leeward Islands, Atlantic Ocean, fixes *Tretomphalus* as having an early stage like *Rosalina* and as distinct from *Cymbaloporetta*.

Family PANNELLAINIDAE Loeblich and Tappan, 1984

Pannellainidae Loeblich and Tappan, 1984 (***1918**), p. 48.

Test a low trochospiral, chambers of successive whorls aligned so that septal ridges extend from the apex to the periphery on the spiral side. Oligocene to Holocene.

PANNELLAINA Seiglie and Bermúdez, 1976

Plate 614, figs. 1-8

Type species: Discorbis byramensis Cushman, 1922 (***719**), p. 96; OD.

Pannellaina Seiglie and Bermúdez, 1976 (***2856**), p. 291 (nom. subst. pro *Fastigiella* Seiglie and Bermúdez, 1965).
Fastigiella Seiglie and Bermúdez, 1965 (***2853**), p. 51 (non *Fastigiella* Reeve, 1848); type species: obj.; OD.

Test tiny, planoconvex, with five or six low trochospiral whorls of seven to nine chambers each, chambers very broad and low as seen on the strongly convex spiral side, aligned with those of the preceding whorl and appearing triangular, with straight and radial sutures around the depressed umbilicus on the umbilical side, spiral suture flush, septal sutures strongly elevated and costate on the spiral side, depressed on the umbilical side and bordered on each side by an elevated poreless margin, periphery sharply angled; wall calcareous, thickened, and with smooth poreless surface between the carinate radial sutures on the spiral side, surface on the umbilical side appearing finely microreticulate with a few scattered pores; aperture obscure. Oligocene to Holocene; USA: Mississippi; Sahul Shelf, Northwest Australia.

Family BRONNIMANNIIDAE Loeblich and Tappan, 1984

Bronnimanniidae Loeblich and Tappan, 1984 (***1918**), p. 48.
Bronnimanniidae Loeblich and Tappan, 1982 (***1917**), p. 34 (name not available, ICZN Art. 13 (a)(i), no description).

Test very low trochospiral to planispiral, bievolute and biconcave with broad truncate periphery; wall hyaline, perforate, optically radiate; aperture on umbilical side associated with umbilical flap, the flaps of previous chambers of the final whorl remaining visible. Miocene to Holocene.

BRONNIMANNIA Bermúdez, 1952

Plate 613, figs. 7-13

Type species: Discorbis palmerae Bermúdez, 1935 (***193**), p. 207; OD.

Bronnimannia Bermúdez, 1952 (***205**), p. 39.
Neobronnimannia McCulloch, 1977 (***1961**), p. 287; type species: *Neobronnimannia compacta* McCulloch, 1977; OD.

Test auriculate in outline, very low trochospiral to planispiral, whorls enlarging rapidly and test somewhat flared, bievolute and biconcave with broadly truncate periphery marked by a sharp angle at the spiral margin and by a distinct keel at the margin of the umbilical side, chambers increasing more rapidly in breadth than height, sutures curved and depressed on both sides, with a sinuate curve resulting from a proximally directed sutural bend at the peripheral angle; wall calcareous, hyaline, optically radial, umbilical side finely perforate, spiral side more coarsely perforate, surface smooth other than the elevated keel that remains as a continuous imperforate spiral suture visible on all whorls of the umbilical side; aperture a low, interiomarginal slit beneath the umbilical flap or folium, posterior margin of folium marked by a distinct notch, both folium and notch remaining evident on most chambers of the final whorl. ?Oligocene, Miocene to Holocene; Gulf of Mexico; Atlantic; Pacific.

Family ROTALIELLIDAE Loeblich and Tappan, 1964

Rotaliellidae Loeblich and Tappan, 1964 (*1910), p. C604.
Rotaliellinae Saidova, 1981 (*2696), p. 54 (subfamily).

Test trochospiral, with few crescentic to subglobular chambers; aperture umbilical with small bordering toothlike umbilical projections. Holocene.

METAROTALIELLA Grell, 1962

Plate 616, figs. 1-5

Type species: Metarotaliella parva Grell, 1962; OD(M).

Metarotaliella Grell, 1962 (*1297), p. 214.

Test tiny, up to 0.09 mm in diameter, about one and a half trochospiral whorls and four to five inflated chambers in the final whorl, sutures curved and depressed on the convex spiral side, radial on the umbilical side, with wide and open umbilicus; wall calcareous, weakly calcified, perforate, and smooth to finely pitted on the spiral side, umbilical side imperforate and smooth except for two to three radial creases in each chamber adjacent to the umbilicus; aperture umbilical, bordered on either side by small projections that rim the umbilicus; heterocaryotic, with one vegetative and three reproductive nuclei, sexual reproduction plastogamic with amoeboid gametes, obligately from different parents. Holocene; France; USA: Georgia.

ROTALIELLA Grell, 1954

Plate 615, figs. 1-8

Type species: Rotaliella heterocaryotica Grell, 1954; OD.

Rotaliella Grell, 1954 (*1294), p. 269.

Test tiny, to 0.06 mm in diameter, trochospiral with about one and a half whorls, oval proloculus followed by smaller hourglasslike second chamber, and later inflated chambers, three to four in the final whorl, chambers appearing hemispherical on the spiral side, globular on the umbilical side, sutures depressed, periphery broadly rounded, peripheral margin lobulate; wall calcareous, very thin, hyaline, finely perforate, optically radial, surface smooth; aperture umbilical in position, with denticulate umbilical margin; living specimens with few thin pseudopodia, heterokaryotic agamont with single vegetative nucleus and three generative nuclei, asexual reproduction producing twelve embryonic gamonts, adult gamont mononucleate, producing ten to twenty-four amoeboid gametes, those of a single parent may fuse in autogamy. Holocene: Yugoslavia; France.

Family SPHAEROIDINIDAE Cushman, 1927

Sphaeroidinidae Loeblich and Tappan, 1961 (*1902), p. 300, nom. transl. ex subfamily Sphaeroidininae.
Sphaeroidininae Cushman, 1927 (*742), p. 86 (subfamily).

Test with strongly embracing chambers variously enrolled; aperture an arched slit just above the base of the chamber, giving the appearance of a flaplike tooth, or primary aperture may be absent in adult and replaced by a series of sutural supplementary openings. U. Cretaceous (Maastrichtian) to Holocene.

PULLENOIDES Hofker, 1951

Plate 616, figs. 6-10

Type species: Pullenoides senoniensis Hofker, 1951; OD.

Pullenoides Hofker, 1951 (*1499), p. 10.

Test subglobular, rounded chambers trochospirally coiled in the early stage, later tending to become planispiral, strongly embracing with only three or even two chambers visible in the adult, sutures depressed; wall calcareous, opaque, very finely perforate, surface smooth, microstructure unknown; aperture a looplike opening in the early stage, later with numerous small supplementary sutural openings. U. Cretaceous (Maastrichtian); Netherlands.

SPHAEROIDINA d'Orbigny, 1826

Plate 617, figs. 1-6

Type species: Sphaeroidina bulloides d'Orbigny, 1826; OD(M).

Sphaeroidina d'Orbigny, 1826 (*2303), p. 267.

Sexloculina Cžjžek, 1848 (*866), p. 138; type species: *Sexloculina haueri* Cžjžek, 1848; OD(M).

Test subglobular, coiling variable, depending on position of aperture, each of the few hemispherical and strongly embracing chambers centered over the preceding aperture, median plane of later chambers diverging from that of earlier ones, either in an alternating manner or in a relatively regular spiral; wall calcareous, very finely perforate, optically radial, surface smooth; aperture a crescentic opening near the base of the chamber, commonly above the junction of three earlier chambers, bordered by a narrow lip, and may have a simple flaplike or a bifid tooth. U. Eocene to Holocene; cosmopolitan.

Superfamily GLABRATELLACEA Loeblich and Tappan, 1964

Glabratellacea Loeblich and Tappan, 1984 (*1918), p. 48, nom. transl. ex family Glabratellidae.

Test trochospiral; wall of hyaline, perforate, optically radial calcite; surface of umbilical side commonly with radial striae, costae, or nodes; aperture interiomarginal and umbilical; sexual reproduction plastogamic, the two gamont tests becoming firmly attached by their umbilical surfaces, which are then resorbed centrally to form a brood chamber for the fusion of gametes and early zygote development. L. Eocene (Cuisian) to Holocene.

Family GLABRATELLIDAE Loeblich and Tappan, 1964

Glabratellidae Loeblich and Tappan, 1964 (*1910), p. C587.
Glabratellinae Saidova, 1981 (*2696), p. 45 (subfamily).

Test a low trochospiral coil, umbilical side commonly with radial ornamentation that aids in attachment during plastogamy. L. Eocene (Cuisian) to Holocene.

ANGULODISCORBIS Uchio, 1953

Plate 617, figs. 7-12 and 19-21

Type species: Angulodiscorbis quadrangularis Uchio, 1953; OD.

Angulodiscorbis Uchio, 1953 (*3237), p. 156.
Subfastigiella McCulloch, 1977 (*1961), p. 303; type species: *Subfastigiella corrugatiformis* McCulloch, 1977; OD.
Subsabinoides McCulloch, 1977 (*1961), p. 315, type species: *Subsabinoides charlesensis* McCulloch, 1977; OD.

Test pyramidal, a high trochospiral coil with strongly elevated spiral side, numerous whorls of four to five vertically aligned angular chambers per whorl, angular to vertically carinate along the median line of the rows of chambers, sutures flush to depressed on the spiral side, radial and depressed around the open umbilicus on the umbilical side; wall calcareous, perforate, surface of spiral side may have vertically aligned angles, carinae, fine striae, or rows of pores, umbilical side with radially aligned pores and granular striae; aperture a low umbilical, interiomarginal slit; sexual reproduction plastogamic, pairs of tests cemented together by their umbilical surfaces are common, and after these are separated, the central part of the umbilical side has been resorbed. Holocene; Pacific.

CLAUDOSTRIATELLA Seiglie and Bermúdez, 1965

Plate 617, figs. 13-15

Type species: Claudostriatella mexicana Seiglie and Bermúdez, 1965; OD.

Claudostriatella Seiglie and Bermúdez, 1965 (*2853), p. 62.

Test small, up to 0.16 mm in diameter, trochospiral, planoconvex, periphery rounded, about two rapidly enlarging whorls and up to seven chambers per whorl, early chambers subglobular, later ones increasing rapidly in breadth and becoming broad and low, sutures depressed, curved, and oblique on the spiral side, radial on the umbilical side, umbilicus small; wall calcareous, spiral side coarsely perforate, surface smooth; aperture a low interiomarginal, umbilical opening on the umbilical side, those of previous chambers filled by secondarily formed and radially striate plates over the umbilical region. M. Eocene; Mexico.

CONORBELLA Hofker, 1951

Plate 618, figs. 1-6

Type species: Discorbina pulvinata Brady, 1884 (*344), p. 650.

Conorbella Hofker, 1951 (*1498), p. 448, 466.
Earltheeia McCulloch, 1977 (*1961), p. 302; type species: *Earltheeia socorroensis* McCulloch, 1977; OD.

Test planoconvex, trochospiral, rapidly enlarging chambers appearing crescentic and sutures oblique, thickened, and depressed on the strongly convex spiral side, peripheral carina rounded to sharply angular, sutures flush and may be obscured by the radial ornamentation on the flat disclike umbilical side: wall calcareous, surface of spiral side strongly rugose, with heavy pustules, rugae, and spinules that may be aligned concentrically, surface of umbilical side with radially aligned striae or rows of granules; aperture a small, interiomarginal, umbilical slit. Holocene; Pacific.

CORRUGATELLA Seiglie and Bermúdez, 1965

Plate 618, figs. 7-9

Type species: Corrugatella donosoi Seiglie and Bermúdez, 1965; OD.

Corrugatella Seiglie and Bermúdez, 1965 (*2853), p. 50.

Test tiny, up to 0.18 mm in diameter, trochospiral, with gradually enlarging and moderately inflated chambers and gently curved and depressed sutures on the flattened spiral side, chambers subtriangular in outline with protruding and angular umbilical shoulder and sutures radial and depressed around the deep umbilicus on the umbilical side, periphery broadly truncate; wall calcareous, surface pustulose and rugose, with radially aligned granules around the umbilicus; aperture not observed, probably interiomarginal and umbilical. U. Eocene to Miocene; Cuba.

CROSBYIA McCulloch, 1977

Plate 617, figs. 16-18

Type species: Crosbyia francesae McCulloch, 1977; OD.

Crosbyia McCulloch, 1977 (*1961), p. 295.

Test oval in outline, trochospiral with about two whorls of seven to eight chambers each, planoconvex to biconvex, spiral side more convex, periphery rounded, chambers increasing rapidly in breadth as added, becoming broad and low and curving back at the periphery, final chamber with a lobulate extension over the umbilical region, sutures flush, curved on the spiral side, radial on the umbilical side around the open umbilicus; wall calcareous, finely perforate, and with fine radiating striae on the umbilical side, each chamber with two or more radial rows of large pores on the spiral side; aperture not observed, possibly an interiomarginal slit at the anterior margin of the final chamber on the umbilical side. Holocene; eastern Pacific, off California.

Remarks: The systematic position of this genus is uncertain, as the umbilical chamber extension and coarse pores on the spiral side are not typical of the Glabratellidae. The apertural position also is uncertain.

CURTRIGHTIA McCulloch, 1977

Plate 618, figs. 13-15

Type species: Curtrightia marcellae McCulloch, 1977; OD.

Curtrightia McCulloch, 1977 (*1961), p. 298.

Test in low trochospiral coil, spiral side convex with a few inflated chambers around a clear central boss that covers earlier chambers, umbilical side flat to slightly concave, six chambers of the final whorl visible around the open umbilicus, sutures straight, radial, depressed on the spiral side, peripheral margin of umbilical side carinate, periphery of spiral side broadly truncate and sloping slightly toward the central boss, peripheral outline lobulate; wall calcareous, translucent, finely perforate except for more coarsely perforate and granulose oval area near the inner margin of each chamber on the spiral side, umbilical side with numerous rows of granules radiating from the umbilicus; aperture umbilical. Holocene, at 20 m to 60 m; USA: Santa Barbara Island, California; Philippines.

DISCORBINOIDES Saidova, 1975

Plate 618, figs. 10-12 and 16-18

Type species: Discorbinoides subpatelliformis Saidova, 1975; OD.

Discorbinoides Saidova, 1975 (*2695), p. 270.

Sabinoides McCulloch, 1977 (*1961), p. 313; type species: *Sabinoides densiformis* McCulloch, 1977; OD.

Test low conical, planoconvex, trochospiral, convex spiral side with three to four whorls of gradually enlarging short crescentic chambers separated by oblique, flush, and thickened sutures, only the six to eight chambers of the final whorl visible on the flat to centrally concave umbilical side where they appear subtriangular, sutures depressed, radial, and straight to curved on the umbilical side, periphery angular, carinate; wall calcareous, finely perforate, smooth on the spiral side, umbilical side with radiating grooves alternating with rows of fine pustules, umbilicus filled with small nodes or pustules; aperture interiomarginal, extraumbilical; plastogamic pairs of tests may be connected by a mass of shell material. Holocene; cosmopolitan.

GLABRATELLA Dorreen, 1948

Plate 619, figs. 1-6

Type species: Glabratella crassa Dorreen, 1948; OD.

Glabratella Dorreen, 1948 (*971), p. 294.

Discorbis (Glabratella) Haynes, 1973 (*1436), p. 147-149 (nom. transl.).

Glabrorosalina McCulloch, 1977 (*1961), p. 334; type species: *Glabrorosalina distincta* McCulloch, 1977; OD.

Test enrolled in a low trochospiral coil, chambers inflated and globular, enlarging rapidly as added, four to five in the final whorl, sutures curved, depressed, periphery rounded; wall calcareous, finely perforate but may be more coarsely perforate on the spiral side, surface smooth, except for radial striae and rows of pustules leading to the umbilicus; aperture a low interiomarginal slit; sexual reproduction plastogamic. Miocene to Holocene; cosmopolitan.

GLABRATELLINA Seiglie and Bermúdez, 1965

Plate 619, figs. 7-18

Type species: Glabratellina arcuata Seiglie and Bermúdez, 1965; OD.

Glabratellina Seiglie and Bermúdez, 1965 (*2853), p. 39.

Crumia McCulloch, 1977 (*1961), p. 297; type species: *Crumia albida* McCulloch, 1977; OD.

Sabinia McCulloch, 1977 (*1961), p. 312 (non *Sabinia* Parona, 1909); type species: *Sabinia turriformis* McCulloch, 1977; OD.

Sabinina McCulloch, 1981 (*1962), p. 6 (nom. subst. pro *Sabinia* McCulloch, 1977).

Test small, trochospiral, planoconvex to concavoconvex, few whorls of five to six chambers that appear crescentic on the gently domed spiral side and subtriangular on the centrally concave umbilical side, sutures flush, oblique, and gently curved on the spiral side, nearly radial and sinuate on the umbilical side, periphery rounded; wall calcareous, finely perforate, smooth on the spiral side, umbilical side with radiating granular or finely pustulose striae; aperture interiomarginal, probably just anterior to the umbilical flap. Miocene to Holocene; Atlantic; Pacific.

GLENNBROWNIA McCulloch, 1977

Plate 619, figs. 19-21

Type species: Glennbrownia cuylerensis McCulloch, 1977; OD.

Glennbrownia McCulloch, 1977 (*1961), p. 288.

Test low trochospiral, planoconvex with convex and semi-involute spiral side, chambers increasing rapidly in breadth but more slowly in height, umbilical side involute and flat to concave, sutures depressed, strongly curved, arching forward to the midpoint, then curving back toward the truncate periphery; wall calcareous, perforate, hyaline, thin, umbilical surface distinctly pustulose; aperture not described. Holocene; at 20 m, off California, San Miguel Island.

Remarks: *Glennbrownia* resembles *Planoglabratella* but has a truncate rather than angular periphery, chambers are not as broad and low and there are fewer per whorl.

HERONALLENITA Seiglie and Bermúdez, 1965

Plate 620, figs. 1-3

Type species: Heronallenita striatospinata Seiglie and Bermúdez, 1965; OD.

Heronallenita Seiglie and Bermúdez, 1965 (*2853), p. 61.

Test tiny, up to 0.2 mm in diameter, low trochospiral coil of two whorls of rapidly enlarging and approximately hemispherical chambers, four per whorl, separated by curved and depressed sutures as seen from the spiral side, sutures radial around the large umbilicus on the umbilical side, periphery rounded; wall calcareous, hyaline, translucent, spiral side perforate, surface with up to four flangelike projections per chamber, oriented perpendicular to the periphery and crossing the chambers from near the periphery of the spiral side where they are most prominent and gradually becoming lower toward the umbilicus on the opposite side, umbilical side also with radial striae between the flanges; aperture small, interiomarginal, umbilical. Holocene; Caribbean; off Venezuela at 39 m.

MURRAYINELLA Farias, 1977

Plate 621, figs. 12-17

Type species: Rotalia murrayi Heron-Allen and Earland, 1915 (***1472**), p. 721: OD.

Murrayinella Farias, 1977 (***1114**), p. 343.

Test small, up to 0.22 mm in diameter, trochospirally enrolled, four to six rapidly enlarging, inflated to globular chambers forming about two and a half whorls, sutures deeply depressed, umbilicus closed, periphery broadly rounded, peripheral outline lobulate; wall calcareous, hyaline, perforate, surface rugose to hispid; aperture a low interiomarginal slit, apparently extraumbilical; sexual reproduction plastogamic. Pliocene to Holocene; Pacific: Japan; Yellow Sea; Malay Archipelago; Indian Ocean; E. Africa.

Remarks: The original description of *Murrayinella* included both *Rotalia murrayi* and *Discorbina imperatoria* var. *globosa* Millett (later renamed *Rotalia erinacea* Heron-Allen and Earland, because *Rotalia globosa* was a secondary homonym). Although the latter species was placed in *Schackoinella* by Quilty (1975, ***2500**, p. 331), Whittaker and Hodgkinson (1979, ***3368**, p. 106) believed it not "to be a true glabratellid with an umbilical aperture and radially striate ventral surface." The strongly inflated chambers and densely hispid surface obscure the umbilical area, but Heron-Allen and Earland (1915, ***1472**, p. 722) observed that "double (or budded) specimens" were present in a locality in New Guinea, thus indicating that reproduction is in fact plastogamic as in other glabratellids.

NEOGLABRATELLA Seiglie and Bermúdez, 1965

Plate 621, figs. 1-8

Type species: Discorbis wiesneri Parr, 1950 (***2363**), p. 356; OD.

Neoglabratella Seiglie and Bermúdez, 1965 (***2853**), p. 48.

Orbignynella Saidova, 1975 (***2695**), p. 211; type species: obj., OD.

Test large, up to 1.4 mm in diameter, circular in outline, low trochospiral, bi-involute and planoconvex, with spiral side gently arched and umbilical side flat, up to ten broad and low chambers in the final whorl that partially to completely overlaps the preceding whorl on both sides, sutures depressed, strongly sinuate and oblique on the spiral side, nearly flush on the umbilical side and obscured by radially aligned pustulose striae, periphery subacute to rounded; wall calcareous, hyaline, optically radial, spiral side distinctly perforate, surface with granulose radial striae on the umbilical side that are more heavily beaded toward the umbilicus; aperture a low interiomarginal, extraumbilical slit at the periphery; sexual reproduction plastogamic, and joined specimens are common. Holocene: Southwest Pacific: Kerguelen Islands.

PIJPERSIA Thalmann, 1954

Plate 620, figs. 4-8

Type species: Bonairea coronaeformis Pijpers, 1933 (***2406**), p. 72; OD.

Pijpersia Thalmann, 1954 (***3174**), p. 153 (nom. subst. pro *Ruttenia* Pijpers, 1933).

Bonairea Pijpers, 1933 (***2406**), p. 72 (non *Bonairea* Burrington Baker, 1924); type species: obj.; OD.

Ruttenia Pijpers, 1933 (***2407**), p. 30 (nom. subst. pro *Bonairea* Pijpers, 1933; non *Ruttenia* Rodhain, 1924); type species: obj.; OD.

Test in a low trochospiral coil of about two whorls, six chambers in the final whorl, chambers increasing in breadth as added, a distinct median tuberculate to spinulate radial carina crosses the chambers on the spiral side approximately parallel to the sutures, resulting in a stellate peripheral outline, chambers and sutures obscure on the umbilical side, which may have a distinctly angular shoulder parallel to and near the peripheral margin, periphery broadly truncate; wall calcareous, surface smooth other than the carinae; aperture a large, interiomarginal, and umbilical arch on the umbilical side. M. to U. Eocene: West Indies; Cuba; Panama; Mexico.

PLANOGLABRATELLA Seiglie and Bermúdez, 1965

Plate 621, figs. 18-23

Type species: Discorbis nakamurai Asano, 1951 (***88**), p. 2; OD.

Planoglabratella Seiglie and Bermúdez, 1965 (***2853**), p. 46.

Truyolsia González-Donoso, 1968 (***1263**), p. 76; type species: *Rosalina opercularis* d'Orbigny, 1826 (***2303**), p. 271; OD.

Test of medium size, up to 1.0 mm in diameter, planoconvex with subconical spiral side and flat umbilical side, trochospiral, about two rapidly enlarging whorls, chambers numerous, broad, and low, strongly curved back at the periphery, about ten to eleven in the final whorl, sutures strongly curved on both sides, flush, umbilicus closed, periphery subangular; wall calcareous, optically radial, finely perforate, surface smooth on spiral side, umbilical side covered with numerous fine radial striae and centrally granulose or pustulose; aperture a low interiomarginal slit near the peripheral margin of the final chamber on the umbilical side. M. Miocene (Tortonian) to Holocene: Japan; Australia: Torres Strait: Cuba; USSR: Ukraine SSR.

Remarks: *Discorbis nakamurai, Rosalina opercularis,* and *Discorbis subopercularis* Asano were included in the original definitions of both *Planoglabratella* and its synonym *Truyolsia.*

PSEUDORUTTENIA Y. Le Calvez, 1959

Plate 622, figs. 1-3

Type species: Pseudoruttenia diadematoides Y. Le Calvez, 1959; OD.

Pseudoruttenia Y. Le Calvez, 1959 (***1802**), p. 92.

Test small in a flat trochospiral coil of about two whorls, centrally concave spiral side of rapidly enlarging and strongly inflated chambers and depressed radial sutures, four in the final whorl, final chamber occupying about one-half the area of the flat umbilical side, sutures flush on the umbilical side, periphery broadly rounded; wall calcareous, finely perforate, periphery smooth but spiral side strongly pustulose and umbilical side with fine radial striae; aperture interiomarginal, umbilical, with broad subtriangular umbilical flap or folium. L. Eocene (Cuisian); France; Belgium.

SCHACKOINELLA Weinhandl, 1958

Plate 621, figs. 9-11

Type species: Schackoinella sarmatica Weinhandl, 1958; OD.

Schackoinella Weinhandl, 1958 (***3357**), p. 141.

Test trochospiral, about two to two and a half whorls of globular, rapidly enlarging chambers, commonly four to five but rarely up to seven in the final whorl, umbilicus open, periphery rounded but a large pointed spine arising from the midpoint of each chamber results in a stellate peripheral test outline; wall calcareous, optically radial, finely perforate, surface smooth to reticulate, with a single large spine on the spiral side of each chamber, umbilical side with striae radiating from the umbilicus and separating rows of fine granules; aperture interiomarginal, umbilical to slightly extraumbilical; sexual reproduction plastogamic and paired individuals common. M. Eocene (Lutetian) to Holocene: Austria; Western Australia; Timor Sea; Sahul Shelf; Yellow Sea; India.

TRUNCOHERONALLENIA

McCulloch, 1977

Plate 620, figs. 9-11

Type species: Truncoheronallenia rarescens McCulloch, 1977; OD.

Truncoheronallenia McCulloch, 1977 (***1961**), p. 324.

Test trochospiral, planoconvex, spiral side convex, about two gradually enlarging whorls of five to seven chambers each, curved and oblique limbate sutures merging outward into the peripheral keel, umbilical side flat with large open umbilicus, sutures radial, slightly depressed, periphery with thick ornate keel; wall calcareous, opaque, finely perforate, smooth on the spiral side, umbilical side with numerous radial granular striae leading to the umbilicus and more prominent granules may encircle the umbilicus, beaded peripheral keel with elevated pustules and rugae; aperture interiomarginal, umbilical, and those of earlier chambers may remain open. Holocene; Pacific: off Korea.

Family HERONALLENIIDAE Loeblich and Tappan, 1986

Heronalleniidae Loeblich and Tappan, 1986 (***1928**), p. 252.
Heronallenidae McCulloch, 1977 (***1961**), p. 317 (nom. imperf.; name not available, ICZN Art. 13 (a)(i), no description).

Test trochospiral, planoconvex; aperture interiomarginal and umbilical, not covered by later chambers but closed by a later formed plate, those of the final whorl remaining visible around the umbilicus, umbilical side also with numerous radial striae. Eocene to Holocene.

HERONALLENIA Chapman and Parr, 1931

Plate 623, figs. 1-18

Type species: Discorbina wilsoni Heron-Allen and Earland, 1922 (***1473**), p. 206; OD.

Heronallenia Chapman and Parr, 1931 (***541**), p. 236.
Metaheronallenia McCulloch, 1977 (***1961**), p. 318; type

species: *Metaheronallenia rugosiformis* McCulloch, 1977; OD.

Neoheronallenia McCulloch, 1977 (*1961), p. 319; type species: *Neoheronallenia craigi* McCulloch, 1977; OD.

Planoheronallenia McCulloch, 1977 (*1961), p. 322; type species: *Planoheronallenia wenmanensis* McCulloch, 1977; OD.

Subheronallenia McCulloch, 1977 (*1961), p. 323; type species: *Subheronallenia crosbyi* McCulloch, 1977; OD.

Guyhoytina McCulloch, 1981 (*1962), p. 149; type species: *Guyhoytina helenae* McCulloch, 1981; OD.

Test ovate to auriculate in outline, plano-convex, low trochospiral coil with one or two rapidly widening whorls, chambers crescentic on the gently convex spiral side, subtriangular on the flat to centrally concave umbilical side, sutures curved, thickened and flush on the spiral side, radial and depressed on the umbilical side, periphery carinate; wall calcareous, optically radial, finely perforate, surface smooth on the spiral side, radially grooved on the umbilical side; aperture a low to high interiomarginal and umbilical arch, may have an umbilical lobe just posterior to the opening on the final chamber, aperture secondarily closed by an umbilical plate as new chambers are added, apertures of earlier chambers not overlapped by the succeeding chambers but closed by the later formed plates that remain visible around the umbilicus. Eocene to Holocene; cosmopolitan.

Family BULIMINOIDIDAE Seiglie, 1970

Buliminoididae Seiglie, 1970 (*2849), p. 113.

Test with very high trochospiral coil; aperture umbilical; sexual reproduction plastogamic. Oligocene to Holocene.

BULIMINOIDES Cushman, 1911

Plate 622, figs. 10-12

Type species: Bulimina williamsoniana Brady, 1881 (*339), p. 56; OD.

Buliminoides Cushman, 1911 (*702), p. 90.

Test elongate, circular in section, with high trochospiral coil, about five broad and low, strongly oblique chambers per whorl, enrolled around an open umbilicus, septal walls commonly resorbed, perhaps during reproduction, sutures obscured by ornamentation; wall calcareous, optically radial, finely perforate, surface with prominent longitudinal costae nearly perpendicular to the sutures but oblique to the test axis, costae may be continuous and occasionally bifurcate, or may be somewhat irregular and rugose in appearance, terminal face with radial striae; aperture interiomarginal, umbilical, in a depressed part of the terminal face; sexual reproduction plastogamic. Oligocene to Holocene; cosmopolitan, on shallow water reefs.

ELONGOBULA Finlay, 1939

Plate 622, figs. 13-15

Type species: Elongobula chattonensis Finlay, 1939; OD.

Elongobula Finlay, 1939 (*1128), p. 321.

Test elongate, in a high trochospiral coil, circular to oval in section, chambers few per whorl, base apiculate, both intercameral sutures and spiral suture oblique to the longitudinal axis of the test, sutures faintly depressed; wall calcareous, surface smooth except for the radially striate terminal face, the grooves leading into the open umbilicus; apertural face obliquely truncated, with small interiomarginal umbilical opening. Oligocene; New Zealand; USA: Alabama.

FREDSMITHIA McCulloch, 1977

Plate 622, figs. 4-9

Type species: Fredsmithia sanclementensis McCulloch, 1977; OD.

Fredsmithia McCulloch, 1977 (*1961), p. 382.

Fredsmithoides McCulloch, 1977 (*1961), p. 384; type species: *Fredsmithoides catalinaensis* McCulloch, 1977; OD.

Test elongate ovate in outline, ovate in section, trochospirally enrolled, with chambers increasing rapidly in breadth but slowly in height, extending far back proximally on the inside of the coil so that the spiral side has an astacoline appearance but final chamber reaches nearly to the proloculus on the umbilical side, thus is opposed to all earlier chambers along the elongate umbilical groove, periphery rounded to subangular at the margins; wall calcareous, hyaline, finely perforate, surface smooth; aperture an interiomarginal and umbilical loop, bordered by a few straight and radiating grooves that extend to the peripheral margin of the flattened apertural face. Holocene; Mexico; USA: off California, San Clemente, Santa Rosa, and Catalina Islands.

Superfamily SIPHONINACEA Cushman, 1927

Siphoninacea Loeblich and Tappan, 1984 (*1918), p. 48, nom. transl. ex subfamily Siphonininae.

Test trochospiral: aperture slitlike, oval, or rounded in the apertural face or elevated on a neck and bordered with a phialine lip. U. Cretaceous (Maastrichtian) to Holocene.

Family SIPHONINIDAE Cushman, 1927

Siphoninidae N. K. Bykova, Vasilenko, Voloshinova, Myatlyuk, and Subbotina, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 270, nom. transl. ex subfamily Siphonininae.

Test trochospiral in early stage, later may be nearly planispiral, streptospiral, uncoiled, or biserial: aperture rounded or oval, commonly projecting on a neck and bordered by a distinct lip, equatorial in position or may be nearly terminal in biserial or uniserial tests. U. Cretaceous (Maastrichtian) to Holocene.

Subfamily SIPHONININAE Cushman, 1927

Siphonininae Cushman, 1927 (*742), p. 77.
Siphoninellinae Saidova, 1981 (*2696), p. 46.

Test trochospiral or may tend to uncoil in later stage. U. Cretaceous (Maastrichtian) to Holocene.

PULSIPHONINA Brotzen, 1948

Plate 624, figs. 1-3

Type species: Siphonina prima Plummer, 1927 (*2421), p. 148; OD.

Siphonina (Pulsiphonina) Brotzen, 1948 (*429), p. 106.
Pulsiphonina Bermúdez, 1952 (*205), p. 68 (nom. transl.).

Test lenticular, trochospiral, periphery angular with carinate or beaded margin, chambers broad, low, and crescentic and sutures oblique, thickened, and beaded on the spiral side, chambers subtriangular, sutures depressed, curved, and nearly radial on the umbilical side, umbilicus closed; wall calcareous, optically granular, distinctly perforate, surface smooth other than the beaded sutures and keel; aperture a low narrow interiomarginal opening against the keel at the periphery on the umbilical side, bordered by a narrow lip. U. Cretaceous (Maastrichtian) to L. Eocene; North America; Europe.

SIPHONINA Reuss, 1850

Plate 624, figs. 4-6 and 13-15

Type species: Siphonina fimbriata Reuss, 1850 = *Rotalina reticulata* Cžjžek, 1848 (*866), p. 145; OD(M).

Siphonina Reuss, 1850 (*2573), p. 372.

Test lenticular to inequally biconvex, circular in outline, trochospiral, with a few broad low, and crescentic chambers per whorl, sutures oblique, thickened, and elevated on the spiral side, continuing into the wide fimbriate peripheral keel, sutures radial and depressed on the umbilical side, umbilicus closed; wall calcareous, optically radial, coarsely perforate, surface may have radial striae or pustules; aperture areal, elliptical, just above the base of the final chamber and nearly equatorial in position, produced on a short neck and bordered with a phialine lip. Eocene to Holocene; cosmopolitan.

SIPHONINELLA Cushman, 1927

Plate 624, figs. 7-9

Type species: Truncatulina soluta Brady, 1884 (*344), p. 670; OD.

Siphoninella Cushman, 1927 (*742), p. 77.

Test with early stage lenticular and chambers trochospirally coiled, later stage uncoiling, uniserial, and rectilinear, sutures curved, limbate, and beaded on the spiral side, nearly radial and slightly depressed on the umbilical side, umbilicus closed, sutures of rectilinear stage may be beaded on both sides, periphery with fimbriate carina; wall calcareous, perforate, surface smooth other than the fimbriate to beaded keel and sutures; aperture terminal, an elongate narrow slit produced on a distinct neck, with phialine lip. M. Eocene to Holocene; Caribbean; North America.

Remarks: The L. Cretaceous (Valanginian) *Siphoninella antiqua* Gorbachik, 1966, now type species of *Pseudosiphoninella* Poroshina, 1986, is much larger and thick walled, with broad low chambers and a solid keel, and the uniserial stage has an oval to circular aperture. It has been placed in the Ceratobuliminidae herein.

Subfamily SIPHONIDINAE Saidova, 1981

Siphonidinae Saidova, 1981 (*2696), p. 46.

Early stage trochospiral, later uncoiled and biserial; terminal aperture bordered by phialine lip. M. Eocene.

SIPHONIDES Feray, 1941

Plate 624, figs. 10-12

Type species: Siphonides biserialis Feray, 1941; OD.

Siphonides Feray, 1941 (*1120), p. 174.

Test tiny, elongate, compressed, early stage trochospirally enrolled as in *Siphonina*, about six chambers separated by curved sutures in the final whorl, umbilicus closed, later stage uncoiled, with crescentic, biserially arranged chambers and arched, thickened, and limbate sutures on the formerly spiral side and nearly straight and depressed sutures on the former umbilical side, periphery with fimbriate keel; wall calcareous, perforate, surface smooth other than the elevated and beaded sutures and fimbriate keel; aperture a subterminal, narrow slit, produced on a short neck. M. Eocene; USA: Texas.

Subfamily SIPHONINOIDINAE Loeblich and Tappan, 1984

Siphoninoidinae Loeblich and Tappan, 1984 (***1918**), p. 48.
Siphoninoidinae Loeblich and Tappan, 1982 (***1917**), p. 35 (name not available, ICZN Art. 13 (a)(i), no description).

Test coiling irregularly trochospiral or streptospiral, involute; circular aperture with perforated plate. Miocene to Holocene.

SIPHONINOIDES Cushman, 1927

Plate 624, figs. 16–21

Type species: Planorbulina echinata Brady, 1879 (***338**), p. 283; OD.

Siphoninoides Cushman, 1927 (***742**), p. 77.

Test subglobular, irregularly trochospiral, chambers enlarging rapidly; wall calcareous, hyaline, thin in the early stage, later much thickened and coarsely perforate, surface pustulose; aperture elevated on a short neck, rounded, and filled with a concave plate that has a single small central pore. Miocene to Holocene; Australia; Pacific Ocean; Indian Ocean; Caribbean; Cuba.

Remarks: As noted by Hofker (1970, ***1519**, p. 33), the previously reported large round aperture and phialine lip are incorrect interpretations. The neck contains a concave plate that is pierced centrally by a small opening.

Superfamily DISCORBINELLACEA Sigal, 1952

Discorbinellacea Loeblich and Tappan, nom. transl. herein ex subfamily.

Test trochospiral, at least in the early stage; wall calcareous, optically radial, aperture equatorial, interiomarginal, a low arch to high slit up the apertural face. Paleocene to Holocene.

Family PARRELLOIDIDAE Hofker, 1956

Parrelloididae Hofker, 1956 (***1510**), p. 936.
Cibicidoidinae Voloshina, 1975 (***3314**), text-fig. 1 on p. 278 (name not available, ICZN Art. 13 (a)(i), no description).

Test trochospiral, biconvex, spiral side coarsely perforate, opposite side with closed umbilicus and central boss; wall optically radial, sparsely perforate or without pores; aperture a low interiomarginal and equatorial opening bordered by a narrow lip. Paleocene to Holocene.

Remarks: *Parrelloides* previously was regarded as having a granular wall structure, but examination of the type species shows it to be optically radial. The type species of *Cibicidoides* was not available to check, but it is similar in other respects to *Parrelloides*; species previously included therein that have optically granular walls should be transferred elsewhere.

CIBICIDOIDES Thalmann, 1939

Plate 626, figs. 1–3

Type species: Truncatulina mundula Brady, Parker, and Jones, 1890 (***347**), p. 228; OD.

Cibicides (Cibicidoides) Thalmann, 1939 (***3160**), p. 448 (validated by designation of type species).
Dendrina Costa ms., in Fornasini, 1898 (***1152A**), p. 206 (non *Dendrina* Quenstedt, 1848); type species: *Dendrina succinea* Costa ms., in Fornasini, 1898; OD(M).
Cibicides (Cibicidoides) Brotzen, 1936 (***425**), p. 186, 194 (name not available, ICZN Art. 13(b), type species not designated).
Cibicidoides McLean, 1951 (***1974**), p. 28 (nom. transl.).

Test lenticular, biconvex, and biumbonate, trochospiral, with about two and a half to three whorls, ten to eleven chambers in the final whorl, sutures curved and limbate on the spiral side, umbilical side with nearly straight and radial sutures around the elevated umbo, periphery angular, carinate; wall calcareous, coarsely perforate on the spiral side, perforations in early chambers only near the spiral suture but cover most of the later chamber surfaces, umbilical side sparsely perforate or without pores; aperture a low interiomarginal and equatorial arch at the base of the apertural face, on the periphery and above the keel of the previous whorl, bordered by a small lip. Paleocene to Holocene; cosmopolitan.

Remarks: Loeblich and Tappan (1955, ***1890**,

p. 25) designated a lectotype (BMNH ZF3585) from off Brazil for *Cibicidoides mundulus*.

PARRELLOIDES Hofker, 1956

Plate 625, figs. 1-7

Type species: Cibicides hyalinus Hofker, 1951 (***1498**), p. 359: OD.

Parrelloides Hofker, 1956 (***1510**), p. 936.

Test tiny, trochospiral, spiral side low to strongly convex, evolute, numerous slowly enlarging whorls, six to eight chambers in the final whorl, spiral suture depressed, intercameral sutures curved, oblique, and may be limbate, umbilical side less convex, sutures straight, radial, and depressed, umbilicus filled with clear shell material that may be continuous with the somewhat thickened sutures, periphery rounded; wall calcareous, hyaline, optically radial, sparse and widely spaced pores on the spiral side, none visible on the umbilical side, surface smooth; aperture interiomarginal and equatorial, a short and low arch against the previous whorl, bordered above by a projecting lip. Holocene: W. Pacific.

Remarks: *Parrelloides* was regarded as a synonym of *Cibicidoides* (Loeblich and Tappan, 1964, ***1910**, p. C757) in the absence of information as to the nature of the wall. However, Hofker (1970, ***1519**, p. 49) stated that the type species has a radial microstructure, and specimens that we have examined from off Northwest Australia also have an optically radial wall. *Parrelloides* differs from *Cibicidoides* in the smaller size, arched spiral side, prominent umbilical filling, and rounded noncarinate periphery.

WOODELLA Haque, 1956

Plate 626, figs. 4-8

Type species: Woodella granosa Haque, 1956; OD.

Woodella Haque, 1956 (***1418**), p. 194.

Test trochospiral, about 0.3 mm to 0.5 mm in diameter, with rapidly expanding whorls and seven to nine strongly angular and peripherally spinose chambers in the final whorl, planoconvex, spiral side flattened, umbilical side convex, chambers angularly inflated centrally, umbilicus closed and may have small plug, sutures depressed, straight, and radial, periphery angular to carinate, margin serrate to spinose; wall calcareous, hyaline, perforate, optically radial, surface granulose; aperture a low interiomarginal, equatorial arch at the base of the apertural face. Paleocene: Pakistan.

Family PSEUDOPARRELLIDAE Voloshinova, 1952

Pseudoparrellidae Subbotina, in Rauzer-Chernousova and Fursenko, 1959 (***2531**), p. 272, nom. transl. ex subfamily Pseudoparrellinae.

Test trochospiral, at least in early stage; aperture a vertical slit in the final chamber face, paralleling the peripheral margin, or may tend to become areal. Oligocene to Holocene.

Subfamily PSEUDOPARRELLINAE Voloshinova, 1952

Pseudoparrellinae Subbotina, in Rauzer-Chernousova and Fursenko, 1959 (***2531**), p. 272, nom. corr. pro Pseudoparellinae.

Pseudoparellinae Voloshinova, in Voloshinova and Dain, 1952 (***3318**), p. 81 (nom. imperf.).

Epistominellinae Reiss, 1963 (***2561**), p. 54.

Test lenticular in form; slitlike aperture extending up the apertural face. Oligocene to Holocene.

ALABAMINOIDES Gudina and Saidova, 1967

Plate 626, figs. 12-16

Type species: Alabamina mitis Gudina, 1966 (***1329**), p. 33; OD.

Alabaminoides Gudina and Saidova, 1967 (***1332**), p. 97.

Alabaminoides Saidova, 1966 (***2692**), p. 282, 283 (name not available, ICZN Art. 13 (a)(i), not described).

Test circular in outline, trochospiral, two and a half to three whorls, concavoconvex, spiral side evolute and convex, chambers low and broad, sutures oblique and depressed, only the five to eight chambers of the final whorl visible on the flattened umbilical side where they appear subtriangular, sutures radial around the closed umbilicus, periphery angular but noncarinate; wall calcareous, thin and transparent, optically radial, finely perforate, surface smooth; aperture a nearly equatorial vertical slit in a low depression, extending up the apertural face of the final chamber on the umbilical side. Oligocene to Holocene; cosmopolitan.

ALEXANDERINA McCulloch, 1977
Plate 626, figs. 17-19

Type species: Alexanderina viejoensis McCulloch, 1977; OD.

Alexanderina McCulloch, 1977 (*1961), p. 337.

Test circular in outline, trochospiral, concavoconvex, with evolute, low, convex spiral side of three and a half whorls of numerous broad, low chambers, about eleven chambers in the final whorl, sutures flush, strongly oblique, and curved, umbilical side concave and partially evolute, about half the preceding whorl remaining visible around the deep umbilicus, sutures somewhat oblique to nearly radial, straight to faintly curved, periphery angular to rounded, noncarinate; wall calcareous, hyaline, polished, finely perforate, surface smooth; aperture a high subequatorial slit, just on the umbilical side of the periphery in a depressed part of the apertural face and bordered by a narrow lip. Holocene; S. Pacific: off Peru.

AMBITROPUS Lipps, 1965
Plate 626, figs. 20-25

Type species: Epistominella evax Bandy, 1953 (*116A), p. 179; OD.

Ambitropus Lipps, 1965 (*1872), p. 120.

Test ovate in outline, trochospiral, flattened to planoconvex, spiral side flat, with all of the two and a half whorls visible, six to seven broad, rapidly enlarging crescentic chambers in the final whorl, umbilical side slightly convex, umbilicus closed, sutures depressed, curved, and oblique on both sides, periphery carinate; wall calcareous, optically radial, finely perforate, surface smooth; aperture interiomarginal and equatorial, a wide vertical slit extending up the apertural face, surrounded by a rim that merges into the peripheral keel. Miocene to Holocene; USA: California; Ecuador.

EILOHEDRA Lipps, 1965
Plate 626, figs. 9-11

Type species: Epistominella levicula Resig, 1958 (*2565), p. 304; OD.

Eilohedra Lipps, 1965 (*1872), p. 124.

Test small, subglobose, trochospiral, about three and a half tightly coiled and slowly enlarging whorls visible on the strongly convex spiral side where the chambers are broad, low, and crescentic and sutures strongly oblique and depressed, only the five to six chambers of the final whorl are visible and sutures are radial and nearly straight on the flattened umbilical side, periphery rounded; wall calcareous, hyaline, optically radial, perforate, surface smooth; aperture an interiomarginal slit extending along the basal suture and then up the depressed apertural face of the final chamber, bordered by a narrow lip. Holocene; USA: California.

Remarks: Although originally referred to the Eponididae, the high slitlike aperture is more characteristic of the Pseudoparrellidae.

EPISTOMINELLA Husezima and Maruhasi, 1944
Plate 627, figs. 1-6

Type species: Epistominella pulchella Husezima and Maruhasi, 1944; OD.

Epistominella Husezima and Maruhasi, 1944 (*1576), p. 397.

Test small to medium in size, trochospiral, with two and a half to three whorls, planoconvex to inequally biconvex, evolute spiral side flat to low convex, sutures straight and oblique, only the six to seven chambers of the final whorl visible on the convex to nearly conical involute umbilical side, sutures gently curved, nearly radial, and slightly depressed, periphery carinate; wall calcareous, optically radial, perforate, surface smooth; aperture an interiomarginal slit extending up the face of the final chamber on the umbilical side. L. Miocene to Holocene; Pacific; Arctic Ocean; Atlantic; Mediterranean.

MEGASTOMELLA Faulkner, de Klasz, and Rérat, 1963
Plate 627, figs. 13-18

Type species: Megastomella africana Faulkner et al., 1963; OD.

Megastomella Faulkner, de Klasz, and Rérat, 1963 (*1119), p. 19.

Test small to medium in size, flattened to slightly biconvex, oval in outline, low trochospiral coil of about one and a half rapidly flaring whorls, spiral side evolute with curved and oblique sutures, umbilical side involute and sutures radial and nearly straight, periphery rounded; wall calcareous, optically radial, perforate, surface smooth; aperture a wide vertical interiomarginal slit extending up the face of the final chamber, subequatorial to slightly on the umbilical side. L. Miocene to U. Miocene; Gabon; USA: California.

PSEUDOPARRELLA Cushman and ten Dam, 1948

Plate 627, figs. 19-24

Type species: Pulvinulinella subperuviana Cushman, 1926 (*737), p. 63; OD.

Pseudoparrella Cushman and ten Dam, 1948 (*819), p. 49 (nom. subst. pro *Pulvinulinella* Cushman, 1926).
Pulvinulinella Cushman, 1926 (*737), p. 62 (non *Pulvinulinella* Eimer and Fickert, 1899); type species: obj.; OD.
Peschongia McCulloch, 1977 (*1961), p. 408; type species: *Peschongia bikiniensis* McCulloch, 1977; OD.

Test small to medium in size, circular in outline, biconvex, trochospiral and tightly coiled, two and a half to three whorls, spiral side evolute, sutures strongly oblique and straight to curved, only the eight to nine chambers of the final whorl visible on the involute umbilical side, sutures gently curved to nearly radial around the closed umbilicus, periphery angular but noncarinate; wall calcareous, optically radial, finely perforate, surface smooth; aperture a narrow and straight interiomarginal and subequatorial slit extending up the face of the final chamber on the umbilical side, bordered by a narrow lip. Oligocene to Holocene; cosmopolitan.

Subfamily CONCAVELLINAE Saidova, 1981

Concavellinae Saidova, 1981 (*2696), p. 45.

Test concavoconvex, spiral side flattened to strongly concave, periphery carinate; aperture a high slit or may become areal. M. Miocene.

CONCAVELLA Lipps, 1965

Plate 627, figs. 7-12

Type species: Pulvinulinella gyroidinaformis Cushman and Goudkoff, 1938 (*821), p. 2; OD.

Concavella Lipps, 1965 (*1872), p. 121.

Test circular in outline, concavoconvex, trochospiral, about two to two and a half whorls, eight to nine chambers in the final whorl, spiral side flattened to strongly excavated with flush and strongly oblique sutures, convex umbilical side involute to slightly evolute with sutures nearly radial and depressed around the umbilicus, periphery broadly truncate, margin of the spiral side carinate and that of the umbilical side gently rounded; wall calcareous, hyaline, optically radial, surface smooth; aperture an interiomarginal slit extending up the apertural face on the umbilical side, adjacent to and paralleling the peripheral keel, may become areal and fail to reach the base of the apertural face in specimens that become bievolute in the later stage. M. Miocene; USA: California.

Subfamily STETSONIINAE Saidova, 1981

Stetsoniinae Saidova, 1981 (*2696), p. 45.

Test slightly trochospiral but final whorl involute on both sides. Holocene.

STETSONIA F. L. Parker, 1954

Plate 628, figs. 1-3

Type species: Stetsonia minuta F. L. Parker, 1954; OD.

Stetsonia F. L. Parker, 1954 (*2340), p. 534.

Test small, circular in outline, biconvex, trochospiral in the early stage, later becoming bi-involute and nearly planispiral, nine to ten chambers in the final whorl, sutures curved back at the periphery, depressed, periphery rounded; wall calcareous, optically radial, thin, finely perforate, surface smooth; aperture a narrow interiomarginal slit extending to the top of the gently curved apertural face and tending to slant toward one face of the test, bordered by a narrow rim. Holocene; Gulf of Mexico; Arctic Ocean.

Family PLANULINOIDIDAE Saidova, 1981

Planulinoididae Saidova, 1981 (*2696), p. 44.
Planulinoidinae Saidova, 1981 (*2696), p. 44 (subfamily).

Test nearly planispiral, periphery truncate, biconcave, and partially evolute on both sides; aperture areal, oblique, and equatorial, with supplementary apertures on the umbilical side at the inner chamber margin. Pliocene to Holocene.

PLANULINOIDES Parr, 1941

Plate 628, figs. 4-11

Type species: Discorbina biconcava Jones and Parker, in Carpenter et al., 1862 (*494), p. 201; OD.

Planulinoides Parr, 1941 (*2358), p. 305.
Discotruncana Shirai, 1960 (*2903), p. 539; type species: *Discotruncana japonica* Shirai, 1960; OD.

Test ovate in outline, flat trochospiral, bievolute or only partly evolute on the umbilical side, about two rapidly enlarging whorls present, six to seven flattened to centrally excavated chambers in the final whorl, sutures oblique, strongly limbate, and elevated, periphery truncate, bicarinate; wall calcareous, finely perforate, surface smooth but with elevated sutures and peripheral keels and may have umbilical pustules or tubercles at the center of the umbilical side; primary aperture areal and equatorial, near the base of the apertural face, ranging from an oval to a short oblique slitlike opening bordered by a distinct lip, supplementary apertures at the umbilical margin of the chambers beneath slight umbilical flaps. Pliocene to Holocene; Australia; Japan.

Remarks: The lectotype of *Discorbina biconcava* (BMNH ZF3646), from shore sands at Melbourne, Australia, was designated by Loeblich and Tappan (1964, *1910, p. C584).

Family DISCORBINELLIDAE Sigal, 1952

Discorbinellidae Loeblich and Tappan, 1984 (*1918), p. 49, nom. transl. ex subfamily Discorbinellinae.
Laticarinidae Hofker, 1951 (*1498), p. 307 (nom. imperf.: name not available, ICZN Art. 13(a)(i), no description).
Laticarininidae Reiss, 1963 (*2561), p. 62.

Test nearly planispiral or very flat trochospiral, may be carinate; primary aperture a small interiomarginal equatorial opening, may have supplementary openings beneath the posterior umbilical margin of umbilical flaps. U. Eocene to Holocene.

Subfamily DISCORBINELLINAE Sigal, 1952

Discorbinellinae Sigal, in Piveteau, 1952 (*2413), p. 228.
Laticarininae Saidova, 1981 (*2696), p. 45 (nom. imperf.; nom. transl. ex family).
Discorbinellinea Saidova, 1981 (*2696), p. 44 (supersubfamily).

Chamber interior simple, not subdivided by partitions. U. Eocene to Holocene.

BIAPERTORBIS Pokorný, 1956

Plate 628, figs. 12-18

Type species: Biapertorbis biaperturata Pokorný, 1956; OD.

Biapertorbis Pokorný, 1956 (*2445), p. 262.

Test tiny, trochospiral, planoconvex, with subconical spiral side, chambers appearing lunate and sutures oblique on the spiral side, sutures slightly curved, radial, and depressed on the umbilical side around a distinct umbilical plug, periphery carinate; wall calcareous, finely perforate, with imperforate thickened sutures, peripheral keel and umbilical plug, surface smooth; primary aperture areal, produced, and rounded, near the base of the apertural face of the final chamber, about midway between the umbilicus and periphery, secondary umbilical opening also present, separated from the primary one by a small chamber flap. U. Eocene to L. Oligocene; Czechoslovakia; Poland; USSR: W. Ukraine.

Remarks: Regarded by Loeblich and Tappan (1964, *1910, p. C572) as a synonym of *Discorbis*, later study of topotypes (Tappan and Loeblich, 1966, *3127, p. 385) led to recognition and transfer of the genus to the Laticarininidae [recte Discorbinellidae].

CARLFRANKLINOIDES McCulloch, 1977

Plate 631, figs. 14-16

Type species: Carlfranklinoides prociduus McCulloch, 1977 (nom. imperf. as *C. procidua*): OD.

Carlfranklinoides McCulloch, 1977 (*1961), p. 294.

Test oval in outline, compressed and planoconvex, bievolute, low trochospiral coil of about two rapidly expanding whorls, spiral side convex, umbilical side flat to concave, chambers semilunate, four in the last whorl, each with a small umbilical flap on the umbilical side, sutures curved, thickened, periphery carinate; wall calcareous, hyaline, finely perforate except for the imperforate keel and limbate sutures, surface smooth; aperture low, apparently beneath the umbilical flaps. Holocene, at 1,700 m to 2,300 m; Pacific, off Bikini.

Remarks: Resembles *Discorbinella* but is evolute on both sides, and no equatorial aperture has been observed. Although reported to have radiating granular striae on the umbilical side of the final chamber, none is present on the holotype. The reported umbilical looplike apertures appear to be a misinterpretation of the posterior part of the umbilical flaps.

COLONIMILESIA McCulloch, 1977

Plate 629, figs. 5-7

Type species: Colonimilesia obscura McCulloch, 1977; OD.

Colonimilesia McCulloch, 1977 (*1961), p. 308.

Test circular in outline, planoconvex, trochospiral, spiral side with one or two partially involute whorls of rapidly enlarging chambers produced centrally to a hyaline point, the tip commonly broken in later chambers to leave a small rounded and elevated opening at the center of each chamber, only the six to seven chambers of the final whorl visible on the flat, involute umbilical side, each having a triangular umbilical flap bordered proximally by a slit, sutures straight and radial on both sides, slightly depressed, periphery carinate; wall calcareous, thin, hyaline, finely perforate except for the imperforate flangelike keel; aperture interiomarginal at both sides of the triangular umbilical flap, the posterior opening curving to a terminal loop, those of earlier chambers of the final whorl remaining as looplike openings. Holocene, at 20 m to 40 m; Philippines.

Remarks: Resembles *Discorbitina* Sellier de Civrieux in the elevated and nearly involute spiral side and flat wholly involute umbilical side and peripheral flangelike keel but has a single central opening resulting from loss of a central spine on each chamber on the convex spiral side, instead of the numerous large rimmed openings on each chamber, and the sutures are straight and radial rather than curved to sinuate on the umbilical side.

DISCORBINELLA Cushman and Martin, 1935

Plate 630, figs. 1-15

Type species: Discorbinella montereyensis Cushman and Martin, 1935; OD.

Discorbinella Cushman and Martin, 1935 (*833), p. 89.

Discopulvinulina Hofker, 1951 (*1500), p. 359; type species: *Rosalina bertheloti* d'Orbigny, 1839 (*2305), p. 135; OD.

Discorbinellopsis McCulloch, 1977 (*1961), p. 298; type species: *Discorbinellopsis symmetrica* McCulloch, 1977; OD.

Discorbinoides McCulloch, 1977 (*1961), p. 299 (non *Discorbinoides* Saidova, 1975); type species: *Discorbinoides chincaensis* McCulloch, 1977; OD.

Neoplanodiscorbis McCulloch, 1977 (*1961), p. 309; type species: *Neoplanodiscorbis galapagosensis* McCulloch, 1977; OD.

Discorbinoidella McCulloch, 1981 (*1962), p. 6 (nom. subst. pro *Discorbinoides* McCulloch, 1977).

Test ovate to circular in outline, planoconvex, trochospiral, with a slight tendency to uncoil, so that part of earlier whorls may be visible centrally on both sides, spiral side convex, with broad low chambers enlarging rapidly as added and sutures curved and depressed, umbilical side flattened, chambers lunate, each with a projecting semicircular umbilical flap or folium, posterior end of the folium of earlier chambers leaving an indentation in the sutures, periphery carinate; wall calcareous, finely perforate, surface smooth; primary aperture an interiomarginal arch at the periphery, with a smaller secondary opening at the posterior end of the folium. Miocene to Holocene; cosmopolitan.

DISCORBITINA Sellier de Civrieux, 1977

Plate 629, figs. 1-4

Type species: Discorbina pustulata Heron-Allen and Earland, 1913 (*1470), p. 129; OD.

Discorbitina Sellier de Civrieux, 1977 (*2866), p. 22.

Test tiny, up to 0.16 mm in diameter, circular in outline, planoconvex, about two whorls visible on the convex spiral side, septa radial and weakly depressed, umbilical side involute, flat to concave, about five to six chambers in the final whorl visible around the open umbilicus, chambers with narrow triangular umbilical flap or folium resulting in a strongly sinuate suture, with distinct reentrant between the umbilical flap and the periphery, peripheral keel prominent; wall calcareous, hyaline, transparent, a few large circular pores bordered by a distinct lip present on the spiral side, ranging from two or three on the earlier chambers to as many as fifteen aligned in rows on later chambers, surface of the umbilical side granulose to pustulose, with prominent pustules at the umbilical margin of earlier chambers; primary aperture subequatorial on the spiral side, oval and bordered by a slight neck, accessory openings also present beneath the umbilical folia. Pleistocene to Holocene: N. Atlantic: off Ireland; S. Atlantic: Brazil; Caribbean: Venezuela.

DISCORBITURA Bandy, 1949

Plate 629, figs. 8-10

Type species: Discorbitura dignata Bandy, 1949: OD.

Discorbitura Bandy, 1949 (***115**), p. 99.

Test trochospiral, concavoconvex, all chambers of the two rapidly expanding whorls visible on the gently convex spiral side, sutures curved back at the periphery, thickened, slightly depressed, umbilical side flat, six to seven crescentic chambers in the final whorl, later chambers with prominent reentrant at the posterior margin, adjacent to a posteriorly directed umbilical flap, sutures curved, thickened, flush, periphery acute, carinate; wall calcareous, surface smooth other than the nodes and pustules at the center of the umbilical region, and the numerous dendritic branching grooves that arise at the preceding suture and extend onto the lower part of the chamber; primary aperture circular, an equatorial areal opening just above the base of the final chamber, bordered by a distinct lip and interrupting the peripheral keel, supplementary openings on the umbilical side beneath the protruding umbilical folia. Oligocene: USA: Alabama.

LATICARININA Galloway and Wissler, 1927

Plate 631, figs. 1-13

Type species: Pulvinulina repanda (Fichtel and Moll) var. *menardii* (d'Orbigny) subvar. *pauperata* Parker and Jones, 1865 (***2351**), p. 395; OD.

Laticarinina Galloway and Wissler, 1927 (***1210**), p. 193 (nom. subst. pro *Carinina* Galloway and Wissler, 1927); OD.

Carinina Galloway and Wissler, 1927 (***1209**), p. 51 (non *Carinina* Hubrecht, 1887); type species: obj.; OD.

Parvicarinina Finlay, 1940 (***1129**), p. 467; type species: *Truncatulina tenuimargo* Brady var. *altocamerata* Heron-Allen and Earland, 1922 (***1473**), p. 209; OD.

Mesocarinina McCulloch, 1977 (***1961**), p. 326; type species: *Mesocarinina velata* McCulloch, 1977; OD.

Metacarinina McCulloch, 1977 (***1961**), p. 328; type species: *Metacarinina inferillata* McCulloch, 1977 (also as *infillerata* on p. 328); OD.

Test flat trochospiral to subplanispiral, adult bievolute, very broad peripheral keel projects forward beyond the lumen of the final chamber and produces distinct sinuate growth lines at each chamber, the carina of earlier whorls remaining as a plate that separates the successive whorls, spiral side somewhat inflated, and sutures radial and slightly depressed, up to three discrete whorls, ten to eleven saddlebaglike chambers comprising the final whorl, the two inequal lobes of each chamber separated by the forward carinal extension of the preceding chamber but connected by small tubular necks, supplementary chambers may occur on the side with the larger lobes, and final chamber may have an umbilical flange at the posterior margin, covering a supplemental opening into the chamber lumen; wall calcareous, of calcite, by X-ray determination, optically radial, finely perforate, carina imperforate, surface smooth; subequatorial aperture may be present at one side of the carina and slightly produced, but in some specimens the entire forward margin of the final chamber is tightly closed, leaving only the supplementary openings beneath the posterior umbilical margin of the smaller lobes. Miocene to Holocene; cosmopolitan.

Remarks: The umbilical openings were described originally for *Parvicarinina* and the forward subequatorial aperture reported in *Laticarinina*; however, as noted by Loeblich and Tappan (1964, ***1910**, p. C582), both types of openings occur in both type species, hence they are regarded as congeneric.

MILESINA McCulloch, 1981

Plate 629, figs. 11-13

Type species: Milesia differens McCulloch, 1977 (***1961**), p. 307; OD.

Milesina McCulloch, 1981 (***1962**), p. 6 (nom. subst. pro *Milesia* McCulloch, 1977).

Milesia McCulloch, 1977 (***1961**), p. 307 (non *Milesia* Latreille, 1804).

Test ovate in outline, low trochospiral and planoconvex, flattened side showing all chambers of the one to one and a half whorls, sutures curved and flush, convex side involute, showing only the two to three and a half rapidly enlarging semicircular chambers of the final whorl and the straight and flush sutures, periphery angular, with broad imperforate carinal band; wall calcareous, hyaline, distinctly perforate except for the peripheral band, surface smooth; aperture in a loop that extends from the umbilicus up the face of the final chamber on the flat side of the test, apparently bordered by a scroll-like pillar, those of earlier chambers also remaining open, the scrolls of the various apertures may be visible through the transparent test from the opposite side. Holocene, 20 m to 40 m; Philippines.

Remarks: *Milesina* is placed in the Discorbinellinae with question; it is similar to *Discorbitina* in the largely involute convex side, prominent imperforate carinal band, and spiralling aperture. However, there is no evidence of a peripheral primary aperture such as characterizes *Discorbinella* and other members of the subfamily.

Subfamily TORRESININAE Loeblich and Tappan, 1984

Torresininae Loeblich and Tappan, 1984 (*1918), p. 49.

Chambers subdivided by secondary partitions that project inward from the peripheral margin on the spiral side. Pliocene to Holocene.

TORRESINA Parr, 1947

Plate 632, figs. 1–4

Type species: Torresina haddoni Parr, 1947; OD.

Torresina Parr, 1947 (*2361), p. 129.

Test ovate in outline, flattened, trochospiral, one margin of the truncate periphery carinate, about two rapidly enlarging whorls, the final one with about six crescentic to semicircular chambers, spiral side slightly convex, umbilical side flat to concave, radially aligned infoldings of the wall on the spiral side partially subdivide the later chambers perpendicular to the septum and outer wall, the pseudoseptula increasing in number in later chambers; wall calcareous, optically radial, coarsely perforate; aperture a short equatorial areal opening bordered by a thickened lip, secondary opening at the inner chamber margin on the umbilical side. Pliocene to Holocene; Australia; S. Pacific: Torres Straits, at about 71 m.

Superfamily PLANORBULINACEA Schwager, 1877

Planorbulinacea Loeblich and Tappan, 1984 (*1918), p. 49, nom. corr.

Planorbulinidea Saidova, 1975 (*2695), p. 243, nom. transl. ex subfamily Planorbulinidae.

Planulinacea González-Donoso, 1969 (*1264), p. 3, nom. transl. ex subfamily.

Test free or attached, trochospiral, at least in early stage, later may be uncoiled and rectilinear or biserial or may have many chambers per whorl or chambers added irregularly; wall of perforate hyaline calcite, commonly optically radial in structure, with *c*-axes perpendicular to the surface, although others have intermediate structure, with crystal axes of inner and outer wall layers radially arranged but those of median layer somewhat oblique; wall coarsely perforate, apertural face may be imperforate; aperture interiomarginal and extraumbilical-umbilical to nearly equatorial, subterminal in uncoiled forms, additional equatorial or umbilical apertures may be present at the opposite edge of the chamber. L. Cretaceous (Berriasian) to Holocene.

Family PLANULINIDAE Bermúdez, 1952

Planulinidae González-Donoso, 1969 (*1264), p. 3, nom. transl. ex subfamily Planulininae.

Planulininae Bermúdez, 1952 (*205), p. 91 (subfamily).

Test trochospiral to nearly planispiral, test partially evolute on both sides, aperture a low interiomarginal equatorial arch. U. Eocene to Holocene.

CRESPINELLA Parr, 1942

Plate 632, figs. 9–13

Type species: Operculina? umbonifera Howchin and Parr, 1938 (*1564), p. 309; OD.

Crespinella Parr, 1942 (*2360), p. 361.

Test lenticular, a low trochospiral in the early stage, later bi-involute, biumbonate, and planispiral, sutures flush, radial to slightly oblique, gently curved, indistinct, periphery rounded, subcarinate; wall calcareous, thick, perforate, surface smooth; aperture an interiomarginal equatorial to slightly asymmetrical slit, bordered with a thick projecting upper lip. Miocene: Australia: Victoria, South Australia.

Remarks: Previously placed in the Rotaliacea, *Crespinella* was transferred to the Discorbacea, family Cibicididae by Quilty (1980, ***2501**, p. 302), who described an additional species, *C. parri*, as having supplementary sutural apertures on the umbilical side. Although we accept the transfer of *Crespinella*, *C. parri* is not regarded as congeneric, as it is more distinctly trochospiral, and the supplementary sutural openings do not occur in *Crespinella*.

HYALINEA Hofker, 1951

Plate 632, figs. 5-8

Type species: Nautilus balthicus Schröter, 1783 (***2808**), p. 20; OD.

Hyalinea Hofker, 1951 (***1498**), p. 416, 508, 513.

Hofkerinella Bermúdez, 1952 (***205**), p. 74 (nom. superfl., ICZN Art. 56 (b); nom. subst. pro *Hyalinea* Hofker, 1951, non *Hyalinia* Agassiz, 1837, and non *Hyalina* Schumacher, 1817, nec Studer, 1820, nec Albers, 1850, nec Jung, 1942); type species: obj.; OD.

Test discoidal, very low trochospiral to nearly planispiral, semievolute on both sides, about two slowly enlarging whorls, eight to twelve chambers in the final whorl, umbilical margin of the chambers with a small umbilical flap or folium, sutures radial, slightly curved, limbate, elevated, the thickened sutures grading into the broad imperforate peripheral carina, periphery angular; wall calcareous, optically radial, finely perforate, surface smooth, except for the elevated imperforate septa and keel and occasional pustules in the umbilcal region: aperture a low equatorial and interiomarginal arch, bordered above by a narrow lip, a low slit continuing laterally beneath the folium in the umbilical region and around the spiral suture on both sides of the test, chamber lumen communicating with the exterior through a small rounded opening beneath the folium, apertures remaining open for a few chambers before being closed by lamellar thickening. Pleistocene to Holocene; Atlantic; Pacific; Mediterranean; Europe; USA.

PLANULINA d'Orbigny, 1826

Plate 633, figs. 1-4

Type species: Planulina ariminensis d'Orbigny, 1826; SD Galloway and Wissler, 1927 (***1209**), p. 66.

Planulina d'Orbigny, 1826 (***2303**), p. 280.

Cibicides (Planulina) Vasilenko, 1954 (***3259**), p. 197 (nom. transl.).

Test discoidal, very low trochospiral of about two whorls, spiral side evolute, umbilical side partially evolute, nine to ten broad, low, and arched chambers in the final whorl, septa thick, sutures imperforate, thickened and elevated, strongly curved back at the peripheral margin, periphery truncate, with thick imperforate marginal keel: wall calcareous, optically radial, finely perforate, and with scattered larger pores, secondary lamellae cover and fill the umbilical region but are pierced by a few pores: aperture an equatorial and interiomarginal arch with narrow imperforate bordering lip, extending somewhat onto the umbilical side beneath the imperforate umbilical folium. U. Eocene to Holocene; cosmopolitan.

Family BISACCIIDAE Loeblich and Tappan, n. fam.

Test irregularly planispiral, chambers inflated and periphery rounded, sutures and primary aperture covered by plates, enclosing sutural canals that lead to small rounded openings along the margins of the plates. Holocene.

Type genus: *Bisaccium* Andersen, 1951.

Remarks: Differs from the Planulinidae in the rounded and noncarinate chamber periphery, in being bi-involute and nearly completely planispiral, and in having plates over the sutures and aperture, resulting in sutural canals and an apertural chamberlet.

BISACCIOIDES Collins, 1981

Plate 633, figs. 8-12

Type species: Bisaccioides cuspatus Collins, 1981; OD.

Bisaccioides Collins, 1981 (***648**), p. 4.

Test irregularly planispiral, bi-involute, final whorl with about six gradually enlarging and inflated chambers, umbilici covered by a perforate and pustulose plate that continues along the base of the final chamber to form a small chamberlet over the primary aperture, branches from the umbilical plate form raised bands along the sutures and connect across the test periphery to those from the opposite side, small arched openings along both sides of the sutural bands lead into the sutural canals beneath the bands, similar small openings border the plate that forms the apertural chamberlet; wall calcareous, radial, relatively thick, coarsely perforate; primary aperture interiomarginal and equatorial, covered by the plate of the apertural chamberlet, with accessory openings along the margins of the umbilical, apertural, and sutural coverplates. Holocene (estuarine): Northwest Australia.

Remarks: Differs from *Bisaccium* in the more inflated chambers, extensive sutural plates that cross the periphery and completely cover the sutures, and in the thicker and more coarsely perforate wall.

BISACCIUM Andersen, 1951

Plate 633, figs. 5-7

Type species: Bisaccium imbricatum Andersen, 1951: OD.

Bisaccium Andersen, 1951 (*31), p. 32.

Test planispiral, bilaterally symmetrical, and bi-involute, chambers increasing gradually in size as added, very slightly inflated, sutures radial, curved, and slightly depressed, umbilicus covered with a plate that radiates along the sutures about halfway to the periphery, a similar plate extends across the base of the apertural face to enclose a small chamberlet over the aperture; wall calcareous, finely perforate, very thin, and hyaline, surface smooth except for the umbilical and sutural plates; primary aperture interiomarginal and equatorial, obscured by the apertural chamberlet, accessory openings along the margins of the sutural plates, two larger ones at the upper margin of the apertural chamberlet cover plate. Holocene; USA: Louisiana.

Remarks: Originally placed in the Nonionidae because of the similarity to the apertural flaps of *Astrononion*, although the optical character of the wall is unknown for *Bisaccium*. Because of the obvious similarity to *Bisaccioides*, which has a radial wall, both are placed in the new family Bisacciidae.

Family CIBICIDIDAE Cushman, 1927

Cibicididae Chapman, Parr, and Collins, 1934 (*543), p. 556, 570, nom. transl. ex subfamily Cibicidinae.
Falsocibicididae Saidova, 1981 (*2696), p. 49.

Test trochospirally enrolled, attached by spiral side; primary aperture a low equatorial arch that may extend onto the spiral side or may become terminal and single or multiple in uncoiled forms. L. Cretaceous (Berriasian) to Holocene.

Subfamily CIBICIDINAE Cushman, 1927

Cibicidinae Cushman, 1927 (*742), p. 93.
Truncatulininae Schubert, 1921 (*2823), p. 151.
Orbitorotaliininae Hofker, 1933 (*1493), p. 125 (invalid, ICZN Art. 29(a); and name not available, Art. 13(a)(i), no description).
Cibicidinea Saidova, 1981 (*2696), p. 48 (supersubfamily).
Cibicidinellinae Saidova, 1981 (*2696), p. 48.
Cibicidinellinea Saidova, 1981 (*2696), p. 48 (supersubfamily).
Lobatulinae Saidova, 1981 (*2696), p. 48.
Lobatulinea Saidova, 1981 (*2696), p. 48 (supersubfamily).
Falsocibicidinae Saidova, 1981 (*2696), p. 49.
Falsocibicidinea Saidova, 1981 (*2696), p. 49 (supersubfamily).

Cibicididae with test enrolled throughout. Paleocene to Holocene.

CIBICICOIDES Saidova, 1975

Plate 634, figs. 4-6

Type species: Cibicicoides tesnersianus Saidova, 1975 (as *teshersianus* in expl. pl. 64, fig. 6); OD.

Cibicicoides Saidova, 1975 (*2695), p. 234.

Test in a low trochospiral coil, spiral side flattened but slightly involute, final whorl slightly elevated and partly overlapping the preceding one, umbilical side convex, umbilicate, sutures curved and depressed, periphery angular, carinate; wall calcareous, optically radial, perforate, surface smooth; aperture an interiomarginal equatorial arch that may extend more onto the umbilical side, with narrow bordering lip. Pleistocene to Holocene; Pacific; USA: California.

CIBICIDES de Montfort, 1808

Plate 634, figs. 1-3

Type species: Cibicides refulgens de Montfort, 1808; OD.

Cibicides de Montfort, 1808 (*2176), p. 122.

Storilus de Montfort, 1808 (*2176), p. 130; type species: *Storilus radiatus* de Montfort, 1808; OD(M).

Truncatulina d'Orbigny, 1826 (*2303), p. 278; type species: obj.: SD Galloway and Wissler, 1927 (*1209), p. 63.

Planorbulina (Truncatulina) Reuss, 1874 (*2592), p. 113 (nom. transl.).

Truncatulina (Cibicides) Yabe and Hanzawa, 1929 (*3410), p. 142 (nom. transl.).

Test commonly attached to a substrate, trochospiral and planoconvex, spiral side flat to concave, evolute, sutures thickened and may be elevated, strongly convex and involute umbilical side with depressed sutures, apertural face angular, periphery carinate; wall calcareous, optically radial, spiral side coarsely perforate, the pores being filled in earlier chambers by lamellar thickening of the wall, umbilical side finely perforate and apertural face and peripheral keel imperforate, surface smooth; aperture a low interiomarginal equatorial opening that extends a short distance onto the umbilical side but continues along the spiral suture on the spiral side. Paleocene to Holocene; cosmopolitan.

CIBICIDINA Bandy, 1949

Plate 634, figs. 13-15

Type species: Cibicidina walli Bandy, 1949; OD.

Cibicidina Bandy, 1949 (*115), p. 91.

Cibicides (Cibicidina) Wood and Haynes, 1957 (*3392), p. 46, 50 (nom. transl.).

Test trochoid, planoconvex, spiral side flat to concave, semievolute, umbilical side convex and involute, sutures curved strongly back at the periphery on the spiral side, gently curved on the umbilical side, depressed, periphery angular, carinate; wall calcareous, hyaline, optically radial, finely perforate, surface smooth; aperture a low interiomarginal and equatorial arch, extending slightly onto the spiral side. U. Paleocene (Thanetian) to Holocene; cosmopolitan.

CIBICIDINELLA Saidova, 1975

Plate 634, figs. 7-9

Type species: Cibicidinella soliorum Saidova, 1975; OD.

Cibicidinella Saidova, 1975 (*2695), p. 236.

Test trochospiral, spiral side incompletely evolute, flattened, with limbate sutures strongly curved back at the periphery, umbilical side incompletely involute and convex, eight to ten gradually enlarging chambers in the final whorl, sutures radial and slightly depressed, periphery subangular, carinate; wall calcareous, optically radial, coarsely perforate on the spiral side, more finely perforate on the umbilical side, sutures and peripheral keel imperforate; aperture interiomarginal, an equatorial arch bordered by a projecting lip, continuing onto the spiral side along the base of the chamber. Holocene, sublittoral to bathyal; Pacific.

DISCORBIA Sellier de Civrieux, 1977

Plate 635, figs. 4-6

Type species: Discorbia valvulinerioides Sellier de Civrieux, 1977; OD.

Discorbia Sellier de Civrieux, 1977 (*2866), p. 17.

Test ovate in outline, low trochospiral, spiral side flat, the two whorls enlarging rapidly, early sutures flush and obscure, final one or two depressed and slightly oblique, umbilical side slightly convex and partially evolute, the earlier whorl visible in the open umbilicus, later chambers with short and broad umbilical flap or folium, sutures radial and depressed, periphery rounded; wall calcareous, earliest chambers not perforate, later coarsely perforate, except for the imperforate peripheral region and apertural face; aperture an equatorial and interiomarginal arch, with prominent bordering lip, extending onto the umbilical side beneath the umbilical folia. Holocene: Caribbean: off Venezuela.

FALSOCIBICIDES Poignant, 1958

Plate 635, figs. 7-11

Type species: Falsocibicides aquitanicus Poignant, 1958; OD.

Falsocibicides Poignant, 1958 (*2437), p. 117.

Test large, ovate in outline, attached, trochospiral, planoconvex, spiral side flattened, chambers increasing rapidly in size as added, umbilical side convex, involute to partially evolute, umbilicate, sutures radial, straight to curved and depressed on both sides, periphery rounded and noncarinate, peripheral outline lobulate; wall calcareous, coarsely perforate, surface without ornamentation; aperture a large rounded interiomarginal subequatorial opening that may be slightly displaced to the umbilical side and may also extend somewhat onto the spiral side, supplementary apertures at the umbilical margin of the chambers on the umbilical side, less commonly may have additional small opening at the posterior margin of the final chamber, all openings bordered by small nonperforate lips, a thin internal plate divides the aperture horizontally and extends back to the previous foramen. M. Oligocene (Stampian) to L. Miocene (Burdigalian): France.

FALSOPLANULINA Bermúdez, 1979

Plate 635, figs. 12-15

Type species: Rotalia ammophila Gümbel, 1870 (***1337**), p. 652; OD.

Falsoplanulina Bermúdez, 1979 (***208**), p. 115.

Test very low trochospiral, bi-involute, planoconvex, seven to twelve chambers in the final whorl, spiral side flattened to slightly concave, umbilical side convex with umbilical plug, chambers broad and low, somewhat elevated adjacent to the depressed sutures that are strongly arched forward and curve back at the periphery; aperture an interiomarginal, equatorial, slitlike opening, without a lip. Paleocene to Miocene; cosmopolitan.

FONTBOTIA González-Donoso and Linares, 1970

Plate 634, figs. 10-12; plate 635, figs. 1-3

Type species: Anomalina wuellerstorfi Schwager, 1866 (***2828**), p. 258; OD.

Fontbotia González-Donoso and Linares, 1970 (***1265**), p. 238.

Test compressed, low trochospiral, all whorls visible on the flat spiral side although the coiling is partially involute, final whorl with eight to twelve chambers, chambers broad, low, and strongly arched, curving back at the periphery on both sides, weakly convex umbilical side involute and umbonate, sutures strongly curved, limbate, elevated, periphery carinate; wall calcareous, optically radial, spiral side coarsely perforate; aperture interiomarginal, a small equatorial arch with a slight lip that may extend somewhat onto the spiral side. Miocene to Holocene; cosmopolitan.

Remarks: Differs from *Planulina* and *Falsoplanulina* in the trochospiral test, from *Cibicides* and *Lobatula* in the very flat trochospiral coiling, more numerous broad low chambers, and strongly recurved to subangular sutures, and more restricted aperture, with only a short extension onto the spiral side. A neotype from the L. Pliocene of Car Nicobar was designated by Srinivasan and Sharma, 1980 (***3053**).

LOBATULA Fleming, 1828

Plate 637, figs. 10-13

Type species: Lobatula vulgaris Fleming, 1828 = *Nautilus lobatulus* Walker and Jacob, in Kanmacher, 1798 (***1639**), p. 642 (syn.: *Serpula lobata* Montagu, 1803, ***2168**, p. 515); OD(M).

Lobatula Fleming, 1828 (***1136**), p. 232.

Test trochospirally coiled, spiral side flat to irregular, sutures thickened, depressed to slightly elevated, oblique, curved backward at the periphery, umbilical side gently convex, sutures depressed and radial around the shallow umbilicus, periphery rounded to angular, carinate, peripheral outline lobulate; wall calcareous, coarsely perforate, but keel, apertural lip and area bordering the aperture are imperforate: aperture an interiomarginal, equatorial arch, bordered by a lip and extending onto the spiral side beneath a narrow folium. Paleocene to Holocene; cosmopolitan.

MONTFORTELLA Loeblich and Tappan, 1963

Plate 636, figs. 1-6; plate 637, figs. 1-9

Type species: Montfortella bramlettei Loeblich and Tappan, 1963; OD.

Montfortella Loeblich and Tappan, 1963 (***1909**), p. 213.

Heterocibicides McCulloch, 1977 (***1961**), p. 449; type species: *Heterocibicides disjuncta* McCulloch, 1977; OD.

Mesocibicides McCulloch, 1977 (***1961**), p. 450 (also err. cit. as *Mesocibides*, p. 450); type species: *Mesocibicides pilotrockensis* McCulloch, 1977 = *Montfortella bramlettei* Loeblich and Tappan, 1963; OD.

Test trochospiral, attached by the flattened to concave and evolute spiral side, umbilical side convex and involute, the chambers having an umbilical flap or folium, sutures curved, limbate, and flush on the spiral side, strongly curved and depressed on the umbilical side, sutural depression greatest toward the umbilicus and may form a slitlike to tubular intercameral opening that completely penetrates the test and opens on the spiral side between the apertural lip and periphery but is not continuous with the aperture, periphery angular, carinate, peripheral outline lobulate to irregular; wall calcareous, optically radial, coarsely perforate on the umbilical side, imperforate to sparsely perforate on the spiral side, with imperforate apertural lip, border of intercameral openings, umbilical projections, and keel; primary aperture interiomarginal and equatorial as in *Cibicides* and continuing along the spiral suture, bordered by a protruding lip, secondary apertures on the umbilical side open beneath the series of triangular umbilical flaps or folia. L. Pliocene to Holocene: USA: California; Mexico; Ecuador; Pacific: Galapagos Islands.

PARACIBICIDES Perelis and Reiss, 1975

Plate 634, figs. 16-18

Type species: Paracibicides edomica Perelis and Reiss, 1975; OD.

Paracibicides Perelis and Reiss, 1975 (*2382), p. 93 (also err. cit. as *Paracibides*, p. 93).

Test trochospiral, planoconvex, with flattened and evolute spiral side and convex involute umbilical side, sutures on the spiral side limbate, elevated and slightly sinuate, sutures on the umbilical side straight, radial, and depressed around the depressed umbilicus, periphery carinate; wall calcareous, optically indistinctly radial, coarsely perforate; aperture a small interiomarginal, equatorial arch that may extend onto the spiral suture and remain open in the last few chambers, tiny secondary apertures occur at the opposite or proximal margin of the chamber on the periphery or just slightly on the spiral side, as in *Caribeanella*. Holocene; Israel: Gulf of Elat.

PSEUDOCIBICIDES Y. Le Calvez and Margerel, 1965

Plate 638, figs. 1-3

Type species: Pseudocibicides occidentalis Y. Le Calvez and Margerel, 1965; OD.

Pseudocibicides Y. Le Calvez and Margerel, 1965 (*1809), p. 205.

Test large, up to 1.1 mm in breadth, planoconvex, spiral side flat and commonly irregular according to the nature of the substrate to which it was attached, chambers enlarging gradually, sutures oblique and curved back at the periphery, umbilical side convex with chambers appearing subtriangular and sutures radial, depressed, and straight near the deeply depressed umbilicus but curving backward near the periphery, periphery angular to carinate, peripheral outline lobulate; wall calcareous, coarsely perforate; aperture interiomarginal and equatorial, at the base of the apertural face on the periphery and bordered by a lip, the short curved sutural openings on the spiral side have nonperforate borders, and additional sutural openings on the umbilical side result from the loosely joined chambers, the interlocular space passing through the test from one side to that opposite as in *Montfortella* but somewhat less pronounced. M. Eocene (U. Lutetian); France.

RHODANOPEZA Loeblich and Tappan, 1986

Plate 638, figs. 4-8

Type species: Cibicides natlandi Beck, 1943 (*167), p. 612; OD.

Rhodanopeza Loeblich and Tappan, 1986 (*1928), p. 253.

Test trochospiral, biconvex, compressed, all whorls visible on the somewhat flatter spiral side, only the nine to ten chambers in the final whorl visible on the umbilical side, sutures strongly curved and oblique, thickened and elevated, continuing into the peripheral keel on the spiral side but forming a strongly elevated and undulating chamber border that parallels the carina and attaches to the border of the preceding chamber on the umbilical side, periphery carinate; wall calcareous, midregion of the chambers coarsely perforate on both sides, but a broad area of the sutures, apertural face, apertural flap on the spiral side, and marginal keel are imperforate, surface of spiral side smooth except for the elevated sutures, umbilical side ornate, with prominent elevated and corrugated sutures that may be produced into spinules, chamber surface also may have occasional pustules that are more elevated on the earlier part of the test due to lamellar thickening; aperture interiomarginal, equatorial, bordered by a distinct narrow rim and extending onto the spiral side beneath a flap at the base of the chamber, then continuing along the spiral suture to the proximal margin of the chamber, and the apertures of the last few chambers may remain open. U. Eocene (Bartonian); USA: Washington.

Remarks: *Rhodanopeza* differs from *Cibicides* in the biconvex test, presence of distinct flaps over the apertural extension on the spiral side, and by the prominent, elevated, pustulose, and undulating sutural ridges on the umbilical side. It resembles *Planulina* in the biconvex test, restriction of perforations to the midregion of the chambers, apertural flaps over the spiral suture, and equatorial rimmed aperture but differs in the involute umbilical side with its prominent sutural ornamentation.

Subfamily STICHOCIBICIDINAE Saidova, 1981

Stichocibicidinae Saidova, 1981 (*2696), p. 48.
Dyocibicidinae Saidova, 1981 (*2696), p. 48.

Test loosely coiled or uncoiled in the later stage and may be uniserial or biserial in uncoiled portion. L. Eocene (Ypresian) to Holocene.

CRIMMIA McCulloch, 1977

Plate 639, figs. 11 and 12

Type species: Crimmia afueraensis McCulloch, 1977; OD.

Crimmia McCulloch, 1977 (***1961**), p. 464.

Test attached, flattened, and spreading in an arcuate series, chambers broad and low, enlarging rapidly to irregularly, peripheral outline strongly lobulate; wall calcareous, distinctly perforate, with scattered much larger pores that may serve as the aperture; no primary aperture observed. Holocene; E. Pacific: off Peru at about 30 m.

Remarks: Apparently known only from a single specimen and may be an aberrant *Rectocibicides;* tentatively recognized pending study of additional specimens.

DYOCIBICIDES Cushman and Valentine, 1930

Plate 639, figs. 4-10

Type species: Dyocibicides biserialis Cushman and Valentine, 1930; OD.

Dyocibicides Cushman and Valentine, 1930 (***852**), p. 30.
Rectocibicidella McLean, 1956 (***1975**), p. 370; type species: *Rectocibicidella robertsi* McLean, 1956; OD.

Test attached, elongate, compressed, early stage trochospirally coiled and attached by the spiral side, later uncoiling and biserial, adult test may have irregular chambers in a staggered uniserial arrangement, sutures curved and limbate in the early stage, later may be slightly depressed, periphery carinate, peripheral outline becoming lobulate in the adult; wall calcareous, coarsely perforate; aperture terminal, an elongate slit bordered by a lip. Eocene to Holocene; cosmopolitan.

GUTZIA McCulloch, 1977

Plate 639, figs. 1-3

Type species: Gutzia gorgonaensis McCulloch, 1977; OD.

Gutzia McCulloch, 1977 (***1961**), p. 464.

Test attached, chambers subrectangular to rounded, irregular in form, flattened, uniserial, sutures straight to slightly curved, depressed, peripheral margin lobulate; wall calcareous, thin, hyaline, distinctly perforate; aperture terminal, rounded, slightly produced, bordered by a narrow lip. Holocene: E. Pacific: off Colombia and Peru, at 40 m to 60 m.

Remarks: Somewhat resembles *Oolitella* but apparently lacks the entosolenian tube of that genus; differs from *Dyocibicides* in the absence of an initial coil.

PYROPILOIDES S. Y. Zheng, 1979

Plate 640, figs. 8-11

Type species: Pyropiloides elongatus S. Y. Zheng, 1979; OD.

Pyropiloides S. Y. Zheng, 1979 (***3449**), p. 185, 227.

Test attached, elongate, slightly flattened, early stage with globular chambers in low trochospiral coil and whorls enlarging rapidly, later chambers increasing in breadth and becoming spreading, sutures radial, depressed, umbilicus open, periphery rounded, peripheral margin lobulate; wall calcareous, coarsely and densely perforate, organic lining imparting a reddish-brown color to the early whorl, later whorls lighter in color, surface smooth; aperture in the early stage an interiomarginal arch extending from the umbilicus to the periphery, becoming umbilical in position in the adult. Holocene; China: Xisha Islands.

Remarks: Although compared originally to *Pyropilus*, this genus does not have the cyclic chamber development of the Cymbaloporidae nor the sutural rows of apertures of *Pyropilus*. It appears much closer to the attached and spreading Stichocibicidinae.

RECTOCIBICIDES Cushman and Ponton, 1932

Plate 639, figs. 13-15

Type species: Rectocibicides miocenicus Cushman and Ponton, 1932; OD.

Rectocibicides Cushman and Ponton, 1932 (*842), p. 2.

Test attached, early stage with a few gradually enlarging enrolled chambers, later uncoiled and uniserial, with broad and low chambers in nearly rectilinear arrangement, sutures nearly horizontal but somewhat irregular, peripheral margin lobulate; wall calcareous, coarsely perforate; aperture terminal and multiple, consisting of a row of rounded to ovate openings on slight necklike projections from the terminal face, each bordered by a lip. Miocene; USA: Florida.

STICHOCIBICIDES Cushman and Bermúdez, 1936

Plate 640, figs. 1-7

Type species: Stichocibicides cubensis Cushman and Bermúdez, 1936; OD.

Stichocibicides Cushman and Bermúdez, 1936 (*804), p. 33.

Test attached, early stage with trochospiral coil of one or more whorls, attached by the evolute flattened side, the free umbilical side convex and involute, later stage uniserial and rectilinear, with broad and low chambers that may be slightly arched at the midline, sutures flush against the attachment, depressed and slightly curved on the free side, periphery with imperforate carina; wall calcareous, coarsely perforate, smooth; aperture terminal, a slightly produced rounded opening with a bordering lip just above the attachment. L. Eocene (Ypresian) to U. Eocene; Cuba; Haiti; USA: Virginia; Czechoslovakia.

Subfamily ANNULOCIBICIDINAE Saidova, 1981

Annulocibicidinae Saidova, 1981 (*2696), p. 48 (also err. cit. as Annulocibidinae, p. 48).

Early stage trochospiral, later with strongly recurved to cyclical chambers. L. Cretaceous (Berriasian) to Holocene.

ANNULOCIBICIDES Cushman and Ponton, 1932

Plate 640, figs. 12-14

Type species: Annulocibicides projectus Cushman and Ponton, 1932; OD.

Annulocibicides Cushman and Ponton, 1932 (*842), p. 1.

Test attached, discoidal, globular early chambers in planispiral coil of about two volutions, sutures straight and radial, flush on the attached side, depressed on the free side, later chambers very broad and low and becoming cyclical, periphery rounded; wall calcareous, coarsely perforate; aperture consisting of rounded openings on the periphery, bordered by narrow lips, resembling *Cyclocibicides* but lacking the large sutural pores on the spiral side. L. Miocene; USA: Florida.

CYCLOCIBICIDES Cushman, 1927

Plate 640, figs. 15-17

Type species: Planorbulina vermiculata d'Orbigny, 1826 (*2303), p. 280; OD.

Cyclocibicides Cushman, 1927 (*742), p. 93.

Test attached, discoidal, the somewhat irregular early chambers in a trochospiral coil, spiral side flattened against the attachment, chambers inflated on the free side, later chambers low and cyclical, sutures depressed, periphery rounded; wall calcareous, optically radial, more coarsely perforate on the unattached side; aperture of large sutural pores on the attached spiral side and scattered peripheral pores that later become foramina connecting the successive annular chambers. Holocene; Mediterranean.

Remarks: The lectotype of *P. vermiculata* (MNHN, Paris, no. 12353) was designated by Loeblich and Tappan (1964, *1910, p. C690).

CYCLOLOCULINA Heron-Allen and Earland, 1908

Plate 640, figs. 18-20

Type species: Cycloloculina annulata Heron-Allen and Earland, 1908 = *Planorbulina eocaenica* Terquem, 1882 (*3147), p. 90; SD Cushman, 1927 (*746), p. 190.

Cycloloculina Heron-Allen and Earland, 1908 (*1466), p. 533.

Test large, up to 1 mm in diameter, discoidal, with smoothly rounded periphery, early chambers planispiral to slightly asymmetrical, later chambers uncoiling and flabelliform, final chambers annular, sutures distinct, depressed, bridged by retral processes; wall calcareous, optically radial, surface pustulose; aperture consisting of irregularly scattered large pores on the surface, no fine perforations present, successive cyclical chambers communicate through foramina formed by secondarily enlarged pores. M. Eocene to L. Miocene: England; France; Belgium; Pacific: Hawaii; Saipan; Midway Atoll.

EPITHEMELLA Sliter, 1968

Plate 641, figs. 1-11

Type species: Conorbina martinae Brotzen, 1936 (***425**), p. 143 (as *martini*); OD.

Epithemella Sliter, 1968 (***3002**), p. 108.

Test attached, concavoconvex, early chambers in a low trochospiral coil, increasing rapidly in breadth as added and nearly astacoline in appearance, but early part may be obscured by secondary thickening, then abruptly changing to very broad, low, crescentic, and strongly overlapping chambers, separated by flush and strongly oblique sutures as seen from the spiral side, amount of overlap increasing until the chambers become cyclical, final chamber may occupy much of the umbilical side, each chamber has an umbilical apertural extension on the umbilical side, those of successive chambers overlapping, sutures strongly curved, weakly depressed, periphery acutely angular and carinate; wall calcareous, with widely spaced coarse perforations except for the imperforate peripheral carina and umbilical apertural flap; aperture interiomarginal, opening beneath the umbilical flap. L. Cretaceous (Berriasian) to M. Miocene (U. Tortonian); Sweden; Germany; USA: California; USSR: Ukraine, Crimea.

PLANORBULINOIDES Cushman, 1928

Plate 642, fig. 1

Type species: Planorbulina retinaculata Parker and Jones, in Carpenter et al., 1862 (***494**), p. 209; OD.

Planorbulinoides Cushman, 1928 (***748**), p. 6.

Test attached, chambers globular in the early trochospiral stage, later chambers more irregular, spreading, and loosely appressed, leaving gaps between adjacent whorls in an open mesh, sutures depressed, periphery irregularly lobulate; wall calcareous, coarsely perforate; aperture multiple, small openings on short necks that arise at the chamber margin against the attachment. Holocene; East Indies; West Indies.

Remarks: As noted previously (Loeblich and Tappan, 1964, ***1910**, p. C691), the type specimen of *P. retinaculata* could not be located in the British Museum. Although originally stated to occur in the "East and West Indies," it seemingly is rare and known only from the original description.

Family PLANORBULINIDAE Schwager, 1877

Planorbulinidae Cushman, 1927 (***742**), p. 95, nom. transl. ex subfamily Planorbulinidae.

Planorbulinellidae Freudenthal, 1969 (***1183**), p. 138 (name not available, ICZN Art. 13 (a)(i), no description).

Planolinderinidae Freudenthal, 1969 (***1183**), p. 138 (name not available, ICZN Art. 13 (a)(i), no description).

Test free or attached, early stage trochospiral, later may have chamber proliferation resulting in discoid, cylindrical, or conical tests; aperture single or multiple, peripheral. Eocene to Holocene.

Subfamily CARIBEANELLINAE Saidova, 1981

Caribeanellinae Saidova, 1981 (***2696**), p. 49.

Caribeanellinea Saidova, 1981 (***2696**), p. 49 (supersubfamily).

Test free, trochospiral, spiral side partially involute, periphery rounded; primary aperture equatorial, and supplementary openings present both in the umbilical position and at the basal margin of the final chamber on the periphery. Pliocene to Holocene.

CARIBEANELLA Bermúdez, 1952

Plate 642, figs. 5-19

Type species: Caribeanella polystoma Bermúdez, 1952; OD.

Caribeanella Bermúdez, 1952 (***205**), p. 121.

Oinomikadoina Matsunaga, 1954 (***2062**), p. 163; type species: *Oinomikadoina ogiensis* Matsunaga, 1954; OD.

Pseudocibicidoides Ujiie, 1956 (***3241**), p. 263; type species: *Pseudocibicidoides katasensis* Ujiie, 1956; OD.

Test low trochospiral, biconvex in the early stage, later becoming somwhat planoconvex, spiral side evolute to partially involute, umbilical side involute, chambers broader than high, curving back at the periphery, six to nine in the final whorl, sutures thickened and imperforate, depressed, curved on the spiral side, nearly straight and radial on the umbilical side, periphery subangular to rounded; wall calcareous, optically radial, very coarsely perforate, surface smooth; primary aperture a low interiomarginal and equatorial arch that continues slightly onto the umbilical side and is bordered above by a prominent imperforate lip, smaller secondary aperture with lip at the proximal margin of the chamber against the preceding suture on the periphery, secondary apertures of the last few chambers remaining open, a third type of opening present as a supplementary low arched aperture on the spiral side near the inner margin of each chamber against the previous whorl, also bordered by a lip, rare specimens may have a slit beneath an umbilical flap on the involute umbilical side as a fourth type of aperture. Pliocene to Holocene; Caribbean; Atlantic; Pacific; Japan.

Subfamily PLANORBULININAE Schwager, 1877

Planorbulininae Galloway, 1933 (*1205), p. 297 (nom. corr.)

Planorbulinidae Schwager, 1877 (*2830), p. 20 (subfamily).

Test attached, chamber proliferation in the adult resulting in a discoidal, cylindrical, or conical test. Eocene to Holocene.

NEOPLANORBULINELLA Matsumara, 1976

Plate 643, figs. 1–4

Type species: Neoplanorbulinella saipanensis Matsumara, 1976; OD.

Neoplanorbulinella Matsumara, 1976 (*2061), p. 201.

Test conical to concavoconvex, up to 0.75 mm in diameter, megalospheric protoconch consisting of proloculus and slightly to completely embracing second chamber, followed by numerous trochospirally arranged chambers, adult with equatorial chambers in annular series and with two or more rows of lateral chambers on the concave side; wall calcareous, thick, coarsely perforate; multiple aperture consists of a basal opening on each side of the chambers. L. Miocene; W. Pacific: Saipan, Mariana Islands.

PLANOLINDERINA Freudenthal, 1969

Plate 643, figs. 5–9; plate 644, figs. 1–5

Type species: Planolinderina escornebovensis Freudenthal, 1969; OD.

Planolinderina Freudenthal, 1969 (*1183), p. 95.

Test small, up to 1 mm in diameter, discoidal, flat to planoconcave, early chambers in a trochoid spire of up to nine chambers in the microspheric generation, juvenile megalospheric stage of protoconch and deuteroconch, later chambers added in cyclic series, periphery rounded, peripheral outline lobulate; wall calcareous, coarsely perforate, surface of the peripheral wall with fine costae paralleling the flat sides of the test, rows of perforations present between the ribs, the flat side of the test may also have fine irregular imperforate ridges; aperture multiple, with a row of three to six small rounded openings on the periphery at the base of each chamber, each bordered by a small imperforate lip, some openings appearing no larger than the pores on other parts of the chamber, but those at the lateral edges of the peripheral margin may be somewhat larger. U. Oligocene (Chattian) to L. Miocene (Burdigalian); France; Southwest Pacific; Australia; Indonesia; India: Kutch.

PLANORBULINA d'Orbigny, 1826

Plate 645, figs. 1–6; plate 646, figs. 1 and 2

Type species: Planorbulina mediterranensis d'Orbigny, 1826 (syn.: *Planorbulina vulgaris* d'Orbigny, 1839, *2304, p. 85); SD Cushman, 1915 (*707), p. 27.

Planorbulina d'Orbigny, 1826 (*2303), p. 280.

Asterodiscus Ehrenberg, 1839 (*1054), table opp. p. 120; type species: *Asterodiscus forskalii* Ehrenberg, 1839 = *Planorbulina mediterranensis* d'Orbigny, 1826, fide Cushman, 1944 (*794), p. 157; OD.

Spirobotrys Ehrenberg, 1844 (*1063), p. 246, 247; type species: *Spirobotrys aegaea* Ehrenberg, 1844 = *Planorbulina mediterranensis*, fide Cushman, 1944 (*794), p. 157; OD(M).

Cibicidella Cushman, 1927 (*742), p. 93; type species: *Truncatulina variabilis* d'Orbigny, 1826 (*2303), p. 279; OD.

Test discoidal, early stage in low trochospiral coil of random coiling direction, attached to the substrate by the spiral side, microspheric proloculus 11 μm to 14 μm in diameter, megalospheric one 23 μm to 56 μm in diameter, later chambers have two apertures and each gives rise to new biapertural chambers, producing numerous spirals and eventually whorls of chambers, sutures distinct, may be thickened and elevated on the attached side, commonly depressed on the free side, periphery rounded to subangular; wall calcareous, optically radial, coarsely perforate, organic membrane giving a brownish color to the early spire and pierced only by the apertures, not by the wall perforations; aperture in early coil single, arched, and interiomarginal on the periphery, each later chamber with two apertures on the periphery at opposite ends of the chamber, each opening bordered by a narrow lip, smaller supplementary openings for the extrusion of pseudopodia may occur on both sides of the test; vegetative cytoplasm greenish-brown to salmon-rose in color but pigments eliminated at reproduction, pseudopodia rectilinear, about equal to test diameter in length, anastomosing slightly and showing slow circulation of granules; much of parent test dissolved during schizogony, 60 to 100 embryos with only an organic test layer being produced in a temporary agglutinated reproductive cyst, calcification commences at about the five-chamber stage and is followed by escape from the cyst; sexual reproduction involves many nuclear divisions and utilization of all parent cytoplasm to produce numerous inequally biflagellate gametes that are released from the parent test at night. Eocene to Holocene; cosmopolitan.

PLANORBULINELLA Cushman, 1927

Plate 642, figs. 2-4

Type species: Planorbulina vulgaris d'Orbigny var. *larvata* Parker and Jones, 1865 (***2351**), p. 380; OD.

Planorbulinella Cushman, 1927 (***742**), p. 96.
Planorbulina (Planorbulinella) Nuttall, 1930 (***2276**), p. 276 (nom. transl.).

Test discoidal, flattened, trochospiral in the early stage, may be attached, later planispiral and nearly symmetrical, with chambers added in annular series, those of successive annuli alternating in position, sutures depressed to thickened and limbate, periphery angular to rounded; wall calcareous, coarsely perforate, optically radial, central part of the test may be thickened by lamellar additions; two interiomarginal apertures per chamber lie at opposite ends of each chamber on the periphery and are provided with a narrow bordering lip. Eocene to Holocene; Atlantic; Mediterranean; Pacific; Australia; New Zealand; Cuba; Mexico; USA: North Carolina.

PLANORBULINOPSIS Banner, 1971

Plate 646, figs. 3-7

Type species: Planorbulinopsis parasitica Banner, 1971; OD.

Planorbulinopsis Banner, 1971 (***122**), p. 115.

Test trochospiral in the early stage, about two whorls of inflated chambers separated by weakly depressed sutures, spiral side evolute, umbilical side involute and umbilicus open and deep, later chambers alternating in position with those of the preceding whorl, adjacent chambers of a single whorl are not in contact; wall calcareous, optically radial, coarsely perforate except for an imperforate peripheral band in the early stage, later chambers entirely perforate except immediately adjacent to the apertures and sutures, laminations added over the early test as successive chambers form and partly or completely close the perforations of earlier chambers on the spiral side; aperture single, interiomarginal, and umbilical in the early stage, with rimlike lip, later chambers with two arched rimmed apertures, one directed toward the umbilicus and the other on the periphery in opposition to the similar aperture of the adjacent adult chamber; parasitic on *Alveolina*, young individuals attach to the host by their umbilical side and burrow into the host's shell, the downward burrowing more rapid than radial growth so that the test becomes partly enclosed by the host test, and the latter is laterally tunnelled, probably by the pseudopodia of the parasite. Holocene; Coral Sea: Papua New Guinea.

TAYAMAIA Hanzawa, 1967

Plate 647, figs. 1-4

Type species: Gypsina marianensis Hanzawa, 1957 (***1409**), p. 66; OD.

Tayamaia Hanzawa, 1967 (*1412), p. 22.

Test domelike, median layer of larger chambers parallels the upper surface, covered dorsally by a few tiers of smaller chambers and with ventral hollow of the dome filled with numerous more irregular chambers, median layer with spherical proloculus and annular series of arcuate chambers interconnected by four stolons, two at each end of the chamber, dorsal series of chambers aligned in tiers, appearing quadrangular in transverse section but irregular in horizontal section, ventral chambers arcuate in transverse section and irregular in horizontal section; wall calcareous, that of lateral chamber walls solid and nonperforate, roofs and floors finely perforate. L. Miocene (Aquitanian): Saipan and Tinian, Mariana Islands.

Family CYMBALOPORIDAE
Cushman, 1927

Cymbaloporidae Cushman, 1927 (*742), p. 81.
Cymbaloporettidae Cushman, 1928 (*747), p. 8.
Halkyardiidae Kudo, 1931 (*1748), p. 201.

Test trochospiral, later chambers in annular series in a single flat to conical layer; numerous apertures present as small circular pores. U. Cretaceous (Cenomanian) to Holocene.

Subfamily CYMBALOPORINAE
Cushman, 1927

Cymbaloporinae Chapman and Parr, 1936 (*542), p. 143, nom. transl. ex family Cymbaloporidae.

Chambers in a single layer, interior undivided. U. Cretaceous (Cenomanian) to Holocene.

ARCHAECYCLUS A. Silvestri, 1908

Plate 647, figs. 5-8

Type species: Planorbulina cenomaniana Seguenza, 1882 (***2840**), p. 200; OD(M).

Archaecyclus A. Silvestri, 1908 (*2944), p. 134.

Test large, up to 1.6 mm in diameter, discoidal to concavoconvex, large proloculus followed by enrolled early stage of five chambers per whorl, later chambers in annular series, those of successive annuli alternating in position, sutures oblique; wall calcareous, perforate, with thin dark median layer; aperture in the early stage interiomarginal, later with stolonlike openings at lateral margins of each chamber. U. Cretaceous (Cenomanian): Italy.

CYMBALOPORA von Hagenow, 1851

Plate 648, figs. 4-6

Type species: Cymbalopora radiata von Hagenow, 1851; OD(M).

Cymbalopora von Hagenow, 1851 (***1360**), p. 104.

Low conical test, early chambers trochospirally arranged, later in annular series around an open umbilicus, umbilical portions of chambers commonly broken away, sutures obscured on spiral side by secondary thickening, radial and depressed on the umbilical side, periphery rounded; wall calcareous, coarsely perforate, lamellar, thickened on the spiral side, obscuring sutures and chambers but leaving some pores open; aperture at the open umbilical end of the chambers. U. Cretaceous to M. Paleocene: France; Netherlands; Yugoslavia; Cuba.

CYMBALOPORELLA Cushman, 1927

Plate 648, figs. 1-3

Type species: Cymbalopora tabellaeformis Brady, 1884 (***344**), p. 637; OD.

Cymbaloporella Cushman, 1927 (*742), p. 81.

Test up to 1 mm in diameter, early stage trochospiral, spiral side flattened, later chambers in approximately cyclic series, those of successive cycles alternating in position, chambers inflated, of somewhat irregular form, sutures depressed, deeply umbilicate on the convex umbilical side, periphery broadly rounded, peripheral outline lobulate; wall calcareous, optically radial, coarsely perforate, an organic layer giving a brownish color to chambers of the early whorl; aperture consists of rows of large pores along each suture on the umbilical side. Holocene; Indian Ocean: Madagascar; W. Pacific: Samoa; Philippines; Ki Islands; Fiji.

CYMBALOPORETTA Cushman, 1928

Plate 649, figs. 1-15

Type species: Rosalina squammosa d'Orbigny, 1839 (***2304**), p. 91; OD.

Cymbaloporetta Cushman, 1928 (***748**), p. 7.

Pseudotretomphalus Hofker, 1979 (***1529**), p. 21; type species: *Tretomphalus bulloides* (d'Orbigny) var. *plana* Cushman, 1924 (***725**), p. 36; OD.

Schizont test benthic, early stage trochospiral, low to moderately high conical, later chambers low and crescentic and added in cycles, those of successive cycles alternating in position, final whorl with three to six subtriangular chambers separated by incised radial sutures or intercameral gaps, all chambers visible and sutures oblique and flush on the spiral side, only the final whorl visible on the flattened side where umbilical platelike chamber extensions may partially obscure the umbilicus, periphery subangular, peripheral margin weakly lobulate; wall calcareous, optically radial, coarsely perforate on the spiral side, umbilical side sparsely or not perforate, surface smooth; aperture in the early stage single, later with interiomarginal apertures at each side bordered with rimlike lips, a third aperture opening into the umbilicus may have the lip extended as a tube or funnel or produced as a flangelike plate around the umbilicus, with a single plate or a complex series of perforated plates over the center; gamont similar in the early stage but at gametogenesis temporarily becomes planktonic as it produces a large hemispherical lobulate float chamber over the umbilical side, lobes of the inflated and nonperforate float chamber corresponding in position to chambers of the final whorl, entire float chamber enclosed in a perforate walled balloon chamber, the float and balloon chambers separated by a space in which the gametes develop or less commonly the two chambers may adhere in places, balloon chamber also with many large rounded openings bordered by distinct lips in the central part of the terminal face. Pliocene to Holocene; cosmopolitan.

Remarks: A lectotype was designated for *Rosalina squammosa* (MNHN, Paris, d'Orbigny Coll. FO 312) by Y. LeCalvez (1977, ***1806**, p. 100, pl. 12, fig. 5). *Tretomphalus bulloides* var. *plana* Cushman was regarded as belonging to *Cymbaloporetta* by Sellier de Civrieux (1976, ***2865**, p. 185) and by Rückert-Hilbig (1983, ***2666**, p. 47), although both considered the latter a synonym of *Tretomphalus*. Banner et al. (1985, ***131**, p. 164) designated a neotype for *Tretomphalus bulloides*, fixing it as having a *Rosalina*-like early stage and thus distinct from *Cymbaloporetta*. As Banner et al. (1985, ***131**) include *T. planus* in *Cymbaloporetta*. *Pseudotretomphalus* also is a junior synonym.

MILLETTIANA Banner, Pereira, and Desai, 1985

Plate 648, figs. 7-11

Type species: Cymbalopora milletti Heron-Allen and Earland, 1915 (***1472**), p. 689; OD.

Cymbaloporetta (Millettiana) Banner, Pereira, and Desai, 1985 (***131**), p. 170.

Test trochospiral and planoconvex in the early stage, chambers rapidly broadening to become crescentic and coarsely perforate on the spiral side, umbilical side imperforate with radial sutures, later chambers added in cycles, the chambers having lateral apertures; the gamont generation during gamogony produces a balloon chamber and enclosed float chamber like those of *Cymbaloporetta* but of greater complexity, the imperforate inner float chamber is fused to the wall of the similarly imperforate balloon chamber except where peripheral infolding forms branching channels, arching of the balloon chamber over the branching channels of the float chamber produces branching tubes, reflected externally as ridges that each terminate in a rounded aperture, the tubes that radiate from the apertures of the trochospiral test to the external openings of the balloon chamber providing multiple pathways for cytoplasm and gametes. Holocene: Pacific Ocean and Indian Ocean.

Remarks: Although *Millettiana* was proposed as a subgenus of *Cymbaloporetta*, the morphologic differences in their float chambers are here regarded as of generic significance.

PYROPILUS Cushman, 1934

Plate 650, figs. 1–4

Type species: Pyropilus rotundatus Cushman, 1934; OD.

Pyropilus Cushman, 1934 (*774), p. 100.

Test trochospirally enrolled in the early stage, chambers later added irregularly to form an elongate mass, all chambers visible on the spiral side, only the final series visible around the umbilical depression of the opposite side, sutures depressed, periphery rounded; wall calcareous, coarsely perforate, with thin organic lining, surface smooth; on the umbilical side of the test, one or more rows of large apertural pores occur along the sutures of all chambers of the final whorl, as in *Cymbaloporella*, and additional pores may occur at the umbilical end of the final chamber. Holocene: Pacific: Rangiroa Atoll.

Subfamily FABIANIINAE Deloffre and Hamaoui, 1973

Fabianiinae Deloffre and Hamaoui, 1973 (*932), p. 302.

Embryonic stage of few large chambers, followed by later chambers in cycles or tiers, repeatedly subdivided by horizontal and vertical partitions; aperture consists of pores on terminal face. U. Paleocene to U. Eocene.

EOFABIANIA Küpper, 1955

Plate 651, figs. 1–3

Type species: Eofabiania grahami Küpper, 1955; OD.

Eofabiania Küpper, 1955 (*1755), p. 135.

Test low to high conical, early stage trochospiral, later chambers may be added in annular series or irregularly, interior without subdivisions; wall calcareous, perforate; apertures slitlike and umbilical in position. M. Eocene?; USA: California.

FABIANIA A. Silvestri, 1924

Plate 651, figs. 4–8

Type species: Patella (Cymbiola) cassis Oppenheim, 1896 (*2301), p. 55, 56; OD.

Fabiania A. Silvestri, 1924 (*2955), p. 7.

Eodictyoconus Cole and Bermúdez, 1944 (*640), p. 336; type species: *Pseudorbitolina cubensis* Cushman and Bermúdez, 1936 (*805), p. 59; OD.

Tschoppina Keijzer, 1945 (*1668), p. 213; type species: *Pseudorbitolina cubensis* Cushman and Bermúdez, 1936 (*805), p. 59; OD.

Test large, up to 4 mm in diameter, conical or a compressed cone with hollow center, apex bluntly rounded, early stage with three globose thick-walled and perforate chambers, followed by a few chambers of about one-half coil in length, later chambers added in cyclic series or tiers, interior with short horizontal and vertical partitions arising from the outer wall to form numerous coarse alveoli that, in turn, are subdivided by second order partitions into smaller alveoli, distinct and depressed horizontal sutures formed by the chamber tiers, alveolar partitions evident externally only on abraded specimens; wall calcareous, thick, outer wall finely perforate, umbilical side and partitions imperforate, surface smooth to papillate; aperture in the earliest chambers a simple arch, later with a single row of large openings leading into the broad open umbilicus. U. Paleocene to U. Eocene: France; Italy; Spain; Turkey; India; W. Pacific: New Caledonia; Japan; Cuba; Dominican Republic; Haiti.

GUNTERIA Cushman and Ponton, 1933

Plate 650, figs. 5–10

Type species: Gunteria floridana Cushman and Ponton, 1933; OD.

Gunteria Cushman and Ponton, 1933 (*845), p. 25.

Test compressed, flabelliform to reniform, early stage with large globular undivided chambers, later chambers concentric and subdivided by numerous radial and vertical partitions as in *Fabiania*, sutures indistinct except on abraded specimens; wall calcareous, perforate, surface smooth to pustulose; aperture of two rows of openings on the terminal face, or occasionally the terminal face may be somewhat expanded at one end and have more numerous openings. M. Eocene: USA: Florida; Cuba; Dominican Republic.

Subfamily HALKYARDIINAE Kudo, 1931

Halkyardiinae Saidova, 1981 (*2696), p. 49, nom. transl. ex family Halkyardiidae.

Embryonic apparatus of protoconch and

deuteroconch followed by small later chambers in annular series; umbilical region filled by horizontal lamellae and connecting pillars; aperture consists of small pores at the periphery. M. Eocene (Lutetian) to M. Oligocene (Rupelian).

HALKYARDIA Heron-Allen and Earland, 1918

Plate 652, figs. 1-13

Type species: Cymbalopora radiata von Hagenow var. *minima* Liebus, 1911 (***1844**), p. 952; SD Cushman, 1928 (***747**), p. 288.

Halkyardia Heron-Allen and Earland, in Halkyard, 1919 (***1364**), p. 107.

Test commonly small, up to about 1.3 mm in diameter, biconvex, spiral side more convex, megalospheric test with large hemispherical protoconch, large deuteroconch, and two primary auxiliary chambers, later chambers in numerous cycles, small as seen from the spiral side, arched toward the periphery and alternating in position with those of the preceding cycle, only those of the final whorl visible on the opposite side, where the chambers appear elongate, inflated, and tubular, umbilical region beneath the embryonic chambers filled with a wide perforate plug formed by horizontal lamellae and connecting pillars, periphery subangular, peripheral outline lobulate; wall calcareous, optically radial, thickened by addition of lamellae on the distinctly perforate spiral side; no aperture other than the surface pores. M. Eocene (Lutetian) to M. Oligocene (Rupelian); Yugoslavia; France; Germany; USSR: Azerbaydzhan; India; Pacific: Bikini Atoll, Marshall Islands.

Family VICTORIELLIDAE Chapman and Crespin, 1930

Victoriellidae Chapman and Crespin, 1930 (***540**), p. 111.
Eorupertiidae Cole, 1957 (***630**), p. 337.

Test attached, early chambers trochospiral, later may grow upward from the attachment in a loose spiral or irregular mass. U. Cretaceous (Santonian) to Holocene.

Subfamily CARPENTERIINAE Saidova, 1981

Carpenteriinae Saidova, 1981 (***2696**), p. 47.

Test trochospiral throughout; aperture large, umbilical. Paleocene to Holocene.

BERMUDEZELLA Thalmann, 1951

Plate 653, figs. 1-3

Type species: Carpenterella truncata Bermúdez, 1949 (***201**), p. 313; OD.

Bermudezella Thalmann, 1951 (***3170**), p. 224 (nom. subst. pro *Carpenterella* Bermúdez, 1949).
Carpenterella Bermúdez, 1949 (***201**), p. 313 (non *Carpenterella* Collenette, 1933, nec Krasheninnikov, 1953); type species: obj.; OD.

Test attached, trochospiral, nearly conical, spiral side flat, about two slowly enlarging whorls, ten to twelve chambers in the final whorl, periphery acutely angled to carinate, then sloping steeply toward the umbilical shoulder, umbilicus broad and filled with clear calcite, sutures straight, oblique, and flush on the spiral side, curved and sinuate on the umbilical side; wall calcareous, perforate, hyaline, surface punctate; aperture an interiomarginal slit with narrow lip, near the peripheral margin. M. Oligocene; Haiti.

CARPENTERIA Gray, 1858

Plate 653, figs. 9-11

Type species: Carpenteria balaniformis Gray, 1858; OD(M).

Carpenteria Gray, 1858 (***1289**), p. 269, 270.

Test attached, planoconvex, trochospiral, all chambers visible on the flat spiral side and sutures flush and strongly oblique, only the six to seven chambers of the final whorl visible on the strongly convex umbilical side where sutures are straight and nearly radial around the narrow and deep umbilicus, periphery carinate and may spread somewhat against the attachment; wall calcareous, umbilical side distinctly perforate, keel and a small area around the umbilicus not perforate, in older specimens umbilicus may be surrounded by thickened shell material; slitlike interiomarginal aperture extending from the periphery to the umbilicus. U. Eocene to Holocene: tropical cosmopolitan.

GYROIDINELLA Y. Le Calvez, 1949

Plate 653, figs. 4-8

Type species: Gyroidinella magna Y. Le Calvez, 1949; OD.

Gyroidinella Y. Le Calvez, 1949 (*1800), p. 27.

Test large, up to 1.6 mm in breadth, trochospiral, with flat to excavated spiral side, umbilical side elevated and subconical with large and deep umbilicus containing pillars that partially fuse, giving the appearance of large umbilical perforations, chambers increasing slowly in height but more rapidly in thickness through the test, sutures somewhat obscure, slightly curved on the spiral side, commonly with bifurcating grooves, radial on the umbilical side, septa thick and inflated at the edge of the foramina, periphery rounded; wall calcareous, thick, finely perforate: aperture an elongate interiomarginal slit, extending from the periphery to the umbilicus. M. Eocene (Lutetian) to basal U. Eocene (Auversian); France; Spain; Belgium; Yugoslavia; Turkey; Israel.

NEOCARPENTERIA Cushman and Bermúdez, 1936

Plate 654, figs. 1-3

Type species: Neocarpenteria cubana Cushman and Bermúdez, 1936; OD.

Neocarpenteria Cushman and Bermúdez, 1936 (*804), p. 34.

Cubanella Saidova, 1981 (*2696), p. 47 (non *Cubanella* Pelegrin Franganillo, 1926); type species: obj.; OD.

Test a low trochospiral, commonly bievolute, chambers ovate and sutures flush and oblique on the attached flattened spiral side, chambers inflated and sutures radial and depressed on the umbilical side, periphery broadly carinate, with keel spreading on the substrate, expanding around the aperture and between the later chambers; wall calcareous, perforate; aperture interiomarginal and extraumbilical. U. Eocene; Cuba.

NEOGYROIDINA Bermúdez, 1949

Plate 654, figs. 4-6

Type species: Gyroidina protea Cushman and Bermúdez, 1937 (*806), p. 22; OD.

Neogyroidina Bermúdez, 1949 (*201), p. 255.

Test trochospiral, planoconvex, attached by the flattened spiral side, twelve to fourteen chambers in the final whorl, sutures straight, oblique, depressed on the spiral side, umbilical side convex, with more prominent final chamber sharply angled at the margin of the apertural face, sutures radial, broad, limbate, and slightly elevated, umbilicus narrow and deep, periphery subacute, noncarinate; wall calcareous, thick, finely perforate, surface smooth to moderately pustulose; aperture a low narrow arch at the base of the flattened apertural face, nearer the umbilicus than the periphery. M. Eocene; Dominican Republic; Cuba; USA: Florida.

PSEUDOGLOBOROTALIA Haque, 1956

Plate 654, figs. 7-10

Type species: Pseudogloborotalia ranikotensis Haque, 1956; OD.

Pseudogloborotalia Haque, 1956 (*1418), p. 184.

Test trochospiral, planoconvex, spiral side flat, sutures oblique and curved back at the periphery, convex umbilical side with angular umbilical shoulder, radial and nearly straight incised sutures and narrow deep umbilicus, periphery angular, carinate; wall calcareous, optically radial, perforate, surface smooth; aperture a low interiomarginal arch between the umbilical shoulder and periphery. Paleocene: Pakistan.

Remarks: *Pseudogloborotalia* appears close to *Neogyroidina* but has a restricted aperture, more oblique and curved sutures, and broad umbilical area bordered with a prominent umbilical shoulder.

Subfamily RUPERTININAE Loeblich and Tappan, 1961

Rupertininae Loeblich and Tappan, 1961 (*1902), p. 312.

Rupertiinae Galloway, 1933 (*1205), p. 302 (invalid, ICZN Art. 39; based on *Rupertia* Wallich, 1877, non Gray, 1865).

Test attached by basal disc, later growing up from the substrate in a loose spiral; aperture narrow, interiomarginal. U. Cretaceous (Santonian) to Holocene.

BIARRITZINA Loeblich and Tappan, 1964

Plate 654, figs. 14-16; plate 655, figs. 1-5

Type species: Columella carpenteriaeformis Halkyard, 1919 (*1364), p. 28; OD.

Biarritzina Loeblich and Tappan, 1964 (*1910), p. 628 (nom. subst. pro *Columella* Halkyard, 1919).

Columella Halkyard, 1919 (*1364), p. 28 (non *Columella* Westerlund, 1878); type species: obj.: OD(M).

Test attached by the flaring base, early stage trochospirally enrolled in a loose elevated spire, later tending to become uniserial and growing upright, chambers globular to pyriform, inflated, sutures depressed; wall calcareous, finely perforate, but with scattered coarser pores; aperture terminal, rounded, with a distinct imperforate lip, and may be present on more than one chamber of the final whorl. M. Eocene to Holocene; tropical cosmopolitan.

HAERELLA Belford, 1960

Plate 654, figs. 11-13

Type species: Haerella conica Belford, 1960; OD.

Haerella Belford, 1960 (*177), p. 112.

Test in a low trochospiral coil, planoconvex, about two whorls visible on the flat spiral side, only the four to five chambers of the final whorl visible on the strongly convex umbilical side, sutures curved and flush on the spiral side, sinuate on the umbilical side, periphery angular, carinate; wall calcareous, finely perforate, surface smooth; aperture umbilical, irregularly rounded, bordered with an imperforate lip. U. Cretaceous (Santonian to Campanian); Western Australia.

RUPERTINA Loeblich and Tappan, 1961

Plate 656, figs. 1-7

Type species: Rupertia stabilis Wallich, 1877 (*3337), p. 502; OD.

Rupertina Loeblich and Tappan, 1961 (*1902), p. 312 (nom. subst. pro *Rupertia* Wallich, 1877).

Rupertia Wallich, 1877 (*3337), p. 502 (non *Rupertia* Gray, 1865); type species: obj.: OD(M).

Test attached by a prominent basal disc, chambers closely coiled and trochospiral in the early stage, later more loosely coiled and high spired, growing upright around a solid central column, chambers somewhat produced, septa simple, imperforate, sutures oblique, depressed; wall calcareous with organic inner lining, thick, optically radial, outer walls coarsely perforate but area just above the aperture imperforate, surface smooth; aperture a low and narrow interiomarginal and umbilical slit and may be bordered by a distinct lip. Miocene to Holocene; cosmopolitan.

Subfamily VICTORIELLINAE Chapman and Crespin, 1930

Victoriellinae Loeblich and Tappan, 1964 (*1910), p. C705, nom. transl. ex family Victoriellidae.

Juvenile stage may be free living, later attached and high spired around a hollow axis; wall with pillarlike thickenings that replace the pores. M. Eocene to M. Oligocene.

EORUPERTIA Yabe and Hanzawa, 1925

Plate 657, figs. 1-4

Type species: Uhligina boninensis Yabe and Hanzawa, 1922 (*3405), p. 72; OD.

Eorupertia Yabe and Hanzawa, 1925 (*3407), p. 77 (nom. subst. pro *Uhligina* Yabe and Hanzawa, 1922).

Uhligina Yabe and Hanzawa, 1922 (*3405), p. 72 (non *Uhligina* Schubert, 1899); type species: obj.: OD.

Test enrolled in a high trochospiral coil, cylindrical to subconical, attached by the spiral side of the early stage, umbilicate, chambers coiled about an axial hollow; wall calcareous, optically radial, coarsely perforate except in the apertural area, prominently bilamellar with dark organic median layer, imperforate inflational pillars developed in the wall, surface pustulose; aperture interiomarginal, umbilical, slitlike, bordered with a lip. M. and U. Eocene; W. Pacific: Bonin Islands; France; Italy; Germany, Austria; Poland; Turkey; Iraq; Venezuela.

KOROBKOVELLA Hagn and Ohmert, 1971

Plate 658, figs. 1-9

Type species: Truncatulina grosserugosa Gümbel, 1870 (*1337), p. 660; OD.

Korobkovella Hagn and Ohmert, 1971 (*1362), p. 135.

Test large, up to 3.2 mm in diameter, low trochospiral coil of one to two whorls, spiral side flattened against the substrate, umbilical side inflated, involute, the ten to eleven chambers of the final whorl surrounding a narrow excavated umbilicus, sutures radial, obscure to weakly depressed, periphery angular to rounded, peripheral margin slightly lobulate; wall calcareous, hyaline, optically radial, thick, coarsely perforate except for the poreless area above the aperture, spiral side smooth, umbilical side with coarse pits and irregular vermiform channels on the surface; aperture an interiomarginal, equatorial arch, continuing onto the spiral side around the spiral suture, bordered by a lip. M. Eocene: Germany; Hungary; Poland.

MASLINELLA Glaessner and Wade, 1959

Plate 657, figs. 5-10

Type species: Maslinella chapmani Glaessner and Wade, 1959; OD.

Maslinella Glaessner and Wade, 1959 (***1251**), p. 203.

Test large, early stage in a low trochospiral coil, later nearly planispiral and semi-involute, asymmetrical, with axis of coiling perpendicular to that of the early stage, chambers inflated, gradually enlarging, sutures straight to curved, radial, thickened, and limbate on the spiral side, appearing beaded around the umbilicus, periphery subangular to rounded; wall calcareous, optically radial, thick, coarsely perforate except for the nonperforate septa and apertural face; aperture a low interiomarginal equatorial opening, bordered by a thickened lip. U. Eocene: Australia.

VICTORIELLA Chapman and Crespin, 1930

Plate 657, figs. 11-13

Type species: Carpenteria proteiformis Goës var. *plecte* Chapman, 1921 (***537**), p. 320 = *Carpenteria conoidea* Rutten, 1914 (***2675**), p. 47; OD(M).

Victoriella Chapman and Crespin, 1930 (***540**), p. 111, 112.

Test conical, free in the juvenile stage, forming a low trochospiral coil, later becoming temporarily or permanently attached by the apex, with a sharp reverse in coiling direction and then high spired around an axial hollow, chambers inflated, three to four per whorl, sutures depressed but early ones obscured by secondary deposition of lamellae; wall calcareous, optically radial, thick and coarsely perforate, except for the imperforate region around the aperture, may have pillarlike thickenings in the wall that displace the perforations and appear at the surface as rounded to elliptical bosses, septa trilamellar; aperture umbilical, bordered by a thick lip. U. Eocene to M. Oligocene; Australia; New Guinea; New Zealand; Europe.

WADELLA Srinivasan, 1966

Plate 656, figs. 8-13

Type species: Carpenteria hamiltonensis Glaessner and Wade, 1959 (***1251**), p. 200; OD.

Wadella Srinivasan, 1966 (***3050**), p. 249.

Test subconical, trochospiral, earliest stage apparently free living, later fixed to the substrate by a small attachment area near the apex, commonly three inflated chambers per whorl but may have up to five, sutures depressed; wall calcareous, primary lamina with organic lining, very coarsely and evenly perforate, pores opening at small mounds, surface roughened and pustulose but without inflational pillars through the wall; aperture an umbilical arch bordered by a projecting lip. U. Eocene (Runangan); Australia; New Zealand.

Superfamily ACERVULINACEA Schultze, 1854

Acervulinacea Loeblich and Tappan, 1984 (***1918**), p. 50, nom. transl. ex family Acervulinida.

Test free or attached, early spiral stage followed by spreading or irregular chambers in an irregular mass, mound, disc, or branching structure; wall of hyaline, optically radial calcite, coarsely perforate; aperture absent except for mural pores or openings in the cribrate upper surface of the chambers. Paleocene to Holocene.

Family ACERVULINIDAE Schultze, 1854

Acervulinidae Eimer and Fickert, 1899 (***1088**), p. 630, nom. corr. pro family Acervulinida.

Acervulinida Schultze, 1854 (*2824), p. 53.
Gypsininae A. Silvestri, 1905 (*2936), p. 142 (subfamily).
Acervulininae Galloway, 1933 (*1205), p. 308 (subfamily).

Early spiral stage followed by spreading chambers in one or more layers: no aperture other than mural pores. Paleocene to Holocene.

ACERVULINA Schultze, 1854

Plate 659, figs. 1-6

Type species: Acervulina inhaerens Schultze, 1854; SD Galloway and Wissler, 1927 (*1209), p. 67.

Acervulina Schultze, 1854 (*2824), p. 67.
Aphrosina H. J. Carter, 1879 (*505), p. 500; type species: *Aphrosina informis* H. J. Carter, 1879; OD.

Test attached, early chambers coiled, later with irregularly arranged inflated chambers encrusting the substrate; wall calcareous, coarsely perforate; aperture consisting only of the coarse perforations. Miocene to Holocene; Europe; North America; Pacific; Indian Ocean.

BORODINIA Hanzawa, 1940

Plate 660, figs. 1 and 2

Type species: Borodinia septentrionalis Hanzawa, 1940; OD.

Borodinia Hanzawa, 1940 (*1405), p. 790.

Test of one or more encrusting layers of chambers, those of successive layers alternating in position; wall calcareous, thick, about 0.075 mm in thickness, coarsely perforate, septal walls about one-third as thick; apertural stolons at opposite ends of each septum. Miocene (Aquitanian); W. Pacific; Daito Island (formerly Borodino Island).

DISCOGYPSINA A. Silvestri, 1937

Plate 661, figs. 11-13

Type species: Discogypsina vesicularis A. Silvestri, 1937 = *Tinoporus vesicularis* (Parker and Jones) of Goës, 1882 (*1255), p. 104 (non *Orbitolina concava* var. *vesicularis* Parker and Jones, 1860); see ICZN Art. 70 (c); OD.

Discogypsina A. Silvestri, 1937 (*2966), p. 156.

Test flattened, lenticular in form, with distinct equatorial layer of somewhat larger chambers separating lateral layers of smaller closely packed chambers on either side lacking regular arrangement, those of successive layers not in alignment, sutures thickened, slightly elevated; wall calcareous, upper surface of the chambers coarsely perforate; aperture consisting of the coarse perforations. U. Eocene (Ludian) to Holocene; Australia; S. Pacific; Philippine Islands; Italy; Caribbean.

Remarks: The specimen illustrated in axial section by Goës (1882, *1255, pl. 7, fig. 246) is here designated as the lectotype of *Discogypsina vesicularis* Silvestri, 1937.

GYPSINA H. J. Carter, 1877

Plate 661, figs. 1-10, 14, and 15

Type species: Polytrema planum H. J. Carter, 1876 (*501), p. 211 (syn.: *Gypsina melobesioides* H. J. Carter, 1877, *503, p. 172); SD H. J. Carter, 1880 (*506), p. 445.

Gypsina H. J. Carter, 1877 (*503), p. 172.
Hemigypsina Bermúdez, 1952 (*205), p. 124; type species: *Gypsina mastelensis* Bursch, 1947 (*454), p. 37; OD.

Test large, attached, formed by a few encrusting layers of chambers that are closely appressed, polygonal in outline, and somewhat inflated, with convex upper surface, chambers of successive layers alternating in position, groups or clusters of chambers may form knobs that are slightly elevated above the general surface; wall calcareous, of fibrous calcite, without perforations other than the large apertural pores; aperture consists of large pores on the upper surface of the chambers. L. Oligocene to Holocene; tropical, cosmopolitan.

LADORONIA Hanzawa, 1957

Plate 660, figs. 3-5

Type species: Acervulina (Ladoronia) vermicularis Hanzawa, 1957; OD.

Acervulina (Ladoronia) Hanzawa, 1957 (*1409), p. 68.
Ladoronia Loeblich and Tappan, 1964 (*1910), p. C698 (nom. transl.).

Test attached, encrusting, early chambers clustered in raspberrylike arrangement, followed by a few whorls of somewhat larger chambers, later chambers more irregular, elongate and vermiform in outline as seen in horizontal section, spreading over the substrate as in *Acervulina*, those of successive layers neither aligned nor regularly alternating in position, chambers of a single layer connected by intercameral stolons through the vertical walls, chambers of successive layers connected by fine pores; wall calcareous, with occasional solid pillars embedded in the roof of nepionic chambers; aperture consisting of the lateral stolons and surface pores. Miocene; N. Pacific: Saipan Island.

PLANOGYPSINA Bermúdez, 1952

Plate 662, figs. 1-3

Type species: Gypsina vesicularis (Parker and Jones) var. *squamiformis* Chapman, 1901 (***533**), p. 200; OD.

Planogypsina Bermúdez, 1952 (***205**), p. 124.

Test large, discoidal, very thin, early stage with globular chambers in planispiral arrangement, later chambers elongate to vermiform and added irregularly in a single layer; wall calcareous, perforated by septal pores; no aperture other than the pores. Miocene to Holocene; tropical cosmopolitan.

Remarks: A lectotype for the type species (BMNH ZF3647, ex 03.2.5.14) from the Recent, Funafuti Lagoon, at 26 fathoms was designated (Loeblich and Tappan, 1964, ***1910**, p. C698).

SPHAEROGYPSINA Galloway, 1933

Plate 662, figs. 4-8

Type species: Ceriopora globulus Reuss, 1848 (***2572**), p. 33 (syn.: *Chaetetes pygmaeus* Reuss, 1848, ***2572**, p. 30; = *Tinoporus fuchsi* Karrer, 1877, ***1654**, p. 388); OD.

Sphaerogypsina Galloway, 1933 (***1205**), p. 309; OD.
Excentrogypsina Popescu, 1975 (***2455**), p. 97; type species: *Tinoporus fuchsi* Karrer, 1877 (***1654**), p. 388; OD.

Test large, up to 2 mm in diameter, globular to somewhat irregular, constructed of numerous layers of small and closely packed chambers, those of successive layers aligned, roof of chambers perforate and septa thick, elevated and imperforate, similar to *Discogypsina*. Paleocene to Holocene; W. Europe; USSR: Ukraine; Australia; New Guinea; Borneo; Caribbean; Jamaica; Costa Rica; San Domingo; Peru.

WILFORDIA Adams, 1965

Plate 662, figs. 9-11

Type species: Wilfordia sarawakensis Adams, 1965; OD.

Wilfordia Adams, 1965 (***9**), p. 326.

Test globular, megalospheric embryo consists of proloculus and three to eight smaller chambers that possibly may form a planispiral coil, with a few coarse radial spines arising from the embryonic chambers, possibly in a single plane, and projecting above the surface of the chambers, later stage with many rectangular lateral chamberlets added in four to eight layers and arranged in slightly irregular radial tiers; wall calcareous, chamberlet floors and roof perforate, pseudopillars formed by thickened lateral walls. U. Eocene; Malaysia: Sarawak.

Remarks: The position of this genus is uncertain, no microspheric generation is known, the arrangement of the early chambers is uncertain, and the possibly canaliculate spines and radial pillars resemble those of the Calcarinidae. The numerous chamberlets and the absence of a canal system and aperture other than the wall perforations allow tentative placement of *Wilfordia* in the Acervulinidae.

Family HOMOTREMATIDAE Cushman, 1927

Homotrematidae Loeblich and Tappan, 1964 (***1910**), p. C702, nom. corr. pro family Homotremidae.
Homotremidae Cushman, 1927 (***742**), p. 97 (nom. imperf.).
Polytremidae Chapman, Parr, and Collins, 1934 (***543**), p. 556, 573 (invalid; ICZN Art. 39; based on *Polytrema* Risso of authors, non Risso, 1826, nec Rafinesque, 1819).
Homotreminae Chapman and Parr, 1936 (***542**), p. 144 (subfamily).
Miniacinidae Thalmann, 1938 (***3159**), p. 208.
Homotrematinae Pokorný, 1958 (***2447**), p. 333 (subfamily).
Polytrematidae Loeblich and Tappan, 1964 (***1910**), p. C702 (nom. correct.).

Test attached, early chambers irregularly trochospiral, later with numerous chambers in a massive or branching structure growing up from the attachment; apertures large, covered by a perforated plate. Eocene to Holocene.

HOMOTREMA Hickson, 1911

Plate 663, figs. 1-3

Type species: Millepora rubra Lamarck, 1816 (***1780**), p. 202; OD(M).

Homotrema Hickson, 1911 (***1483**), p. 445.

Test large, up to 8 mm in diameter, attached, variable in form, globose, hemispherical, or encrusting with conical projections or erect branches, early chambers in spiral or clustered arrangement, later in numerous layers, walls may be partially resorbed as layers are added, producing large and irregular passages; wall calcareous, hyaline, optically radial, early chambers with organic wall, later wholly calcareous, intercameral walls imperforate, septa elevated at the surface, upper chamber wall coarsely perforate, commonly red in color, probably as a result of partial decomposition of chlorophyll pigments of endosymbionts; aperture consisting of the large perforations. Miocene to Holocene; cosmopolitan in warm waters.

MINIACINA Galloway, 1933

Plate 663, figs. 4-6; plate 664, figs. 1-5

Type species: Millepora miniacea Pallas, 1766 (***2325**), p. 251; OD.

Miniacina Galloway, 1933 (***1205**), p. 305.

Pustularia Gray, 1858 (***1289**), p. 270, 271 (non *Pustularia* Swainson, 1840); type species: *Pustularia rosea* Gray, 1858 = *Millepora miniacea* Pallas, 1766; OD(M).

Megalospheric generation with raspberry-like cluster of globular chambers, consisting of proloculus, gradually enlarging second globular chamber, and third larger, ovoid chamber forming a free-living early stage, numerous stolons radiating from the third chamber connect to the surrounding tubular to reniform chambers, microspheric generation with five to nine chambers in an early trochospire of about one and a half whorls; following the juvenile three-chambered or trochospiral stage, the test attaches to a substrate, commonly to other shells, the attached base varying from narrow to spreading, and up to 5 mm in diameter, from this base arise vertical conical to irregularly branching structures up to 7 mm in height, the central core of the branches formed by irregular and bifurcating but nonseptate imperforate and double-walled cylindrical vertical tubes that expand at the open ends, the core surrounded by encrusting compartments termed pillar-pore chambers with tubelike infoldings of the wall at the base, normal chambers occur between the pillar-pore chambers and may utilize their walls, successive chambers overlap both the earlier true chambers and pillar-pore chambers; wall of proloculus thick and proteinaceous, succeeding chambers with thick organic layer that is progressively thinner in later chambers, and an outer calcareous layer that may have numerous irregular channels against the organic layer, finally with calcareous layers on both sides of the very thin organic layer, wall light pink to red in color, rarely white, hyaline, of optically radial calcite, small pores of 3 μm to 4 μm in diameter, and larger interspersed pillar-pores up to 50 μm in diameter that open into the pillar-pore chambers and result in a pock-marked surface, wall of pillar-pore tubes imperforate, lamellae may obscure the pores of earlier parts of the wall as new layers of chambers are added; chambers of early stage with one or more apertures at the peripheral margin, adult with one to multiple rounded apertures with phialine bordering lip at the ends of the branches, chambers near the multiple apertures may be subdivided into tubular chamberlets or apertural tubes by intertubular partitions, chambers and pillar-pore chambers interconnected only by the fine wall perforations and not by foramina, large openings at the ends of the branches not involved in later chamber formation. L. Miocene (Aquitanian) to Holocene; cosmopolitan in warm waters.

SPORADOTREMA Hickson, 1911

Plate 665, figs. 1-5

Type species: Polytrema cylindricum H. J. Carter, 1880 (***506**), p. 441; OD.

Sporadotrema Hickson, 1911 (***1483**), p. 447.

Test attached, up to 27 mm in height, early stage planispirally coiled, later chambers spiralling upward to form a large cylindrical upright and terminally branching structure, large chambers on the branches communicating by open passages, central core formed by irregular vertical tubes that spiral up the trunk and branches, to open distally on the branches; wall calcareous, hyaline, with irregularly scattered coarse perforations that result from outward fusion of the finer pores at the inner wall surface, inner septal walls imperforate, surface lacking both the areolae of *Homotrema* and the pillar-pores of *Miniacina*; early upright spiralling chambers with terminal aperture that remains as a foramen connecting successive chambers, an additional opening leads into the axial network of stolons that in turn open to the exterior at the ends of the branches. Eocene to Holocene; cosmopolitan in warmer waters.

Superfamily ASTERIGERINACEA d'Orbigny, 1839

Asterigerinacea Loeblich and Tappan, 1961 (*1902), p. 302, nom. transl. ex family Asterigerinidae.
Asterigerinoidea Ayala-Castañares, 1963 (*101), p. 78.
Anomalinacea Loeblich and Tappan, 1964 (*1911), p. 34 (based on *Anomalina*; suppressed, ICZN petition pending).
Anomalinidea Saidova, 1981 (*2696), p. 40.

Test trochospiral to nearly planispiral; chambers with internal partitions, secondary septa or intersepta that attach to the outer wall and form supplementary chambers around the umbilicus; no canal system or stolons; wall of hyaline perforate calcite, optically radial; primary aperture interiomarginal, equatorial to extraumbilical-umbilical in position, may extend up the apertural face or be areal, secondary apertures sutural in position or related to the supplementary internal partitions. U. Cretaceous (U. Santonian) to Holocene.

Family EPISTOMARIIDAE Hofker, 1954

Epistomariidae Hofker, 1954 (*1505), p. 166.

Test trochospiral, chambers with internal plate that may attach to the wall to form supplementary chambers on the umbilical side; primary aperture interiomarginal, supplementary sutural and areal apertures also may be present. U. Cretaceous (U. Santonian) to Holocene.

Subfamily EPISTOMARIINAE Hofker, 1954

Epistomariinae Saidova, 1981 (*2696), p. 46, nom. transl. ex family Epistomariidae.

Test with numerous supplementary openings on both sides. M. Eocene to Holocene.

ASANONELLA Huang, 1965

Plate 666, figs. 1-7

Type species: Asanonella shojii Huang, 1965 = *Truncatulina tubulifera* Heron-Allen and Earland, 1915 (*1472), p. 710; OD.

Asanonella Huang, 1965 (*1571), p. 167.

Test lenticular to inequally biconvex, trochospiral, all of the two and a half whorls visible, rapidly enlarging chambers appearing semilunate on the spiral side, tubular projections are developed around the major fields of coarse perforations in earlier chambers, sutures strongly oblique and slightly depressed, chambers subtriangular on the umbilical side, sutures radial and slightly depressed, umbilicus closed, periphery subacute; wall calcareous, optically radial, coarsely perforate in a band near the periphery on both spiral and umbilical sides of the final chamber, with later growth a crenulate ridge is added around the band of coarse perforations on the spiral side of earlier chambers, becoming progressively more elevated with lamellar additions and forming short wide cylinders within which the pores gradually are filled, the cylindrical structures of earlier whorls resembling a large elevated pore at the midpoint of each chamber, coarse perforations present only on the final chamber on the umbilical side, where they continue to the previous intercameral suture, those of earlier chambers secondarily filled; aperture an elongate interiomarginal and extraumbilical slit, partially filled with a toothlike protrusion of transparent shell material arising from the previous spiral wall. Pliocene to Holocene; Taiwan; S. China Sea; tropical Pacific; Indian Ocean; Timor Sea; Sahul Shelf off Northwest Australia; Caribbean; off Venezuela.

Remarks: Although *Asanonella shojii* originally was regarded as distinct from *Truncatulina tubulifera*, the two appear to be conspecific. The progressive development of the tubular outgrowth over the coarsely perforate area on each chamber has not been described previously. The row of coarse pores along the intercameral suture on the umbilical side may have been misinterpreted as supplementary sutural openings in *Asanonella*.

EPISTOMARIA Galloway, 1933

Plate 667, figs. 1-6

Type species: Discorbina rimosa Parker and Jones, in Carpenter et al., 1862 (*494), p. 205; OD.

Epistomaria Galloway, 1933 (*1205), p. 286 (nom. subst. pro *Epistomella* Cushman, 1928).
Epistomella Cushman, 1928 (*748), p. 6 (non *Epistomella* Zittel, 1878); type species: obj.; OD.

Test in a low trochospiral coil, moderately biconvex, about two whorls of relatively broad and low chambers visible on the spiral side, increasing in relative height as added, sutures gently curved, depressed, only the subtriangular chambers of the final whorl visible on the umbilical side, interior of chambers with curved partitions that form secondary sutures at the contact with the outer wall on the umbilical side, one series of such sutures paralleling the periphery a short distance nearer the umbilicus, and another series crossing the apertural face a short distance above the base, intercameral sutures nearly straight, radial, and depressed, periphery rounded, peripheral outline entire; wall calcareous, perforate, surface smooth; primary aperture a low interiomarginal slit extending from the periphery nearly to the umbilicus, supplementary sutural openings on both spiral and umbilical sides and additional supplementary openings at the contact of the internal partitions with the outer wall, both in the apertural face and paralleling the peripheral margin. M. Eocene (Lutetian): France; USSR: Ukraine.

Remarks: A lectotype (BMNH no. P41670) was designated for *Discorbina rimosa* Parker and Jones, from the Eocene of Hauteville, France (Loeblich and Tappan, 1964, *1910, C594).

HILDEMANNIA McCulloch, 1977

Plate 667, figs. 7-9

Type species: Hildemannia bubnanensis McCulloch, 1977; OD.

Hildemannia McCulloch, 1977 (*1961), p. 306.

Test tiny, about 0.2 mm in diameter, low trochospiral coil, planoconvex and bi-involute, convex spiral side with lunate chambers and depressed sutures that curve back at the periphery, concave umbilical side with very strongly curved sutures, seven chambers in the final whorl, periphery rounded, peripheral outline lobulate; wall calcareous, finely perforate, surface smooth on the spiral side except for a slightly elevated row of large perforations, umbilical side more coarsely perforate and surface distinctly granular; aperture interiomarginal, nearly equatorial but slightly on the umbilical side, spiral side with a prominent band of coarse pores on each chamber adjacent to the suture. Holocene, at 20 m to 40 m: Philippines.

Remarks: The elevated band of openings on the spiral side resembles that of *Asanonella*, but the primary aperture of the latter genus extends up the face and possesses a tooth at the base. *Hildemannia* also differs in being bi-involute.

MONSPELIENSINA Glaçon and Lys, 1968

Plate 668, figs. 1-10

Type species: Monspeliensina vulpesi Glaçon and Lys, 1968; OD.

Monspeliensina Glaçon and Lys, 1968 (*1243), p. 2302.
Taxyella Anglada and Magné, 1969 (*42), p. 367; type species: *Taxyella fontcaudensis* Anglada and Magné, 1969 - *Monspeliensina vulpesi* Glaçon and Lys, 1968; OD.

Test a low trochospiral, about three whorls visible on the flattened and evolute spiral side, chambers enlarging gradually, early ones may be partially obscured by a central boss, only the six to nine chambers of the final whorl visible on the slightly inflated and involute umbilical side, sutures gently curved, slightly depressed, chamber lumen incompletely divided by a bifurcating internal partition that connects the sutural apertures and the areal intercameral foramen, the partition forming an umbilical chamberlet that opens both to the exterior and into the preceding chamber, the main part of the chamber communicating with the preceding chamber by the areal foramen, periphery rounded; wall calcareous, of calcite, by X-ray determination, optically radial, finely and densely perforate, surface smooth; primary aperture an interiomarginal slit, extending from the umbilicus to the periphery, sutural supplementary apertures present on both sides, straight and narrow slits on the spiral side progressively filled with shell material with growth, openings on the umbilical side follow the slightly arched sutures, and an ovate areal intercameral foramen occurs in the septal face of earlier chambers a short distance above the base and in nearly equatorial position. L. Miocene (Aquitanian); S. France.

PSEUDOEPONIDES Uchio, 1950

Plate 667, figs. 10-12

Type species: Pseudoeponides japonicus Uchio, in Kawai et al., 1950 (as *japonica*); OD.

Pseudoeponides Uchio, in Kawai et al., 1950 (*1663), p. 190 (Japanese); Uchio, 1951 (*3235), p. 38 (English).
Epistomaria (Epistomariella) Kuwano, 1950 (*1760), p. 315; type species: *Epistomaria (Epistomariella) miurensis* Kuwano, 1950 = *Pseudoeponides japonicus* Uchio, 1950; OD.

Test lenticular, biconvex, trochospiral, about three and a half whorls visible on the spiral side, gradually enlarging chambers broad, low, and crescentic and sutures slightly curved, strongly oblique and weakly depressed, on the umbilical side only the five chambers of the final whorl visible and sutures nearly radial, periphery rounded; wall calcareous, very finely perforate, surface smooth; interiomarginal primary aperture midway betweem umbilicus and periphery on the umbilical side, short slitlike supplementary openings on the spiral side at the midpoint of the chambers are near and parallel to the spiral suture at the junction with the intercameral suture, additional hooklike supplementary slits at the posterior margin of each chamber on the umbilical side, perpendicular to the suture and then curving forward, reflecting the position of the internal toothplate that extends vertically through the chamber and attaches at the supplementary opening on the spiral side. Pliocene to Holocene; Japan; Caribbean; Netherlands.

Subfamily EPONIDELLINAE Seiglie and Bermúdez, 1965

Eponidellinae Seiglie and Bermúdez, 1965 (*2852), p. 163.

Aperture a high oblique opening in the final chamber face that is partially closed when a new chamber is added, leaving only an areal intercameral foramen. U. Eocene to Holocene.

ELPHIDIOIDES Cushman, 1945

Plate 668, figs. 11-14

Type species: Elphidioides americanus Cushman, 1945; OD.

Elphidioides Cushman, 1945 (*795), p. 7.

Test trochospiral, biconvex, spiral side evolute, umbilical side involute, umbilicus covered by extension from final chamber, numerous low chambers increasing gradually in breadth, sutures radial, gently curved to nearly straight, slightly depressed, periphery broadly rounded; wall calcareous, coarsely perforate; primary aperture interiomarginal on the umbilical side, a slit midway between the periphery and the umbilicus, a supplementary curved, slitlike oblique areal opening situated in the apertural face, and sutural openings present between the retral processes on both spiral and umbilical sides. U. Eocene (Priabonian): USA: Georgia.

EPONIDELLA Cushman and Hedberg, 1935

Plate 669, figs. 1-16

Type species: Eponidella libertadensis Cushman and Hedberg, 1935; OD.

Eponidella Cushman and Hedberg, 1935 (*824), p. 13.
Paranonion Logue and Haas, 1943 (*1931), p. 177; type species: *Paranonion venezuelanum* Logue and Haas, 1943; OD.
Pseudogyroidina S. Y. Zheng, in S. Y. Zheng et al., 1978 (*3453), p. 52, 76; type species: *Pseudogyroidina sinensis* S. Y. Zheng, in S. Y. Zheng et al., 1978; OD.

Test trochospiral, biconvex, spiral side evolute but early part may be obscured by umbonal shell thickening, chambers broader than high and sutures curved and limbate, sutures on umbilical side more radial and depressed, prominent chamberlets in the central part of the test result from an internal partition that extends from the aperture across the umbilical side of the chambers to attach to the previous septum but does not reach the spiral side of the test, periphery broadly rounded; wall calcareous, with proteinaceous inner layer, coarsely perforate, wall of umbilical chamberlets thin; aperture interiomarginal, a loop extending up the apertural face on the periphery, the lower part closed secondarily so that the intercameral foramen is wholly areal. Miocene to Holocene; Venezuela; USA: Louisiana; Dominican Republic; China: Shandong Province.

Subfamily NUTTALLIDINAE Saidova, 1981

Nuttalidinae Saidova, 1981 (*2696), p. 46.

Test trochospiral; chambers with internal plate extending partially through chamber lumen but not attaching to opposite wall to form chamberlet. U. Cretaceous (U. Santonian) to U. Eocene (Priabonian); Holocene.

NUTTALLIDES Finlay, 1939

Plate 669, figs. 17-27

Type species: Eponides truempyi Nuttall, 1930 (***2276**), p. 287; OD.

Nuttallides Finlay, 1939 (***1126**), p. 520.

Osangulariella Saidova, Belyaeva, and Burmistrova, 1974 (***2697**), p. 124, textfig. 1 (name not available, ICZN Art. 13 (a)(i), no description).

Osangulariella Saidova, 1975 (***2695**); type species: *Eponides bradyi* Earland, 1934 (***1041**), p. 187; OD.

Test lenticular, biconvex, trochospiral, about three whorls visible on the spiral side, chambers broad and low, crescentic, sutures strongly oblique, limbate, and curving into the peripheral keel, only the seven to eight subtriangular chambers of the final whorl visible on the umbilical side, sutures gently curved, slightly depressed, and nearly radial around the clear imperforate umbilical boss, interior of chambers subdivided by a plate that extends diagonally from the septal foramen toward the peripheral apertural notch but does not connect to the opposite wall to form a chamberlet, periphery with imperforate carina, peripheral outline slightly lobulate; wall calcareous, optically radial, perforate, septa and keel imperforate; aperture interiomarginal, extending from the umbilical boss nearly to the peripheral keel, with a small notch parallel to the plane of coiling. U. Paleocene (Landenian) to U. Eocene (Priabonian); Mexico; New Zealand; S. Pacific; Tonga; Holocene, bathyal: Atlantic and Pacific.

Remarks: The specimen figured as *Truncatulina pygmaea* Hantken by Brady (1884, ***344**, pl. 95, fig. 9a-c) is here designated as lectotype of *Eponides bradyi* Earland, the type species of *Osangulariella*, now placed in *Nuttallides*.

NUTTALLINELLA Belford, 1959

Plate 670, figs. 1-5

Type species: Nuttallina coronula Belford, 1958 (***175**), p. 97; OD.

Nuttallinella Belford, 1959 (***176**), p. 20 (nom. subst. pro *Nuttallina* Belford, 1958).

Nuttallina Belford, 1958 (***175**), p. 96 (non *Nuttallina* Dall, 1871); type species: obj.; OD.

Test planoconvex, slightly flattened, trochospiral, about two to three whorls visible on the flattened spiral side, chambers narrow and sutures straight, strongly oblique and flush, umbilical side convex, about seven chambers in the final whorl, slightly produced near the small open umbilicus, sutures nearly radial, straight to sinuate, periphery carinate, with broad poreless keel; wall calcareous, hyaline, optically radial, perforate, septa imperforate, aperture interiomarginal, an elongate slit on the umbilical side, with a narrow lip, internally a plate extends from near the periphery diagonally across the chamber to the previous septal foramen, as in *Nuttallides*, but has a strongly folded upper margin. U. Cretaceous (U. Santonian to U. Campanian); Western Australia; New Zealand.

Subfamily PALMERINELLINAE Loeblich and Tappan, 1984

Palmerinellinae Loeblich and Tappan, 1984 (***1918**), p. 51.

Test in a low trochospiral coil, bievolute; apertural opening divided by a vertical partition, with secondarily formed internal plate paralleling the septum and partially closing the vertical apertural slits. U. Miocene to Holocene.

PALMERINELLA Bermúdez, 1934

Plate 670, figs. 6-11

Type species: Palmerinella palmerae Bermúdez, 1934; OD.

Palmerinella Bermúdez, 1934 (***192**), p. 83.

Test flattened, bievolute, low trochospiral coil of two to three whorls that become nearly planispiral, ten to twenty broad low chambers in the final whorl, sutures thickened, clear, and imperforate, radial to slightly curved back at the periphery, umbonal area covered with clear shell material, periphery rounded; wall calcareous, vitreous, coarsely perforate except for the nonperforate sutures; aperture a high arch in the terminal face, divided into two vertical slits by a median plate that joins at the top and base to the narrow bordering lip of the spiral side but leaves the opening on the umbilical side free against the previous whorl, the two vertical slits filled in earlier chambers by an internal plate parallel to the septum and perforated by a vertical series of slits. U. Miocene to Holocene: Cuba: Dominican Republic: Trinidad: USA: Texas.

Remarks: The genus was stated by Saunders (1957, ***2736**, p. 370) to have supplementary chambers at the inner chamber margin on the umbilical side. Examination of topotypes in glycerine with transmitted and reflected light shows that the apparent "chamberlets" are only the normal chambers of the previous whorl visible around the umbilicus of the bievolute test.

Family ALFREDINIDAE S. N. Singh and Kalia, 1972

Alfredinidae Loeblich and Tappan, 1984 (***1918**), p. 51, nom. transl. ex subfamily Alfredininae.

Alfredininae S. N. Singh and Kalia, 1972 (***2982**), p. 157 (subfamily).

Anomalinidae Cushman, 1927 (***742**), p. 92 (based on *Anomalina*, suppressed, ICZN petition pending, as type specimen indicates it to be identical to *Epistomaroides*).

Anomalininae Cushman, 1927 (***742**), p. 92 (based on *Anomalina*; suppressed, ICZN petition pending, as type specimen indicates it to be identical to *Epistomaroides*).

Anomalininea Saidova, 1981 (***2696**), p. 40 (supersubfamily).

Supplementary chambers in umbilical region on umbilical side; areal and interiomarginal openings present. M. Eocene, Holocene.

ALFREDINA S. N. Singh and Kalia, 1972

Plate 671, figs. 1-5

Type species: Alfredina tappanae S. N. Singh and Kalia, 1972; OD.

Alfredina S. N. Singh and Kalia, 1972 (***2982**), p. 157.

Alfredina S. N. Singh, 1971 (***2977**), p. 1173 (name not available, ICZN Art. 13 (a)(I), no description).

Test ovate in outline, flattened, coiled in a low trochospiral, convex spiral side with few rapidly expanding chambers in slightly more than a single whorl and separated by deeply depressed and fissurelike sinuate sutures that are bridged by shell material between the sutural openings, secondary shell material in the umbonal region may obscure the early chambers, umbilical side concave, appearing centrally stellate because of the chamberlets surrounding the umbilical plug that alternate in position with the main chambers, the outer tip of the stellate chamberlets extending along the radial intercameral sutures about half the distance to the angular periphery, peripheral outline lobulate; wall calcareous, optically radial, coarsely perforate; primary aperture a row of interiomarginal openings on the final stellate chamber, primary chamber communicates only with adjacent stellate chambers, secondary multiple sutural openings on the spiral side and along the sutures of both primary chambers and stellate chamberlets on the umbilical side. M. Eocene (Lutetian); India.

EPISTOMAROIDES Uchio, 1952

Plate 671, figs. 6-13

Type species: Discorbina polystomelloides Parker and Jones, 1865 (***2351**), p. 421; OD.

Epistomaroides Uchio, 1952 (***3236**), p. 158.

Anomalina d'Orbigny, 1826 (***2303**), p. 282 (suppressed, ICZN petition pending; type species: *Anomalina punctulata* d'Orbigny, 1826 (synonym: *Epistomaria punctata* Said, 1949, ***2689**, p. 37); SD Cushman, 1915 (***707**), p. 44.

Test low trochospiral and biconvex, all chambers of the two whorls visible from the spiral side, only the nine or ten of the final whorl visible on the umbilicate opposite side where supplementary chamberlets formed by a transverse internal partition result in a stellate appearance, sutures deeply incised, bridged by shell material between the multiple sutural openings, periphery rounded, peripheral outline lobulate; wall calcareous, thin, coarsely perforate; primary aperture a low interiomarginal arch extending from the peripheral margin to the umbilicus, small secondary areal opening at the suture between primary and supplementary chambers in the apertural face, and multiple sutural openings present on both sides of the test. Holocene: Pacific Ocean: Indian Ocean: Mediterranean Sea: Red Sea.

Remarks: As shown by Hansen and Rögl (1980, ***1396**, p. 153), the type species of *Anomalina*, *A. punctulata*, is identical with *Epistomaria punctata* Said and congeneric with species now known as *Epistomaroides*. As a very broad concept for *Anomalina* previously had resulted from the somewhat generalized original figures, and as the type specimen was lost, a petition was submitted to the ICZN for suppression of *Anomalina* and retention of *Epistomaroides* as a valid genus.

MULLINIA McCulloch, 1977

Plate 671, figs. 14-16

Type species: Mullinia rara McCulloch, 1977; OD.

Mullinia McCulloch, 1977 (*1961), p. 308.

Test auriculate in outline, planoconvex, low trochospiral coil with about one and a half rapidly enlarging whorls, bievolute so that all chambers are visible on both sides, spiral side weakly convex, sutures curved and strongly oblique, umbilical side flat with chambers wedgelike and sutures radial, periphery angular, carinate; wall calcareous, hyaline, appearing to be thickened just beneath the septal face, but this is interpreted as the internal attachment to the wall on the spiral side of a toothplate that extends across the terminal face and along the peripheral wall about halfway to the previous septum and extends from the lower margin of the septal face to attach like a septal flap to the previous septum; aperture interiomarginal on the umbilical side, extending from the periphery to the umbilicus and appearing to continue around the spiral suture. Holocene, between 1,720 m and 2,300 m; Pacific, off Bikini Island.

Remarks: Based on a single specimen, the type species is incompletely known. The original figure of the spiral side is fairly accurate, but the umbilical side of the specimen does not show the crenulate peripheral margin suggested by the figure nor are the sutures accurately indicated. Sections of additional specimens are required for an adequate description of the internal characters, particularly the nature of the toothplate.

Family ASTERIGERINATIDAE Reiss, 1963

Asterigerinatidae S. N. Singh and Kalia, 1972 (*2982), p. 159, nom. transl. ex subfamily Asterigerinatinae.
Asterigerinatinae Reiss, 1963 (*2561), p. 58 (subfamily).
Heminwayininae Reiss, 1963 (*2561), p. 66 (subfamily).
Eoeponidellidae Seiglie and Bermúdez, in Seiglie, 1965 (*2846), p. 2 (name not available, ICZN Art. 13 (a)(i), no description).

Test trochospiral, umbilical side with secondarily produced chamberlets. U. Cretaceous (Campanian) to Holocene.

ALTASTERELLA Seiglie, 1965

Plate 674, figs. 1-6

Type species: Eoeponidella (Altasterella) riveroae Seiglie, 1965; OD.

Eoeponidella (Altasterella) Seiglie, 1965 (*2846), p. 3.
Asterigerinita Seiglie and Bermúdez, 1965 (*2852), p. 159 (name not available, ICZN Art. 13 (a)(i), no description).
Asterigerinita Seiglie and Bermúdez, 1966 (*2854), p. 433; type species: *Globorotalia kochi* Pijpers, 1933 (*2406), p. 71; OD.

Test small, trochospiral, planoconvex, with flattened spiral side of two to two and a half whorls, chambers progressively broader as added, and later chambers crescentic, sutures depressed, curved, and oblique, umbilical side moderately to strongly convex, with centrally depressed umbilicus, sutures radial but largely obscured by the addition of rhomboidal and inflated coverplates over the aperture and sutures, forming a central stellate area on the umbilical side, periphery acutely angled to subcarinate; wall calcareous, perforate, no surface ornamentation; aperture a high interiomarginal arch, umbilical in position, the secondarily formed coverplate leaving open only a low slit. M. to U. Eocene; Mexico; Cuba; USA: California; Pakistan.

Remarks: Both the type species of *Eoeponidella (Altasterella)* and *Asterigerinita* are planoconvex, with strongly convex umbilical side and centrally depressed umbilicus, and have secondarily added large rhomboidal coverplates over the aperture and intercameral suture. They are here considered congeneric, and the prior *Altasterella* is elevated to generic rank.

ASTERIGERINATA Bermúdez, 1949

Plate 672, figs. 1-3

Type species: Asterigerinata dominicana Bermúdez, 1949; OD.

Asterigerinata Bermúdez, 1949 (*201), p. 266.

Test planoconvex, low trochospiral, three to four whorls visible on the convex spiral side, chambers increasing rapidly in breadth and becoming broad, low, semilunate, and strongly overlapping, the final chamber occupying almost one-half the periphery, sutures curved, strongly oblique, thickened, poreless and flush, on the umbilical side only the five chambers of the final whorl are visible, the umbilical end of each chamber secondarily covered by a convex ovoid coverplate, those of the final whorl producing a rosette around the central umbilical plug, sutures curved to sinuate, slightly depressed, periphery acutely angled and carinate; wall calcareous, coarsely perforate on the spiral side, coverplates most coarsely perforate on the umbilical side and may be finely pustulose; aperture a low interiomarginal arch, bordered by short radiating grooves and pustules. Oligocene to Holocene; cosmopolitan.

ASTERIGERINELLA Bandy, 1949

Plate 673, figs. 1-6

Type species: Asterigerinella gallowayi Bandy, 1949; OD.

Asterigerinella Bandy, 1949 (*115), p. 118.

Test flattened lenticular, very low trochospiral, bievolute, chambers enlarging gradually, about eight in the final whorl, sutures curved and slightly depressed on the spiral side, nearly radial and depressed on the umbilical side, inner margin of each chamber and intercameral suture secondarily covered by a rhomboidal plate as the next chamber is added, the rhomboidal plates of the final whorl forming a stellate pattern around the umbilicus, periphery broadly carinate; wall calcareous, finely perforate, surface papillate on spiral side; primary aperture interiomarginal, an arch at the base of the oblique final chamber face, facing the umbilical side and extending nearly to the peripheral keel, after addition of the coverplate and new chamber the intercameral foramen remains as a slightly irregular elongate vertical slit about midway in the septal face. U. Eocene (Priabonian) to Oligocene; USA: Alabama.

ASTERIGERINOIDES Bermúdez, 1952

Plate 674, figs. 7-11

Type species: Discorbina guerichi Franke, 1912 (*1169), p. 29; OD.

Asterigerinoides Bermúdez, 1952 (*205), p. 61.

Test biconvex, trochospiral, about three whorls visible on the spiral side, chambers broad and low, sutures oblique, thickened and flush, only the seven to eight chambers of the final whorl visible on the centrally umbonate umbilical side, sutures gently curved and radial, apertural coverplate secondarily formed over the aperture and innermost half of the chambers, the suture between the resulting chamberlet and primary chamber paralleling the test periphery, in rare specimens the coverplate may be present on the final chamber and cover only the proximal part of the aperture, periphery carinate; wall calcareous, of calcite by X-ray powder diffraction film, coarsely perforate except for the imperforate sutures and keel; aperture a low interiomarginal arch at the base of the apertural face on the umbilical side, with a narrow bordering lip, surface of test prominently beaded just above and below the aperture. M. Oligocene to M. Miocene; Germany; France; Belgium; Netherlands; Denmark.

BIASTERIGERINA Seiglie and Bermúdez, 1965

Plate 672, figs. 10-13

Type species: Asterigerina planorbis d'Orbigny, 1846 (*2309), p. 205; OD.

Biasterigerina Seiglie and Bermúdez, 1965 (*2852), p. 159.

Biasterigerina Seiglie and Bermúdez, in Seiglie, 1965 (*2846), p. 5 (name not available, ICZN Art. 13(a)(i), no description.

Test of medium size, planoconvex, with conical spiral side showing all whorls, chambers broad, low, and crescentic and sutures flush and strongly oblique; on the flat umbilical side only the final whorl is visible, chambers lunate, the final one occupying up to one-third the surface, umbilical chamberlets narrow, elongate, and inflated, forming a stellate pattern but with irregular margins, the chamberlet covering the preceding aperture and extending along the suture nearly to the periphery, umbilicus depressed, sutures curved, oblique, and weakly depressed, periphery acutely angled and carinate; wall calcareous, finely perforate, keel and sutures on spiral side imperforate, surface with granules and pustules just below the aperture on the previous whorl; primary aperture a broad low interiomarginal arch, extending from the umbilicus nearly to the periphery, only a small part remaining open as the next supplementary chamber is added. Paleocene to Holocene: cosmopolitan.

Remarks: A lectotype was designated for *Asterigerina planorbis* by Papp and Schmid (1985, ***2338**, p. 75) from Nussdorf, Austria (Micropaleontological Collection, Geologische Bundesanstalt GBA 1981/03/336). *Biasterigerina* differs from *Asterigerinata* in the high conical spiral side, umbilical side with depressed umbilicus rather than an umbilical plug, very narrow and elongate rather than petaloid supplementary chambers, and in these being sutural in position rather than covering the base of the primary chamber. It differs from *Altasterella* in the spiral rather than umbilical side being convex, and in the more tapering chamberlets.

BOLTOVSKOYELLA Malumián and Masiuk, 1972

Plate 675, figs. 1–4

Type species: Boltovskoyella argentinensis Malumián and Masiuk, 1972; OD.

Boltovskoyella Malumián and Masiuk, 1972 (***2001**), p. 1.

Test conical, spiral side strongly convex and umbilical side flat to concave, early whorl with up to six chambers, rapidly reduced to three per whorl, sutures curved and oblique, flush on the spiral surface, depressed around the umbilicus on the umbilical side, an ovoid to reniform supplementary chamber secondarily produced on each chamber around the umbilicus, periphery angular; wall calcareous, of calcite, by X-ray determination, optically radial, lamellar, hyaline, light brown in color, finely perforate on spiral surface but sutures, periphery, and umbilical surface imperforate, surface smooth but with small nodes on the umbilical surface; aperture a high interiomarginal arch, bordered by a lip. U. Eocene to L. Oligocene; Argentina.

Remarks: Assignment of this genus to the Asterigerinatidae follows the original description as being like the Asterigerinidae but having secondarily formed chamberlets. However, *Boltovskoyella* is unique in the very high spire forming a parallel-sided cone and in the broad umbilicus, and the systematic position needs additional study.

DUBLINIA McCulloch, 1977

Plate 672, figs. 4–9

Type species: Dublinia expetenda McCulloch, 1977; OD.

Dublinia McCulloch, 1977 (***1961**), p. 282.

Carlfranklinia McCulloch, 1977 (***1961**), p. 294; type species: *Carlfranklinia surreptiva* McCulloch, 1977; OD.

Test rounded to auriculate in outline, spiral side flat to weakly convex, may be slightly concave on the umbilical side, chambers in a flat trochospiral coil, increasing rapidly in breadth but slowly in height on the spiral side and appearing crescentic, sutures strongly curved, slightly depressed, chambers on umbilical side with reentrants on each side of an umbilical lobe, the anterior one later covered with a rounded coverplate as in *Asterigerinata*, coverplates of the final whorl remaining visible around the depressed umbilicus, periphery with clear imperforate keel; wall calcareous, thin, translucent, surface on spiral side undulating, with numerous irregular granules giving a rough appearance, umbilical side smooth; aperture a low interiomarginal arch beneath the anterior reentrant of the final chamber. Holocene; 1,720 m to 2,300 m, off Bikini Atoll, W. Pacific.

Remarks: The above synonymy and description are based on a restudy of the type specimens, although differing somewhat from the original description. The type specimens of the type species of both *Dublinia* and *Carlfranklinia* were from the same sample.

EOEPONIDELLA Wickenden, 1949

Plate 675, figs. 5–21

Type species: Eoeponidella linki Wickenden, 1949; OD(M).

Eoeponidella Wickenden, 1949 (***3372**), p. 81.

Heminwayina Bermúdez, 1951 (***204**), p. 325; type species: *Discorbis multisectus* Galloway and Heminway, 1941 (***1207**), p. 384; OD.

Asterellina Anderson, 1963 (***37**), p. 313; type species: *Pninaella? pulchella* F. L. Parker, 1952 (***2339**), p. 420; OD.

Eoeponidella (Umboasterella) Seiglie, 1965 (***2846**), p. 6; type species: *Eoeponidella (Umboasterella) meyerhoffi* Seiglie, 1965; OD.

Test small, planoconvex to biconvex, two to three whorls, chambers crescentic and sutures depressed, curved, and oblique on the convex spiral side, five to eight chambers in the final whorl, sutures radial on the centrally depressed and flatter involute umbilical side where a secondarily added umbilical plate over the aperture forms a stellate series around the umbilicus, occasional specimens may have a small umbilical plug, periphery rounded to subangular; wall calcareous, finely to relatively coarsely perforate; primary aperture a broad interiomarginal arch in the umbilical face of the final chamber, the aperture obscured as the supplementary coverplate is added, leaving only a small opening near the proximal chamber margin. U. Cretaceous (Campanian) to Holocene; cosmopolitan.

Remarks: *Heminwayina* was placed in synonymy by Loeblich and Tappan (1964, ***1910**, p. C577). *Asterellina* was considered a synonym by Seiglie (1964, ***2846**), Seiglie and Bermúdez (1965, ***2852**), and Haman, 1973, ***1369**); *Eoeponidella (Umboasterella)* was regarded as differing in having an umbilical plug, rather than a simple umbilicus, but this feature appears variable even within a species, as noted by Anderson for *Asterellina*. The holotype of *Pninaella pulchella* also has a plug, although the paratype does not appear to have this, hence if this character were used for generic separation, *Asterellina* would have priority over *Umboasterella*.

HUBBARDINA McCulloch, 1977

Plate 676, figs. 1-3

Type species: Hubbardina pacifica McCulloch, 1977; OD.

Hubbardina McCulloch, 1977 (***1961**), p. 375.

Test lenticular, trochospiral, biconvex, spiral side evolute, showing three to four whorls of nearly constant height but with chambers increasing in breadth as added, sutures depressed, oblique, the five to seven wedgelike chambers of the final whorl visible around the closed umbilicus on the umbilical side, and sutures straight and radial, an ovate umbilical plate aligned with the suture covers each previous aperture, the coverplates alternating in position with the primary chambers, periphery subacute; wall calcareous, thin, hyaline, finely perforate, umbilical plates somewhat more coarsely perforate, surface granulose; aperture an interiomarginal, extraumbilical arch that is later covered by the ovate umbilical coverplate as the next chamber is added. Holocene, at about 32 m; Philippines.

Remarks: The equatorial aperture shown in the original figure of the type species is not apparent on the holotype specimen, the aperture lying about midway between the umbilicus and periphery.

MULLINOIDES McCulloch, 1977

Plate 676, figs. 4-6

Type species: Mullinoides differens McCulloch, 1977; OD.

Mullinoides McCulloch, 1977 (***1961**), p. 309.

Test small, trochospiral, planoconvex, spiral side convex, with about two rapidly enlarging whorls of semilunate chambers and flush curved sutures extending back along the periphery, umbilical side flat to concave, with six wedgelike chambers of the final whorl separated by radial, depressed sutures around the closed umbilicus, an ovate umbilical plate covers each earlier aperture and the umbilical end of the respective chamber, periphery angular, carinate; wall calcareous, hyaline, surface smooth; aperture a high interiomarginal and extraumbilical arch, later covered by the umbilical plate as a new chamber is formed. Holocene; USA: off San Clemente Island, California, at 75 m.

Remarks: Resembles *Eoeponidella* but differs in the lunate chambers, sharply angled and carinate periphery and concave umbilical side.

NARAYANIA S. N. Singh and Kalia, 1982

Plate 676, figs. 7-9

Type species: Narayania lakshanika S. N. Singh and Kalia, 1982; OD.

Narayania S. N. Singh and Kalia, 1982 (***2985**), p. 31.
Narayania S. N. Singh, 1971 (***2977**), p. 1173 (name not available, ICZN Art. 13 (a)(i), no description).

Test biconvex, trochospiral with about two whorls, chambers enlarging rapidly as added, five or six in the final whorl, sutures distinct, radial, and deeply incised, secondarily added sutural-umbilical plates cover the incised sutures and central region on the umbilical side, forming a stellate system of chamberlets, periphery carinate, peripheral outline lobulate; wall calcareous, coarsely perforate, optically radial, stated to be of aragonite as determined by Meigen's reaction but more probably of calcite, surface smooth; aperture an asymmetrical interiomarginal arch, extending from the periphery onto the umbilical side and bordered by a distinct lip. M. Eocene (Lutetian): India: Rajasthan.

Remarks: *Narayania* was originally placed in the family Ceratobuliminidae, as it was said to have an aragonitic wall determined by Meigen's reaction. The latter is not as reliable as X-ray determination, and the coarse perforation and secondarily formed chamberlets are not characteristic for Ceratobuliminidae. The young paratypes described as having uncovered and deeply incised sutures and an umbilical plug are probably neither conspecific nor congeneric.

Family ASTERIGERINIDAE d'Orbigny, 1839

Asterigerinidae d'Orbigny, 1839 (***2304**), p. xxxix, 116.
Asterigerinida Copeland, 1956 (***680**), p. 187 (err. emend.).
Asterigerininae Saidova, 1981 (***2696**), p. 46 (subfamily).

Test trochospirally enrolled, primary chambers alternating with smaller chamberlets in a stellate series around an umbilical plug, chamberlets primarily formed at the contact of the internal toothplate with the umbilical wall. L. Eocene to Holocene.

ASTERIGERINA d'Orbigny, 1839

Plate 676, figs. 10-13

Type species: Asterigerina carinata d'Orbigny, 1839; SD Cushman, 1927 (***746**), p. 190.

Asterigerina d'Orbigny, 1839 (***2304**), p. 117.

Test inequally biconvex with more elevated umbilical side, about three gradually enlarging whorls, chambers appear low and semicircular and sutures oblique and thickened on the spiral side, only the final whorl of about nine subtriangular chambers visible on the umbilical side, septal face oblique to the plane of coiling, a prominent stellate series of rhomboidal chamberlets surrounding the closed umbilicus results from subdivision of the primary chamber lumen by an internal toothplate that extends from the apertural face obliquely through the chamber to attach near the middle of the preceding septum and to the lateral chamber wall on the umbilical side, chamberlet communicating only with the remainder of the same chamber and not separately to the exterior, periphery carinate; wall calcareous, hyaline, optically radial, finely perforate, surface smooth, except in the region of the aperture, where numerous small inflational granules, grooves, and pustules cover the final portion of the preceding whorl just below the aperture on the umbilical side and commonly are aligned in the direction of growth; aperture a low interiomarginal slit, opening only into the primary chamber, and extending from the contact with the final supplementary chamber nearly to the peripheral keel, bordered above by a narrow lip, aperture of previous chambers serving as intercameral foramina. L. Eocene to Holocene; cosmopolitan.

Remarks: The lectotype of the type species, from the Recent of Cuba, is in the d'Orbigny collection, FO-228, MNHN, Paris (Y. Le Calvez, 1977, ***1806**, p. 8).

Family AMPHISTEGINIDAE Cushman, 1927

Amphisteginidae Cushman, 1927 (***742**), p. 79.
Amphisteginina Chapman and Parr, 1936 (***542**), p. 144 (subfamily).

Chambers numerous, with complex chamberlets at center of umbilical side, and may have interseptal pillars; aperture a narrow interiomarginal slit. Eocene to Holocene.

AMPHISTEGINA d'Orbigny, 1826

Plate 677, figs. 1-8

Type species: Amphistegina quoyii d'Orbigny, 1826 (***2303**), p. 304, pl. 17, figs. 1-4 (figs. erroneously stated to be *A. lessonii* in the text, but cited as *A. quoyii* in plate explanation) = *Nautilus radiatus* Fichtel and Moll, 1798 (***1124**), p. 58; OD(M).

Amphistegina d'Orbigny, 1826 (*2303), p. 304.
Omphalophacus Ehrenberg, 1839 (*1054), chart opp. p. 120; type species: *Omphalophacus hemprichii* Ehrenberg, 1840; OD(M).

Test low trochospiral, lenticular and inequally biconvex, may be bi-involute or partially evolute on the spiral side, chambers numerous, broad, and low, strongly curved back at the periphery to form chamber prolongations, interior of all chambers with primarily formed toothplate that extends from the apertural face to about the middle of the previous septum and almost completely divides the chamber lumen, contact of the toothplate with the wall of the umbilical side producing a stellate pattern like that of *Asterigerina* although commonly more irregular due to the twisting of the toothplate, distinct umbilical plug present, periphery angular to carinate; wall calcareous, optically radial, finely perforate, surface smooth other than the papillae in the apertural region; aperture an interiomarginal slit on the umbilical side, bordered by a lip, those of preceding chambers serving as intercameral foramina, surface of the preceding whorl just beneath the aperture covered with fine papillae or rugae oriented in the direction of growth. Eocene to Holocene; cosmopolitan.

Remarks: Because d'Orbigny (1826, *2303) referred to the figures as both *A. quoyii* (on the plate explanation) and *A. lessonii* (in the text), the type species has been variously identified. Of the eight species of *Amphistegina* listed by d'Orbigny (1826), seven were nomina nuda, having neither figures nor descriptions at that time; two were represented by Modèles, but these had no validity until figures were published by Parker, Jones, and Brady (1865, *2354), hence only the species represented by d'Orbigny's original figures was valid in 1826. Lys (1948, *1953, p. 64) and later authors have shown that these figures represent the species that d'Orbigny's models referred to *A. quoyii* and not that known as *A. lessonii* (which was apparently validated by illustrations presented by Guérin-Méneville, 1843, *1339). Thus, as neither *Amphistegina vulgaris* d'Orbigny, designated by Parker, Jones, and Brady (1865, *2354, p. 25), nor *A. lessonii* d'Orbigny, designated by Cushman (1914, *706, p. 35), were valid species as of 1826, they were not available, leaving *A. quoyii* as the type species by monotypy. Hofker (1927, *1491, p. 77), stated that the species figured by d'Orbigny was in fact *Amphistegina radiata* (Fichtel and Moll), the synonymy being confirmed by Rögl and Hansen (1984, *2639, p.43) from a study of the Fichtel and Moll types and from the Indian Ocean lectotype they designated from the original material. Cushman (1944, *794, p. 157) examined the Ehrenberg types in Berlin and stated that *Omphalophacus hemprichii* Ehrenberg (never figured) is an inequally biconvex *Amphistegina*.

Family BORELOIDIDAE Reiss, 1963

Boreloididae Reiss, 1963 (*2561), p. 70.

Test spherical, conical, or fusiform, bilocular protoconch followed by early trochospiral stage, later planispiral and involute, and later chambers divided into chamberlets, spiral wall thick. M. to U. Eocene.

BORELOIDES Cole and Bermúdez, 1947

Plate 678, figs. 1–4

Type species: Boreloides cubensis Cole and Bermúdez, 1947; OD.

Boreloides Cole and Bermúdez, 1947 (*641), p. 197.

Test subspherical to fusiform, bilocular protoconch followed by numerous gradually enlarging enrolled chambers, trochospiral in the early stage, later chambers cyclical, nearly planispiral, bi-involute; wall calcareous, perforate, spiral wall thick, with inflational pustules and pillars, abraded specimens may appear to be pitted where the outer wall of the chamberlets is removed; intercameral stolons present. M. to U. Eocene: Cuba: Pacific: Eniwetok Atoll, Marshall Islands.

EOCONULOIDES Cole and Bermúdez, 1944

Plate 678, figs. 5–15

Type species: Eoconuloides wellsi Cole and Bermúdez, 1944; OD.

Eoconuloides Cole and Bermúdez, 1944 (*640), p. 340.
Tremastegina Brönnimann, 1950 (*367), p. 166; also 1951 (*368), p. 256; type species: *Amphistegina senni* Cush-

man, in Vaughan, 1945 (*3270), p. 49 = *Nummulites parvula* Cushman, 1919 (*715), p. 51, pl. 4, figs. 3, 6 (not fig. 5) (syn.: *Amphistegina lopeztrigoi* Palmer, 1934 (*2326), p. 255); OD.

Test lenticular to conical so that axial sections are triangular, enrolled, and involute, embryonic stage bilocular, final chambers subdivided into chamberlets on the ventral side; wall calcareous, spiral wall thick in the early stage, with prominent irregular pillars projecting above the surface, later thinner and with less prominent pillars, parallel ridges, and furrows near the periphery, base of ventral septa with multiple alternating stolons; aperture and foramina are slitlike openings in the septa, with backward projecting lips or countersepta, pores near the periphery communicate between ventral and dorsal chambers. M. to U. Eocene; Cuba; Leeward Islands: St. Bartholomew; Barbados.

Family LEPIDOCYCLINIDAE Scheffen, 1932

Lepidocyclinidae Scheffen, 1932 (*2747), p. 251.
Helicolepidinidae Pokorný, 1958 (*2447), p. 395.

Test discoidal to inflated lenticular, with distinct equatorial layer of chambers and zones of lateral chambers at each side; chamber walls perforated by stolons, no canal system. M. Eocene to L. Miocene (Burdigalian).

Subfamily HELICOLEPIDININAE Tan, 1936

Helicolepidininae Tan, 1936 (*3116), p. 277.
Helicolepidinae Vaughan and Cole, in Cushman, 1940 (*787), p. 325 (err. cit.).

Test with bilocular embryo surrounded by thickened wall, lacking adauxiliary chambers, precyclical equatorial layer of chambers in one or more definite and persistant open spirals, thickened wall of embryo may continue as a thickened spiral lamina, later equatorial chambers arcuate. M. Eocene to L. Miocene (Burdigalian).

EULINDERINA R. W. Barker and Grimsdale, 1936

Plate 679, figs. 1-9

Type species: Planorbulina (Planorbulinella) guayabalensis Nuttall, 1930 (***2276**), p. 276; OD.

Eulinderina R. W. Barker and Grimsdale, 1936 (*138), p. 237.
Eulinderina (Eolepidina) Tan, 1939 (*3119), p. 65: type species: *Eulinderina semiradiata* R. W. Barker and Grimsdale, 1936 (*138), p. 238; OD.

Test lenticular to discoidal, bilocular embryonic stage followed by trochoid coil of one whorl with thick outer wall and few chambers, connected by apertures and countersepta, spire followed by a median layer of numerous cycles of arcuate chambers that are connected by cylindrical stolons, lateral wall layers may be in contact or may leave irregular interspaces that in some species become lateral chambers; wall calcareous, surface with large pustules representing the ends of pillars. M. Eocene; Mexico.

HELICOLEPIDINA Tobler, 1922

Plate 680, figs. 1-12

Type species: Lepidocyclina (Helicolepidina) spiralis Tobler, 1922; OD.

Lepidocyclina (Helicolepidina) Tobler, 1922 (*3200), p. 380.
Helicolepidina Galloway, 1928 (*1203), p. 60 (nom. transl.).
Helicocyclina Tan, 1936 (*3117), p. 995; type species: *Helicolepidina paucispira* R. W. Barker and Grimsdale, 1936 (*138), p. 243; OD.

Test lenticular, bilocular embryonic stage followed by loose planispiral coil of one or two whorls having a thick and perforate spiral outer wall termed the helicolepidine string and a series of relatively large and asymmetrical imbricate chambers forming a continuous series outside of the helicolepidine string, median layer also has smaller arcuate chambers that fill the remaining space both inside and outside of the helicolepidine string, median chambers with single or double apertures, lateral chambers well developed. M. to U. Eocene; North America; South America.

HELICOSTEGINA R. W. Barker and Grimsdale, 1936

Plate 679, figs. 10-15

Type species: Helicostegina dimorpha R. W. Barker and Grimsdale, 1936; OD.

Helicostegina R. W. Barker and Grimsdale, 1936 (*138), p. 233.
Helicolepidinoides Tan, 1936 (*3117), p. 992; type species: *Helicostegina gyralis* R. W. Barker and Grimsdale, 1936 (*138), p. 236; OD.

Test lenticular, early chambers in an involute trochospiral coil, later ones subdivided ventrally to form small chamberlets in early species or subdivided on both sides in later species, adult test with peripheral flange and arcuate chambers in annular series around the periphery of the juvenile stage; wall surface pustulose to papillose; aperture a narrow slit near the inner margin of the final chamber. M. to U. Eocene: Trinidad; Mexico.

HELICOSTEGINOPSIS Caudri, 1975

Plate 681, figs. 1-7

Type species: Helicostegina soldadensis Grimsdale, 1941 (*1310), p. 86; OD.

Helicosteginopsis Caudri, 1975 (*513), p. 570.

Test small, lenticular, coiled throughout, simple chambers and septa in the first one or two whorls, then with relatively large chambers resembling those of earlier whorls forming a single row just against the periphery of the preceding whorl, and numerous smaller arcuate chamberlets forming two or three rows just beneath the outer wall of the whorls, the latter resembling the later median chambers, no lateral chambers developed but may have meandrine prolongations of the chambers over the test axis, final stage with flangelike single layer of larger chamberlets; primary chambers interconnected by slitlike apertures with thickened rims, no countersepta. U. Eocene; Trinidad.

NEPHROLEPIDINA H. Douvillé, 1911

Plate 681, figs. 8-11; plate 682, figs. 1-10; plate 683, figs. 1-10

Type species: Nummulites marginata Michelotti, 1841 (*2099), p. 297; SD Yabe, 1919 (*3402), p. 41.

Lepidocyclina (Nephrolepidina) H. Douvillé, 1911 (*987), p. 59, 70, 73 (as section of *Lepidocyclina*).

Lepidocyclina (Pliolepidina) H. Douvillé, 1915 (*990), p. 727; type species: *Lepidocyclina (Pliolepidina) tobleri* H. Douvillé, 1917 (*994), p. 844; SD(SM).

Lepidocyclina (Multicyclina) Cushman, 1918 (*712), p. 96; type species: *Lepidocyclina (Multicyclina) duplicata* Cushman, 1918; OD.

Amphilepidina H. Douvillé, 1922 (*999), p. 552; type species: *Orbitoides sumatrensis* Brady, 1875 (*335), p. 536; SD H. Douvillé, 1925 (*1001), p. 100.

Lepidocyclina (Amphilepidina) H. Douvillé, 1925 (*1001), p. 33, 44 (nom. transl.).

Pliolepidina Galloway, 1928 (*1203), p. 63 (nom. transl.).

Cyclosiphon (Nephrolepidina) Galloway, 1928 (*1203), p. 66 (nom. transl.).

Cyclosiphon (Amphilepidina) Galloway, 1928 (*1203), p. 67 (nom. transl.).

Lepidocyclina (Multilepidina) Hanzawa, 1932 (*1400), p. 447; type species: *Lepidocyclina (Multilepidina) irregularis* Hanzawa, 1932; OD(M).

Lepidocyclina (Cyclolepidina) Whipple, 1934 (*3365), p. 143; type species: *Lepidocyclina (Cyclolepidina) suvaensis* Whipple, 1934; OD.

Orbitoina (Isorbitoina) van de Geyn and van der Vlerk, 1935 (*1233), p. 222, 227, 255 (name not available, ICZN Art. 13 (b), no type species).

Orbitoina (Pliorbitoina) van de Geyn and van der Vlerk, 1935 (*1233), p. 222, 227, 255; type species: *Lepidocyclina (Pliolepidina) tobleri* H. Douvillé, 1917 (*994), p. 844; OD(M).

Multilepidina A. Silvestri, 1937 (*2966), p. 160 (non *Multilepidina* Hanzawa, 1932); "group" of *Lepidocyclina*, no species included.

Triplalepidina Vaughan and Cole, 1938 (*3272), p. 167; type species: *Triplalepidina veracruziana* Vaughan and Cole, 1938; OD.

Orbitoina (Isorbitoina) Thalmann, 1938 (*3159), p. 202; type species: *Lepidocyclina (Isolepidina) trinitatis* H. Douvillé, 1925 (*1001), p. 34; OD.

Lepidocyclina (Neolepidina) Brönnimann, 1947 (*365), p. 378; type species: *Lepidocyclina (Isolepidina) pustulosa* H. Douvillé, 1917 (*994), p. 844; OD.

Multilepidina Cole, in Loeblich and Tappan, 1964 (*1910), p. C723 (non *Multilepidina* Hanzawa, 1932; cited as synonym of *Lepidocyclina (Pliolepidina)*, with same type species; name not available, ICZN Art. 11 (e)(i)).

Nephrolepidina Matsumara, 1971 (*2060), p. 97 (nom. transl.).

Megalospheric early stage with small proloculus about half surrounded by the reniform deuteroloculus, the two chambers slightly compressed, separated by a thin imperforate wall with a central foramen and surrounded by a common thick tubulated wall, later chambers variously arranged, resembling *Helicolepidina* but without the thick spiral wall, equatorial layer of chambers arcuate in older species, in younger species these are pointed at the top, spatulate, and tend to become hexagonal; basal stolon present. M. Eocene to L. Miocene (Burdigalian); North America; South America; Europe; N. Africa; Indo-Pacific.

POLYLEPIDINA Vaughan, 1924

Plate 683, figs. 11-13; plate 684, figs. 1-7

Type species: Lepidocyclina (Polylepidina) chiapasensis Vaughan, 1924 = *Lepidocyclina antillea* Cushman, 1919 (*715), p. 63; OD.

Lepidocyclina (Polylepidina) Vaughan, 1924 (*3261), p. 794, 807.

Polylepidina Galloway, 1928 (*1203), p. 60 (nom. transl.).
Orbitoina (Polyorbitoina) van de Geyn and van der Vlerk, 1935 (*1233), p. 227; type species: *Lepidocyclina (Polylepidina) proteiformis* Vaughan, 1924 (*3261), p. 810; OD(M).

Embryo consists of protoconch and deuteroconch surrounded by a thickened wall, may have one or more early postembryonic chambers with single basal aperture, hence producing a single much reduced spire, later chambers then have a second retrovert aperture or the earliest postembryonic chambers may immediately have two apertures, all biapertural chambers then producing two new chambers and eventually a cyclic growth stage, arcuate equatorial chambers with only radial stolons, lateral chambers present. Upper M. Eocene: Mexico; West Indies.

Subfamily LEPIDOCYCLININAE Scheffen, 1932

Lepidocyclininae Tan, 1936 (*3116), p. 277, nom. transl. ex family Lepidocyclinidae.

Thin-walled bilocular or multilocular embryonal stage surrounded by a thickened wall, adauxiliary chambers present, may have limited number of spirally arranged chambers but these do not completely surround the embryonal stage, later with cyclical series of arcuate to hexagonal equatorial chambers and numerous lateral chambers well differentiated from the equatorial layer. M. Eocene to L. Miocene (Aquitanian).

ASTROLEPIDINA, n. gen.

Plate 684, figs. 8 and 9

Type species: Lepidocyclina asterodisca Nuttall, 1932 (*2277), p. 34; OD.

Lepidocyclina (Astrolepidina) A. Silvestri, 1931 (*2962), p. 35 (name not available, ICZN Art. 13 (b), no type species designated).
Astrolepidina Cole, in Loeblich and Tappan, 1964 (*1910), p. C721; type species: obj. (name not available, ICZN Art. 11 (e)(i, ii), published as a junior synonym of *Lepidocyclina*).

Test flattened, up to 5 mm in diameter and 1 mm in thickness, stellate in outline, with four broad elevated arms, bilocular embryo of approximately equal sized chambers separated by a straight wall, followed by much smaller equatorial chambers, ogival in outline in the early stage, later ones hexagonal, chambers in the rays four or more times the size of the interray chambers, equatorial layer increasing in thickness toward the periphery, lateral chambers of length twice their height; surface with numerous large and elevated pustules reflecting internal pillars, adjacent papillae joined by narrow ridges, about five ridges from each of the papillae. L. to U. Oligocene; Mexico.

Remarks: Silvestri (1931, *2962) proposed the subgenus for stellate forms of *Lepidocyclina*, and although all generic taxa proposed after 1930 must have a type species designated (ICZN Art. 13 (b)), he included no named species. Cole (in Loeblich and Tappan, 1964, *1910) cited *Astrolepidina* in the generic sense, referred to Silvestri's publication that included a minimal description, and designated a type species but did not validate the genus as he cited it only in the synonymy of *Lepidocyclina* (ICZN Art. 11 (e)(i, ii)). Although similar to *Lepidocyclina*, radial forms are recognized as distinct genera in the Discocylinidae and Nummulitidae, hence the present genus is also recognized as valid.

CAUDRIELLA Haman and Huddleston, 1984

Plate 685, figs. 1-7

Type species: Margaritella ospinae Caudri, 1974 (*512), p. 307; OD.

Caudriella Haman and Huddleston, 1984 (*1375), p. 126 (nom. subst. pro *Margaritella* Caudri, 1974).
Margaritella Caudri, 1974 (*512), p. 307 (non *Margaritella* Meek and Hayden, 1860).

Test of moderate size, to about 2 mm in diameter, flattened lenticular, with differentiated median and lateral chambers, those of median layer with arcuate outer wall as seen in vertical section, irregularly arranged lateral chambers with thick walls and open lumina, embryo with small globular proloculus, followed by two somewhat larger chambers, then with two symmetrically arranged auxiliary chambers on each side and a third at the distal end of chamber three, the following periembryonic spiral forms a complete ring of chambers around the embryo, later chambers of median layer irregularly arranged, periphery bluntly rounded: wall calcareous, thick, perforate, surface with thick meandrine ridges and heavy knobs at the termination of the numerous pillars in the central area. M. Eocene: Venezuela.

EULEPIDINA H. Douvillé, 1911

Plate 685, figs. 8 and 9; plate 686, figs. 1-7

Type species: Orbitoides dilatata Michelotti, 1861 (***2100**), p. 17; SD Yabe, 1919 (***3402**), p. 41.

Lepidocyclina (Eulepidina) H. Douvillé, 1911 (***987**), p. 59 (as Section of *Lepidocyclina*).

Eulepidina H. Douvillé, 1917 (***993**), p. 145 (nom. transl.).

Cyclosiphon (Eulepidina) Galloway, 1928 (***1203**), p. 67 (nom. transl.).

Trybliolepidina van der Vlerk, 1928 (***3302**), p. 10, 13; type species: *Lepidocyclina ephippioides* Jones and Chapman, 1900 (***1617**), p. 251, 256; SD Berry, 1929 (***217**), p. 37.

Lepidocyclina (Trybliolepidina) Yabe and Hanzawa, 1929 (***3410**), p. 146 (nom. transl.).

Test discoidal, large bilocular megalospheric nucleoconch from 1 mm to 3 mm in diameter, small spherical to cuboidal protoconch nearly or completely surrounded by larger deuteroconch, the two touching tangentially at the latter's roof and floor, both surrounded by a thick wall pierced by numerous stolons that lead to the equatorial auxiliary chambers and originate new spirals of equatorial chambers, stolons from the protoconch also connect with early lateral auxiliary chambers; microspheric test with very tiny protoconch and deuteroconch followed by four to six chambers with proximal stolons only, then by chambers with two stolons, each giving rise to two spirals, large spatulate equatorial chambers may appear hexagonal, lateral chambers low and irregular, rounded to polygonal, those of successive layers alternating and may occur in groups around imperforate pillars; wall calcareous, that of the median layer with multiple grooves and ridges associated with the stolons; cyclic stolons connect equatorial chambers of the same annulae, and two sets of stolons that cross connect to adjacent chambers of adjacent cycles, perforations in the floor and roof of equatorial chambers connect with adjoining lateral chambers that also have perforate roofs and floors and side walls with stolons. M. Oligocene (Rupelian) to L. Miocene (Aquitanian): North America: South America: Europe: Africa: Asia: Australia.

LEPIDOCYCLINA Gümbel, 1870

Plate 687, figs. 1-5

Type species: Nummulites mantelli Morton, 1833 (***2193**), p. 291; SD H. Douvillé, 1898 (***979**), p. 594.

Lepidocyclina Gümbel, 1870 (***1337**), p. 689 (nom. conserv., ICZN Op. 127).

Cyclosiphon Ehrenberg, 1855 (***1069**), p. 288 (nom. reject. ICZN Op. 127); type species: obj.; OD(M).

Orbitoides (Lepidocyclina) Zittel, 1910 (***3454**), p. 44 (nom. transl.).

Lepidocyclina (Isolepidina) H. Douvillé, 1915 (***990**), p. 724; type species: obj.; OD.

Bilocular megalospheric nucleoconch with proloculus partly embraced by the equal sized deuteroconch, the two separated by a flat dividing wall and the entire nucleoconch surrounded by a thicker wall, median layer thin, early postembryonic chambers without regularity of arrangement, chambers arcuate, hexagonal, or more commonly spatulate, each biaperturate, roof and floors perforate, septa may be moderately fluted in axial section, lateral region may have pillars, six- or eight-stolon system present. M. Eocene to L. Miocene (Aquitanian); North America; South America.

PSEUDOLEPIDINA R. W. Barker and Grimsdale, 1937

Plate 687, figs. 6-11

Type species: Pseudolepidina trimera R. W. Barker and Grimsdale, 1937; OD.

Pseudolepidina R. W. Barker and Grimsdale, 1937 (***139**), p. 169.

Test small, lenticular to asymmetrical, surface papillate, subequal protoconch and deuteroconch in the equatorial plane and surrounded by a common wall, large third chamber on the less convex side of the equatorial plane partially embraces the nucleoconch, a few smaller supplementary chambers form a spiral around the nucleoconch in a plane perpendicular to the equatorial plane of the test, equatorial layer doubled beyond the protoconch, the irregularly arcuate chambers communicating with chambers of the lateral layers by long stolons. M. Eocene; Mexico; Jamaica.

Superfamily NONIONACEA Schultze, 1854

Nonionacea Loeblich and Tappan, 1964 (*1911), p. 34, nom. corr. pro superfamily Nonionidea.

Nonionidea Subbotina, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 282, nom. transl. ex subfamily Nonionida.

Nonionellidea Saidova, 1981 (*2696), p. 41.

Nonionoidea Tappan and Loeblich, 1982 (*3128), p. 550.

Test enrolled and planispiral to slightly asymmetrical; wall perforate, commonly of hyaline oblique calcite and appearing optically granular but rarely may be optically radial; aperture equatorial and interiomarginal, less commonly areal, a group of pores, a series of sutural openings, or a peripheral slitlike opening in each chamber that lies slightly to one side of the periphery. U. Cretaceous (Coniacian) to Holocene.

Family NONIONIDAE Schultze, 1854

Nonionidae Cushman, 1927 (*472), p. 49, nom. corr. pro family Nonionida.

Nonionida Schmarda, 1871 (*2781), p. 165, nom. transl. ex subfamily Nonionida.

Nonioninidae Reuss, 1860 (*2581), p. 151.

Nonioninideae Reuss, 1860 (*2581), p. 221.

Pullenidae Schwager, 1877 (*2830), p. 18.

Melonidae Chapman, Parr, and Collins, 1934 (*543), p. 556.

Nonionidea Copeland, 1956 (*680), p. 187.

Pulleniidae Putrya, 1963 (*2494), p. 37.

Nonionellidae Saidova, 1981 (*2696), p. 41.

Bermudezinellidae Saidova, 1981 (*2696), p. 52.

Spirotectidae Loeblich and Tappan, 1982 (*1917), p. 36, nom. corr.; nom. transl. ex subfamily Spiroplectinae.

Test planispiral or nearly so, at least in the early stage, involute to evolute; aperture interiomarginal and equatorial or a series of small equatorial openings. U. Cretaceous (Coniacian) to Holocene.

Subfamily SPIROTECTINAE Saidova, 1981

Spirotectinae Loeblich and Tappan, 1984 (*1918), p. 52, nom. corr. pro subfamily Spiroplectinae.

Spiroplectinae Saidova, 1981 (*2696), p. 42 (nom. imperf.).

Test trochospiral but final whorl completely envelops early ones on both sides of test. U. Cretaceous (Campanian to Maastrichtian).

SPIROTECTA Belford, 1961

Plate 688, figs. 1-5

Type species: Spirotecta pellicula Belford, 1961; OD.

Spirotecta Belford, 1961 (*178), p. 81.

Spiroplecta Saidova, 1981 (*2696), p. 42 (err. cit.: non *Spiroplecta* Ehrenberg, 1844).

Test low trochospiral but bi-involute with closed umbilicus on both sides, inequally biconvex, few chambers per whorl, increasing gradually in size, sutures strongly curved on the flatter side, straight, radial and depressed on the more inflated side, periphery subangular but rounded; wall calcareous, optically granular, finely perforate, surface smooth; aperture an interiomarginal equatorial arch that extends nearly to the umbilicus on the convex side, bordered by a narrow lip. U. Cretaceous (Campanian to Maastrichtian); Western Australia; France.

Subfamily NONIONINAE Schultze, 1854

Nonioninae Chapman and Parr, 1936 (*542), p. 145, nom. corr. pro subfamily Nonionida.

Nonionida Schultze, 1854 (*2824), p. 53.

Nonionininae A. Silvestri, 1950 (*2972), p. 52.

Nonionellinae Voloshinova, 1958 (*3315), p. 141.

Nonionellinea Saidova, 1981 (*2696), p. 41 (supersubfamily).

Nonionellininea Saidova, 1981 (*2696), p. 41 (supersubfamily).

Nonioninea Saidova, 1981 (*2696), p. 52 (supersubfamily).

Test moderately compressed, numerous chambers per whorl, height of whorl increasing rapidly; aperture a small interiomarginal equatorial opening. U. Cretaceous (Coniacian) to Holocene.

DARIELLINA Grigyalis, 1980

Plate 688, figs. 6-10

Type species: Daria daira Grigyalis, 1970 (*1303), p. 365; OD.

Dariellina Grigyalis, 1980 (*1307A), p. 125 (nom. subst. pro *Daria* Grigyalis, 1970).

Daria Grigyalis, 1970 (*1303), p. 365 (non *Daria* Ragonot, 1888); type species: obj.; OD.

Test planispiral, robust, bilaterally symmetrical throughout, involute and biumbonate, few chambers per whorl, increasing rapidly in height as added so that test is somewhat oval in outline, sutures radial and nearly straight, periphery rounded; wall calcareous, vitreous, optically granular, thin, very finely and sparsely perforate, slightly larger pores in the apertural face, surface of umbilical area covered by small granules; aperture interiomarginal, equatorial, largely obscured by granules, leaving open only small pores. Upper Cretaceous (Maastrichtian) to Paleocene; USSR: Ukraine, Baltic region, W. Siberia; E. Germany.

EVOLUTONONION N. W. Wang, 1964

Plate 691, figs. 8-13

Type species: Evolutononion shansiense N. W. Wang, 1964, first figured by P. X. Wang et al., 1975 (***3345**), p. 27 as *Nonion shansiense* (N. W. Wang); also see N. W. Wang, 1981 (***3344**), p. 19 (as *E. shanxiense*): OD.

Evolutononion N. W. Wang, 1964 (***3343**), p. 58.

Test planispiral and advolute, part of all early whorls visible in the umbilical region, numerous chambers per whorl, enlarging slowly as added, sutures radial, straight to gently curved, periphery broadly rounded, peripheral outline lobulate; wall calcareous, surface smooth, but with granular deposits in the umbilical region; aperture a low interiomarginal and equatorial slit, with narrow bordering lip. U. Quaternary to Holocene; China: Shanxi Province.

Remarks: Differs from *Nonion* in the semi-evolute or advolute test and broadly rounded periphery.

HAYNESINA Banner and Culver, 1978

Plate 689, figs. 1-4

Type species: Nonionina germanica Ehrenberg, 1840 (***1056**), p. 23, figured 1840 (***1055**), pl. 2, figs. 1a-g; OD.

Haynesina Banner and Culver, 1978 (***128**), p. 184.

Test planispiral, at least in the adult, involute, biumbilicate, with narrow depressed umbilici, about eight to ten chambers per whorl, enlarging gradually as added, chamber walls bend inward posteriorly and fuse to the preceding septal face, forming narrow intercameral lacunae along the septa, intercameral sutures radial, gently curved, deeply incised near the umbilicus, no rotaliid septal flaps or toothplates, no septal or radial canals, and no retral processes or fossettes, periphery broadly rounded; wall calcareous, perforate, of optically radial but morphologically granular calcite, tubercles prominently developed around the aperture, along the intercameral sutures and over the umbilicus; primary aperture a low and symmetrical interiomarginal arch but may be obscured by abundant surface pustules, intercameral foramen similar but may be enlarged by resorption, internally an interiomarginal supplementary aperture connects the intercameral lacunae to the following chamber lumen, or supplementary areal apertures may connect the lacunae to both preceding and following chambers. U. Pliocene (Astian) to Holocene: England; Wales; Ireland; North Sea; France; Netherlands; Denmark; Norway; Germany; Turkey; Siberia; USA: off New York, Massachusetts.

LIPPSINA Haman, 1985

Plate 691, figs. 17-21

Type species: Nonion demens Bik, 1964 (***237**), p. 71; OD.

Lippsina Haman, 1985 (***1373**), p. 160 (nom. subst. pro *Nonionoides* Schäfer, 1980).

Nonionoides Schäfer, 1980 (***2741**), p. 194 (non *Nonionoides* Saidova, 1975); type species: obj.; OD.

Test planispiral and evolute, large proloculus followed by a single whorl of up to ten inflated and globular to ovoid chambers that commonly are of less diameter than the proloculus, later chambers may be elongate in shape and added in a plane perpendicular to that of the earlier chambers or may be irregular in arrangement, sutures radial, depressed, umbilicus wide, slightly depressed to flush with the surface, periphery rounded, peripheral outline smooth to lobulate; wall calcareous, thin, translucent, distinctly perforate, surface of well-preserved specimens finely hispid, with fine pustules or granules present in the umbilical depression, along the sutures and on adjacent parts of the chambers; aperture interiomarginal, consisting of a row of small openings at the base of the last chamber but not apparent on the later irregular chambers. Miocene (Aquitanian), brackish water; Germany.

NONION de Montfort, 1808

Plate 690, figs. 1-7; plate 691, figs. 1-7 and 14-16

Type species: Nautilus faba Fichtel and Moll, 1798 (***1124**); SD ICZN, ZN(S) 2225/1, petition pending.

Nonion de Montfort, 1808 (***2176**), p. 210.

Nonionina (Nonion) Yabe and Hanzawa, 1929 (***3410**), p. 155 (nom. transl.).

Azera Khalilov, 1958 (***1683**), p. 6; type species: *Azera transversa* Khalilov, 1958; OD.

Neoanomalina McCulloch, 1977 (***1961**), p. 443; type species: *Neoanomalina chincuensis* McCulloch, 1977; OD.

Abbottina McCulloch, 1977 (***1961**), p. 444; type species: *Abbottina tannerbankensis* McCulloch, 1977; OD.

Test planispiral throughout, ovate to circular in outline, coiling involute to slightly evolute, laterally compressed and biumbilicate, umbilici partially to completely filled with pustules on the somewhat crenulate inner margins of the chambers, sutures curved, depressed near the umbilici to flush near the rounded to subangular periphery, peripheral outline smooth; wall calcareous, optically granular, surface smooth except for the granules, incised sutures and radial ridges or grooves in the umbilical region, and pustulose border around the aperture; aperture a low interiomarginal and equatorial slit at the base of the arched apertural face, extending laterally nearly to the umbilici. U. Cretaceous (Campanian) to Holocene; cosmopolitan.

Remarks: The species previously recognized as the type species of *Nonion, Nautilus incrassatus* Fichtel and Moll, 1798, was shown by a restudy of the types of Fichtel and Moll (Hansen and Rögl, 1980, ***1397**, p. 173; Rögl and Hansen, 1984, ***2639**, p. 36) to belong to the genus generally known as *Anomalinoides* and thus referrable to a completely different foraminiferal family. A proposal was submitted to the ICZN to set aside the original type designation, to place the species *incrassatus* on the Official List of invalid and rejected names, and to designate *Nautilus faba* Fichtel and Moll, 1798 as the type species of *Nonion*. This action would maintain the genus and higher taxa based on it as these have generally been understood since 1808. The changed concepts of both *Nonion* and *Florilus*, based on restudy of their type species, also results in *Azera* Khalilov, 1958 now being considered a synonym of *Nonion*.

NONIONELLA Cushman, 1926

Plate 689, figs. 5-7 and 18-21

Type species: Nonionella miocenica Cushman, 1926; OD.

Nonionella Cushman, 1926 (***737**), p. 64.

Ziesenhenneia McCulloch, 1977 (***1961**), p. 378; type species: *Ziesenhenneia simplex* McCulloch, 1977; OD.

Test slightly compressed in a low trochospiral coil, periphery rounded, spiral side partially evolute around an umbonal boss, umbilical side involute, chambers numerous, broad, and low, whorls progressively enlarging and may produce a somewhat flaring test, chambers with a flaplike projection overhanging the umbilicus, those of successive chambers overlapping, sutures curved, depressed, periphery rounded; wall calcareous, optically granular, finely perforate, surface smooth and without pustules; aperture a small interiomarginal and nearly equatorial arch, extending somewhat onto the umbilical side. U. Cretaceous (Coniacian) to Holocene; cosmopolitan.

NONIONELLINA Voloshinova, 1958

Plate 689, figs. 8-17

Type species: Nonionina labradorica J. W. Dawson, 1860 (***904**), p. 191; OD.

Nonionellina Voloshinova, 1958 (***3315**), p. 142.

Test trochospiral in the early stage, later nearly planispiral and involute, chambers enlarging rapidly as added, with a somewhat inflated basal lobe on the umbilical side, biumbilicate but umbilici small and inequal, open throughout growth and not covered with chamber lobes as in *Nonionella*, periphery subangular to rounded; wall calcareous, optically granular, finely perforate, surface smooth other than the pustules at the umbilical ends of the chambers; aperture a low interiomarginal and equatorial arch. Miocene to Holocene; cosmopolitan.

NONIONELLETA Khalilov, 1967

Plate 693, figs. 6-8

Type species: Nonionella tumida Khalilov, 1957 (***1682**), p. 46; OD.

Nonionelleta Khalilov, 1967 (***1684**), p. 23.

Test slightly trochoid and somewhat asymmetrical in the early stage, later nearly planispiral, biumbilicate, with rapidly enlarging whorl resulting in an auriculate outline, laterally compressed, chambers few, about six in the last whorl, enlarging rapidly, sutures radial to slightly curved, depressed, periphery rounded; wall calcareous, may have secondary pustules in the umbilical region; aperture an equatorial row of small openings at the base of the apertural face. Paleocene (Danian) to Oligocene: USSR: Azerbaydzhan.

NONIONOIDES Saidova, 1975

Plate 692, figs. 7-14

Type species: Nonionina grateloupi d'Orbigny, 1826 (***2303**), p. 294; OD.

Nonionoides Saidova, 1975 (***2695**), p. 248.

Test slightly asymmetrical and weakly trochospiral, with evolute spiral side and nearly involute and deeply umbilicate opposite side, chambers of nearly constant height but increasing rapidly in breadth to result in an auriculate test outline, sutures slightly depressed, particularly in the umbilical region, gently curved, sides flattened, periphery rounded; wall calcareous, perforate, hyaline, optically granular, transparent, surface smooth, but with pustules or small spinules bordering the umbilical rim of the chambers, in the vicinity of the aperture; aperture a low interiomarginal and equatorial arch. Holocene; sublittoral region, Atlantic, Caribbean, Pacific.

PROTELPHIDIUM Haynes, 1956

Plate 693, figs. 1-5

Type species: Protelphidium hofkeri Haynes, 1956; OD.

Protelphidium Haynes, 1956 (***1433**), p. 86.

Test planispiral and partially evolute, about eight to ten gradually enlarging chambers in the final whorl, sutures radial, gently curved, deeply incised toward the umbilici but without intercameral lacunae, both umbilici filled by a complex of fused imperforate and tuberculate umbilical flaps, one from each chamber, the tubercules thickened by lamellar additions until older ones become pillarlike, intercommunicating umbilical cavities remain in the spaces between the platelike flaps and supporting pillars, no rotalid septal flap, no septal or spiral canals, retral processes, fossettes, or sutural pores, periphery rounded, peripheral outline lobulate; wall calcareous, perforate, optically radial but morphologically microgranular, surface with prominent tubercles on lower part of apertural face and on the preceding whorl adjacent to the aperture, as well as over the umbilical structure of flaps, tubercles, and pillars and extending along the margins of the incised sutures; primary aperture a low, narrow, interiomarginal and equatorial arch. L. Paleocene (Danian) to Oligocene; England; France; Libya; USSR.

PSEUDONONION Asano, 1936

Plate 692, figs. 1-6

Type species: Pseudononion japonicum Asano, 1936; OD.

Pseudononion Asano, 1936 (***80**), p. 347.

Test low trochospiral and involute, chambers increasing moderately to rapidly in size as added to result in an ovate outline, laterally somewhat compressed, sutures may be depressed in the umbilical region, periphery subangular; wall calcareous, optically granular, finely perforate, pustules present on both the spiral and intercameral sutures, umbilicus of varied size and depth may be filled by pustules, or pustules may be limited to the umbilical margin and depressed part of the sutures; aperture a broad low interiomarginal slit that may extend to the umbilicus but may be partly or completely filled by pustules and discernable only as the intercameral foramen of earlier chambers. Paleocene (Danian) to Holocene; cosmopolitan.

SUBANOMALINA McCulloch, 1977

Plate 693, figs. 9-11

Type species: Subanomalina guadalupensis McCulloch, 1977; OD.

Subanomalina McCulloch, 1977 (***1961**), p. 443.

Test lenticular, biumbonate, planispiral, with rapidly enlarging whorl resulting in an ovate outline, chambers increasingly broad but of nearly constant height, sutures slightly curved, weakly depressed, periphery acutely angled and carinate; wall calcareous, surface smooth; aperture an equatorial arch at the base of the apertural face. Holocene: Pacific, off Guadalupe Island, Mexico.

ZEAFLORILUS Vella, 1962

Plate 690, figs. 8-10

Type species: Nonionella parri Cushman, 1936 (***780**), p. 89; OD.

Zeaflorilus Vella, 1962 (***3287**), p. 294.

Test relatively large, auriculate in outline, chambers low and numerous, widening rapidly as added, sutures radial and curved, coiling appears planispiral but involute on one side, centrally depressed but with closed umbilicus, evolute on the opposite side, periphery angular, subacute; wall calcareous, surface smooth; aperture an interiomarginal slit on the involute side. M. Miocene (Helvetian), Lillburnian, to Holocene; New Zealand.

Remarks: Differs from *Nonion* in being involute on one side and evolute on the opposite side.

Subfamily ASTRONONIONINAE
Saidova, 1981

Astrononioninae Saidova, 1981 (***2696**), p. 52.

Test planispiral and involute; chambers numerous, increasing gradually in height; each chamber with a broad to narrow flap that extends from the umbilicus for some distance over each suture; apertural opening near the midpoint of each flap at its proximal edge. M. Eocene to Holocene.

ASTRONONION Cushman and Edwards, 1937

Plate 694, figs. 1, 2, 20 and 21

Type species: Nonionina stelligera d'Orbigny, 1839 (***2305**), p. 128; OD.

Astrononion Cushman and Edwards, 1937 (***820**), p. 30.

Test planispiral and involute, laterally compressed, bilaterally symmetrical, may be umbilicate, chambers relatively numerous, enlarging gradually, each with a rhomboidal to triangular plate extending from the umbilicus along the intercameral suture at the back of the chamber, earlier chambers may have narrower tubular plates as in *Pacinonion*, the sutural plates attached along the forward margin but open proximally, successive plates may partly fuse in the umbilical region, periphery rounded; wall calcareous, thin, optically granular, hyaline, finely and densely perforate, surface smooth; aperture a low interiomarginal, equatorial slit, bordered with a lip and extending laterally to the umbilici. M. Eocene to Holocene; cosmopolitan.

Remarks: The type specimen of *Astrononion stelligerum* in the d'Orbigny collection of the MNHN, Paris, having been destroyed, a specimen from the original material of d'Orbigny was designated as neotype (Y. Le Calvez, 1974, ***1804**, p. 37). As it is from the original material, it supersedes the specimen (BMNH 1963.7.18.1) from a different locality, the inner harbor at Las Palmas, also designated as a neotype of *A. stelligerum* by Hornibrook (1964, ***1540**, p. 334).

FIJINONION Hornibrook, 1964

Plate 694, figs. 5-10

Type species: Astrononion fijiensis Cushman and Edwards, 1937 (***820**), p. 35; OD.

Astrononion (Fijinonion) Hornibrook, 1964 (***1540**), p. 338.
Fijinonion Saidova, 1975 (***2695**), p. 251 (nom. transl.).

Test relatively large, planispiral, and involute, moderately compressed, biumbilicate, chambers numerous, each with a large arched triangular apertural plate arising at the umbilical end of the apertural lip, those of successive chambers fused along their borders into a tube that opens at the outer margin, sutures thickened, curved, nearly flush, periphery rounded; wall calcareous, hyaline, optically granular, finely perforate; aperture a low interiomarginal, equatorial slit, extending laterally to the umbilici and bordered by a narrow lip. L. Miocene to Holocene; Fiji; New Zealand.

LAMINONONION Hornibrook, 1964

Plate 694, figs. 3, 4 and 16–19

Type species: Astrononion tumidum Cushman and Edwards, 1937 (***820**), p. 33; OD.

Astrononion (Laminononion) Hornibrook, 1964 (***1540**), p. 335.

Laminononion Saidova, 1975 (***2695**), p. 251 (nom. transl.).

Test planispiral, involute, umbilici closed, few inflated chambers per whorl, each with a large rhomboidal to subtriangular plate extending from the lateral ends of the aperture across the umbilical margin of the chamber to attach to the posterior border, covering the umbilical region and inner part of the intercameral suture and opening along the oblique peripherally facing margin, sutures depressed, periphery rounded, peripheral outline lobulate; wall calcareous, hyaline, optically granular, finely perforate, surface smooth; aperture interiomarginal and equatorial, a low slit extending laterally to the umbilici. M. Eocene to Holocene: cosmopolitan.

PACINONION Vella, 1962

Plate 694, figs. 11–15

Type species: Astrononion novozealandicum Cushman and Edwards, 1937 (***820**), p. 35; OD.

Pacinonion Vella, 1962 (***3287**), p. 289.

Astronoides Burmistrova, 1974 (***452**), p. 131 (name not available, ICZN Art. 13 (a)(i), no description).

Astronoides Saidova, 1975 (***2695**), p. 252; type species: obj. (err. cit. as *novazealandicum*); OD.

Test large, up to 1.1 mm in diameter, planispiral and biumbilicate, robust, nearly circular in outline, numerous chambers enlarging gradually as added, sutures curved, partly covered by narrow parallel-sided sutural tubes that extend from the umbilical margin of the chamber nearly two-thirds the distance to the periphery where they open to the exterior, periphery broadly rounded; wall calcareous, optically granular, perforate, surface smooth; aperture interiomarginal, equatorial, and extending to the umbilical margin, each sutural tube with a semicircular opening facing the periphery. U. Eocene to Holocene: New Zealand; W. Pacific.

Subfamily PULLENIINAE Schwager, 1877

Pulleniinae Saidova, 1981 (***2696**), p. 52; nom. corr. pro subfamily Pullenidae.

Pullenidae Schwager, 1877 (***2830**), p. 18 (nom. imperf.).

Pulleninae Bütschli, in Bronn, 1880 (***421**), p. 210.

Melonisinae Voloshinova, 1958 (***3315**), p. 147.

Pulleniinea Saidova, 1981 (***2696**), p. 52 (supersubfamily).

Poropullenia Saidova, 1981 (***2696**), p. 52 (subfamily; nom. imperf.).

Test planispiral and involute, with few chambers per whorl; slitlike aperture extends from umbilicus of one side to that on the other or may have a series of pores in that position. U. Cretaceous to Holocene.

BERMUDEZINELLA Sellier de Civrieux, 1969

Plate 695, figs. 1–9

Type species: Pullenia riveroi Bermúdez, 1939 (***198**), p. 11; OD.

Bermudezinella Sellier de Civrieux, 1969 (***2864**), p. 164.

Poropullenia Voloshinova, in Voloshinova et al., 1970 (***3319**), p. 85; type species: *Poropullenia bulloides* Voloshinova, in Voloshinova et al., 1970; OD.

Test subglobular, robust, planispiral, and involute, biumbilicate and bilaterally symmetrical, about seven to nine chambers in the final whorl, sutures straight and radial, later ones slightly depressed, with a row of sutural pores that is clearly visible in the later sutures, periphery broadly rounded; wall calcareous, thick, opaque, optically granular, very finely perforate, surface smooth; aperture interiomarginal, equatorial, a low slit extending to the umbilicus on both sides, with narrow bordering lip, intercameral foramen modified as a row of pores. M. Miocene to Holocene: Dominican Republic; Cuba; Venezuela; USSR; Sakhalin Island.

Remarks: Although *Poropullenia* was described only as having a basal row of pores for an aperture, all illustrated specimens were broken, showing only intercameral foramina; sutural pores were said to be absent in *Poropullenia* but appear to be indicated in the original figures, hence it is regarded as a synonym of *Bermudezinella*.

CHILOSTOMELLINA Cushman, 1926

Plate 695, figs. 10–13

Type species: Chilostomellina fimbriata Cushman, 1926; OD.

Chilostomellina Cushman, 1926 (***732**), p. 78.

Test inflated to subglobular, planispiral, and involute, chambers enlarging rapidly, strongly overlapping, basal margin of apertural face and sides of final chamber digitate, sutures curved, flush to slightly depressed, periphery broadly rounded; wall calcareous, optically granular, surface smooth, other than the fingerlike projections of the chamber margin; aperture a low interiomarginal arch, small supplementary openings present between the fingerlike projections along the base of the final chamber. Holocene; Pacific, at 2,560 m; Bering Sea.

CRIBROPULLENIA Thalmann, 1937

Plate 696, figs. 1 and 2

Type species: Nonion? marielensis Palmer, 1936 (***2327**), p. 127; OD.

Cribropullenia Thalmann, 1937 (***3156**), p. 351.

Antillesina Galloway and Heminway, 1941 (***1207**), p. 366; type species: obj.; OD.

Test planispiral and involute, chambers inflated, few per whorl, enlarging rapidly, sutures radial, nearly straight, slightly depressed, periphery broadly rounded, peripheral outline lobulate; wall calcareous, finely perforate, surface with low parallel costae spiralling about the test; aperture multiple, consisting of numerous small openings at the base of the apertural face between the costae. Eocene to Oligocene; Cuba; Puerto Rico; Egypt.

Remarks: The lectotype of *C. marielensis* (USNM 498778), from the Oligocene of Cuba, was designated by Loeblich and Tappan (1964, ***1910**, p. C746).

MELONIS de Montfort, 1808

Plate 696, figs. 5-8

Type species: Melonis etruscus de Montfort, 1808 = *Nautilus pompilioides* Fichtel and Moll, 1798 (***1124**), p. 31; OD.

Melonis de Montfort, 1808 (***2176**), p. 66.

Melonia Bronn, 1849 (***420**), p. 720 (err. emend.; non *Melonia* Lamarck, 1822, nec Schinz, 1825, err. cit. pro *Melania* Lamarck, 1799).

Test planispiral, symmetrical and involute, robust, biumbilicate, with deep and open umbilici, chambers broad and low, enlarging gradually as added, ten to twelve in the final whorl, sutures radial and straight to slightly curved, somewhat thickened, septal flap added against the previous apertural face as new chambers are added, periphery broadly rounded, peripheral outline smooth; wall calcareous, hyaline, optically granular, coarsely perforate other than the imperforate apertural face, sutures, and thickened umbilical rim, surface without ornamentation; aperture a low interiomarginal and equatorial slit, extending to the umbilici and remaining open around the umbilical margin, bordered with a distinct and protruding lip. M. Eocene to Holocene; cosmopolitan.

Remarks: A lectotype from the Fichtel and Moll collection was designated by Rögl and Hansen (1984, ***2639**, p. 30). Although two localities are cited (Pliocene of Coroncina, Italy, and Recent of the Mediterranean), the provenance of the lectotype was not indicated.

PULLENIA Parker and Jones, 1862

Plate 696, figs. 3 and 4

Type species: Nonionina bulloides d'Orbigny, 1846 (***2309**), p. 107 (syn.: *Nonionina sphaeroides* d'Orbigny, 1826, ***2303**, p. 293, name not available, ICZN Art. 12 (a), no description); OD(M).

Pullenia Parker and Jones, in Carpenter et al., 1862 (***494**), p. 184.

Test globular to slightly compressed, planispiral and involute, three to six moderately inflated chambers in the final whorl, sutures radial, flush to slightly depressed; wall calcareous, optically granular, finely perforate, surface smooth; aperture a narrow interiomarginal crescentic slit, extending across the periphery to the umbilici. U. Cretaceous to Holocene; cosmopolitan.

Remarks: The lectotype of *P. bulloides* (d'Orbigny collection, MNHN, Paris) was designated by Loeblich and Tappan (1964, ***1910**, p. C748) from the Miocene of Nussdorf.

Family SPIROTECTINIDAE Saidova, 1981

Spirotectinidae Loeblich and Tappan, 1984 (***1918**), p. 52, nom. corr. pro family Spiroplectinidae.

Spiroplectinidae Saidova, 1981 (***2696**), p. 42 (nom. imperf.; based on *Spirotectina* Saidova, 1975).

Spiroplectininae Saidova, 1981 (***2696**), p. 42 (subfamily; nom. imperf., based on *Spirotectina* Saidova, 1975).

Spirotectininae Loeblich and Tappan, 1982 (***1917**), p. 36 (nom. corr.).

Test trochospiral, spiral side partially involute; sutures with septal bridges; aperture basal and equatorial, with secondary sutural openings between the septal bridges. Holocene.

SPIROTECTINA Saidova, 1975

Plate 696, figs. 9-13

Type species: Spirotectina crassa Saidova, 1975; OD.

Spirotectina Saidova, 1975 (*2695), p. 273.

Spiroplectina Saidova, 1981 (*2696), p. 42 (err. cit.; non *Spiroplectina* Schubert, 1902, nec Cushman, 1927).

Test low trochospiral and nearly planispiral, spiral side partially evolute and with umbonal boss, umbilical side involute, umbilicus closed, six to seven chambers in the final whorl, sutures slightly curved, radial, crossed by septal bridges, periphery subangular, rounded; wall calcareous, perforate, granular, surface smooth; aperture a wide interiomarginal equatorial arch, extending across the base of the apertural face from the umbilicus to the spiral suture of the spiral side, with narrow bordering upper lip and lower lip attached to the previous whorl, small rounded supplementary sutural openings between the sutural bridges of the final suture, possibly earlier ones may be secondarily filled. Holocene; W. Pacific: New Hebrides.

Family ALMAENIDAE Myatlyuk, 1959

Almaenidae Subbotina, in Subbotina et al., 1981 (*3083), p. 89, nom. transl. ex subfamily Almaeninae.

Test nearly planispiral; primary aperture interiomarginal, equatorial, or located slightly to umbilical side, secondary slitlike aperture at outer peripheral margin in the plane of coiling. L. Eocene to Holocene.

Subfamily ALMAENINAE Myatlyuk, 1959

Almaeninae Myatlyuk, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 272.

Almaeninea Saidova, 1981 (*2696), p. 41 (supersubfamily).

Test partly or wholly evolute; primary aperture interiomarginal or areal, and secondary apertures peripheral. L. Eocene to Miocene.

ALMAENA Samoylova, 1940

Plate 697, figs. 1-7

Type species: Almaena taurica Samoylova, 1940; OD(M).

Almaena Samoylova, 1940 (*2720), p. 377.

Kelyphistoma Keijzer, 1945 (*1668), p. 207; type species: *Kelyphistoma ampulloloculata* Keijzer, 1945; OD.

Planulinella Sigal, 1949 (*2915), p. 158; type species: *Planulinella escornebovensis* Sigal, 1949; OD.

Almaena (Planulinella) Sigal, 1950 (*2916), p. 70 (nom. transl.).

Almaena (Kelyphistoma) Sigal, 1950 (*2916), p. 71 (nom. transl.).

Test laterally compressed, enrolled in a low trochospiral to nearly planispiral coil, bievolute, commonly eight to nine chambers in the final whorl, sutures curved to nearly straight, thickened and may be elevated, periphery asymmetrically bicarinate, one keel lying in the peripheral plane and the other paralleling the periphery a short distance to one side; wall calcareous, coarsely perforate, with nonperforate peripheral keels, apertural face and septa, surface smooth or may have elevated sutures; aperture oval to slitlike, interiomarginal and equatorial but may be slightly asymmetrical, with narrow bordering lip, a secondary slitlike opening between the two keels at the peripheral angle, bordered by an imperforate lip and closed in earlier chambers by additional shell material. U. Eocene to Miocene; France; Netherlands; Germany; Austria; Hungary; USSR: Crimea; Cuba.

GANELLA Aurouze and Boulanger, 1954

Plate 698, figs. 1-6

Type species: Ganella neumannae Aurouze and Boulanger, 1954; OD.

Ganella Aurouze and Boulanger, 1954 (*96), p. 187.

Test lenticular, low trochospiral coil in the early stage, becoming nearly planispiral but asymmetrical in the adult, bievolute, five or six gradually enlarging chambers per whorl, sutures strongly curved backward to the periphery, those of the earlier stage limbate and elevated, final one or two depressed, periphery carinate; wall calcareous, optically granular, perforate except for the nonperforate beaded and elevated sutures and peripheral keel, surface smooth or with a few low pustules or rugae; aperture an elongate vertical slit in the oblique and flattened apertural face, in the early stage interiomarginal, later progressively higher in the apertural face and bordered with an elevated rim. L. Eocene (Ypresian) to M. Eocene (Lutetian); France.

PSEUDOPLANULINELLA Sigal, 1950

Plate 699, figs. 1–8

Type species: Pseudoplanulinella hieroglyphica Sigal, 1950 (as *hierogliphyca* in fig. expl.): OD.

Pseudoplanulinella Sigal, 1950 (*2916), p. 63.
Almaena (Pseudoplanulinella) Sigal, 1950 (*2916), p. 71 (nom. transl.).

Test enrolled, appearing planispiral but slightly asymmetrical, bievolute, about eight or nine chambers in the final whorl, enlarging gradually as added, the final one or two may tend to uncoil, sutures arched, limbate, and elevated, periphery bicarinate, one keel at the periphery and the other paralleling it a short distance to one side; wall calcareous, perforate, with nonperforate keels and sutures, surface variously ornamented, commonly beginning as ridges around the pores in a distinct reticulum, later with part of the reticulum becoming more prominent as pustules or straight to sinuate ridges, nearly obscuring the intervening pores; primary aperture a low arch at the base of the apertural face, bordered by a lip, secondary peripheral opening lies between the two keels and may be elevated on a necklike extension, bordered by an imperforate rim. Oligocene to Miocene: France; Netherlands; Germany; Hungary.

QUERALTINA Marie, 1950

Plate 697, figs. 8–12

Type species: Queraltina epistominoides Marie, 1950; OD.

Queraltina Marie, 1950 (*2034), p. 73.

Test distinctly trochospiral but bievolute, lenticular, asymmetrical and inequally biconvex, umbilical side more convex and chambers more inflated, eight or nine gradually enlarging chambers in the final whorl, sutures curved, depressed, periphery bicarinate; wall calcareous, optically granular, coarsely perforate, surface may be pustulose or rugose; primary aperture a small rounded interiomarginal and equatorial opening bordered by a distinct lip, with supplementary opening at the periphery between the two keels. M. Eocene (Lutetian) to U. Eocene (Bartonian): France; Spain.

SARASWATI Kalia, 1982

Plate 700, figs. 1–3

Type species: Saraswati noetlingi S. N. Singh and Kalia, 1973 (*2983), p. 180; OD.

Saraswati Kalia, 1982 (*1636), p. 550 (validated by designation of type species).
Saraswati S. N. Singh, 1971 (*2977), p. 1173 (name not available, ICZN Art. 13 (a)(i), no description).
Saraswati S. N. Singh and Kalia, 1973 (*2983), p. 180 (name not available, ICZN Art. 68 (b)(i), formula "n. gen., n. sp." not a valid type designation after 1930).

Test auriculate in outline, biconcave, low trochospiral coil of about two and a half whorls, seven to nine chambers in the final whorl, later chambers somewhat inflated, spiral side evolute with curved and limbate sutures, umbilical side involute, with closed umbilicus and straight, radial, and depressed sutures, periphery truncate, bicarinate, peripheral outline lobulate; wall calcareous, microgranular, coarsely perforate, peripheral keels imperforate; aperture a high interiomarginal, equatorial arch bordered by a narrow lip, supplementary sigmoidal apertures parallel the periphery on the umbilical side, arising from the basal suture of the chambers and extending about one-third to one-half the height of the chambers, those of earlier chambers closed with later growth. M. Eocene: India.

Subfamily ANOMALINELLINAE Saidova, 1981

Anomalinellinae Saidova, 1981 (*2696), p. 41.

Test completely involute; both interiomarginal and peripheral apertures present. U. Eocene to Holocene.

ANOMALINELLA Cushman, 1927

Plate 700, figs. 4–12

Type species: Truncatulina rostrata Brady, 1881 (*339), p. 65; OD.

Anomalinella Cushman, 1927 (*742), p. 93.
Anomalinella (Preanomalinella) S. K. Singh, 1973 (*2975), p. 171; type species: *Anomalinella (Preanomalinella) sureshi* S. K. Singh, 1973; OD.

Test lenticular, slightly trochospiral but planispiral in the adult, bi-involute and biumbonate, nine to ten gradually enlarging chambers in the final whorl, sutures gently curved, limbate, periphery angular, carinate, with a less elevated second keel paralleling the periphery a slight distance to one side of the median plane; wall calcareous, optically granular, hyaline, coarsely perforate, sutures and keels imperforate, apertural face imperforate or with a few pores; aperture a low rounded interiomarginal and equatorial arch against the peripheral margin of the preceding whorl, with protruding bordering lip, supplementary aperture consisting of an elongate slit on the periphery between the two keels, those of earlier chambers secondarily closed. U. Eocene to Holocene; Pacific; India.

Remarks: A lectotype was designated for *A. rostrata* (BMNH ZF2549) by Loeblich and Tappan (1964, ***1910**, p. C764), from Challenger Station 217A, Papua, New Guinea. The subgenus *Preanomalinella* was described as slightly trochoid in the early stage and as having a slightly asymmetrical aperture, but both features are present in topotypes of the type species of *Anomalinella, A. rostrata,* hence they are regarded as congeneric.

Superfamily CHILOSTOMELLACEA Brady, 1881

Chilostomellacea Loeblich and Tappan, 1982 (***1917**), p. 36, nom. transl. ex family Chilostomellidae.

Test enrolled, trochospiral, chambers may be somewhat enveloping, and attached forms may uncoil in the adult; wall of perforate hyaline oblique calcite, appearing optically granular; aperture interiomarginal, extending from the periphery nearly to the umbilicus on the umbilical side or may extend up the apertural face as a high slit, becoming terminal and rounded in uncoiled forms. L. Cretaceous (Barremian) to Holocene.

Family CHILOSTOMELLIDAE Brady, 1881

Chilostomellidae Brady, 1881 (***339**), p. 42, 44.
Chilostomellida Haeckel, 1894 (***1355**), p. 185.

Test trochospiral to planispiral, chambers without an internal partition. L. Cretaceous (Albian) to Holocene.

Subfamily CHILOSTOMELLINAE Brady, 1881

Chilostomellinae A. Silvestri, 1906 (***2937**), p. 23.
Allomorphininae Cushman, 1927 (***742**), p. 85.
Allomorphinellinae Cushman, 1927 (***742**), p. 86.

Test trochospiral to planispiral, chambers much enveloping and only those of the final whorl visible, no internal partition. U. Cretaceous to Holocene.

ALLOMORPHINA Reuss, 1849

Plate 701, figs. 1-3

Type species: Allomorphina trigona Reuss, 1850 (***2573**), p. 380; SD(SM).

Allomorphina Reuss, in Cžjžek, 1849 (***867**), p. 50.

Test ovoid, circular in section, trochospiral and involute, only the final whorl of three strongly enveloping chambers visible from the exterior, sutures gently curved, slightly depressed; wall calcareous, optically granular, finely perforate, surface smooth; aperture an elongate slit, with a projecting bordering rim. U. Cretaceous (Campanian) to Holocene; cosmopolitan.

Remarks: Brotzen (1948, ***429**, p. 127) described an internal toothplate in *Allomorphina halli* Jennings, but Troelsen (1954, ***3226**, p. 469) stated that *A. trigona*, the type species of the genus, did not have this structure. He therefore referred *A. halli* to *Quadrimorphina*, which also has a toothplate. Loeblich and Tappan (1964, ***1910**, p. C743) restricted *Allomorphina* to involutely coiled species like the type species and referred to *Quadrimorphina* the trochospirally coiled species with early whorls visible at one side. The latter genus also differs in having an apertural flap as well as the internal toothplate. Hofker (1954, ***1506**, p. 148) illustrated with sketches a toothplate in sectioned specimens of "*A. trigona*," but the illustrations are of a species with much more restricted aperture than the very broad slitlike one of topotypes we have examined and most probably are *Quadrimorphina*. Troelsen (1955, ***3227**, p. 80) again reexamined *A. trigona* by a variety of methods and reiterated that no internal partition is present, a conclusion with which our own studies agree. Hansen (1970, ***1391**, p. 93) followed Hofker in regarding "typical *Allomorphina*" as having a toothplate but described *Allomorphina paleocenica* as lacking a toothplate.

ALLOMORPHINELLA Cushman, 1927

Plate 701, figs. 8-10

Type species: Allomorphina trigona Reuss, 1850 (***2573**), p. 380; SD(SM).

Allomorphinella Cushman, 1927 (***742**), p. 86

Test ovoid, slightly compressed, planispiral and involute, with few rapidly enlarging chambers, periphery rounded; wall calcareous, finely perforate, surface smooth; aperture a narrow elongate equatorial and interiomarginal slit. U. Cretaceous; Europe.

CHILOSTOMELLA Reuss, 1849

Plate 701, figs. 6 and 7

Type species: Chilostomella ovoidea Reuss, 1850 (***2573**), p. 380; SD Cushman, 1914 (***706**), p. 2.

Chilostomella Reuss, in Cžjžek, 1849 (***867**), p. 50.

Test ovoid, circular in section, planispiral and involute, two strongly embracing chambers per whorl; wall calcareous, optically granular, finely perforate, surface smooth; aperture a narrow interiomarginal and equatorial slit and may have a slightly elevated margin. U. Cretaceous to Holocene; cosmopolitan.

CHILOSTOMELLOIDES Cushman, 1926

Plate 701, figs. 4 and 5

Type species: Lagena (Obliquina) oviformis Sherborn and Chapman, 1886 (***2901**), p. 745; OD.

Chilostomelloides Cushman, 1926 (***732**), p. 77.

Test ovoid, chambers strongly embracing, only the final two visible from the exterior, sutures oblique, slightly depressed; wall calcareous, finely perforate, surface smooth; aperture circular with slightly thickened rim, situated near the basal suture of the final chamber and offset from the general test contour. Paleocene to Miocene; cosmopolitan.

Remarks: The lectotype (BMNH P41673) from the London Clay was designated (Loeblich and Tappan, 1964, ***1910**, p. C743) as the specimen originally figured by Sherborn and Chapman, 1886.

HIDINA Mihaela Gheorghian, Iva, and Musat Gheorghian, 1968

Plate 701, figs. 11-14

Type species: Hidina variabilis M. Gheorghian et al., 1968 (as *variabilae*, nom. imperf.; see ICZN Art. 34 (b)); OD.

Hidina Mihaela Gheorghian, Iva, and Musat Gheorghian, 1968 (***1235**), p. 195.

Test globular, trochospiral, chambers rapidly enlarging and strongly embracing, about four partly visible from the exterior, sutures curved, slightly depressed; wall calcareous, thin, finely perforate, surface smooth; aperture an elongate slit, extending across nearly half the test circumference, with narrow but prominent overhanging and flaplike upper lip. L. Miocene (U. Burdigalian) to M. Miocene (L. Helvetian); Romania.

RESIGIA Schnitker and Tjalsma, 1980

Plate 701, figs. 15-17

Type species: Resigia westcotti Schnitker and Tjalsma, 1980; OD.

Resigia Schnitker and Tjalsma, 1980 (***2787**), p. 240.

Test tiny, about 0.2 mm in diameter, asymmetrically planispiral and bi-involute, subtriangular to subquadrate in outline, about two to three and a half whorls, three to four chambers in the final whorl, sutures radial, straight on one side, curved on the opposite side, slightly depressed, periphery rounded; wall calcareous, optically granular, finely perforate, surface smooth; aperture an interiomarginal equatorial arch, extending a short distance onto both sides of the test, the inflated apertural face projecting over the aperture. M. Eocene (Lutetian) to U. Eocene (Priabonian); deep water of the Northeast Atlantic; E. Pacific.

Subfamily CHILOSTOMININAE Finger and Gaponoff, 1986

Chilostomininae Finger and Gaponoff, 1986 (***1125**), p. 36.

Test a low trochospiral coil, bi-involute, few chambers per whorl, final chamber with digitate margin extending over the umbilicus, surface pustulose around the aperture and umbilicus. Miocene.

CHILOSTOMINA Finger and Gaponoff, 1986

Plate 702, figs. 1-8

Type species: Chilostomina pustulosa Finger and Gaponoff, 1986; OD.

Chilostomina Finger and Gaponoff, 1986 (*1125), p. 36.

Test subglobular, low trochospiral coil of strongly enveloping, very rapidly enlarging, and asymmetrical chambers, about six to eight in the final whorl, the inner margin on the umbilical side with digitate extensions that obscure the umbilicus, sutures curved, depressed, periphery very broadly rounded, outline weakly lobulate; wall calcareous, optically granular, surface smooth, but with prominent pustules in a row along the apertural margins on both the apertural face and the periphery of the preceding whorl just below the aperture, additional pustules present along the margin of the digitate extensions on the umbilical side on both the final and penultimate chambers, successive protrusions and pustules forming layers over the umbilical area; aperture a low slitlike interiomarginal and equatorial opening that extends somewhat onto the umbilical side but is partially obscured by the rows of pustules. L. to U. Miocene; USA: California.

Subfamily PALLAIMORPHININAE, n. subfam.

Test low to moderately high trochospiral, chambers inflated, all whorls visible on the spiral side, no internal partition. L. Cretaceous (Albian) to L. Miocene.

Type genus: *Pallaimorphina* Tappan, 1957.

ABYSSAMINA Schnitker and Tjalsma, 1980

Plate 703, figs. 1-3

Type species: Abyssamina quadrata Schnitker and Tjalsma, 1980; OD.

Abyssamina Schnitker and Tjalsma, 1980 (*2787), p. 235.

Test small, 0.2 mm to 0.3 mm in diameter, globular to slightly compressed, low trochospiral to nearly planispiral coil of two to two and a half whorls, spiral side evolute, chambers strongly overlapping, commonly about four in the final whorl, umbilicus closed, sutures straight on the spiral side, curved on the umbilical side, slightly depressed, periphery broadly rounded; wall calcareous, optically granular, finely perforate, surface smooth; aperture an interiomarginal crescentic slit between the periphery and umbilicus. U. Paleocene (Thanetian) to L. Miocene (Aquitanian); deep waters of Atlantic; Pacific; Philippine Islands; Indonesia.

BAGGINOIDES Podobina, 1975

Plate 703, figs. 4-6

Type species: "Discorbis" quadrilobus Mello, 1969 (*2087), p. 91; OD.

Bagginoides Podobina, 1975 (*2434), p. 101.

Test small, up to 0.2 mm in diameter, low trochospire of about two whorls, four chambers per whorl, umbilical side involute, umbilicus closed, sutures radial, slightly depressed, periphery rounded, peripheral outline lobulate; wall calcareous, optically granular, finely perforate, surface smooth; aperture a low interiomarginal slit extending from the periphery to the umbilicus, with a poreless margin but not a distinct lip. L. Cretaceous (Albian) to U. Cretaceous (L. Maastrichtian); USA: South Dakota, Texas; Canada: Alberta; USSR: W. Siberia; W. Europe.

GLOBIMORPHINA Voloshina, 1969

Plate 703, figs. 7-10

Type species: Globigerina trochoides Reuss, 1845 (*2570), p. 36; OD.

Globimorphina Voloshina, 1969 (*3310), p. 3.

Test trochospiral, with conical spiral side of three to four rapidly enlarging whorls, early whorls with up to five chambers per whorl, rapidly reduced to three chambers per whorl, chambers globular and inflated, sutures depressed; wall calcareous, optically granular, surface smooth and glossy; aperture a low arch or slit at the base of the final chamber, nearly umbilical in position. U. Cretaceous (Turonian) to Eocene; cosmopolitan.

GUBKINELLA Suleymanov, 1955

Plate 704, figs. 1-5

Type species: Gubkinella asiatica Suleymanov, 1955; OD.

Gubkinella Suleymanov, 1955 (*3087), p. 623.

Test trochospiral, with two and a half whorls, five or six inflated and subglobular chambers in the earliest whorl, later reduced to four, sutures depressed; wall calcareous, thin, finely and sparsely perforate, surface smooth; aperture a low arch at the base of the final chamber, bordered with a narrow lip. U. Cretaceous (Campanian to Maastrichtian); Asia: Uzbek SSR; Turkmen SSR.

Remarks: Restudy of the wall structure of topotypes of *G. asiatica* (Gorbachik and Suleymanov, 1985, ***1274**) showed *Gubkinella* to be a benthic genus related to *Quadrimorphina*.

PALLAIMORPHINA Tappan, 1957

Plate 703, figs. 11-13

Type species: Pallaimorphina ruckerae Tappan, 1957; OD.

Pallaimorphina Tappan, 1957 (***3124**), p. 220.

Test trochospiral, rotund, biconvex, about three slowly enlarging whorls, with four to five chambers in the final whorl, chambers appearing semicircular and sutures oblique and depressed on the spiral side, on the umbilical side sutures are radial and chambers somewhat inflated near the closed umbilicus, periphery broadly rounded; wall calcareous, finely perforate, surface smooth; aperture a low interiomarginal slit, extending from the umbilicus about half the distance to the periphery, with narrow bordering lip but lacking an internal toothplate. L. Cretaceous (Albian) to Paleocene; USA: Alaska; Greenland.

QUADRIMORPHINELLA Vetrova, 1975

Plate 705, figs. 1-5

Type species: Quadrimorphinella vitabunda Vetrova, 1975; OD.

Quadrimorphinella Vetrova, 1975 (***3291**), p. 26.

Test subglobular, trochospiral, one to three whorls, with three to four inflated subglobular chambers in the final whorl, sutures nearly straight, slightly depressed, umbilicus open, periphery broadly rounded; wall calcareous, very thin, finely perforate; aperture an elongate interiomarginal and umbilical slit that may have a flaplike bordering lip. U. Cretaceous (Coniacian) to M. Eocene; USSR: Azerbaydzhan; USA: Texas.

Family QUADRIMORPHINIDAE Saidova, 1981

Quadrimorphinidae Loeblich and Tappan, 1982 (***1917**), p. 36, nom. transl. ex subfamily Quadrimorphininae.

Quadrimorphininae Saidova, 1981 (***2696**), p. 42 (subfamily).

Test trochospiral, chambers not strongly enveloping, with internal partition. U. Cretaceous to Holocene.

QUADRIMORPHINA Finlay, 1939

Plate 705, figs. 6-9

Type species: Valvulina allomorphinoides Reuss, 1860 (***2581**), p. 223; OD.

Quadrimorphina Finlay, 1939 (***1128**), p. 325.

Gyromorphina Marie, 1941 (***2031**), p. 230, 256; type species: obj.; OD.

Test ovate in outline, biconvex, low trochospiral coil, three to six slightly elongated chambers in the final whorl, sutures curved back at the periphery on the spiral side, nearly radial around the open umbilicus of the umbilical side, slightly depressed, periphery rounded; wall calcareous, optically granular, finely perforate, surface smooth; aperture interiomarginal and umbilical, a low opening covered by a large rounded to triangular lip, with internal toothplate consisting of a partition attached to the previous umbilical flap at an angle to the septal foramen and forming a crest on the inside of the apertural lip. U. Cretaceous (Coniacian) to Holocene; cosmopolitan.

Family ALABAMINIDAE Hofker, 1951

Alabaminidae Hofker, 1951 (***1498**), p. 389.

Alabamininae Saidova, 1981 (***2696**), p. 43 (subfamily, nom. transl.).

Alabamininea Saidova, 1981 (***2696**), p. 42 (supersubfamily).

Test trochospiral; aperture an interiomarginal slit partially obscured by an infolded area of the apertural face. U. Cretaceous (Turonian) to Holocene.

ALABAMINA Toulmin, 1941

Plate 705, figs. 10-12

Type species: Alabamina wilcoxensis Toulmin, 1941; OD.

Alabamina Toulmin, 1941 (***3216**), p. 602.

Eponidoides Brotzen, 1942 (***428**), p. 38; type species: *Eponides dorsoplanus* Brotzen, 1940 (***427**), p. 31; OD.

Test trochospiral, lenticular, and biconvex, spiral side evolute, with three whorls and about five chambers in the final whorl, sutures depressed, curved and oblique, umbilical side involute, apertural face deeply excavated from the umbilicus to the periphery, then sharply folded forward at the periphery, sutures radial and slightly depressed, umbilicus closed but depressed, periphery subangular; wall calcareous, optically granular, finely perforate except for a nonperforate peripheral margin, surface smooth; aperture an interiomarginal slit beneath the deeply indented apertural face, extending almost to the periphery from where the apertural face turns forward near the periphery, bordered by a narrow lip. U. Cretaceous (Santonian) to Holocene; cosmopolitan.

CLINAPERTINA Tjalsma and Lohmann, 1983

Plate 705, figs. 13-15

Type species: Clinapertina inflata Tjalsma and Lohmann, 1983; OD.

Clinapertina Tjalsma and Lohmann, 1983 (April) (***3199**), p. 29.

Clinapertina K. G. Miller, 1983 (Feb.) (***2139**), p. 411-413, 416, 420, 423, 431 (name not available, ICZN Art. 13 (a)(i), no description).

Test very low trochospiral, robust, biconvex, about two whorls visible on the evolute spiral side, six chambers in the final whorl, sutures straight, radial, and flush, umbilical side involute with curved and flush sutures, umbilicus closed, periphery subacute to rounded; wall calcareous, microstructure unknown, finely to moderately coarsely perforate, surface smooth; aperture an interiomarginal asymmetrical arch on the umbilical side, extending from the umbilicus nearly to the peripheral margin, apertural face oblique and sloping backward on the umbilical side. L. Eocene (Ypresian) to M. Eocene (Lutetian); Atlantic and Pacific.

SVRATKINA Pokorný, 1956

Plate 706, figs. 1-3

Type species: Discorbis tuberculata (Balkwill and Wright) var. *australiensis* Chapman, Parr, and Collins, 1934 (***543**), p. 563; OD.

Svratkina Pokorný, 1956 (***2445**), p. 257.

Test trochospiral, biconvex, spiral side evolute, six to seven crescentic chambers in the final whorl, sutures oblique and curved, umbilical side involute, sutures radial and slightly depressed around the closed umbilicus, periphery rounded; wall calcareous, coarsely perforate, the large pores opening at the center of small tubercles that cover both surfaces; aperture an elongate oblique opening in a slight depression extending from near the umbilicus up the face of the final chamber about halfway to the periphery. U. Cretaceous (Maastrichtian) to Holocene; Australia; Europe; North America.

VALVALABAMINA Reiss, 1963

Plate 706, figs. 4-12

Type species: Rotalina lenticula Reuss, 1845 (***2570**), p. 35 (syn.: *Rotalina depressa* Alth, 1850, ***28**, p. 266; *Rotalia cretacea* Carsey, 1926, ***495**, p. 48); OD.

Valvalabamina Reiss, 1963 (***2561**), p. 62.

Test in a low trochospiral coil, flattened, two gradually enlarging whorls visible on the evolute spiral side, nine to twelve chambers in the final whorl, sutures depressed, curved, and oblique, umbilical side involute, sutures radial, final chamber with an umbilical plate-like extension that may fuse to other chambers of the final whorl, periphery subacute; wall calcareous, optically granular, finely perforate, surface smooth; aperture a narrow elongate umbilical-extraumbilical slit in the depressed apertural face. U. Cretaceous (Turonian) to Paleocene; cosmopolitan.

Family GLOBOROTALITIDAE Loeblich and Tappan, 1984

Globorotalitidae Loeblich and Tappan, 1984 (***1918**), p. 53.

Globorotalitidae Loeblich and Tappan, 1982 (***1917**), p. 36 (name not available, ICZN Art. 13 (a)(i), no description).

Test trochospiral, planoconvex, pseudoumbilicus on umbilical side; deep indentation or murus reflectus at base of apertural face attaches to previous septum internally but is not a true aperture and does not communicate with chamber interior; aperture interiomarginal, midway between umbilical region and periphery. L. Cretaceous (Barremian) to U. Cretaceous (Maastrichtian).

CONOROTALITES Kaever, 1958

Plate 707, figs. 1-3

Type species: Globorotalites bartensteini Bettenstaedt subsp. *aptiensis* Bettenstaedt, 1952 (*228), p. 282; OD.

Conorotalites Kaever, 1958 (*1627), p. 435.

Test trochospiral, planoconvex, or inequally biconvex, spiral side flattened and sutures limbate, curved, and strongly oblique, umbilical side elevated and sutures curved to sinuate, flush to depressed, nearly radial around the pseudoumbilicus, umbilical shoulder angular, periphery angular and carinate; wall calcareous, optically granular, coarsely perforate, surface smooth other than the limbate sutures and keel; aperture a narrow interiomarginal slit, with deeply indented murus reflectus giving the appearance of a second aperture. L. Cretaceous (Barremian to Albian); Europe.

GLOBOROTALITES Brotzen, 1942

Plate 706, figs. 13-17

Type species: Globorotalia multisepta Brotzen, 1936 (*425), p. 161; OD.

Globorotalites Brotzen, 1942 (*428), p. 31.

Test trochospiral, planoconvex, spiral side flattened or may be slightly concave or convex, umbilical side strongly convex, chambers enlarging gradually, sutures oblique, limbate, and elevated on the spiral side, radial, curved to sinuate, and depressed on the umbilical side around the broad pseudoumbilicus and angular umbilical shoulder, apertural face deeply indented at the base in a murus reflectus that attaches to the previous septum, periphery with poreless carina; wall calcareous, optically granular, finely perforate, surface smooth; low and slitlike interiomarginal aperture on the umbilical side about midway between the umbilicus and periphery, the deeply indented murus reflectus resembling a second aperture but does not communicate with the chamber interior. L. Cretaceous (Albian) to U. Cretaceous (Maastrichtian); cosmopolitan.

Family OSANGULARIIDAE Loeblich and Tappan, 1964

Osangulariidae Loeblich and Tappan, 1964 (*1910), p. C752.

Osangulariinae Saidova, 1981 (*2696), p. 41 (subfamily).

Aperture with an interiomarginal part that may be indicated only by a deeply indented murus reflectus and a separate or joined vertical or oblique part that extends up the apertural face, or aperture may be areal and may become multiple. L. Cretaceous (Albian) to Holocene.

CHARLTONINA Bermúdez, 1952

Plate 707, figs. 4-9

Type species: Pseudoparrella madrugaensis Cushman and Bermúdez, 1948 (*812), p. 73; OD.

Charltonina Bermúdez, 1952 (*205), p. 69.

Transylvanina Mihaela Gheorghian, Iva, and Musat Gheorghian, 1968 (*1235), p. 193; type species: *Transylvanina sigali* M. Gheorghian, Iva, and M. Gheorghian, 1968; OD.

Test lenticular to inequally biconvex, low trochospiral, all whorls visible, chambers lunate and sutures strongly oblique on the spiral side, sutures radial and depressed, slightly curved on the involute umbilical side, umbilicus closed, periphery angular and carinate; wall calcareous, perforate, optical character not described, surface smooth; aperture an elongate interiomarginal slit extending from the umbilicus to the margin of the peripheral keel, then bending up the apertural face and paralleling the keel. L. Cretaceous (Albian) to L. Miocene (Burdigalian); Caribbean: Cuba; England; Romania; Egypt; Australia.

CRIBROPARRELLA ten Dam, 1948

Plate 707, figs. 10-12

Type species: Cribroparrella regadana ten Dam, 1948; OD.

Cribroparrella ten Dam, 1948 (*887), p. 487 (also err. cit. as *Cribroparella*, p. 486, and *Dribroparella*, pl. expl.).

Test in a low trochospiral coil, lenticular and biconvex, spiral side evolute, about two and a half rapidly enlarging whorls, nine to ten narrow chambers in the final whorl, sutures curved, oblique, more so on the spiral side, umbilicus closed and umbonate, periphery carinate; wall calcareous, optically granular, finely perforate; aperture a narrow slit near the base of the apertural face, extending obliquely up the face from the periphery toward the umbilical side, bordered by a projecting lip, small circular supplementary areal openings scattered over the entire apertural face. L. to U. Miocene; Algeria; Gabon; Jamaica.

GOUPILLAUDINA Marie, 1958

Plate 707, figs. 13-19

Type species: Goupillaudina daguini Marie, 1958; OD.

Goupillaudina Marie, 1958 (***2039**), p. 861.
Goupillaudina Marie, 1957 (***2038**), p. 247 (name not available, ICZN Art. 13(a)(i), no description).

Test large, up to 2.5 mm in diameter, lenticular to compressed and nearly discoidal, weakly trochospiral to nearly planispiral, may be involute in the early stage, later evolute with prominent and elevated central boss on both sides, whorls enlarging rapidly, with numerous lunate to bandlike chambers per whorl and oblique sutures strongly curved back at the periphery, final chamber occupying one-third to one-half of the circumference, periphery acutely angular; wall calcareous, finely perforate, optical character unknown; aperture interiomarginal, extending onto one side along the base of the chamber and continuing along the deeply incised spiral suture, bending sharply upward near the equatorial plane and extending up the apertural face as in *Charltonina*. U. Cretaceous (Coniacian to Maastrichtian); France; Spain.

OSANGULARIA Brotzen, 1940

Plate 708, figs. 1-5

Type species: Osangularia lens Brotzen, 1940; OD.

Osangularia Brotzen, 1940 (***427**), p. 30.
Parrella Finlay, 1939 (***1126**), p. 523 (non *Parrella* Ginsburg, 1938); type species: *Anomalina bengalensis* Schwager, 1866 (***2828**), p. 259; OD.

Test trochospiral, lenticular, biumbonate, spiral side evolute, whorls enlarging gradually, sutures thickened, oblique, and curved, umbilical side involute, sutures radial, sinuate, and depressed, periphery carinate; wall calcareous, optically granular, finely perforate, surface smooth; aperture areal, at an acute angle to the base of the chamber face which is deeply infolded in a murus reflectus that attaches to the preceding whorl at the edge nearest the spiral side, the deep indentation appearing falsely to be an interiomarginal aperture. L. Cretaceous to Holocene; cosmopolitan.

Family ORIDORSALIDAE Loeblich and Tappan, 1984

Oridorsalidae Loeblich and Tappan, 1984 (***1918**), p. 53.
Oridorsalidae Loeblich and Tappan, 1982 (***1917**), p. 36 (name not available, ICZN Art. 13(a)(i), no description).

Test lenticular, chambers in low trochospiral coil; wall calcareous, finely perforate, hyaline oblique and optically granular in structure; aperture at base of apertural face, extending from near the periphery to the umbilical region, small secondary sutural openings on spiral side near junction of spiral and septal sutures, with similar small openings at sharp curve near midpoint of sutures on the umbilical side. Oligocene to Holocene.

Remarks: Differs from the Alabaminidae in the nearly equatorial low basal aperture, absence of a deep indentation of the apertural face, and in having sutural secondary openings on both sides of the test.

ORIDORSALIS Andersen, 1961

Plate 708, figs. 6-11

Type species: Oridorsalis westi Andersen, 1961; OD.

Oridorsalis Andersen, 1961 (***34**), p. 107.

Test lenticular, a low trochospiral coil, spiral side evolute, with three slowly enlarging whorls, four to five chambers in the final whorl, sutures radial and depressed, umbilical side involute and sutures sinuate, reflecting the position of the secondary sutural openings, periphery carinate, peripheral outline lobulate; wall calcareous, hyaline, optically granular, very finely perforate, surface smooth; primary aperture interiomarginal, extending from near the periphery almost to the closed umbilicus, small secondary openings occur at the junction of spiral and intercameral sutures on the spiral side, and similar sutural openings at a sinuate bend in the sutures near their midpoint on the umbilical side. Oligocene to Holocene; North America; Europe; Caribbean; Japan.

SCHWANTZIA McCulloch, 1977

Plate 708, figs. 12-14

Type species: Schwantzia elegantissima McCulloch, 1977; OD.

Schwantzia McCulloch, 1977 (*1961), p. 316.

Test of medium size, about 0.3 mm to 0.4 mm in diameter, in a low trochospiral coil, concavoconvex, about two and a half to three and a half whorls of rapidly enlarging inflated chambers, spiral side evolute, sutures curved, oblique and depressed, umbilical side concave, partially evolute, sutures nearly straight, slightly oblique, internal partition cuts off a small umbilical chamberlet, umbilicus with prominent central plug, periphery rounded; wall calcareous, thick, almost opaque, perforate, surface smooth; primary aperture interiomarginal, beneath the flaps on the umbilical side, and may remain open on earlier chambers of the final whorl, small triangular secondary sutural openings present at the junction of spiral and intercameral sutures on the spiral side and secondarily closed as later chambers are added, additional sutural openings present in a small reentrant in the radial sutures a short distance from the umbilicus on the umbilical side. Holocene; Philippine Islands.

Remarks: Differs from *Oridorsalis* in the rounded periphery, more numerous chambers per whorl, partially evolute umbilical side, and arched primary aperture near the periphery. The large opening shown in the illustration of the holotype is broken and not a true aperture.

Family HETEROLEPIDAE González-Donoso, 1969

Heterolepidae González-Donoso, 1969 (*1264), p. 6.
Heterolepinae Saidova, 1981 (*2696), p. 40 (subfamily).
Heterolepinea Saidova, 1981 (*2696), p. 40 (supersubfamily).

Test trochospiral, lenticular; umbilical side with closed umbilicus, commonly with boss; aperture a small interiomarginal opening bordered by a narrow lip. L. Cretaceous (Albian) to Holocene.

ANOMALINOIDES Brotzen, 1942

Plate 708, figs. 18-20

Type species: Anomalinoides plummerae Brotzen, 1942 = *Anomalina pinguis* P. H. Jennings, 1936 (*1609), p. 195; OD.

Anomalinoides Brotzen, 1942 (*428), p. 23.
Cibicides (Anomalinoides) Vasilenko, 1954 (*3259), p. 140 (nom. transl.).

Test robust, in a low trochospiral coil, spiral side partially evolute with early whorls later covered by central boss, chambers inflated and sutures curved and depressed, umbilical side involute with sutures depressed, gently curved to nearly straight and radial around the small umbilicus, periphery broadly rounded, peripheral outline lobulate; wall calcareous, optically granular, coarsely perforate; aperture a low interiomarginal arch against the periphery of the preceding whorl, extending onto the spiral side where it continues along the spiral suture beneath the umbilical margin of the last few chambers of the final whorl, a narrow bordering lip present above the aperture. L. Cretaceous (Albian) to Holocene; cosmopolitan.

GEMELLIDES Vasilenko, 1954

Plate 708, figs. 15-17

Type species: Cibicides (Gemellides) orcinus Vasilenko, 1954; OD.

Cibicides (Gemellides) Vasilenko, 1954 (*3259), p. 186.

Test trochospiral, planoconvex to biconvex, commonly with flatter and evolute spiral side and more inflated involute umbilical side, whorls gradually enlarging, about eight to twelve chambers per whorl, sutures straight and oblique on the spiral side, curved back to the periphery on the umbilical side, umbilicus filled with clear shell boss, periphery angular; wall calcareous, coarsely to finely but uniformly perforate; aperture a low interiomarginal and equatorial opening, extending slightly onto the umbilical side and continuing along the spiral suture for a short distance on the spiral side. U. Cretaceous (Maastrichtian) to Holocene; cosmopolitan.

Remarks: The original description of *Cibicides (Gemellides)* included the type species of *Heterolepa* and that of the later described *Paralabamina*. It has previously been regarded as a synonym of *Heterolepa*. However, the type species, *C. orcinus*, differs from *Heterolepa* in having a biconvex test, peripheral aperture extending a short distance on both spiral and umbilical sides, and a plug filling the umbilical region. Species with optically granular walls that previously were placed in *Cibicidoides* may belong to *Gemellides*.

HETEROLEPA Franzenau, 1884

Plate 709, figs. 1-8; plate 710, figs. 1-6

Type species: Heterolepa simplex Franzenau, 1884 = *Rotalina dutemplei* d'Orbigny, 1846 (*2309), p. 157; SD Loeblich and Tappan, 1962 (*1908), p. 72.

Heterolepa Franzenau, 1884 (*1175), p. 214.
Pseudotruncatulina Andreae, 1884 (*38), p. 122; type species: *Rotalina dutemplei* d'Orbigny, 1846; OD.
Cibusoides Saidova, 1975 (*2695), p. 267; type species: *Cibusoides elegans* Saidova, 1975; OD.
Crawfordoides McCulloch, 1981 (*1962), p. 174; type species: *Crawfordoides semisinuosa* McCulloch, 1981; OD.

Test trochospiral, planoconvex to inequally biconvex with flatter spiral side, about three slowly enlarging volutions, ten to twelve quadrangular-appearing chambers in the final whorl, sutures limbate, oblique, very slightly curved, umbilical side convex, chambers broad and low, converging at the closed umbilicus, sutures curved and flush to weakly depressed, periphery subangular; wall calcareous, optically granular, thick and lamellar, coarsely and regularly perforate, surface smooth; aperture a low interiomarginal slit on the umbilical side, extending from about midway between the umbilicus and periphery across the periphery to continue a short distance onto the spiral side, bordered above with a low lip. U. Cretaceous (Maastrichtian) to Holocene; cosmopolitan.

Remarks: A lectotype (Geologische Bundesanstalt Wien, GBA 1981/03/240) was designated by Papp and Schmid (1985, *2338, p. 61) for *Heterolepa dutemplei*.

LOISTHOSTOMATA Loeblich and Tappan, 1986

Plate 710, figs. 7-11

Type species: Loisthostomata exiguum Loeblich and Tappan, 1986; OD.

Loisthostomata Loeblich and Tappan, 1986 (*1928), p. 255.

Test lenticular, spiral side more convex, with a low trochospiral coil of about three gradually enlarging whorls and seven broad and low chambers in the final whorl, sutures oblique, later ones slightly depressed, chambers subtriangular on the more flattened umbilical side, sutures radial around the shallow umbilicus, periphery subacute, rounded, peripheral outline somewhat lobulate; wall calcareous, coarsely but sparsely perforate, but with imperforate spiral suture, peripheral margin, and apertural lip or may have rare pores on the periphery, surface otherwise smooth; aperture a low interiomarginal equatorial arch bordered by a protruding lip, extending somewhat onto the spiral side, a small part of the proximal end of successive apertures remaining open as relict apertures as new chambers are added. U. Eocene (Priabonian): USA: Mississippi.

Remarks: Differs from *Cibicidoides* in the convex spiral side and depressed rather than umbonate umbilical side, differs from *Hollandina* in the more compressed test and more prominent aperture, and differs from both in having relict apertures on the spiral side.

TALPINELLA Baumfalk, Fortuin, and Mok, 1982

Plate 711, figs. 1-6

Type species: Talpinella cunicularia Baumfalk et al., 1982; OD.

Talpinella Baumfalk, Fortuin, and Mok, 1982 (*163), p. 187.

Parasitic, burrowing into the equatorial layer of *Orbitoides*, test trochospirally enrolled in the early stage as in *Anomalinoides*, about two whorls with broadly rounded periphery and six to eight inflated chambers in the final whorl, sutures straight, radial, and slightly depressed, then with more irregularly added and lobate trochospiral chambers, still later the irregular chambers become tubular and early chambers are resorbed, at maximum size the large tubular chambers occupy about one-half the diameter of the host and form a wide loop around the *Orbitoides* embryo, the elongate chambers being separated by thin and fragile septa; wall calcareous, coarsely perforate but with nearly imperforate periphery in the coiled stage, surface covered with numerous needlelike spines that anchor the test within the cavities burrowed into the host test, later burrowing stage with relatively thin and sparsely perforate walls; aperture in the early stage a low interiomarginal slit with narrow lip, extending onto the spiral side along the spiral suture. U. Cretaceous (L. Campanian to U. Maastrichtian); France; Netherlands.

Family GAVELINELLIDAE Hofker, 1956

Gavelinellidae Hofker, 1956 (*1510), p. 946.
Lingulogavelinellidae Scheibnerová, 1972 (*2750), p. 214.

Test trochospiral; aperture an interiomarginal equatorial arch that may extend to the umbilicus on the umbilical side, bordered by a lip or flap. L. Cretaceous (Barremian) to Holocene.

Subfamily GYROIDINOIDINAE Saidova, 1981

Gyroidinoidinae Saidova, 1981 (*2696), p. 41.

Test trochospiral and planoconvex to high trochospiral; aperture extends from periphery to open umbilicus, may be bordered by an apertural flap. U. Cretaceous (Cenomanian) to Holocene.

ESCORNEBOVINA Butt, 1966

Plate 712, figs. 1-9

Type species: Rotalia cuvillieri Poignant, 1965 (*2439), p. 103; OD.

Escornebovina Butt, 1966 (*459), p. 56.
Pseudopatellina Kenawy and Nyírő, 1967 (*1670), p. 104 (non *Pseudopatellina* Haque, 1960, nec Zheng, 1980): type species: *Pseudopatellina plana* Kenawy and Nyírő, 1967; OD.
Falsipatellina D. Haman and Huddleston, 1981 (*1374), p. 378 (nom. subst. pro *Pseudopatellina* Kenawy and Nyírő, 1967); type species: obj.; OD.

Test small, about 0.3 mm to 0.4 mm in diameter, low trochospiral coil, planoconvex, spiral side evolute, gently convex, about three and a half to four very slowly enlarging whorls of numerous narrow chambers, about twelve to twenty-six in the final whorl, chambers distinctly inflated at their base against the previous suture and erroneously appearing to represent limbate sutures, whereas the true sutures are straight, radial, and depressed, umbilical side flat to slightly excavated centrally, sutures straight and radial toward the umbilicus but curve proximally at the periphery, broad umbilicus occupying about one-third of the test diameter and filled with a solid central plug or button of shell material, periphery angular; wall calcareous, optically granular, no perforations visible on the spiral side at magnifications up to × 20,000, surface appearing leathery at × 5,000; aperture a narrow interiomarginal slit extending from near the periphery toward the umbilicus, with small pustules on the lower apertural face and area below the aperture. M. Oligocene (Stampian) to M. Miocene (Vindobonian); France; Spain; Italy; Germany; Hungary.

GYROIDINOIDES Brotzen, 1942

Plate 713, figs. 7-9

Type species: Rotalina nitida Reuss, 1844 (*2569), p. 214; OD.

Gyroidinoides Brotzen, 1942 (*428), p. 19.
Gyroidina (Gyroidinoides) Reiss and Hottinger, 1984 (*2562), p. 290 (nom. transl.).

Test trochospiral, planoconvex, with flat and evolute spiral side and convex and involute umbilical side, umbilicus open but partially obscured by an umbilical apertural flap, umbilical shoulder angular, sutures radial, very slightly curved, periphery rounded; wall calcareous, optically granular, perforate, surface smooth; aperture a low interiomarginal slit extending from the periphery to the umbilicus, where it is partially obscured by the umbilical flap from the chambers, apertures of previous chambers may remain open in the umbilicus. U. Cretaceous (Cenomanian) to Holocene; cosmopolitan.

NOTOPLANULINA Malumian and Masiuk, 1976

Plate 713, figs. 1-6

Type species: Planulina rakauroana Finlay, 1939 (***1128**), p. 326; OD.

Notoplanulina Malumian and Masiuk, 1976 (***2002**), p. 195

Test about 1 mm in diameter, flattened, low trochospiral coil of about three whorls, six to thirteen rapidly flaring chambers in the final whorl, planoconvex, spiral side flat and evolute, sutures strongly curved, raised, and limbate, umbilical side involute, chambers inflated, sutures curved and depressed, umbilicus open and deep or may be partly covered by umbilical chamber extensions or folia, periphery angular and carinate; wall calcareous, optically granular, finely perforate except for the imperforate thickened sutures; aperture an areal transverse slit bending sharply to an interiomarginal continuation along the base of the chamber face. U. Cretaceous (Coniacian to Maastrichtian); New Zealand; Argentina; USA: California.

Remarks: The placement of this genus is tentative. It was originally described as belonging to the Osangulariidae but differs in having umbilical folia and a more extensive interiomarginal aperture.

NUMMODISCORBIS Hornibrook, 1961

Plate 714, figs. 1-6

Type species: Nummodiscorbis novozealandica Hornibrook, 1961; OD.

Nummodiscorbis Hornibrook, 1961 (***1539**), p. 106.

Test low and conical, planoconvex to concavoconvex, trochospiral, with about two and a half gradually enlarging whorls of numerous chambers, about twenty chambers in the final whorl, sutures elevated as narrow irregular ridges and strongly curved back toward the periphery on the convex spiral side, radial and depressed on the flattened umbilical side in the early stage, in larger specimens bending near the periphery, and finally with sutures sharply angled midway between the deep open umbilicus and the acutely angled periphery; wall calcareous, thin, finely perforate, surface finely pustulose on the spiral side and on the earlier chambers of the final whorl on the umbilical side; aperture an elongate interiomarginal slit extending from the periphery nearly to the umbilicus. M. Eocene (U. Lutetian) to L. Miocene (Aquitanian); New Zealand.

ROTALIATINA Cushman, 1925

Plate 715, figs. 1-3

Type species: Rotaliatina mexicana Cushman, 1925; OD.

Rotaliatina Cushman, 1925 (***727**), p. 4.

Test a high trochospiral coil, all chambers visible on the strongly elevated spiral side, only the final whorl visible around the small deep umbilicus on the umbilical side, sutures radial, nearly straight, periphery rounded; wall calcareous, optical character unknown, finely perforate, surface smooth; aperture an elongate interiomarginal slit, extending from near the periphery to the open umbilicus, bordered with a narrow lip. U. Eocene (Priabonian) to Oligocene; Mexico; USA: Mississippi.

ROTALIATINOPSIS Banner and Blow, 1967

Plate 714, figs. 7-11

Type species: Pulleniatina? semiinvoluta Germeraad, 1946 (***1228**), p. 72; OD.

Rotaliatinopsis Banner and Blow, 1967 (***127**), p. 146.

Test small, up to 0.25 mm in diameter, low to high trochospiral coil of about four whorls, biconvex, about five to six chambers per whorl, spiral side evolute but final whorl may show a tendency to overlap that preceding, umbilical side involute, chambers inflated, enlarging rapidly as added, periphery broadly rounded; wall calcareous, optically granular, very finely perforate, surface smooth; aperture an elongate slit at the base of the apertural face but with a bordering lip both above and below. Pliocene (Plaisancian) to Pleistocene; Indonesia; India; Arabian Sea.

SCARIFICATINA Moorkens, 1982

Plate 713, figs. 10-14

Type species: Boldia reinholdi Pożaryska and Szczechura, 1970 (***2468**), p. 99 (syn.: *Scarificatina reinholdi* Marie, 1964 (***2042**), p. 1082, 1083, 1100, pl. 2, fig. 4a-c, name not available, ICZN Art. 13 (a)(i), no description); OD.

Scarificatina Moorkens, 1982 (***2180**), p. 103.

Scarificatina Marie, 1950 (***2035**), p. 50 (name not available, ICZN Art. 13 (a)(i), no description); OD.

Test enrolled in a low trochospiral coil, planoconcave or biconcave with broadly truncate periphery, evolute spiral side with elevated spiral suture and may have a carinate margin, margin of umbilical side rounded; wall calcareous, spiral side coarsely perforate, surface of final whorl may have radial costae in addition to a series of straight parallel ridges in the central area only or covering most of the umbilical side and appearing to reflect attachment to a substrate; aperture multiple, of small rounded openings scattered over the lower part of the apertural face, each bordered by a lip. Paleocene (Montian); Belgium; Poland.

Remarks: Although the generic and specific names were first used by Marie (1950, ***2035**; 1964, ***2042**), both were nomina nuda. The species was first validly described by Pożaryska and Szczechura (1970, ***2468**) and the genus described by Moorkens (1982, ***2180**), although both were credited erroneously to Marie. As the later authors provided the descriptions, they are the authors of these taxa, regardless of the source of the names. Apparently no holotype was designated for this species, hence the specimen figured by Pożaryska and Szczechura (1970, ***2468**, pl. 2, figs. 3a-c) is here designated as the lectotype of *Scarificatina reinholdi* (Pożaryska and Szczechura).

STENSIOEINA Brotzen, 1936

Plate 715, figs. 4-6

Type species: Rotalia exsculpta Reuss, 1860 (***2581**), p. 222; OD.

Stensioeina Brotzen, 1936 (***425**), p. 164 (as *Stensiöina*).

Test coiled in a flat trochospiral, planoconvex to inequally biconvex, spiral side flat and evolute, with chambers enlarging gradually and separated by curved, limbate sutures that are strongly elevated in somewhat irregular ridges, resulting in a reticulose surface, on the convex opposite side chambers are inflated and elevated into ridges near the umbilicus, sutures are more nearly radial, and later ones may be slightly depressed, periphery broadly rounded; wall calcareous, optically granular, coarsely perforate, surface with prominent irregular sutural ridges on the spiral side; aperture a low interiomarginal opening between the umbilicus and periphery. U. Cretaceous (Turonian to Maastrichtian); cosmopolitan.

Subfamily GAVELINELLINAE Hofker, 1956

Gavelinellinae Loeblich and Tappan, 1961 (***1902**), p. 316 (nom. transl. ex family).

Gyroidininae Saidova, 1981 (***2696**), p. 43 (subfamily).

Test trochospirally coiled; aperture an interiomarginal equatorial arch that may continue on the umbilical side to the umbilicus, where it is partially covered by a distinctive flap, flaps of successive chambers commonly remaining visible in the umbilical area. L. Cretaceous (Barremian) to Holocene.

ANGULOGAVELINELLA Hofker, 1957

Plate 716, figs. 19-21

Type species: Discorbina gracilis Marsson, 1878 (***2047**), p. 166; OD.

Angulogavelinella Hofker, 1957 (***1512**), p. 365.

Test lenticular to inequally biconvex, low trochospiral coil with numerous chambers per whorl, spiral side evolute, sutures curved and oblique, umbilical side involute, sutures very strongly curved back at the periphery, umbilicus small and deep, periphery carinate; wall calcareous, spiral side nonperforate, umbilical side coarsely perforate, sutures and carina nonperforate; aperture an elevated interiomarginal arch that may be somewhat oblique, about midway between the umbilicus and periphery on the umbilical side. U. Cretaceous (Maastrichtian); East Germany; Sweden; Netherlands.

ANOMALINULLA Saidova, 1975

Plate 715, figs. 7-9

Type species: Anomalinulla marina Saidova, 1975; OD.

Anomalinulla Saidova, 1975 (***2695**), p. 277.

Test small, from 0.5 mm to 0.6 mm in diameter, enrolled in a low trochospiral coil, evolute and flattened spiral side of about two whorls, only the eight to nine chambers of the final whorl visible on the involute and centrally umbilicate side, sutures straight, radial, weakly depressed, periphery broadly rounded; wall calcareous, microgranular, perforate, surface smooth; aperture interiomarginal, equatorial, continuing on the umbilical side to the umbilicus, bordered by a narrow lip that expands at the umbilical margin. Holocene; tropical and temperate areas of the Pacific.

Remarks: *Gyroidinopsis* McCulloch, 1977 is very similar in general appearance but has a prominently angled umbilical shoulder and a more restricted equatorial aperture that does not extend into the umbilical area.

BERTHELINA Malapris, 1965

Plate 715, figs. 16-18

Type species: Anomalina intermedia Berthelin, 1880 (***221**), p. 67; OD.

Gavelinella (Berthelina) Malapris, 1965 (***1998**), p. 138 (also err. cit. as *Gavelinella (Berthelinella)*, pl. 5, non *Berthelinella* Loeblich and Tappan, 1957).

Test in a flat trochospiral, spiral side partially evolute, with early whorls covered by a thickened umbo, numerous chambers enlarging rapidly as added, sutures curved, depressed, umbilical side nearly involute, with umbilicus partially covered by the apertural flaps that extend proximally and toward the umbilicus from each chamber, those of the last few chambers distinctly visible at the center of the test, each slightly overlapping that preceding but not covering the umbilicus and may remain separated or may be attached to earlier ones, periphery rounded to subangular, peripheral outline may be slightly lobulate; wall calcareous, optically granular, perforate, surface smooth; aperture interiomarginal, extending from the periphery onto the umbilical side where it continues beneath the umbilical apertural flap, upper bordering lip slightly produced. L. Cretaceous (Albian); cosmopolitan.

BILINGULOGAVELINELLA

Scheibnerová, 1971

Plate 716, figs. 1-3

Type species: Bilingulogavelinella australis Scheibnerová, 1971; OD.

Bilingulogavelinella Scheibnerová, 1971 (***2749**), p. 122.

Test coiled in a flat trochospiral or planispiral, bi-involute but asymmetrical, with umbilical flaps from the chambers on both sides, six to eight somewhat inflated chambers in the final whorl, sutures radial to slightly curved, depressed, periphery broadly rounded; wall calcareous, thin, perforate, optical character not described, surface smooth; aperture an equatorial interiomarginal slit, with supplementary slitlike openings beneath the tonguelike umbilical chamber flaps. L. Cretaceous (Albian) to U. Cretaceous (Turonian); cool water, cosmopolitan.

BOLDIA van Bellen, 1946

Plate 715, figs. 10-15

Type species: Rotalina lobata Terquem, 1882 (***3147**), p. 63; OD.

Boldia van Bellen, in van den Bold, 1946 (***279**), p. 124 (nom. subst. pro *Terquemia* van Bellen, 1946).

Terquemia van Bellen, 1946 (***182**), p. 86 (non *Terquemia* Tate, 1868, nec van Veen, 1932); type species: obj., OD.

Test in a flat trochospiral coil, planoconcave to biconcave, spiral side evolute, numerous gradually enlarging chambers, surface excavated but with an elevated margin of the apertural face continuing into the peripheral keel on the spiral side, remaining as an elevation parallel to and adjacent to the curved and depressed sutures, umbilical side flat to concave, involute, umbilical apertural flap extending from each chamber into the umbilicus, sutures nearly radial, flush in the outer part but incised between the umbilical chamber flaps near the moderately depressed umbilicus, periphery broadly truncate and may have carinate margins, peripheral outline lobulate; wall calcareous, coarsely perforate, surface appearing roughened; aperture a low interiomarginal arch at the umbilical edge of the truncate apertural face, continuing onto the umbilical side beneath the umbilical chamber flap, earlier apertures of the final whorl may remain as slits bordering the imbricated chamber flaps of previous chambers. Paleocene to M. Eocene; Europe; Cuba; Guatemala.

COCOAROTA Loeblich and Tappan, 1986

Plate 717, figs. 1-7

Type species: Anomalina cocoaensis Cushman, 1928 (***749**), p. 75; OD.

Cocoarota Loeblich and Tappan, 1986 (***1928**), p. 257.

Test planoconvex to concavoconvex, with a low trochospiral coil, globular proloculus followed by two to three whorls, ten to thirteen chambers in the final whorl, spiral side evolute, concave where the chamber surface is excavated below the level of the elevated sutures, umbilical side involute, sutures thickened, nearly straight and radial, slightly elevated on the spiral side, strongly elevated on the umbilical side and terminating in a prominent raised boss at the umbilical margin, umbilical bosses of earlier chambers and whorls forming a pillarlike umbilical mass, periphery subangular in early whorls, broadly rounded in the final chambers; wall calcareous, coarsely perforate except for the imperforate apertural face, apertural lip, and limbate sutures, perforations may be obscured by secondary deposits on the spiral side but remain open between the imperforate elevated sutures on the umbilical side; aperture a low interiomarginal and equatorial arch, bordered by a prominent narrow lip, and continuing beneath the basal margin of the chamber onto the umbilical side. U. Eocene; USA: Alabama; Mexico; Cuba; Trinidad; Peru.

Remarks: Van Morkhoven et al. (1986b, ***2185A**, p. 267) incorrectly identified as *Cibicidoides micrus* (Bermúdez)" specimens of the type species of *Cocoarota*. If synonymous, Cushman's species from the U. Eocene would have clear priority of many years, but it is a much more robust form, with broad peripheral margin, deeply excavated spiral side with clear secondary deposit of shell material obscuring early whorls, thickened sutures ending in prominent umbilical thickenings around an umbonal plug or plugs on the convex umbilical side, and an imperforate, broad low apertural face. In contrast, the L. Eocene *Cibicides micrus* Bermúdez is lenticular, subequally biconvex, and has an acutely angled periphery.

DISCANOMALINA Asano, 1951

Plate 718, figs. 1-9

Type species: Discanomalina japonica Asano, 1951 = *Rotalina semipunctata* Bailey, 1851 (***106**), p. 11; OD.

Discanomalina Asano, 1951 (***87**), p. 13.

Paromalina Loeblich and Tappan, 1957 (***1897**), p. 230; type species: *Paromalina bilateralis* Loeblich and Tappan, 1957 = *Rotalina semipunctata* Bailey, 1851; OD.

Pseudorosalinoides McCulloch, 1977 (***1961**), p. 452; type species: *Pseudorosalinoides chathamensis* McCulloch, 1977 = *Rotalina semipunctata* Bailey, 1851; OD.

Test free or attached by one side during life, resulting in irregular growth, robust, coiling low trochospiral to nearly planispiral, one and a half to two rapidly enlarging whorls and about seven to nine laterally inflated chambers in the final whorl, chambers with umbilical flaplike projections on one or both sides, coiling variable, may be partially or wholly involute on one or both sides, or may be almost entirely evolute, sutures radial, straight to curved, depressed, periphery broadly rounded, peripheral outline circular, lobulate, or with one or more projections, depending on the mode of attachment if any; wall calcareous, optically granular, coarsely perforate, but with nonperforate apertural face, chamber flaps and area of attachment; aperture a broad and low interiomarginal and equatorial slit that may extend onto the imperforate side of the test and bordered above by a narrow lip, slitlike supplementary openings present beneath the umbilical flaps, but both flaps and supplementary apertures are reduced or disappear on the free side of asymmetrical attached specimens that have distinct imperforate and perforate sides. Miocene to Holocene; cosmopolitan.

Remarks: The extreme variability in a large population of the type species was demonstrated by Medioli and Scott, 1978 (*2083) to reflect the free or attached nature of the individual specimen.

ECHIGOINA Matsunaga, 1963

Plate 716, figs. 4 and 5

Type species: Echigoina hatai Matsunaga, 1963; OD.

Echigoina Matsunaga, 1963 (*2064), p. 115.

Test trochospiral in the early stage, planispiral in the adult, eight to ten rapidly enlarging and slightly inflated chambers in the final whorl, chambers with small umbilical flaps on both sides of the test, sutures radial, gently curved, depressed, periphery rounded; wall calcareous, coarsely perforate, optical character not described; aperture interiomarginal, equatorial, and extending along the base of the final chamber onto both sides, bordered above with a narrow lip. Miocene to Pliocene; Japan.

GAVELINELLA Brotzen, 1942

Plate 718, figs. 10-18

Type species: Discorbina pertusa Marsson, 1878 (*2047), p. 166; OD.

Gavelinella Brotzen, 1942 (*428), p. 7.

Pseudovalvulinera Brotzen, 1942 (*428), p. 20; type species: *Rosalina lorneiana* d'Orbigny, 1840 (*2307), p. 36; OD.

Anomalina (Gavelinella) Vasilenko, 1954 (*3259), p. 73 (nom. transl.).

Anomalina (Pseudovalvulineria) Vasilenko, 1954 (*3259), p. 83 (nom. transl.).

Anomalina (Brotzenella) Vasilenko, in N. K. Bykova et al., 1958 (*475), p. 52; type species: *Anomalina monterelensis* Marie, 1941 (*2031), p. 243; OD.

Brotzenella Podobina, 1975 (*2434), p. 134 (nom. transl.).

Test trochospiral, biconvex, sides flattened, spiral side evolute, umbilical side involute, umbilicus partially closed by a subtriangular umbilical flap from each chamber, may also have a small umbilical boss, periphery rounded; wall calcareous, optically granular, perforate; aperture a low interiomarginal slit extending from near the periphery to the umbilicus, bordered above by a narrow lip that is continuous on the flattened side with the umbilical flap at the chamber margin, the aperture continuing beneath the flaps to connect with those of earlier chambers. L. Cretaceous (Barremian) to U. Paleocene (Landenian); cosmopolitan.

GYROIDELLA Saidova, 1975

Plate 716, figs. 6 and 7

Type species: Gyroidella planata Saidova, 1975; OD.

Gyroidella Saidova, 1975 (*2695), p. 276.

Test trochospiral, slightly flattened, spiral side evolute, with about two and a half gradually enlarging whorls, about nine to ten chambers in the final whorl, sutures curved, slightly oblique, umbilical side involute, sutures radial and slightly depressed, umbilicus closed with glassy umbonal plug; wall calcareous, optically granular, finely perforate, surface smooth; aperture interiomarginal and equatorial, against the periphery of the preceding whorl and extending somewhat onto the umbilical side. Holocene, at 988 m to 1,350 m; W. Pacific: off New Guinea, Samoa, Tonga, and Kermadec.

GYROIDINA d'Orbigny, 1826

Plate 716, figs. 8-18

Type species: Gyroidina orbicularis d'Orbigny, 1826; SD Cushman, 1927 (*746), p. 190.

Gyroidina d'Orbigny, 1826 (*2303), p. 278.

Rotalia (Gyroidina) Yabe and Hanzawa, 1929 (*3410), p. 155 (nom. transl.).

Gyroidinus Saidova, Belyaeva, and Burmistrova, 1974 (*2697), textfig. 1 (name not available, ICZN Art. 13 (a)(i), no description).

Gyroidinus Saidova, 1975 (*2695), p. 237; type species: *Gyroidinus pulisukensis* Saidova, 1975; OD.

Test trochospiral, spiral side evolute, flattened, or slightly convex, chambers in two and a half to three gradually enlarging whorls, early whorls covered with later calcite lamellae, sutures curved back to the periphery, umbilical side strongly convex, involute, sutures curved, nearly radial, umbilicus closed, periphery bluntly angled; wall calcareous, optically granular, coarsely perforate; aperture a low interiomarginal slit, extending nearly to the periphery and about halfway to the umbilicus. Holocene; Italy.

Remarks: The description of this genus has been changed to conform with the lectotype of *G. orbicularis* designated by Hansen (1967, *1390, p. 7). Most other records of *G. orbicularis* are neither conspecific nor congeneric with the lectotype. Many species previously included in *Gyroidina* are correctly placed in *Gyroidinoides* or *Hansenisca.*

GYROIDINOPSIS McCulloch, 1977

Plate 717, figs. 8-10

Type species: Gyroidinopsis partidiana McCulloch, 1977; OD.

Gyroidinopsis McCulloch, 1977 (*1961), p. 374.

Test robust, trochospiral, spiral side slightly convex, all of the three rapidly enlarging whorls visible although early ones are partially obscured by clear calcite in the umbonal region, chambers increasing very little in height as added, about twelve in the final whorl, sutures straight, radial, thickened, and flush with the surface, on the umbilical side a ridge about midway between the periphery and the umbilicus marks the sharply angled umbilical shoulder that borders the deeply excavated umbilical margin, sutures flush at the outer end of the chambers but incised inward from the shoulder ridge to a small umbilical plug, periphery broadly rounded; wall calcareous, hyaline, translucent, finely perforate except the umbilical ends of the chambers that are imperforate from the umbilical shoulder inward; aperture interiomarginal, a low equatorial arch bordered by a narrow lip but not extending onto either spiral or umbilical side. Holocene: off Mexico, USA: California.

Remarks: The incised sutures on the umbilical side were described and figured as secondary apertures between umbilical flaps, but the holotype of the type species shows only the imperforate umbilical end of the chambers extending inward from the angular umbilical shoulder with no openings other than the equatorial aperture.

HANSENISCA, n. gen.

Plate 719, figs. 5-9

Type species: Gyroidina soldanii d'Orbigny, 1826 (*2303), p. 278; OD.

Test trochospirally enrolled, spiral side evolute and flattened to slightly depressed below the margin of the final whorl of chambers, umbilical side elevated and involute, with subangular umbilical shoulder bordering the open umbilicus, sutures radial, straight to slightly curved, flush to depressed, periphery broadly truncate; wall calcareous, hyaline, optically granular, perforate, surface smooth; aperture a short equatorial and interiomarginal slit, bordered by a narrow lip, an umbilical flap extending into the umbilicus from each chamber partially covers the small secondary aperture, so that the latter can be seen around the umbilicus only when viewed obliquely. U. Oligocene to Holocene; cosmopolitan.

Etymology: Patronymic, for Hans Jörgen Hansen of Copenhagen, in recognition of his work on foraminiferal morphology and ultrastructure, + *isca*, diminutive; gender feminine.

Remarks: Hansen (1967, *1390, p. 7) designated a lectotype for *Gyroidina orbicularis* d'Orbigny, the type species of *Gyroidina*, and later (1970, *1391, p. 105) showed that the specimens illustrated by Loeblich and Tappan (1964, *1910, fig. 614, 5, 6) are not that species but "*Gyroidina*" *soldanii*. *Hansenisca* differs from *Gyroidina* in having an open umbilicus surrounded by umbilical chamber flaps over the supplementary umbilical apertures.

Gyroidina soldanii was named by d'Orbigny in 1826 and the occurrence given as Adriatic Sea, near Rimini, Italy. Although no description was given at that time, the species was validated by d'Orbigny's reference to figures in Soldani (ICZN Art. 12 (a), 12 (b)(1, 7)).

HANZAWAIA Asano, 1944

Plate 719, figs. 1-4

Type species: Hanzawaia nipponica Asano, 1944; OD.

Hanzawaia Asano, 1944 (*84), p. 98.

Test trochospiral, planoconvex, whorls enlarging rapidly, chambers numerous, sutures thickened and strongly curved back at the periphery, convex side involute with clear central umbilical boss, flattened side partially evolute, umbilical apertural flap from each chamber extending over the umbilical region and chambers of earlier whorls, successive flaps may coalesce over the entire umbilical area, periphery subangular and may be carinate; wall calcareous, optically granular, moderately coarsely perforate but with clear nonperforate area above the aperture and nonperforate umbilical flaps, thickened sutures, and peripheral keel; aperture interiomarginal and equatorial, against the periphery of the previous whorl and extending slightly onto the involute side but continuing beneath the umbilical flaps on the flattened side, supplementary openings present at the inner and outer margins of the umbilical flaps. Oligocene to Holocene; cosmopolitan.

Remarks: *Nautilus asterizans* Fichtel and Moll, 1798 was shown by Hansen and Rögl (1980, *1397, p. 174) to be congeneric with *Hanzawaia*, and as *Florilus stellatus* (type species of *Florilus*) was proposed as a replacement name for *N. asterizans*, *Florilus* is synonymous with *Hanzawaia*. A petition was submitted to the ICZN (ZN(S) 2225/2) to suppress *Florilus*, which previously was regarded as very close to *Nonion* and to include both *Florilus* and *Nautilus asterizans* on the Official Lists of Rejected and Invalid Generic [and Species] Names in Zoology, respectively, and to place *Hanzawaia* and its type species, *H. nipponica*, on the Official Lists of Generic [and Species] Names in Zoology, respectively.

HOLLANDINA Haynes, 1956

Plate 720, figs. 1-9

Type species: Hollandina pegwellensis Haynes, 1956; OD.

Hollandina Haynes, 1956 (*1433), p. 94.

Test tiny, lenticular, spiral side convex and evolute, with about three slowly enlarging whorls, final whorl with six to nine chambers, sutures oblique and curved, later ones slightly depressed, umbilical side involute and slightly less convex, sutures gently curved, weakly depressed, umbilicus closed, periphery subangular; wall calcareous, optically granular, surface smooth to grainy in appearance, scattered perforations widely spaced on the spiral side, only rare pores near the periphery on the umbilical side; aperture interiomarginal, a low arch on the periphery, extending onto the umbilical side about halfway to the umbilicus and with a somewhat elevated imperforate bordering lip. U. Paleocene (Thanetian); England; Sweden; Denmark; Greenland.

Remarks: Previously regarded as congeneric with *Heterolepa* (Loeblich and Tappan, 1964, *1910, p. C759), study of topotypes with the SEM allows recognition of *Hollandina* as a distinct genus, with tiny lenticular test, fewer chambers per whorl, wall perforations largely restricted to the spiral side, and aperture restricted to the umbilical side.

HOLMANELLA Loeblich and Tappan, 1962

Plate 719, figs. 16-24

Type species: Discorbinella valmonteensis Kleinpell, 1938 (*1707), p. 350; OD.

Holmanella Loeblich and Tappan, 1962 (*1908), p. 72.

Test large, flattened, early stage in a low trochospiral coil, later becoming nearly planispiral and bievolute but not symmetrical, about two and a half rapidly enlarging whorls, increasing from about five to seven chambers per whorl in the early stage to eight or nine in the final whorl, sutures depressed, curved slightly back at the periphery, bluntly rounded periphery with imperforate carinal band; wall calcareous, thin, optically granular, coarsely perforate; aperture a low subequatorial arch in the early stage, becoming progressively more asymmetrical in later chambers, a narrow slit beginning perpendicular to the basal aperture and extending obliquely up the apertural face, both slits bordered above by a narrow lip, aperture continuing as a slit along the spiral suture on the umbilical side, the umbilical margin of each chamber bordered with a very narrow protruding flap or lip. M. Miocene (Helvetian), Mohnian; USA: California.

LINARESIA González-Donoso, 1968

Plate 722, figs. 1-7

Type species: Anomalina pompilioides Galloway and Heminway var. *semicribrata* J. P. Beckmann, 1954 (*170), p. 400; OD.

Linaresia González-Donoso, 1968 (*1263), p. 76.

Test in a low trochospiral to almost planispiral coil, robust, umbilical side involute and spiral side partially evolute and centrally umbonate, slightly depressed sutures gently curved on the spiral side, radial and straight on the umbilical side, periphery broadly rounded, peripheral outline slightly lobulate; wall calcareous, optically granular, coarsely perforate on the umbilical side, the pores becoming larger and conical in form with the addition of successive lamellae, spiral side smooth and more sparsely perforate and may have an imperforate peripheral band; aperture a low interiomarginal and equatorial slit extending nearly to the umbilicus on the umbilical side, bordered by a narrow lip. Eocene; Barbados; Spain.

Remarks: Although the genus was described originally as "radial," this apparently referred to the thick and fibrous appearance of the wall as viewed in the light microscope, resulting from the lamellae and coarse perforations. In polarized light, a specimen from Barbados showed an optically granular wall.

LINGULOGAVELINELLA Malapris, 1965

Plate 721, figs. 8-19

Type species: Lingulogavelinella albiensis Malapris, 1965; OD.

Lingulogavelinella Malapris, 1965 (***1998**), p. 139.
Orostella Butt, 1966 (***458**), p. 178; type species: *Orostella turonica* Butt, 1966; OD.

Test in a flat trochospiral coil, spiral side may be partially evolute or involute, about five to eight somewhat inflated chambers in the final whorl, sutures depressed, radial, and gently curved, umbilical side concave, flat, or slightly convex, umbilicus closed, chambers with large umbilical flaps projecting backward and toward the umbilical region, successive flaps imbricated and resulting in a stellate umbilical pattern, periphery broadly rounded, peripheral outline slightly lobulate; wall calcareous, thin, hyaline, perforate, optical character not described; aperture an interiomarginal and equatorial arch, continuing from the periphery to the umbilicus and bordered by a narrow lip that expands at the umbilical end to form the stellate flaps, aperture continues beneath and along the back side of the flap to a small sutural opening, the sutural openings remain as relict apertures adjacent to the flaps of earlier chambers. L. Cretaceous (Albian) to U. Cretaceous (Turonian); cosmopolitan.

ORITHOSTELLA Eicher and Worstell, 1970

Plate 723, figs. 1-7

Type species: Orithostella viriola Eicher and Worstell, 1970; OD.

Orithostella Eicher and Worstell, 1970 (***1082**), p. 295; OD.

Test with a flat trochospiral coil, planoconvex, involute side convex to subconical, chambers strongly protruding around the narrow umbilicus that may be filled with a central boss, flat side semievolute, with one and a half to two whorls, and about seven to nine chambers in the final whorl, the umbilical margin produced as a large umbilical flap that may cover part of the preceding chamber, sutures curved and sinuate, depressed on the convex involute side, flush to somewhat depressed adjacent to the umbo on the flat side, periphery subangular, with a thick imperforate keel; wall calcareous, optically granular, perforate on both sides of the test; aperture an interiomarginal equatorial arch against the periphery of the preceding whorl, continuing onto the flat side around the umbilical flap and along the preceding suture, those of previous chambers of the final whorl remaining open around the spiral suture and successive flaps. U. Cretaceous (Cenomanian to Turonian); cosmopolitan.

PARALABAMINA Hansen, 1970

Plate 721, figs. 1-7

Type species: Eponides lunata Brotzen, 1948 (***429**), p. 77; OD.

Paralabamina Hansen, 1970 (***1391**), p. 101.

Test free, trochospiral, biconvex, nearly circular in outline, about six chambers in the final whorl, sutures radial to slightly curved on the convex umbilical side, curved and oblique on the less convex spiral side, umbilicus closed, periphery rounded to subacute; wall calcareous, more densely and rather coarsely perforate on the spiral side, optically granular, surface smooth; aperture a low interiomarginal arch on the umbilical side, midway between the umbilicus and periphery.

continuing as a slit nearly to the umbilicus and periphery and bordered by a narrow lip. U. Cretaceous (Maastrichtian) to Paleocene; Sweden; Denmark; Poland; Egypt; USA: New Jersey.

PSEUDOGAVELINELLA Voloshina, 1981

Plate 719, figs. 10-15

Type species: Rosalina clementiana d'Orbigny, 1840 (***2307**), p. 37; OD.

Pseudogavelinella Voloshina, in Subbotina et al., 1981 (***3083**), p. 85.

Test in a low trochospiral coil, sides flattened, all whorls visible on the spiral side, only the eight to nine chambers of the final whorl visible on the opposite side, chambers with prominent umbilical flaps that remain exposed around the narrow umbilicus, sutures thickened, elevated, and slightly oblique on the spiral side, straight, radial, and depressed on the umbilical side, periphery broadly rounded, peripheral outline lobulate; wall calcareous, more coarsely perforate on the umbilical side; aperture interiomarginal, an equatorial arch extending onto the umbilical side beneath the umbilical flaps and bordered above by a narrow lip. U. Cretaceous (Campanian); Europe.

SCHEIBNEROVA Quilty, 1984

Plate 723, figs. 8-14

Type species: Scheibnerova protindica Quilty, 1984; OD.

Scheibnerova Quilty, 1984 (***2503**), p. 234.

Test lenticular, trochospiral, with two and a half whorls, the five and a half to six chambers of the final whorl appearing crescentic on the strongly convex spiral side where not obscured by the hispid surface, sutures flush to slightly elevated, strongly recurved at the periphery, umbilical side convex but with broadly depressed umbilical region, chambers with wide umbilical flaps, sutures radial, nearly straight, depressed, periphery carinate, peripheral outline lobulate; wall calcareous, spiral side prominently hispid, the short spinules imperforate and circular in section, umbilical side may have peripheral hispid zone but is smooth elsewhere and generally imperforate, with only a few coarse pores in the central part of each chamber; aperture interiomarginal, midway between the umbilicus and periphery, extending beneath the umbilical flap where it may continue as a short slit along the intercameral suture. U. Cretaceous (L. Cenomanian); Indian Ocean.

Family KARRERIIDAE Saidova, 1981

Karreriidae Loeblich and Tappan, 1982 (***1917**), p. 36, nom. transl. ex subfamily Karreriinae.

Karreriinae Saidova, 1981 (***2696**), p. 40 (subfamily).

Test attached, early stage trochospiral, later uncoiling and rectilinear; aperture terminal, rounded. L. Cretaceous (Aptian) to Holocene.

KARRERIA Rzehak, 1891

Plate 724, figs. 1-7

Type species: Karreria fallax Rzehak, 1891; OD.

Karreria Rzehak, 1891 (***2681**), p. 4, 6.

Vagocibicides Finlay, 1939 (***1128**), p. 326; type species: *Vagocibicides maoria* Finlay, 1939; OD.

Test attached for much of growth, early stage trochospirally enrolled with one or more volutions, the spiral side attached and the free side involute, later uncoiling, with shape and nature of chambers varying according to the nature of the attachment, sutures depressed, nearly straight; wall calcareous, optically granular, thick and of two distinct layers, an outer fine-grained and finely perforate layer and an inner more coarse-grained layer, surface smooth; aperture subterminal to terminal, rounded. L. Cretaceous (Albian) to Holocene; cosmopolitan.

MANORELLA Grice, 1948

Plate 65, fig. 8; plate 724, figs. 11-14; plate 725, figs. 1-5

Type species: Manorella proteus Grice, 1948; OD.

Manorella Grice, 1948 (***1299**), p. 223.

Arenonina Barnard, 1958 (***140**), p. 118; type species: *Arenonina cretacea* Barnard, 1958; OD.

Test trochospirally enrolled in the early stage, later uncoiling and uniserial, with closely appressed chambers that may remain cylindrical, may expand laterally and become flared, or may branch; wall calcareous, coarsely perforate, optically granular, very thick, of two layers, a fine-grained structurally radial and lamellar outer layer separated by a dark median line from the innermost coarsely crystalline layer that has large crystals projecting into the chamber cavity; aperture generally multiple, one or more ovate to slitlike or irregular openings that may be produced on low collarlike projections. U. Cretaceous: USA: Texas (Coniacian); England (Senonian).

Remarks: Previously both *Manorella* and *Arenonina* were thought to be agglutinated, but our restudy and thin sections of numerous topotypes of the former show its calcareous perforate nature. Illustration of the holotype of *Arenonina cretacea* by SEM also shows it to be calcareous and perforate, according to a revision by Mark A. Wilson (personal communication, Nov. 21, 1986; see also Wilson, 1986, ***3381A**, p. 1).

SIMIONESCELLA Neagu, 1975

Plate 724, figs. 8-10

Type species: Simionescella megastoma Neagu, 1975; OD.

Simionescella Neagu, 1975 (***2236**), p. 114.

Test attached by the flat to weakly concave spiral side, compressed, low trochospiral coil of two to three close coiled whorls followed by a rapidly expanding whorl that becomes astacoline and may have a few uncoiled chambers, sutures curved, thickened, and elevated on the spiral side, weakly depressed on the umbilical side, umbilicus closed but lacks a plug, periphery subangular; wall calcareous, surface smooth; aperture a large oval opening that occupies the entire apertural face, with recurved border forming a broad lip. L. Cretaceous (L. Aptian); Romania.

Family COLEITIDAE Loeblich and Tappan, 1984

Coleitidae Loeblich and Tappan, 1984 (***1918**), p. 54.

Test trochospiral in the early stage, later uncoiled and rectilinear; wall calcareous, hyaline oblique, surface coarsely cancellate; aperture elongate and terminal in the uncoiled stage, with projecting tooth at one margin, a solid columnar toothplate extending from inner margin of aperture to attach near the previous foramen. L. Paleocene (Danian) to M. Eocene (Lutetian).

COLEITES Plummer, 1934

Plate 726, figs. 1-3

Type species: Pulvinulina reticulosa Plummer, 1927 (***2421**), p. 152; OD.

Coleites Plummer, 1934 (***2426**), p. 605.

Test trochospirally coiled in the early stage, later uncoiling and flattened, sutures gently curved, periphery carinate; wall calcareous, hyaline, optically granular, coarsely perforate, sutures elevated, with cross ridges connecting the sutural ridges and producing a coarsely reticulate surface; aperture in the early stage an irregular oval near the periphery on the umbilical side, becoming elongate and terminal in the adult with a small tooth on the umbilical margin of the opening, a solid columnar toothplate extending from the inner margin of the aperture through the chamber lumen to connect with the preceding foramen. Paleocene (Danian) to M. Eocene (Lutetian); USA: Texas, Alabama, New Jersey, California; Guatemala; Cuba; Haiti; Sweden; Pakistan.

Family TRICHOHYALIDAE Saidova, 1981

Trichohyalidae Loeblich and Tappan, 1982 (***1917**), p. 36, nom. transl. ex subfamily Trichohyalinae.

Trichohyalinae Saidova, 1981 (***2696**), p. 43 (subfamily).

Trichohyalinea Saidova, 1981 (***2696**), p. 43 (supersubfamily).

Test trochospiral, umbilical side partly or wholly obscured by secondary growth of shell material. Oligocene to Holocene.

AUBIGNYNA Margerel, 1970

Plate 726, figs. 4-10

Type species: Aubignyna mariei Margerel, 1970; OD.

Aubignyna Margerel, 1970 (***2027**), p. 60.

Test a low trochospiral coil of one and a half to two gradually enlarging whorls, eight chambers in the final whorl, sides flattened, sutures weakly depressed, straight, and radial to oblique on the evolute spiral side, curved on the involute umbilical side and deeply incised from the umbilicus midway to the periphery, final whorl of chambers somewhat produced in the umbilical region, periphery rounded; wall calcareous, hyaline, optically radial, perforate, surface smooth, except for numerous beadlike granules that cover the lower part of the apertural face, the borders of the incised sutures on the umbilical side and the umbilicus; aperture interiomarginal, extending from the umbilicus to the periphery but commonly obscured by the granular deposit, supplementary sutural apertures reported to occur on the umbilical side, although these may merely reflect the deeply incised sutures, as in *Buccella*. Pliocene: France.

BUCCELLA Andersen, 1952

Plate 726, figs. 11-16

Type species: Eponides hannai Phleger and F. L. Parker, 1951 (***2404**), p. 21; OD.

Buccella Andersen, 1952 (***33**), p. 143.

Mesorotalia McCulloch, 1977 (***1961**), p. 426; type species: *Mesorotalia fastidiosa* McCulloch, 1977; OD.

Test planoconvex to lenticular, trochospiral, with three to four gradually enlarging whorls, seven to eight chambers in the final whorl, sutures thickened, oblique, curved back toward the periphery on the spiral side, radial and incised on the umbilical side, umbilical ends of the sutural fissures closed by a deposit of granules, but openings are left into the fissures near the outer end of the granular cover, the openings previously having been misinterpreted as sutural apertures, periphery carinate; aperture interiomarginal, midway between umbilicus and periphery, and may be partially covered by the umbilical granules. Oligocene to Holocene; cosmopolitan.

NEOBUCCELLA McCulloch, 1977

Plate 728, figs. 1-3

Type species: Neobuccella elaborata McCulloch, 1977; OD.

Neobuccella McCulloch, 1977 (***1961**), p. 293.

Test flattened lenticular, with a rapidly flaring and nearly symmetrical trochospiral coil of numerous broad and low chambers, sutures strongly curved, thickened, beaded, and elevated on the umbilical side, depressed on the spiral side, periphery subangular; wall calcareous, perforate, except for the imperforate apertural face, surface of early chambers on umbilical side highly pustulose, spiral side smooth; aperture may be obscured by the pustulose coating. Holocene; Mexico.

Remarks: *Neobuccella* differs from *Trichohyalus* in having a pustulose coating only on early chambers of the umbilical side.

TRICHOHYALUS Loeblich and Tappan, 1953

Plate 727, figs. 1-10

Type species: Discorbis bartletti Cushman, 1933 (***773**), p. 6; OD.

Trichohyalus Loeblich and Tappan, 1953 (***1887**), p. 116.

Test trochospiral, planoconvex, spiral side evolute, about nine or ten chambers in the final whorl, sutures depressed, radial, and gently curved, umbilical side involute, periphery rounded, peripheral outline moderately lobulate; wall calcareous, optically granular, coarsely perforate, umbilical side radially finely striate and pustulose, the later lamellae forming a vesicular plate over most of the umbilical surface, perforations through the plate opening into the cavity beneath; no external aperture apparent, but dissection shows an interiomarginal intercameral foramen on the umbilical side near the outer margin of the chambers. Pleistocene to Holocene: Arctic Canada; USSR: Northeast Taymyr Peninsula.

Superfamily ORBITOIDACEA Schwager, 1876

Orbitoidacea Loeblich and Tappan, 1961 (***1902**), p. 310, nom. corr. pro superfamily Orbitoidicae.

Orbitoidicae Brönnimann, 1958 (***384**), p. 167, nom. transl. ex family Orbitoidee.

Orbitoidoidea Ayala-Castañares, 1963 (***101**), p. 97.

Test discoidal to lenticular; dimorphism prominent, microspheric early stage enrolled or biserial, megalospheric generation with distinctive embryonic stage enclosed in a thicker wall, the early coiled or bilocular embryo followed by somewhat larger periembryonal chambers, equatorial and lateral chambers may be differentiated or indistinguishable, chambers of median layer may be subdivided into secondary chamberlets; wall of perforate, hyaline, optically radial calcite; openings present between chambers in geologically older forms, replaced by distinct stolons in advanced forms, no canal system. U. Cretaceous (Santonian) to U. Eocene.

Family LINDERINIDAE Loeblich and Tappan, 1984

Linderinidae Loeblich and Tappan, 1984 (*1918), p. 54.
Linderinidae Freudenthal, 1969 (*1183), p. 138 (name not available, ICZN Art. 13 (a)(i), no description).

Test with megalospheric biloculine embryonal stage, later chambers in annular series, with those of successive whorls alternating in position, may have varied amount of umbonal lateral thickening but no lateral chamberlets. M. to U. Eocene.

EOANNULARIA Cole and Bermúdez, 1944

Plate 728, figs. 4-11

Type species: Eoannularia eocenica Cole and Bermúdez, 1944; OD.

Eoannularia Cole and Bermúdez, 1944 (*640), p. 342.

Test discoidal, flat to concavoconvex, convex side may appear umbonate due to lamellar thickening in the early stage, megalospheric generation with proloculus slightly to completely embraced by second chamber of the biloculine embryo, later chambers in annular series in a single layer, early annular chambers with arched terminal wall, those of later cycles rectangular in form and alternating in position with those of the preceding and subsequent cycles; wall calcareous, coarsely perforate, central region thickened; aperture multiple, consisting of numerous stoloniferous openings. M. Eocene; Cuba.

EPIANNULARIA Caudri, 1974

Plate 729, figs. 1-4

Type species: Epiannularia pollonaisae Caudri, 1974; OD.

Epiannularia Caudri, 1974 (*512), p. 305.

Test discoidal, up to 2.6 mm in diameter, flattened to saucerlike, thin centrally but thickening toward the periphery, dorsal side may have clear central plug of shell material, all early chambers visible on ventral side, megalospheric test with bilocular nucleoconch followed by a zone of arcuate chambers and then by undivided cyclic chambers, microspheric test spiral in the early stage, later with cycles of chambers, adult with undivided annular chambers in a single layer, periphery rounded; wall calcareous, translucent, coarsely perforate, surface finely granular. M. Eocene; Venezuela.

Remarks: Resembles *Eoannularia* in the early stage but has undivided cyclic chambers in the later stage.

LINDERINA Schlumberger, 1893

Plate 729, figs. 5-7

Type species: Linderina brugesi Schlumberger, 1893; OD(M).

Linderina Schlumberger, 1893 (*2767), p. 120.

Test large, up to 3.5 mm in diameter, discoidal, centrally thickened, early chambers of microspheric test in an irregular cluster, rather than in a distinct spire, megalospheric test with bilocular embryo followed by a nepionic ring of seven to eight small chambers, later with concentric series of small arched chambers in a single equatorial layer, those of successive series progressively larger and alternating in position, early stage covered by numerous layers of calcite, resulting in an inflated central region that may be traversed by fine pores connecting the chambers to the exterior, periphery rounded, peripheral outline lobulate; wall calcareous, surface with small pustules; apertures and intercameral openings at the base of the chamber against the chambers of the preceding cycle. M. Eocene (Lutetian) to U. Eocene; France; Spain; Romania; Turkey; Somalia; North America; Indonesia.

Family ORBITOIDIDAE Schwager, 1876

Orbitoididae Eimer and Fickert, 1899 (*1088), p. 616, nom. corr. pro family Orbitoidee.
Orbitoidee Schwager, 1876 (*2829), p. 481 (nom. imperf.).
Orbitoidinae A. Silvestri, 1907 (*2940), p. 12.
Orbitoidae A. Silvestri, 1937 (*2966), p. 155.
Orbitoidida Copeland, 1956 (*680), p. 188.

Embryonal chambers enclosed by thick perforated wall or with thin-walled bilocular embryonal chambers followed by relatively large periembryonal ones; stolons present but no canal system. U. Cretaceous (Santonian to Maastrichtian).

Subfamily ORBITOIDINAE Schwager, 1876

Orbitoidinae Prever, 1904 (*2471), p. 111, nom. transl. ex family Orbitoidee.

Postembryonal lateral chambers, when present, differentiated from equatorial layer. U. Cretaceous (U. Santonian to Maastrichtian).

ORBITOIDES d'Orbigny, 1848

Plate 730, figs. 1-6; plate 731, figs. 1-7

Type species: Lycophris faujasii Defrance, 1823 (*920), p. 271 (syn.: *Orbitolites media* d'Archiac, 1837, *63, p. 178); SD Jones, Parker, and Brady, 1866 (*1622), appendix [p. 3 of unnumbered pages in appendix].

Orbitoides d'Orbigny, in Lyell, 1848 (*1952), p. 12 (validated by inclusion of species, ICZN Art. 12 (b)(5)).

Hymenocyclus Bronn and Roemer, 1853 (*422), p. 94; type species: *Lycophris faujasii* Defrance, 1823, obj.; OD(M).

Silvestrina Prever, 1904 (*2471), p. 113, 122; type species: *Orbitoides apiculata* Schlumberger, 1902 (*2772), p. 465; SD Lemoine and R. Douvillé, 1905 (*1821), p. 58.

Schlumbergeria A. Silvestri, 1910 (*2946), p. 118; type species: *Linderina? douvillei* Silvestri, 1910 (syn.: *Monolepidorbis douvillei* Astre, 1928 *93, p. 390); OD(M).

Orbitoides (Orbitella) H. Douvillé, 1915 (*989), p. 666; type species: *Orbitolites media* d'Archiac, 1837 = *Lycophris faujasii* Defrance, 1823, obj.; OD.

Monolepidorbis Astre, 1928 (*93), p. 388; type species: *Monolepidorbis sanctaepelagiae* Astre, 1928 = *Linderina? douvillei* Silvestri, 1910; OD.

Gallowayina Ellis, 1932 (*1101), p. 1; type species: *Gallowayina browni* Ellis, 1932; OD.

Test large, rarely up to 5 cm in diameter, lenticular, symmetrically biconvex to planoconvex, megalospheric test commonly with four-chambered embryo, consisting of a vertically but not horizontally compressed round to oval protoconch, a reniform deuteroconch, and two somewhat embracing embryonic chambers, the four embryonic chambers being surrounded by a thick perforated wall, less commonly may have only a three- or two-chambered embryo, embryonic chambers connected to the surrounding auxiliary chambers by stolons, base of the arcuate median chambers clearly separated from that of others of the same cycle, chambers communicating with those of the previous and following cycles by diagonal stolons, lateral chambers present and of varied form and size, communicating through stolons and wall perforations; wall calcareous, surface smooth or may be nodose where pillars terminate and may have radiating costae. U. Cretaceous (U. Santonian to Maastrichtian); Europe; North America; Caribbean; India.

PSEUDOMPHALOCYCLUS Meriç, 1980

Plate 731, figs. 8-11

Type species: Pseudomphalocyclus blumenthali Meriç, 1980; OD(M).

Pseudomphalocyclus Meriç, 1980 (*2095), p. 85.

Test large, up to 4.9 mm in diameter, discoidal to slightly biconcave, periphery rounded, the bilocular, trilocular, or quadrilocular megalospheric embryo followed by a single row of arcuate equatorial chambers, then by alternating zones of rapidly widening equatorial chambers, followed by two layers of chambers, and finally three layers toward the periphery, three to four layers of lateral chambers present at the test center, decreasing to one or two layers near the periphery, with numerous thin short pillars between the lateral chambers. U. Cretaceous (U. Maastrichtian); Turkey.

SIMPLORBITES de Gregorio, 1882

Plate 733, figs. 1-4; plate 734, figs. 1 and 2

Type species: Simplorbites cupulimis de Gregorio, 1882 = *Nummulites papyraceus* Boubeé, 1832 (*315), p. 445 (as *papyracea*; syn.: *Orbitolites gensacicus* Leymerie, 1851 *1842, p. 190, nom. superfl.); SD Galloway, 1928 (*1203), p. 63.

Simplorbites de Gregorio, 1882 (*1290), p. 10.

Orbitoides (Simplorbites) H. Douvillé, 1915 (*989), p. 667 (nom. transl.).

Test large, up to 51 mm in diameter, discoidal with flattened faces or may be somewhat thickened centrally, nucleoconch large, up to 2.0 mm in diameter, consisting of numerous irregularly arranged chambers surrounded by a very thick wall, later median chambers arcuate and added in annular series, those of successive cycles alternating in position, lateral chambers with pillars as in *Orbitoides*; wall calcareous, surface commonly with granules; basal stolons present. U. Cretaceous (Maastrichtian); Italy: Sicily; France: Carpathians; Egypt.

Remarks: The type species of this genus is generally cited as fixed by H. Douvillé (1920, recte 1921), although he never mentioned a type species, merely including (1921, *996, p. 219) Boubeé's species, *N. papyraceus*, in the synonymy of the later proposed *gensacicus* of Leymerie (also including "*Simplorbites* de Gregorio"). However, Yabe (1919, *3402, p. 41) had earlier stated the type species to be "*O. gensacica.*" As the nominal type species can only be one that was included by the original author, *S. cupulimis* de Gregorio was so designated by Galloway, 1928 (*1203). Most workers on the orbitoids agree that the specimens of Boubeé, de Gregorio, and Leymerie are conspecific, yet have followed Leymerie in identifying the species as *gensacicus*. Leymerie himself stated that he was renaming the species, as he preferred to use the specific epithet *papyracea* for a new Eocene species that he was describing from Biarritz. According to the ICZN, the correct name for the type species must be that first validly proposed, *Nummulites papyraceus*, and Leymerie's name was superfluous. De Gregorio illustrated sections of his species from Pachino, Sicily (which he regarded as ?Turonian but were actually of Maastrichtian age), whereas both Boubeé's species from the vicinity of Boulogne, France, and that of Leymerie from the Gensac region of France, were originally described only on external shape.

SIVASELLA Sirel and Gündüz, 1978

Plate 732, figs. 1-5

Type species: Sivasella monolateralis Sirel and Gündüz, 1978; OD.

Sivasella Sirel and Gündüz, 1978 (*2989), p. 68.

Test relatively small, up to 1.3 mm in diameter, low conical form, equatorial chambers arcuate, with somewhat smaller and irregularly arranged arcuate lateral chambers piled on one side and with lamellar thickening on the other side decreasing in thickness toward the periphery, megalospheric embryonic apparatus large, possibly bilocular, and surrounded by a thick imperforate wall; wall calcareous, hyaline; equatorial chambers communicate through stolons. U. Cretaceous (Maastrichtian); central Turkey: Sivas; Greece.

Subfamily OMPHALOCYCLINAE Vaughan, 1928

Omphalocyclinae Vaughan, in Cushman, 1928 (*747), p. 336, 355.

Lateral chambers not differentiated from equatorial ones in post embryonal stage. U. Cretaceous (Maastrichtian).

OMPHALOCYCYLUS Bronn, 1853

Plate 734, figs. 3-5; plate 735, figs. 1 and 2

Type species: Orbulites macropora Lamarck, 1816 (*1780), p. 197; OD.

Omphalocyclus Bronn, in Bronn and Roemer, 1853 (*422), p. 95.

Test discoidal, biconcave, centrally depressed and thickest at the periphery, early stage of microspheric generation with a small irregular coil that is not in the plane of the adult test, megalospheric embryo of two to four chambers, followed by cycles of arched equatorial chambers that communicate through large marginal stolons, the equatorial chambers rapidly increasing in thickness, then supplemented by lateral chambers that are not differentiated but are similar to the equatorial chambers. U. Cretaceous (Maastrichtian); France; Netherlands; Switzerland; Italy; Greece; Yugoslavia; Romania; Turkey; Iran; Syria; Tunisia; India; Tibet; Cuba.

Remarks: Sections of microspheric *Omphalocyclus* and other orbitoids have been described as having a biserial and guembeline early stage, but as shown by Hofker (1958, *1513, p. 99), these sections did not intersect the true globular proloculus (less than 30 μm in diameter) but a larger (about 60 μm) and irregular later chamber in the coil, the oblique intersection of various chambers of the irregular coil falsely suggesting the appearance of a few paired chambers. There is no good evidence of a biserial planktonic ancestry for orbitoidal foraminifera.

TORREINA D. K. Palmer, 1934

Plate 735, figs. 3 and 4

Type species: Torreina torrei D. K. Palmer, 1934; OD.

Torreina D. K. Palmer, 1934 (*2326), p. 237.

Omphalocyclus (Torreina) Cole, in Loeblich and Tappan, 1964 (*1910), p. C712 (nom. transl.).

Test subspherical, embryonic stage of four or five chambers surrounded by a thick fibrous wall, later chambers low and arcuate, arranged in concentric series; wall calcareous, finely perforate, with thin finely porous outer layer and fibrous inner layer, no pillars, spines, or labyrinthic canals present; stolons present both at the base of the chambers and in the chamber walls. U. Cretaceous; Cuba.

Family LEPIDORBITOIDIDAE Vaughan, 1933

Lepidorbitoididae Pokorný, 1958 (*2447), p. 388, nom. transl. ex subfamily Lepidorbitoidinae.

Hellenocyclinidae Freudenthal, 1969 (*1183), p. 137 (name not available, ICZN Art. 13 (a)(i), no description).

Bilocular embryonic stage followed by spatulate, hexagonal, or arcuate equatorial chambers and by differentiated lateral chambers; no canal system. U. Cretaceous (Santonian) to M. Eocene (Lutetian).

Subfamily CLYPEORBINAE Sigal, 1952

Clypeorbinae Sigal, in Piveteau, 1952 (*2413), p. 259.

Test asymmetrical, with large protoconch and trochoid early spire and a thin conical equatorial layer of arcuate chambers that become hexagonal toward the periphery, a thick protruding central pillar originates at the protoconch and widens rapidly within the cone to the exterior, lateral chambers immediately adjacent to the pillar are considerably larger than others and appear to be spirally enrolled. U. Cretaceous (Santonian to Maastrichtian).

CLYPEORBIS H. Douvillé, 1915

Plate 735, figs. 5-8

Type species: Orbitoides mammillatus Schlumberger, 1902 (*2773), p. 259 (as *mammillata*); OD(M).

Orbitoides (Clypeorbis) H. Douvillé, 1915 (*989), p. 668, 669.

Clypeorbis H. Douvillé, 1920 (*995), p. 167 (nom. transl.).

Test of moderate size, commonly 2 mm to 5 mm in diameter and may be up to 8 mm, asymmetrical, subconical, large protoconch at the apex of the cone followed by trochospiral early stage and very thin equatorial layer of arcuate chambers situated in a plane below that of the protoconch, equatorial chambers becoming hexagonal toward the test periphery, equatorial layer flanked by numerous lateral chambers on both sides but the more elevated side of the test with a thick protruding central pillar that begins at the protoconch and widens rapidly toward the exterior, lateral chambers adjacent to the pillar larger than other lateral chambers and appear to have a spiral arrangement; wall calcareous, perforate, surface may have pustules on both sides. U. Cretaceous (U. Maastrichtian); S. France; N. Spain.

SIRTINA Brönnimann and Wirz, 1962

Plate 735, figs. 9-12; plate 736, figs. 1-11

Type species: Sirtina orbitoidiformis Brönnimann and Wirz, 1962; OD.

Sirtina Brönnimann and Wirz, 1962 (*411), p. 520.

Neumannites Rahaghi, 1976 (*2507), p. 11; type species: *Neumannites granulata* Rahaghi, 1976; OD.

Iranites Rahaghi, 1976 (*2507), p. 13; type species: *Iranites ornatus* Rahaghi, 1976 = *Sirtina orbitoidiformis* Brönnimann and Wirz, 1962, obj.; OD.

Test lenticular, inflated, up to 2 mm in diameter, bilocular embryo of approximately equal sized spherical protoconch and deuteroconch followed by trochospirally enrolled early stage with well-differentiated, less convex, and finely pustulose dorsal side and convex coarsely pustulose ventral side, later nearly planispiral and involute with sides more similar, three to five whorls of numerous broad and low chambers, about sixteen to twenty-eight chambers in the final whorl, sutures radial, slightly curved, well-developed umbilical pillars, tightly packed on the ventral side and expressed externally as a pustulose umbo, thin vertical canals between the umbilical pillars, several layers of orbitoidal lateral chambers present on the dorsal side in addition to the pillars, periphery acutely angled; spiral chambers connected by basal foramina, communication between lateral chambers through basal stolons and numerous fine pores. U. Cretaceous (Santonian to L. Maastrichtian); Iran; Libya; France.

VANDERBEEKIA Brönnimann and Wirz, 1962

Plate 736, fig. 12

Type species: Vanderbeekia trochoidea Brönnimann and Wirz, 1962; OD.

Vanderbeekia Brönnimann and Wirz, 1962 (*411), p. 526.

Test rotaloid and trochospiral as in *Sirtina*, diameter of holotype 1.27 mm, on the ventral side spiral chambers surround an umbilical mass of tightly packed pillars with intercalated vertical canals, dorsal side has many layers of lateral chambers inserted between the pillars, both lateral chambers and pillars of the dorsal side being separated from the spiral chambers and umbilical mass of the ventral side by a single layer of small thick-walled equatorial chambers whose plane of growth forms a broad inverted cone. U. Cretaceous (L. Maastrichtian); Iran.

Remarks: Described from oblique axial sections, hence the nature of the embryonic chambers, wall, septa, and aperture is not known.

Subfamily LEPIDORBITOIDINAE Vaughan, 1933

Lepidorbitoidinae Vaughan, in Cushman, 1933 (*766), p. 285 (nom. nud.).

Lepidorbitoidinae Vaughan, in Cushman, 1933 (*767), Family 47 [p. 24], in Key.

Test symmetrical, with biloculine megalospheric embryo, and with median equatorial layer of chambers. U. Cretaceous (Santonian) to M. Eocene (Lutetian).

ACTINOSIPHON Vaughan, 1929

Plate 737, figs. 1-8

Type species: Actinosiphon semmesi Vaughan, 1929; OD.

Actinosiphon Vaughan, 1929 (*3263), p. 163, 166.

Orbitosiphon Rao, 1940 (*2512), p. 414; type species: *Lepidocyclina (Polylepidina) punjabensis* Davies, in Davies and Pinfold, 1937 (*901), p. 53 = *Lepidorbitoides tibetica* H. Douvillé, 1916 (*992), p. 34; OD.

Test small to large, lenticular, equatorial chambers and well-developed lateral chambers present, megalospheric embryo of large subspherical protoconch and smaller reniform deuteroconch, followed by a spire of about eleven chambers, later with numerous polygonal to hexagonal equatorial chambers arranged in cycles, those of successive whorls may be poorly radially aligned or diagonally aligned, up to eight layers of well-developed lateral chambers near the center of the test decreasing to one or two layers toward the periphery, pillars present; wall of chamber roof and floor perforate, external surface papillate; equatorial chambers of same cycle communicate by medially placed stolons, communication with lateral chambers through small perforations. Paleocene; Mexico; Venezuela; Peru; India; Salt Range; Tibet.

ARNAUDIELLA H. Douvillé, 1907

Plate 738, figs. 1-7

Type species: Arnaudiella grossouvrei H. Douvillé, 1907; OD.

Arnaudiella H. Douvillé, 1907 (*985), p. 599.

Siderina Abrard, 1926 (*4), p. 31 (non *Siderina* Dana, 1848); type species: *Siderina douvillei* Abrard, 1926 = *Arnaudiella grossouvrei* H. Douvillé, 1907; OD(M).

Pokornyella Loeblich and Tappan, 1961 (*1904), p. 220 (nom. subst. pro *Siderina* Abrard, 1926; non *Pokornyella* Oertli, 1956); obj.; OD.

Pokornyellina Loeblich and Tappan, 1964 (*1910), p. C618 (nom. subst. pro *Pokornyella* Loeblich and Tappan, 1961); obj.; OD.

Test large, up to 6 mm in diameter, flat and lenticular, with central thickening and broad flattened border, spherical protoconch and slightly larger deuteroconch followed by two to five whorls of spirally arranged primary chambers, earliest whorl evolute, later ones involute, increasing rapidly from about eight chambers in the earliest whorl up to forty-five in the final whorl, well-developed system of lateral chambers between consecutive whorls enclosed by the next whorl of the involute primary spiral, septa secondarily doubled by formation of a septal flap, pillars present in the region of the lateral chambers; wall calcareous, much thickened into a broad flange at the periphery, surface with randomly spaced pustules that are larger in the central area and are the external expression of the lateral pillars; basal intercameral foramen present in early chambers and probably multiple openings in later ones, radial canals pierce the marginal flange and open into coarse pores at the test periphery or into the chamber lumen of the succeeding whorl. U. Cretaceous (U. Campanian); France; Spain; Yugoslavia; Greece; Algeria; Tunisia.

Remarks: The suggested synonymy of *Pokornyellina* and *Arnaudiella* (Loeblich and

Tappan, 1964, *1910, p. C618) was confirmed by a study of topotypes of the type species (van Gorsel, 1974, *1279, p. 333–335).

DAVIESINA Smout, 1954

Plate 739, figs. 1-8; plate 740, figs. 1-3

Type species: Daviesina khatiyahi Smout, 1954; OD.

Daviesina Smout, 1954 (*3008), p. 66.

Miscellanoides Sander, 1962 (*2730), p. 13; type species: *Miscellanoides bramkampi* Sander, 1962; OD.

Test large, rotaloid to operculine, lenticular to flattened and may be slightly asymmetrical, low trochospiral to planispiral coil, septa secondarily doubled, the septal flap enclosing intraseptal canals, umbilical plate present at the base of the alar extension of the chamber on the umbilical side, a low space remaining beneath the umbilical plate as a spiralling canal that communicates with the intraseptal spaces at the base of the septa and connects through small openings to the chamber lumen above the plate, in the larger operculine species folds in the septal flap may produce secondary septa as in *Heterostegina*, but no marginal cord is present in *Daviesina*, periphery acute to slightly rounded; wall calcareous, lamellar, very thick, optically radial, perforate except for the imperforate periphery, prominent umbilical pillars, fissures, and vertical canals on both sides of the test, chambers may have radial median ridges and nodes or spiralling chevronlike folds crossing the surface; aperture an interiomarginal slit. U. Paleocene (Thanetian) to M. Eocene; Qatar; Persian Gulf; Egypt; E. Africa; Spain; France.

DIZERINA Meriç, 1978

Plate 736, figs. 13-16

Type species: Dizerina anatolica Meriç, 1978; OD.

Dizerina Meriç, 1978 (*2094), p. 97.

Test of medium size, 1 mm to 2 mm in diameter, lenticular, megalospheric embryo of nearly equal-sized protoconch and deuteroconch, followed by up to twenty-seven large spirally enrolled chambers, the spire comprising up to half the test diameter, later arcuate equatorial chambers of lesser height, commonly in a low trochospiral coil rather than a flat plane, lateral chambers in regular layers on both sides of the equatorial layer but number of layers not constant in all specimens, pillars few and thin, periphery rounded, surface apparently with sparse granules. U. Cretaceous (U. Maastrichtian); Turkey.

HELICORBITOIDES Macgillavry, 1963

Plate 740, figs. 4-6

Type species: Pseudorbitoides longispiralis Papp and Küpper, 1953 (*2336), p. 352; OD.

Helicorbitoides Macgillavry, 1963 (*1967), p. 160.

Test lenticular, protoconch and slightly larger deuteroconch followed by two to three whorls of planispirally enrolled large equitant chambers in the equatorial layer, earliest six to nine chambers with single aperture, later ones also with retrovert aperture, whorls expanding so that smaller secondary chambers are intercalated between them, lateral layers of chambers on both sides but weakly developed in geologically older representatives, pillars present, no distinct roof and floor between equatorial and lateral layers; wall with numerous pores. U. Cretaceous (U. Campanian); Austria; Sweden; Switzerland.

HELLENOCYCLINA Reichel, 1949

Plate 741, figs. 1-8

Type species: Hellenocyclina beotica Reichel, 1949 (syn.: *Hellenocyclina charentensis* Freudenthal, 1969, *1183, p. 134); OD.

Hellenocyclina Reichel, 1949 (*2547), p. 140; 1950 (*2549), p. 482.

Test small, lenticular to low conical, microspheric test with globular proloculus of about 12 μm diameter, followed by eight to thirteen chambers with single aperture in a planispiral coil of up to two whorls; megalospheric embryo with proloculus of 38 μm to 40 μm diameter and deuteroconch of nearly equal size, the two surrounded by a slightly thickened common wall, subspherical primary auxiliary chamber may be larger than the two embryonic chambers; nepionic stage with double spire resulting from two apertures per chamber, later median chambers regularly arranged, arcuate in the central region to ogival toward the periphery, lateral layers appressed and no lateral chambers present, periphery lobulate; wall finely perforate, two diagonally arranged stolons in the equatorial chambers allow communication with the succeeding cycles of chambers. U. Cretaceous (Maastrichtian); Greece; France; Netherlands.

Remarks: Originally only the megalospheric test was known; the microspheric generation later was described by Freudenthal (1969, *1183), Dupeuble et al. (1972, *1024), and Hofker (1975, *1523).

LEPIDORBITOIDES A. Silvestri, 1907

Plate 741, figs. 9-12; plate 742, figs. 1-6

Type species: Orbitoides socialis Leymerie, 1851 (*1842), p. 191; OD.

Lepidorbitoides A. Silvestri, 1907 (*2939), p. 80 (name available, ICZN Art. 12 (a), 12 (b)(5)); also see A. Silvestri, 1908 (*2945), p. 18, 23.

Orbitoides (Lepidorbitoides) Jaeger, 1914 (*1597), p. 146, 147, 158-160 (nom. transl.).

Orbitocyclina (Orbitocyclinoides) Brönnimann, 1943 (*361), p. 108; also 1944 (*362), p. 5; type species: *Orbitocyclina (Orbitocyclinoides) schencki* Brönnimann, 1943; OD.

Lepidorbitoides (Orbitocyclinoides) Caudri, 1948 (*510), p. 474 (nom. transl.).

Test flattened lenticular, large, up to 10 mm in diameter and rarely up to 25 mm, bilocular embryo with reniform deuteroconch equal in size or larger than the protoconch, the two surrounded by a very thick common wall, two primary auxiliary chambers and numerous adauxiliary chambers, nepionic stage quadriserial, early equatorial chambers arcuate, later ones spatulate to hexagonal, the equatorial chambers in concentric rows, well-differentiated lateral layers of chambers on both sides may be traversed by pillars reflected as pustules at the surface, arcuate chambers with basal stolons, spatulate ones with both diagonal and annular stolons of slightly larger diameter than the coarse wall perforations of chamber roofs and floors. U. Cretaceous (Campanian to Maastrichtian); Austria; France; Italy; Switzerland; Turkey.

Remarks: The genus commonly is credited to A. Silvestri, 1907, with various mention of three different references; the earliest cited by Galloway (1928, *1203, p. 64) was Silvestri, 1907 (*2940), p. 11, but the genus is not mentioned in that article. Silvestri, 1907 (*2939), p. 80, lists *Lepidorbitoides* (tipo *socialis*) in a table without description, but in 1907 citation of one or more included available species was sufficient as an indication (see above). Silvestri (1908, *2945, p. 23), briefly described the genus as including "the ancient lepidocycliniform *Orbitoides* of the Upper Cretaceous, having for type the species *Orbitoides minor* Schlumberger and *O. socialis* Leymerie" (translation from Italian) and on p. 18 also cited *Lepidorbitoides paronai* n. gen., n. sp. (previously described as *Orbitoides*). Schubert (1911, *2818, p. 334) then designated *Orbitoides minor* Schlumberger as the type species, although the type species had already been fixed by Silvestri in the original 1907 publication.

PENOPERCULOIDES Cole and Gravell, 1952

Plate 743, figs. 1-5

Type species: Penoperculoides cubensis Cole and Gravell, 1952; OD.

Penoperculoides Cole and Gravell, 1952 (*643), p. 714.

Test lenticular, planispirally enrolled, biinvolute and biumbonate, with prominent umbonal pillars, numerous chambers in about four and a half whorls, sutures thickened, radial, curved back at the periphery, septa secondarily doubled, with septal flap and intraseptal canal, periphery acute; wall calcareous, lamellar, perforate, umbonal pustules at the surface reflect the position of internal pillars, sutures elevated; aperture an arched interiomarginal equatorial slit that may extend slightly more on one side than the other. M. Eocene; Cuba.

PRAESIDEROLITES Wannier, 1983

Plate 743, figs. 6-13

Type species: Praesiderolites douvillei Wannier, 1983; OD.

Praesiderolites Wannier, 1983 (*3350), p. 16.

Test lenticular, centrally swollen, planispirally enrolled and involute, with about three whorls and up to eighteen chambers in the final whorl, radial pillers appear as pustules at the surface, pustules larger in umbonal areas and progressively smaller toward the periphery, canal system consists of a spiral canal in the umbilical area, lateral intraseptal canals, equatorial radial canals, and a marginal canal, no lateral chamberlets such as occur in *Arnaudiella*, periphery angular, peripheral outline circular and may be denticulate; wall calcareous, coarsely perforate; a single row of intercameral foramina present at the base of the septa. U. Cretaceous (Santonian to Campanian); Spain; France.

PSEUDOSIDEROLITES Smout, 1955

Plate 744, figs. 1-8

Type species: Siderolites vidali H. Douvillé, 1907 (***985**), p. 599; OD.

Pseudosiderolites Smout, 1955 (***3009**), p. 206.
Siderolites (Pseudosiderolites) Hofker, 1970 (***1519**), p. 53 (nom. transl.).

Test large, up to 6 mm in diameter, lenticular, bilaterally symmetrical, planispirally enrolled with rapidly expanding whorls, numerous chambers per whorl, narrow and elongate irregular lateral chamberlets present in the interseptal space of the last whorls near the angular periphery; wall thick and lamellar, umbilical region with spiral canal, successive whorls interconnected by umbilical vertical canals between the pillars, anastomosing canal system beneath the lateral walls connects the umbilical spiral canal and the marginal and equatorial canals, radial lateral canals arise from the anastomosing canals to open at the surface toward the test periphery, forming an enveloping canal system, canals up to 12 μm in diameter and about two to three times the diameter of the pores; aperture single in protoconch and deuteroconch, multiple in later chambers with a single row of openings at the base of the apertural face, three to seven per chamber in the early whorl, up to more than thirty in the adult. U. Cretaceous (Campanian); Spain; France; Switzerland; Austria; Greece; Turkey.

SULCOPERCULINA Thalmann, 1939

Plate 745, figs. 1-9

Type species: Camerina(?) dickersoni D. K. Palmer, 1934 (***2326**), p. 243; OD.

Operculina (Sulcoperculina) Thalmann, 1939 (***3161**), p. 330.
Sulcoperculina de Cizancourt, 1949 (***612**), p. 670 (nom. transl.).

Test lenticular to slightly flattened, about 2 mm in diameter, low trochoid coil of three to four whorls, up to twenty-three chambers in the final whorl, bi-involute, canal system with intraseptal radial and spiral canals, imperforate peripheral margin deeply grooved and with a single canal at its base somewhat ventral to the periphery of the preceding whorl, the canal bending and giving rise to a radial canal at each septum, closely set vertical plates border the sulcus on each side; wall calcareous, lateral walls thickly lamellar, external surface with central knob and other inflational pustules. U. Cretaceous (Campanian to Maastrichtian); Cuba; Haiti; Jamaica; Venezuela; Mexico; Greece.

Superfamily ROTALIACEA Ehrenberg, 1839

Rotaliacea Loeblich and Tappan, 1961 (***1902**), p. 303, nom. corr. pro superfamily Rotalidea.
Rotalidea Glaessner, 1945 (***1250**), p. 143, nom. transl. ex family Rotalina.
Rotaliaridia Rhumbler, in Kükenthal and Krumbach, 1923 (***1752**), p. 88 (family group).
Rotaliidea Smout, 1954 (***3008**), p. 40.
Rotaliicae Brönnimann, 1958 (***384**), p. 175.
Rotalioidea Ayala-Castañares, 1963 (***101**), p. 87.
Elphidiidea Saidova, 1981 (***2696**), p. 53.

Test enrolled in a trochospiral or planispiral coil, involute to evolute, commonly with many small chambers in numerous whorls; as new chambers are added septal flap attaches to previous apertural face and encloses radial canals, fissures, umbilical cavities, and intraseptal and subsutural canals; wall of perforate, hyaline calcite, generally optically radial in structure, or rarely hyaline oblique and optically granular; primary aperture single or multiple, interiomarginal to areal, may be absent on final chamber and only an intercameral foramen is present; small openings into the canal system may occur along the sutures but do not communicate with the chamber interior. U. Cretaceous (Coniacian) to Holocene.

Family PSEUDORBITOIDIDAE M. G. Rutten, 1935

Pseudorbitoididae Brönnimann, 1958 (***384**), p. 167, nom. transl. ex subfamily Pseudorbitoidinae.

Orbitocyclinidae van Gorsel, 1972 (*1278), p. 346 (name not available, ICZN Art. 13 (a)(i), no description).

Test lenticular, bilocular embryonal chambers followed by spire of nepionic chambers, later equatorial layer of chambers covered on each side by zones of lateral chambers; canal system and stolons present. U. Cretaceous (Campanian to Maastrichtian).

Subfamily PSEUDORBITOIDINAE M. G. Rutten, 1935

Pseudorbitoidinae M. G. Rutten, 1935 (*2676), p. 544.

Postembryonal equatorial layer of chambers subdivided vertically by variously arranged radial plates or rods. U. Cretaceous (Campanian to Maastrichtian).

CONORBITOIDES Brönnimann, 1958

Plate 747, figs. 5-10

Type species: Conorbitoides cristalensis Brönnimann, 1958; OD.

Conorbitoides Brönnimann, 1958 (*384), p. 173.

Test conical, small, up to about 0.7 mm in diameter and to 0.5 mm in height of cone, dorsal side flat to slightly umbonate, conical ventral side with flat sides and pointed apex, subspherical protoconch followed by a simple trochospiral coil of gradually enlarging chambers that each have a single basal aperture or stolon, flanks of the conical ventral side covered by layers of large polygonal thick-walled lateral chambers, a few lateral chambers may occur on the spiral dorsal side producing a slight umbonal thickening, single axial spine of calcite protrudes at the test apex, periphery at base of cone with well-developed, narrow, and deeply incised sulcus that may have some short radial plates. U. Cretaceous (U. Campanian or L. Maastrichtian); Cuba.

Remarks: Stated by Brönnimann (1958, *384) to be derived from a *Sulcoperculina* ancestor by development of the asymmetrical conical test.

HISTORBITOIDES Brönnimann, 1956

Plate 745, figs. 10-13

Type species: Historbitoides kozaryi Brönnimann, 1956; OD.

Historbitoides Brönnimann, 1956 (*383), p. 61.

Test lenticular in megalospheric generation and up to 1.6 mm in diameter, more discoidal microspheric test up to 4 mm, juvenarium quadriserial and symmetrical, single equatorial layer of chambers has interconnected irregular vertical radial plates, differentiated radii and interradii result in a weakly stellate structure, radii have vertical radial plates perpendicular to the axis of the radii, whereas in the interradii the plates intersect the equatorial layer and fuse to form a discontinuous floor, stellate appearance masked at the surface by lateral layers of chambers on both sides, primary lateral chambers directly overlying the equatorial layer and in turn overlain by regular tiers of secondary lateral chambers in a lenticular thickening, lateral chambers interconnected by basal stolons and fine pores, pillars regularly distributed. U. Cretaceous (Maastrichtian); Cuba.

Remarks: Seiglie and Ayala-Castañares (1963, ***2850**, p. 44) and Cole (in Loeblich and Tappan, 1964, ***1910**, p. C725) suggest that *Historbitoides* is a synonym of *Pseudorbitoides*, and van Gorsel (1978, ***1281**, p. 87) indicates that it may be a variant or end form of *Pseudorbitoides*.

PSEUDORBITOIDES H. Douvillé, 1922

Plate 746, figs. 1-10

Type species: Pseudorbitoides trechmanni H. Douvillé, 1922; OD.

Pseudorbitoides H. Douvillé, 1922 (*998), p. 204.

Test lenticular, with single equatorial layer of chambers that may be completely covered by lateral layers on both sides or may have a peripheral flange of exposed equatorial chambers, microspheric juvenarium uniserial, megalospheric one uniserial to quadriserial and without accessory auxiliary chambers, neanic stage with one system of vertical radial plates in the equatorial layer that may be reduced and irregular toward the periphery, primary lateral layer rests directly on the radial plates and chambers of the juvenarium, lenticular thickening of the test results from the regular tiers of secondary lateral chambers that communicate through basal stolons and fine pores. U. Cretaceous (Campanian to Maastrichtian); Jamaica; Cuba; Haiti; USA: Texas, Louisiana.

RHABDORBITOIDES Brönnimann, 1955

Plate 747, figs. 1-4

Type species: Rhabdorbitoides hedbergi Brönnimann, 1955; OD.

Rhabdorbitoides Brönnimann, 1955 (*382), p. 97.

Test lenticular, single equatorial layer of chambers covered by lateral layers on both sides, juvenarium uniserial but not rotaloid, neanic stage with irregular rows and layers of radial rods and primary lateral chambers, two layers of radial rods near the center increase by intercalation of new rods, up to ten layers toward the margin where regular annular and irregular vertical and diagonal connections produce a lattice, primary lateral chambers rest directly on the rods and are overlain by regular tiers of secondary lateral chambers that result in the lenticular thickening, lateral chambers interconnect through basal stolons and fine pores, pillars present. U. Cretaceous (Campanian); Cuba.

Remarks: Characterized by the marginal lattice of the equatorial layer; differs from *Pseudorbitoides* in the radial rods of the neanic stage and differs from *Sulcorbitoides* by the increase in layers of rods toward the periphery.

SULCORBITOIDES Brönnimann, 1954

Plate 747, figs. 11-15

Type species: Sulcorbitoides pardoi Brönnimann, 1954; OD.

Sulcorbitoides Brönnimann, 1954 (*379), p. 55.

Test lenticular, single equatorial layer of chambers completely covered on both sides by lateral layers, bilocular embryo followed by one whorl of enrolled chambers with basal aperture, outer walls of spiral chambers with radial stolons in equatorial plane, neanic stage with vertical radial plates projecting into the equatorial layer from both sides, radial plates may fuse at the center or may elongate to cross the equatorial layer, becoming more irregular toward the periphery, lateral chambers in regular tiers of two to nine layers directly overlying the radial plates and interconnected by basal stolons and fine pores, pillars present. U. Cretaceous (Campanian); Cuba; USA: Texas, Louisiana, Florida.

Subfamily VAUGHANININAE MacGillavry, 1963

Vaughanininae MacGillavry, 1963 (*1967), p. 171, 175, 177.

Sulcoperculinoid juvenarium, later developing lateral chambers, equatorial layer as in pseudorbitoids but with roof and floor, equatorial chambers and chamber walls traversed by radial plates, later ones elongated concentrically; chamber walls traversed by radial stolons. U. Cretaceous (Campanian to Maastrichtian).

AKTINORBITOIDES Brönnimann, 1958

Plate 748, figs. 1 and 2

Type species: Aktinorbitoides browni Brönnimann, 1958; OD.

Aktinorbitoides Brönnimann, 1958 (*384), p. 167.

Test lenticular, outline stellate, juvenarium of planispirally coiled chambers with basal aperture and not differentiated into radii and interradii, beginning in the neanic stage seven to ten short flat radii are formed by two alternating systems of vertical plates and by lateral chambers, vertical plates crossed by regularly spaced annular walls pierced by radial stolons, radii subcircular in section nearest the center of the test and laterally compressed toward the periphery, equatorial pseudorbitoidal structure only in the radii, the interradii being filled by regular tiers of lateral chambers that also cover the juvenarium, pillars present. U. Cretaceous (U. Campanian or L. Maastrichtian); Cuba; British Honduras.

CTENORBITOIDES Brönnimann, 1958

Plate 748, figs. 3-9

Type species: Ctenorbitoides cardwelli Brönnimann, 1958; OD.

Ctenorbitoides Brönnimann, 1958 (*384), p. 171.

Test conical, dorsal side flat to slightly umbonate, ventral side conical, with concave flanks and flattened "comblike" apex; centrally placed juvenarium has uniserial, trochospirally coiled chambers with basal apertures, communicating with lateral chambers through fine pores, "equatorial" layer of chambers in this as in other conical orbitoids forms a low cone rather than a plane, pseudorbitoidal structure consists of two systems of alternating vertical plates radiating from the juvenarium to the periphery and separated by a median gap, annular walls present and perforated by radial stolons, vertical plates arise from the nepionic chambers on the ventral side and form a fanlike extension that projects at the cone apex, thick-walled and radially elongate low lateral chambers are separated from the pseudorbitoidal structure by the latter's distinct roofs and floors, flanks and base of the cone covered by eight to nine layers of lateral chambers in regular tiers, pillars among the lateral chambers project as pustules at the surface. U. Cretaceous (U. Campanian or L. Maastrichtian); Cuba.

VAUGHANINA D. K. Palmer, 1934

Plate 749, figs. 1-8

Type species: Vaughanina cubensis D. K. Palmer, 1934; OD.

Vaughanina D. K. Palmer, 1934 (***2326**), p. 240.

Test lenticular, bilocular juvenarium followed by five to twenty-seven uniserial chambers in a low trochospire and with rudimentary peripheral sulcus, neanic stage with single equatorial layer of annular chambers surrounding the early spire, two alternating systems of vertical radial plates, separated by a narrow gap, project from roof and floor into the equatorial layer, equatorial layer partially covered on both sides by lateral layers of regular tiers of chambers separated by pillars, but in the peripheral part of the outer flange numerous radial plates remain exposed and project slightly as a delicate pectinate margin, large radial stolons pierce the annular walls near the floor and roof of the equatorial layer, stolons and fine pores connect the equatorial layer with chambers of the lateral layers, and lateral chambers are similarly interconnected. U. Cretaceous (U. Campanian to Maastrichtian); Cuba; USA: Florida; Mexico; Guatemala; Venezuela.

Remarks: The cotype of *V. cubensis* figured by Palmer (1934, ***2326**, pl. 12, fig. 5) was designated as lectotype by Brönnimann (1954, ***380**, p. 93).

Subfamily PSEUDORBITELLINAE Hanzawa, 1962

Pseudorbitellinae Hanzawa, 1962 (***1410**), p. 148.
Orbitocyclininae van Gorsel, 1978 (***1281**), p. 104 (nom. subst.).

Pseudorbitoidal structure but lacking radial plates. U. Cretaceous (Campanian to Maastrichtian).

Remarks. Although *Pseudorbitella* Hanzawa, 1962 is regarded as a junior synonym of *Orbitocyclina* Vaughan, 1929, after 1960 the oldest family group name must be retained (ICZN Art. 40(a)), in this case the Pseudorbitellinae, even if the type genus is considered to be a subjective synonym.

ASTERORBIS Vaughan and Cole, 1932

Plate 749, figs. 9-11; plate 750, figs. 1-7

Type species: Asterorbis rooki Vaughan and Cole, 1932; OD.

Asterorbis Vaughan and Cole, 1932 (***3271**), p. 611.
Lepidorbitoides (Cryptasterorbis) M. G. Rutten, 1935 (***2676**), p. 533; type species: *Asterorbis? cubensis* D. K. Palmer, 1934 (***2326**), p. 249; OD.
Lepidorbitoides (Asterorbis) M. G. Rutten, 1935 (***2676**), p. 533 (nom. transl.).
Cryptasterorbis Cole, in Loeblich and Tappan, 1964 (***1910**), p. C711 (nom. transl.).
Asterorbis (Cryptasterorbis) van Gorsel, 1978 (***1281**), p. 62 (nom. transl.).

Test small to medium sized, up to 4.5 mm in diameter, lenticular, umbonate, stellate, with four to eight rays that may be elevated as ribs, surface papillose with larger pustules on the umbo, bilocular embryo surrounded by thick wall and two large auxiliary chambers forming a quadriserial juvenarium, equatorial chambers in horizontal section diamond shaped to ogival in plan and increase in height from the center to the test periphery, up to sixteen layers of lateral chambers form distinct tiers on both sides of the equatorial layer, the layers decreasing in number from the umbo toward the periphery, where the equatorial layer is left exposed without lateral chambers, pillars well developed. U. Cretaceous (Campanian to Maastrichtian); USA: Mississippi, Louisiana, Florida; Guatemala; Cuba; central equatorial Pacific (DSDP site 315A).

ORBITOCYCLINA Vaughan, 1929

Plate 751, figs. 1-5; plate 752, figs. 1-4

Type species: Lepidorbitoides minima H. Douvillé, 1927 (*1002), p. 291 (syn.: *Polylepidina cardenasensis* Galloway, 1928, *1204, p. 302); OD.

Orbitocyclina Vaughan, 1929 (*3267), p. 291.
Pseudorbitella Hanzawa, 1962 (*1410), p. 148: type species: *Pseudorbitella americana* Hanzawa, 1962 (syn.: *Lepidorbitoides nortoni* (Vaughan) of Cole, 1941, *622, p. 40, non Vaughan, 1929); OD.
Lepidorbitoides (Orbitocyclina) Cole and Applin, 1970 (*639), p. 49 (nom. transl.).
Orbitocyclina (Pseudorbitella) van Gorsel, 1972 (*1278), p. 342 (nom. transl.).

Test lenticular, bilocular megalospheric embryonic apparatus enclosed by thick wall, followed by spiral chambers for about three-fourths of a whorl, retrovert apertures present from the third or fourth chamber in the magalospheric test, and juvenarium may have a peripheral sulcus, first seven chambers spiralling around the microspheric protoconch lack a retrovert aperture, equatorial layer of arcuate to diamond-shaped chambers interconnected by stolons, lateral layers of chambers on both sides form irregular tiers of about five to six chambers at the center of the test decreasing in number outward until the outermost equatorial chambers are uncovered at the flangelike periphery, pillars may be present in the central part of the test. U. Cretaceous (Campanian to Maastrichtian); Mexico; Cuba; USA: Florida, Louisiana.

Remarks: Vaughan (1929, *3264, p. 171) erroneously cited the type species of *Orbitocyclina* as "*Lepidocyclina minima* H. Douvillé."

Family ROTALIIDAE Ehrenberg, 1839

Rotaliidae Chapman, 1900 (*529), p. 10, nom. corr. pro family Rotalina.
Rotalina Ehrenberg, 1839 (*1054), table opp. p. 120.
Rotalideae Reuss, 1860 (*2581), p. 221.
Rotalidea Reuss and Fritsch, 1861 (*2593), p. 4.
Rotalida Schmarda, 1871 (*2781), p. 164.
Rotalidee Schwager, 1876 (*2829), p. 479.
Rotalidae Brady, 1881 (*339), p. 44.
Rotalinae Delage and Hérouard, 1896 (*926), p. 145.
Rotaliaridae Rhumbler, 1913 (*2621), p. 339.
Arrotalaridia Rhumbler, 1913 (*2621), p. 342 (err. emend.).
Rotalinidae Dylążanka, 1923 (*1029), p. 45.
Indicolidae S. N. Singh and Kalia, 1970 (*2981), p. 77.
Ammoniidae Saidova, 1981 (*2696), p. 50.

Test trochospiral throughout, with radial canals or fissures and intraseptal and subsutural canals. U. Cretaceous (Coniacian) to Holocene.

Subfamily CUVILLIERININAE Loeblich and Tappan, 1964

Cuvillierininae Loeblich and Tappan, 1964 (*1910), p. C614.

Test trochospiral to nearly planispiral, spiral and umbilical sides not differentiated in structure; canal system with subsutural and intraseptal canals and vertical fissures. U. Cretaceous (Maastrichtian) to Miocene.

CIVRIEUXIA Bermúdez, 1978

Plate 754, figs. 1-3

Type species: Rotalia? palmerae Cushman and Bermúdez, 1947 (*810), p. 26; OD.

Civrieuxia Bermúdez, 1978 (*207), p. 193.

Test auriculate in outline, biconcave, chambers in rapidly expanding spiral, early whorl trochospiral, later nearly planispiral, up to twelve chambers in the final whorl, chambers angularly inflated on the more involute spiral side, sutures depressed, radial, and slightly curved, peripheral margin angularly truncate, peripheral outline lobulate; wall calcareous, surface of early chambers tuberculate, sides of later chambers and the broad apertural face with prominent, oblique costae that are interrupted at the sutures; aperture a short interiomarginal slit, slightly on the umbilical side, but nearly equatorial. M. Eocene; Cuba; Venezuela.

CUVILLIERINA Debourle, 1955

Plate 752, figs. 5-9

Type species: Cuvillierina eocenica Debourle, 1955 = *Laffitteina vallensis* Ruiz de Gaona, 1948 (*2671), p. 87 (syn.: *Laffitteina vanbelleni* Grimsdale, 1952, *1311, p. 232); OD.

Cuvillierina Debourle, 1955 (*908), p. 55 (non *Cuvillierina* Garcia, 1972).

Cuvillierina Debourle, 1955 (*907), p. 19 (name not available, ICZN Art. 13 (a)(i), no description).

Test lenticular, auriculate in outline, biconvex, planispirally enrolled, whorls expanding rapidly, few chambers per whorl, sutures depressed, straight, and radial, septal flap longitudinally folded, bending forward to coalesce with the distal face of the chamber, periphery angular; wall calcareous, perforate, optically radial, bilamellar, with intraseptal spaces widening toward the periphery, surface with reticulate ornamentation of polygonal ridges and pillars in the umbonal region grading into chevronlike spiralling ridges toward the periphery, apertural face also with low vertical ribs; intercameral foramen comma shaped as in *Pararotalia*, vertical canals present in umbonal region, divergent canals present over chambers of outer whorls. L. Eocene (Ypresian); Spain; France; Romania; Syria; Iraq; Israel.

FISSOELPHIDIUM Smout, 1955

Plate 753, figs. 1-5

Type species: Fissoelphidium operculiferum Smout, 1955; OD.

Fissoelphidium Smout, 1955 (*3009), p. 208.

Test lenticular, planispiral, bilaterally symmetrical, chambers numerous, septa radial, slightly curved, deeply fissured in dendritic pattern, secondarily doubled by the septal flap, periphery rounded, peripheral outline entire to gently lobulate; wall calcareous, radially fibrous, distinctly perforate, lamellar, surface of umbonal mass and early part of the last whorl with reticulate fissures on both sides, final chambers smooth; aperture equatorial, of numerous pores in a protruding crescentic apertural plate that is resorbed as the next chamber forms and leaves an arcuate slitlike intercameral foramen. U. Cretaceous (Maastrichtian); Qatar; Persian Gulf; Iraq.

ORNATANOMALINA Haque, 1956

Plate 753, figs. 6-16

Type species: Ornatanomalina geei Haque, 1956 (syn.: *Ornatanomalina hafeezi* Haque, 1956; *Saudella rugosa* Hasson, 1985); OD.

Ornatanomalina Haque, 1956 (*1418), p. 196.

Saudella Hasson, 1985 (*1428), p. 347; type species: *Saudella rugosa* Hasson, 1985 = *Ornatanomalina geei* Haque, 1956; OD.

Test discoidal, sides flattened, chambers weakly trochospiral in the early stage, later planispiral, about seven to eleven in the final whorl, periphery rounded, peripheral outline lobulate; wall calcareous, finely perforate, optically radial, surface with spiralling ribs that may be sharply angled and interrupted at a radial median ridge across the chamber surface; aperture interiomarginal, equatorial. Paleocene to L. Eocene; Pakistan; Saudi Arabia.

Remarks: Hasson (1985, *1428, p. 347) stated that the specimen illustrated as *Ornatanomalina hafeezi* by Loeblich and Tappan (1964, *1910, fig. 494, *2a-c*) differed from Haque's species and belonged to the newly described *Saudella rugosa*. However, this illustrated specimen is (as stated) a topotype specimen identified by Haque. The angularity of the ribs on this and other described species of *Ornatanomalina* is variable on the specimens, and the original illustrations are somewhat stylized drawings. Hasson stated that *Saudella* differed in having a smooth apertural face with imperforate limbate border, but this description suggests that the specimens are broken, with the septal face bordered by the thick and limbate suture of the succeeding chamber. The two type species appear to be both congeneric and conspecific.

PSEUDOWOODELLA Haque, 1956

Plate 755, figs. 6-8

Type species: Pseudowoodella mamilligera Haque, 1956; OD.

Pseudowoodella Haque, 1956 (*1418), p. 202.

Test trochospiral with about two and a half whorls of rapidly enlarging chambers, eight or nine chambers in the final whorl, inequally biconvex, with centrally flattened to concave evolute spiral side and convex involute umbilical side, sutures depressed, slightly curved on the spiral side, straight and radial on the umbilical side, periphery broadly rounded, margin lobulate; wall calcareous, hyaline, perforate, optically radial, surface of spiral side with a prominent spinule near the midpoint of each chamber but closer to the inner margin than to the periphery, the spinules giving the chambers a mammilate appearance, umbilical side strongly pustulose, possibly reflecting internal pillars; aperture interiomarginal and equatorial. Paleocene to L. Eocene; Pakistan.

Remarks: *Pseudowoodella* needs additional study, particularly with thin sections to determine the possible presence of a canal system and whether or not the pustules of the umbilical side reflect internal pillars.

REICHELINELLA Seiglie and Bermúdez, 1966

Plate 754, figs. 4-13

Type species: Discorbis baitoensis Bermúdez, 1949 (***201**), p. 236.

Reichelinella Seiglie and Bermúdez, 1966 (***2854**), p. 434.

Arcanispira Poag, 1966 (***2431**), p. 141 (name not available, ICZN Art. 13(a)(i), no description).

Arcanispira Poag, 1966 (***2430**), p. 413; type species: *Arcanispira bucata* Poag, 1966; OD.

Test planoconvex, trochospiral, involute on the convex side, partially evolute on the flattened side around a pustular central area, the pustules being the external expression of vertical pillars, commonly six to seven chambers per whorl, sutures slightly depressed, curving backward at the periphery, septa secondarily doubled by septal flap, periphery carinate, peripheral outline entire to slightly lobulate; wall calcareous, optically radial, canaliculate, canal openings between the central pillars, surface with pustules in the umbilical region and radial to slightly oblique grooves and ridges crossing the chambers on the flattened side; aperture oval and areal, bordered by a distinct lip, situated between the periphery and umbilical margin just above the base of the chamber face, secondary sutural aperture in a sutural reentrant at the proximal margin of the final chamber. Miocene; Dominican Republic; Cuba; USA: Alabama, Mississippi.

Remarks: Restudy of the original type specimens by Seiglie and Poag (1968, ***2859**, p. 31) showed *Arcanispira* and *Reichelinella* to be synonymous.

STORRSELLA Drooger, 1960

Plate 755, figs. 1-5

Type species: Cibicides haasteri van den Bold, 1946 (***279**), p. 125; OD.

Storrsella Drooger, 1960 (***1012**), p. 295.

Test trochospiral, chambers increasing rapidly in number in successive whorls, prominent and thick fissured umbilical mass on one side, septa secondarily doubled, sutures nearly radial, depressed, and fissured on both sides; wall calcareous, fibrous, optically radial, thick, perforate, surface smooth except for the fissured umbilical plug, pustules, and fissured sutures; aperture of final chamber unknown, intercameral foramen interiomarginal, nearly equatorial but slightly on the umbilical side; radial canals open between the umbilical pillars. Paleocene to L. Eocene; Guatemala; British Honduras; Cuba; French Guiana.

THALMANNITA Bermúdez, 1952

Plate 754, figs. 14-16

Type species: Rotalia madruguaensis Cushman and Bermúdez, 1947 (***810**), p. 24; OD.

Thalmannita Bermúdez, 1952 (***205**), p. 76.

Test discoidal, sides flattened, slightly trochospiral in the early stage, later planispiral, about eight to ten chambers in the final whorl, sutures radial, depressed, periphery rounded, peripheral outline lobulate; wall calcareous, perforate, surface ornamented with strong spiralling costae that are interrupted at the sutures and may break up into smaller pustules or ridges; aperture a low interiomarginal and equatorial slit with bordering lip. Paleocene to Oligocene; Cuba; Puerto Rico.

Remarks: The internal structure has not been described.

Subfamily PARAROTALIINAE Reiss, 1963

Pararotaliinae Reiss, 1963 (***2561**), p. 85.

Test trochospiral, no canal system but may have umbilical cavities; single interiomarginal slitlike aperture, converted into areal intercameral foramen by later attachment of the toothplate. U. Cretaceous (Coniacian) to Holocene.

GLOBOROSALINA Quilty, 1981

Plate 755, figs. 9-14

Type species: Globorosalina westraliensis Quilty, 1981; OD.

Globorosalina Quilty, 1981 (*2502), p. 90.

Test low trochospiral, biconvex, spiral side evolute, umbilical side involute, commonly five to five and a half chambers per whorl, sutures straight, oblique and depressed on the spiral side, radial on the umbilical side and strongly incised near the small open umbilicus, periphery rounded, peripheral outline slightly lobulate; wall calcareous, thick, and lamellar, optically radial, coarsely perforate on the spiral side, finely perforate on the umbilical side; primary aperture interiomarginal and beneath an umbilical flap, areal intercameral foramen not part of the original opening but secondarily produced in apertural face as new chamber is added, areal foramen separated from the primary aperture by a columnar buttress. U. Eocene, Miocene; South Australia.

PARAROTALIA Y. Le Calvez, 1949

Plate 755, figs. 15-21

Type species: Rotalina inermis Terquem, 1882 (*3147), p. 68; OD.

Pararotalia Y. Le Calvez, 1949 (*1800), p. 32.

Neorotalia Bermúdez, 1952 (*205), p. 75; type species: *Rotalia mexicana* Nuttall, 1928 (*2275), p. 374; OD.

Test in a low trochospiral coil, planoconvex to biconvex, chambers flat to centrally elevated on the spiral side, commonly inflated and produced around the umbilicus, with a prominent umbilical shoulder surrounding a large solid umbilical plug of clear shell material that may be broken out in preservation, intercameral septa imperforate, doubled secondarily by attachment of a septal flap, sutures gently curved back at the periphery on the spiral side, radial, depressed, and may be fissured on the umbilical side, periphery carinate, peripheral outline lobulate; wall calcareous, perforate, optically radial, surface smooth to pustulose; aperture interiomarginal, extending obliquely up the apertural face, intercameral foramen areal, comma shaped due to the attachment of an imperforate toothplate at the proximal margin of the penultimate chamber foramen, toothplate extending to the distal or outer margin of the aperture, the upper free part being spatulate in form. U. Cretaceous (Coniacian) to Holocene; cosmopolitan.

Subfamily ROTALIINAE Ehrenberg, 1839

Rotaliinae Chapman, 1900 (*529), p. 11, nom. corr. pro subfamily Rotalida.

Rotalida Schultze, 1854 (*2824), p. 52, nom. transl. ex family Rotalina.

Rotalinae Carpenter, Parker, and Jones, 1862 (*494), p. 198.

Rotalina Jones, in Griffith and Henfrey, 1875 (*1300), p. 320.

Rotalidae Schwager, 1876 (*2829), p. 20.

Rotalininae Hofker, 1933 (*1493), p. 125.

Test trochospiral, external openings of umbilical side consist of radial canals or fissures or umbilical cavities, commonly also has intraseptal and subsutural canals, umbilical region primarily closed by an umbilical flap, single intercameral foramen. U. Cretaceous (Coniacian) to L. Miocene.

Remarks: The umbilical character of the dominantly Paleogene taxa, including *Rotalia*, differs from that of most Neogene Rotaliidae (Müller-Merz, 1980, *2202; Billman et al., 1980, *238), allowing recognition of a restricted Rotaliinae for the former group and placement of the Neogene taxa in the subfamily Ammoniinae (Loeblich and Tappan, 1986, *1928, p. 260).

CAMAGUEYIA Cole and Bermúdez, 1944

Plate 756, figs. 1-7

Type species: Camagueyia perplexa Cole and Bermúdez, 1944; OD.

Camagueyia Cole and Bermúdez, 1944 (*640), p. 335.

Test conical, with chambers in a high trochospiral coil, chamber lumen much reduced by thick lamellar deposits, umbilical pillars filling the umbilical region; wall calcareous, thick, optically radial, strongly lamellar. M. Eocene; Cuba.

Remarks: *Camaguevia* was originally described as an agglutinated member of the Valvulinidae. Because the original description indicated the presence of pillars, it was transferred tentatively to the Ataxophragmiidae (Loeblich and Tappan, 1964, *1910, p. C284), with the comment that the genus was "poorly known from original materials and needs further study." Cole (1945, *625, p. 111) reexamined the original specimens and stated that the wall was perforate and hyaline, transferring the genus to the Rotaliidae. Study of additional sectioned specimens (Loeblich and Tappan, 1986, *1928, p. 260) confirm this placement. *Camaguevia* resembles *Kathina* and *Lockhartia* but differs in having a much more elevated spire, much thicker wall on the flattened umbilical side, and resultant reduced chamber lumen, and fewer but massive umbilical pillars.

CINCORIOLA Haque, 1958

Plate 757, figs. 1-7

Type species: Punjabia ovoidea Haque, 1956 (*1418), p. 153; OD.

Cincoriola Haque, 1958 (*1419), p. 103 (nom. subst. pro *Punjabia* Haque, 1958).

Punjabia Haque, 1956 (*1418), p. 153 (non *Punjabia* Eames, 1952); type species: obj.; OD.

Praeindicola S. N. Singh and Kalia, 1970 (*2979), p. 356 (name not available, ICZN Art. 13 (b), no species included; no type species).

Praeindicola S. N. Singh and Kalia, in S. N. Singh, 1971 (*2977), p. 1177; type species: *Praeindicola bikanerensis* Singh, 1971; OD.

Test low trochospiral, spiral side flattened to concave, evolute, with sharply angled shoulder, about six to seven chambers in the final whorl, sutures flush, opposite side involute and umbilicate, sutures radial and depressed, umbilical region filled with pillarlike mass, periphery broadly rounded, peripheral outline lobulate; wall calcareous, optically radial, surface smooth to pitted; primary aperture an interiomarginal slit near the umbilicus. Paleocene to L. Eocene (Ypresian); Pakistan; India.

Remarks: Hasson (1985, *1428, p. 354) included in *Cincoriola* a species with angular truncate chambers, small open umbilicus, and cribrate aperture but lacking the characteristic umbilical filling of typical *Cincoriola*. She also considered *Pseudogloborotalia* Haque as synonymous. The completely different test and chamber shape and umbilical and apertural characters do not support this synonymy.

DICTYOCONOIDES Nuttall, 1925

Plate 757, figs. 8-14

Type species: Conulites cooki H. J. Carter, 1861 (*498), p. 53; OD.

Dictyoconoides Nuttall, 1925 (*2273), p. 384 (nom. subst. pro *Conulites* H. J. Carter, 1861).

Conulites H. J. Carter, 1861 (*498), p. 53 (non *Conulites* Fischer de Waldheim, 1832, nec Cozzens, 1846); type species: obj.; OD.

Test low and conical, trochospirally coiled, convex spiral side with thin imperforate outer wall covering a narrow zone of multiple spires of small rectangular chambers, interior of the cone of chambers on the flat to gently convex umbilical side filled by narrow radiating pillars (about 0.1 mm to 0.15 mm in diameter) that arise just beneath the layer of chambers at the apex and increase in number as the test enlarges, pillars separated by intervening spaces of nearly equal size that are subdivided by horizontal partitions; septa doubled and have a median intraseptal canal and subsutural canal system; wall calcareous, hyaline, perforate, lamellar; aperture consists of pores between the umbilical pillars. M. Eocene; India; Qatar Peninsula; Somalia.

DICTYOKATHINA Smout, 1954

Plate 758, figs. 1-6

Type species: Dictyokathina simplex Smout, 1954; OD.

Dictyokathina Smout, 1954 (*3008), p. 64.

Test a low trochospiral, spiral side evolute, with multiple spire of chambers formed by repeated doubling in the plane of coiling as in *Dictyoconoides*, solid umbilical mass of numerous pillars, strong vertical radial canals as in *Kathina* extend from the umbilical apertures of the chambers to external pores at the umbilical surface; wall calcareous, radially fibrous, laminated, finely perforate; chambers intercommunicate through slitlike basal intercameral foramina. Paleocene, L. Eocene?: Qatar Peninsula; Iraq.

KATHINA Smout, 1954

Plate 760, figs. 1-10

Type species: Kathina delseata Smout, 1954; OD.

Kathina Smout, 1954 (***3008**), p. 61.

Orduina Sirel, 1969 (***2986**), p. 145; type species: *Orduina erki* Sirel, 1969; OD.

Test lenticular, low trochospiral coil with a single spire of simple chambers with small chamber lumen, no supplementary chambers or umbilical extensions, umbilical side with numerous pillars, may have central plug and prominent vertical canals opening as pores or slits on the umbilical side, septa double, with intraseptal and subsutural canals but without sutural openings, periphery subacute; wall calcareous, radially fibrous, lamellar, very finely perforate; aperture an interiomarginal slit. U. Cretaceous to Paleocene; Qatar Peninsula; Iraq; Turkey; Cuba.

LAFFITTEINA Marie, 1946

Plate 759, figs. 1-9

Type species: Laffitteina bibensis Marie, 1946 = *Nummulites mengaudi* G. Astre, 1923 (***92**), p. 360; OD.

Laffitteina Marie, 1946 (***2033**), p. 430.

Test lenticular, flattened to inflated, low trochospiral to nearly planispiral but asymmetrical and nearly bi-involute, umbilical thickening on both sides but more prominent on one side, septa double, with ramifying interseptal canals that open as two alternating rows of pores along the sutures on the spiral side, vertical umbilical canals present, as well as peripheral and lateral spiral canals that communicate with the intraseptal canals; wall calcareous, hyaline; aperture an oblique interiomarginal slit extending toward the umbilical plug. U. Cretaceous (Maastrichtian); France; Spain; Italy; Greece; Yugoslavia; W. Africa: Mauritania.

Remarks: The synonymy of *L. bibensis* and *N. mengaudi*, as well as the Maastrichtian rather than Paleocene age of this genus, was demonstrated by P. L. Blanc (1975, ***252**, p. 62-66).

LOCKHARTIA Davies, 1932

Plate 761, figs. 1-6

Type species: Dictyoconoides haimei L. M. Davies, 1927 (***897**), p. 280; OD.

Lockhartia L. M. Davies, 1932 (***899**), p. 406.

Test conical to lenticular, trochospiral, simple spire of numerous chambers visible on the strongly convex spiral side, structure similar to *Dictyoconoides* but lacks intercalary whorls of chambers, septa double, intraseptal canals present, broad umbilicus filled with numerous pillars that arise at the umbilical end of the chambers, appearing at the umbilical surface as pustules, numerous interconnecting umbilical cavities communicate with the chamber lumina and also open to the exterior through large circular pores or meandrine slits, peripheral margin with imperforate band; wall calcareous, lamellar, radially fibrous, coarsely perforate and punctate on the spiral side; apertural foramen an interiomarginal slit. Paleocene to M. Eocene; Punjab Salt Range; Arabia; Iraq; Somaliland.

MEDOCIA Parvati, 1971

Plate 762, figs. 1-8

Type species: Medocia blayensis Parvati, 1971; OD.

Medocia Parvati, 1971 (***2365**), p. 23.

Test lenticular, trochospiral, spiral side strongly convex, septa doubled by addition of septal flap leaving septal passages between the simple sutural fissures and the overlying perforate sutural lobes formed as an extension of the chambers on the umbilical side, alternate laminae from sutural lobes and secondary deposits produce an umbilical mass with labyrinthic grooves, pierced by vertical tubular funnels that connect earlier parts of the spiral canal directly to the surface of the umbilical side, spiral canal lies between the umbilical mass and the umbilical flaps and is covered by the sutural lobes, peripheral margin with imperforate band; wall calcareous, perforate, laminated, with thick lamellar wall on the spiral side as in *Rotalia*; aperture an interiomarginal slit, extending from the umbilical mass nearly to the periphery, partially covered by a large imperforate lip that is separated from the apertural face by a passage, both areal and interiomarginal intercameral foramina present. M. Eocene (Lutetian): France.

ORBITOKATHINA Hottinger, 1966

Plate 763, figs. 1-9

Type species: Orbitokathina vonderschmitti Hottinger, 1966; OD.

Orbitokathina Hottinger, 1966 (***1545**), p. 290.

Test of megalospheric generation lenticular and biconvex, up to 2 mm in diameter, trochospirally coiled, approximately twenty chambers in the final whorl, microspheric test with three to four trochospiral whorls followed by arcuate to spatulate chambers with diagonal stolons, added in concentric series in an orbitoidal manner, test becoming convexoconcave and up to 7 mm in diameter, septa doubled, thin, and fragile, intraseptal spaces closed or may open only as normal pores on the spiral surface but widen rapidly toward the umbilical side to open into the vertical stolons, periphery rounded to subangular; wall calcareous, perforate, lamellar, surface of spiral side smooth, pillars on umbilical side resulting in pustulose or vermiform surface, with vertical canals between the pillars; narrow interiomarginal intercameral foramen and arcuate chambers with diagonal stolons. U. Cretaceous (Coniacian); Spain.

PRAESTORRSELLA Gowda, 1978

Plate 758, figs. 7-11

Type species: Cibicides roestae Visser, 1951 (***3298**), p. 291; OD.

Praestorrsella Gowda, 1978 (***1283**), p. 1.

Test trochospiral, inequally biconvex, spiral side more strongly convex and involute, the extensive calcareous deposits and prominent central and strongly pustulose umbo obscuring all but the latest of the seven to eleven chambers of the final whorl, those sutures visible on the spiral side are thickened, elevated, and curved back at the periphery to grade into the angular peripheral margin, nearly obscured but radial on the umbilical side, no external sutural fissures but septa have rotalid intraseptal passages, central area of umbilical side filled with thick laminar pillars, pierced by vertical canals that open to the surface as large pores; wall calcareous, lamellar, optically radial, finely perforate, center of umbilical side covered with knobs reflecting the ends of the pillars, chambers of the last whorl with numerous ribs that may be radially aligned, the surface knobs, pustules, and ribs obscuring the pores except on the later chambers where they may be visible between the inflational deposits; aperture a simple narrow interiomarginal slit on the umbilical side near the periphery. U. Cretaceous (Santonian to U. Maastrichtian); Netherlands; France; India.

Remarks: Hofker (1955, ***1507**) states that a spiral canal is present around the umbilical mass of pillars and that a pillarlike toothplate divides the aperture in the type species, but neither structure was found by Gowda (1978, ***1283**). Both illustrated only sketches, and no photographs of thin sections have as yet been published.

REDMONDINA Hasson, 1985

Plate 765, figs. 1-4

Type species: Redmondina henningtoni Hasson, 1985; OD.

Redmondina Hasson, 1985 (***1428**), p. 352.

Flattened lenticular test in a low trochospiral coil, about twelve chambers in the final whorl, all visible on the weakly convex spiral side around a central umbonal knob, sutures depressed, oblique and curved back at the periphery, umbilical side with incised sutures and with umbilical chamber extensions in young individuals resembling the imperforate lip or astral lobe of *Rotalia* but apparently perforate in *Redmondina*, in larger specimens the umbilical area is filled with protruding coarse pustules; wall calcareous, thick, of radially fibrous calcite, coarsely perforate; primary aperture an interiomarginal slit, supplemented by the large areal pores of the apertural face. L. Eocene; Saudi Arabia.

Remarks: Although originally placed in the Cuvillierininae, *Redmondina* was described as structurally different on the two sides, hence is transferred to the Rotaliinae.

REEDELLA Hasson, 1985

Plate 762, figs. 9-13

Type species: Reedella radhumaensis Hasson, 1985; OD.

Reedella Hasson, 1985 (*1428), p. 352.

Test subglobular, trochospiral but bi-involute, eleven to twelve broad and low chambers in the final whorl, sutures limbate and elevated, septa double, with intraseptal canals, umbilical side with labyrinthine and perforated umbilical filling; wall calcareous, optically radial, finely perforate; aperture a short broad interiomarginal and nearly equatorial slit at the base of the smooth, flat to excavated apertural face. L. Eocene (Ypresian); Saudi Arabia.

ROTALIA Lamarck, 1804

Plate 764, figs. 1-8

Type species: Rotalites trochidiformis Lamarck, 1804; SD Children, 1823 (*586), p. 156.

Rotalia Lamarck, 1804 (*1776), p. 183.

Rotalites Lamarck, 1804 (*1776), p. 104 (used for fossil *Rotalia*, name not available, ICZN Art. 20); non *Rotalites* Lamarck, 1801).

Test trochospiral, biconvex, all chambers visible on the strongly convex spiral side, only those of the final whorl visible on the umbilical side, an imperforate lip, astral lobe, or folium at the umbilical extremity of the chambers is separated from the perforate ventral wall of the main chamber lumen by a shallow transverse groove, secondary deposits on the folium gradually build thick lamellar pillars that fill the umbilical area, internally a septal flap attaches to the peripheral margin of the septum and secondarily doubles the septal wall, umbilical flap extends from the previous septum to the apertural face to limit the chamber lumen around the umbilicus, forming a spiral canal that encircles the central umbilical mass of pillars, sutures imperforate, may be elevated, oblique and curved back at the periphery on the spiral side, nearly radial, deeply incised with feathered margins on the umbilical side, periphery angular; wall calcareous, distinctly perforate except for the imperforate peripheral margin and the lip, pustules and granules of the central area of the umbilical side; simple interiomarginal aperture and intercameral foramina, extending from the umbilicus toward the periphery. U. Cretaceous (Coniacian) to Eocene; cosmopolitan.

SAKESARIA L. M. Davies, 1937

Plate 765, figs. 5-10

Type species: Sakesaria cotteri L. M. Davies, in L. M. Davies and Pinfold, 1937; OD(M).

Sakesaria L. M. Davies, in L. M. Davies and Pinfold, 1937 (*901), p. 49.

Test elongate conical to subcylindrical, very high trochospiral coiling, commonly with more than four whorls that increase slowly in diameter, spiral side conical, numerous chambers forming a high cone, sutures oblique, thickened, and elevated, central area on the convex umbilical side filled with pillars connected by perforate umbilical plates as in *Lockhartia*, the pillars ending in pustules at the surface, interspersed with pores; wall calcareous, perforate, surface with raised and limbate sutures and pustules and may be reticulate. Paleocene to L. Eocene; Qatar Peninsula; Arabia; Somalia; India.

SMOUTINA Drooger, 1960

Plate 760, figs. 11-17

Type species: Smoutina cruysi Drooger, 1960; OD.

Smoutina Drooger, 1960 (*1013), p. 306.

Test lenticular, inequally biconvex, trochospiral, spiral side with two and a half to three whorls of numerous chambers forming a broad cone, twenty to twenty-six chambers in the final whorl, central area of cone filled with pillars that occupy about half the diameter of the umbilical side, vertical canals between the pillars open as circular to slitlike pores at the surface, chambers open into spiral canal at the umbilical margin, septa doubled, with intraseptal canals, sutures flush on the spiral side, fissured on the umbilical side, the fissures opening into the branching spiral canal system in the umbilical mass; wall calcareous, lamellar, optically radial, finely perforate; intercameral foramen an elongate slit. U. Cretaceous (Maastrichtian) to M. Eocene; French Guiana; Cuba; USA: Florida.

SORIELLA Haque, 1960

Plate 766, figs. 1-14

Type species: Soriella schoechlei Haque, 1960: OD.

Soriella Haque, 1960 (*1420), p. 39.

Indicola S. N. Singh and Kalia, 1970 (*2981), p. 77; type species: *Indicola rajasthanensis* S. N. Singh and Kalia, 1970; OD.

Test a low trochospiral coil of three to three and a half whorls, planoconvex, with angular and truncated margins, spiral side flat to weakly convex or slightly concave, about seven to eleven chambers in the final whorl, sutures radial, straight to slightly curved, umbilical side elevated, prominent carinate umbilical shoulder of reticulose appearance surrounding a narrow elongate umbilicus that is filled with horizontal plates from the chambers and by vertical pillars, periphery carinate, peripheral outline slightly lobulate; wall calcareous, coarsely perforate; aperture may consist of a row of openings at the base of the chamber. M. Eocene (Lutetian); Pakistan; India: Rajasthan.

Remarks: Sketches of the apertural face suggest the aperture of *Soriella* to be a single interiomarginal arch and *Indicola* to have a row of pores near the base of the face, the latter also indistinctly shown in photographs. Whether these represent the true aperture or an intercameral foramen is uncertain.

YAUCOROTALIA Seiglie, 1972

Plate 764, figs. 9-13

Type species: Yaucorotalia moussai Seiglie, 1972; OD.

Yaucorotalia Seiglie, 1972 (*2849A), p. 115.

Test lenticular, inequally biconvex, trochospiral, about three whorls visible on the more convex spiral side, five chambers in the final whorl, umbilical side with umbilical plug of pillars separated by anastomosing fissures, periphery angular, carinate; wall calcareous, perforate, surface smooth on spiral side, umbilical side with fissures in the umbilical plug and costae radiating from the aperture across the face of the final chamber; aperture slitlike, with lip at umbilical margin. Oligocene to L. Miocene; Puerto Rico.

Subfamily AMMONIINAE Saidova, 1981

Ammoniinae Loeblich and Tappan, 1986 (*1928), p. 262 (nom. transl. ex family Ammoniidae Saidova, 1981).

Test trochospiral, umbilical region secondarily closed by a foraminal cover plate that extends into the previous chamber, with radial canals, fissures, or umbilical cavities connecting the chambers, the canal system functioning as an aperture. L. Miocene to Holocene.

AMMONIA Brünnich, 1772

Plate 767, figs. 1-10

Type species: Nautilus beccarii Linné, 1758 (*1859), p. 710; SD Frizzell and Keen, 1949 (*1187), p. 106.

Ammonia Brünnich, 1772 (*440), p. 232.

Hammonia Soldani, 1789 (*3017), p. 56 (err. emend.).

Streblus Fischer de Waldheim, 1817 (*1132), p. 449; type species: obj.; OD(M).

Rotalia (les Turbinulines) d'Orbigny, 1826 (*2303), p. 275 (name not available, ICZN Art. 11 (b)(i); 11 (g); vernacular).

Turbinulina Risso, 1826 (*2628), p. 18; type species: *Turbinulina italica* = *Rotalia* (les Turbinulines) *italica* d'Orbigny, 1826 (*2303), p. 275 = *Nautilus beccarii* Linné, 1758, obj.; SD herein.

Rolshausenia Bermúdez, 1952 (*205), p. 63; type species: *Rotalia rolshauseni* Cushman and Bermúdez, 1946 (*809), p. 119; OD.

Test biconvex, with low trochospiral coil of 3 to 4 volutions, spiral side evolute, umbilical side involute and may have large umbilical plug surrounded by umbilical fissure, final whorl with deeply incised umbilical, radial, and intraseptal spaces, sutural fissures straight or branching and appear feathered on the umbilical side, umbilical and intraseptal spaces of earlier whorls filled by secondary lamellae, leaving only one vertical passage from each chamber of the penultimate whorl to the junction of the umbilical fissure and intraseptal space of the final whorl, early chambers closed toward umbilicus, no spiral canal present, periphery rounded to carinate; wall calcareous, optically radial, primarily bilamellar, moderately coarsely perforate, both surfaces may be ornamented by pillars and umbilical side may have transverse ridges resulting from the feathered umbilical sutures when these are present; primary aperture an interiomarginal extraumbilical arch, bordered by a protruding lip at the umbilical end, space between the lip and umbilical pillars may be filled by secondary lamellae as new chambers form. L. Miocene to Holocene; cosmopolitan.

Remarks: A. M. Davies (1935, ***896**, p. 27) stated that *T. beccarii* (Linné) is the "genotype" of *Turbinulina* d'Orbigny, but the genus was not validly described by d'Orbigny, who used only the vernacular name "les Turbinulines" for the subgenus of *Rotalia. Turbinulina* was validated by Risso, 1826, with three included species, *T. depressura* (citing in the synonymy figures of *Nautilus depressulus* Walker and Jacob given by Montagu, 1803, which appear planispiral and possibly a peneroplid but not congeneric with *Ammonia*), *T. laevigatula* (= *Nautilus laevigatulus* Walker and Jacob, also planispiral, and possibly a *Lenticulina*), and *T. italica* (including in the synonymy a reference to d'Orbigny's 1826 figures of *Rotalia* (les Turbinulines) *italica* d'Orbigny). The latter species is conspecific with *Nautilus beccarii* Linné, 1758 and is here designated as the type species of *Turbinulina* Risso, which is thus a junior synonym of *Ammonia.*

ASANOINA Finlay, 1939

Plate 768, figs. 1-7

Type species: Rotaliatina globosa Yabe and Asano, 1937 (***3404**), p. 124; OD.

Asanoina Finlay, 1939 (***1126**), p. 541.

Test large, up to 2 mm in diameter, globular to ovoid, high spired as a result of the axial lengthening of the chambers, sutures slightly oblique on both sides, becoming twisted in a backward spiral near the umbilicus, septal flap against the previous septum encloses an intraseptal canal system, narrow umbilicus covered by imperforate extensions of the apertural lip, umbilical region in the adult filled with pillars and intercalated vertical canals, encircled by the spiral canal, periphery rounded, noncarinate; wall calcareous, finely perforate, with few and much larger sutural pores alternating on either side of the septa between numerous elevated and nonperforate rounded to elongate pustules that may fuse by lamellar growth to resemble a keel on the spiral side; aperture slitlike, interiomarginal, at the umbilical margin of the chambers. Pliocene; Indonesia: Borneo; Java; New Zealand.

Remarks: *Asanoina* was incorrectly placed in synonymy of *Pseudorotalia* by Billman et al., 1980 (***238**), although it has clear priority of many years; however, both genera are recognized as distinct herein.

ASTEROAMMONIA Voloshinova, 1970

Plate 769, figs. 1-4

Type species: Asteroammonia katangliensis Voloshinova, in Voloshinova et al., 1970; OD.

Asteroammonia Voloshinova, in Voloshinova, Kuznetsova, and Leonenko, 1970 (***3319**), p. 147.

Test trochospiral, biconvex, all of the two to four slowly enlarging whorls visible on the spiral side, seven to eight chambers in the final whorl, sutures oblique, slightly depressed, umbilical side with radial, depressed sutures, umbilicus and preceding sutural slit covered by narrow, elongate, platelike extension from the apertural lip as in *Asterorotalia*, leaving a slitlike opening at the margin, successive platelike lips of the final whorl produce a stellate area around the solid umbilical plug of the umbilicus, periphery rounded; wall calcareous, perforate, surface smooth; aperture an interiomarginal arch on the umbilical side, with lip continuing back over the preceding suture to form the central stellate structure. M. Miocene to Pliocene; USSR: Sakhalin Island; Japan.

ASTEROROTALIA Hofker, 1950

Plate 769, figs. 5-11

Type species: Rotalina (Calcarina) pulchella d'Orbigny, 1839 (***2304**), p. 80 (syn.: *Rotalia trispinosa* Thalmann, 1933, ***3152**, p. 248); OD(M).

Asterorotalia Hofker, 1950 (***1495**), p. 73, 76.

Test flattened, low trochospiral to nearly planispiral coil of two to three whorls, eight to twelve chambers in the final whorl, sutures slightly depressed, chambers on umbilical side separated by deeply incised sutures with granulose to spinose borders, the umbilical end of the wide sutural interlocular space covered by a backward extension from the lip of the final chamber, liplike extensions of successive chambers radiating from the umbilicus that is filled with a central pillar, simple spiral canal around the umbilical plug is connected to the hooked umbilical extensions from the chambers, periphery with imperforate keel interrupted by deep sutural incisions; wall calcareous, perforate, optically radial, surface of spiral side smooth between the numerous inflational knobs, pustules, and ridges that may obscure the sutures or the sutural incisions may be bordered by narrow ridges, three large solid spines arise as extensions from the imperforate keel of the first whorl in megalospheric specimens and from the third whorl of the microspheric generation and are subsequently enlarged by lamellar growth as new chambers and whorls are added: aperture a vertically aligned and nearly equatorial ovate opening at the base of the apertural face, a small hooked foraminal plate present at the umbilical margin of the foramen. Pliocene to Holocene: Caribbean: Cuba; Indonesia: Borneo, Java; Persian Gulf.

Remarks: As noted earlier (Loeblich and Tappan, 1964, ***1910**, p. C608). *Rotalina (Calcarina) pulchella* is neither a primary homonym of *Rotalia (Rotalia) pulchella* d'Orbigny, in Parker, Jones, and Brady, 1865 (***2354**, p. 30, pl. 3 fig. 80; syn.: *Rotalia (Rotalia) pulchella* d'Orbigny, 1826, nom. nud.) nor a secondary homonym, as the two are not now regarded as congeneric. Furthermore, *Rotalina (Calcarina) pulchella* was validated in 1839 and *Rotalia pulchella* not until 1865. Thus the name *Rotalia trispinosa* is a superfluous synonym.

CHALLENGERELLA Billman, Hottinger, and Oesterle, 1980

Plate 770, figs. 1-8

Type species: Challengerella bradyi Billman et al., 1980; OD.

Challengerella Billman, Hottinger, and Oesterle, 1980 (***238**), p. 81.

Test trochospiral, nearly equally biconvex, all of the two to three slowly enlarging whorls visible on the spiral side, sutures limbate, straight to curved, bending slightly backward toward the periphery, only the fourteen to sixteen chambers of the final whorl visible on the umbilical side, sutures deeply incised with elevated margins that may be weakly feathered and finely pustulose, leaving open intraseptal spaces that later are transformed into tubular passages to successive whorls of the spiral canal, chamber lumen connected to canal system by an opening from the umbilical chamber extension that leads into vertical intraseptal canals, umbilicus with large umbilical plug having few or no vertical canals but may be subdivided in larger microspheric individuals, umbilical plug surrounded by an umbilical fissure that becomes a simple spiral canal, periphery weakly carinate in early part of last whorl, rounded in later chambers; wall calcareous, finely perforate, smooth except for the imperforate sutural margins, apertural face imperforate; primary aperture a small interiomarginal slit bordered by an imperforate lip that extends into the umbilicus and partly covers the spiral fissure. Holocene; Red Sea: Gulf of Elat; Indian Ocean.

PSEUDOROTALIA Reiss and Merling, 1958

Plate 771, figs. 1-6

Type species: Rotalia schroeteriana Carpenter, Parker, and Jones, 1862 (***494**), p. 212; OD.

Pseudorotalia Reiss and Merling, 1958 (***2563**), p. 13.

Test large, subconical, planoconvex and trochospiral with two to four gradually enlarging whorls, ten to twenty chambers in the final whorl, spiral side flat and umbilical side strongly elevated, sutures nearly straight and radial to slightly oblique on the spiral side, straight and radial on the umbilical side, elevated and limbate on both sides but commonly broken into beads or nodes by the rows of openings into the canal system, imperforate umbilical lips extend into the narrow umbilicus and are thickened by secondary lamellae as new chambers are added, producing a cavity filled umbilical mass that is perforated by a few large rounded openings into the umbilical canal system, intraseptal canals open to the exterior by a double row of alternating sutural pores on both sides of the test, periphery acute and with imperforate keel; wall calcareous, of lamellar fibrous calcite, optically radial, coarsely perforate; aperture interiomarginal on umbilical side, partly covered by narrow extension of apertural face. U. Miocene to Holocene; Borneo; New Guinea; Australia.

Remarks: Billman et al. (1980, ***238**, p. 108) included the type species of *Asanoina* Finlay, 1939 in *Pseudorotalia*, as the two have a similar inner structure. However, if the two are considered to be congeneric, *Asanoina* has nearly twenty years priority. *Asanoina* has a strongly convex spiral side and high trochospiral coil, whereas *Pseudorotalia* has a flat to faintly convex spiral side and conical umbilical side. In conformity with similar differences separating *Sakesaria* and *Kathina* or *Lockhartia*, we recognize the two genera as distinct.

ROTALIDIUM Asano, 1936

Plate 771, figs. 7-9; plate 772, figs. 1-7

Type species: Rotalidium pacificum Asano, 1936; OD.

Rotalidium Asano, 1936 (***81**), p. 350.

Cavarotalia Müller-Merz, 1980 (***2202**), p. 36; type species: *Rotalia annectens* Parker and Jones, 1865 (***2351**), p. 387, 422; OD.

Test lenticular, trochospiral, about four slowly enlarging whorls, the final one with ten to fifteen chambers, sutures limbate, elevated on the spiral side, incised on the umbilical side and leaving wide interlocular spaces with feathered margins, narrow umbilicus with an umbilical plug containing a single vertical cavity in small individuals and numerous irregular vertical canals in larger specimens, umbilical space of preceding whorl covered by umbilical extensions from the chambers to become a broad spiral canal, intraseptal canal system consists of a single broad radial canal in each septum that opens at the peripheral end of the suture on the umbilical side; wall calcareous, finely perforate, spiral side with elevated septal and spiral sutures and ridgelike thickenings near the apex, umbilical side with smooth surface except for the pustulose, ridgelike sutural margins and central umbilical pillars; aperture an interiomarginal arch between the umbilical margin and periphery. U. Miocene to Holocene; Japan; Hong Kong; Borneo; Indian Ocean.

Remarks: As noted previously (Loeblich and Tappan, 1964, ***1910**, p. C607), the structures described in *R. pacificum* as supplementary chamberlets are umbilical chamber extensions or folia, as described for *Cavarotalia* and other Ammoniinae. Billman et al. (1980, ***238**, p. 98) also suggested that *Rotalidium pacificum* and *Rotalia japonica* Hada, 1931 belong to *Cavarotalia*; however, the older name *Rotalidium* obviously has priority.

ROTALINOIDES Saidova, 1975

Plate 773, figs. 1-8

Type species: Rotalia papillosa Brady, 1884 (***344**), p. 708 (non *Rotalia (Rotalia) papillosa* d'Orbigny, 1826, name not available, ICZN Art. 12 (a), no description; and non *Rotalia papillosa* d'Orbigny, 1850) = *Turbinulina gaimardi* d'Orbigny, in Fornasini, 1906 (***1155**), p. 67 (syn.: *Rotalia (Turbinulina) gaimardi* d'Orbigny, 1826, ***2303**, p. 275, name not available, ICZN Art. 12 (a), no description); OD.

Rotalinoides Saidova, 1975 (***2695**), p. 220.

Test large and robust, lenticular, trochospiral, about three to four slowly enlarging whorls, nine to fourteen chambers in the final whorl, spiral side slightly less convex, sutures oblique and curved back at the periphery, slightly depressed, with elevated poreless rims that later fuse to appear as beaded sutures, the inflational beads or pustules progressively larger toward the umbo, sutures radial, strongly incised and feathered on the umbilical side because of the alternating series of beadlike pustules along each edge, umbilicus filled with inflational pillars, perforate extensions of the chamber wall over the spiral and sutural fissures form a spiral canal and radial canals, with large apertures leading directly into the umbilical canal system as well as at the umbilical end of the sutural fissure, periphery with imperforate keel interrupted by sutural incisions of the outer margin; wall calcareous, thick, finely perforate but sutures, pustules, pillars, and keel imperforate. M. Miocene to Holocene: Indo-Pacific; Malaysia; Java; Borneo; Red Sea.

Remarks: Species here regarded as belonging to *Rotalinoides* were considered to be nonspinose species of *Asterorotalia* by Billman et al. (1980, *238), but the thick solid spines and small and delicate compressed test of *Asterorotalia* distinguish that genus from the more robust *Rotalinoides*.

Family CHAPMANINIDAE Thalmann, 1938

Chapmaninidae Thalmann, 1938 (*3159), p. 207.

Chapmaniidae Galloway, 1933 (*1205), p. 316 (invalid, based on *Chapmania* A. Silvestri and Prever, 1904, non Monticelli, 1893).

Chapmanininae Frizzell, 1949 (*1186), p. 482, (subfamily, nom. transl. ex family).

Chapmaniida Copeland, 1956 (*680), p. 187 (err. emend.).

Test conical, early portion trochospiral, later uniserial; septa invaginated into tube pillars or chamberlets; aperture consists of tube openings. U. Paleocene to M. Miocene (Tortonian).

ANGOTIA Cuvillier, 1963

Plate 774, figs. 1-8

Type species: Angotia aquitanica Cuvillier, 1963; OD(M).

Angotia Cuvillier, 1963 (*863), p. 223.

Test attached, conical, large thick-walled bilocular embryo followed by a series of low flat chambers forming a low to high cone with flattened base, lamellae at the base of the test may be infolded and touch the previous wall, forming what appear to be hollow pillars, similar and regularly spaced undulations or infolding of the wall in the peripheral zone produces tunnels perpendicular to the outer margin, with alternating longer and shorter radial infoldings, the longer ones commonly terminating at one of the hollow pillars; wall calcareous, finely perforate, thickened by lamellar additions, surface smooth except where abraded; aperture consists of multiple rounded pores formed by the hollow pillars in the flattened base. M. Eocene (U. Lutetian); France.

CHAPMANINA A. Silvestri, 1931

Plate 775, figs. 1-10

Type species: Chapmania gassinensis A. Silvestri, 1905 (*2935), p. 130; SD ICZN Op. 765, China, 1966 (*588), p. 25.

Chapmanina A. Silvestri, 1931 (*2961), p. 74 (nom. subst. pro *Chapmania* A. Silvestri and Prever, 1904).

Chapmania A. Silvestri and Prever, in Silvestri, 1904 (*2932), p. 17 (non *Chapmania* Monticelli, 1893, nec Spuler, 1910, nec de Miranda Ribeiro, 1920, nec Bernhauer, 1933).

Archapmanoum Rhumbler, 1913 (*2621), p. 392 (err. emend.).

Preverina Frizzell, 1949 (*1186), p. 489; type species: *Chapmania galea* A. Silvestri, 1923 (*2953), p. 90; OD.

Test conical, bilocular embryo followed by much reduced trochoid spiral at the apex of the cone, then with rapidly broadening large flat discoidal chambers in uniserial arrangement, central part of the chambers with concentric rings of tube pillars of identical size within a chamber but becoming slightly larger in successive chambers, not continuous from one chamber to the next, each tube pillar with a raised lunate rim on the septum inside the chamber, opening to the exterior as a round pore where the septal wall is infolded, peripheral region with a ring of forty to fifty regular secondary chamberlets formed by radial partitions or beams that are perpendicular to the main septa, chamberlets slightly wider in the later chambers and alternating in position from chamber to chamber, undulations in the marginal zone reflect the position of the partitions; wall calcareous, perforate; apertural face broad and flat, aperture consists of the numerous rounded openings of the tube pillars on the central part of the chamber wall. M. Eocene (Lutetian) to M. Miocene (Tortonian); Italy; France; Spain; Greece; Romania.

Remarks: The holotype of *Chapmania galea* A. Silvestri is in the Silvestri Collection, section no. 1307, AGIP, Milan, Italy.

CRESPININA Wade, 1955

Plate 776, figs. 1-12

Type species: Crespinina kingscotensis Wade, 1955; OD.

Crespinina Wade, 1955 (*3330), p. 45.

Low conical test, bilocular megalospheric embryo of spherical protoconch and reniform deuteroconch, followed by a few annular and undivided chambers and later by broadly saucer-shaped rectilinear chambers, microspheric form with early planispiral coil followed by embracing and finally annular chambers, annular and saucer-shaped chambers divided by the imperforate radial partitions formed by infolding of the outer wall, interior with hollow pillars extending from one septum to the next and similarly formed by infolding of the basal wall, neither partitions nor pillars aligned in successive chambers; wall calcareous, lamellar, convex surface and pillars perforate, ventral surface of the test partially imperforate and radial partitions imperforate; aperture consists of the large pores that open into the hollow pillars. U. Eocene to L. Oligocene; South Australia.

FERAYINA Frizzell, 1949

Plate 776, figs. 13-15

Type species: Ferayina coralliformis Frizzell, 1949: OD.

Ferayina Frizzell, 1949 (*1186), p. 483, 492.

Test conical, proloculus followed by three or four tiny chambers, then with rapidly enlarging saucerlike rectilinear chambers, septa horizontal, flat; wall of calcite by X-ray analysis, optically radial, finely perforate but with imperforate flat apertural face, surface with low equidistant longitudinal costae, additional ribs intercalated with growth to maintain their constant spacing; aperture consisting of numerous rounded openings on the terminal face at the end of hollow pillars that extend to the previous septum. M. Eocene; USA: Texas, California; Ecuador; Peru.

SHERBORNINA Chapman, 1922

Plate 777, figs. 1-7

Type species: Sherbornina atkinsoni Chapman, 1922; OD.

Sherbornina Chapman, 1922 (*538), p. 501.

Test discoidal but with differentiated sides, up to 2 mm in diameter, periphery broadly rounded, early stage planispirally coiled, from four to ten enrolled chambers in the megalospheric test, up to fourteen in the microspheric test, postembryonic chambers increasing rapidly in length, becoming embracing and pavonine, chambers annular in the adult, lateral walls with corrugations, especially near the sutures, that alternate from chamber to chamber so that ridges and the underlying extensions of the chamber lumen from one chamber overlap the infolded part of that preceding, chamber prolongations may be enlarged and irregular on the ventral side, septal flap formed against the previous septum as new chambers are added, canal system symmetrical on dorsal and ventral sides, juvenile stage with spiral and septal canals, adult with septal and radial canals having branches to the surface that terminate in coarse pores, final pair of annular canals opens by a ring of pores in the position to be occupied by the radial canals of the succeeding chamber; wall calcareous, optically radial, additional lamellae deposited over the entire test as each new chamber is added, wall perforations much smaller than canal openings and may open into the canals or directly to the surface, apertural face may be imperforate or perforate as is the rest of the test wall. U. Paleocene to M. Miocene; warm water, cosmopolitan.

TENISONINA Quilty, 1980

Plate 777, figs. 8-16

Type species: Tenisonina tasmaniae Quilty, 1980; OD.

Tenisonina Quilty, 1980 (*2501), p. 305.

Test discoidal, planoconvex, flatter surface may be centrally depressed, early enrolled stage as in *Sherbornina*, with six to eight chambers forming up to one and a half whorls, followed by annular series of arcuate chambers resulting from strong corrugation of the peripheral margin so that the outer wall of chambers of a single cycle is a continuous sheet of calcite, final one or two annular chambers may be undivided, canal system well developed; wall calcareous, coarsely perforate, radial, thick lamellae added to test surface with each cycle of chambers. L. Miocene; Tasmania.

Family CALCARINIDAE Schwager, 1876

Calcarinidae Eimer and Fickert, 1899 (*1088), p. 631, nom. corr. pro family Calcarine.

Calcarine Schwager, 1876 (*2829), p. 481 (nom. imperf.).

Tinoporidea Schwager, 1877 (*2830), p. 21.

Tinoporinae Brady, 1884 (*344), p. 74 (subfamily).

Tinoporina Lankester, 1885 (*1790), p. 847.

Tinoporinae Delage and Hérouard, 1896 (*926), p. 147.

Tinoporidae Lister, in Lankester, 1903 (*1791), p. 146.

Calcarininae Hofker, 1927 (*1491), p. 42 (subfamily).

Tinoporininae Hofker, 1933 (*1493), p. 125 (subfamily).

Siderolitidae Finlay, 1939 (*1126), p. 525.

Siderolitinae Sigal, in Piveteau, 1952 (*2413), p. 250 (subfamily).

Baculogypsinidae Smout, 1955 (*3009), p. 205.

Test enrolled, showing little or no differentiation of spiral and umbilical surfaces; commonly with large inflational spines; canal system diffuse and confused with perforations. U. Cretaceous (Maastrichtian) to Holocene.

BACULOGYPSINA Sacco, 1893

Plate 778, figs. 1-6

Type species: Orbitolina concava Lamarck var. *sphaerulata* Parker and Jones, 1860 (***2348**), p. 34, 38; OD(M).

Baculogypsina Sacco, 1893 (*2686), p. 206.

Test biconvex, lenticular, with prominent radial spines, thick-walled embryo consists of spherical proloculus and one and a half whorls of trochospirally arranged chambers interconnected by two to three stolons each and communicate with the spiral canal system on the ventral side by a single small radial canal, four to eight large spines arise from the spiral juvenarium and continue to enlarge with growth, anastomosing spine canals connected by radial canals to the central spiral canal, spiral juvenile followed by successive growth steps of numerous domelike lateral chamberlets in a loose network over the test, chamberlets of successive networks alternate in position and communicate through oblique multiple stolons, but chamberlets also are aligned in series that radiate from the center, those adjacent to the spines may have connections to the spine canals and those of the final series have small basal apertures on all sides of the chamberlets, solid pillars inserted between the vertical rows of chamberlets and appear at the surface as imperforate pustules: wall calcareous, coarsely perforate. Holocene; W. tropical Pacific.

Remarks: A lectotype (BMNH, ZF3599) was designated for *Orbitolina sphaerulata* (Loeblich and Tappan, 1964, ***1910**, p. C629).

BACULOGYPSINOIDES Yabe and Hanzawa, 1930

Plate 779, figs. 1-8

Type species: Baculogypsinoides spinosus Yabe and Hanzawa, 1930; OD(M).

Baculogypsinoides Yabe and Hanzawa, 1930 (*3411), p. 43.

Siderolites (Baculogypsinoides) Hofker, 1970 (*1519), p. 55 (nom. transl.).

Test globular but the three or four large thick and protruding spines may give a triangular to tetrahedral appearance, early chambers of both generations in a low trochospiral coil, with pores in the spiral side and distinct canals in the umbilical side that connect to the anastomosing radial spine canals, spines arise from the earliest whorl of chambers and enlarge rapidly with test growth, postembryonic stage with numerous small chamberlets added on all sides as in *Baculogypsina*, the pillars projecting as pustules at the surface, intraseptal canals formed by addition of a septal flap from the new chambers; wall calcareous, compact, coarsely perforate; spiral chambers with single basal to areal aperture, later chambers with row of rounded pores adjacent to the suture and may also have areal openings. Holocene; Philippines; Okinawa.

Remarks: *Baculogypsinoides spinosus* was described by Yabe and Hanzawa for the species described as *Siderolites? tetrahedra* (Gümbel) by Cushman (1919, ***713**, pl. 44, fig. 5, pl. 45, figs. 1-5). Gümbel's species is now the type species of *Silvestriella* Hanzawa, 1952. As no type specimen had been designated for *B. spinosus*, Loeblich and Tappan (1964, ***1910**, p. C629) reillustrated and designated the juvenile specimen illustrated by Cushman (1919, pl. 45, figs. 2a, b) as lectotype of the species. Hofker (1970, ***1519**, p. 53, 75) regards this specimen as *Calcarina hispida*, but Hanzawa (1952, ***1408**, p. 5) stated that the young phase of growth of *Baculogypsinoides* cannot be distinguished from *Calcarina*. Both species were reported by Cushman from his samples: in addition to the lectotype, Albatross Station D5179 includes numerous adults of both species. Although a juvenile individual unfortunately was designated as lectotype, and it cannot be sectioned to unequivocally determine the internal structure, the detailed studies by Hofker (1927, ***1491**, as *Baculogypsina tetraedra;* and 1970, ***1519**, as *Baculogypsinoides*) and by Hanzawa (1952, ***1408**) accurately demonstrate the external appearance and internal structure of *Baculogypsinoides*.

CALCARINA d'Orbigny, 1826

Plate 780, figs. 1-6; plate 781, figs. 1-6

Type species: Nautilus spengleri Gmelin, 1788 (***1252**), p. 3371; SD Parker and Jones, 1859 (***2345**), p. 482.

Calcarina d'Orbigny, 1826 (***2303**), p. 276.

Tinoporus de Montfort, 1808 (***2176**), p. 147 (nom. reject., ICZN ZN(S) 2225/3, petition pending); type species: *Tinoporus baculatus* de Montfort, 1808 = *Nautilus spengleri* Gmelin, 1788; OD(M).

Rotalina (Calcarina) d'Orbigny, 1839 (***2304**), p. 37, 79 (nom. transl.).

Siderolites (Calcarina) Hofker, 1970 (***1519**), p. 55 (nom. transl.).

Test large, up to 2 mm in diameter, lenticular, biconvex, commonly with a few to many heavy and blunt to splayed or bifurcating radial spines, five to six whorls, trochospirally coiled throughout, ten to twenty chambers in the final whorl, spiral canal system present on the umbilical side, giving rise to radial canals and to numerous anastomosing radial spine canals that pass over the chambers on the spiral side to run through the spines; wall calcareous, thickly lamellar, perforate but with imperforate apertural face, surface highly ornamented, numerous pustules and spinules covering the test and obscuring the sutures, umbilicus filled by a pillarlike mass formed by lamellar deposits, apertural face may have radiating ridges; aperture and intercameral foramina consist of multiple rounded pores with elevated lips along the base of the apertural or septal face. Pliocene to Holocene; Pacific Ocean.

Remarks: A neotype for *Calcarina spengleri* was selected and designated by Hansen (1981, ***1393**, p. 198) from Spengler's original material in the Geological Museum, University of Copenhagen (MCUH 15076).

QUASIROTALIA Hanzawa, 1967

Plate 779, figs. 9-11

Type species: Quasirotalia guamensis Hanzawa, 1967; OD.

Quasirotalia Hanzawa, 1967 (***1412**), p. 23.

Test about 2 mm in diameter, lenticular to planoconvex, spiral side flat, early chambers in simple trochospiral coil of up to four whorls, later whorls also with layers of chambers added to the periphery and umbilical side and with inflational pillars in the umbilical region; wall calcareous, secondarily doubled as in *Calcarina*, pierced by numerous large pores. Pliocene; Guam; Japan.

SCHLUMBERGERELLA Hanzawa, 1952

Plate 782, figs. 1-7

Type species: Baculogypsina floresiana Schlumberger, 1896 (***2768A**), p. 88; OD.

Schlumbergerella Hanzawa, 1952 (***1408**), p. 19.

Test large, globular, up to 3.5 mm in diameter, with slightly projecting spines or tubercles, microspheric generation with early flat to planispiral coil of about two whorls without spines, then with inflational spines that lack an internal canal system arising from the outer wall, megalospheric embryo consists of spherical proloculus, deuteroloculus, and reniform third chamber with tetragonal spines formed from the outer chamber walls of each, embryonal stage followed by numerous small arched chambers that produce a globular test, communicating with adjacent chambers through stolons in the lateral walls and with chambers of the same radial row by the coarse wall perforations, numerous massive crystalline ornamental pillars form at a later stage of growth and are interspersed between the radiating rows of chamberlets; canal system much reduced, with only a few elongate radial stolons in the chamberlets at their contact with the spines taking the function of the canal system; wall calcareous, coarsely perforate. Pleistocene to Holocene; Indonesia: Java; Timor.

SIDEROLITES Lamarck, 1801

Plate 783, figs. 1-8

Type species: Siderolites calcitrapoides Lamarck, 1801: OD(M).

Siderolites Lamarck, 1801 (*1775), p. 376.
Siderolithes de Montfort, 1808 (*2176), p. 151 (err. emend.).
Siderolina Defrance, 1824 (*921), p. 180 (err. emend.).
Sideroporus Bronn, 1825 (*418), p. 30, 31; type species: *Sideroporus calcitrapa* Bronn, 1825 (syn.: Sidérolite calcitrapoïde Faujas de Saint-Fond, 1799, *1118, p. 188, vernacular).
Siderolithus Bronn, 1838 (*419), p. 711 (err. emend.).
Nummulina (Siderolina) d'Orbigny, 1839 (*2304), p. 48 (nom. transl.).

Test large, globular proloculus followed by planispiral and involute coil of about four whorls, more than twelve chambers in the final whorl, two to seven large coarse spines, commonly four, arise near the proloculus in the plane of coiling; canal system consists of spiral canals in the umbilical region on both sides of the test connecting to lateral intraseptal canals and a marginal canal from which arise bundles of ramifying spine canals; wall calcareous, with thin finely perforate inner layer and thicker coarsely perforate outer layer, pillars may occur in the umbilical region and appear as solid pustules or knobs at the surface; aperture in the early chambers a single areal opening surrounded by a lip and lying near the base of the apertural face, later chambers with a single row of foramina at the base of the septa. U. Cretaceous (Maastrichtian); Europe; Mideast; India.

SILVESTRIELLA Hanzawa, 1952

Plate 778, figs. 7-9

Type species: Calcarina tetraedra Gümbel, 1870 (*1337), p. 656; OD.

Silvestriella Hanzawa, 1952 (*1408), p. 17.

Test large, about 2.5 mm in diameter, rarely up to 3.5 mm, commonly with four large radial spines resulting in a tetrahedral form, rarely as many as ten spines, early megalospheric stage with thin-walled proloculus, and four or more thicker-walled chambers in raspberrylike arrangement, spines arise from the early whorl of chambers and widen rapidly, longitudinal spine canals probably arise from the interseptal spaces of the early chambers, lateral branches of the canals along the spines lead to the surface as numerous pores along the spine margins or may lead into the chambers adjacent to the spines, following the juvenarium many arched chambers are inserted between and attached along the inner part of the spines but leave the tips uncovered, narrow solid pillars may be present between the outermost chambers; wall calcareous, thick, and distinctly perforate in the early chambers, later somewhat thinner and with finer pores; aperture interiomarginal in the early stage, later chambers with basal row of rounded areal foramina as in *Calcarina*. U. Eocene (Auversian to Bartonian): Italy; Austria; Spain.

Remarks: Although the raspberrylike early chamber arrangement of the megalospheric test is more characteristic of the Acervulinidae, the canaliculate spines, rows of areal foramina near the base of the septa, and free-living habit of *Silvestriella* differ from that family. The raspberrylike stage was regarded by Küpper (1954, *1753, p. 28) as a reduced spiral; as no sectioned microspheric specimens have been illustrated, the presence of a true spiral in *Silvestriella* is not certain.

Family ELPHIDIIDAE Galloway, 1933

Elphidiidae Sigal, in Piveteau, 1952 (*2413), p. 240, nom. transl. ex subfamily Elphidiinae (replacement name maintained, ICZN Art. 40 (b)).
Polystomellidea Reuss and Fritsch, 1861 (*2593), p. 4.
Polystomellida Schmarda, 1871 (*2781), p. 165.
Polystomellina Lankester, 1885 (*1790), p. 848.
Polystomellinae Delage and Hérouard, 1896 (*926), p. 150.
Polystomellidae Eimer and Fickert, 1899 (*1088), p. 626.
Canaliferidae Krasheninnikov, 1953 (*1727), p. 89 (non Canaliferidae Broderip, 1839).
Faujasinidae Saidova, 1981 (*2696), p. 51.

Test planispiral to trochospiral or may uncoil in later stage; sutural canal system opening into sutural pores; aperture interiomarginal or areal, single or multiple. Paleocene to Holocene.

Subfamily ELPHIDIINAE Galloway, 1933

Elphidiinae Galloway, 1933 (*1205), p. 265 (replacement name maintained, ICZN Art. 40 (b)).
Polystomellida Schultze, 1854 (*2824), p. 53.
Polystomellina Jones, in Griffith and Henfrey, 1875 (*1300), p. 320.

Polystomellinae Brady, 1881 (*339), p. 44.
Cribroelphidiinae Voloshinova, 1958 (*3315), p. 167.

Sutural pores and sutural canal system present, retral processes may bridge the sutures; interiomarginal or areal multiple apertural openings present. Paleocene to Holocene.

CRIBROELPHIDIUM Cushman and Brönnimann, 1948

Plate 784, figs. 1-14; plate 785, figs. 1-18

Type species: Cribroelphidium vadescens Cushman and Brönnimann, 1948; OD.

Cribroelphidium Cushman and Brönnimann, 1948 (*814), p. 18.

Elphidiononion Hofker, 1951 (*1500), p. 356; type species: *Polystomella poeyana* d'Orbigny, 1839 (*2304), p. 55; OD.

Porosononion Putrya, in Voloshinova, 1958 (*3315), p. 135; type species: *Nonionina subgranosa* Egger, 1857 (*1047), p. 299; OD.

Cribroelphidium (Rimelphidium) Voloshinova, 1958 (*3315), p. 173; type species: *Elphidium vulgare* var. *vulgare* Voloshinova, in Voloshinova and Dain, 1952 (*3318), p. 53; OD.

Canalifera (Criptocanalifera) Krasheninnikov, 1960 (*1729), p. 60; type species: *Canalifera (Criptocanalifera) clara* Krasheninnikov, 1960; OD.

Retroelphidium Voloshinova, in Voloshinova et al., 1970 (*3319), p. 155; type species: *Elphidium longipontis* Shchedrina, 1962 (*2889) p. 59; OD.

Toddinella Gudina and Levchuk, 1983 (*1331), p. 34; type species: *Elphidium? ustulatum* Todd, 1957 (*3202), p. 230; OD.

Test planispiral and involute with rounded noncarinate periphery, about eight to eleven slightly inflated chambers in the final whorl, retral processes few, ponticuli present, sutures nearly radial, slightly depressed, umbilicus with boss, umbilical spiral canal system formed by sealed off umbilical parts of the chambers that are interconnected by the umbilicalmost foramina, may have a few vertical canals; wall calcareous, perforate but apertural face smooth and largely or entirely imperforate, wall of earlier chambers thickened by later lamination, optically radial, bilamellar with septal flaps; aperture multiple, interiomarginal, and also may have areal openings. Miocene to Holocene; cosmopolitan.

Remarks: Hansen and Lykke-Andersen (1976, *1395) described in detail many species of the Elphidiidae, including most of the above-cited type species. We agree with the synonymy of many of the genera but recognize the present genus as distinct from *Elphidium* on the basis of the perforate rounded periphery, rather than an imperforate and carinate periphery.

Nonionina subgranosa Egger, 1857, the type species of *Porosononion* Putrya, was stated by Marks (1951, *2044, p. 50) to be a junior synonym of *Nonionina tuberculata* d'Orbigny, 1846. However, d'Orbigny's material of this species, as illustrated by Papp and Schmid (1985, *2338, pl. 35, fig. 7) and as shown by the original figures, is biumbilicate, much thicker, and has fewer chambers per whorl. *Nonionina tuberculata* was placed in *Melonis* by Papp and Schmid. In contrast, Egger's species is flattened and discoidal, with depressed sutures and prominent pustulose umbilical plug.

CRIBRONONION Thalmann, 1947

Plate 786, figs. 1-5

Type species: Nonionina heteropora Egger, 1857 (*1047), p. 300; OD.

Nonion (Cribrononion) Thalmann, 1947 (*3168), p. 312.
Cribrononion Bermúdez, 1952 (*205), p. 104 (nom. transl.).

Test small, planispirally enrolled, bilaterally symmetrical, five to six inflated chambers in the final whorl, sutures depressed, radial, with sutural pores leading into subsutural canals between septum and septal flap, anastomosing canals connect the sutural canals to the simple spiral canal, ponticuli small, retral processes absent, periphery broadly rounded; wall calcareous, finely perforate, optically granular, surface of apertural face, chamberlet, and adjacent part of the previous whorl densely pustulose; aperture a low short interiomarginal slit bordered by a thickened rim, the slit secondarily divided into a row of foramina in earlier chambers, base of apertural face with small bullalike apertural chamberlet bearing scattered coarse perforations among the densely crowded pustules, chamberlet resorbed as new chambers are added, as none occur in earlier chambers. Eocene to Miocene (Burdigalian); Germany; France; Belgium; Denmark.

Remarks: The apertural chamberlet was described in *Nonionina heteropora* by Kristoffersen (1972, *1747, p. 30), who based a redefinition of the genus on its presence. *Cribrononion* differs from *Elphidiella* in the small size, few and inflated chambers per whorl, densely pustulose surface, and apertural chamberlet.

ELPHIDIELLA Cushman, 1936

Plate 790, figs. 1-16

Type species: Polystomella arctica Parker and Jones, in Brady, 1864 (*325), p. 471: OD.

Elphidiella Cushman, 1936 (*780), p. 89.

Saidovella Voloshinova and Kuznetsova, in Voloshinova et al., 1970 (*3319), p. 158; type species: *Saidovella okhotica* Voloshinova and Kuznetsova, 1970: OD.

Pseudoelphidiella Voloshinova and Kuznetsova, in Voloshinova et al., 1970 (*3319), p. 178; type species: *Elphidium gorbunovi* Shchedrina, 1946 (*2886), p. 4; OD.

?*Cryptoelphidiella* Feyling-Hanssen, in Feyling-Hanssen et al., 1971 (*1123), p. 284; type species: *Cryptoelphidiella itriaensis* Feyling-Hanssen, 1971: OD.

Test large, planispiral, involute, and bilaterally symmetrical, from ten to twenty chambers in the final whorl, no true ponticuli or fossettes but may have retral processes, after the early chambers single or double rows of openings along the sutures open into subsutural canals between the septa and the septal flap of the following chamber, the subsutural canals connecting to the umbilical spiral canal system, sutural openings not homologous with the fossettes of *Elphidium*, vertical umbilical canals may also occur, periphery rounded; wall calcareous, perforate, optically radial or less commonly optically granular, bilamellar, septal flaps partly or completely overlapping the septa, surface smooth or may be pustulose; aperture and foramina interiomarginal, single or multiple, and may also have multiple areal openings. Paleocene to Holocene; cosmopolitan.

Remarks: *Cryptoelphidiella* is tentatively regarded as synonymous with *Elphidiella*, although a canal system has not been described.

ELPHIDIUM de Montfort, 1808

Plate 786, figs. 6-9; plate 787, figs. 1-7; plate 788, figs. 1-13; plate 789, figs. 1-7, 12, and 13

Type species: Nautilus macellus var. β Fichtel and Moll, 1798 (*1124), p. 66; OD.

Elphidium de Montfort, 1808 (*2176), p. 14.

Andromedes de Montfort, 1808 (*2176), p. 38; type species: *Nautilus strigillatus* var. α Fichtel and Moll, 1798 (*1124), p. 49 = *Nautilus macellus* Fichtel and Moll: OD.

Geophonus de Montfort, 1808 (*2176), p. 18; type species: *Nautilus macellus* var. α Fichtel and Moll, 1798 (*1124), p. 66; OD (M).

Sporilus de Montfort, 1808 (*2176), p. 42; type species: *Nautilus strigillatus* var. β Fichtel and Moll, 1798 (*1124), p. 49 = *Nautilus macellus* Fichtel and Moll; OD(M).

Themeon de Montfort, 1808 (*2176), p. 202; type species: *Themeon rigatus* de Montfort, 1808 = *Nautilus crispus* Linné, 1758 (*1859), p. 709; OD(M).

Cellanthus de Montfort, 1808 (*2176), p. 206; type species: *Nautilus craticulatus* Fichtel and Moll, 1798 (*1124), p. 51; OD.

Vorticialis Lamarck, 1812 (*1779), p. 122; type species: *Nautilus craticulatus* Fichtel and Moll, 1798; SD Galloway and Wissler, 1927 (*1209), p. 82.

Polystomella Lamarck, 1822 (*1782), p. 624; type species: *Nautilus crispus* Linné, 1758 (*1859), p. 709; SD Children, 1823 (*586), p. 158.

Polystomatium Ehrenberg, 1839 (*1054), table opp. p. 120; type species: *Nautilus strigillatus* Fichtel and Moll, 1798 (*1124), p. 49; SD(SM) Ehrenberg, 1840 (*1055), p. 132.

Cellulia Agassiz, 1844 (*15), p. 6 (err. emend.).

Helicoza Möbius, 1880 (*2157), p. 103; type species: *Nautilus craticulatus* Fichtel and Moll, 1798; OD(M).

Polystomella (Elphidium) Yabe and Hanzawa, 1929 (*3410), p. 142, 145 (nom. transl.).

Carpenterella Krasheninnikov, 1953 (*1727), p. 88 (non *Carpenterella* Collenette, 1933, nec Bermúdez, 1949); type species: *Nautilus craticulatus* Fichtel and Moll, 1798; OD.

Canalifera Krasheninnikov, 1953 (*1727), p. 88 (name not available, ICZN Art. 13(a)(i); no description).

Faujasinella Voloshinova, 1958 (*3315), p. 162; type species: *Elphidium semiinvolutum* Myatlyuk, in Dubagyan, Myatlyuk, and Pishvanova, 1956 (*868), p. 228 (as *semiinvoluta*); OD.

Planoelphidium Voloshinova, 1958 (*3315), p. 165; type species: *Polystomella laminata* Terquem, 1878 (*3145), p. 16; OD.

Canalifera Krasheninnikov, 1960 (*1729), p. 59; type species: *Elphidium eichwaldi* Bogdanovich, in Serova, 1955 (*2877), p. 354; OD.

Perfectononion Voloshinova and Leonenko, in Voloshinova et al., 1970 (*3319), p. 90; type species: *Elphidium incertum* (Williamson) var. *obscurum* Voloshinova, in Voloshinova and Petrov, 1939 (*3320), p. 16 (as var. *obscura*); OD.

Test large, lenticular, planispirally enrolled, involute or partially evolute, biumbonate, may have umbilical plug on each side, seven to twenty chambers in the final whorl, deeply incised sutures form interlocular spaces that communicate with an umbilical spiral canal system, may have vertical umbilical canals leading from the spiral canal to the surface of the umbilical plug, externally ponticuli span the gently curved sutures, and fossettes between the ponticuli open into the intercameral space, internally may have retral processes (small backward extensions from the chamber lumen along the sutures), periphery carinate; wall calcareous, optically radial or less commonly granular, finely perforate, bilamellar, septal flap partly or completely covering previous septa as the new chamber is formed, surface with openings of canal system in the plugs and along the sutures and may have pustules or spiralling striae or ridges; aperture and foramina, a single interiomarginal pore or multiple, and may have additional areal openings. L. Eocene to Holocene; cosmopolitan.

OZAWAIA Cushman, 1931

Plate 791, figs. 1-4

Type species: Ozawaia tongaensis Cushman, 1931; OD.

Ozawaia Cushman, 1931 (***759**), p. 80.

Test lenticular and biumbonate, early stage planispirally coiled, with prominent umbilical bosses, sutures strongly curved, slightly depressed, later chambers cylindrical, uncoiling and rectilinear, sutural ponticuli and fossettes present in both coiled and uncoiled stages, periphery carinate in the enrolled stage, presence of true retral processes or canal system not known: wall calcareous, finely perforate; multiple aperture in the enrolled stage consisting of an interiomarginal row of pores, adult uncoiled stage with pores in the terminal face. Holocene; South Pacific.

PELLATISPIRELLA Hanzawa, 1937

Plate 789, figs. 8-11

Type species: Camerina matleyi Vaughan, 1929 (***3265**), p. 376; OD.

Pellatispirella Hanzawa, 1937 (***1402**), p. 114.

Test lenticular to compressed, up to 2.5 mm in diameter, planispiral and involute, biumbonate with umbilical plugs perforated by vertical canals, four to five gradually enlarging whorls with twenty to forty chambers in the final one, septa produced at the base and directed strongly back toward the periphery, sutures slightly elevated, radial, no marginal cord or primary septal canal but with numerous transverse canals, periphery rounded to subcarinate; wall calcareous, finely perforate; primary aperture siphonate, equatorial, and areal, just above the base of the backward sloping apertural face, smaller secondary apertures at each side along the base of the septal face. M. Eocene; West Indies: Jamaica.

RECTOELPHIDIELLA He, Hu, and Wang, 1965

Plate 791, figs. 5-9

Type species: Rectoelphidiella lepida He, Hu, and Wang, 1965; OD.

Rectoelphidiella He, Hu, and Wang, 1965 (***1448**), p. 131, 161.

Delosinella Collins, 1981 (***648**), p. 4; type species: *Delosinella planispiralis* Collins, 1981; OD.

Test auriculate in outline, planispirally enrolled with rapidly enlarging astacoline whorl, eight or nine chambers in the final whorl, bilaterally symmetrical, umbilicus closed on both sides, sutures slightly depressed, gently curved, a row of pores on each side of the sutures leading to subsutural canals; wall calcareous, finely perforate, hyaline, translucent; aperture multiple, areal in the high apertural face. Pleistocene to Holocene; China: Kiangsu Province; Northwest Australia.

Remarks: Although the flaring whorl is not characteristic of the Elphidiinae, the planispiral coil, double rows of sutural pores, and subsutural canals support this placement. No information is available as to the possible presence of a spiral canal.

STOMOLOCULINA He, Hu, and Wang, 1965

Plate 791, figs. 10-17

Type species: Stomoloculina multangula He, Hu, and Wang, 1965; OD.

Stomoloculina He, Hu, and Wang, 1965 (***1448**), p. 121, 159.

Munkiella Collins, 1981 (***648**), p. 3; type species: *Munkiella lingulata* Collins, 1981; OD.

Test auriculate in outline, laterally compressed, semi-involute or may be involute on one side and evolute on the other, seven to ten inflated chambers in the final whorl increasing rapidly in breadth as added, sutures limbate, slightly depressed, curved, with a single row of sutural pores at their proximal edge, sutural pores appear to open into intraseptal canals that lead to a spiral canal between the base of the chambers and the periphery of the preceding whorl, ponticuli weakly developed, periphery rounded; wall calcareous, both that of chambers and apertural chamberlet finely perforate, thin, hyaline, optically radial, septa bilamellar with septal flap, surface smooth, although the umbilical area may be pustulose; primary aperture areal, that of the final chamber masked by a triangular to ovate apertural chamberlet extending from the base approximately to the middle of the apertural face and bordered with a small row of irregular pores, as a new chamber is added the resorbed apertural chamberlet is replaced by the septal flap. Pleistocene to Holocene; China: Kiangsu Province; Northwest Australia.

Remarks: Collins (1981, ***648**) tentatively placed the genus *Munkiella* in the Elphidiinae, although stating that an apertural chamberlet had not been recorded for this subfamily. However, as noted above in the description of *Cribrononion*, a similarly temporary apertural chamberlet also occurs in *C. heteroporum* (Egger).

Subfamily NOTOROTALIINAE Hornibrook, 1961

Notorotaliinae Hornibrook, 1961 (***1539**), p. 129.
Parrellininae Saidova, 1981 (***2696**), p. 51.

Test trochospiral, umbilical side with overlapping septal flaps or chamber extensions that may form an umbilical plug, vertical umbilical canals present, intraseptal canal system with canals branching near the surface to lead into the sutural pores; aperture consists of one or two rows or a cluster of small pores at the base of the apertural face. M. Eocene to Holocene.

CRIBROROTALIA Hornibrook, 1961

Plate 792, fig. 9; plate 794, figs. 1–4

Type species: Notorotalia tainuia Dorreen, 1948 (***971**), p. 290; OD.

Cribrorotalia Hornibrook, 1961 (***1539**), p. 138.

Test lenticular, trochospiral, strongly biconvex, chambers numerous, enlarging slowly as added, sutures oblique on the spiral side, radial on the umbilical side where sutural pores are well developed, sutures on umbilical side with numerous pustules, umbilical margin of chambers and surface pustules fused in the central area to form a prominent umbonal plug containing a network of anastomosing canals, periphery acute, with imperforate carina; wall calcareous, lamellar, finely perforate, surface ornamented with tubercles and granules that may coalesce as incipient spiralling ribs, spiral surface may have less well-developed ornamentation; apertural face smooth, with a row of small openings near its base, although the openings may be obscured. U. Eocene to M. Miocene; New Zealand; Australia.

DISCOROTALIA Hornibrook, 1961

Plate 794, figs. 5–7

Type species: Polystomella tenuissima Karrer, 1865 (***1651**), p. 83; OD.

Discorotalia Hornibrook, 1961 (***1539**), p. 141.

Test discoidal, partly evolute on the spiral side, involute on the umbilical side, chambers numerous, strongly recurved, retral processes present, whorls increasing rapidly in height, sutures thickened, strongly curved back toward the periphery, no umbilical plug, small sutural pores present between adjacent costae; wall calcareous, finely perforate, surface with slightly irregular narrow ribs extending from suture to suture, the intervening area with fine pustules; aperture consists of a cluster of small rimmed areal pores near the base of the apertural face. L. Oligocene to M. Miocene; New Zealand.

NOTOROTALIA Finlay, 1939

Plate 792, figs. 1–8

Type species: Notorotalia zelandica Finlay, 1939; OD.

Notorotalia Finlay, 1939 (***1126**), p. 517.

Test lenticular, trochospirally coiled, about eleven chambers in the final whorl, umbonal region with overlapping platelike extensions of the chambers, retral processes present but only observable at the interior as there are no hollow ponticuli, sutures curved, elevated, each with a double row of pores with slightly elevated rim, but these are not homologous with the fossettes of *Elphidium*, central umbilical region has a distinct spiral canal system formed by sealing off the umbilicalmost part of the chamber lumen as in *Elphidiella*, the posterior umbilical aperture then connects the spiral canal to the subsutural canals that also are formed as in *Elphidiella*, periphery sharply angular; wall calcareous, perforate, lamellar, optically radial, septa bilamellar with added septal flap, surface with spiralling ridges parallel to the peripheral margin, apertural face with radiating ridges, and with surface between ridges densely covered with fine tubercles; aperture and foramina consist of a row of openings with bordering rims situated in deep clefts between the ridges near the base of the apertural face, openings may be somewhat obscured by the ridges and tubercles. M. Eocene to Holocene; New Zealand; Eastern Australia; Sub-Antarctic; Kerguelen Island; Falkland Islands; Argentina; Uruguay.

Remarks: A lectotype was selected and illustrated by Vella (1957, ***3285**, p. 55) for the previously unfigured type species.

PARRELLINA Thalmann, 1951

Plate 793, figs. 1-8

Type species: Polystomella imperatrix Brady, 1881 (***339**), p. 66; OD.

Parrellina Thalmann, 1951 (***3170**), p. 224 (nom. subst. pro *Elphidioides* Parr, 1950).

Elphidioides Parr, 1950 (***2363**), p. 373 (non *Elphidioides* Cushman, 1945); type species: obj.; OD.

Test planispiral, bilaterally symmetrical, commonly involute although larger microspheric individuals may become only partially involute in the later stage, chambers numerous and enlarging rapidly, sutures distinct, may be elevated, radial near the umbilici but strongly curved back at the periphery, canal system opening along the lateral chamber sutures in a single row of pores, intraseptal canal system repeatedly branching at the periphery to envelop the peripheral part of the chamber, periphery carinate and with a few canaliculate spines; wall calcareous, finely perforate, optically radial, numerous somewhat irregular ridges on the proximal part of the chamber surface, perpendicular to the suture and parallel to the periphery, and may bifurcate before dying out toward the anterior face of the chamber, vertical ridges also extend a short distance up the apertural face from its base; aperture consists of a row of pores near the base of the apertural face. Oligocene to Holocene; Australia: New South Wales, Victoria, Tasmania.

POROSOROTALIA Voloshinova, 1958

Plate 792, figs. 10-12

Type species: Notorotalia clarki Voloshinova, in Voloshinova and Dain, 1952 (***3318**), p. 56; OD.

Porosorotalia Voloshinova, 1958 (***3315**), p. 167.

Test large, up to 2 mm in diameter, lenticular, biconvex, trochospirally enrolled with two to three slowly enlarging whorls, chambers numerous, twelve to sixteen in the final whorl, sutures thickened, oblique on the spiral side, radial on the umbilical side around a pustulose umbilical plug, canal system consists of a spiral umbilical canal and long anastomosing umbilical canals, periphery subangular, with imperforate band; wall calcareous, thick, lamellar, optically radial, finely perforate, elevated spiral and septal sutures giving a reticulate appearance; aperture of the final chamber obscured by granular coating, intercameral foramen consists of a row of five to seven rounded openings near the base of the septa. U. Miocene to L. Pliocene; USSR: Northeast Siberia, Sakhalin Island.

Remarks: The original description of the type species of *Porosorotalia* included in synonymy the specimen referred to *Ammonia beccarii* by Clark (1906, ***614**, p. 215) and stated by Voloshinova to be from California. However, Clark's material was from the Pleistocene Talbot Formation of Wailes Bluff, Maryland, on the Atlantic coast, and appears to be a true *Ammonia*.

Subfamily FAUJASININAE
Bermúdez, 1952

Faujasininae Bermúdez, 1952 (***205**), p. 192.

Test trochospiral, planoconvex; spiral canal system well developed on umbilical side, rudimentary on spiral side, interseptal canals present; aperture an interiomarginal series of pores. Pliocene to Pleistocene.

AMMOELPHIDIELLA Conato and Segre, 1974

Plate 794, figs. 8-17

Type species: Ammoelphidiella antarctica Conato and Segre, 1974; OD.

Ammoelphidiella Conato and Segre, 1974 [April] (*655), p. 12.

Trochoelphidiella Webb, 1974 [Oct.] (*3353), p. 195; type species: *Trochoelphidiella onyxi* Webb, 1974 = *Ammoelphidiella antarctica* Conato and Segre, 1974; OD.

Test large and robust, chambers in low trochospiral coil of two and a half to three and a half whorls, six to seven chambers in the final whorl, spiral side evolute, umbilical side involute with slightly depressed central area, an umbilical lumen covered by overlapping umbilical extensions of the chamber walls that do not form a plug, the umbilical lumen connecting with the simple sutural canal system that extends onto the spiral side to join the canal system just above the spiral sutures, sutural canals open to the exterior through paired fossettes, retral processes present but not reflected at the exterior of the test, sutures curved, oblique on the spiral side, nearly radial on the umbilical side, periphery broadly rounded; wall calcareous, perforate, surface covered by pustules that are most prominent on the umbilical side; aperture multiple but the one or two rows of tiny openings along the base of the apertural face may be obscured by the heavy pustule development, septal foramina of earlier chambers enlarged by resorption to an interiomarginal slit that extends from the periphery onto the umbilical side. Pleistocene; Antarctica.

FAUJASINA d'Orbigny, 1839

Plate 795, figs. 1-7

Type species: Faujasina carinata d'Orbigny, 1839; OD(M).

Faujasina d'Orbigny, 1839 (*2304), p. 109.

Test trochospiral, planoconvex, partially evolute flat spiral side with numerous rapidly enlarging and strongly arched chambers and curved oblique sutures, umbilical side convex and involute, with strongly arched sutures curving forward midway from the umbilicus and then recurved toward the periphery, intraseptal canals connect the well-developed canal system on the umbilical side with the narrower one of the spiral side, periphery angular to carinate; wall calcareous, ornamentation consists of regular and closely spaced ponticuli extending into ridges and grooves that begin at the basal margin of the chambers and extend nearly to the succeeding septum, remainder of the wall surface distinctly pustulose; aperture consists of a row of pores at the base of the apertural face on the umbilical side, and a few rimmed areal pores may occur in one or two rows on the face. Pliocene to Pleistocene; England; France; Belgium; Netherlands; Japan.

POLYSTOMELLINA Yabe and Hanzawa, 1923

Plate 795, figs. 8-14

Type species: Polystomella (Polystomellina) discorbinoides Yabe and Hanzawa, 1923; OD(M).

Polystomella (Polystomellina) Yabe and Hanzawa, 1923 (*3406), p. 99.

Polystomellina Cushman, 1927 (*742), p. 51 (nom. transl.).

Test trochospiral, planoconvex, evolute and convex spiral side with central umbonal thickening, umbilical side flat and involute, about ten chambers in the final whorl, sutures distinct, thickened, flush, strongly arched, and curving back at the periphery, with short but distinct retral processes, periphery subacute to carinate; wall calcareous, finely perforate; aperture a row of pores at the base of the apertural face. Pliocene; Japan.

Family MIOGYPSINIDAE Vaughan, 1928

Miogypsinidae Tan, 1936 (*3115), p. 45, nom. transl. ex subfamily Miogypsininae.

Miogypsininae Vaughan, in Cushman, 1928 (*747), p. 354 (subfamily).

Miogypsinoidinae Hanzawa, 1947 (*1406), p. 262 (subfamily).

Test flattened to subconical, bilocular megalospheric embryonal stage followed by spire of periembryonal chambers, microspheric generation with early planispiral coil, later with appressed laminae or well-developed lateral chambers at each side of equatorial layer of chambers, spiral and intraseptal canals may be present, equatorial chambers connected by stolons. M. Oligocene to L. Miocene.

LEPIDOSEMICYCLINA Rutten, 1911

Plate 796, figs. 1-9

Type species: Orbitoides (Lepidosemicyclina) thecideaeformis Rutten, 1911; SD Cole, in Loeblich and Tappan, 1964 (*1910), p. C650.

Orbitoides (Lepidosemicyclina) Rutten, 1911 (*2673), p. 1135.

Lepidosemicyclina K. Mohan and Chatterji, 1956 (*2161), p. 351, 352 (nom. transl.).

Miogypsina (Lepidosemicyclina) K. Mohan and Chatterji, 1956 (*2161), p. 355 (nom. transl.).

Test large, somewhat irregularly flabelliform in outline, inequally biconvex, protruding and peripheral embryonal stage consisting of spherical protoconch, with subtriangular lip on the protoconchal stolon at one pole, and reniform deuteroconch with deuteroconchal stolons on either side of the protoconch lip that lead to the second primary auxiliary chamber, a deuteroconchal stolon at the opposite pole leads to the first primary auxiliary chamber; two sets of planispiral periembryonic chambers surround the embryo, the larger primary spiral and three inequal secondary spirals resulting in a distinct asymmetry, chambers arranged in intersecting arcs, the distinct equatorial chambers at first ogival in outline, then rhombic and finally distinctly hexagonal, up to five or six layers of flattened lateral chambers on each side of the equatorial layer, spiral canal and intraseptal canals present, surface with papillae that are larger in the apical zone over the juvenarium, and progressively smaller toward the periphery. L. Miocene (Burdigalian); Borneo; Saipan; Australia; New Zealand; India; Japan.

MIOGYPSINA Sacco, 1893

Plate 797, figs. 1-8; plate 798, figs. 1-4

Type species: Nummulites globulina Michelotti, 1841 (*2099), p. 297; OD.

Gypsina (Miogypsina) Sacco, 1893 (*2686), p. 205.

Flabelliporus Dervieux, 1894 (*939), p. 59; type species: *Flabelliporus dilatatus* Dervieux, 1894 (nom. superfl.) = *Nummulites globulina* Michelotti, 1841; SD Cole, in Loeblich and Tappan, 1964 (*1910), p. C650.

Miogypsina De Amicis, 1894 (*906), p. 138 (nom. transl).

Orbitoides (Miogypsina) Zittel, 1910 (*3454), p. 44 (nom. transl.).

Miogypsinopsis Hanzawa, 1940 (*1405), p. 773; type species: *Miogypsina gunteri* Cole, 1938 (*621), p. 42; OD.

Miogypsinitella Hanzawa, 1968 (*1413), p. 97; type species: *Miogypsina (Miogypsina) indonesiensis* Tan, 1936 (*3115), p. 54; OD.

Test subcircular in outline, megalospheric embryonic apparatus apically placed, with no equatorial chambers between it and the marginal fringe but followed by two inequal sets of spiralling chambers, the larger being equal in size to the secondary spirals and the other somewhat smaller, equatorial chambers spatulate, ogival, or rhombic and arranged in concentric circles, hexagonal ones if present are confined to the frontal margins of large specimens only, septa primarily double and without septal flap or intraseptal canal system, complex stolon system with equatorial chambers interconnected by up to twelve horizontal stolons per chamber arranged in groups of three although some may later fuse, two narrower vertical stolons may occur in opposite corners and lead to the several layers of well-developed lateral chambers ornamented with pustules at the surface, pillars may be present; wall calcareous, finely perforate, surface covered with numerous small papillae. U. Oligocene to L. Miocene; Europe; North America; South America; Indo-Pacific region.

MIOGYPSINITA Drooger, 1952

Plate 798, figs. 8-12

Type species: Miogypsina mexicana Nuttall, 1933 (*2278), p. 175; OD.

Miogypsina (Miogypsinita) Drooger, 1952 (*1010), p. 57, 61.

Test circular to oval in outline, biconvex, thickest at the center, up to 5 mm in diameter, megalospheric embryo and nepionic stage situated about midway between the center of the test and the periphery, but these are peripheral in the microspheric test, embryo consists of two inequal chambers with straight dividing septum and two inequal principal auxiliary chambers, bispiral, spire from the smaller auxiliary chamber relatively short and may be covered by the larger spire, later equatorial chambers diamond shaped, lateral chambers present in five or six superposed layers; wall calcareous, finely perforate, surface tuberculate. U. Oligocene to L. Miocene (Burdigalian); Mexico; Trinidad; USA: Florida, Mississippi, Louisiana.

MIOGYPSINOIDES Yabe and Hanzawa, 1928

Plate 798, figs. 5-7; plate 799, figs. 1-10

Type species: Miogypsina dehaartii van der Vlerk, 1924 (*3301), p. 429; OD.

Miogypsina (Miogypsinoides) Yabe and Hanzawa, 1928 (*3409), p. 535.

Miogypsinoides Chapman, 1932 (*539), p. 492 (nom. transl.)

Miogypsinoides (Conomiogypsinoides) Tan, 1936 (*3115), p. 51; type species: *Miogypsina abunensis* Tobler, 1927 (*3201), p. 328; OD.

Miogypsinella Hanzawa, 1938 (*1404), p. 387-389 (name not available, ICZN Art. 13 (a)(i), no description).

Miogypsinella Hanzawa, 1940 (*1405), p. 765, 770, 775; type species: *Miogypsinella borodinensis* Hanzawa, 1940; OD.

Miogypsina (Miogypsinella) Drooger, 1951 (*1009), p. 364 (nom. transl.).

Test large, may be flat and concavoconvex or less commonly almost conical, based on the position of the intraseptal canal system the convex side is ventral, embryo near test apex consists of large spherical protoconch and reniform deuteroconch separated by an imperforate wall but both surrounded by a perforate wall, nepionic chambers in a single spiral, equatorial chambers asymmetrical, ogival to rhombic, septal flap present and intraseptal canal system developed around each embryonic, nepionic, and equatorial chamber, vertical canals extend to both ventral and dorsal sides from the intersections of the intraseptal canals, lateral canal system also present on the ventral side, dorsal side massive, simple stolon system of equatorial chambers with four stolons per chamber, two close together at the apical end of the chamber and the other two more widely spaced on the frontal wall, although these may grow together, no vertical stolons; wall calcareous, lateral walls thick, compact, and distinctly lamellar but lateral chambers absent, surface smooth, no pillars, large pustules at the surface centered directly above the chambers of the equatorial layer, reflecting externally the position of the spiral and equatorial chambers. M. Oligocene to L. Miocene; Europe; North America; Indo-Pacific region; India: Kutch.

MIOLEPIDOCYCLINA A. Silvestri, 1907

Plate 800, figs. 1-6

Type species: Orbitoides (Lepidocyclina) burdigalensis Gümbel, 1870 (*1337), p. 719; OD.

Miolepidocyclina A. Silvestri, 1907 (*2939), p. 80.

Heterosteginoides Cushman, 1918 (*712), p. 97; type species: *Heterosteginoides panamensis* Cushman, 1918; OD.

Miogypsina (Miolepidocyclina) R. W. Barker and Grimsdale, 1937 (*139), p. 166 (nom. transl.).

Test large, up to 4 mm in diameter, asymmetrical and subpolygonal to discoidal, protoconch and deuteroconch surrounded by thick wall and then by nepionic spiral, embryonic and nepionic chambers not apical but eccentric in position and situated some distance from the periphery in both microspheric and megalospheric generations, with some equatorial chambers lying between the early stage and the marginal fringe, equatorial chambers spatulate to ogival, lateral chambers present on both sides of the equatorial layer. L. Miocene (Aquitanian, ?L. Burdigalian); Mediterranean region of Europe and Africa; USA: California, Mississippi, Florida; Mexico; Puerto Rico; Ecuador; Panama; East Indies.

Superfamily NUMMULITACEA de Blainville, 1827

Nummulitacea Grigyalis, 1978 (*1306), p. 9, nom. transl. ex family Nummulacea.

Discocyclinidea Puri, 1957 (*2484), p. 139.

Test planispiral, evolute to involute, lenticular, discoidal to globular; chambers numerous and may be subdivided into chamberlets, equatorial chambers and lateral chamberlets may be differentiated, and later chambers may be added in annular series; septal flap present as in Rotaliacea; subsutural canals, spiral marginal cord and spiral canal system present in early forms but modified in later ones or replaced by intraseptal canals in advanced forms. Paleocene to Holocene.

Family PELLATISPIRIDAE Hanzawa, 1937

Pellatispiridae Hanzawa, 1937 (*1402), p. 113.
Heterospiridae Tan, 1936 (*3118), p. 177 (invalid, based on *Heterospira* Umbgrove, 1936, non Koken, 1896).
Miscellaneidae Sigal, in Piveteau, 1952 (*2413), p. 244, 272.
Pellatispirinae Hanzawa, 1957 (*1409), p. 50 (subfamily, nom. transl.).
Miscellaneinae Kacharava, in Rauzer-Chernousova and Fursenko, 1959 (*2531), p. 314 (subfamily).

Planispiral to low trochospiral coil, spiral and umbilical sides not differentiated, no marginal cord, but subsutural and intraseptal radial canals and vertical canals or fissures may be well developed. Paleocene to U. Eocene.

BIPLANISPIRA Umbgrove, 1937

Plate 800, figs. 7-10

Type species: Heterospira mirabilis Umbgrove, 1936 (*3247), p. 157; OD.

Biplanispira Umbgrove, 1937 (*3248), p. 309 (nom. subst. pro *Heterospira* Umbgrove, 1936).
Heterospira Umbgrove, 1936 (*3247), p. 156 (non *Heterospira* Koken, 1896); type species: obj.; OD.

Test flattened lenticular to strongly inflated centrally, megalospheric tests up to 4 mm in diameter, possible microspheric ones up to 10 mm, planispirally coiled, involute in the early stage, a single whorl of primary chambers with single aperture each, numerous tubular pores radiate from the distal wall of the primary chambers, bifurcating in the equatorial plane, one branch opening at the test surface and the other opening into slowly enlarging secondary chambers that spiral irregularly in two evolute series, one on each side paralleling the equatorial plane, with increasing numbers of chambers per whorl; wall calcareous, thick, and fibrous, lamellar, perforate, umbilical pillars present, with pores opening between the pillars. M. and U. Eocene; Indo-Pacific: Borneo; New Guinea; Saipan Island; E. India; Andaman Islands.

BOLKARINA Sirel, 1981

Plate 801, figs. 1-5

Type species: Bolkarina aksarayi Sirel, 1981; OD.

Bolkarina Sirel, 1981 (*2987), p. 79.

Test large, up to 18 mm in diameter and 1 mm thick, discoidal, thin and flat to undulating, proloculus followed by up to fifty rectangular periembryonic chambers in a planispiral and involute coil of up to four rapidly expanding whorls, later with smaller irregularly hexagonal chambers in many annular series, about sixty-four annuli in the holotype of the type species, in some individuals the equatorial plane of the annular series may be 90° from that of the early coil, septa doubled and contain intraseptal canals, sutures gently curved, periphery rounded; wall calcareous, coarsely perforate, spiral wall of planispiral stage thick, surface pustulose; intercameral foramina in early planispiral chambers a simple interiomarginal slit. U. Paleocene (Thanetian); Turkey.

MISCELLANEA Pfender, 1935

Plate 802, figs. 1-7

Type species: Nummulites miscella d'Archiac and Haime, 1854 (*68), p. 345; OD.

Miscellanea Pfender, 1935 (*2396), p. 230.
Miscellanea Pfender, 1934 (*2395), p. 80 (name not available, ICZN Art. 13 (a)(i), no description).

Test lenticular or may have slightly compressed peripheral region, protoconch and slightly smaller deuteroconch surrounded by a common wall with encircling canal, later chambers in about two to three planispiral whorls, eight chambers in the first whorl increasing to about thirty in later whorls, septa expanding to an inflated hollow end adjacent to the aperture, sutures radial, straight, elevated throughout length or may be broken into surface pustules; large intraseptal canal present, thick inner part of spiral wall pierced by numerous radial canals and contains vacuoles separating it from a thin outer wall layer, an internal spiralling canal of triangular section and bounded by a distinct wall with minute perforations lies at the outer margin of the chambers toward the test periphery; wall calcareous, surface of umbo with numerous elevated pustules and radial rows of small pustules between the elevated sutures; aperture and intercameral foramina interiomarginal beneath the thickened end of the apertural face or septa at the surface of the preceding whorl. Paleocene; Pakistan; Qatar; Saudi Arabia; Somalia; Nicaragua.

PELLATISPIRA Boussac, 1906

Plate 803, figs. 1-8

Type species: Pellatispira douvillei Boussac, 1906 = *Nummulites madarazi* Hantken, 1876 (*1398), p. 75; OD.

Pellatispira Boussac, 1906 (*320), p. 91.

Vacuolispira Tan, 1936 (*3118), p. 177; type species: *Pellatispira inflata* Umbgrove, 1928 (*3246), p. 63.

Test large, up to 8 mm or 9 mm in diameter, discoidal to lenticular, single median layer of chambers in a loose evolute planispiral coil with intervening canaliferous shell material, double septa formed by infolding of the thin inner wall layer and enclosing intraseptal canals, septal flaps lack perforations, spiral and radial canals present; wall calcareous, thin inner layer finely perforate and thick outer layer coarsely perforate, pillars perpendicular to the surface, spiral laminae extend to the poles as new chambers added, tightly fused so that all are perforated by the canals, surface may have depressed spiral suture and surface papillae at the ends of the pillars. U. Eocene: Italy; Hungary; Pakistan; India; Tanganyika; Japan; Ryukyu Islands; Timor; Fiji: Saipan: Marshall Islands; Palau; Indonesia; Bonin Islands; Borneo; Tonga Island.

Family NUMMULITIDAE de Blainville, 1827

Nummulitidae Eimer and Fickert, 1899 (*1088), p. 634, nom. corr. pro family Nummulacea.

Nummulacea de Blainville, 1827 (*248), p. 372 (nom. imperf.).

Nummulitidea Reuss and Fritsch, 1861 (*2593), p. 4.

Nummulinida Carpenter, Parker, and Jones, 1862 (*494), p. 238.

Camerinidae Meek and Hayden, 1865 (*2086), p. 11.

Nummulitideae Gümbel, 1870 (*1337), p. 84.

Nummulinina Jones, in Griffith and Henfrey, 1875 (*1300), p. 320 (subfamily).

Nummuliti Schwager, 1876 (*2829), p. 477.

Nummulitidae Schwager, 1877 (*2830), p. 19 (subfamily).

Nummulinidae Schulze, 1877 (*2827), p. 29.

Cycloclypidae Bütschli, in Bronn, 1880 (*421), p. 215 (subfamily).

Nummulitinae Brady, 1881 (*339), p. 484 (subfamily).

Cycloclypeinae Brady, 1884 (*344), p. 76 (subfamily).

Nummulitina Lankester, 1885 (*1790), p. 848.

Cycloclypeina Lankester, 1885 (*1790), p. 848.

Nummulinetta Haeckel, 1894 (*1355), p. 164.

Nummulitinae Delage and Hérouard, 1896 (*926), p. 152.

Cycloclypeinae Delage and Hérouard, 1896 (*926), p. 152.

Cycloclypeina Calkins, 1901 (*477), p. 109 (subfamily).

Heteroclypeinae Schubert, 1906 (*2813), p. 640 (subfamily).

Camerininae Cushman, 1928 (*747), p. 209 (subfamily).

Cycloclypeidae Galloway, 1933 (*1205), p. 441.

Heterosteginінae Galloway, 1933 (*1205), p. 421 (subfamily).

Nummulariidae Wedekind, 1937 (*3355), p. 111.

Nummulitida Copeland, 1956 (*680), p. 188.

Assilininae Puri, 1957 (*2485), p. 97 (subfamily).

Test planispiral, involute or evolute, numerous median chambers may be simple or subdivided into chamberlets, with or without lateral chambers; complex canal system of septal, marginal, and vertical canals; aperture an arched slit at the base of the apertural face. Paleocene to Holocene.

ASSILINA d'Orbigny, 1839

Plate 804, figs. 1-9; plate 805, figs. 1-5

Type species: Assilina depressa d'Orbigny, 1850 (*2311), p. 336 = *Nummulites spira* de Roissy, 1805 (*2645), p. 57; SD d'Archiac and Haime, 1853 (*68), p. 156.

Nummulina (Assilina) d'Orbigny, 1839 (*2304), p. 48.

Assilina d'Orbigny, 1846 (*2309), p. 116 (nom. transl.).

Nummulites (Assilina) Reuss, 1862 (*2586), p. 391 (nom. transl.).

Operculina (Frilla) de Gregorio, 1894 (*1292), p. 10; type species: *Operculina ammonea* Leymerie, 1846 (*1841), p. 359; OD.

Neooperculinoides Golev, 1961 (*1261), p. 114; type species: *Nautilus ammonoides* Gronovius, 1781 (*1314), p. 282; OD.

Operculina (Assilina) Schaub, 1981 (*2744), p. 193 (nom. transl.).

Test large, flattened, may be involute but more commonly evolute, with rapidly enlarging whorls and numerous chambers per whorl, sutures radial, slightly curved back at the periphery, imperforate and may be elevated, septa simple, septal flap unfolded, no trabeculae, marginal cord thick, canal system with elongate meshes in the marginal canal, intraseptal canals join the lateral canals of the lateral walls that in turn connect the spiral canal at the base of the whorl to the bundle of marginal canals at the periphery, simple, narrow, and short sutural canals along the lateral canals may be forked or ramified and form rows of alternating openings along the imperforate septal suture, stolons simple, radial, or oblique and irregularly distributed; wall calcareous, finely perforate, surface may be smooth, have pustules reflecting interseptal pillars, or have a reticulate pattern due to elevated or pillar-bearing spiral and radial sutures; intercameral foramen formed by resorption at the base of the imperforate septal face, apertural face with longitudinal grooves that are continuous along the periphery to the preceding septum. M. Paleocene to Holocene; cosmopolitan tropical and subtropical.

Remarks: Hottinger (1977, *1550, p. 10) placed "species traditionally classified as '*Assilina*'... in the genus *Operculina*," redefining the latter on the basis of a "new" type species, *Nautilus ammonoides* Gronovius, which is also the type species of *Neooperculinoides*. However, once a type species is designated, it cannot be changed except by action of the ICZN. Furthermore, the species of Gronovius is not available for designation as type species of *Operculina* as it was not among those species originally included by d'Orbigny, and *Lenticulites complanata* Defrance was validly designated by Cushman as the type species of *Operculina*. *Assilina* thus includes "*Operculina*" as used by Hottinger, and *Planoperculina* Hottinger, 1977 is a junior synonym of *Operculina* d'Orbigny, 1826.

BOZORGNIELLA Rahaghi, 1973

Plate 805, figs. 6-11

Type species: Bozorgniella qumiensis Rahaghi, 1973; OD.

Bozorgniella Rahaghi, 1973 (*2506), p. 25.

Test large, planispiral and involute, lenticular, about two and a half gradually enlarging whorls, eleven to sixteen chambers in the final whorl, sutures obscured externally by numerous granules and pustules, periphery subacute; wall calcareous, coarsely perforate, spiral wall thicker than the septa, surface entirely covered on both sides of the test with granules that grade into coarse pustules in the central region and are the surface expression of internal umbilical pillars; aperture not described. L. Miocene (Aquitanian); Iran.

Remarks: This genus is tentatively retained in the Nummulitidae where it was originally placed, although no canal system was described. It also was said to be slightly trochospiral in the early stage, but this is not evident in the illustrated sections.

CYCLOCLYPEUS W. B. Carpenter, 1856

Plate 806, figs. 1-11; plate 807, fig. 1

Type species: Cycloclypeus carpenteri Brady, 1881 (*339), p. 67 (syn.: *Cycloclypeus guembeliana* Brady, 1881, *339, p. 66); SD ICZN petition pending.

Cycloclypeus W. B. Carpenter, 1856 (*484), p. 555.

Heteroclypeus Schubert, 1906 (*2813), p. 640 (non *Heteroclypeus* Cotteau, 1895); type species: *Heterostegina cycloclypeus* A. Silvestri, 1905 (*2934), p. 126 (not illustrated); OD.

Cycloclypeus (Katacycloclypeus) Tan, 1932 (*3114), p. 39; type species: *Cycloclypeus annulatus* K. Martin, 1880 (*2048), p. 157; OD.

Test large, circular in plan, centrally umbonate and narrowed at the periphery, microspheric test up to nearly 6 cm in diameter, megalospheric test up to 14 mm across, young microspheric form planispiral and evolute, megalospheric one with globular proloculus and reniform deuteroloculus followed by a few undivided nepionic chambers, then planispiral and peneropliform and finally with annular chambers subdivided into numerous chamberlets, those of successive cyclic chambers not aligned, chamberlets of microspheric and postnepionic megalospheric chambers formed by radial folds of the septal flap, the resultant double-walled secondary septa enclosing intraseptal canals in the interlocular space, *X*- or *Y*-shaped stolons lie in the median plane where the fold of the septal flap touches the inner apertural wall, a thin horizontal lamella in the median plane separates the stolons and results in a double foraminal aperture on the distal side of the septum, many vertically superimposed stolons also may occur around large megalospheric embryos, sutural canals simple and vertical as in *Heterostegina*, marginal cord present in the early spiral part of the test but disappears with the first annular chamber, canal system modified in the annular chambers to conform to the circular septa, sutural canals simple and unbranched; wall calcareous, hyaline, finely perforate, surface ornamented with raised annuli or may have concentric rings of pustules. L. Oligocene to Holocene; tropical Indo-Pacific.

Remarks: *Cycloclypeus* was described without included species, and the first species to be assigned therein (hence the type species by subsequent monotypy) was *C. mammilatus* H. J. Carter, 1861 (*499), p. 461. According to Adams and Frame (1979, *12, p. 6), Carter's species was based on a single unfigured specimen that was subsequently lost, although the limestone from which it was obtained was found to be of U. Oligocene age. Because of the uncertain status of *Cycloclypeus* as based on an unrecognizable species, they submitted a petition to the ICZN to set aside the type designation by subsequent monotypy and to designate as type species that species studied by Carpenter and named *C. carpenteri* by Brady, for which syntypes are preserved (BMNH).

The subgenus *Katacycloclypeus* was defined for mid-Miocene *Cycloclypeus* with one or more annuli in the megalospheric generation and thought to represent a distinct lineage. However, other *Cycloclypeus* also may have an annulus, leaving no morphologic basis for separation.

HETEROCYCLINA Hottinger, 1977

Plate 807, figs. 2-7

Type species: Heterostegina tuberculata Möbius, 1880 (*2157), p. 107; OD.

Heterocyclina Hottinger, 1977 (*1550), p. 10, 142.

Test discoidal, thin, megalospheric proloculus followed by three to four planispiral and evolute whorls of progressively more elongate chambers, finally becoming annular in the adult, postembryonic chambers subdivided by complete secondary septa, earliest one or two chambers operculine and then up to twenty-eight heterostegine ones, the latest spiral chamber containing about fifty septula and chamberlets, sutures not ornamented and early ones may be obscured at the surface by secondary lamellation, stolon system *L*-shaped, one radial and one annular stolon per chamberlet occupy a single layer in the median plane where the secondary septum touches the frontal wall of the chamber, adjacent chambers have no other interconnection, sutural canals of primary and secondary septa simple and unbranched; wall calcareous, very finely perforate, large interseptal pillars present on the lateral wall of the chamberlets; apertural face of annular chambers deeply folded, the grooves taking the place of the marginal cord of those with spiral chambers at the periphery. Holocene; Mauritius; Gulf of Aqaba; off Madagascar.

HETEROSTEGINA d'Orbigny, 1826

Plate 808, figs. 1-11; plate 809, figs. 1 and 2

Type species: Heterostegina depressa d'Orbigny, 1826; SD Parker, Jones, and Brady, 1865 (*2354), p. 36.

Heterostegina d'Orbigny, 1826 (*2303), p. 304, 305.

Grzybowskia Bieda, 1950 (*230), p. 151, 167; type species: *Grzybowskia multifida* Bieda, 1950; OD.

Heterostegina (Vlerkina) Eames, Clarke, Banner, Smout, and Blow, 1968 (*1038), p. 290; type species: *Heterostegina borneensis* van der Vlerk, 1929 (*3303), p. 16; OD.

Heterostegina (Vlerkinella) Eames, Clarke, Banner, Smout, and Blow, 1968 (*1038), p. 291; type species: *Heterostegina (Vlerkinella) kugleri* Eames et al., 1968; OD.

Test involute to evolute, centrally thickened, megalospheric proloculus followed by up to sixteen operculinoid and unfolded septa, larger and relatively rare microspheric test with about thirty unfolded septa, then with chamberlets formed by complete secondary septa produced by folds of the septal flap, no communication between adjacent chamberlets of the same chamber, marginal cord consists of an anastomosing bundle of canals in the peripheral band that are continuous with those in the spiral septum of earlier whorls, intraseptal canals formed from part of former marginal canals as new chamber is added, and connect the marginal canals of successive whorls, secondary sutural canals in the septula forming the chamberlets connect successive sutural canals, and those in peripheral position may lead into the marginal canals, apertures of proloculus and early undivided chambers form the primary stolons or apertural or foraminal tubes, later chambers and chamberlets of a single chamber connected by radial stolons or tubes and may also have annular stolons or tangential tubes, so-called because of their position, *Y*-shaped supplementary stolons occur at the distal tip of the secondary septula in the median plane, smaller connections occur between the chamber lumen and peripheral canals of the final whorl and spiralling canals of the underlying whorl and may also lead to the intraseptal canals, canal system opens through small branches or trabeculae into the relatively large pores or openings of the marginal, septal and secondary septal canals and to the exterior; wall calcareous, finely perforate, chambers and stolons with organic lining but none present in the canal system, up to six interseptal pillars present on the lateral chamberlet walls; openings of the canal system along the periphery may serve for ingestion of nutrients, waste excretion, and exit of the protoplasm from the test at the time of sexual reproduction; live individuals have endosymbiotic diatoms whose photosynthesis provides nutrition for the host; asexual reproduction by multiple fission of protoplasm that earlier had streamed outside the test, producing 100 to over 1,000 young that obtain symbionts from the parent protoplasm, rarely some residual protoplasm remains in the parent cell, continues to grow, and later reproduces a second time; at gamogony thousands of 120 μm ovoid biflagellate gametes are produced. U. Eocene to Holocene; cosmopolitan, tropical to temperate Atlantic, Pacific, and Indian Oceans.

NUMMULITES Lamarck, 1801

Plate 809, figs. 3-7; plate 810, figs. 1-11; plate 811, figs. 1-8; plate 812, figs. 1-3; plate 813, fig. 3

Type species: Camerina laevigata Bruguière, 1792 (*441), p. 399; SD ICZN, 1945, Op. 192.

Nummulites Lamarck, 1801 (*1775), p. 101 (nom. conserv.; ICZN, 1945, Op. 192, p. 154).

Camerina Bruguière, 1792 (*441), p. 395 (nom. suppress.; ICZN Op. 192).

Phacites Blumenbach, 1799 (*262), pl. 40; type species: *Phacites fossilis* Blumenbach, 1799; OD(M).

Egeon de Montfort, 1808 (*2176), p. 167; type species: *Egeon perforatus* de Montfort, 1808 = *Nautilus lenticularis* var. *ε* Fichtel and Moll, 1798 (*1124), p. 57); OD.

Helicites de Blainville, 1824 (*246), p. 179 (err. nom. subst. pro *Egeon*).

Nummulina d'Orbigny, 1826 (*2303), p. 295-296 (err. emend.).

Nummularia Sowerby and Sowerby, 1826 (*3044), p. 73 (err. emend.).

Nummulita Fleming, 1828 (*1136), p. 233 (err. emend.).

Discospira Morris, in Mantell, 1850 (*2021), p. 142 (no species included).

Camerina (Bruguieria) Prever, 1902 (*2469), p. 11; type species: obj.; SD Galloway, 1933 (*1205), p. 415.

Camerina (Laharpeia) Prever, 1902 (*2469), p. 11; type species: *Camerina tuberculata* Bruguière, 1792 (*441), p. 400; SD Galloway, 1933 (*1205), p. 415.

Lenticulina (Hantkenia) Prever, 1902 (*2469), p. 11, 70 (non *Hantkenia* Munier-Chalmas, in Fischer, 1885); type species: *Nummulites tchihatcheffi* d'Archiac and Haime, 1853 (*68), p. 98; OD (cited as type species, p. 70).

Paronaea Prever, 1903 (*2470), p. 461 (nom. subst. pro *Lenticulina (Hantkenia)* Prever, 1902).

Paronia Chelussi, 1903 (*551), p. 74 (err. cit.; non *Paronia* Diamare, 1900).

Palaeonummulites Schubert, 1908 (*2851), p. 378; type species: *Nummulina pristina* Brady, 1874 (*332), p. 225; OD(M).

Verbeekia A. Silvestri, 1908 (*2943), p. 137 (non *Verbeekia* Fritsch, 1877); type species: *Amphistegina cumingii* Carpenter, 1860 (*485), p. 32; SD "Thalmann, 1933," fide Ellis and Messina, 1940 (*1102), but no Thalmann reference with this citation could be found.

Operculinella Yabe, 1918 (*3401), p. 126; type species: *Amphistegina cumingii* Carpenter, 1860 (*485), p. 32; OD.

Operculina (Operculinella) Yabe and Hanzawa, 1929 (*3410), p. 140, 142, 144 (nom. transl.).

Operculinoides Hanzawa, 1935 (*1401), p. 18; type species: *Nummulites willcoxi* Heilprin, 1883 (*1450), p. 191; OD.

Pseudonummulites A. Silvestri, 1937 (*2966), p. 149 (nom. subst. pro *Verbeekia* A. Silvestri, 1908).

Paraspiroclypeus Hanzawa, 1937 (*1402), p. 116; type species: *Camerina chawneri* D. K. Palmer, 1934 (*2326), p. 261; OD.

Pseudonummulites Thalmann, 1941 (*3162), p. 658 (non *Pseudonummulites* A. Silvestri, 1937); type species: *Nummulina radiata* d'Orbigny, 1846 (*2309), p. 115; OD.

Eoassilina S. N. Singh, 1957 (*2976), p. 210; type species: *Eoassilina elliptica* S. N. Singh, 1957; OD.

Planocamerinoides Cole, 1958 (*634), p. 262; type species: *Nummularia exponens* de Sowerby, in Sykes, 1840 (*3107), p. 719; OD.

Craterocamerina Omara and Kenawy, 1979 (*2300), p. 126; type species: *Craterocamerina vulgaris* Omara and Kenawy, 1979; OD.

Test globular, lenticular or discoidal, commonly large, up to about 12 cm in diameter, dimorphism pronounced in larger species, planispirally enrolled, commonly involute but may be evolute in the later stage, proloculus and deuteroconch separated by an imperforate common wall with a single central round pore and with a row of pores at the base of the septum, outer wall of the embryonal chambers perforate, later chambers simple and undivided, many per whorl, septa curved back at the periphery and may be sigmoidal, supplementary stolons in the unfolded septa, distinct marginal cord on the periphery, marginal canal with a network of elongate meshes, sutural canals ramified, directed obliquely backward and foreward on both sides of the septa, the oblique paths of the sutural canals and the branches in the lateral walls visible on the lateral wall surface where the offset pores leave narrow unperforated bands as transverse trabeculae, dissolution may modify the trabecular canals into radial passages that directly connect the canal systems of superposed whorls of involute tests, supplementary lateral passages result from gaps in the septa between adjacent alar prolongations of the involute chambers, pillars may be interspersed between septal filaments and appear at the surface as pustules; aperture in all post prolocular chambers consists of a row of pores at the base of the face. Paleocene to Holocene; tropical and subtropical cosmopolitan.

Remarks: Syntypes of *Nummulina pristina* Brady, the type species of *Palaeonummulites* Schubert, were reillustrated by Eames et al. (1962, ***1036**, pl. 1, figs. F-H), and the specimen (BMNH P-35413) figured by Brady (1874, ***332**, pl. 12, fig. 1) was designated as the lectotype. A probable synonym is *Nummulites wemmelensis* de la Harpe and van den Broeck, 1881. Eames et al. regarded *Operculinella* and *Operculinoides* as synonyms of *Palaeonummulites. Amphistegina cumingii* Carpenter, the type species of *Operculinella*, was shown by Hottinger (1977, ***1550**, p. 11) to have a structure identical to that of *Nummulites*, hence all three genera are regarded as synonyms of *Nummulites*.

OPERCULINA d'Orbigny, 1826

Plate 812, figs. 4-8; plate 813, figs. 1, 2, 4-8

Type species: Lenticulites complanatus Defrance, 1822 (***919**), p. 453; SD Cushman, 1914 (***706**), p. 36.

Operculina d'Orbigny, 1826 (***2303**), p. 281.

Anastegina Vitális-Zilahy, 1966 (***3299**), p. 226; type species: *Anastegina strigoniensis* Vitális-Zilahy, 1966 = *Operculina canalifera* Defrance subsp. *gomezi* Colom and Bauzá, 1950 (***653**), p. 219; OD.

Planoperculina Hottinger, 1977 (***1550**), p. 10, 141; type species: *Operculina heterosteginoides* Hofker, 1933 (***1493**), p. 148; OD.

Test planispiral and evolute, flattened, of medium to large size, numerous narrow chambers in many rapidly expanding whorls, sutures strongly curved back at the periphery, septal flap moderately to strongly folded laterally, the folds alternating in position with the septal stolons, marginal cord with numerous superposed marginal canals, intraseptal canal system with symmetrical lateral canals and sutural canals that are strongly curved forward on the lateral wall to open in the zone of interseptal pillars, proximal row of sutural canals vertical, forked, or branching and distal row branching and inclined in the direction of growth, leading from the lateral intraseptal canal in the fold of the septal flap obliquely across the perforate lateral wall and opening into the median zone of the chamber surface between the pores and interseptal pillars, multiple secondarily formed simple supplementary stolons are radial, arranged regularly in the median plane and alternating with the folds of the septal flap; wall calcareous, lamellar, finely perforate, surface may be smooth or pustulose, with numerous septal and cameral pustules; interseptal foramen formed by resorption at the base of the septal face. Oligocene to Holocene; cosmopolitan subtropical.

Remarks: Hottinger (1977, ***1550**) stated that as Cushman was working with a Recent species, he erred in designating *Operculina complanata* as the type species for *Operculina* d'Orbigny. Hottinger then suggested that the type species should be changed to *Operculina ammonoides*. However, as noted above under *Assilina*, *O. ammonoides* was not among the species originally included by d'Orbigny in *Operculina*, and thus was not available for such designation. Once designated, the type species cannot be later changed.

RADIOCYCLOCLYPEUS Tan, 1932

Plate 814, figs. 1-4

Type species: Cycloclypeus neglectus Martin var. *stellatus* Tan, 1930 (***3113**), p. 235; OD.

Cycloclypeus (Radiocycloclypeus) Tan, 1932 (***3114**), p. 39, 92.

Test stellate, with five to seven irregular radial ridges, up to 7 mm in diameter, thick-walled embryo with globular protoconch and larger embracing deuteroconch, followed by about six thin-walled nepionic chambers that gradually increase in length and develop secondary radial partitions as in *Heterostegina*, finally becoming cyclic as in *Cycloclypeus*, chamberlets of successive cycles alternating in position, median layer of chambers increasing very slowly in thickness toward the periphery, lateral layers thicker at the center of the test, thinning toward the periphery, and may have pillars that appear as numerous pustules at the surface. L. Miocene (Burdigalian) to M. Miocene (Vindobonian): Java: Borneo.

RANIKOTHALIA Caudri, 1944

Plate 814, figs. 5-10; plate 815, figs. 1-8; plate 816, figs. 1-11

Type species: Nummulites nuttalli L. M. Davies, 1927 (*897), p. 266; OD.

Ranikothalia Caudri, 1944 (*509), p. 367.

Operculina (Nummulitoides) Abrard, 1956 (*5), p. 489; type species: *Operculina (Nummulitoides) tessieri* Abrard, 1956; OD(M).

Nummulites (Chordoperculinoides) Arni, 1965 (*73), p. 26; type species: *Operculina bermudezi* D. K. Palmer, 1934 (*2326), p. 238; OD.

Nummulites (Ranikothalia) Arni, 1965 (*73), p. 24 (nom. transl.).

Sindulites Eames, 1968 (*1035), p. 435; type species: *Operculina sindensis* L. M. Davies, 1927 (*897), p. 274; OD.

Test flattened lenticular with central boss, megalospheric form with bilocular embryo and test up to 4 mm to 6 mm in diameter, microspheric one 8 mm to 15 mm in diameter, planispiral, whorls enlarging gradually as added, involute to evolute, chambers may have very long alar prolongations, marginal cord strongly thickened, septa thick to thin, straight to undulating, septal flap unfolded, canal system with large canals, meshes of marginal canal network relatively short and coarse, radially directed connections occur between the conspicuous intraseptal canals and the marginal canal system, sutural canals simple and vertical, not bifurcating, opening in two alternating rows on the sides of the imperforate sutural band, sutural canal openings at least twice the diameter of normal wall perforations, a few secondarily formed simple stolons irregularly scattered on the septa; wall calcareous, coarsely perforate, surface smooth to pustulose, spiral suture may be strongly elevated; intercameral foramen secondarily formed at the base of the septum. M. and U. Paleocene; cosmopolitan, tropical and subtropical.

SPIROCLYPEUS H. Douvillé, 1905

Plate 817, figs. 1-5

Type species: Spiroclypeus orbitoideus H. Douvillé, 1905; OD.

Spiroclypeus H. Douvillé, 1905 (*983), p. 458.

Test lenticular to discoidal, planispirally coiled and involute, with rapidly enlarging whorls of numerous strongly curved chambers that increase rapidly in height but very slowly in width, earliest one or two coiled chambers may be undivided but later ones have numerous complete secondary septa as in *Heterostegina*, lateral chamberlets formed by backward folding of the entire proximal primary lateral wall and alar prolongations, details of canal system not known, *Y*-shaped supplementary stolons occur in the median plane and where the fold of the septal flap touches the inner apertural wall, lateral pillars perpendicular to the surface; wall calcareous, finely perforate, spiral wall thick, surface may be pustulose in the umbonal region. U. Eocene to L. Miocene; Europe; Africa; West Indies; Borneo; Saipan.

Family DISCOCYCLINIDAE Galloway, 1928

Discocyclinidae Vaughan and Cole, in Cushman, 1940 (*787), p. 327, nom. transl. ex subfamily Discocyclininae.

Discocyclininae Galloway, 1928 (*1203), p. 55 (subfamily).

Orthophragminidae Wedekind, 1937 (*3355), p. 123, 124.

Orthophragmininae Wedekind, 1937 (*3355), p. 125 (subfamily).

Orbitoclypeinae Brönnimann, 1946 (*364), p. 612 (subfamily).

Orbitoclypeidae Pokorný, 1958 (*2447), p. 393.

Actinocyclininae Bashkirov and Antonishin, 1974 (*155), p. 17, 20 (subfamily).

Megalospheric generation with subspherical initial chamber embraced by larger second chamber, microspheric generation with initial coil of small chambers, later stage with planispiral equatorial layer of rapidly enlarging and finally annular chambers, secondarily subdivided into chamberlets and connected with adjacent chambers and chamberlets by annular and radial stolons, hence six stolons per chamber, lateral chambers present on each side of equatorial layer; intraseptal and intramural canal system present. M. Paleocene to U. Eocene.

ACTINOCYCLINA Gümbel, 1870

Plate 817, figs. 6-9; plate 818, figs. 1-4

Type species: Orbitolites radians d'Archiac, 1850 (*66), p. 405; SD Dollfus, 1889 (*967), p. 1226.

Orbitoides (Actinocyclina) Gümbel, 1870 (*1337), p. 688, 707 (as *Orbitoides (Aktinocyclina)* on p. 688).

Asteriacites Schlotheim, 1822 (*2757), p. 71 (non *Asteriacites* Schlotheim, 1820); type species: *Asteriacites patellaris* Schlotheim, 1822; OD(M).

Orthophragmina (Actinocyclina) Heim, 1908 (*1451), p. 296 (nom. transl.).

Actinocyclina H. Douvillé, 1922 (*997), p. 79 (nom. transl.).

Discocyclina (Aktinocyclina) Vaughan, in Cushman, 1928 (*747), p. 344 (nom. transl.).

Test up to 12 mm in diameter, thin and lenticular, discoidal to stellate in outline, structure similar to *Discocyclina* but with distinct rays or ridges formed by proliferation of broad and low lateral chambers that may extend slightly beyond the general periphery, number of rays may increase by intercalation toward the periphery, megalospheric embryo with spherical protoconch nearly surrounded by the larger deuteroconch, later equatorial chambers cyclical and of increasing height as seen in equatorial section, subdivided into chamberlets by radial partitions approximately aligned in successive whorls, pillars may be present along the rays; wall of lateral chambers thin, surface with numerous granules between and upon the elevated ribs, those toward the periphery appearing in concentric circles. M. to U. Eocene; Europe; North America.

ASTEROPHRAGMINA Rao, 1942

Plate 819, figs. 1-7

Type species: Pseudophragmina (Asterophragmina) pagoda Rao, 1942; OD.

Pseudophragmina (Asterophragmina) Rao, 1942 (*2513), p. 9.

Asterophragmina Samanta, 1967 (*2719), p. 166 (nom. transl.).

Test stellate in outline, with rays radiating from the center and formed by the equatorial chambers as in *Asterocyclina*, megalospheric test with ovate proloculus and partly enveloping deuteroloculus, followed by a few whorls of rapidly lengthening equatorial chambers, then with annular chambers subdivided into chamberlets by thin radial septula, those of successive annuli alternating in position, radial walls absent after about five to ten annuli and later cyclic chambers remain undivided, annular stolons present on the distal end of the chambers; annular walls relatively thick, septula when present are thin walled. U. Eocene; Burma; Israel.

DISCOCYCLINA Gümbel, 1870

Plate 819, figs. 8-10; plate 820, figs. 1-14; plate 821, figs. 1-5

Type species: Orbitolites prattii Michelin, 1846 (*2098), p. 278; SD Galloway, 1928 (*1203), p. 56 (ICZN, case 2599, petition pending).

Orbitoides (Discocyclina) Gümbel, 1870 (*1337), p. 687.

Orbitoides (Rhipidocyclina) Gümbel, 1870 (*1337), p. 688; type species: *Orbitoides (Rhipidocyclina) multiplicata* Gümbel, 1870; SD Dollfus, 1889 (*967), p. 1226.

Orthophragmina Munier-Chalmas, 1891 (*2209), p. 17-19; type species: *Orbitolites prattii* Michelin, 1846 (*2098), p. 278; SD Schlumberger, 1902 (*2772), p. 464.

Orbitoides (Orthophragmina) Checchia-Rispoli, 1907 (*549), p. 178, 181, 188 (nom. transl.).

Orthophragmina (Nodocyclina) Heim, 1908 (*1451), p. 271; type species: *Orthophragmina umbilicata* Deprat, 1905 (*933), p. 497; SD Galloway, 1928 (*1203), p. 57.

Orthophragmina (Discocyclina) Heim, 1908 (*1451), p. 255 (nom. transl.).

Discocyclina H. Douvillé, 1922 (*997), p. 61, 64 (nom. transl.).

Discocyclina (Eudiscodina) van der Weijden, 1940 (*3356), p. 15 (name not available, ICZN Art. 13 (b), type species not designated).

Discocyclina (Umbilicodiscodina) van der Weijden, 1940 (*3356), p. 15 (name not available, ICZN Art. 13 (b), type species not designated).

Discocyclina (Eudiscodina) Thalmann, 1943 (*3166), p. 400; type species: *Orthophragmina archiaci* Schlumberger, 1903 (*2774), p. 277; OD.

Discocyclina (Umbilicodiscodina) Thalmann, 1943 (*3166), p. 405; type species: *Orbitolites discus* Rütimeyer, 1850 (*2667), p. 116; OD.

Hexagonocyclina Caudri, 1944 (*509), p. 362; type species: *Orbitoclypeus? cristensis* Vaughan, 1924 (*3261), p. 814; OD.

Bontourina Caudri, 1948 (*510), p. 477; type species: *Bontourina inflata* Caudri, 1948; OD.

Test large, microspheric test up to 23 mm in diameter, discoidal to lenticular, thin or centrally inflated, megalospheric embryo with small subglobular protoconch embraced by larger reniform deuteroconch, first nepionic cycle of chambers may be larger than the subsequent ones, radial partitions in equatorial chambers form concentric annuli of rectangular chamberlets, those of successive cycles alternating in position, adjacent chamberlets of an annulus connected by annular stolons at the proximal end of the radial walls, those of successive annuli connected by two or three radial stolons at different levels, about fifteen tiers of prominent lateral chambers comprise most of the test thickness, vertical stolons connect chamberlets of the equatorial layer with the lateral chambers, well-developed pillars end in surface papillae; wall calcareous, with dark median lines representing interseptal spaces or fissures but not true canals, surface granulate. M. Paleocene to U. Eocene; cosmopolitan, tropical and temperate.

ORBITOCLYPEUS A. Silvestri, 1907

Plate 821, figs. 6-10; plate 822, figs. 1-5

Type species: Orbitoclypeus himerensis A. Silvestri, 1907 = *Hymenocyclus? nummuliticus* Gümbel, 1861 (*1335), p. 653 = *Orbitoides (Rhipidocyclina) nummuliticus* (Gümbel), 1870 (*1337), p. 702; OD.

Orbitoclypeus A. Silvestri, 1907 (*2942), p. 106.

Exagonocyclina Checchia-Rispoli, 1907 (*549), p. 188; type species: *Orbitoides (Exagonocyclina) schopeni* Checchia-Rispoli, 1907 = *O. nummuliticus* (Gümbel), 1870; SD Galloway, 1928 (*1203), p. 54.

Discocyclina (Trybliodiscodina) van der Weijden, 1940 (*3356), p. 15 (name not available, ICZN Art. 13 (b), no type designated).

Discocyclina (Trybliodiscodina) Thalmann, 1943 (*3166), p. 405; type species: *Orthophragmina chudeaui* Schlumberger, 1903 (*2774), p. 282; OD.

Pileocyclina Portnaya, 1983 (*2462), p. 107; type species: *H. nummuliticus* Gümbel, 1870; OD.

Test large, commonly inflated centrally, megalospheric embryo with deuteroconch nearly or completely surrounding the protoconch and followed by complete cycles of periembryonal chambers, equatorial chambers spatulate and in concentric annuli, without stolons connecting adjacent equatorial chambers. U. Paleocene to U. Eocene (Priabonian): Europe.

Remarks: The type species of *Orbitoclypeus* was not illustrated when originally described, but Silvestri's types were restudied and a lectotype designated and illustrated by Laghi and Sirotti (1982, *1769). The latter authors also showed Silvestri's species and that of Checchia-Rispoli to be conspecific with that of Gümbel.

Family ASTEROCYCLINIDAE Brönnimann, 1951

Asterocyclinidae Brönnimann, 1951 (*369), p. 208.

Asterocyclininae Fermont, 1982 (*1122), p. 131 (subfamily; nom. transl.).

As in the Discocyclinidae, with equatorial layer of chambers but with several layers of small lateral chambers, annular chambers not secondarily subdivided into chamberlets, chambers with four stolons each. M. Paleocene to U. Eocene.

ASTEROCYCLINA Gümbel, 1870

Plate 823, figs. 1-12; plate 824, figs. 1-3

Type species: Calcarina? stellata d'Archiac, 1846 (*65), p. 199 (syn.: *Asterodiscus pentagonalis* Schafhäutl, 1863 (*2743), p. 108); SD Dollfus, 1889 (*967), p. 1226.

Asterocyclina Gümbel, 1870 (*1337), p. 689.

Asterodiscus Schafhäutl, 1863 (*2743), p. 107 (non *Asterodiscus* Ehrenberg, 1840); type species: *Asterodiscus pentagonalis* Schafhäutl, 1863, obj.; OD(M).

Cisseis Guppy, 1866 (*1341), p. 584 (non *Cisseis* Laporte and Gory, 1839); type species: *Cisseis asteriscus* Guppy, 1866; OD(M).

Orthophragmina (Asterodiscus) H. Douvillé, 1915 (*990), p. 723 (nom. transl).

Orthophragmina (Asterodiscocyclina) Berry, 1928 (*216), p. 406; type species: *Orthophragmina (Asterodiscocyclina) stewarti* Berry, 1928; OD.

Orthocyclina van der Vlerk, 1923 (*3300), p. 93; type species: *Orthocyclina soeroeanensis* van der Vlerk, 1923 = *Orthophragmina taramellii* Munier-Chalmas, in Schlumberger, 1904 (*2775), p. 131; OD.

Isodiscodina van der Weijden, 1940 (*3356), p. 15; type species: *Orthophragmina pentagonalis* Deprat, 1905 (*933), p. 507 (non *Asterodiscus pentagonalis* Schafhäutl, 1863) = *Asterodiscus cuvillieri* Neumann, 1958 (*2243), p. 119; OD(M).

Discocyclina (Asterocyclina) Brönnimann, 1940 (*360), p. 13 (nom. transl.).

Test stellate to subdiscoidal, rays may be evident at the surface or only visible in horizontal section, globular megalospheric protoconch partly embraced by larger reniform deuteroconch, followed by two principal auxiliary chambers, other chambers of the first annulus somewhat smaller, microspheric protoconch followed by a short nepionic spiral of arcuate chambers, later chambers in annular series, those of successive annuli alternating in position, equatorial chambers not subdivided into chamberlets, later chambers spatulate and finally rectangular in both generations, the median layer thicker and lateral layers reduced toward the periphery, radial zones formed by elongated equatorial chambers in the median plane separated by zones of smaller chambers in the interrays, commonly five rays present but these may increase by intercalation toward the periphery of larger specimens, lateral chambers present on both sides of the median layer, annular stolons at the proximal side of the equatorial chambers and additional stolons may connect chambers with those of adjacent annuli; radial chamber walls well developed, pillars present, appearing as pustules at the surface where they are surrounded by rosettes of lateral walls. M. Paleocene to U. Eocene: cosmopolitan, tropical and subtropical.

NEODISCOCYCLINA Caudri, 1972

Plate 825, figs. 1-9; plate 826, figs. 1 and 2

Type species: Discocyclina anconensis Barker, 1932 (*135), p. 303: OD.

Neodiscocyclina Caudri, 1972 (*511), p. 216.

Test flat to inflated and lenticular, microspheric test with early planispiral coil, megalospheric test with spherical protoconch enclosed by a reniform to circular deuteroconch, the next cycle of chambers somewhat irregular, later stage with rectangular to hexagonal equatorial chambers, enlarging from the proloculus to the periphery and arranged in somewhat irregular annuli, chambers of successive annuli alternating in position, radial walls thin, annular stolons on the proximal side of the chambers and other stolons connect chambers of successive annuli, up to twenty layers of lateral chambers on both sides of the equatorial layer, with oblique stolons at the ends of the lateral chambers and with tangential, radial, and vertical stolons, numerous pillars visible in vertical section, ending in surface papillae. M. Eocene; Barbados; Ecuador.

PSEUDOPHRAGMINA H. Douvillé, 1923

Plate 826, figs. 3-6; plate 827, figs. 1-5

Type species: Orthophragmina floridana Cushman, 1917 (*709), p. 116; OD.

Pseudophragmina H. Douvillé, 1923 (*1000), p. 106.

Pseudophragmina (Proporocyclina) Vaughan and Cole, in Cushman, 1940 (*787), p. 330; type species: *Discocyclina perpusilla* Vaughan, 1929 (*3266), p. 9 = *Orthophragmina flintensis* Cushman, 1917, (*709), p. 115; OD.

Pseudophragmina (Athecocyclina) Vaughan and Cole, in Cushman, 1940 (*787), p. 330; type species: *Discocyclina cookei* Vaughan, 1936 (*3269), p. 256; OD.

Athecocyclina Brönnimann, 1946 (*364), p. 579, 611 (nom. transl.).

Proporocyclina Brönnimann, 1946 (*364), p. 579, 611 (nom. transl.).

Test circular to subquadrate in outline, globular proloculus and much larger embracing deuteroconch followed by a single ring of large nepionic chambers, smaller equatorial chambers later form a single layer of numerous slightly irregular annuli, very thin and irregular radial walls of equatorial chambers may be complete, incomplete distally, or absent, those of successive annuli aligned, annular stolons at the distal side of the chambers connect those of a single annulus, stolons also present between successive annuli, chamber roofs and floors with pores, fine canals present in annular and radial walls, numerous somewhat irregular layers of lateral chambers on both sides of the equatorial layer, pillars present. L. Eocene to U. Eocene; North America; South America.

STENOCYCLINA Caudri, 1972

Plate 824, figs. 4 and 5

Type species: Orthophragmina advena Cushman, 1921 (*718), p. 139; OD.

Stenocyclina Caudri, 1972 (*511), p. 217.

Test circular in outline, up to about 7.5 mm in diameter, microspheric test flattened, early stage in a simple coil, megalospheric test more inflated and with central depression, megalospheric bilocular embryo with deuteroconch completely enclosing the protoconch but in contact at one side or may be somewhat reniform and only partly surround the protoconch, neanic equatorial chambers small and square in outline, forming numerous very narrow annuli, radial walls aligned in successive annuli, thin equatorial layer well differentiated from the many layers of very low lateral chambers on both sides, annular stolons at both proximal and distal ends of chambers, radial stolons in continuous alignment across the annuli; pillars in the lateral layers appear as granules at the surface or the surface may be smooth. M. Eocene; USA: Louisiana, California.

Family Group Taxa Based on Genera of Uncertain Status

Astrorhizinellidae Saidova, 1981 (***2696**), p. 12.
Astrorhizinellidea Saidova, 1981 (***2696**), p. 12 (superfamily).
Astrorhizinellinae Saidova, 1981 (***2696**), p. 12.
Dariopsidae Malakhova, 1975 (***1996**), p. 75.
Hydromylinidae de Witt Puyt, 1941 (***3385**), p. 54.
Lingulinopsinae Loeblich and Tappan, 1984 (***1918**), p. 34.
Syn.: Lingulinopsinae Loeblich and Tappan, 1982 (***1917**), p. 31 (name not available, ICZN Art. 13 (a)(i), no description).
Loeblichellinae Pessagno, 1967 (***2387**), p. 287.
Neoangulodiscinae Kristan-Tollmann, 1984 (***1746**), p. 282.
Neodiscinae J. X. Lin, 1984 (***1855**), p. 139, 329.
Phialineiinae R. W. Jones, 1984 (***1615**), p. 91, 92, 94, 125 (nom. imperf.; based on *Phialinea* R. W. Jones, 1984).
Plectotrochamminidae Loeblich and Tappan, 1982 (***1917**), p. 28, nom. transl. ex subfamily Plectotrochammininae.
Syn.: Plectotrochammininae Saidova, 1981 (***2696**), p. 23.
Silicotextulinidae Sigal, in Piveteau, 1952 (***2413**), p. 163.
Vulvulinoidinae Saidova, 1981 (***2696**), p. 20.

Foraminiferal Genera of Uncertain Status

ABOUDARAGINA Nakkady, 1955

Plate 837, figs. 1-3

Type species: Aboudaragina eponidelliformis Nakkady, 1955; OD.

Aboudaragina Nakkady, 1955 (***2227**), p. 261.

Described from the M. Jurassic (Bathonian) of Egypt as trochospiral and ventrally umbilicate with an interiomarginal equatorial aperture, it has not been recorded since the original description. The figures show two concentric rings of chambers rather than a trochospire, and the nature of the wall is unknown. Unrecognizable without additional information.

ABRIOLINA Luperto, 1964

Plate 837, figs. 7-9

Type species: Abriolina mediterranea Luperto, 1964; OD.

Abriolina Luperto, 1964 (***1944**), p. 86.

Based on thin sections in Permian limestone from Italy, apparently microgranular calcareous with a double-layered wall but exact nature of coiling, aperture, and so forth unknown. Said to be trochospiral, but the figures suggest that it might belong to the Biseriamminidae.

ADHAERENTINA Paalzow, 1935

Plate 837, fig. 4

Type species: Adhaerentina permiana Paalzow, 1935.

Adhaerentina Paalzow, 1935 (***2324**), p. 28.

An attached agglutinated tube of Permian age but not sufficiently complete for determination of its relationship among the foraminifers or whether it is in fact referrable to this group.

ADHERENTINA Spandel, 1909

Plate 837, figs. 5 and 6

Type species: Adherentina rhenana Spandel, 1909.

Adherentina Spandel, 1909 (***3048**), p. 212.

AEOLIDES de Montfort, 1808

Type species: Aeolides squammatus de Montfort, 1808.

Aeolides de Montfort, 1808 (***2176**), p. 143.

ALANYANA Güvenç, 1967

Plate 837, fig. 17

Type species: Alanyana reicheli Güvenç, 1967; OD.

Alanyana Güvenç, 1967 (***1349**), p. 41.

Described from sectioned specimens from the U. Permian of Turkey as a rectilinear, uniserial member of the "Nodosariidea," bifurcating in the later stage, and with a microgranular radial and perforate wall that commonly is recrystallized. However, the illustrated section of the holotype shows a uniserial early stage followed by an apparently flaring stage, but the central part is extremely irregular and shows no evidence in the median area of an external wall of the two branches.

ALLOTHECA Ehrenberg, 1843

Type species: Allotheca megathyra Ehrenberg, 1843; OD(M).

Allotheca Ehrenberg, 1843 (***1059**), p. 407.

Very tiny and enrolled, illustrated in transparency, and probably a juvenile of unknown affinity. Although Sherborn (1893, ***2899**, p. 3) regarded it as a young *Planorbulina farcta* and Cushman (1927, ***745**, p. 489) stated it to be *Discorbis*, the absence of information as to aperture, wall characters, and other features leave it unrecognizable.

ALVEOCLAVULINA S. N. Singh and Kalia, 1977

Plate 837, figs. 19 and 20

Type species: Alveoclavulina madhuchakra S. N. Singh and Kalia, 1977; OD.

Alveoclavulina S. N. Singh and Kalia, 1977 (*2984), p. 354.
Alveoclavulina S. N. Singh, 1971 (*2977), p. 1173 (name not available, ICZN Art. 13 (a)(i), no description).

Described as triserial to uniserial with internal secondary partitions in the chambers and therefore placed in the Pavonitininae. However, the original side views of the type species show three chambers at the base on a single side, suggesting a trochospiral arrangement; furthermore, neither the supposed internal partitions nor the connection of these partitions with surface reticulation are discernable in the published thin section illustrations.

AMMOFRONDICULARIA Schubert, 1902

Plate 837, fig. 18

Type species: Ammofrondicularia angusta Schubert, 1902; OD(M).

Ammofrondicularia Schubert, 1902 (*2811), p. 24.

Known only from a thin section of a fragment of an agglutinated uniserial foraminifer from the L. Oligocene, it has been regarded as a synonym of *Reophax* but could equally well represent any of a dozen other genera or families, as neither the early stage nor apertural region are preserved and whether it is rounded or compressed is unknown.

AMMONEMA Eimer and Fickert, 1899

Plate 837, fig. 16

Type species: Serpula filum Schmid, 1867 (*2782), p. 583; OD(M).

Ammonema Eimer and Fickert, 1899 (*1088), p. 685.

Although previously regarded as a synonym of *Lituotuba*, the type species of the two genera differ, and *Lituotuba* is an agglutinated taxon, with chambered and irregularly coiled initial part and uncoiled later stage. The type species of *Ammonema* appears more probably porcelaneous with a smooth and polished surface, but the repository of the original types is not known, hence the identity of *Ammonema* is questionable.

ANNULINA Terquem, 1862

Plate 837, figs. 10-15

Type species: Annulina metensis Terquem, 1862.

Annulina Terquem, 1862 (*3137), p. 432.

ANSA Temirbekova, 1978

Plate 837, figs. 21 and 22

Type species: Ansa plana Temirbekova, in Magomedov and Temirbekova, 1978; OD.

Ansa Temirbekova, in Magomedov and Temirbekova, 1978 (*1981), p. 102.

Described as an elongate test of two laterally joined narrow elongate tubular chambers, both of which open along one side, and with smooth calcareous wall. The illustrations suggest a fragment of a laterally compressed tubular form, split longitudinally, and is not recognizable as a distinct genus. Middle Jurassic (Bajocian); USSR: Dagestan.

APIOPTERINA Zborzewski, 1834

Type species: Apiopterina orbignyi Zborzewski, 1834; OD(M).

Apiopterina Zborzewski, 1834 (*3441), p. 311.

ARCHAEOGLOBITRUNCANA Salaj and Maamouri, 1984

Plate 838, figs. 1-6

Type species: Rugotruncana kefiana Salaj and Maamouri, 1982 (*2713), p. 468; OD.

Archaeoglobitruncana Salaj and Maamouri, 1984 (*2714), p. 554.

Described as a planktonic genus with trochospiral coil, tubulospinate chambers with two rows of spines on the periphery and an interiomarginal and extraumbilical aperture. The figures do not show characters of the aperture, umbilicus, or surface, and the type species might be similar to the Hedbergellidae, without umbilical porticus or tegilla, or the Globotruncanidae or Rugoglobigerinidae with tegilla (such as *Plummerita*). As the genus cannot be placed or identified without additional information, it is considered unrecognizable as yet.

ARETHUSA de Montfort, 1808
Type species: Arethusa corymbosa de Montfort, 1808; OD.
Arethusa de Montfort, 1808 (***2176**), p. 303.

ARISTEROPORA Ehrenberg, 1858
Aristeropora Ehrenberg, 1858 (***1072**), p. 11.

Included five species, none illustrated, no type designated.

ARISTEROSPIRA Ehrenberg, 1858
Type species: Aristerospira isoderma Ehrenberg, 1858; SD Cushman, 1927 (***745**), p. 489.
Aristerospira Ehrenberg, 1858 (***1072**), p. 11.

Although Cushman (1927, ***745**) regarded this genus as a synonym of *Discorbis*, the type specimen probably represents a juvenile planktonic species. It was recorded from a depth of 9,720 ft (nearly 3,000 m), whereas *Discorbis* commonly occurs in relatively shallow water. As no information is available concerning the aperture, internal structure, or wall characters, it is unrecognizable.

ARPSAMMOSIPHOUM Rhumbler, 1913
Type species: Nodosinella wedmoriensis Chapman, 1895 (***527**), p. 320; OD.
Arpsammosiphoum Rhumbler, 1913 (***2621**), p. 339, 440.

Used in a new taxonomic system, both with and to replace the name *Psammosiphon* Vine, 1882 (described as a fossil worm; not a foraminiferan), but *Arpsammosiphoum* was stated by Rhumbler to have Chapman's species as type. *Nodosinella wedmoriensis* consists of large agglutinated tubes, described as having a thick and labyrinthic wall although the figures do not indicate a truly labyrinthic wall and the method of growth shown in the figures does not appear to be that of a foraminifer.

ARTHROCENA Modeer, 1791
Arthrocena Modeer, 1791 (***2155**), p. 91.

No species included.

ASPIDODEXIA Ehrenberg, 1872
Type species: Aspidodexia lineolata Ehrenberg, 1872; OD(M).
Aspidodexia Ehrenberg, 1872 (***1076**), p. 276.

Probably a planktonic species but unrecognizable.

ASPIDOSPIRA Ehrenberg, 1844
Aspidospira Ehrenberg, 1844 (***1062**), p. 75.

Included many species from deep water, not illustrated, type not designated

ASTRORHIZINELLA Saidova, 1970
Plate 838, figs. 7-14
Type species: Astrorhizinella planata Saidova, 1970; OD.
Astrorhizinella Saidova, 1970 (***2693**), p. 146.

Based on large flat irregular arenaceous fragments (6 mm to 6.5 mm across); could be a foraminifer or xenophyophorid or may be inorganic; not recognizable.

AULOSTOMELLA Alth, 1850
Type species: Aulostomella pediculus Alth, 1850; SD Loeblich and Tappan, 1964 (***1910**), p. C531.
Aulostomella Alth, 1850 (***28**), p. 263.

The genus was erected for a globuline form with a fistulose growth at the apertural end. No chamber arrangement is indicated, hence the genus is unrecognizable. Fistulose growths are common in most genera of the Polymorphinidae and probably represent a reproductive phase. The genus has not been recognized since it was proposed.

AURICULINA O. G. Costa, 1856
Type species: Auriculina crenata O. G. Costa, 1856; OD.
Auriculina O. G. Costa, 1856 (***686**), p. 259 (non *Auriculina* Grateloup, 1838, nec Gray, 1847).

BIRBALINA M. R. Sahni and Sastri, 1957
Type species: Birbalina pulchra Sahni and Sastri, 1957; OD.
Birbalina M. R. Sahni and Sastri, 1957 (***2688**), p. 28.

The type species and genus are based on two random subaxial sections of an indeterminable orbitolinid that do not pass through the apex and early stage.

BOLBODIUM Ehrenberg, 1872

Type species: Bolbodium sphaerula Ehrenberg, 1872; OD(M).

Bolbodium Ehrenberg, 1872 (***1076**), p. 276.

BUCCININA O. G. Costa, 1861

Type species: Buccinina subrecta O. G. Costa, 1861; SD Loeblich and Tappan, 1964 (***1910**), p. C520.

Buccinina O. G. Costa, 1861 (***687**), p. 53.

Unrecognizable on the basis of the type species.

BULIMINOPSIS Rzehak, 1895

Type species: Buliminopsis conulus Rzehak, 1895; OD.

Buliminopsis Rzehak, 1895 (***2682**), p. 217 (non *Buliminopsis* Heude, 1890).

CALATHARIA Zalessky, 1926

Type species: Calatharia perforata Zalessky, 1926; OD(M).

Calatharia Zalessky, 1926 (***3423**), p. 87.

CAMEROCONUS Meunier, 1888

Type species: Cameroconus marmoris Meunier, 1888; OD(M).

Cameroconus Meunier, 1888 (***2096**), p. 234.

CANOPUS de Montfort, 1808

Type species: Canopus fabeolatus de Montfort, 1808; OD.

Canopus de Montfort, 1808 (***2176**), p. 291 (non *Canopus* Fabricius, 1803, nec Rafinesque, 1840, nec Walker, 1855, nec Felder, 1861, nec Wollaston, 1864).

CANTHARUS de Montfort, 1808

Type species: Cantharus calceolatus de Montfort, 1808; OD.

Cantharus de Montfort, 1808 (***2176**), p. 295 (non *Cantharus* Bolten, 1798, nec Cuvier, 1817, nec Scudder, 1882).

CANTHROPES de Montfort, 1808

Type species: Canthrope galet de Montfort, 1808 (invalid: vernacular); OD(M).

Canthropes de Montfort, 1808 (***2176**), p. 47.

Canthropus Pallas in Oken, 1815 (***2294**), p. 335 (publication ruled unavailable, ICZN).

CARPATHIELLA Myatlyuk, 1966

Plate 839, figs. 1-5

Type species: Rheophax [sic] *ovulum* Grzybowski, 1896 (***1326**), p. 276 (recte *Reophax*); OD.

Carpathiella Myatlyuk, 1966 (***2218**), p. 261.

The type species, from the Oligocene of Poland, consists of small isolated flasklike chambers of a multilocular foraminifer. Specimens illustrated as *Carpathiella ovulum* by Myatlyuk (1966, ***2218**, pls. 1-3) from the Cretaceous (Senonian), Danian, and U. Paleocene of the Carpathians, are at least twice as large, more circular in outline, and some appear to show sutures on the surface. They do not appear conspecific or congeneric with the Oligocene species. Bulatova, in Subbotina et al. (1981, ***3083**, p. 20) regarded *Carpathiella* as a synonym of the Recent *Pelosinella* Parr, 1950, but the latter has a coarsely agglutinated and probably flexible wall, with very elongate necklike extensions. Although flattened flasklike tests are common in the flysch deposits, whether they are isolated *Saccammina*-like chambers, segments of a rectilinear species, or contain internal septa and are related to other groups is uncertain, hence the genus is considered unrecognizable.

CAUDAMMINA Montanaro-Gallitelli, 1955

Plate 839, figs. 6-9

Type species: Saccammina? caudata Montanaro Gallitelli, 1955 (first illustrated Montanaro-Gallitelli, 1958, ***2175**, pl. 1, figs. 3, 4.); OD.

Caudammina Montanaro-Gallitelli, 1955 (***2171**), p. 178.

A flattened flasklike to subspherical finely arenacous chamber provided with a tubular neck and a similar tubular basal projection, *Caudammina* was regarded as a synonym of *Pelosina* by Loeblich and Tappan (1964, ***1910**, p. C200). However, the latter has a much more irregular test, provided with a prominent organic lining that protrudes from the basal opening to form a holdfast. The Cretaceous flysch species commonly is compressed and whether or not it is congeneric appears uncertain.

CEPINULA Schafhäutl, 1851

Cepinula Schafhäutl, 1851 (***2742**), p. 49.

CERATARIA Zalessky, 1926

Type species: Cerataria pulchella Zalessky, 1926; OD(M).

Cerataria Zalessky, 1926 (***3423**), p. 92.

CERATESTINA H. J. Carter, 1880

Type species: Ceratestina globularis H. J. Carter, 1880; SD Galloway, 1933 (***1205**), p. 294.

Ceratestina H. J. Carter, 1880 (***506**), p. 448.

A series of variously arranged globular chambers with stoloniferous connections, consisting of brown organic material. Described from the Indian Ocean and previously referred to the Allogromiidae, it probably represents the inner organic lining of a foraminifer, the stolonlike intercameral connections being the linings of the foramina through the former calcareous chamber walls. The type specimens, stated to be in the Liverpool Free Museum, were destroyed during World War II.

CHELIBS de Montfort, 1808

Type species: Chelibs gradatus de Montfort, 1808; OD.

Chelibs de Montfort, 1808 (***2176**), p. 307.

CIDARIA Grzybowski, 1896

Type species: Lagena (Cidaria) cidarina Grzybowski, 1896; SD Loeblich and Tappan, 1964 (***1910**), p. C512.

Cidaria Grzybowski, 1896 (***1326**), p. 267, 292; (non *Cidaria* Treitschke, 1825).

Described as a subgenus of *Lagena* but appears to be the proloculus of a multichambered form, with only the broken lower rim of the next chamber remaining. Could represent any of various nodosarid genera and is generically and specifically unrecognizable, as well as a homonym.

CIDAROLLUS de Montfort, 1808

Type species: Cidarollus plicatus de Montfort, 1808; OD(M).

Cidarollus de Montfort, 1808 (***2176**), p. 111.

CIMELIDIUM Ehrenberg, 1858

Type species: Guttulina? homeri Ehrenberg, 1858; OD(M).

Cimelidium Ehrenberg, 1858 (***1072**), p. 22.

COLPOPLEURA Ehrenberg, 1844

Type species: Rotalia ocellata Ehrenberg, 1839 (***1054**), p. 134; OD(M).

Colpopleura Ehrenberg, 1844 (***1062**), p. 74.

CONICOCORNUSPIRA Marie, 1961

Type species: Conicocornuspira conica Marie, in Deleau and Marie, 1961; OD.

Conicocornuspira Marie, in Deleau and Marie, 1961 (***927**), p. 74.

Based on oblique sections of specimens in rock, in the Carboniferous (Westphalian) from northern Algeria, the genus was regarded as similar to *Cornuspira* but trochospiral. However, the wall was said to be microgranular or porcelaneous, and it may be a synonym of *Turrispiroides;* pending additional information, it is regarded as unrecognizable.

CORTALUS de Montfort, 1808

Type species: Cortalus pagodus de Montfort, 1808; OD(M).

Cortalus de Montfort, 1808 (***2176**), p. 115

COSKINOLINELLA Delmas and Deloffre, 1961

Type species: Coskinolinella daguini Delmas and Deloffre, 1961; OD.

Coskinolinella Delmas and Deloffre, 1961 (***928**), p. 167.

Originally described from unoriented sections as a low conical form belonging questionably to the Orbitolinidae, the absence of any internal chamber subdivisions prevents such assignment. Insufficient information is available for recognition or systematic placement of this genus.

CRATERIOLA Strand, 1943

Type species: Craterella albescens Dons, 1942, OD.

Crateriola Strand, 1943 (*3073), p. 211 (nom. subst. pro *Craterella* Dons, 1942.

Craterella Dons, 1942 (*969), p. 136 (non *Craterella* Schrammen, 1901, nec Kofoid and Campbell, 1929); type species: obj.

Nyholm (1961, *2284) observed reproductive cysts produced by *Cibicides* that appear identical to the attached conical to hemispherical agglutinated forms referred to *Crateriola*. As similar temporary cysts probably are found in other genera as well, the present nominal genus is regarded as unrecognizable.

CRUSTULA Allix, 1913

Type species: Crustula complanata Allix, 1913; OD.

Crustula Allix, in Lecointre and Allix, 1913 (*1811), p. 46.

CRYPTOMORPHINA Sellier de Civrieux and Dessauvagie, 1965

Plate 839, figs. 10-16

Type species: Cryptomorphina limonitica Sellier de Civrieux and Dessauvagie, 1965; OD.

Cryptomorphina Sellier de Civrieux and Dessauvagie, 1965 (*2867), p. 51.

Described as having strongly overlapping chambers that obscure the sutures and early stage, an indistinct aperture, and the interior with a limonitic coating. May be a synonym of *Involutaria* but is too poorly preserved for recognition.

CUCURBITINA O. G. Costa, 1856

Type species: Cucurbitina cruciata Costa, 1856; OD(M).

Cucurbitina O. G. Costa, 1856 (*686), p. 363 (non *Cucurbitina* Alexander, 1833).

CYCLOPAVONINA A. Silvestri, 1937

Type species: Cyclopavonina cyclica A. Silvestri, 1937: OD(M).

Cyclopavonina A. Silvestri, 1937 (*2966), p. 93.

CYLINDRIA de Gregorio, 1930

Type species: Cylindria minuta de Gregorio, 1930 (OD).

Cylindria de Gregorio, 1930 (*1293), p. 48 (non *Cylindria* Zetterstedt, 1849, err. pro *Cylidria* Desvoidy, 1830).

DARIOPSIS Malakhova, 1975

Plate 839, figs. 17-21

Type species: Dariopsis curviseptum Malakhova, 1975; OD.

Dariopsis Malakhova, 1975 (*1996), p. 74.

Described from the Mississippean (Tournaisian to Visean) of the USSR as coiled to uncoiled and rectilinear, with septa extending only partially across the central part of the chamber, curving sharply backward to attach to the preceding septum, and leaving undivided the axial part of the test. Placed under the Tetrataxidae but stated to represent a new family Dariopsidae. The described features are not clearly shown in the illustrations that may include more than one taxon, including one with a very large planispiral coil, and others that appear triangular in longitudinal section. Needs additional documentation.

DEXIOPORA Ehrenberg, 1861

Type species: Dexiopora? megapora Ehrenberg, 1861: OD(M).

Dexiopora Ehrenberg, 1861 (*1074), p. 304.

DICARINELLA Porthault, 1970

Plate 840, figs. 1-3

Type species: Globotruncana indica Jacob and Sastry, 1950 (*1596), p. 267; OD.

Praeglobotruncana (Dicarinella) Porthault, in Donze et al., 1970 (*970), p. 70.

Dicarinella Longoria and Gamper, 1975 (*1934), p. 86 (nom. transl.).

The type species was described as a double-keeled globotruncanid, associated with a Cenomanian fauna, including *Globotruncana appenninica* Renz, (= *Rotalipora*). Numerous other species have been attributed to the genus, but as noted by Wonders (1980, *3388, p. 118), the holotype is not available for examination, no topotype material can be obtained, and the stratigraphic occurrence appears questionable for a bicarinate species. According to Robaszynski and Caron (1979, *2631, p. 85), *G. indica* "shows a morphological similarity with [the Turonian *Praeglobotruncana*] *hagni*," and "because it is impossible at present to clear the taxonomical status of *G. indica*, *D. hagni* is retained as [a] more adequate taxon to identify the European forms." However, the original type species cannot be changed (ICZN), and the genus is unrecognizable on the basis of the type species.

DIOXEIA de Folin, 1887

Plate 840, fig. 7

Type species: Dioxeia richardi de Folin, 1887; OD(M).

Dioxeia de Folin, 1887 (*1144), p. 115.
Dyoxeia de Folin, 1881 (*1142), p. 141 (name not available, ICZN Art. 12 (a), no description).

Has been considered a synonym of *Technitella* Norman, 1878 on the basis of the original figure of a fusiform spicule-covered body. The description stated only that the test was constructed of sponge spicules and neither the locality from which the material came nor the magnification of the figure was given. It remains insufficiently known for recognition.

DIPLOSTOMA Ebensberger, 1962

Type species: Diplostoma siamesia Ebensberger, 1962; OD.

Diplostoma Ebensberger, 1962 (*1045), p. 54 (non *Diplostoma* Rafinesque, 1817, nec de Fromentel, 1860).

DISCORBULA Lamarck, 1816

Type species: Discorbula ariminensis Lamarck, 1816 = *Rotalites discorbula* Lamarck, 1804 (***1776**), p. 185; OD(M).

Discorbula Lamarck, 1816 (*1781), p. 14.

The name of the type species would suggest that it was obtained from Rimini, and Sherborn (1893, ***2899**, p. 102) regarded it as conspecific with the Recent *Rotalia beccarii*, the type species of *Ammonia*. However, the same highly diagrammatic figures were given for both *D. ariminensis* and *Rotalites discorbula*, which was said to be from Grignon in the Paris Basin (hence Lutetian, M. Eocene in age). The latter is the type locality for the type species of both *Rotalia* and *Discorbis*, and Lamarck's figures could represent either of these, hence *Discorbula* is regarded as unrecognizable.

DISONELLA Conil and Lys, 1964

Plate 840, figs. 4-6

Type species: Disonella lucens Conil and Lys, 1964; OD.

Disonella Conil and Lys, 1964 (*661), p. 69.

Based on unoriented sections from the L. Carboniferous (Dinantian) of France. Later references to the genus appear to represent algal remains. Unrecognizable on the basis of the type species.

DORBIGNYAEA Deshayes, 1830

Dorbignyaea Deshayes, 1830 (*949), p. 231.

No species included.

DUJARDINIA Gray, 1858

Type species: Dujardinia mediterranea Gray, 1858; OD(M).

Dujardinia Gray, 1858 (*1289), p. 270 (non *Dujardinia* Quatrefages, 1844, nec Gedoelst, 1916).

EARLMYERSIA Rhumbler, 1938

Plate 840, figs. 8-10

Type species: Earlmyersia punctulata (d'Orbigny) forma *liliputana* Rhumbler, 1938; OD.

Earlmyersia Rhumbler, 1938 (*2624), p. 209.

Known only from the original illustrations that are line drawings in transmitted light of a specimen from Helgoland; nothing is known of the aperture, wall character, or internal structure, if any, only that it forms temporary agglutinated growth cysts, as do many other foraminifera. Apparently *E. liliputana* has not been recognized since the original description.

ELLIPTINA Harting, 1852

Elliptina Harting, 1852 (*1427), p. 116.

Type not designated; may not be a foraminifer.

ENANTIOAMPHICORYNA Marie, 1956

Plate 840, figs. 17-19

Type species: Enantioamphicoryna obesa Marie, 1956; OD.

Enantioamphicoryna Marie, 1956 (*2037), p. B243.

Unrecognizable on the basis of the original description and illustrations of the type species.

ENCORYCIUM Ehrenberg, 1858

Type species: Encorycium nodosaria Ehrenberg, 1858; SD Loeblich and Tappan, 1964 (***1910**), p. C537.

Encorycium Ehrenberg, 1858 (*1072), p. 12.

Possibly *Nodosaria, Dentalina,* or *Glandulina* but type specimen of type species mounted in balsam and figured only in transparency.

hence cannot be recognized specifically or generically.

ENTOLAGENA A. Silvestri, 1900

Type species: Vermiculum globosum Montagu, 1803 (***2168**), p. 523; OD(M).

Entolagena A. Silvestri, 1900 (***2923**), p. 4.

The original figure is shown with a broken apertural region, hence the presence or absence of an entosolenian tube cannot be determined. Based on the type species, *Entolagena* may thus represent any of various genera of the Lagenidae or Ellipsolagenidae and is unrecognizable.

EOCERATOBULIMINA Fuchs, 1973

Plate 840, figs. 11-13

Type species: Eoceratobulimina iucunda Fuchs, 1973; OD.

Eoceratobulimina Fuchs, 1973 (***1193**), p. 467.

Trochospiral form from the M. Jurassic (U. Callovian) of Poland, reported to be transitional between *Oberhauserella* and *Ceratobulimina*. The nature of the wall, internal structures, and character of the aperture are unknown.

EOFLABELLINA Payard, 1947

Type species: Peneroplis dorbignyi F. A. Roemer, 1839 (***2642**), p. 47 (as *d'orbignyi*); OD.

Eoflabellina Payard, 1947 (***2374**), p. 101.

Although other species included herein by Payard may be *Falsopalmula*, the type species probably is a *Lenticulina* or a related genus and is not generically recognizable.

EOHETEROHELIX Fuchs, 1973

Plate 840, figs. 14-16

Type species: Eoheterohelix prima Fuchs, 1973; OD.

Eoheterohelix Fuchs, 1973 (***1193**), p. 463.

Based on glauconitic casts from the U. Jurassic (L. Oxfordian) of Poland of a species with early trochospiral and later irregular coil. Probably congeneric with *Tectoglobigerina* but both are unrecognizable pending a study of better-preserved specimens that allow description of wall characters.

EOTOURNAYELLINA Lipina, 1965

Plate 841, figs. 3-8

Type species: Tournayellina? (Eotournayellina) primitiva Lipina, 1965; OD.

Tournayellina (Eotournayellina) Lipina, 1965 (***1866**), p. 75.

The type species is known from thin sections of an irregular form with occasional constrictions but is neither definitely enrolled nor septate. May be a primitive tournayellid, but preservation is too poor for recognition; possibly a member of the Usloniidae or similar primitive nonseptate foraminifer, but the nature of the wall is insufficiently described for recognition. L. Carboniferous; USSR.

EPISTOMINITES Zalessky, 1926

Type species: Epistominites formosulus Zalessky, 1926; OD(M).

Epistominites Zalessky, 1926 (***3423**), p. 92.

FOLIOTORTUS Piller and Senowbari-Daryan, 1980

Plate 841, figs. 14-17

Type species: Foliotortus spinosus Piller and Senowbari-Daryan, 1980; OD(M).

Foliotortus Piller and Senowbari-Daryan, 1980 (***2410**), p. 220.

Described from numerous random sections of the U. Triassic (Norian) reef deposits of Sicily. *Foliotortus* appears to consist of a spiralling sheet surrounding a conical central area, the sheet having spinose projections from the outer edge. The presence of a chamber lumen is uncertain, although the state of preservation may obscure this. Pending additional description of the inner structure, *Foliotortus* is not recognizable.

FUJIMOTOELLA Morikawa, 1952

Type species: Fujimotoella umplicata Morikawa, 1952; OD.

Fujimotoella Morikawa, 1952 (***2183**), p. 36.

The types are badly crushed and poorly preserved, hence unrecognizable.

GAUDRIYADHELLA Plotnikova, 1976

Plate 841, figs. 1 and 2

Type species: Marssonella ouachensis Sigal, 1952 (***2917**), p. 19; OD.

Gaudriyadhella Plotnikova, 1976 (***2416**), p. 116.

The type species, from the Barremian of northern Algeria, was described only as having an elongate twisted test with strongly elevated sutures and rounded section. No information is given as to the early chamber arrangement or internal structure. Plotnikova illustrated under the same name a Hauterivian species from the Crimea, with depressed rather than elevated sutures and triangular in section, hence probably not conspecific.

GAVELINONION Hofker, 1957

Type species: Nautilus umbilicatulus Walker and Jacob, in Kanmacher, 1798 (***1639**), p. 641; OD.

Gavelinonion Hofker, 1957 (***1512**), p. 368.

Gavelinonion Hofker, 1951 (***1499**), p. 17 (name not available, ICZN Art. 13 (a)(i), no description).

Gavelinonion Thalmann, 1953 (***3173**), p. 876: type species: *Rotalia tuberculifera* Reuss, 1862 (***2585**), p. 313; OD (name not available, ICZN Art. 13 (a)(i): no description).

Gavelinonion Hofker, 1956 (***1511**), p. 116 (non Thalmann, 1953; name not available, ICZN Art. 13 (b); type not designated).

The type species was described from the shore sands at Sandwich, Kent, based on unrecognizable figures given in Walker and Boys (1784, ***3336**) of a large trochospirally coiled shell. As noted by Cushman (1930, ***755**, p. 2), species of both *Nonion* and *Elphidium* have been given this specific name, although the original figures are trochospiral. Cushman also noted that Montagu (1803, ***2168**), who had available both the original specimens and figures stated that "we perceive so considerable a difference between the original drawings . . . and the engravings taken from them that we would scarce have known them to be the same, had they not been marked with the same numbers." Apparently the species has not since been recognized in the type area, and Hofker's West Indies specimens are very small in comparison, planispiral, and probably belong to *Melonis*.

GEMMULINA d'Orbigny, 1839

Type species: Bigenerina (les Gemmulines) *digitata* d'Orbigny, 1826; OD(M).

Gemmulina d'Orbigny, 1839 (***2304**), p. 141.

Bigenerina (les Gemmulines) d'Orbigny, 1826 (***2303**), p. 262 (name not available, Art. 11 (b)(i); 11 (g), vernacular).

Although commonly regarded as a synonym of *Bigenerina*, the illustrations of d'Orbigny's Modèle for the type species of *Gemmulina* has a later stage like *Dentalina* and may represent a hyaline calcareous form such as *Paradentalina* rather than an agglutinated one. Only a restudy of the original types could allow recognition of this genus.

GLANDIOLUS de Montfort, 1808

Type species: Glandiolus gradatus de Montfort, 1808; OD.

Glandiolus de Montfort, 1808 (***2176**), p. 315.

GLOMERINA Franke, 1928

Type species: Lituola globigerinoides Perner, 1892 (***2383**), p. 52; OD.

Glomerina Franke, 1928 (***1173**), p. 164.

Previously included as a synonym of *Trochammina* (Loeblich and Tappan, 1964, ***1910**) but better regarded as unrecognizable. The type species from the U. Cretaceous (Cenomanian) of Bohemia consists of irregularly arranged globular chambers, but no information is available as to chamber arrangement or apertural character.

GOURISINA Reichel, 1946

Plate 841, figs. 12 and 13

Type species: Gourisina broennimanni Reichel, 1946; OD.

Gourisina Reichel, 1946 (***2545**), p. 539.

Described from a single thin section of Permian limestone in Greece as having two series of chambers coiled about the proloculus; may be a synonym of *Biseriammina* but cannot be recognized without additional information.

GRAMMOBOTRYS Ehrenberg, 1844

Type species: Polymorphina? aculeata Ehrenberg, 1844; OD(M).

Grammobotrys Ehrenberg, 1844 (***1062**), p. 95.

GUEMBELIA Prever, 1902

Type species: Nautilus lenticularis Fichtel and Moll, 1798 (***1124**), p. 55; SD Galloway, 1933 (***1205**), p. 416.

Lenticulina (Gümbelia) Prever, 1902 (*2469), p. 11.
Nummulites (Gümbelia) Prever, in Chelussi, 1903 (*551), p. 74 (nom. transl.).

Unrecognizable, based on the type species, although possibly a *Nummulites:* no type material preserved in the Fichtel and Moll collections, according to Rögl and Hansen, 1984 (*2639), p. 43.

GYRAMMINA Eimer and Fickert, 1899

Type species: Trochammina annularis Brady, 1876 (*334), p. 76; OD(M).

Gyrammina Eimer and Fickert, 1899 (*1088), p. 669.

HAPLOSTICHE Reuss, 1861

Plate 838, figs. 15 and 16

Type species: Dentalina foedissima Reuss, 1860 (*2581), p. 189; OD.

Haplostiche Reuss, 1861 (*2583), p. 15.
Arhaplostichoum Rhumbler, 1913 (*2621), p. 446 (err. emend.).

Although commonly regarded as an agglutinated U. Cretaceous taxon with labyrinthic or alveolar interior, the type species is unrecognizable. The original figure is of a tapering and slightly arcuate specimen, with lobulate chambers and simple aperture. The nature of the wall interior is unknown. Described from the "Diluvialsande von Hamm," but M. Kaever of the University of Münster (personal communication, 9 November, 1984) states that Reuss probably obtained his material from v. d. Marck, who published an article (1858, *2022) on the fossil material from the "Diluvial-Kieses von Hamm." Marck's collections in Münster include a mixture of fossils ranging in age from Devonian to Jurassic, Late Cretaceous, and even Tertiary, but no specimens comparable to *D. foedissima* are present. The exact locality from which the type specimen of Reuss's species came is unknown, although it may have been a Cretaceous specimen reworked in Pleistocene sands; no similarly lobulate specimens have been found in Cretaceous sediments in this area or elsewhere. Other species later referred to *Haplostiche* do not resemble the type figure; some appear closer to *Coscinophragma* or to *Cribratina.*

HEDBERGINA Brönnimann and Brown, 1956

Type species: Globigerina seminolensis Harlton, 1927 (*1422), p. 24; OD.

Hedbergina Brönnimann and Brown, 1956 (*394), p. 529.

HEMISTEGINA Kaufmann, 1867

Type species: Hemistegina rotula Kaufmann, 1867; OD(M).

Hemistegina Kaufmann, 1867 (*1662), p. 150.

HEMISTEREA Ehrenberg, 1872

Type species: Hemisterea nautilus Ehrenberg, 1872; OD(M).

Hemisterea Ehrenberg, 1872 (*1076), p. 276.

HEMISTICTA Ehrenberg, 1872

Type species: Hemisticta amplificata Ehrenberg, 1872; OD(M).

Hemisticta Ehrenberg, 1872 (*1076), p. 276.

HETEROSTOMUM Ehrenberg, 1854

Type species: Heterostomum cyclostomum Ehrenberg, 1854; SD Cushman, 1927 (*745), p. 490.

Heterostomum Ehrenberg, 1854 (*1068), p. 22 (non *Heterostomum* Diesing, 1850, err. cit. pro *Heterostoma* Filippi, 1837).

HUKAWNGIA M. R. Sahni and Sastri, 1954

Plate 841, fig. 10

Type species: Hukawngia problematica M. R. Sahni and Sastri, 1954; OD.

Hukawngia M. R. Sahni and Sastri, 1954 (*2687), p. 384.

Based on a thin section of a coiled to uniserial foraminifer from the Cenomanian of Burma; not stated whether calcareous or agglutinated and aperture not observed.

HYBRIDINA Kübler and Zwingli, 1866

Type species: Hybridina obliqua Kübler and Zwingli, 1866; SD Loeblich and Tappan, 1964 (*1910), p. C515.

Hybridina Kübler and Zwingli, 1866 (*1749), p. 8.

Described with two species, apparently viewed in transparency, but has not been reported since the original description and is unrecognizable.

HYDROMYLINA de Witt Puyt, 1941

Plate 841, fig. 9

Type species: Hydromylina rutteni de Witt Puyt, 1941; OD.

Hydromylina de Witt Puyt, 1941 (***3385**), p. 54.

Eocene of Hercegovina, Yugoslavia. Planispirally enrolled and bievolute, with strongly limbate and elevated sutures and rounded areal aperture. *Hydromylina* was regarded previously as a synonym of *Lenticulina*, but wall and apertural characters are not known, and it could be related to the Epistominidae. Unrecognizable pending further study.

IRRAWADDIA M. R. Sahni and Sastri, 1954

Plate 841, fig. 11

Type species: Irrawaddia trigonalis M. R. Sahni and Sastri, 1954; OD.

Irrawaddia M. R. Sahni and Sastri, 1954 (***2687**), p. 384.

Based on a thin section of a biserial species from the Cenomanian of Burma; base not shown, nature of aperture unknown, and not stated whether calcareous or agglutinated

JURASSOROTALIA Fuchs, 1973

Plate 842, figs. 7-9

Type species: Jurassorotalia grandis Fuchs, 1973; OD.

Jurassorotalia Fuchs, 1973 (***1193**), p. 472.

Based on a glauconitic cast of a tiny trochospirally coiled species from the M. Jurassic (U. Callovian) of Poland and reported from Bajocian to Bathonian of Turkmen SSR, USSR. Described from the same sample and may be congeneric with *Mariannenina*, but both are unrecognizable pending information as to wall and apertural characters of better preserved specimens.

KNASTERIA Macko, 1963

Plate 842, fig. 10

Type species: Knasteria spiralis Macko, 1963; OD(M).

Knasteria Macko, 1963 (***1973**), p. 24.

Organic linings of enrolled foraminifers but originally described as possible green alga of the Caulerpaceae. Unrecognizable.

KUTAUNGIA M. R. Sahni and Sastri, 1954

Plate 842, fig. 14

Type species: Kutaungia cretacea M. R. Sahni and Sastri, 1954; OD.

Kutaungia M. R. Sahni and Sastri, 1954 (***2687**), p. 384.

Based on a thin section of a biserial to uniserial foraminifer from the Cretaceous of Burma; not stated whether calcareous or agglutinated and aperture unknown.

KYATSOKIA M. R. Sahni and Sastri, 1954

Plate 842, fig. 11

Type species: Kyatsokia tibetica M. R. Sahni and Sastri, 1954; OD.

Kyatsokia M. R. Sahni and Sastri, 1954 (***2687**), p. 385.

Based on a thin section of a trochospirally coiled calcareous species from the Cretaceous of Tibet; structure of wall, internal features, and aperture unknown.

LAGENOPSIS de Gregorio, 1930

Type species: Lagenopsis maliarda de Gregorio, 1930; OD.

Lagenopsis de Gregorio, 1930 (***1293**), p. 48.

LAGENULA de Montfort, 1808

Type species: Lagenula floscula de Montfort, 1808; OD(M).

Lagenula de Montfort, 1808 (***2176**), p. 311.

LEKITHIAMMINA de Folin, 1887

Type species: Lekithiammina aculeata de Folin, 1887 (OD(M).

Lekithiammina de Folin, 1887 (***1146**), p. 128.

Lekithiammina de Folin, 1881 (***1142**), p. 136 (name not available, ICZN Art. 12 (a)(i), no description.

LEPISTA Zalessky, 1926

Type species: Lepista ornata Zalessky, 1926; OD(M).

Lepista Zalessky, 1926 (***3423**), p. 90 (non *Lepista* Wallengren, 1863).

LINGULINOPSIS Reuss, 1860

Type species: Lingulina bohemica Reuss, 1846 (***2571**), p. 108; OD(M).

Lingulinopsis Reuss, 1860 (***2578**), p. 23.

The type species originally was described from the Bohemian Cretaceous as rectilinear, tapering at the base, with horizontal septa. Reuss described the genus as having an early coiled stage and later rectilinear stage, but this was never illustrated. Later publications identify the type species as a *Rectoglandulina*. We have recollected many of the Cretaceous localities in the Bohemian region but found no specimens resembling Reuss's description, and the genus is as yet unrecognizable.

LINGULOGLANDULINA A. Silvestri, 1903
Type species: Linguloglandulina laevigata A. Silvestri, 1903; OD.
Linguloglandulina A. Silvestri, 1903 (***2928**), p. 49.

Linguloglandulina laevigata was described from the Ionian Sea off Sicily and illustrated by line drawings and a sketch of a section. No type repository was indicated, and neither type species nor genus have been reported again.

LOBULARIA O. G. Costa, 1839
Type species: Lobularia vesiculosa O. G. Costa, 1839; OD(M).
Lobularia O. G. Costa, 1839 (***684**), p. 186 (non *Lobularia* Lamarck, 1816).

LOEBLICHELLA Pessagno, 1967
Plate 842, figs. 1-3
Type species: Praeglobotruncana hessi Pessagno, 1962 (***2385**), p. 358; OD.
Loeblichella Pessagno, 1967 (***2387**), p. 288.

Although described as differing from *Hedbergella* in having sutural supplementary apertures on the spiral side, Masters (1977, ***2056**, p. 449) noted that "an examination of the holotype and paratypes of *Praeglobotruncana hessi* subsp. *hessi* Pessagno, the type species of *Loeblichella*, disclosed no supplementary apertures of any type . . . [and] the primary types are probably internal molds and are poorly preserved." *Loeblichella* is not recognizable in view of the questionable status of the type species.

LYCOPHRIS de Montfort, 1808
Type species: Lycophris lenticularis de Montfort, 1808 (= *Nautilus lenticularis* Fichtel and Moll, 1798); OD(M).
Lycophris de Montfort, 1808 (***2176**), p. 159.

No type specimen is preserved in the Fichtel and Moll collection, according to Rögl and Hansen, 1984 (***2639**), p. 43; unrecognizable from description.

LYRINA Zborzewski, 1834
Type species: Lyrina fischeri Zborzewski, 1834; OD(M).
Lyrina Zborzewski, 1834 (***3441**), p. 311.

MACRODITES de Montfort, 1808
Type species: Macrodites cucullatus de Montfort, 1808; OD(M).
Macrodites de Montfort, 1808 (***2176**), p. 238.

MAGNELLA Neumann, Pożaryska, and Vachard, 1975
Plate 842, fig. 12
Type species: Magnella reitlingerae Neumann et al., 1975; OD.
Magnella Neumann, Pożaryska, and Vachard, 1975 (***2251**), p. 45.

A small thin-walled cone in a random section of U. Devonian limestone from a well in Poland. The authors state that it is of uncertain position, resembling a tentaculitid, tintinnid, foraminifer, or *Pithonella*, or may be only a fragment of an organism of unknown nature.

MAGNITELLA Malakhova, 1975
Plate 842, figs. 15-17
Type species: Magnitella porosa Malakhova, 1975; OD.
Magnitella Malakhova, 1975 (***1995**), p. 7.

Large tubular structures in random thin sections of L. Carboniferous (L. Visean) age in the Ural Mountains. Has a thick coarsely perforate wall with distinctly lamellar structure. Probably not a foraminifer and may be a siphonous alga.

MANGASHTIA Henson, 1948
Plate 838, figs. 17 and 18
Type species: Mangashtia viennoti Henson, 1948; OD.
Mangashtia Henson, 1948 (***1460**), p. 94.

The provisional description was based on random and fragmentary sections, from Cenomanian-Turonian limestones of Iran, but many essential characters are not described and the genus is unrecognizable pending description of better and more complete material.

MARIANNENINA Fuchs, 1973

Plate 842, figs. 4-6

Type species: Mariannenina pulchra Fuchs, 1973; OD.

Mariannenina Fuchs, 1973 (***1193**), p. 469.

Based on a small trochospiral species from the M. Jurassic (U. Callovian) of Poland. May be congeneric with *Jurassorotalia* but needs study of better preserved specimens that allow description of wall characters.

MEGATHYRA Ehrenberg, 1843

Type species: Megathyra planularia Ehrenberg, 1843; SD Loeblich and Tappan, 1964 (***1910**), p. C522.

Megathyra Ehrenberg, 1843 (***1059**), p. 409.

Three species originally reported from the Holocene of Greenland, Mexico, and the north polar region. Although two were illustrated by drawings in transmitted light, they could represent any of many genera of enrolled foraminifera.

MESANIA M. R. Sahni and Sastri, 1954

Plate 842, fig. 13

Type species: Mesania vermiformis M. R. Sahni and Sastri, 1954 (as *M. vermiforme*); OD.

Mesania M. R. Sahni and Sastri, 1954 (***2687**), p. 385.

Based on a thin section of a biserial species from the L. Cretaceous of Burma; composition and microstructure of wall and nature of aperture unknown.

MESOPORA Ehrenberg, 1854

Type species: Mesopora chloris Ehrenberg, 1854; OD(M).

Mesopora Ehrenberg, 1854 (***1067**), p. 377 (non *Mesopora* Wesmael, 1852).

MIRFA de Gregorio, 1890

Type species: Mirfa subtetraedra de Gregorio, 1890; OD.

Mirfa de Gregorio, 1890 (***1291**), p. 260.

MIRGA de Gregorio, 1930

Type species: Orbulina (Mirga) permiana de Gregorio, 1930; OD.

Orbulina (Mirga) de Gregorio, 1930 (***1293**), p. 49.

MISILUS de Montfort, 1808

Type species: Misilus aquatifer de Montfort, 1808; OD.

Misilus de Montfort, 1808 (***2176**), p. 295.

MOLNARIA Zalessky, 1926

Type species: Molnaria spinulata Zalessky, 1926; OD(M).

Molnaria Zalessky, 1926 (***3423**), p. 89.

MONETULITES Ehrenberg, 1855

Monetulites Ehrenberg, 1855 (***1069**), p. 289.

No species included; proposed for nummulites with irregular early chambers; unrecognizable.

MONOCYSTIS Ehrenberg, 1854

Type species: Monocystis arcella Ehrenberg, 1854; OD(M).

Miliola (Monocystis) Ehrenberg, 1854 (***1068**), p. 22 (non *Monocystis* Stein, 1848).

MONOGENERINA Spandel, 1901

Type species: Monogenerina atava Spandel, 1901; SD Cushman, 1928 (***747**), p. 119.

Monogenerina Spandel, 1901 (***3047**), p. 179.

Previously regarded as a synonym of *Nodosinella* (Loeblich and Tappan, 1964, ***1910**, p. C323) but wall character not described and could belong elsewhere.

MULTIDISCUS A. D. Miklukho-Maklay, 1953

Plate 843, fig. 1

Type species: Nummulostegina padangensis Lange, 1925 (***1788**), p. 271; OD.

Multidiscus A. D. Miklukho-Maklay, 1953 (***2117**), p. 130.

May be an archaediscid but insufficiently known for determination.

MULTIFARINA J. X. Lin, 1984

Plate 839, figs. 22 and 23

Type species: Multifarina xintanensis J. X. Lin, 1984; OD.

Multifarina J. X. Lin, 1984 (*1855), p. 120, 328 (also as *Multifaina*, p. 328).

Originally placed in the Nodosinellidae, subfamily Nodosinellinae, with two-layered wall, an inner granular layer and an outer radially fibrous layer. Said to be flabelliform, with triserial chambers following the second chamber. However, the "triserial" chambers consist of three apparent rows of chambers radiating from the proloculus and seem to represent a uniserial flabelliform test, cut obliquely and allowing the section to intersect the thick outer wall in places. Upper L. Permian; China: Xintan, Hubei.

NAUTILINA O. G. Costa, 1856

Type species: Nautilina puteolana O. G. Costa, 1856; OD(M).

Nautilina O. G. Costa, 1856 (*686), p. 370 (non *Nautilina* Stein, 1850).

NEOANGULODISCUS Kristan-Tollmann, 1962

Plate 843, figs. 2-5

Type species: Neoangulodiscus leischneri Kristan-Tollmann, 1962; OD.

Neoangulodiscus Kristan-Tollmann, 1962 (*1737), p. 230.

An enrolled undivided tubular chamber, with early whorls oscillating, later planispiral and involute, described from the L. Jurassic (Lias) of Austria. Placed in the Ophthalmidiidae, subfamily Cornuspirinae with *Involutina* and *Trocholina*, and later (Kristan-Tollmann, 1984, *1746) in the subfamily Neoangulodiscinae, family Nubeculariidae. Probably referrable to the Involutinidae but needs additional study and illustration.

NEODISCUS A. D. Miklukho-Maklay, 1953

Plate 843, fig. 10

Type species: Neodiscus milliloides A. D. Miklukho-Maklay, 1953; OD.

Neodiscus A. D. Miklukho-Maklay, 1953 (*2117), p. 129.

NINALOOMISIA McCulloch, 1977

Plate 844, figs. 4 and 5

Type species: Ninaloomisia differens McCulloch, 1977; OD.

Ninaloomisia McCulloch, 1977 (*1961), p. 208.

Originally described from Bikini Atoll in the South Pacific as a polymorphinid, because of the similarity in chamber arrangement, but has a long entosolenian tube that extends across the chamber from the aperture to the dorsal wall, runs proximally for a short distance, then curves sharply to one side, and finally curves strongly around to point distally again. The tube suggests some members of the Glandulinidae, but *Ninaloomisia* differs from both these families in having a basal looplike aperture rather than a terminal radiate one. Apparently known from a single specimen, the side with the aperture has a longitudinal groove suggesting that it might have been attached during life. The systematic placement is not clear and additional study of chamber arrangement, wall composition, and aperture is needed.

NODOSARIOPSIS Rzehak, 1895

Type species: Nodosaria perforata Seguenza, 1880 (*2839), p. 332; SD Loeblich and Tappan, 1964 (*1910), p. C512.

Nodosariopsis Rzehak, 1895 (*2682), p. 228 (non *Nodosariopsis* Silvestri, 1902).

Nodosariopsis was said to differ from *Nodosaria* in having a very coarsely perforate test. The type species was described from the Pleistocene of Reggio Calabria, Italy, but we have been unable to locate specimens of this species in topotype material. Pending information as to the nature of the aperture and other characters, *Nodosariopsis* is regarded as unrecognizable.

NODOSAROUM Rhumbler, 1913

Type species: Nodosaria index Ehrenberg, 1854 (*1068), pl. xxxvii, group xi, fig. 11.10; OD.

Nodosaroum Rhumbler, 1913 (*2621), p. 443.

Arnodosaroum Rhumbler, 1913 (*2621), p. 443; type species: *Arnodosaroum indictoum* Rhumbler, 1913 (err. emend.).

Based on a sketch of a thin section of a rectilinear, uniserial foraminifer but variously suggested to be calcareous and perforate or agglutinated. Unrecognizable without more information.

NUMMULITELLA Doreen, 1948

Plate 844, figs. 1-3

Type species: Nummulitella polystylata Doreen, 1948; OD.

Nummulitella Doreen, 1948 (*971), p. 291.

Described from the U. Eocene of New Zealand as a nummulitid but with septa replaced by radial rows of pillars. The horizontal section was illustrated only by a drawing, and there is no information as to presence or absence of canal system or marginal cord.

NUMMULOSTEGINA Schubert, 1907

Type species: Nummulostegina velebitana Schubert, 1908 (*2815), p. 377; SD Schubert, 1908.

Nummulostegina Schubert, 1907 (*2814), p. 212.

A fusuline but interior structure not described; unrecognizable.

OBERHAUSERINA Fuchs, 1967

Plate 843, figs. 6-9

Type species: Oberhauserina morator Fuchs, 1967; OD.

Oberhauserina Fuchs, 1967 (*1189), p. 256, 258, 327.

The type species, from the L. Cretaceous (M. Albian) of the Netherlands, is small, planoconvex, and trochospiral, but the holotype and figured paratype do not appear to be congeneric. The holotype has inflated chambers and obliquely curved sutures on the umbilical side, whereas the paratype has a sharp periphery and concave umbilical side with radial sutures. The aperture was described from the "paratype," and is obscured by extraneous material on the holotype. May be congeneric with *Conorbina* or *Conorboides* but needs study of better-preserved specimens.

OLYMPINA Reichel, 1946

Plate 843, figs. 14 and 15

Type species: Olympina insolita Reichel, 1946; OD.

Olympina Reichel, 1946 (*2545), p. 540.

Described from two thin sections of Permian algal limestone from Cyprus. Enrolled and originally suggested to be trochospiral but may be biserial and planispirally enrolled like *Biseriammina* or even a junior synonym of the latter.

ONCOBOTRYS Ehrenberg, 1856

Type species: Oncobotrys buccinum Ehrenberg, 1856; OD(M).

Oncobotrys Ehrenberg, 1856 (*1070), p. 172.

ONDOGORDIUS Marie, 1961

Plate 843, figs. 11-13

Type species: Ondogordius campanula Marie, in Deleau and Marie, 1961; OD.

Ondogordius Marie, in Deleau and Marie, 1961 (*927), p. 78.

Described from the U. Carboniferous (Westphalian) of Algeria, and placed in the Ophthalmidiidae. Consists of a tubular coiled chamber with oscillating coiling and "probably porcelaneous" wall. May be related to the Hemigordiopsidae or Archaediscidae but neither illustrations nor description provide sufficient information.

ORBIGNYNOIDES Dain, 1971

Plate 844, figs. 9 and 10

Type species: Orbignynoides monstratus Dain, in Dain and Kuznetsova, 1971; OD.

Orbignynoides Dain, in Dain and Kuznetsova, 1971 (*882), p. 110.

Described from U. Jurassic (Kimmeridgian) strata as differing from *Orbignyna* in the better-developed uncoiled portion with subconical terminal chamber. The type species was stated to have radial interseptal partitions subdividing the outer part of the chambers. No thin sections were illustrated, and other wall characters are unknown. Of the two other species included in the genus, the Lower Cretaceous *Spirolina aequalis* Roemer has a simple chamber interior without interseptal partions and is the type species of *Haplophragmium*. The Upper Cretaceous *Ammobaculites braunsteini* Cushman and Applin, 1946, also referred to this genus, lacks interseptal partitions and is probably an *Ammotium*.

ORMATHASCIA Deák, 1964

Plate 843, fig. 16

Type species: Ormathascia vadaszi Deák, 1964; OD.

Ormathascia Deák, 1964 (*905), p. 98, 104.

Based on inner organic lining of a foraminifer, probably one of the Nubeculariidae but not generically recognizable.

OROBIAS Eichwald, 1859

Plate 843, figs. 20-24

Type species: Orobias aequalis Eichwald, 1859: OD(M).

Orobias Eichwald, 1859 (***1085**), pl. 22, fig. 16; 1860 (***1086**), p. 352.

Validated by provision of illustration in 1859, and then monotypic, although other species were included in the text that appeared in 1860. A fusuline with short axis of coiling but type species unrecognizable.

ORTHOCERINA d'Orbigny, 1839

Type species: Nodosaria (Orthocerina) quadrilatera d'Orbigny, 1839: OD(M).

Nodosaria (Orthocerina) d'Orbigny, 1839 (***2304**), p. 17.
Nodosaria (Orthocérine) d'Orbigny, 1826 (***2303**), p. 255 (name not available, ICZN Art. 11 (b)(i), and 11 (g), vernacular).

The type species was stated previously (Loeblich and Tappan, 1964, ***1910**, p. C785) to be known only from the original description, and as this did not state whether the species was calcareous or agglutinated, the species and hence the genus was regarded as unrecognizable. Le Calvez (1977, ***1806**, p. 59) redescribed the d'Orbigny collection in Paris and designated and illustrated a lectotype for this species. However, she stated that the perforate calcareous specimen was poorly preserved and that it had a multiple aperture, rather than the single one reported by d'Orbigny. The species might represent a *Chrysalidinella*, but the chamber arrangement in the early stage could not be determined, hence the species and genus remain unrecognizable.

OTOSTOMUM Ehrenberg, 1872

Type species: Otostomum strophoconus Ehrenberg, 1872; OD(M).

Otostomum Ehrenberg, 1872 (***1076**), p. 276.

OVOLINA Terquem, 1864

Type species: Oolina fusiformis Terquem, 1864 (***3138**), p. 377: OD(M).

Ovolina Terquem, 1864 (***3139**), p. 285.

OZAWAINA Lee, 1927

Type species: Nummulina antiquior Rouiller and Vosinsky, 1849 (***2653**), p. 337; SD Galloway, 1933 (***1205**), p. 396.

Ozawaina Lee, 1927 (***1813**), p. 19.

PACHYAMMINA Eisenack, 1967

Plate 843, figs. 17-19

Type species: Amphitremoida? pachytheca Eisenack, 1954 (***1091**), p. 56; OD.

Pachyammina Eisenack, 1967 (***1093**), p. 255.

Very small ovate structures, with a thick wall of quartz particles, lacking any openings but containing clumped acritarchs and prasinophytes (algal cysts) within, from the lower Paleozoic of the Baltic region. Probably not a foraminifer.

PARACALIGELLOIDES Reytlinger, 1965

Plate 845, fig. 1

Type species: Paracaligelloides abramjanae Reytlinger, in Chuvashov, 1965: OD.

Paracaligelloides Reytlinger, in Chuvashov, 1965 (***595**), p. 38.

Described in the Caligellidae but may be algal. Not recognizable as a foraminifer.

PECTINARIA Zalessky, 1926

Type species: Pectinaria costata Zalessky, 1926; OD(M).

Pectinaria Zalessky, 1926 (***3423**), p. 94 (non *Pectinaria* Lamarck, 1818).

PERIPLES de Montfort, 1808

Type species: Periples elongatus de Montfort, 1808; OD(M).

Periples de Montfort, 1808 (***2176**), p. 270.

Unrecognizable on the basis of the illustrations and reported as fossil and recent.

PHANEROSTOMUM Ehrenberg, 1843

Type species: Phanerostomum integerrimum Ehrenberg, 1843.

Phanerostomum Ehrenberg, 1843 (***1059**), p. 409.

PHIALINEA R. W. Jones, 1984

Type species: Miliola elongata Ehrenberg, 1844 (***1064**), p. 274; OD.

Phialinea R. W. Jones, 1984 (***1615**), p. 125.

The type species was described originally from "Kurdistan," but not then figured. The only figure was that in Ehrenberg (1854, ***1068**, pl. 25, fig. 1) from a white limestone of "Antilibanon" [W. Syria] (stated by Brady, 1884, ***344**, to be of Cretaceous age) of an elongate, subfusiform chamber broken at both ends that may be from either a multilocular or unilocular test. The species was transferred to *Lagena* and recorded from the L. Jurassic of England by Tate and Blake (1876, *3130, p. 454). Brady (1884, *344, p. 457) identified the species from Recent sediments on the basis of the figures of English L. Jurassic specimens. Later workers have incorrectly recognized the species on the basis of Brady's Recent specimens, although the original material is unrecognizable.

PHYSOMPHALUS Ehrenberg, 1856

Type species: Physomphalus porosus Ehrenberg, 1856; OD(M).

Physomphalus Ehrenberg, 1856 (*1070), p. 172.

PILEOLINA Bermúdez, 1952

Plate 845, figs. 2–4

Type species: Valvulina pileolus d'Orbigny, 1839 (*2306), p. 47; OD.

Pileolina Bermúdez, 1952 (*205), p. 38.

Unrecognizable based on the type species. According to Hornibrook and Vella (1954, *1542, p. 24), the genus was originally thought to have an umbilical plug, but this was an erroneous assumption based on d'Orbigny's figures. The type specimen is not preserved but Heron-Allen and Earland (1932, *1480, p. 416) examined d'Orbigny's original material and found specimens indicating that the species was a "*Discorbis*" with radial striae on the ventral side and with a small individual attached at the umbilicus, features characteristic of many Glabratellidae. Pending illustration of the type material and selection of a neotype, *Pileolina* remains unrecognizable.

PLATYOECUS Ehrenberg, 1854

Type species: Platyoecus squama Ehrenberg, 1854; OD(M).

Platyoecus Ehrenberg, 1854 (*1068), p. 23.

PLECTOTROCHAMMINA Parr, 1950

Plate 844, figs. 6–8

Type species: Plectotrochammina subglobosa Parr, 1950; OD.

Plectotrochammina Parr, 1950 (*2363), p. 280.

Holocene Antarctic topotypes received from Parr do not show the trochospiral to biserial character described; the coarsely agglutinated material of the test wall may have given this erroneous impression.

PLEURITES Ehrenberg, 1854

Type species: Pleurites cretae Ehrenberg, 1854; SD Cushman, 1927 (*745), p. 490.

Pleurites Ehrenberg, 1854 (*1068), p. 23.

PLEUROSTOMINA A. Costa, 1862

Type species: Pleurostomina bimucronata A. Costa, 1862; OD(M).

Pleurostomina A. Costa, 1862 (*683), p. 94.

PLEUROTREMA Ehrenberg, 1839

Type species: Pleurotrema calcarina Ehrenberg, 1839; OD(M).

Pleurotrema Ehrenberg, 1839 (*1054), chart opp. p. 120.

PNINAELLA Brotzen, 1948

Plate 844, figs. 11–14

Type species: Pninaella scanica Brotzen, 1948; OD.

Pninaella Brotzen, 1948 (*429), p. 119.

Pninaella was defined as having much reduced septa and an enlarged aperture occupying the entire apertural face. As noted by Loeblich and Tappan (1964, *1910, p. C760), this appearance is due to broken specimens, and poor preservation of the final whorl in that sectioned. Although then considered a synonym of *Heterolepa*, it differs in having a large umbilical boss on the umbilical side and appears closer to *Cibicidoides*. Possibly *P. scanica* is conspecific with *Cibicidoides proprius* Brotzen, described simultaneously from the same samples, but is unrecognizable pending description of the aperture and wall structure from better material.

POLYXENES de Montfort, 1808

Type species: Polyxenes cribratus de Montfort, 1808 = *Nautilus farctus* Fichtel and Moll, 1798 (*1124), p. 64; OD.

Polyxenes de Montfort, 1808 (*2176), p. 138.

Rögl and Hansen (1984, *2639) designated a lectotype for *Nautilus farctus*, but both the lectotype and paratype have broken final chambers, hence the nature of the aperture cannot be determined. Not recognizable from the original types.

PORONAIA Ujiié and Watanabe, 1960

Plate 845, figs. 5-8

Type species: Plectina poronaiensis Asano, 1952 (*89), p. 33; OD.

Poronaia Ujiié and Watanabe, 1960 (*3243), p. 133.

Described from the U. Eocene of Japan, specimens are invariably crushed and may belong either to the Verneuilinidae or Textulariellidae, as the description indicated a possibly alveolar wall.

POROSPIRA Ehrenberg, 1844

Type species: Porospira comes Ehrenberg, 1844; SD Cushman, 1927 (*745), p. 490.

Porospira Ehrenberg, 1844 (*1062), p. 75.

Type species known only from an enrolled and possibly planispiral specimen mounted in balsam, although the nature of coiling cannot be determined from the illustration (Ehrenberg, 1854, ***1068**, pl. 21, fig. 93). This species is from the Cretaceous of Oran, Africa, whereas other species included by Ehrenberg in *Porospira* are from Recent deepwater sediments and at least some are planktonic.

PRAELAMARCKINA
Kaptarenko-Chernousova, 1956

Plate 845, figs. 12-14

Type species: Praelamarckina humilis Kaptarenko-Chernousova, 1956; OD.

Praelamarckina Kaptarenko-Chernousova, 1956 (*1646), p. 159; 1956 (*1647), p. 54.

Described from the L. to M. Jurassic (Aalenian to Bajocian) of the Ukraine SSR as a primitive member of the Ceratobuliminidae with interiomarginal slitlike aperture. No information was given as to the internal structure, but later workers reported an areal intercameral foramen and the absence of an internal partition. More information as to morphology and structure is needed.

PRAEUVIGERINA Hofker, 1951

Plate 845, figs. 9 and 10

Type species: "*Praeuvigerina westphalica* (Franke) from the Senonian of Maastricht"; OD.

Praeuvigerina Hofker, 1951 (*1498), p. 188.

Hofker described the genus from specimens in the Cretaceous of the Netherlands that resemble *Praebulimina* or *Pseudouvigerina*, illustrating one with virguline aperture and simple troughlike toothplate. However, the original illustration of *Uvigerina westphalica* Franke, 1913 (***1171**, p. 280) from Germany shows a narrow test with elongate neck on a produced final chamber, resembling *Eouvigerina* Cushman, 1926, such as *E. gracilis* Cushman. Neither *Praeuvigerina* nor *P. westphalica* were reported in later monographic studies of the late Cretaceous of Maastricht (Hofker, 1957, ***1512**) and Germany (Hofker, 1966, ***1517**).

PSAMMOSCENE Thalmann, 1934

Type species: Psammoscene craterula Rhumbler, in Wiesner, 1931 (***3375**); OD.

Psammoscene Thalmann, 1934 (*3153), p. 243.

Psammoscene Rhumbler, in Wiesner, 1931 (*3375), p. 85 (name not available, ICZN Art. 13 (a)(i), no type species designated).

Not figured and insufficiently described to determine which of the numerous attached and agglutinated genera it represents. As no type repository was indicated, restudy of type material is not possible.

PSEUDASTRORHIZULA Wetzel, 1940

Type species: Pseudastrorhizula eisenacki Wetzel, 1940; OD.

Pseudastrorhizula Wetzel, 1940 (*3360), p. 122.

PSEUDONUMMOLOCULINA Calvez, 1986

Type species: Pseudonummoloculina aurigerica Calvez, 1986; OD.

Pseudonummoloculina Calvez, 1986 (*478A), p. 31.

Family Miliolidae. Validated by brief combined generic and specific description; not illustrated.

PSEUDOPATELLINA Haque, 1960

Plate 845, figs. 15-17

Type species: Pseudopatellina arthurcooperi Haque, 1960; OD.

Pseudopatellina Haque, 1960 (*1420), p. 28 (non *Pseudopatellina* Kenawy and Nyírö, 1967, nec S. Y. Zheng, 1980).

Originally placed both in Spirillinidae (p. 28) and Rotaliidae (p. 29), it needs further description. Arrangement of the early chambers is unknown, later chambers are variously described as crescentic throughout, as final chambers concentric or nearly so, and as adult two or three chambers annular. The description also states, "No aperture visible, probably at the base of the chamber on the ventral side," and "the pores on the chambers may also have served as apertures." M. to U. Eocene; Pakistan.

PTEROPTYX Ehrenberg, 1873

Type species: Pteroptyx vespertilio Ehrenberg, 1873; OD(M).

Pteroptyx Ehrenberg, 1873 (*1078), p. 151, 152 (non *Pteroptyx* Olivier, 1902).

PTYGOSTOMUM Ehrenberg, 1843

Type species: Ptygostomum oligoporum Ehrenberg, 1843; OD(M).

Ptygostomum Ehrenberg, 1843 (*1059), p. 409.

RAPHANULINA Zborzewski, 1834

Plate 845, fig. 18

Type species: Raphanulina humboldtii Zborzewski, 1834; OD(M).

Raphanulina Zborzewski, 1834 (*3441), p. 311.

RECURVOIDATUS Saidova, 1970

Plate 847, figs. 1-3

Type species: Recurvoides trochamminiformis Saidova, 1961 (*2691), p. 26; OD.

Recurvoidatus Saidova, 1970 (*2693), p. 151.

Whether the early stage is trochospiral or streptospiral is not indicated, and the original apertural view does not appear to agree with the other views of the holotype. Holocene; Pacific.

RENULINA Blake, 1876

Type species: Renulina sorbyana Blake, 1876; OD(M).

Renulina Blake, 1876 (*250), p. 262 (non *Renulina* Lamarck, 1805, nec de Blainville, 1825).

REOPHAXOPSIS de Folin, 1887

Type species: Reophaxopsis elegans de Folin, 1887; OD(M).

Reophaxopsis de Folin, 1887 (*1145), p. 127.

Agglutinated, possibly *Reophax*, but type species not described and no type repository, geologic age, or locality given.

RHABDELLA d'Archiac and Haime, 1853

Type species: Rhabdella malcolmi d'Archiac and Haime, 1853; OD(M).

Rhabdella d'Archiac and Haime, 1853 (*68), p. 351.

RHABDOPLEURA G. M. Dawson, 1870

Type species: Rhabdopleura abyssorum G. M. Dawson, 1870; OD(M).

Rhabdopleura G. M. Dawson, 1870 (*903), p. 175 (non Allman, 1869, nec de Koninck, 1881).

A large elongate agglutinated tube, known only from the original illustration, for which no magnification is given. The original description referred solely to the occurrence in Gaspé Bay, and the repository of the types is unknown. Although the original figures of *R. abyssorum* are of a specimen open at both ends that may be tubular or chambered, other specimens later referred to this species resemble *Hyperammina*, with bulbous proloculus, undivided later tubular chamber, and restricted aperture.

RHAETOTORULUS

Kristan-Tollmann, 1970

Plate 845, figs. 19-21

Type species: Rhaetotorulus striatus Kristan-Tollmann, 1970; OD.

Rhaetotorulus Kristan-Tollmann, in Tollmann and Kristan-Tollmann, 1970 (*3207), p. 121.

Said to appear from one side as an undivided enrolled tube with a broad flaring final whorl, without visible structure on the opposite side, and related to *Lasiodiscus*. However, no internal structure was evident, and the illustration suggests an ammodiscid with one side partially covered by sediment. Needs photographs of the internal structure and redescription from well-preserved material.

RHAPHIDOHELIX Möbius, 1880

Type species: Rhaphidohelix eligans Möbius, 1880; OD(M).

Rhaphidohelix Möbius, 1880 (*2157), p. 76.

Previously regarded as a synonym of *Trochammina* but insufficiently known for definite allocation.

RHAPHIDODENDRON Möbius, 1876

Type species: Rhaphidodendron album Möbius, 1876: OD(M).

Rhaphidodendron Möbius, 1876 (***2156**), p. 115.

RHODONASCIA Deák, 1964

Plate 846, figs. 1 and 2

Type species: Rhodonascia majzoni Deák, 1964; OD.

Rhodonascia Deák, 1964 (***905**), p. 100, 105.

Organic lining of a decalcified trochospirally enrolled foraminifer, not recognizable generically.

RHYNCHOPLECTA Ehrenberg, 1854

Type species: Rhynchoplecta punctata Ehrenberg, 1854; OD(M).

Rhynchoplecta Ehrenberg, 1854 (***1067**), p. 405.

ROBULAMMINA Montanaro-Gallitelli, 1947

Plate 847, figs. 4-6

Type species: Haplophragmoides? robulus Montanaro-Gallitelli, 1947; OD.

Robulammina Montanaro-Gallitelli, 1947 (***2170**), p. 189.

Originally described from Cretaceous flysch, the type species was suggested questionably to have a cribrate aperture. It has been considered a junior synonym of *Haplophragmoides* (Loeblich and Tappan, 1964, ***1910**, p. C225) or a senior synonym of *Unitendina* (Alekseychik-Mitskevich, in Subbotina et al., 1981, ***3083**, p. 27). The questionable nature of the aperture prevents recognition.

ROTALITES Lamarck, 1801

Type species: Rotalites tuberculosa Lamarck, 1801, OD(M).

Rotalites Lamarck, 1801 (***1775**), p. 401.

SCORTIMUS de Montfort, 1808

Type species: Scortimus navicularis de Montfort, 1808; OD(M).

Scortimus de Montfort, 1808 (***2176**), p. 250.

SEGUENZA O. Silvestri, 1889

Type species: Seguenza anomala O. Silvestri, 1889; OD(M).

Seguenza O. Silvestri, 1889 (***2973**), p. 57.

Previously considered to be a synonym of *Glomospira*, but the original figure does not show typical streptospiral coiling. Described as imperforate and subvitreous, it may either be porcelaneous or hyaline (perhaps referrable to the Spirillinina) rather than agglutinated; no type repository was indicated.

SIDEROSPIRA Ehrenberg, 1845

Type species: Siderolina? indica Ehrenberg, 1845; OD(M).

Siderospira Ehrenberg, 1845 (***1065**), p. 376.

SILICINA L. G. Bornemann, 1874

Type species: Involutina polymorpha Terquem, 1864 (***3138**); SD Cushman, 1927 (***746**), p. 188.

Silicina L. G. Bornemann, 1874 (***307**), p. 731.

Arsilicoum Rhumbler, 1913 (***2621**), p. 389 (err. emend.).

As noted by Tappan (1957, ***3124**, p. 210), of the three type specimens of Terquem's species in Paris, two are indeterminate fragments and the other a fragment of an agglutinated species, possibly of *Reophax*. Restriction of *Reophax* to those species with wall built of a single layer of grains and having a slightly asymmetrical test make this assignment unlikely, and Terquem's species is generically unrecognizable.

SILICOTEXTULINA Deflandre, 1934

Type species: Silicotextulina diatomitarum Deflandre, 1934; OD.

Silicotextulina Deflandre, 1934 (***916**), p. 1447.

Internal casts, organic linings, or siliceous replacements of isolated chambers and proloculi of a small biserial form described from diatomites; generically and specifically unrecognizable.

SIPHONCLAVULINA A. Silvestri, 1941

Type species: Siphonclavulina trigona A. Silvestri, 1948; OD(M).

Siphonclavulina A. Silvestri, 1948 (***2971**), p. 43.

Stated to have an internal tube and previously regarded as a synonym of *Tritaxia*.

However, the "tube" illustrated may only represent the junction of three series of chambers at the center of the section and the genus is unrecognizable.

SOLDANINA O. G. Costa, 1856

Type species: Soldanina exagona O. G. Costa, 1856; OD(M).

Soldanina O. G. Costa, 1856 (*686), p. 246.

Probably an attached representative of the Cibicididae or Planorbulinidae, but chamber arrangement, aperture, and other important features are undescribed.

SPINIFERELLA Saidova, 1975

Plate 847, fig. 11

Type species: Spiniferella spinea Saidova, 1975; OD.

Spiniferella Saidova, 1975 (*2695), p. 347.

Referred to the Islandiellidae and characterized by radial chamber prolongations, but chamber arrangement and apertural features are insufficiently described. The type species appears similar to and may be a senior synonym of *Globocassidulina crenulata* Nomura, 1983. If so, *Spiniferella* would be a synonym of *Globocassidulina* Voloshinova, 1960.

SPIRONATUS N. K. Bykova and Ptushkina, 1980

Plate 845, figs. 22 and 23

Type species: Spiroplectammina gissarensis Zhukova, in Akramkhodzhaev et al., 1967 (*20), p. 85; OD.

Spironatus N. K. Bykova and Ptushkina, 1980 (*476), p. 56.

The type species was described as having a planispiral evolutely coiled test of two whorls, the final whorl with nine chambers, and rarely having a very short biserial stage. Two specimens were figured (neither stated to be the holotype, which was designated as IGIRNIGM Coll. no. 253). Of the figured specimens, that in fig. 9 is wholly enrolled, robust in form, with chambers in peripheral view about as wide as high enlarging rapidly as added and a rounded areal aperture near the peripheral angle. The specimen in fig. 8 appears to be aberrant, a single chamber having a reversed direction of growth but not truly biserial. In contrast, the genus as described by Bykova and Ptushkina has coiling strictly in one plane, two to three involute to semi-involute whorls, chambers subdivided medially to form two parts, final chambers tending to become uniserial, with a weakly developed biserial part, and sinuous sutures. Their illustrated specimen somewhat resembles the umbilical side of *Asterotrochammina* and appears to uncoil rather than be biserial in the later stage. Unrecognizable pending clarification of the discrepancies between the descriptions and illustrations of the genus and its type species.

SPIROPLEURITES Ehrenberg, 1854

Spiropleurites Ehrenberg, 1854 (*1066), p. 237.

Type species not designated.

STROPHOCONUS Ehrenberg, 1843

Type species: Strophoconus cribosus Ehrenberg, 1843; OD.

Strophoconus Ehrenberg, 1843 (*1061), p. 166.

SYNSPIRA Ehrenberg, 1854

Type species: Synspira triquetra Ehrenberg, 1854; OD(M).

Synspira Ehrenberg, 1854 (*1068), p. 24.

TAUROGYPSINA Sacco, 1893

Type species: Taurogypsina taurobaculata Sacco, 1893; OD.

Taurogypsina Sacco, 1893 (*2686), p. 205.

TECTOGLOBIGERINA Fuchs, 1973

Plate 846, figs. 3-5

Type species: Tectoglobigerina calloviana Fuchs, 1973; OD.

Tectoglobigerina Fuchs, 1973 (*1193), p. 459.

Described from glauconitic casts of a species with irregular trochospiral coiling. Probably congeneric with *Eoheterohelix*, but both taxa need information concerning the wall from a study of better-preserved specimens. M. Jurassic (U. Callovian) of Poland.

TEREUVA Vella, 1961

Type species: Uvigerina paeniteres Finlay, 1939 (*1127), p. 103; OD.

Hofkeruva (Tereuva) Vella, 1961 (*3286), p. 475.

Unrecognizable, as type species apparently has never been illustrated.

THALMANNINA Majzon, 1943

Plate 845, fig. 11

Type species: Thalmannina nothi Majzon, 1943; OD(M).

Thalmannina Majzon, 1943 (***1982**), p. 64, 154.

The fragmentary type specimen is an irregular *U*-shaped tube, but the early stage of the test is unknown and it might represent almost any genus of the Ammodiscidae.

TOLYPAMMINELLA Marie, 1961

Plate 846, figs. 6 and 7

Type species: Tolypamminella vermiculare Marie, 1961.

Tolypamminella Marie, in Deleau and Marie, 1961 (***927**), p. 83.

Based on thin sections but nature of the wall uncertain; could belong either to the Ammodiscidae or to the microgranular Earlandiacea.

TRIOXEIA de Folin, 1888

Type species: Trioxeia edwardsi de Folin, 1888.

Trioxeia de Folin, 1888 (***1147**), p. 110.

Trioxeia de Folin, 1881 (***1142**), p. 141 (name not available, ICZN Art. 12 (a), no description).

TRITAXIOPSIS Rzehak, 1895

Plate 846, figs. 8-10

Type species: Tritaxia pleurostoma Rzehak, 1895; OD(M).

Tritaxiopsis Rzehak, 1895 (***2682**), p. 217.

Tertiary of Czechoslovakia. May be a synonym of *Tritaxia*, but the offset aperture of the type species, somewhat to one side of the apex, is unlike the agglutinated Tritaxiidae, and the smooth texture and slightly inflated sides suggest that it may be a hyaline calcareous species related to the Buliminacea.

TROCHILIASCIA Deák, 1964

Plate 846, fig. 11

Type species: Trochiliascia cuvillieri Deák, 1964; OD.

Trochiliascia Deák, 1964 (***905**), p. 99.

Internal organic lining of a decalcified trochospiral foraminifer; not generically recognizable.

TURAENSIS Pronina, 1970

Plate 836, figs. 13 and 14

Type species: Turaensis compactilus Pronina, 1970; OD.

Turaensis Pronina, 1970 (***2478**), p. 112.

Assigned to the Parathuramminidae but differs from that family in that no aperture is apparent, and the test was reported to consist of a series of superposed spherical to hemispherical chambers. The wall has three layers, thin, finely granular inner and outer layers being separated by a thick gray intermediate layer. U. Silurian (Ludlovian), on the E. slope of the central Urals, USSR.

UPSONELLA W. L. Moore, 1959

Type species: Upsonella typus W. L. Moore, 1959; OD.

Upsonella W. L. Moore, 1959 (***2178**), p. 995.

VAGINULOGLANDULINA A. Silvestri, 1906

Type species: Vaginuloglandulina laevigata A. Silvestri, 1906; OD(M).

Vaginuloglandulina A. Silvestri, 1906 (***2937**), p. 24.

Described with a single included species but never illustrated.

VOLUTARIA Zalessky, 1926

Type species: Volutaria potoniei Zalessky, 1926.

Volutaria Zalessky, 1926 (***3423**), p. 95.

VULVULINOIDES Saidova, 1975

Plate 847, figs. 7-10

Type species: Vulvulinoides benignus Saidova, 1975; OD.

Vulvulinoides Saidova, 1975 (***2695**), p. 120 (also err. cit. as *Valvulinoides*, p. 598, non *Valvulinoides* Podobina, 1975).

Described as planispiral to biserial, with basal aperture surrounded by a lip. However, illustrations of the somewhat inflated base suggest a triserial early stage rather than a planispiral coil and need clarification.

YANBONIA M. R. Sahni and Sastri, 1954

Plate 846, fig. 12

Type species: Yanbonia moniliformis M. R. Sahni and Sastri, 1954 (nom. imperf., as *moniliforme*); OD.

Yanbonia M. R. Sahni and Sastri, 1954 (*2687), p. 384.

Described from a thin section as thick-walled, uniserial, and rectilinear; wall composition and structure and apertural character unknown. Cenomanian of Burma.

ZEKRITIA Henson, 1948

Plate 847, fig. 12

Type species: Zekritia langhami Henson, 1948; OD.

Zekritia Henson, 1948 (*1460), p. 95.

Described from a single "good specimen," but the early stage, nature of the aperture, and other essential features remain unknown. Unrecognizable pending description of additional material. From subsurface probable Turonian limestone, Qatar Peninsula of Arabia.

Unavailable Family-Group Names Used for Foraminifera

Endothyrininae Miklukho-Maklay, 1963 (***2130**), p. 183. Invalid, as type genus not valid: type species never described.

Hauranitinae Septfontaine, 1986 (***2875A**), p. 54 (name not available, ICZN Art. 11 (f)(i)(1), not based on available genus; and ICZN Art. 13 (a)(i), no description).

Orbitorotalininae Hofker, 1933 (***1493**), p. 125 (name not available, ICZN Art. 11 (f)(i)(1), not based on included genus).

Paleomayncininae Septfontaine, 1986 (***2875A**), p. 54 (name not available, ICZN Art. 11 (f)(i)(1), not based on available genus; and ICZN Art. 13 (a)(i), no description).

Paleopfenderininae Septfontaine, 1986 (***2875A**), p. 54 (name not available, ICZN Art. 11 (f)(i)(1), not based on available genus; and ICZN Art. 13 (a)(i), no description).

Praerotalininae Hofker, 1933 (***1493**), p. 125 (name not available, ICZN Art. 11 (f)(i)(1), not based on included genus).

Proarchaediscidae Işik, 1981 (***1592**), p. 81 (name not available, ICZN Art. 13 (a)(i, ii), no description; and ICZN Art. 11 (f)(i)(1), not based on included genus); also err. cit. as Proarchadisciidae, and Proarchadisciidae, in expl. pl. 1, fig. 4.

Cladegroups, Category Not Recognized by ICZN

The following names were proposed as "cladegroups," a category not recognized under the ICZN, hence not available.

Candeinidecimae Fordham, 1986 (***1149A**), p. 55; stem species: *Globigerina (Eoglobigerina) tetragona* Morozova, 1961 (***2189A**), p. 13.

Candeininonae Fordham, 1986 (***1149A**), p. 57; stem species: *Globigerina (Eoglobigerina) taurica* Morozova, 1961 (***2189A**), p. 10.

Candeiniquartae Fordham, 1986 (***1149A**), p. 62; stem species: *Candeina* sp.

Candeiniquintae Fordham, 1986 (***1149A**), p. 62; stem species: *Acarinina inaequiconica* Subbotina, 1960 (***3079A**), p. 202.

Candeiniseptimae Fordham, 1986 (***1149A**), p. 59; stem species: *Globorotalia insolita* Jenkins, 1966 (***1605**), p. 1120.

Candeinisextae Fordham, 1986 (***1149A**), p. 60; stem species: *Globigerina praeglobotruncanaeformis* N. K. Bykova, 1960 (***472**), p. 320.

Candeinitertiae Fordham, 1986 (***1149A**), p. 64; stem species: *Globigerinatella insueta* Cushman and Stainforth, 1945 (***848**), p. 69.

Candeinoctavae Fordham, 1986 (***1149A**), p. 58; stem species: *Globigerina (Eoglobigerina) theodosica* Morozova, 1961 (***2189A**), p. 11.

Cassigerinelliprimae Fordham, 1986 (***1149A**), p. 59; stem species: *Cassidulina chipolensis* Cushman and Ponton, 1932 (***844**), p. 98.

Cassigerinelloitiprimae Fordham, 1986 (***1149A**), p. 45; stem species: *Eoglobigerina? fodina* Blow, 1979 (***259**), p. 1221.

Globigerinathekiquartae Fordham, 1986 (***1149A**), p. 73; stem species: *Globorotalia angulata* var. *praepentacamerata* Shutskaya, 1956 (***2905A**), p. 94.

Globigerinathekiquintae Fordham, 1986 (***1149A**), p. 72; stem species: *Globigerina inconstans* Subbotina, 1953 (***3079**), p. 58.

Globigerinathekisecundae Fordham, 1986 (***1149A**), p. 75; stem species: *Globigerina mckannai* White, 1928 (***3366A**), p. 194.

Globigerinathekitertiae Fordham, 1986 (***1149A**), p. 74; stem species: *Globigerina subsphaerica* Subbotina, 1947 (***3076A**), p. 108.

Globigerinelliprimae Fordham, 1986 (***1149A**), p. 99; stem species: *Globigerinella evoluta* Fordham, 1986.

Globigerinidecimae Fordham, 1986 (***1149A**), p. 88; stem species: *Globigerina linaperta* Finlay, 1939 (***1127**), p. 125.

Globigeriniduodecimae Fordham, 1986 (***1149A**), p. 87; stem species: *Globigerina* sp. e.

Globigeriniduodevicesimae Fordham, 1986 (***1149A**), p. 71; stem species: *Globigerina fringa* Subbotina, 1950 (***3077**), p. 104.

Globigeriniprimae Fordham, 1986 (***1149A**), p. 113; stem species: *Globigerina concinna* Reuss, 1850 (***2573**), p. 373.

Globigeriniquartae Fordham, 1986 (***1149A**), p. 100; stem species: *Sphaeroidinella disjuncta* Finlay, 1940 (***1129**), p. 469.

Globigeriniquartaedecimae Fordham, 1986 (***1149A**), p. 85; stem species: *Globigerina* sp. c.

Globigeriniquintae Fordham, 1986 (***1149A**), p. 96; stem species: *Globigerina parva* Bolli, 1957 (***284**), p. 108.

Globigeriniquintaedecimae Fordham, 1986 (***1149A**), p. 80; stem species: *Globigerina* sp. b.

Globigerinisecundae Fordham, 1986 (***1149A**), p. 112; stem species: *Globigerina microstoma* Cita, Premoli Silva, and Rossi, 1965 (***610A**), p. 250.

Globigeriniseptimae Fordham, 1986 (***1149A**), p. 89; stem species: *Globigerina pseudoeocaena* Subbotina, 1953 (***3079**), p. 66.

Globigeriniseptimaedecimae Fordham, 1986 (***1149A**), p. 77; stem species: *Globigerina* sp. a.

Globigerinisextae Fordham, 1986 (***1149A**), p. 93; stem species: *Globigerina ouachitaensis* Howe and Wallace, 1932 (***1569**), p. 74.

Globigerinisextaedecimae Fordham, 1986 (***1149A**), p. 78; stem species: *Globigerina velascoensis* Cushman, 1925 (***728**), p. 19.

Globigerinitertiaedecimae Fordham, 1986 (***1149A**), p. 86; stem species: *Globigerina* sp. d.

Globigerinivicesimae Fordham, 1986 (***1149A**), p. 52; stem species: *Globorotalia monmouthensis* Olsson, 1960 (***2296A**), p. 47.

Globigerinivicesimaeseptimae Fordham, 1986 (***1149A**), p. 44; stem species: *Diplotremina multifimbriata* Fuchs, 1967 (***1190**), p. 141.

Globigerinivicesimaesextae Fordham, 1986 (***1149A**), p. 52; stem species: *Kollmannita* sp.

Globigerinoidiprimae Fordham, 1986 (***1149A**), p. 104; stem species: *Globigerina haitiensis* Coryell and Rivero, 1940 (***682A**), p. 339.

Globigerinundecimae Fordham, 1986 (*1149A), p. 88; stem species: *Globigerina ayalai* Bermúdez, 1961 (*206), p. 1158.

Globigerinundevicesimae Fordham, 1986 (*1149A), p. 69; stem species: *Eoglobigerina edita* subsp. *praeedita* Blow, 1979 (*259), p. 1212.

Globoquadrinisecundae Fordham, 1986 (*1149A), p. 80; stem species: *Globigerina yeguaensis* Weinzierl and Applin, 1929 (*3358), p. 408.

Globorotalinonae Fordham, 1986 (*1149A), p. 118; stem species: *Globigerina bakeri* Cole, 1927 (*619), p. 33.

Globorotalioctavae Fordham, 1986 (*1149A), p. 118; stem species: *Globorotalia opima* Bolli, 1957 (*284), p. 117.

Globorotaliprimae Fordham, 1986 (*1149A), p. 140; stem species: *Globorotalia menardii* var. *fijiensis* Cushman, 1934 (*775A), p. 136.

Globorotaliquartae Fordham, 1986 (*1149A), p. 136; stem species: *Rotalia limbata* Fornasini, 1902 (*1153), p. 56 (= *Rotalia limbata* d'Orbigny, 1826, *2203, p. 274, nom. nud.).

Globorotaliquintae Fordham, 1986 (*1149A), p. 130; stem species: *Globorotalia praemenardii* Cushman and Stainforth, 1945 (*848), p. 70.

Globorotaliseptimae Fordham, 1986 (*1149A), p. 127; stem species: *Globorotalia kugleri* Bolli, 1957 (*284), p. 118.

Globorotalisextae Fordham, 1986 (*1149A), p. 120; stem species: *Globorotalia miozea* Finlay, 1939 (*1128), p. 326.

Globorotaloidiprimae Fordham, 1986 (*1149A), p. 90; stem species: *Catapsydrax parvulus* Bolli, Loeblich, and Tappan, 1957 (*292), p. 36.

Globorotaloidisecundae Fordham, 1986 (*1149A), p. 89; stem species: *Globigerina incretacea* Khalilov, 1956 (*1681), p. 247.

Guembelitriquintae Fordham, 1986 (*1149A), p. 45; stem species: *Conoglobigerina* sp.

Guembelitrisecundae Fordham, 1986 (*1149A), p. 45; stem species: *Guembelitria cretacea* Cushman, 1933 (*769), p. 37.

Hantkeniniprimae Fordham, 1986 (*1149A), p. 87; stem species: *Hastigerinella eocanica* Nuttall, 1928 (*2275), p. 376.

Hastigerinitertiae Fordham, 1986 (*1149A), p. 97; stem species: *Hastigerina* sp.

Heterohelicidecimae Fordham, 1986 (*1149A), p. 45; stem species: *Praegubkinella* sp.

Heterohelicinonae Fordham, 1986 (*1149A), p. 47; stem species: *Woletzina* sp.

Morozovelliprimae Fordham, 1986 (*1149A), p. 69; stem species: *Pulvinulina velascoensis* Cushman, 1925 (*728), p. 19.

Neoacarininiprimae Fordham, 1986 (*1149A), p. 82; stem species: *Globigerina eocaena* Gümbel, 1870 (*1337), p. 662.

Obandyelliprimae Fordham, 1986 (*1149A), p. 134; stem species: *Globorotalia cibaoensis* Bermúdez, 1949 (*201), p. 285.

Obandyellisecundae Fordham, 1986 (*1149A), p. 131; stem species: *Globorotalia scitula* subsp. *ventriosa* Ogniben, 1958 (*2291B), p. 246.

Orbulinisecundae Fordham, 1986 (*1149A), p. 100; stem species: *Globigerinoides triloba* subsp. *altiapertura* Bolli, 1957 (*284), p. 113.

Planorotalitiprimae Fordham, 1986 (*1149A), p. 57; stem species: *Globigerina compressa* Plummer, 1927 (*2421), p. 135.

Pulleniatiniprimae Fordham, 1986 (*1149A), p. 119; stem species: *Globorotalia mayeri* Cushman and Ellisor, 1939 (*820A), p. 11.

Streptochiliprimae Fordham, 1986 (*1149A), p. 48; stem species: *Streptochilus pristinum* Brönnimann and Resig, 1971 (*402), p. 1289.

Tinophodelliprimae Fordham, 1986 (*1149A), p. 67; stem species: *Globigerina antarctica* Keany and Kennett, 1972 (*1664A), p. 532.

Tinophodellisecundae Fordham, 1986 (*1149A), p. 65; stem species: *Tinophodella praemonita* Fordham, 1986.

Truncorotaliprimae Fordham, 1986 (*1149A), p. 144; stem species: *Globorotalia tosaensis* Takayanagi and Saito, 1962 (*3112A), p. 81.

Truncorotalisecundae Fordham, 1986 (*1149A), p. 143; stem species: *Globorotalia crassula* Cushman and R. E. Stewart, in Cushman et al., 1930 (*849A), p. 77.

Truncorotalitertiae Fordham, 1986 (*1149A), p. 142; stem species: *Globorotalia conomiozea* subsp. *sphericomiozea* Walters, 1965 (*3337A), p. 126.

Truncorotaloidiprimae Fordham, 1986 (*1149A), p. 76; stem species: *Pulvinulina crassata* var. *densa* Cushman, 1925 (*731A), p. 301.

Turborotaliprimae Fordham, 1986 (*1149A), p. 71; stem species: *Globigerina varianta* Subbotina, 1953 (*3079), p. 63.

Turborotalisextae Fordham, 1986 (*1149A), p. 71; stem species: *Turborotalia* sp.

Turborotalitiprimae Fordham, 1986 (*1149A),p. 93; stem species: *Globigerina fariasi* Bermúdez, 1961 (*206), p. 1181.

Zeauvigerinisecundae Fordham, 1986 (*1149A), p. 47; stem species: *Guembelina wilcoxensis* Cushman and Ponton, 1932 (*843), p. 66.

Unavailable Generic Names Used for Foraminifera

(Nomina nuda unless otherwise noted)

Acanthospira Reinsch, 1877 (***2554**), p. 177.

Actinoplicata Bashkirov and Antonishin, 1974 (***155**), p. 17 (subgenus of *Asterocyclina*; invalid: no species included.

Amorphina W. K. Parker, in W. K. Parker and Jones, 1857 (***2344**), p. 278.

Amphigramma Reinsch, 1877 (***2554**), p. 177.

Angelina Altiner, 1986 (***28A**), p. 25 (name not available, ICZN Art. 13 (b), no type species).

Archeorbis Leupold and Bigler, 1936 (***1829**), p. 606.

Armeniella A. D. Miklukho-Maklay, 1953 (***2118**), p. 60.

Askopsis de Folin, 1881 (***1142**), p. 138.

Asterogavelinella Reiss, 1957 (***2557**), p. 3 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii)).

Asterorbitoides A. Silvestri, 1907 (***2941**), p. 86.

Bandyus Fordham, 1986 (***1149A**), p. 56 (name not available, ICZN Art. 13 (a)(i), no description); type species: *Globorotaloides suteri* subsp. *relizensis* Bandy, Ingle, and Wright, 1971 (***119A**), p. 15; OD.

Beichuanensis K. L. Wang, 1979 (***3340**), p. 120.

Berthelinia Haynes, 1981 (***1437**), textfig. 9.2 on p. 187; Copestake and Johnson, 1984 (***681**), p. 183, 184.

Bessiella Conil and Hance, in Conil et al., 1980 (***660**), p. 62 (name not available, ICZN Art. 13 (b), type species not available); type species: *Bessiella legrandi* Conil and Hance (not available, ICZN Art. 13 (a)(i), not described; OD(M).

The genus was described in Conil et al., 1980 as in press, and the type species was also indicated as in press. Both are thus invalid at present. The genus was again cited as *Bessiella* in Conil, 1980 (***657**), p. 47, with description of another new species, but without validation of the genus.

Bigeneropolis Marie, 1950 (***2035**), p. 50.

Bitectina Malakhova, 1969 (***1992**), p. 31, 71.

Bithurammina Miklukho-Maklay, 1963 (***2130**), p. 148; type species: "*Parathurammina*? aff. *dagmarae* Grozdilova and Lebedeva, 1954 (***1321**), p. 23 (non *Parathurammina dagmarae* Suleymanov, 1945); OD.

Genus invalid as type species not available; *Parathurammina dagmarae* Suleymanov is the type species of *Parathurammina*.

Biticinella Sigal, 1966 (***2920**), p. 189, 193.

Described as a "morphogenre," as a "subgenus" of a "spectrogenre"; categories not recognized by ICZN.

Bivicinesphaera Kazennov, Bogush, and Benediktova, 1975 (***1664**), p. 20.

Blowellus Fordham, 1986 (***1149A**), p. 56 (name not available, ICZN Art. 13 (a)(i), no description); type species: *Globorotalia birngeae* Blow, 1959 (***256**), p. 210; OD.

Brevisiphon Chernykh, in Poyarkov, 1979 (***2466**), p. 62 (name not available, ICZN Art. 13 (b), type species not available; type species: *Brevisiphon circulus* Chernykh, in Poyarkov, 1979 (name not available, ICZN Art. 13 (a)(i), no description); OD.

Described as a tubular agglutinated form, with apertures at the ends. Two species, *B. circulus* and B. *compressus*, are listed, but neither is described nor figured. As the two are not differentiated, the generic diagnosis cannot be regarded as a combined generic and specific description.

Calcidiscus Grozdilova, 1960 (***1318**), p. 44.

Carina A. D. Miklukho-Maklay, 1953 (***2118**), p. 18.

Caspirella N. K. Bykova, 1960 (***472**), p. 324.

Chaetotrochus Ehrenberg, 1866 (***1075**), p. 76, 81.

Cheirammina de Folin, 1881 (***1142**), p. 132.

Cheiropsis de Folin, 1881 (***1142**), p. 132.

Chernousovella Hutton, 1966 (***1578**), p. 72 (subgenus of *Paramillerella*); type species: *Eostaffella mosquensis* Vissarionova, 1948 (***3296**), p. 222; OD.

Chomatochernella Dil, 1977 (***960**), expl. pl. 3, fig. 58.

Chrysanthemina K. L. Wang, 1979 (***3340**), p. 120.

Clavula de Folin, 1881 (***1142**), p. 132 (non *Clavula* Wright, 1859).

Clypeocyclina A. Silvestri, 1908 (***2944**), p. 154.

Theoretical genus, no species included.

Clyphogonium Reinsch, 1877 (***2554**), p. 177.

Conicokurnubia Septfontaine, 1981 (***2875**), p. 174, 183-185, pl. 1, fig. 14; Septfontaine, 1986 (***2875A**), p. 54 (name not available, ICZN Art. 13 (b), no type species).

Conicopfenderina Septfontaine, 1981 (***2875**), p. 172, 174, 182-184, 192, 193; Septfontaine, 1986 (***2875A**), p. 54 (name not available, ICZN Art. 13 (b), no type species).

Conicovalvulina Marie, 1964 (***2042**), p. 1083, 1100, pl. 1, figs. 3a, b.

Conocorbina Colom, 1982 (***652**), p. 453; possibly err. cit.; not stated to be new but *Conocorbina multicamerata* described.

Craterularia Rhumbler, 1911 (***2620**), p. 90, 100, 136; no type designated.

Genus originally described and illustrated by Rhumbler (1911) but no named species included. Unpublished plate explanations referred to the illustrations as *Craterularia truncatulinoides*, but this manuscript name was first published in 1949 (Anonymous, 1949, ***45**, p. 38), and is not available (ICZN Art. 13 (ii)).

Cribroendothyra Lebedeva, 1956 (***1795**), p. 46.

Cyclogypsinoides A. Silvestri, 1937 (***2966**), p. 201.

Cylindrospira de Folin, 1883 (***1143**), p. 318.

Dendropela de Folin, 1883 (***1143**), p. 328; 1887 (***1144**), p. 113.

Deshayesulus Fordham, 1986 (***1149A**), p. 56 (name not available, ICZN Art. 13 (a)(i), no description); type species: *Globigerina puncticulata* Deshayes, 1832 (***949A**), p. 170; OD.

Dillina Munier-Chalmas and Schlumberger, 1883 (***2212**), p. 862.

Diplomasta de Folin, 1881 (***1142**), p. 136.

Discolita Rafinesque, 1815 (***2505**), p. 140.

Discorbitoides A. Silvestri, 1907 (***2941**), p. 86 (name not available, ICZN Art. 13 (b), no type species).

Dissimiloglobigerina Reiss, 1957 (***2557**), p. 4 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii)).

Duoplanum Haynes, 1981 (***1437**), p. 156, 167 (name not available, ICZN Art. 13 (b), no species included); also *Duoplanum* Copestake and Johnson, 1984 (***681**), p. 183, 184.

Dyoxeia de Folin, 1881 (***1142**), p. 132.

Eggerellovalvulina Marie, 1964 (***2042**), pl. 1, fig. 6a, b.

Ehrenbergellus Fordham, 1986 (***1149A**), p. 56 (name not available, ICZN Art. 13 (a)(i), no description); type species: *Aristerospira pachyderma* Ehrenberg, 1861 (***1074**), p. 276, 277, 303; OD.

Eilemammina de Folin, 1881 (***1142**), p. 132.

Elipsomorphina Mohan, Soodan, and Bhaktavasala, 1984 (***2163**), p. 316, pl. 10/2; also as *Elipsemorphina*, p. 316 (nom. nud.? or err. cit.?).

Endoglomospiranella Conil and Longerstaey, in Conil et al., 1980 (***660**), p. 63, 70 (stated to be suggested as a new genus in a personal communication from Reytlinger; name not available, ICZN Art. 13 (a)(i), 13 (b)).

Endothyrina Mikhaylov, 1935 (***2113**), p. 40; type species: *Endothyrina typica* Mikhaylov, 1935 (illustrated, but not described).

Eocyclammina Bermúdez, 1950 (***203**), p. 225.

Eofrondicularia K. V. Miklukho-Maklay, 1954 (***2134**), p. 42.

Eoglobigerinella Reiss, 1957 (***2557**), p. 3 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii)).

Eogloborotalia Reiss, 1957 (***2557**), p. 4 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii)).

Eolituonella Bermúdez, 1950 (***203**), p. 225.

Eozawainella A. D. Miklukho-Maklay, 1953 (***2118**), p. 18.

Exseroammodiscus Poyarkov, 1957 (***2463**), p. 34, 36.

Falsella Fordham, 1986 (***1149A**), p. 56 (name not available, ICZN Art. 13 (a)(i), no description); type species: *Falsella spuritumida* Fordham, 1986; OD.

Favocibicides Saidova, 1975 (***2695**), p. 615, pl. 78, fig. 5.

Florenella Conil, in Conil et al., 1980 (***660**), p. 63; type species: "*Florenella stricta* (Conil and Lys)," ?= *Plectogyra rotayi* (Lebedeva) var. *stricta* Conil and Lys, 1964 (***661**), p. 213, pl. 36, figs. 719–721 (invalid, ICZN Art. 15, varieties not available).

Also cited as *Florennella* Conil, 1980 (***657**), p. 47, genus invalid, no valid type species.

The genus was briefly described by Conil, in Conil et al., 1980 (***660**) as in press, with a sketch to show characteristics of the genus. The type species was stated to be *Florenella stricta*, but *stricta* was described as a variety in 1964, and varieties are nomenclaturally unavailable after 1960; furthermore, as the same paper also described *Plectogyra convexa* var. *stricta*, on p. 180, pl. 27, figs. 534–536, the two are homonyms, and no indication was given as to which taxon was indicated. Therefore the later "elevation" of the variety to specific rank as *Florenella stricta* is also invalid.

Florilus de Montfort, 1808 (***2176**), p. 134 (nom. suppress.; ICZN petition pending); type species: *Florilus stellatus* de Montfort, 1808 = err. nom. subst. pro *Nautilus asterizans* Fichtel and Moll, 1798 (***1124**), p. 37; OD.

As shown by Hansen and Rögl (1980, ***1397**, p. 174), *Nautilus asterizans* Fichtel and Moll, the valid name of the type species of *Florilus*, is unlike species commonly referred thereto but is congeneric with *Hanzawaia*. A proposal was submitted to the ICZN (ZN(S) 2225/2, petition pending) to suppress both *Florilus* and *Nautilus asterizans* and to recognize *Hanzawaia* as the valid name of this taxon.

Gallerius Fordham, 1986 (***1149A**), p. 56 (name not available, ICZN Art. 13 (a)(i), no description); type species: *Globigerina crassaformis* Galloway and Wissler, 1927 (***1209**), p. 41.

Glaesneria Brotzen and Bermúdez, in Bermúdez, 1950 (***203**), p. 341.

Glandulinaria Dain, 1960 (***872**), p. 197.

Globalternina Ivanova, in Subbotina, Glushko, and Pishvanova, 1955 (***3082**), p. 606.

Globigerinellita Sobetskiy et al., 1982 (***3014**), p. 7 (nomen nudum or err. cit.).

Globiglobotruncana Reiss, 1957 (***2557**), p. 3; also Reiss, 1957 (***2558**), p. 140, and table opp. p. 142 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii)).

Globulites Manoliu, 1972 (***2020**), p. 117 (non *Globulites* de Haan, 1825, nec Jeannel, 1954); subgenus of *Nummulites* (name not available, ICZN Art. 13 (b), no type species cited).

Granulites Manoliu, 1972 (***2020**), p. 116 (non *Granulites* Rafinesque, 1831); subgenus of *Nummulites* (name not available, ICZN Art. 13 (b), no type species cited).

Gratobuliminella Reiss, 1957 (***2557**), p. 4 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii)).

Helicites Gesner, 1758 (***1232**), p. 50 (non-Linnaean).

Helicospirina Hutton, 1966 (***1578**), p. 72; type species: *Valvulina plicata* Brady, 1873 (***331**), p. 99, OD (name not available, ICZN Art. 13 (a)(i), no description).

Helicovalvulina Marie, 1964 (***2042**), pl. 1, figs. 4, 5, 7.
Herrmannia Andreae, 1898 (***39**), p. 172.
Heterosteginella A. Silvestri, 1937 (***2966**), p. 117.
Hispidoglobigerina Reiss, 1957 (***2557**), p. 3 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii)).
Ilyopegma de Folin, 1881 (***1142**), p. 139.
Ilyoperidia de Folin, 1881 (***1142**), p. 139.
Ilyosphaera de Folin, 1883 (***1143**), p. 328.
Ilyozotika de Folin, 1881 (***1142**), p. 139.
Julia de Folin, 1881 (***1142**), p. 141 (non *Julia* Gould, 1862).
Kikrammina de Folin, 1881 (***1142**), p. 132.
Kitakamiella Toriyama, 1947 (***3210**), p. 112, 113.
Kuphus Sharkovskiy et al., 1985 (***2882**), p. 35.
Labroglobigerina Sigal, 1967 (***2921**), p. 23. Morphogenus: category not recognized by ICZN.
Labroglobigerinella Sigal, 1967 (***2921**), p. 21. Spectrogenus; category not recognized by ICZN.
Labroglobigerinella Sigal, 1967 (***2921**), p. 22. Morphogenus; category not recognized by ICZN.
Labrobiglobigerinella Sigal, 1967 (***2921**), p. 22. Morphogenus; category not recognized by ICZN.
Lagena Boys and Walker, 1784 (***323**), p. 6, as *Serpula (Lagena)* (publication rejected, ICZN Op. 558, 1959).
Limocaecum de Folin, 1881 (***1142**), p. 139.
Linthuris de Montfort, 1808 (***2176**), p. 254; type species: *Linthuris cassidatus* de Montfort, 1808 (generic and specific names suppressed, ICZN, ZN(S) 2225/5, petition pending).
Lipininella Cummings, 1961 (***698**), p. 109, 122, 123 (name not available, ICZN Art. 13 (a)(i), 13 (b)).
Mallopela de Folin, 1881 (***1142**), p. 140; 1883 (***1143**), p. 328.
Messina Brotzen, 1960 (***431**), p. 13.
Messinoglobigerinella Reiss, 1957 (***2557**), p. 4 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii)).
Microglobigerinella Reiss, 1957 (***2557**), p. 4 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii)).
Neimonggolina G. Y. Xia, 1979 (***3399**), p. 4 (subgenus of *Minojapanella*) (name not available, ICZN Art. 13 (b), type species not designated).

Described as a cylindrical form with obvious tunnel and chomata and with fluted septa.

Nemkovella Less, 1983 (***1828**), p. 190 (name not available, ICZN Art. 13 (a)(i); 13 (b), no description; type species not designated).
Neoarchaesphaera A. D. Miklukho-Maklay, 1958 (***2124**), p. 131, fig. 1.
Neokilianina Septfontaine, 1986 (***2875A**), p. 55 (name not available, ICZN Art. 13 (a)(i); 13 (b), no description; type species not designated).
Neoorbitolites Ghose, 1959 (***1236**), p. 376; and *Neoorbitolites complexa* Ghose, 1959.
Neoozawainella T. X. Han and X. L. Lu, 1979 (***1387**), p. 5.
Neoseptatournayella Bushmina, Bogush, and Kononova, 1984 (***457**), p. 18, 19, 37 (subgenus of *Septatournayella*: nom. nud. or err. cit.?).
Neotruncorotalia Reiss, 1957 (***2557**), p. 4 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii)).
Nodosarina Parker and Jones, 1859 (***2345**), p. 477 (nom. superfl.).

Nodosarina was proposed in a discussion of Linne's *Nautilus calcar,* which was stated to be "a good type of the *Cristellariae.*" From this type, "modifications" included *Marginulina, Robulina, Saracenaria,* and *Planularia.* Parker and Jones stated that in "essential characters of structure and mode of growth, the *Cristellaria* and *Nodosaria* are one; and the *Glandulinae, Lingulinae, Dentalinae, Rimulinae, Vaginulinae, Marginulinae, Dimorphinae, Flabellinae,* and *Frondiculariae* of authors necessarily fall in the same category. We propose to use the term *Nodosarina* as expressive of the type species, including all the above. We adopt *Cristellaria* and *Nodosaria* as subspecific [sic] apellations." Proposed expressly to include all of these previous genera, *Nodosarina* is a superfluous name and unavailable. Parker and Jones did not indicate a type species for *Nodosarina,* other than including its proposal within a discussion of *Nautilus calcar* that they regarded as a typical *Cristellaria.*

Nodulinella Rhumbler, in Anonymous, 1949 (***45**), expl. pl. 8.
Nonionella Rhumbler, in Anonymous, 1949 (***45**), p. 40 (non *Nonionella* Cushman, 1926); type species: *Nonionella aberrans* Rhumbler.
Nonionia Risso, 1826 (***2628**), p. 22; type species: *Nautilus incrassatus* Fichtel and Moll, 1798 (***1124**), p. 38; SD Loeblich and Tappan, 1964 (***1910**), p. C746 (unavailable, type species suppressed, ICZN petition pending).

Nautilus incrassatus, type species of *Nonion* de Montfort and *Nonionia,* was shown to differ from the long-standing concept of *Nonion,* and instead to be like that known as *Anomalinoides,* hence a petition was submitted to the ICZN (ZN(S) 2225/1) to suppress the species *incrassatus,* and designate *Nautilus faba* Fichtel and Moll as type species of *Nonion.* Suppression of *incrassatus* also renders the present name unavailable, and not a synonym of *Nonion* as previously considered.

Nonionina d'Orbigny, 1826 (***2303**), p. 293; type species: *Nautilus asterizans* Fichtel and Moll, 1798 (***1124**), p. 37; SD Parker and Jones, 1863 (***2350**), p. 433 (name not available, type species suppressed, ICZN ZN(S) 2225/2, petition pending).
Polystomella (Nonionina) Parker and Jones, 1860 (***2347**), p. 100 (nom. transl.).

Nonionina was proposed by d'Orbigny to replace various genera described by de Montfort and by de Blainville, including *Nonion, Melonis, Cancris, Florilus, Chrysolus, Lenticulina, Polystomella,* and *Placentula,* hence was a superfluous name. Among the twenty-four species included by d'Orbigny were the type species of *Melonis, Nonion, Florilus, Cancris,* and *Pullenia* (although the type species for the latter was a nomen nudum in this publication).

Nummularia Wedekind, 1937 (***3355**), p. 111 (non *Nummularia* Sowerby and Sowerby, 1826).
Ocanthularia Sosnina, 1960 (***3032**), p. 55.
Ophidionella de Folin, 1881 (***1142**), p. 140.
Orbitoina van de Geyn and van der Vlerk, 1935 (***1233**),

p. 222, 227 (name not available, ICZN Art. 13 (b); no type species.

Orientella A. D. Miklukho-Maklay, 1953 (*2118), p. 21.

Orthocera Modeer, in Soldani, 1789 (*3017), p. 41; SD Melville, 1959 (*2088), nom. reject., ICZN petition pending.

Orthocera Lamarck, 1799 (*1774), p. 80 (non *Orthocera* Modeer, 1789); type species: *Nautilus raphanus* Linné, 1758 (*1859), p. 711: OD(M) (nom. reject., ICZN petition pending).

Ovulida de Folin, 1887 (*1144), p. 114.

Palaeocornuspira Bogdanovich, 1952 (*268), p. 40, 41, 46, 57.

Paleomayncina Septfontaine, 1986 (*2875A), p. 54 (name not available, ICZN Art. 13 (a)(i), no description).

Paleopfenderina Septfontaine, 1986 (*2875A), p. 54 (name not available, ICZN Art. 13 (a)(i), no description).

Paradagmarita K. L. Wang, 1979 (*3340), p. 120 (non *Paradagmarita* Lys and Marcoux, 1978).

Paravalvulina Septfontaine, 1981 (*2875), p. 175, 181, 182, 186, 188, 192; Septfontaine, 1986 (*2875A), p. 54 (name not available, ICZN Art. 13 (b), no type species designated).

Parkerina Fordham, 1986 (*1149A), p. 56 (name not available, ICZN Art. 13 (a)(i), no description); type species: *Globigerinita iota* F. L. Parker, 1962 (*2340A), p. 250; OD.

Pentasyderina Nicolucci, 1846 (*2256), p. 205.

Pilosiphonia Arnold, 1979 (*77), p. 306, 321.

Planisepta Septfontaine, 1986 (*2875A), p. 54 (name not available, ICZN Art. 13 (a)(i), no description).

Planispira Chanton, 1964 (*520), p. 383, 385, 389.

Planorbella Kraeva, 1971 (*1726), p. 101.

Pozaryskaia Marie, 1964 (*2042), pl. 2, fig. 5a-c.

Praecuneolina Reiss, 1957 (*2557), p. 2 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii).

Praeglobigerina Reiss, 1957 (*2557), p. 2 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii).

Praerotalipora Salaj and Samuel, in Scheibnerova, 1962 (*2748), p. 215.

Premnammina de Folin, 1881 (*1142), p. 136.

Proreophax Ghose, 1959 (*1236), p. 376.

Protochusenella Z. Q. Zhang, 1984 (*3447), textfig. 2, p. 163.

Psammechinus de Folin, 1881 (*1142), p. 136 (non *Psammechinus* Agassiz, 1864).

Psammolychna de Folin, 1881 (*1142), p. 136.

Psammoperidia de Folin, 1881 (*1142), p. 135.

Psammozotika de Folin, 1881 (*1142), p. 138.

Pseudoalabamina Saidova, 1966 (*2692), p. 282.

Pseudocoscinoconus Speck, 1953 (*3049), p. 155.

Pseudoeggerella Septfontaine, 1981 (*2875), p. 181, 182; Septfontaine, 1986 (*2875A), p. 54 (name not available, ICZN Art. 13 (a)(i), 13 (b), no description, no type species).

Pseudoirregularina Sabirov, in Zadorozhnyy and Yuferev, 1984 (*3421), p. 72.

Pseudolituola Marie, 1941 (*2031), p. 21, 256.

Pseudomangashtia Hamaoui, in Hamaoui and Raab, 1965 (*1385), p. 36, and chart following p. 39.

Pseudoprotriticites Yarikov, Melnikova, and Nikitina, 1959 (*3417), fig. 2, p. 114.

Pseudosigmoilina Bogdanovich, 1952 (*268), p. 41, 42, 158 (non *Pseudosigmoilina* Bartenstein, 1965 nec S. Y. Zheng, 1981).

Pseudospiroloculina Bogdanovich, 1952 (*268), p. 41, 42, 152.

Pseudotruncorotalia Reiss, 1957 (*2557), p. 4 (name not available, ICZN Art. 13 (a)(i), 13 (b).

Ptyka de Folin, 1881 (*1142), p. 139.

Pyramidovalvulina Marie, 1964 (*2042), p. 1100, pl. 1, fig. 1a-c.

Quinqueloculinella Knudsen and Lykke-Andersen, 1982 (*1710), p. 107.

Rastidiscus Ferguson, 1962 (*1121), p. 1099.

Rectoeoendothyra Reytlinger, 1971 (*2610), p. 9.

Rectoeoquasiendothyra Reytlinger, 1971 (*2610), p. 9.

Rectoquasiendothyra Reytlinger, 1971 (*2610), p. 9 (subgenus of *Quasiendothyra*).

Rectotrochamminoides Fischer, 1954 (*1131), p. 9.

Restis N. K. Bykova, 1959 (*471), text-fig. 3 (subgenus of *Uvigerinella*).

Reticuloglobigerina Reiss, 1957 (*2557), p. 2 (name not available, ICZN Arts. 11 (d), and 16 (b)(ii)).

Rhizopela de Folin, 1881 (*1142), p. 140.

Ropalozotika de Folin, 1881 (*1142), p. 141.

Rugoglobotruncana Reiss, 1957 (*2557), p. 3; also Reiss, 1957 (*2558), p. 140, and table opp. p. 142. Unavailable, ICZN Arts. 11 (d), and 16 (b)(ii).

Rzehakinella Caus and Vicens, 1984 (*516A), p. 271, 275, pl. 1, figs. 3, 4. Illustrated under generic name only (name not available, ICZN Art. 13 (a)(i); 13 (b), no description, no species included, no type species).

Sibirella Bulatova, 1960 (*448), p. 69, 75, 76; also as *Sibiriella*, table 2, and text-fig. 2.

Sigmonosiphon Serova et al., 1984 (*2881), p. 61 (nom. nud.? or err. cit.).

Siphovalvulina Septfontaine, 1981 (*2875), p. 175, 181, 182, 186, 188, 191, 192; Septfontaine, 1986 (*2875A), p. 54 (name not available, ICZN Art. 13 (a)(i), (b), no description, no type species).

Sosninella Sellier de Civrieux and Dessauvagie, 1965 (*2867), p. 39.

No species included, only thin sections of unnamed species; name not available, ICZN Art. 13 (b).

Sphaerophthalmidium Pokorný, 1954 (*2443), p. 59.

Spinoseptatournayella Mamet, in Mamet and Skipp, 1970 (*2015), p. 1135.

Spirolinoides Hamaoui, 1965 (*1381), p. 20; also Hamaoui, in Arkin and Braun, 1965 (*69), p. 10 (name not available, ICZN Art. 13 (b), no species included).

Stephanopela de Folin, 1881 (*1142), p. 140.

Subinvoluta Trifonov and Burago, 1960 (*3222), p. 96, used in the combination "*Subinvoluta caucasica* (Suhb.)".

Taihuella A. D. Wang, Z. Q. Xu, and Y. M. Lu, 1979 (*3338), p. 120.

Ticinella Sigal, 1966 (*2920), p. 189; described as "spectrogenre"; category not recognized by ICZN.

Toddella Fordham, 1986 (*1149A), p. 56 (name not available, ICZN Art. 13(a)(i), no description; non *Toddella* Brönniman and Zaninetti, 1984); type species: *Globigerina? grata* Todd, 1957 (***3203**), p. 300; OD.

Toxinopsis de Folin, 1881 (***1142**), p. 130.

Trochonelloides Plotnikova and Dabagyan, 1971 (***2420**), p. 57.

Truncoglobotruncana Reiss, 1957 (***2557**), p. 3 (name not available, ICZN Art. 11 (d) and 16 (b)(ii)).

Vertebranomalina Marie, 1964 (***2042**), p. 1082, 1083, 1094, 1100, pl. 2, figs. 6a-c.

Vigularina N. K. Bykova, 1959 (***471**), p. 72 (nom. nud.? or err. cit.?).

Vissarionovella Hutton, 1966 (***1578**), p. 72; type species: *Eostaffella ikensis* Vissarionova, 1948 (***3296**), p. 219; OD.

Zellerella Hutton, 1966 (***1578**), p. 72; type species: *Paramillerella thompsoni* Anisgard and Campau, 1963 (***44**), p. 102; OD. No description.

Zollina X. Chen and J. H. Wang, 1979 (***556**), p. 2.

Generic and Family Group Taxa Appearing Too Late for Inclusion

Alloglobigerinoides Huang, 1986 (***1571A**), p. 94 (also as *Alloglobigeninoides*, p. 93); type species: *Globigerina conglobata* Brady, 1879 (***338**), p. 286; OD. Superfamily Globigerinacea.

Bidiexodina Leven, in Leven and Grabchak, 1986 (***1833A**), p. 27; subgenus of *Eopolydiexodina*. Type species: *Eopolydiexodina (Bidiexodina) primaris* Leven and Grabchak, 1986; OD. Family Schwagerinidae, subfamily Polydiexodininae.

Camurammina Brönnimann and Keij, 1986 (***399A**), p. 20; type species: *Camurammina cifelli* Brönnimann and Keij, 1986; OD. Family Trochamminidae, subfamily Trochammininae.

Cerebrina Patterson, 1986 (***2369A**), p. 65; type species: *Cerebrina perplexa* Patterson, 1986; OD. Family Lagenidae.

Crescentia Ciarapica, Cirilli, Martini, and Zaninetti, 1986 (***598A**), p. 208; type species: *Crescentia vertebralis* Ciarapica et al., 1986; OD. Family Biseriamminidae, subfamily Dagmaritinae.

Eofusulinella Ektova, 1986 (***1096A**), p. 10; type species: *Profusulinella primitiva* Sosnina subsp. *asiatica* Ektova, 1976 (***1095A**), p. 84; OD. Family Fusulinidae.

Globofissurella Patterson, 1986 (***2369A**), p. 66; type species: *Globofissurella scotti* Patterson, 1986; OD. Family Lagenidae.

Kunklerina Rauzer-Chernousova and Reytlinger, 1986 (***2534A**), p. 19; type species: *Reophax kunklerensis* Conkin, 1961 (***671**), p. 279; OD.

Kunklerinidae Rauzer-Chernousova and Reytlinger, 1986 (***2534A**), p. 19. Family of the Superfamily Hormosinacea.

Lapillincola Wilson, 1986 (***3381A**), p. 3; type species: *Lapillincola faringdonensis* Wilson, 1986; OD. Family Placopsilinidae.

Lepidoparatrochammina Brönnimann and Whittaker, 1986 (***409A**), p. 118 (subgenus of *Paratrochammina*); type species *Paratrochammina (Lepidoparatrochammina) lepida* Brönnimann and Whittaker, 1986; OD. Family Trochamminidae, subfamily Trochammininae. Syn.: *Trochammina (Lepidoparatrochammina)* Brönnimann and Zaninetti, 1984 (***412**), p. 64, 68 (name not available, ICZN Art. 13 (a)(i), 13 (b); no description, no type species).

Lingulotrochammina Hercogova, 1987 (***1464A**), p. 201; type species: *Trochammina callima* Loeblich and Tappan, 1950 (***1882A**), p. 10; OD. Family Trochamminidae.

Moellerites Solov'eva, 1986 (***3027A**), p. 15; type species: *Moellerites lopasniensis* Solov'eva, 1986; OD. Order Fusulinida.

Paralagena Sabirov, 1986 (***2685A**), p. 102; type species: *Archaelagena magna* Sabirov, 1978 (***2684**), p. 18; OD. Family Parathuramminidae.

Pseudovirgulina Grignani and Cococcetta, 1973 (***1300A**), p. 309; type species: *Pseudovirgulina solignaci* Grignani and Cococcetta, 1973; OD.

Quasistaffella Solov'eva, 1986 (***3027A**), p. 21; type species: *Quasistaffella postparadoxa* Solov'eva, 1986; OD. Order Ozawainellida.

Rockfordina Rauzer-Chernousova and Reytlinger, 1986 (***2534A**), p. 18; type species: *Reophax lachrymosus* Gutschick and Treckman, 1959 (***1347A**), p. 240; OD. Family Hormosinellidae.

Staffellaeformes Solov'eva, 1986 (***3027A**), p. 20; type species: *Profusulinella staffellaeformis* Kireeva, in Rauzer-Chernousova et al., 1951 (***2532**), p. 159; OD. Order Fusulinida.

Toretammina Brönnimann, 1986 (***389A**), p. 95; type species: *Toretammina whittakeri* Brönnimann, 1986; OD. Family Trochamminidae, subfamily Toretammininae.

Toretammininae Brönnimann, 1986 (***389A**), p. 95; subfamily of Family Trochamminidae.

Trematophragmoides Brönnimann and Keij, 1986 (***399A**), p. 14; type species: *Trematophragmoides bruneiensis* Brönnimann and Keij, 1986; OD. Family Lituolidae, subfamily Haplophragmoidinae.

Apparently Described Genera for Which Reference Not Seen

Eoomphalotis. Cited by Chermnykh, 1984 (*577), p. 315.
Grozdilovella Chermnykh, 1972 (*576); type species: *Grozdilovella minima* Chermnykh, 1972; OD.
Ocellina. Cited by Davydov, 1986 (*902A), p. 35.
Pseudotaberina. *Pseudotaberina malabarica* listed by Datta and Bhatia, 1977 (*894), p. 59.
Rectoparaendothyra Chermnykh, 1972 (*576); type species: *Rectoparaendothyra prima* Chermnykh, 1972; OD. Family Endothyridae.
Ruzhenzevites. Cited by Davydov, 1986 (*902A), p. 35.
Schellusienia. Cited by Davydov, 1986 (*902A), p. 35.
Ultradaixina. Cited by Davydov, 1986 (*902A), p. 35.

Generic Taxa Erroneously Regarded as Foraminifers

Aguayoina Bermúdez, 1938 (*197), p. 386; type speies: *Aguayoina asterostomata* Bermúdez, 1938.

Anthozoan.

Ammosphaeroides Cushman, 1910 (*701), p. 51; type species: *Ammosphaeroides distoma* Cushman, 1910.
Arammosphaerium Rhumbler, 1913 (*2621), p. 348 emend.).

Mineral coating on sand grain; inorganic.

Aoujgalia G. Termier and H. Termier, 1950 (*3136), p. 40; type species: *Aoujgalia variabilis* G. Termier and H. Termier, 1950; OD.
Aoujgalia G. and H. Termier, 1947 (*3135), p. 146, 271, pl. 5, fig. 46 (nom. nud.).

Previously included in the Endothyracea but now placed in red algae, family Ungdarellaceae.

Archaelagena Howchin, 1888 (*1560), p. 539; type species: *Lagena howchiniana* Brady, 1876 (*334), p. 121.

Plant.

Arnoldia Hovasse, 1956 (see *Birrimarnoldia*).

Aschemonella Brady, 1879 (*337), p. 44; type species: *Aschemonella scabra* Brady, 1879; OD(M). (See Plate 42, figs. 17, 18).
Araschemonellum Rhumbler, 1913 (*2621), p. 440 (err. emend.).

As *Aschemonella* is now placed in the Class Xenophyophorea, so also are the family group taxa based on it:

Aschemonellidae Eimer and Fickert, 1899 (*1088), p. 604.
Aschemonellinae Cushman, 1910 (*701), p. 80, subfamily; nom. transl.
Araschemonellinia Rhumbler, 1913 (*2621), p. 439 (err. emend.).

The test consists of a single or branching series of tubular to inflated chambers connected by stolonlike necks, constructed of membrane-bound accumulations (stercomare) of fecal pellets (stercomes); multinucleate, cytoplasm contains minute barite crystals, and is enclosed within a branched system of organic tubes (granellare). Holocene; deep Atlantic and Pacific. *Aschemonella ramuliformis* Brady, 1884 was shown by Gooday and Nott (1982, *1266A) to be a xenophyophoran, and the type species, *A. scabra*, also is similarly allocated (Gooday, personal communication, Feb. 20, 1987).

Asterosphaera Reytlinger, 1957 (*2600), p. 775; type species: *Asterosphaera pulchra* Reytlinger, 1957; OD(M).

Calcisphere.

Auerinella Frenguelli, 1953 (*1179), p. 46; type species: *Auerinella fuegiae* Frenguelli, 1953.
Aueria Frenguelli, 1951 (*1178), p. 20, not described, merely cited as "*Aueria rigida* n. gen. et n. sp."

A very small serial structure found in acid residues of Pleistocene interglacial deposits (gyttja) and therefore suggested to be siliceous, but it is probably an organic fungal structure.

Baissunella Arapova, 1961 (*56), p. 151; type species: *Baissunella mirkamalovae* Arapova; OD.

Previously placed in the Ammodiscidae, this very large Cretaceous form may be a worm tube.

Balanulina Rzehak, 1888 (*2680), p. 265; type species: *Balanulina kittlii* Rzehak, 1888.

Possibly a barnacle, bryozoan, or coral; unrecognizable.

Birrimarnoldia Hovasse and Couture, 1961 (*1559), p. 1054 (nom. subst. pro *Arnoldia* Hovasse, 1965); type species: *Arnoldia antiqua* Hovasse, 1956, OD.
Arnoldia Hovasse, 1956 (*1558), p. 2584 (non *Arnoldia* Mayer, 1887, nec Kieffer, 1895, nec Wlassenko, 1931); type species: obj.; OD.

Inorganic siliceous and iron oxide globules from Precambrian of Africa.

Cadosina Wanner, 1941 (*3348), p. 79; type species: *Cadosina fusca* Wanner, 1941.

Tintinnida.

Cadosinella Vogler, 1941 (*3305), p. 282; type species: *Cadosinella gracillimoides* Vogler, 1941.

Tintinnida.

Calcisphaera Williamson, 1881 (*3380), p. 520.

Calcisphere.

Calcisphaerula Bonet, 1956 (*300), p. 55; type species: *Calcisphaerula innominata* Bonet, 1956; OD.

Calcisphere.

Cancellus Derville, 1950 (see *Palaeocancellus* Derville, 1952).

Caninina Vyalov, 1977 (*3328), p. 7; type species: *Caninina odobaena* Vyalov, 1977; OD.

Described from the U. Trias (Carnian) as a large arcuate tapering tube and assigned to the Flagrinidae. Probably a scaphopod.

Capsulina Seguenza, 1880 (***2839**), p. 375; type species: *Capsulina loculicida* Seguenza, 1880.

Probably echinoderm pedicellaria.

Cayeuxina Galloway, 1933 (***1205**), p. 156; type species: *Cayeuxina precambrica* Galloway, 1933; OD.

Inorganic spheres, Precambrian of Brittany, France.

Cellulina Zborzewski, 1834 (***3441**), p. 308.

Alga.

Cercidina Vogler, 1941 (***3305**), p. 290; type species: *Cercidina supracretacea* Vogler, 1941.

Probably Tintinnida.

Cheilosporites Wähner, 1903 (***3333**), p. 98; type species *Cheilosporites tirolensis* Wähner, 1903.

Alga.

Chuaria Walcott, 1899 (***3334**), p. 234; type species: *Chuaria circularis* Walcott, 1899.

Prasinophyte algal cyst.

Cochleatina E. V. Bykova, 1956 (***465**), p. 12; type species: *Cochleatina plavinensis* E. V. Bykova, 1956.

Bryozoan, probably Corynotrypa.

Coelotrochium Schlüter, 1879 (***2758**), p. 668; type species: *Coelotrochium decheni* Schlüter, 1879.

Alga.

Coscinoconus Leupold, in Leupold and Bigler, 1936 (***1829**), p. 618; type species: *Coscinoconus alpinus* Leupold, 1936.

Alga.

Cysteodictyina H. J. Carter, 1880 (***506**), p. 448; type species: *Cysteodictyina compressa* Carter, 1880.

Calcareous alga.

Cytosphaera P. H. Derville, 1931 (***945**), p. 139; type species: *Cytosphaera cancellata* P. H. Derville, 1931; OD(M).

Calcisphere; according to Conil and Lys, 1964 (***661**), p. 44 = *Palaeocancellus* Derville, 1952 but has obvious priority, if congeneric.

Dexiopora Ehrenberg, 1858 (***1073**), p. 309.

Glauconite.

Dexiospira Ehrenberg, 1858 (***1073**), p. 309 (non *Dexiospira* Caullery and Mesnil, 1897).

Glauconite.

Diplosphaerella Kristan-Tollmann, 1972 (***1743**), p. 528; type species: *Diplosphaerella ramosa* Kristan-Tollmann, 1972; OD.

Internal structure suggests that this is a radiolarian.

Discoidina Terquem and Berthelin, 1875 (***3150**), p. 15 (non *Discoidina* Stein, 1850); type species: *Discoidina liasica* Terquem and Berthelin, 1875.

Echinogromia Schröder, 1907 (***2790**), p. 345; type species: *Echinogromia multifenestrata* Schröder, 1907; OD.

Probably an Acantharian radiolarian.

Fourstonella Cummings, 1955 (***694**), p. 6; type species: *Stacheia fusiformis* Brady, 1876 (***334**), p. 114, OD.

A red alga.

Girvanella Nicholson and Etheridge, 1878 (***2255**), p. 23; type species: *Girvanella problematica* Nicholson and Etheridge, 1878.

Argirvanellum Rhumbler, 1913 (***2621**), p. 386 (err. emend.).

Alga.

Goniolina d'Orbigny, 1850 (***2312**), p. 41; type species: *Goniolina hexagona* d'Orbigny, 1850.

Dasyclad alga.

Granulosphaera Derville, 1931 (***945**), p. 132; type species: *Granulosphaera laevis* Derville, 1931; OD(M).

Calcisphere.

Hipporina E. V. Bykova, 1955 (***464**), p. 36 (also as *Hypporina*, p. 36, 37); type species: *Hipporina hastila* E. V. Bykova, 1955; OD.

Originally described as a foraminifer in the Lagenidae (= Nodosariidae), it was tentatively transferred to the Nodosinellidae (Loeblich and Tappan, 1964, ***1910**, p. C324). Probably not a foraminiferan.

Holocladina H. J. Carter, 1880 (***506**), p. 447; type species: *Holocladina pustulifera* H. J. Carter, 1880; OD(M).

Calcareous alga.

Kelyphosphaera H. Derville, 1952 (***944**), p. 434; no named species included.

Calcisphere.

Lacazopsis H. Douvillé:, 1930 (***1003**), p. 247; type species: *Lacazopsis termieri* H. Douvillé, 1930; OD(M).

Described originally as a miliolid from the U. Cretaceous (Senonian) of Morocco, it apparently is an encrusting cheilostome bryozoan.

Ladinosphaera Oberhauser, 1960 (***2289**), p. 44; type species: *Ladinosphaera geometrica* Oberhauser, 1960; OD.

Limonitic concretions.

Lepyrosphaera H. Derville, 1952 (***944**), p. 434; no named species included.

Calcisphere.

Matthewina Galloway, 1933 (***1205**), p. 157; type species: *Globigerina cambrica* Matthew, 1895 (***2064A**), p. 111; OD.

Microtubus Flügel, 1964 (***1140**), p. 75; type species: *Microtubus communis* Flügel, 1964; OD.

Based on thin sections of numerous very small tubes from the U. Triassic (Rhaetian) of Austria, Italy, and Greece; wall composition not stated; probably algal, resembling *Girvanella*.

Millarella H. J. Carter, 1888 (***507**), p. 178; type species: *Millarella cantabrigiensis* H. J. Carter, 1888.

Moellerina Ulrich, 1886 (***3244**); type species: *Moellerina greenei* Ulrich, 1886; OD(M).

Described as a foraminifer, but it is an internal cast of a gyrogonite of the charophyte alga *Trochiliscus*.

Nodoplanulis Hussey, 1943 (*1577), p. 166; type species: *Nodoplanulis elongata* Hussey, 1943.

Isopod appendage.

Pachysphaerina Conil and Lys, in Conil et al., 1969 (*658), p. 57 (nom. subst. pro *Pachysphaera* Conil and Lys, 1964): type species: *Pachysphaera dervillei* Conil and Lys, 1964; OD.

?*Pachysphaera* Voynovskiy-Kriger, 1963 (*3324), p. 72 (nom. nud.).

Pachysphaera Conil and Lys, 1964 (*661), p. 42 (non *Pachysphaera* Pilsbry, in Pilsbry and Tyron, 1892, nec Ostenfeld, 1899, nec Brandt, 1902).

Pachysphaerina Conil and Lys, 1968 (*665), p. 501 (nom. nud.).

Calcisphere: according to Mamet (in Mamet et al., 1970, *3013, p. 41) - *Calcisphaera* Williamson, 1881.

Palaeocancellus H. Derville, 1952 (*943), p. 237; type species: *Calcisphaera cancellatus* Williamson, 1881 (*3380).

Cancellus H. Derville, 1950 (*941), p. 476 (non *Cancellus* Milne-Edwards, 1836): unavailable ICZN Art. 13 (b) as no type species cited, but valid, ICBN, if algal, as originally described.

Calcisphere.

Palaeonubecularia Reytlinger, 1950 (*2597), p. 91; type species: *Palaeonubecularia fluxa* Reytlinger, 1950; OD.

Attached form previously regarded as a foraminifer but probably algal.

Palaeosphaeroidina Korolyuk, 1966 (*1722), p. 189; type species: *Palaeosphaeroidina knjasevi* Korolyuk, 1966; OD.

Thick-walled spheres, up to 1.0 mm in diameter and with single-layered wall, described from L. Cambrian of the USSR: Urals, and associated with algal oncolites such as *Osagia*. Probably algal.

Pflugella Huddleston and Haman, 1981 (*1573), p. 421: nom. subst. pro *Tricellaria* Pflug, 1965; type species: *Tricellaria delylensis* Pflug, 1965; OD.

Tricellaria Pflug, 1965 (*2401), p. 15 (non *Tricellaria* Fleming, 1828).

Described originally as of unknown relationships, the homonym was renamed as a possible foraminifer. It probably is fungal in origin and may be a result of fungal contamination of the rocks in outcrop or during laboratory preparation. If fungal, *Tricellaria* is the valid name.

Polyderma H. Derville, 1951 (*942), p. 273; type species: *Polyderma incertum* H. Derville, 1951; OD.

Calcisphere.

Polytrema Risso, 1826 (*2629), p. 340 (non *Polytrema* Rafinesque, 1819, nec Férussac, 1822, nec d'Orbigny, 1850).

Bryozoan.

Protocyclina Paalzow, 1922 (*2322), p. 35; type species: *Protocyclina liasina* Paalzow, 1922; OD(M).

Echinoderm ossicle.

Psammosiphon Vine, 1882 (*3294), p. 390; type species: *Psammosiphon amplexus* Vine, 1882.

Possibly Annelida.

Pseudarcella Spandel, 1909 (*3048), p. 199; type species: *Pseudarcella rhumbleri* Spandel, 1909; OD.

Arpseudarcelloum Rhumbler, 1913 (*2621), p. 349 (err. emend.).

Tintinnida.

Pseudogypsina Trauth, 1918 (*3221), p. 243; type species: *Pseudogypsina multiformis* Trauth, 1918.

Possibly a calcareous alga.

Pseudovermiporella Elliott, 1958 (*1100), p. 419; type species: *Pseudovermiporella sodalica* Elliott, 1958; OD.

Variously regarded as an alga or foraminifer. Korde (1967, *1720A) reported the presence of sporangia and referred it to the red algae. It occurs in the Permian (Asselian to Djulfian); Tethyan region of Europe, Africa, and Asia; Sumatra, Japan, Thailand; Philippines.

Quasipolyderma Conil and Lys, 1964 (*661), p. 51; type species: *Polyderma chovanensis* Reytlinger, 1957 (*2600), p. 775; OD.

Radiina Reytlinger, 1957 (*2600), p. 775; type species: *Radiina graciosa* Reytlinger, 1957; OD(M).

Calcisphere.

Radiosphaera Reytlinger, 1960 (*2602), p. 146 (non *Radiosphaera* Jörgensen, 1905, nec Snow, in Ward and Whipple, 1918, nec Pascher, 1932); type species: *Radiosphaera basilica* Reytlinger, 1957; OD.

Radiosphaera Reytlinger, 1957 (*2600), p. 775 (not available, no type species designated).

Calcisphere.

Ratella Kotlyar, 1982 (*1725), p. 10; type species: *Ratella ramiformia* Kotlyar, 1982; OD.

Ninaella Kotlyar, 1980 (*1724), p. 67, 69 (nom. nud.); Berchenko and Kotlyar, 1980 (*188), p. 129, 131 (nom. nud.).

Globular, up to 0.15 mm in diameter; with finely granular, dark gray homogeneous wall that was suggested under high magnification to be finely perforate; with numerous irregular, branching solid protrusions. U. Devonian (U. Frasnian); USSR: Volinsk, L'vov, and Odessa districts.

Illustrated only with drawings of specimens in thin sections and foraminiferal affinity doubtful. Wall composition not described, but the small size of the simple sphere with surface covered by very irregular and possibly bifurcating processes suggest that it may be an acritarch, as such processes are not characteristic of the foraminifera.

Rectangulina Antropov, 1959 (*52), p. 30; type species: *Syniella tortuosa* Antropov, 1950 (*51), p. 31; OD.

Originally regarded as a foraminifer, it was later transferred to the Reitlingerellida; now placed with the red algae.

Renalcis Vologdin, 1932 (*3307), p. 15; type species: *Renalcis granosus* Vologdin, 1932; OD.

Described originally among the archeocyathids from the M. Cambrian, regarded as a bluegreen alga by Korde (1961, *1720, p. 55) and a red alga by Vologdin (1962, *3307A, p. 477), it was considered by Riding and Brasier (1975, *2626A, p. 200) to be a foraminifer, and the family Renalcidae defined to include it.

Rhaphidoscene A. V. Jennings, 1896 (*1608), p. 320; type species: *Rhaphidoscene conica* Jennings, 1896.

Arrhaphoscenum Rhumbler, 1913 (*2621), p. 346 (err. emend.).

Juvenile of sponge *Tentorium*.

Scaniella Pflug, 1965 (*2400), p. 55; type species: *Scaniella scaniensis* Pflug, 1965; OD.

From the Precambrian (Algonkian) of USA: Montana, and the U. Cambrian of Sweden; not a foraminifer.

Semseya Franzenau, 1893 (*1177), p. 358; type species: *Semseya lamellata* Franzenau, 1893.

According to Bajraktarević (1983, *107, p. 9), *Semseya* is a calcareous dinoflagellate cyst.

Septammina Meunier, 1888 (*2096), p. 235; type species: *Septammina renaulti* Meunier, 1888; SD Galloway, 1933 (*1205), p. 160.

Probably fungal hyphae and spores.

Serginella Pronina, 1964 (*2475), p. 7; type species: *Serginella scabruma* Pronina, 1964; OD.

Described from the Silurian (Wenlockian, Ludlovian) as belonging to the Parathuramminidae, but the illustrations appear to indicate a somewhat metamorphosed sediment and the characters indicated for the genus cannot be substantiated.

Siphonema J. G. Bornemann, 1887 (*306), p. 17.

Alga.

Sphaerella Keller, 1946 (*1669), p. 95 (non *Sphaerella* Sommerfelt, 1824, nec Conrad, 1838, nec 1860, nec Gray, 1869, nec Bubani, 1901, nec Heding and Panning, 1954, nec Reytlinger, 1957).

Oligosteginid or possibly oolite from the U. Cretaceous.

Sphaerella Reytlinger, 1957 (*2600), p. 775 (non *Sphaerella* Keller, 1946, etc.); type species: *Sphaerella mirabilis* Reytlinger, 1957; OD(M).

Calcisphere.

Spirigerina Terquem, 1866 (see Terebralina).

Spirocerium Ehrenberg, 1858 (*1073), p. 310; type species: *Spirocerium priscum* Ehrenberg, 1858; OD(M).

Glauconitic globules.

Spongina de Gregorio, 1930 (*1293), p. 8, 48; type species: *Globigerina (Spongina) permica* de Gregorio, 1930.

Described as subgenus of *Globigerina*; not a foraminifer.

Stacheia Brady, 1876 (*334), p. 107; type species: *Stacheia marginulinoides* Brady, 1876; SD Cushman, 1927 (*746), p. 189.

Stacheya Delage and Hérouard, 1896 (*926), p. 134 (err. emend.).

Arstachecoum Rhumbler, 1913 (*2621), p. 446 (err. emend.).

Red alga of family Ungdarellaceae.

Stacheoides Cummings, 1955 (*695), p. 343; type species: *Stacheia polytrematoides* Brady, 1876 (*334), p. 118; OD.

Red alga; family Ungdarellaceae.

Stoliczkiella H. J. Carter, 1888 (*507), p. 173; type species: *Stoliczkiella theobaldi* Carter, 1888; OD.

Probably echinoderm.

Stomiosphaera Wanner, 1941 (*3348), p. 76; type species: *Stomiosphaera moluccana* Wanner, 1941.

Calcareous cysts, possibly dinoflagellate.

Syringammina Brady, 1883 (*343), p. 159; type species: *Syringammina fragilissima* Brady, 1883; OD.

Arsyringammum Rhumbler, 1913 (*2621), p. 345 (err. emend.).

Xenophyophorida.

Terebralina Terquem, 1866 (*3141), p. 471, 173 (nom. nov. pro *Spirigerina* Terquem, 1866, non d'Orbigny, 1847; type species: *Spirigerina antiqua* Terquem, 1866 (*3140), p. 354, 454 (syn. = *Terebralina regularis* Terquem, 1866, *3141, p. 473); OD(M).

Spirigerina Terquem, 1866 (*3140), p. 454 (non *Spirigerina* d'Orbigny, 1847).

Previously regarded as a high-spired, nonchambered genus in the Buliminidae, or as an early high-spired genus of the family Spirillinidae, and type of the subfamily Terebralininae Cushman, 1927 (*742), p. 65. However, the large size (1.0 mm in length), very narrow and elongate form, and the nature of the apertural region of the type and apparently only figured specimen are unlike the foraminifers. It is probably a small gastropod or perhaps an internal cast of one.

Terquemina Galloway, 1933 (*1205), p. 157; type species: *Terquemina devonica* Galloway, 1933; OD.

Tricellaria (see *Pflugella*).

Trichosphaerium Schneider, 1878 (*2784); type species: *Trichosphaerium sieboldi* Schneider, 1878.

A rhizopod with test of calcareous spicules; suggested to belong to the Lobosia, not the Foraminiferida, as the pseudopodia are nongranulose.

Tscherdyncevella Antropov, 1950 (*51), p. 29; type species: *Tscherdyncevella acervulinoides* Antropov, 1950; OD.

Attached and irregular in form, with calcareous wall and numerous chambers. Devonian of the Russian Platform. Probably algal.

Turriclavula Rhumbler, 1911 (*2620), p. 85; type species: *Turriclavula interjecta* Rhumbler, 1911; OD.

Described from bottom sediments in the Atlantic, off Cape Verde Islands, as having a small uniserial and rectilinear test, 0.15 mm in length, with membranous organic wall and apparently slitlike terminal aperture. Appears to be a fungal spore and congeneric with *Pleurocellisporites*.

Umbella Maslov, in E. V. Bykova, 1955 (see *Umbellina*).

Umbellina Loeblich and Tappan, 1961 (***1902**), p. 284; nom. subst. pro *Umbella* Maslov, 1955; type species: *Umbella bella* Maslov, 1955; OD.

Umbella Maslov, in E. V. Bykova, 1955 (***464**), p. 37 (non *Umbella* d'Orbigny, 1841, nec Scudder, 1882); type species: obj.

Umbella Lipina, 1950 (***1861**), p. 111-115, pl. 3, figs. 18-20 (invalid; no description).

An algal cyst or charophyte gyrogonite.

Weikkoella Summerson, 1958 (***3105**), p. 548; type species: *Weikkoella sphaerica* Summerson, 1958; OD.

Silicified steinkern of a gyrogonite of the charophyte *Moellerina* or *Karpinskya*.

Wetheredella Wood, 1948 (***3389A**), p. 20; type species: *Wetheredella silurica* Wood, 1948.

Alga.

Xenotheka Eisenack, 1938 (***1090**), p. 239; type species: *Xenotheka klinostoma* Eisenack, 1938; OD.

Previously considered an allogromiid foraminifer, but probably belongs with the graptolites. See Eisenack, 1970 (***1095**) p. 449.

Glossary

aboral Opposite to oral side or end.

A_1 generation Plurinucleate megalospheric forms.

A_2 generation Uninucleate megalospheric forms.

acanthus; pl., acanthi Sharply pointed secondary deposit on chamber floor of endothyrids, not distally curved.

accessory apertures Test openings that extend through or between accessory structures but notdirectly into the chamber lumen; as in bullae or tegilla of planktonic foraminifers.

acervuline Chambers in irregular clusters, as in *Acervulina*.

actinate Structure of equatorial layer having one or more aktinorbitoid interradii, as in *Aktinorbitoides* and the Pseudorbitoididae.

adauxiliary chamber Small chamber originating from stolon in deuteroconchal wall, as in *Lepidorbitoides*.

adelosine internal structure Juvenile stage of proloculus and cornuspirine second chamber with neck and encircling the proloculus, as in *Adelosina*.

adventitious Foreign particles, as those forming agglutinated test.

advolute Enrolled test, with neither completely involute nor evolute coiling; chambers of each whorl only partially overlapped by the next whorl.

agamont Foraminiferal zygote and mature individual produced by fusion of gametes; distinguished from asexually produced gamont generation.

agglutinated With foreign particles, commonly mineral or shell fragments, bound together by cement in the test wall.

aktinorbitoid interradius Sector in the equatorial plane of the actinate test, composed only of lateral chambers.

aktinorbitoid radius Sector in the equatorial plane of the actinate test to which true equatorial chambers are confined; separated by the interradii.

alar prolongation Lateral part of involute spiralling chambers of a lenticular test, extending over the surface of previous whorls and commonly meandering in form.

alveolus; pl., alveoli 1. Irregular blind cavities in agglutinated test wall of Loftusiidae. 2. Minute cavities in keriotheca of some fusulinids. 3. Blind chamberlet with secondary apertures opening only at the back, in alveolinids such as *Bullalveolina*.

alveolar wall Wall with numerous small alveoli.

amoeboid Shape as in *Amoeba*, with lobopodia; as in gametes of *Spirillina*.

ampulla; pl., ampullae Modified primary chamber added in line with the normal chamber additions but covering primary aperture of earlier chambers, possessing one or more smaller marginal openings or openings at the end of tubular extensions, as in *Globigerinita*.

annular Cyclic or ringlike.

annular canal Free space left beneath the subepidermal network of the endoskeletal pillars (if any), as in *Orbitopsella*.

annulus, pl., annuli Ring or circle of chambers.

anterior Directed forward, toward aperture, distally.

antetheca Final septal face in fusulinids; apertural face.

aperture Main opening or openings from chamber of test, allowing cytoplasm to flow to the exterior for extension of pseudopodia or to bring in nutrients.

apertural face External surface of final chamber wall, where the primary aperture is located; antetheca of fusulinids.

apertural lip Projection of chamber wall above and along an interiomarginal aperture, as in *Globorotalia*, or surrounding an areal one, as in *Siphotextularia*.

arborescent Branching in treelike manner.

areal aperture Aperture in face of final chamber.

areal bulla; pl., **bullae** Blisterlike structure covering areal apertures as in *Globigerinatella.*

arenaceous Constructed of quartz sand particles, as in agglutinated tests.

areolate Surface subdivided into smaller spaces.

argillaceous Constructed of clay or mud, as in some agglutinated tests.

astral fissure Fissure separating the astral lobe from the adjoining ventral chamber wall and the umbilical flap of the same instar, in *Rotalia trochidiformis:* astral furrow; labial aperture.

astral furrow See *astral fissure.*

astral lobe Triangular imperforate extension of the apertural face over the spiral canal in the umbilical region, separated from the ventral chamber wall by a deep fissure (astral fissure, astral furrow), as in *Rotalia;* folium; ventral tenon; umbilical lip.

atelomonolamellar Primarily lamellar foraminiferal test but without addition of secondary lamellae over the earlier formed chamber at later instars.

attic Tiny, uppermost (abaxial) chamberlet in superposed chamberlets of a whorl; in *Alveolinella.*

autogamy Fertilization of gametes from a single parent in sexual reproduction.

auxiliary chamber Third chamber formed, commonly at junction of protoconch and deuteroconch (primary auxiliary chamber), advanced orbitoids may have two auxiliary chambers.

axial fillings Dense calcite deposits in axial region of some fusulinids, probably formed at time of deposition of chomata and parachomata and excavation of tunnels and foramina.

axial section Section of test along axis and perpendicular to plane of coiling, intersecting the proloculus (in enrolled foraminifers).

axial septulum; pl., **septula** Secondary or tertiary septum between primary septa, as in Verbeekinidae, in plane parallel to axis of coiling, and thus observable in equatorial, parallel, and tangential sections; may have primary axial septula and secondary axial septula.

axis (of test) Imaginary line around which spiral or cyclic test is coiled, perpendicular to plane of coiling; axis of spiral or radial symmetry in chamber arrangement.

axoneme Central shaft of axopodium, composed of a bundle of parallel microtubules.

axopodium Stiff straight pseudopodium with central shaft or axoneme.

axostyle Internal extension from blepharoplast to distal extremity of flagellum of gametes of Miliolacea.

B-generation Microspheric generation, commonly the agamont.

basal layer 1. Layer of shell material forming chamber floor, overlying previously formed test wall in miliolids; basal thickening. 2. Uniform calcite deposit of varied thickness at base of chambers and adhering to wall of preceding whorl, commonly best developed in the axial region and may be greatly thickened in some alveolinids.

beam (*poutre* in French, *balken* in German). First order radial exoskeletal subepidermal partition, perpendicular to septum, in some agglutinated taxa.

biconvex Both sides of spiral test convex or inflated, as in lenticular test.

bifid Divided into two branches.

biforaminate Having two apertural openings, a primary aperture or protoforamen and a secondary aperture or deuteroforamen.

biformed Dimorphic test, with ontogenetic change in growth plan, as from coiled to uncoiled or biserial to uniserial.

bilamellar Chamber wall of hyaline calcareous test consisting of two primarily formed layers, deposited on each side of an organic layer, the outer calcareous layer also extending over the exterior of the previously formed test, resulting in secondary lamellae; both layers may be distinct in the light microscope or they may differ in relative thickness and be distinguishable only by electron microscopy.

bilocuiine 1. Test with only two chambers visible externally, as in the test of *Pyrgo.* 2. With reference to a two-chambered megalospheric embryo (including protoconch and deuteroconch).

biserial Chambers arranged in two alternating rows, as in *Textularia.*

biumbilicate Enrolled test with central depression or umbilicus on both sides, e.g., *Endothyra.*

biumbonate Enrolled test with central elevated umbilical boss on both sides, e.g., *Lenticulina.*

blepharoplast Small compact granule into which flagella are inserted; in flagellate gametes of foraminifers.

boss Elevated or knoblike secondary thickening, as in umbonal region.

buccal aperture Tunnel opening between chambers of fusulinids; foramen.

buccal apparatus Oral or apertural structure, e.g., in *Allogromia.*

budding stage Period during which one equatorial chamber forms: in the cyclical phase budding stage refers to simultaneous development of several equatorial chambers, in Orbitoididae.

bulla; pl., bullae Blisterlike structure of the test that partly or completely covers primary or secondary apertures in planktonic foraminifers and may be umbilical, sutural, or areal in position, may have one or more accessory marginal apertures; not part of the primary chamber series.

calcite crust Secondary deposit of calcite over test exterior, commonly greatly thickening the wall in the later ontogenetic stage.

calcite eyes Rounded bodies of clear calcite sporadically occurring in radial zone and central area of Orbitolinidae.

cameral aperture Chamber opening.

cameral flange Perforated lateral extensions at either side of the aperture, as in *Ventilabrella;* flanges may merge to fill the open space between proliferating chambers.

cameral ridge Imperforate rim at the edge of the cameral flange that becomes continuous over the final series of chambers, as in *Ventilabrella*.

canal Part of interlocular space, usually tubular, subdivided by shell elements.

canaliculate Test wall perforated by fine tubular cavities that may be closed at one or both ends; as in wall of *Textularia*.

cancellate Honeycomblike surface.

carina Imperforate peripheral keel or flange.

carinal band Imperforate marginal area or poreless margin at test periphery of enrolled taxa or between marginal keels of *Globotruncana*.

cellules Subdivision of marginal chamberlets by primary and secondary partitions in outer part of marginal zone, in Orbitolinidae.

central complex Central zone or core of test in which chamber passages bifurcate and anastomose in reticulate pattern, in Orbitolinidae.

central section Section bisecting central chambers of test.

chamber Test cavity and surrounding wall, formed at one instar in multilocular species and always connected to other such chambers or to exterior by pores, intercameral foramina, or stolons.

chamberlet Subdivision of primary chamber due to axial or transverse septula or other partitions.

chamber lumen Internal space of the chamber.

chamber passages Radial corridors consisting of centrally directed extensions of marginal chamberlets, in Orbitolinidae.

choma; pl., chomata Ridgelike spiralling secondary deposit of dense shell substance at margins of the tunnel in fusulinids.

clavate Club-shaped, terminally inflated.

contreforts Buttress or lateral thickening of the inner layer of the wall against the base of the chamber lumen, seen in axial section of some archaediscids.

convolute Evolute, enrolled with all whorls visible externally.

cornuspirine Having planispirally enrolled and undivided tubular chamber, as in *Cornuspira*.

cortex Overlapping thin layers of calcite formed at test exterior, may close the pores of the underlying primary wall, forming a thickened and smooth surface as a late stage in calcification, as in *Sphaeroidinella*.

costa Elevated ridge or rib on test surface.

costate Having elevated ridges or costae.

costellae Short to elongate ridges formed by lateral fusion of surface pustules, meridionally aligned in *Costellagerina*.

countersepta Backward projecting apertural lips, as in *Coconuloides*.

cribrate Perforated with round holes: sievelike.

cryptoquinqueloculine Chambers one-half coil in length, successively added 144° apart, in five planes, 72° apart, but overlapping laterally in later stage, so that only three to four chambers are visible from the exterior; also *kryptoquinqueloculine*.

cuniculus; pl., cuniculi Tunnel-like continuous cavity resulting from strong septal fluting in which opposed folds of adjacent septa fuse to produce continuous spirals separating arched cavities and connecting adjacent chambers from one foramen to the next, as in the Verbeekinidae; cunicular passage.

cyclogyrine Having planispirally enrolled tubular chamber; see cornuspirine.

cyclomorphosis Changes in form during ontogeny.

cyst Resistant cover of agglutinated debris, formed for temporary protection during chamber formation or during reproduction.

cytoplasm Protoplasm of the protozoan, exclusive of the nucleus; rich in protein, poor in phosphorus.

dendritic Branched, treelike in form.

deuteroconch Second formed chamber in megalospheric test, immediately following the proloculus and in contact with it, commonly differing in wall structure from the adult chambers.

deuteroforamen Aperture in some enrolled foraminifers that is independent of the toothplate.

deuteropore Groups of protopores that fuse within the wall to open into a single larger pore at the exterior.

diagonal section Section obliquely intersecting the axis of coiling.

diaphanotheca Thick, light-colored to translucent wall layer immediately below the tectum, in fusulinids.

dimorphism Distinct sexually and asexually reproducing generations of a single species, gamont and schizont with haploid and diploid nuclei, respectively, commonly reflected morphologically in the foraminifers as differences in size of proloculus, megalospheric and microspheric, in ontogenetic development, and in adult test size.

diploid Nucleus with full number of chromosomes, as in zygote and in schizont generation of foraminifers.

distal Direction of growth away from proloculus toward the aperture.

dorsal Side opposite to ventral, commonly the spiral side of trochospirally coiled foraminifers.

ectoparasite External parasite.

ectoplasm Hyaline and homogeneous outer zone of the cytoplasm.

ectosolenian neck Having an external tubular neck.

embryon See *embryonic chambers.*

embryonic apparatus Group of relatively large early chambers of some megalospheric tests, may differ in shape and arrangement from later ones; nucleoconch.

embryonic chambers Usually two chambers, protoconch and reniform deuteroconch, or rarely with three or four chambers in orbitoids, the entire group enclosed by a thicker wall; embryon.

endoskeleton Internal thickening of the septal wall that subdivides the chamber lumen but does not abut the outer wall; as the interseptal pillars of the Orbitolinidae.

endoplasm Central part of the cytoplasmic mass, may be granular.

entosolenian Having an internal tubular extension from the aperture, as in *Oolina, Glandulina.*

enveloping canal system Interlocular space formed by cover over the radial chamber sutures.

ephebic With reference to adult stage in ontogeny.

epiauxiliary chambers Chambers originating from stolons in the embryonal wall of the orbitoids.

epidermal layer Imperforate outer wall layer, as in Lituolidae.

epitheca Secondary deposit in inner wall of fusulinids; tectorium and chomata.

equatorial Located in median plane or plane of coiling, perpendicular to axis of coiling.

equatorial aperture Symmetrical opening of enrolled test, in the plane of coiling, commonly interiomarginal and against the periphery of the preceding whorl but may be areal or peripheral.

equatorial section Section of test in the equatorial plane; sagittal section.

equitant Inverted *V*-shaped or chevron-shaped, as in chambers of *Frondicularia.*

evolute Successive whorls in contact but not embracing.

exogenous Added to exterior.

exoskeleton Localized internal thickenings of the outer chamber wall that subdivide the chamber lumen but independent of the protoplasmic circulation in the central part of the chambers; includes beams, rafters, and subepidermal network.

external furrow Linear depression on outer surface of test of fusulinids or alveolinids that corresponds to suture between adjacent chambers; suture; septal furrow.

extraumbilical aperture Aperture of final chamber that does not extend to umbilicus of enrolled species, commonly interiomarginal, and situated between the umbilicus and periphery.

extraumbilical-umbilical aperture Aperture of final chamber that extends along base of apertural face from the umbilicus toward the periphery, to some extraumbilical point, i.e., outside the umbilicus in enrolled species.

filamentous Threadlike, constructed of filaments.

filose Threadlike.

fimbriate Fringed appearance, as in the keel of *Siphonina.*

fissure Deep cleft, as in the incised sutures of some enrolled tests; e.g. *Ammonia.*

fistulose 1. Tubular irregular growth covering the apertural region in many polymorphinids, may be related to reproductive stage. 2. Lateral tubular projections from the chambers.

flabelliform Fanlike.

flagellum; pl., **flagella** Whiplike structure used in locomotion of the Mastigophora, and present in biflagellate or triflagellate gametes of some foraminifers.

flange Platelike marginal extension from chambers, as in *Sphaeroidinella,* or peripheral extension, as in *Laticarinina.*

flexostyle 1. Enrolled tube of about one whorl immediately following the proloculus of some Miliolacea. 2. Flexostyle canal of larger species.

floor Bottom wall of superposed chamberlet in Alveolinids.

fluting See *septal fluting.*

folium; pl., **folia** Acuminate umbilical extremity of the chamber in *Rotalia* that overlies a small cavity separate from the chamber lumen; astral lobe; ventral tenon.

foramen, pl., **foramina** Opening between adjacent chambers, may be basal or areal and may be the former aperture of that chamber, or produced secondarily by resorption; passage for cytoplasm, and not equivalent to the mural pores of a perforate test.

fossettes Short but deep grooves between ponticuli, paralleling the periphery, that lead from the surface into the interlocular space (sunken or incised sutures) as in *Elphidium* but do not communicate with chamber lumen.

four-stolon system Open arcuate chambers having two basal stolons in each chamber wall as seen in horizontal section, so that each chamber has four connections to adjacent chambers.

funnel-shaped deuteroconchal stolons Two funnel-shaped stolons extending from the deuteroconch to the second primary auxiliary chamber in miogypsinids.

fusiform Spindle-shaped, tapering at each end; e.g., in fusulinids and alveolinids.

fusulinellid wall Wall of fusulinid having tectum, diaphanotheca, and inner and outer tectoria, all four layers penetrated by small mural pores.

gamete Reproductive cell with haploid number of chromosomes; may fuse in pairs and form zygote for a new diploid individual; different foraminiferans may have biflagellate, triflagellate, or amoeboid gametes.

gamont Generation that forms gametes and reproduces sexually; commonly is megalospheric; *A*-form.

gerontic Senile stage in ontogeny.

glomospirine Having an irregularly wound coiled tubular chamber, as in *Glomospira.*

granular hyaline wall Perforate lamellar test of minutely granular calcite, the equidimensional granules with *c*-axis preferentially oriented at an angle to the surface, neither parallel to nor perpendicular to the surface, resulting in a mottled appearance in crossed nicols of minute flecks of color; optically granular; hyaline oblique; e.g. *Pleurostomella.*

granuloreticulose pseudopodia Bifurcating and anastomosing extensions of the protoplasm, having a more solid axis of stereoplasm, and a fluid granular outer part of rheoplasm, the granules continuously moving along the pseudopodia; food may be captured and even digested by pseudopodia outside the main body of the protozoan.

hamulus; pl., **hamuli** Hooklike secondary deposit on the chamber floor in endothyrids, point of hook directed distally, toward the aperture.

haploid Stage in life history in which nuclei have half the normal number of chromosomes, resulting from a nuclear reduction division; may be temporary and only in the gametes, or may represent a distinct gamont generation in the foraminifers.

helicolepidine string Thick and perforate outer or spiral wall of the early planispiral coil of *Helicolepidina.*

hemisepta Partial or short septa that occur between adjacent normal septa in some Lituolacea.

heterokaryotic Multinucleate, with nuclei having different functions, such as vegetative and reproductive nuclei.

hispid Surface covered with fine hairlike short spines.

historbitoid radius Radial swellings of the equatorial layer in which radial plates are present.

hologamic Having biflagellate gametes, all alike, freed from isolated parents that were not associated in pairs (plastogamy) or groups (syzygy); gametes released into open water may be free living for days before fertilization produces the zygote.

hyaline Glassy, clear, transparent.

hypodermis Reticulate wall layer beneath outer imperforate layer, as in *Cyclammina.*

imperforate 1. Without pores in the wall, as in the porcelaneous Miliolacea. 2. Absence of pores in inflational ornamentation (spines, costae), or keel, peripheral band or apertural structures or region of various hyaline foraminifers.

infralaminal accessory aperture Opening in test of planktonic foraminifer at margin of accessory structures such as bullae or tegilla and leading to the cavity beneath these structures, as in *Catapsydrax.*

inframarginal sulcus Deep indentation of the apertural face, as in *Alabamina;* infundibulum; scrobis septalis.

infundibulum Deep indentation of the apertural face, as in *Alabamina;* see *inframarginal sulcus.*

inner lining Inner mineralized layer of the primary test wall in bilamellar foraminiferans, between the organic median layer and the chamber lumen.

instar Single episode of test formation, commonly producing a single chamber.

intercameral Located between chambers.

intercameral foramen Opening between successive chambers: may consist of previous aperture or may be secondarily formed.

interioareal aperture One or more openings in the apertural face of the final chamber but not at its base; areal aperture.

interiomarginal aperture Basal opening at margin of final chamber: may be umbilical, extraumbilical, or equatorial in position.

interlocular space External space between chambers, commonly as incised sutures; e.g. *Montfortella*.

interseptal Located between septa; e.g., pillars of orbitolinids.

intradermal plates Transverse partitions of the chambers originating by infolding of the lateral walls, in Archaiasinae.

intralaminal accessory aperture Opening in test of planktonic foraminifer leading through such accessory structures as bullae or tegilla, into the cavity beneath these structures, but not directly into the chambers; as in *Rugoglobigerina*.

intraseptal Located within a septum; e.g., intraseptal canals of the Rotaliidae.

intraumbilical aperture Apertural opening into the umbilicus of the enrolled test but not extending along the suture beyond the umbilicus.

involute Strongly overlapping successive whorls, the outer ones completely enclosing earlier ones, as in *Pullenia*.

isogamy Conjugation of morphologically similar gametes in sexual reproduction.

isogenotypic Two or more generic names proposed with the same type species; hence objective synonyms.

joist Second order beam, about one-half the height of the primary beams; primary transverse partition.

juvenarium Embryonic apparatus of some larger foraminifers, consisting of proloculus and the following one or few chambers.

keriotheca Thick wall layer with honeycomblike structure underlying the tectum in some fusulinids; may have differentiated upper and lower keriothecal layers.

kryptoquinqueloculine See *cryptoquinqueloculine*.

labial aperture Opening formed by free part of apertural lip, not opening directly into chamber; accessory aperture.

labyrinthic wall Complex spongy wall with interlaced dendritic channels perpendicular to the surface; vacuolar; vesicular.

lamellar wall 1. Wall constructed of thin platelike layers of calcite or aragonite; primarily lamellar. 2. Additional layer added over the previous test surface as each new chamber is added; secondarily lamellar.

lamelliform buttress Pillarlike structures in the chamber lumen.

lanceolate Flat, narrow, and tapering shape, as in *Plectofrondicularia*.

lateral chamberlet Lateral part of chamber lumen, connected with main equatorial chamber lumen only by stolon system.

lateral chambers Smaller chambers on each side of the equatorial series of chambers in the orbitoidal foraminifers.

lenticuline Lens-shaped, as in *Lenticulina*.

lepidoline wall Wall almost devoid of keriothecal layer and largely of tectum only, in fusulines such as *Lepidolina*.

limbate Thickened border or edge of a chamber at the suture, may also be elevated.

lip Produced border of aperture, may be small to large, restricted to one side or completely surrounding the opening.

lobopodia Pseudopodia that are thick and blunt with rounded termination and contain both ectoplasm and endoplasm as in *Amoeba*; present in gametes of *Spirillina*.

loculus Chamber.

lower keriotheca Lower part of keriotheca having coarse alveolar structure, farther from outer surface and adjacent to chamber lumen; as in *Schwagerina*.

lower tectorium Secondary layer of spirotheca next below the diaphanotheca or tectum; as in *Profusulinella*.

lumen; pl., lumina Chamber cavity in the foraminiferal test.

marginal band Imperforate strip of chamber wall at the test periphery; may be bounded by keels, as in *Globotruncana*.

marginal chamberlets Subdivisions of primary chambers in the marginal zone, formed by the radial partitions or beams, as in Orbitolinidae.

marginal canal system Interlocular space formed by subsequent lamellae covering grooves of the marginally extended apertural face, in nummulitids.

marginal cord Thickened imperforate equatorial rim of the nummulitids, containing a three-dimensional network of canals that communicate with polygonal grooves along the marginal rim by means of short subradial connections.

marginal zone Peripheral part of the chambers, containing chamberlets produced by primary and secondary vertical and horizontal exoskeletal partitions, beams, and rafters, in Orbitolinidae.

meandrine Tortuous, meandriform, winding.

median section Section in central sagittal position, intersecting proloculus and perpendicular to axis of coiling.

megalospheric Generation with large proloculus and smaller adult test, commonly the gamont generation; *A*-form.

microgranular wall Microscopically granular wall constructed of minute calcite crystals that may be randomly arranged or aligned in rows perpendicular to the surface to result in a fibrous structure; various wall layers may have different arrangement of crystals; as in Parathuramminacea, Endothyracea, Fusulinacea.

microsomes Fine refringent, colorless, slightly elongate granules in the cytoplasm, may be tinted gray by ferric hematoxyline and brown violet by feulgen; in *Peneroplis, Cibicides, Elphidium.*

microspheric Generation with small proloculus and larger adult test, commonly the agamont or schizont generation, *B*-form.

milioline Structure as in the Miliolacea, commonly with narrow elongate chambers, added two per whorl and in varied planes of coiling.

mitosis Nuclear division in asexual reproduction, fission, or schizogony, each resultant nucleus having the same number of chromosomes as the parent nucleus.

monolamellar Single-layered septa and outer wall; previously believed to occur in many hyaline foraminifera but now known only in the Spirillinacea, in which the test is formed by marginal accretion rather than by calcification of an organic template.

monothalamous Single-chambered test, unilocular.

multilocular Foraminiferan with test having numerous interconnected chambers; polythalamous.

multiple tunnels Series of openings in test chambers formed by resorption along the lower part of the septa, in fusulinids.

murica; pl., muricae Conical moundlike surface structure with hollow proximal part that is in continuity with the chamber lumen, in some planktonic foraminifera.

murical sheath Formed by closely crowded and coalescing muricae on the chamber surface; primary feature of the wall and not a later formed calcite crust.

muricocarina Carina or keel formed by fused muricae superimposed on an imperforate peripheral band.

murus reflectus Deep sutural indentation of apertural face of the test, longitudinally and obliquely folded below the aperture, as in *Osangularia.*

neanic Youthful stage in ontogeny.

nepionic Stage immediately after the embryonic stage in ontogeny.

nucleoconch See *embryonic apparatus.*

nucleolus Small spherical body within the nucleus that shows a characteristic reaction to some stains.

nucleus Roughly spherical compact mass of chromatin surrounded by a membrane within the cytoplasmic body and having an important role in ontogenetic development and in such cell functions as digestion and test formation; individual foraminiferan may have one or many nuclei.

oblique section Section cut through test that is neither parallel nor perpendicular to axis of coiling.

oligoplectoid coiling Moderately asymmetrical coiling derived from strictly planispiral coiling, as in *Sornayina.*

organic lining Mucopolysaccharide envelope of endoplasm, coating the internal surfaces of the chambers and intercameral passages.

orifice Aperture or other opening in the test.

orthomonolamellar wall Lamellar wall in which entire exposed part of the calcareous test is covered by a secondary lamella at each instar.

outer lamella Outer mineralized layer of the primary test wall of bilamellar foraminifera, external to the median organic template.

palmate Flat and spreading form, resembling a hand with outstretched fingers.

parachomata Ridges of dense calcite between adjacent foramina, produced in tests with multiple foramina per chamber; in some fusulinids, such as *Pseudodoliolina.*

parallel section Section cut through test in a plane parallel to the axis of coiling but not intersecting the proloculus.

paries proximus See *septal flap.*

pectinate Comblike appearance of the outer margin of the test, resulting from the slight protrusion of radial elements beyond the peripheral equatorial chambers, as in *Pseudorbitoides.*

peneropliform See *peneropline.*

peneropline Having the form of *Peneroplis*, with early coil and later rapidly flaring chambers.

perforate wall Wall of hyaline calcareous test pierced by numerous fine pores, and commonly closed by organic plugs or sieveplates.

periembryonic chambers Nepionic part of test, equatorial chambers immediately surrounding the embryo and developed prior to the phase of cyclic growth, as in orbitoids; nepiont.

peristome Raised rim around the aperture of the test.

phialine Everted rim of apertural neck, like that of a bottle.

phrenothecae Thin and dense partitions crossing the chambers in various places and at various angles, as in *Pseudofusulina.*

pilintradermal plates Transverse partitions of the chambers, approximately paired and separated by one to five rows of orifices; originate by fusion of inner infolding of lateral wall with a pillar, in Archaiasinae.

pillar Cylindrical or hemicylindrical structures, filling the umbilical region as in *Rotalia*, or extending from chamber floor to roof as in *Dictyoconus;* interseptal buttresses.

pillar-pore External opening left by infolding of the outer wall to produce a large tubular chamber or pillar-pore chamber, closed at the base, and with imperforate wall, as in *Miniacina.*

planispiral Coiled in a single plane.

plastogamy Fusion of adult tests by their umbilical surfaces at time of sexual reproduction to better ensure fertilization of gametes, as in *Glabratella.*

plectogyral Coiling in different planes, as by a ball of string; streptospiral.

plesiomonolamellar Primarily lamellar calcareous test with secondary lamellae formed at each instar but covering only part of the previously formed test.

plicate Having folds or ridges.

podostyle Pseudopodial trunk consisting of mass of cytoplasm protruding from the aperture of monothalamous foraminifers, from which the pseudopodia arise.

polymonolamellar Primarily lamellar calcareous test with secondary lamellae formed at each instar that cover entire exposed test and with additional lamellae covering both the exposed early part of the test and the last formed chamber.

polymorphine Shape or structure as in *Polymorphina.*

polymorphism Morphologically different forms of a single species; may represent alternate haploid and diploid generations.

polythalamous Constructed of many chambers; multilocular.

polyvalent individuals Vegetative association, probably accidental and due to crowding, resulting in specimens with two or more embryonal apparatuses, always of the same generation (whether micro-or megalospheric), and of approximately the same age; not related to plastogamy.

ponticulus; pl., **ponticuli** 1. Prolongation of shell substance across the suture, as in the Elphidiidae, ponticuli may be hollow and contain a retral process or may be solid. 2. Distinctive cover plate in *Racemiguembelina*, extending from upper part of apertural face to chambers in same plane on opposite side of the test, the ponticuli bordered by large infralaminal accessory apertures.

porcelaneous Wall that is calcareous, white, shiny, and commonly imperforate, resembling porcelain in general appearance, shows low polarization tints between crossed nicols, and appears brown in transmitted light; constructed of rodlike crystals, whose random orientation refracts light in all directions to result in the milky opacity but may have a surface layer of tabular rhombohedral crystals; in Suborder Miliolina.

pore Minute perforations through the test wall, with tubular organic lining and subdivided by organic sieveplates, each sieveplate corresponding to the boundary between secondary laminae of the wall or to the median organic layer of lamellar calcareous tests.

pore pit Pit in wall surface, with pore at the center, may become funnel shaped in later stage due to secondary lamellar thickening of the wall.

pore plug Tiny organic microporous plates at the base of the wall pores of some foraminifers.

porticus; pl., **portici** Distinctly asymmetrical apertural flap, commonly imperforate, as in *Praeglobotruncana.*

postseptal passage Opening at the proximal margin of a chamber, against the outer wall and preceding septum and connecting all chamberlets of a single chamber; in Alveolinidae.

preseptal passage Opening at the distal or anterior margin of a chamber against the following septum and connecting all chamberlets of a single chamber; in Alveolinidae.

primary aperture Main test opening, may be single or multiple, and may be accompanied by secondary or accessory apertures; protoforamen.

primary axial septulum; pl., septula Chamberlet-forming partition, in plane approximately parallel to the axis of coiling, visible in sagittal section, as in fusulinid *Yabeina.*

primary chamber 1. Chamber formed at a single instar, may be subdivided into chamberlets. 2. Chambers of the primary spiral in the orbitoids.

primary septulum; pl., septula Main partitions bounding a chamberlet, includes both axial and transverse septula, as in *Neoschwagerina.*

primary transverse septulum; pl., septula Chamberlet-forming partition, in plane perpendicular to axis of coiling, visible in axial sections, as in fusulinid *Yabeina.*

primatheca Undifferentiated wall in inner whorl of fusulinids, bounded by tectum; protheca.

profusulinellid wall Type of fusulinid wall, originally regarded as three-layered, with tectum and inner and outer tectoria, but later shown to have outer tectorium, tectum, and diaphanotheca, as in *Fusiella.*

progressive chamber First chamber added that has two apertures, in the orbitoids.

proloculus; pl., proloculi First chamber of foraminiferal test; protoconch.

proloculus pore Single round opening in the proloculus, leading to the second formed chamber.

protheca Primary element of primitive fusulinid wall, equivalent to the diaphanotheca of advanced taxa and bounded above by a thin film of tectum; primatheca.

protoconch First formed chamber, see *proloculus.*

protoconchal stolon Stolon connecting protoconch and deuteroconch; a lip or elevated collar develops around the protoconchal stolon in the miogypsinids.

protoforamen Primary aperture of test that may have an associated well-developed or rudimentary toothplate.

protoplasm Living matter comprising the body of the protozoan or cells of other organisms, includes both cytoplasm and nucleus.

protoplast Protoplasmic body of the protozoan.

protopore Fine wall perforation, with rounded margins, at least on inner wall surface.

proximal In the direction of the proloculus, opposite to that of continued growth; away from the aperture.

pseudocarina Perforated, ridgelike thickening of peripheral part of chamber, approximately in plane of coiling.

pseudochambers Partial subdivision of test interior, indicated by slight wall protrusions or incipient septa, as in the Tournayellidae, or *Paratikhinella.*

pseudochitin Proteinaceous material comprising the wall of some foraminiferans, similar to keratin in containing sulfur, but with microscopic granules of opaline silica.

pseudocortex Late stage in calcification, resulting in filling of sutural depressions, mural pores, and other surface irregularities. Similar to the cortex, but inconsistently developed within a population, or even on a single specimen.

pseudolimbation Secondary calcification filling and partially covering original surface structures such as muricae, especially along the sutures, and producing a relatively smooth calcite surface; raised areas formed over the sutures may resemble limbate sutures.

pseudopodia Temporary or semipermanent cytoplasmic extensions that serve for locomotion, attachment, capture and digestion of food, and additions to the test or construction of new chambers; thin and anastomosing granulose reticulopodia in the foraminiferans.

pseudopodial trunk Mass of cytoplasm projecting from the aperture of some unilocular foraminiferans, from which the pseudopodia arise; podostyle.

pseudorbitoid layer Radial elements formed in the equatorial layer that divide later equatorial chambers into top and bottom half, as in the pseudorbitoids.

pseudopores Deep pits in the surface of some Miliolacea that do not completely penetrate the wall, as in *Miliola;* punctuations.

pseudotriloculine Chambers added one-half coil in length but irregularly triloculine, with final three chambers added so that two of the angles between chambers are greater than 130°, and the other less than 90°, the planes varying from the normal 120° apart of typical triloculine chamber addition.

pseudoumbilicus Wide or deep depression between the inner umbilical chamber walls, bordered by sharply angled umbilical shoulder, as in *Morozovella.*

punctuations Incomplete pores or pits in wall of Archaiasinae, that do not completely perforate the wall; pseudopores.

pustule 1. Solid surface knobs or pustules of calcite on the wall of some planktonic foraminifers that do not correspond to spines or spine bases. 2. Surface pustules in the orbitoidal foraminifera that reflect the termination of pillars in the central part of the test.

pycnotheca Dense layer of wall traversed by septal pores and situated between the tectum and keriotheca of the septal face or antetheca, as in Schwagerinids.

quinqueloculine Chambers one-half coil in length, successive chambers added 144° apart, resulting in chambers in five planes 72° apart, as in *Quinqueloculina*.

radial Direction from pole or axis to circumference of test, as radial beams, radial striae.

radial microstructure Hyaline calcareous tests with crystals of calcite or aragonite having *c*-axes perpendicular to the surface; between crossed nicols shows a black cross with concentric rings of color-mimicking negative uniaxial interference figure; optically radial.

radial zone Part of chamber between the marginal zone and the central part of the test, mostly containing radial elements, as in Orbitolinidae.

radiate aperture Opening having many diverging slits, as in *Nodosaria, Polymorphina*.

rafter Subepidermal exoskeletal partition parallel to the septa, in larger agglutinated foraminifera; also bars; *poutrelle* (French); *Bälkchen* (German).

rectilinear Growing in a straight line.

relict apertures Portion of aperture not covered by succeeding chamber, those of successive chambers remaining as small openings, commonly around umbilicus of enrolled tests.

reniform Kidney-shaped.

reticulate 1. Network of ridges on test surface, producing honeycomblike appearance, as in *Favocassidulina*. 2. Inner meshwork formed by beams and rafters just beneath imperforate epidermis, subepidermal network in *Cyclammina*.

retral processes Backward-directed closed extensions of the chamber lumen over the preceding septum, as in *Elphidium*; visible from the interior of the chamber but may not be reflected at the surface.

retrovert apertures In chambers having two apertures, one at the proximal margin and the other at the distal margin, the former is termed the retrovert aperture, as in the orbitoids.

retrovert chamber Secondary chamber, produced from the retrovert aperture, in the orbitoids.

rhizopodia Repeatedly bifurcating and anastomosing pseudopodia.

rugose surface Rough and irregular surface ornamentation of rugae or irregular ridges.

sagittal section Section through the test perpendicular to the axis of coiling and passing through the proloculus; equatorial section.

sarcode Protoplasm of the protozoan.

schizogamy See *schizogony*.

schizogony Asexual division; formation of new embryos by multiple fission of the multinucleate schizont; schizogamy; agamogony.

schizont Generation that divides asexually to produce embryos; commonly with microspheric test; *B*-form; agamont.

scrobis septalis Asymmetrical indentation or concave surface of the apertural face, as in *Alabamina*; infundibulum; inframarginal sulcus.

secondarily lamellar Lamellar calcareous test completely covered by new lamellae at each instar.

secondarily mesolamellar Lamella from newly built chamber of calcareous test is attached to and covers at least one previously formed chamber but does not cover the entire previously formed test at each instar.

secondarily nonlamellar Wall of newly built chamber attached to and may cover part of preceding chamber but new lamellae do not cover the entire test.

secondary apertures Additional or supplementary openings into the chamber lumen; may be areal, sutural, or peripheral in position.

secondary axial septulum; pl., septula Minor partition, extending a short distance inward from the spiral wall, in a plane approximately parallel to the axis of coiling and inserted between primary axial septula; as in neoschwagerines.

secondary chambers Equatorial chambers in the orbitoidal foraminifers, other than those constituting the primary spiral.

secondary septulum; pl., septula Minor partition, extending a short distance inward from the spiral wall, as in neoschwagerines.

secondary transverse septulum; pl., septula Minor partition of chamberlet, in plane perpendicular to axis of coiling, as in neoschwagerines.

septal flap Inner lining of the bilamellar calcareous wall that may extend farther to attach against the previous apertural face as new chamber is added, partially or ompletely covering it to secondarily form a three-layered septum; as in *Rotalia*; attached part of paries proximus.

septal fluting Folding or corrugation of septum or apertural face, transverse to axis of coiling, commonly more intense in the lower part of the septum farther from the outer wall and toward the poles of the test; as in Paraschwagerina.

septal foramen Intercameral opening, commonly homologous with the previous aperture but may be secondarily formed.

septal furrow External furrow, suture.

septal pore Small perforations in septum and apertural face or antetheca, in fusulinids.

septulum; pl., **septula** Secondary partition extending from chamber roof, and partly subdividing the chambers, as in *Neoschwagerina*, *Pavonitina*.

septum; pl., **septa** Partition between chambers, commonly equivalent to previous outer wall or apertural face.

sessile Attached, sedentary.

sieveplate 1. Minute organic plate containing micropores in concentric rows, present in pore canals of calcareous foraminifers. 2. Trematophore with cribrate aperture.

sigmoid *S*-shaped.

sigmoiline Plane of chamber addition in sigmoid curve rather than flat, observable in transverse section, as in *Sigmoilina*.

siphon Internal tube extending downward from aperture, as in *Oolina*.

six-stolon system Each spatulate and ogival equatorial chamber is connected to adjacent chambers of the same cycle by basal or annular stolons, and to chambers of the preceding and subsequent cycles by diagonal stolons, as in *Eulepidina*.

socculus Low pedestal-like elevation forming the base of pillars, at the proximal side of the chambers, arranged along the circumference of the chamber, may have sulci between or may be arranged in a network, in Archaiasinae.

somatic nucleus Vegetative nucleus not taking part in reproduction, found in heterokaryotic foraminifers.

spheroconch Spherical second chamber or deuteroconch, completely enveloping the thin-walled megalospheric proloculus in some larger agglutinated foraminifers.

spinose Test surface having fine elongate spines that appear optically as single calcite crystals elongated on the *c*-axis; as in *Globigerina*.

spiral canals Part of canal system surrounding the umbilicus, paralleling but inside the lateral chamber margins, as in *Elphidium*.

spiral side Side of trochospiral test in which all whorls are visible; commonly dorsal.

spirilline Planispiral nonseptate tube enrolled about the globular proloculus, as in *Spirillina*.

spirotheca Outer or spiralling wall, in fusulinids.

spiroumbilical aperture Interiomarginal aperture that extends from umbilicus to periphery and continues onto the spiral side.

stercomata Brown oval masses of debris within the cytoplasm; fecal pellets.

stereoplasm Relatively solid central axis of granuloreticulose pseudopodia, surrounded by the granular rheoplasm; observed in *Peneroplis*, *Elphidium*, but not observed in most agglutinated species.

stolon Tubelike connections between adjacent chambers, as in orbitoids.

stolon plane Plane defined by layer of stolons, parallel to the equator in discoidal foraminifers.

stomostyle Thickened outer membrane invaginated in the cytoplasm of the apertural region, from which the pseudopodial trunk emerges.

streptospiral Coiled like a ball of string, in continually changing planes.

striate Surface marked by narrow parallel grooves.

subepidermal lamellae Commonly oblique transverse partitions between adjacent subepidermal plates and parallel to the outer wall and septa, forming a subepidermal network, in *Timidonella*; rafters.

subepidermal network Exoskeletal structure of beams and rafters producing a dense polygonal alveolar mesh in the outer part of the chamber, adjacent to the imperforate epidermis.

subepidermal plates Plates perpendicular to the test surface at the lateral sides and apertural face that may be interconnected by transverse and commonly oblique subepidermal lamellae to form a subepidermal network; beams.

subseptate Having incipient septa or slight protuberances forming pseudochambers, as in Tournayellidae.

sulcoperculinoid phase Uniapertural early growth stage of pseudorbitoid foraminifers, prior to development of chambers with retrovert aperture.

sumatrinalike wall Wall of tectum and very fine textured keriotheca, but tectum does not extend into the septula that are formed only of keriothecal elements, as in the fusulinid *Sumatrina*.

supplementary apertures Secondary openings in the test, may be in addition to the primary aperture and independent of it or may even replace the primary aperture.

supplementary multiple areal apertures Subordinate openings in the test, may be associated with a primary aperture, as in *Cribrohantkenina*.

supraembryonic area Circular apical area above the megalospheric proloculus in some orbitolinids.

sutural supplementary apertures One or more openings along the sutures in addition to the primary aperture; may be single and on the umbilical side as in *Rotalipora*, on the spiral side as in *Truncatulinoides*, or multiple and on both sides in *Candeina*.

suture Line of union between adjacent chambers (intercameral suture) or between two whorls (spiral suture) of evolutely coiled test.

symbiosis Mutually beneficial life association; common endosymbionts of planktonic and larger benthic foraminifers include green or bluegreen algae, dinoflagellates, and diatoms.

syzygy Association of two or more gamont individuals in common reproductive cyst for protection during emission and fusion of gametes.

tangential section Section through outer part of test, close to surface and may parallel the axis of coiling or growth in fusulinids, or be oblique to the axis of orbitolinids.

tectine Albuminoid organic substance resembling chitin in appearance but chemically distinct.

tectorium; pl., tectoria Inner lining of chambers, secondarily formed of dense calcite when tunnel is excavated in fusulinids; may include upper tectoria on the floor of the chamber against the previous whorl and lower tectoria at the inner margin of the wall and lining the chamber roof.

tectum Thin dense outer layer of the spirotheca or wall, in fusulinids.

tegillum; pl., tegilla Umbilical extensions from the chambers over the primary aperture, and extending across the umbilicus to completely cover it, may be attached laterally to tegilla of earlier chambers and form a spiralling structure, as in the globotruncanids, and may have interiomarginal or infralaminal openings that open into the umbilical region.

test Shell or covering of the foraminifer; may be gelatinous, membranous, calcareous, agglutinated, siliceous, or combinations of these.

tooth Projection of wall into the test aperture, may be simple or complex, single or multiple.

toothplate Extension of chamber wall or contorted plate extending within the chamber lumen from the aperture to the margin of the preceding foramen; may attach to the foramen, and may be laterally attached to the inner chamber wall.

transverse septulum; pl., septula Minor partitions within chambers, oriented transverse to the axis of coiling, and visible in sagittal and parallel sections, as in Verbeekinidae.

trematophore Perforated plate over the aperture of some larger miliolids, may be supported by pillars; sieve plate.

triloculine Chambers one-half coil in length, added successively in three planes 120° apart, as in *Triloculina*.

trimorphism Three alternate generations in a species, plurinucleate megalospheric individuals that reproduce asexually as schizonts, uninucleate megalospheric individuals, and microspheric individuals; the uninucleate and multinucleate gamonts designated as A_1 and A_2 generations, respectively; trimorphism not demonstrated to occur in all species.

triserial Chambers added in three vertical columns in a high trochospiral coil of three chambers per whorl.

tritoconch Large, elongate and spreading third chamber with many stoloniferous openings; in *Miniacina*.

trochoid See *trochospiral*.

trochospiral Trochoid, rotaliform, chambers coiled in a low to high spire, and not in a flat plane, commonly evolute on one side and involute on the opposite.

tube pillars Lamellae of basal wall or septum deeply invaginated, touching the preceding wall and forming hollow pillars, as in *Chapmania*.

tuberculate Covered with tubercles or small rounded prominences.

tubulospine Chamber produced radially into a long hollow extension, with prolongation of the chamber lumen as well as the outer wall; as in *Schackoina*.

tumulus; pl., tumuli Secondary deposit on chamber floor, appearing in section as a symmetrical node with rounded summit, as in endothyrids.

tunnel Intercameral foramen, formed by resorption at base of septa in central part of test, in fusulinids and pfenderinids, may be bounded by chomata; facilitates communication between chambers.

umbilical canal system Interlocular space formed in umbilicus as incised spiral and umbilical sutures are covered; commonly modified by resorption.

umbilical depression Closed shallow axial depressed area formed by curvature of the chambers in an involute spire, may be filled by pillars or thickenings.

umbilical shoulder Sharp angle at edge of pseudoumbilicus, may be pustulose to carinate, as in *Morozovella*, *Truncorotalia*.

umbilical side Commonly the involute side of trochospirally coiled tests, with only those chambers of the final whorl visible around the umbilicus, may have the primary aperture; also may be termed ventral side.

umbilical teeth Triangular apertural lips extending into umbilicus, those of successive chambers resulting in a serrate umbilical margin.

umbilicate Umbilicus present on one or both sides of enrolled test.

umbilicus; pl., **umbilici** 1. Central depression on planispiral test surface where chambers meet at axis of coiling, as in *Pullenia*. 2. Conical space in trochospiral tests at inner margin of umbilical wall of chambers of the same whorl, may be open in *Globigerina*, covered by tegilla in *Globotruncana*, by a bulla in *Catapsydrax*, filled with a plug in *Rotalia*, or with pillars in *Lockhartia*.

umbo Central elevated area of lenticular or discoidal forms, due to lamellar thickening on one or both sides of the test, as in *Lenticulina*.

umbonate Having an umbo on one or both sides (biumbonate) of the test.

unilocular Monothalamous, single-chambered test.

uniserial Chambers added in a single row or series.

upper keriotheca Upper part of keriotheca, closest to the tectum, and characterized by finer alveoles, as in *Schwagerina*.

upper tectorium Secondary wall layer added just above the tectum of the spirotheca or spiralling wall, as in *Profusulinella*.

vacuole 1. Globular inclusions in the cytoplasm, as food vacuoles, contractile vacuoles. 2. globular or irregular cavities in the test wall.

ventral With reference to the lower side of the test, opposite the dorsal side, and commonly bearing the aperture; umbilical side.

vertical stolon Stolon or passage from the equatorial main chamber lumen to a lateral chamberlet.

vitreous Hyaline, having the appearance and luster of glass.

whorl Single turn through 360°, one volution of an enrolled test.

xanthosome Small refringent, brown to yellow globular inclusions in the cytoplasm, commonly numerous, and may be products of excretion.

zygote Result of fusion of two haploid gametes in sexual reproduction, the diploid zygote having twice the number of chromosomes as the gametes.

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Systematic Index

In the index, suprageneric categories are printed in capital letters, and genera and species in lower case. Primary page references to foraminiferal genera and to herein recognized suprageneric categories are in boldface. Valid or recognized genera and species are not differentiated from invalid ones by the index. Plate citations (indicated by pl. or pls.) follow the page citations.