

M. DAN GEORGESCU

HANDBOOK OF LATE CRETACEOUS PLANKTIC FORAMINIFERA

(Practical Classification, Biostratigraphy)



PALEONTOLOGY, GEOSCIENCES
AND STRATIGRAPHY

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**M. DAN GEORGESCU
EDITOR**

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CONTENTS

Preface		vii
Acknowledgments		ix
Chapter 1	A New Solution in the Classification Methods	1
Chapter 2	Morphology and Terminology	5
Chapter 3	Genus Descriptions and Identification	15
Chapter 4	Species Presentation	45
Chapter 5	Biostratigraphy	321
Index		327

PREFACE

Developing the evolutionary history and classification in the planktic foraminifera of the Late Cretaceous age also led to the proliferation of taxa names and an unprecedented expansion in terminology. This new data is spread out over several tens of articles published in international journals and books. *Handbook of Late Cretaceous Planktic Foraminifera (Practical Classification, Biostratigraphy)* brings a variety of this data into the practical field in a ready-to-use form. The species and genera of all the Cretaceous planktic foraminiferal groups are described and illustrated, and additional readings are recommended. Each species is dedicated to one of the 237 plates illustrated with high-quality scanning, electron microscope photographs. The large-sized illustrations are designed to allow the reader to connect quickly with the gross test architecture data with those pertaining to the wall ultrastructure, ornamentation, porosity and high detail morphological features of the test. Fossil material was collected from a variety of localities worldwide, but most of them are from sites in the Atlantic, Indian and Pacific Oceans. With higher than 95% of estimated coverage, the handbook is designed as a useful identification tool for a variety of professionals interested in using the Late Cretaceous planktic foraminifera. Revised stratigraphical ranges for all the 237 species are given in a chart calibrated on the classical Cretaceous Stage/Age scale in which the species are ordered by genus.

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Chapter 1

A NEW SOLUTION IN THE CLASSIFICATION METHODS

Modern science was centred, since its official beginnings with establishment of the Royal Society of London in 1660, around two interconnected goals, namely the advancement of knowledge through scientific method and its further use in increasing predictability of the various natural processes and phenomena. Such goals are nowhere more well-defined than in the field of classification of the living and fossil organisms on Earth.

The beginnings of the living organisms classification dates back to the pre-Greek Rationalism times and is witnessed in plant classification based on their uses discovered in the Assyrian King Ashurbanipal's clay tablet library of Nineveh. Today we accept in general that the foundation of the widely used present-day classification of plants and animals was laid by Aristotle of Stagira and his collaborator Theophrastus of Eresos circa 24 centuries ago. This classification, which is based on Aristotelian concepts uses the degree of resemblance between organisms as method in grouping them into higher categories, was subsequently and continuously improved for more than two millennia, from the post-Hellenistic and Roman Antiquity to the present times. The method remained unchanged during the Renaissance when the binomial system started to be applied in naming species and the early modern attempts in classification of which we mention herein only those by Charleton (1668) and Ray (1693).

The Linnean classification does not differ fundamentally of the previous ones, but was widely accepted in the scientific community around one hundred years after its release in the first edition of *Systema Naturæ* of Linnaeus (1735). This work and its more than ten subsequent editions published during the life of K. Linnaeus cannot be read by the modern scientist without noting a serious dose of mysticism, which might appear normal given they were written in a period when Creationism was a norm in science. The release of the Theory of Evolution by Darwin (1859) completely changed the perspectives on classification. The beginnings of evolutionary classification can be traced back to this work and especially to the observation that the species resemblances are the result of common ancestry and differences of the divergent nature of the process of evolution. However, C. Darwin did not elaborate on this topic neither in the subsequent editions of *The Origin of Species* nor in journal articles.

One of the advances brought by the Theory of Evolution in the classification of the life forms is that it drew attention on the ancestor-descendant relationships as factor that can be

used in the development of a 'natural' classification. Cladism, which uses the degree of resemblance between organisms to infer the ancestor-descendant relationships was developed by Hennig (1950) and adopted by a relatively large number of taxonomists especially in the last three decades. The use of resemblances alone between the taxa at various classification levels makes cladism a system close to the 'Linnaean' classification. Surprisingly the evolutionary classification, as prefigured by Darwin's observation that the ancestor-descendant relationship involves a combination of resemblances and differences, was not developed in more than one century.

Evolutionary classification started to be dealt with in detail in the last decade of the twentieth century (Mayr and Ashlock, 1991), but the empirical character of the evolutionary classification was emphasized earlier by Mary (1968). However, although they assessed accurately the roles of morphological resemblances and differences, Mayr and Ashlock (1991) used taxonomical units defined solely on the basis of resemblance, namely those of the "Linnaean" classification. This discrepancy was noted in the next stage of development in evolutionary classification, which is associated with "ultrastructure revolution," when Georgescu (2009) grouped species into lineages rather than genera and then when the lineage was defined as the fundamental unit in evolutionary classification by Georgescu (2014).

The newest developments in evolutionary classification led to a significant increase in the number of conceptual changes, terminology and the number and nature of categories (taxa) used in classification. Such an increase in the accuracy to understand the fossil record came with a major challenge for the practicing specialist in biostratigraphy, paleoecology, paleoceanography, etc: the vast amount of new data spread over tens of articles that must be assimilated and then applied requires additional work and much higher level of expertise when compared to the data used in the "Linnaean" classification. Although more accurate in the study of evolution and interpretation of the fossil record, the evolutionary classification became less easy to use in the common micropaleontological practice and practically it was reached the level of the old dilemma of classification: 'natural' or practical?

A new solution to this dilemma is proposed herein starting from the observation that the two goals are divergent and avoiding at the same time the rope pulling-type debate that proved so inefficient and at times hindering in the last century. Herein, it is proposed to separate between the practical classification, which should be used in applied studies, and evolutionary classification than can be used to advance in the field of the Theory of Evolution. The proposed separation between the practical classification and evolutionary classification can be only beneficial for both branches, for each of them can approach its field of study better suited and therefore, with higher prospects of success. Practical classification is relatively simple and does not require definition of taxonomic units excepting for those of species and genus. Moreover, by lacking any role in evolutionary studies it appears flexible and prone to accept rapidly the new discoveries expected in evolutionary classification.

The idea of a practical classification is not new. The beginnings of the practical classification in the Cretaceous foraminifera can be considered with the "Handbook of Cretaceous Foraminifera of Texas" by Frizzell (1954), which is an ordered collection of taxa reports including illustrations and occurrences from this geographical area. The first well-developed framework of practical classification is the "Manual of Planktonic Foraminifera" by Postuma (1971) developed for the whole group of planktic foraminifera; the classification adopted by this author is simple and each unit at genus or species level could be used individually or as part of an assemblage for biostratigraphy purposes. An increase in

complexity occurs with the review of the Mesozoic planktic foraminifera by Masters (1977), which marks a conspicuous specialization necessary to increase the study effectiveness. The publication of the atlases by Robaszynski and others (1979, 1984) followed by the extended synthesis of Caron (1985) determined an increased interest for the hybrid classification and it was widely accepted in the scientific community for more than three decades, despite the significant gaps in the evaluation of the various species and genera. Such classification could be used for the study of the detached and thin section material and this became evident in the work of Premoli Silva and Sliter (1995). The adoption of such a practical-evolutionary hybrid based on the principles of the “Linnaean” classification is very well illustrated by the review of the Cretaceous heterohelicid planktics of Nederbragt (1991).

The separation between the hybrid (H) and evolutionary classification (E) followed by that between the hybrid (H) and practical classification (P) have another benefit and this is the possibility to recognize the role of each of these classification systems in the applied and evolution studies respectively (Figure 1). This solution is provided in a practical way in the present work, which is designed to cover the Late Cretaceous (Cenomanian-Maastrichtian) planktic foraminifera, but those of the late Albian were added due to the significant continuity of the group across the Albian/Cenomanian boundary.

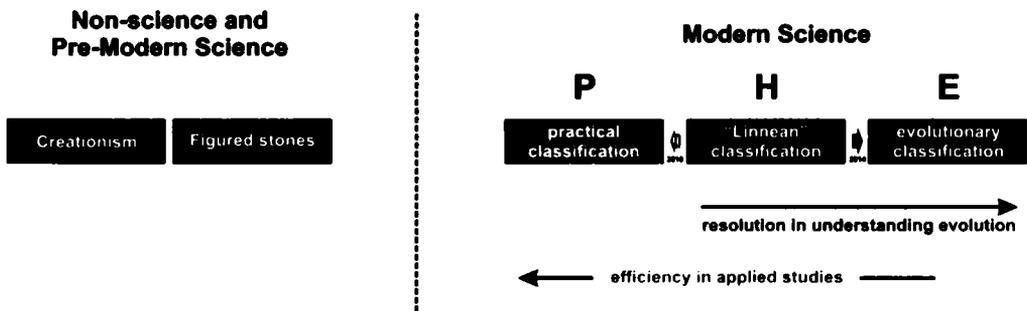


Figure 1. Conceptual diagram showing the relationships between the practical (P), hybrid (H) and evolutionary classification (E), and their role in applied and evolutionary studies.

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Chapter 2

MORPHOLOGY AND TERMINOLOGY

The first step in identification of the Late Cretaceous planktic foraminiferal tests is to assess correctly its morphology. The taxa of this group can be included into four informal groups, function of the chamber arrangement: triserial, biserial, planispiral and trochospiral. The orientation used in the illustrations of the representatives of the four groups is given in Figure 2 and will be followed in this work. Additional illustrations presenting the certain aspects of the morphology of the biserial, planispiral and trochospiral taxa are showed in Figures 3, 4 and 5 respectively. The classification of the test wall ultrastructures is illustrated in Figure 6. All the morphological terms are presented in the Glossary of Morphological Terms and Expressions. The definitions should be used as complement to the illustrations.

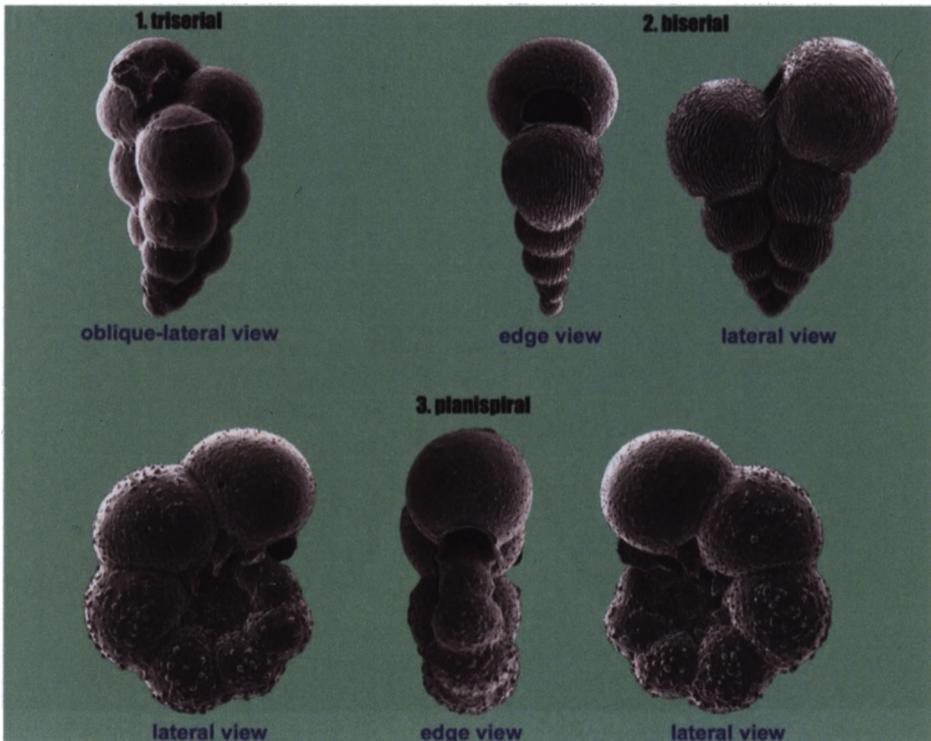


Figure 2. (Continued).

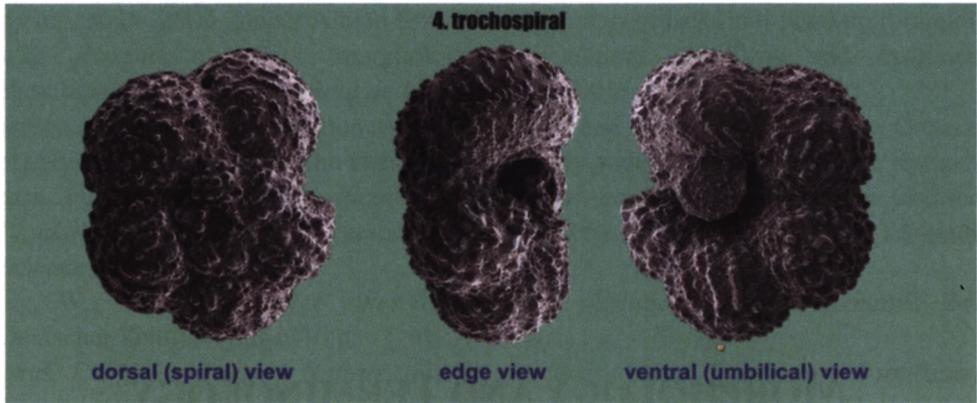


Figure 2. Test orientation and views used in the illustration, description and identification of the Late Cretaceous planktic foraminifera.

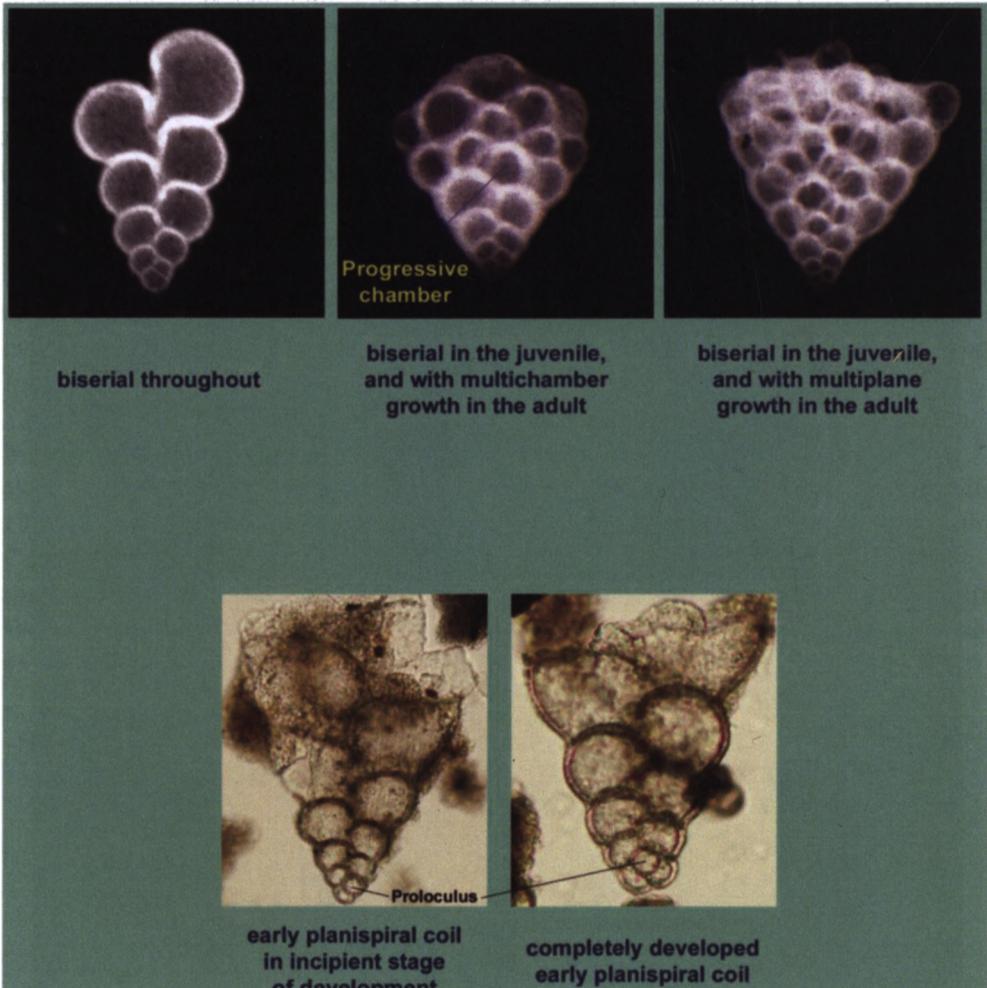


Figure 3. Selected morphological features used in the classification of the biserial planktic foraminifera: gross test architecture (above) and occurrence of an early planispiral coil (below).

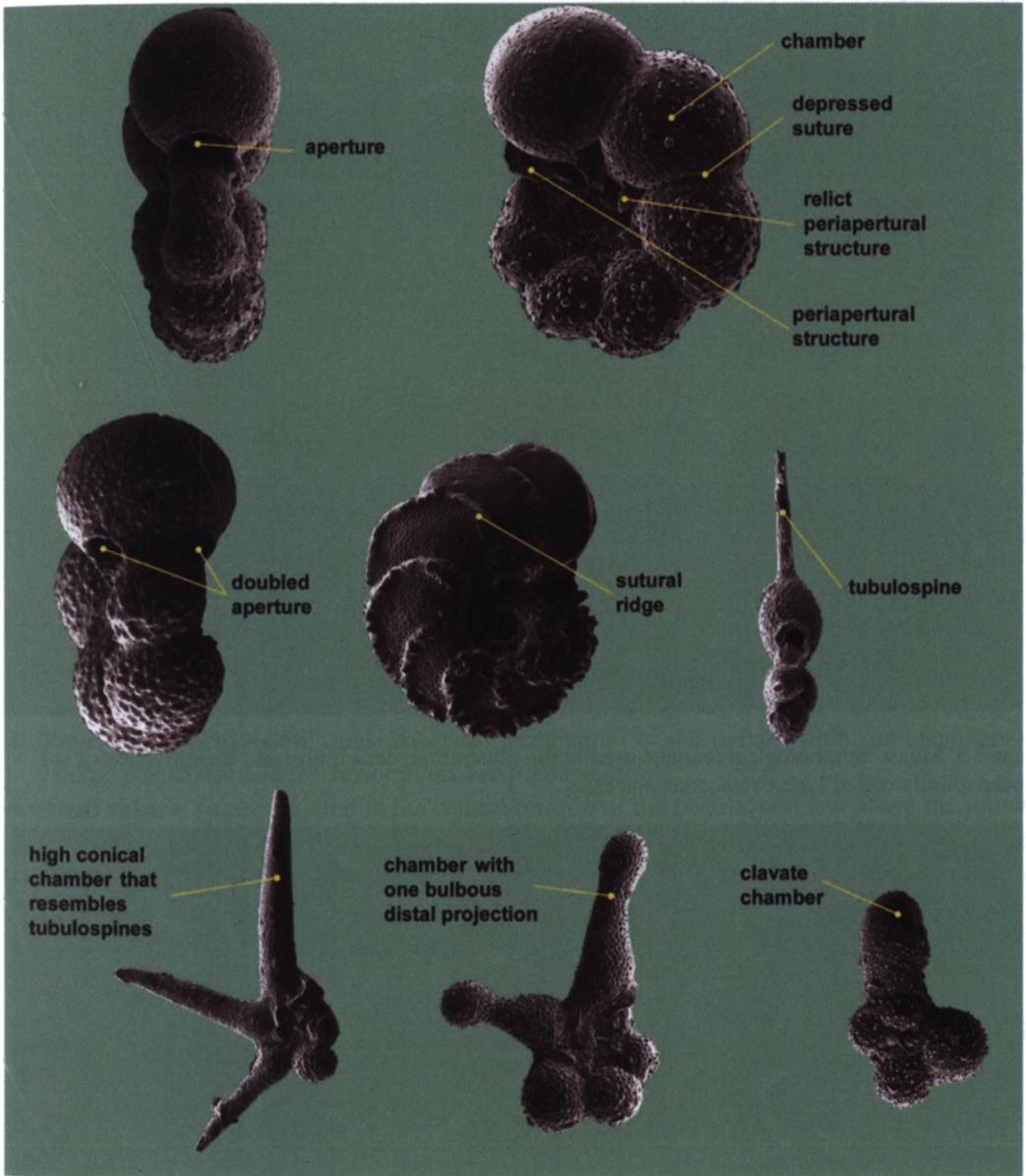


Figure 4. Major morphological features used in the illustration, description and identification of the Late Cretaceous planktics with planispiral coil.

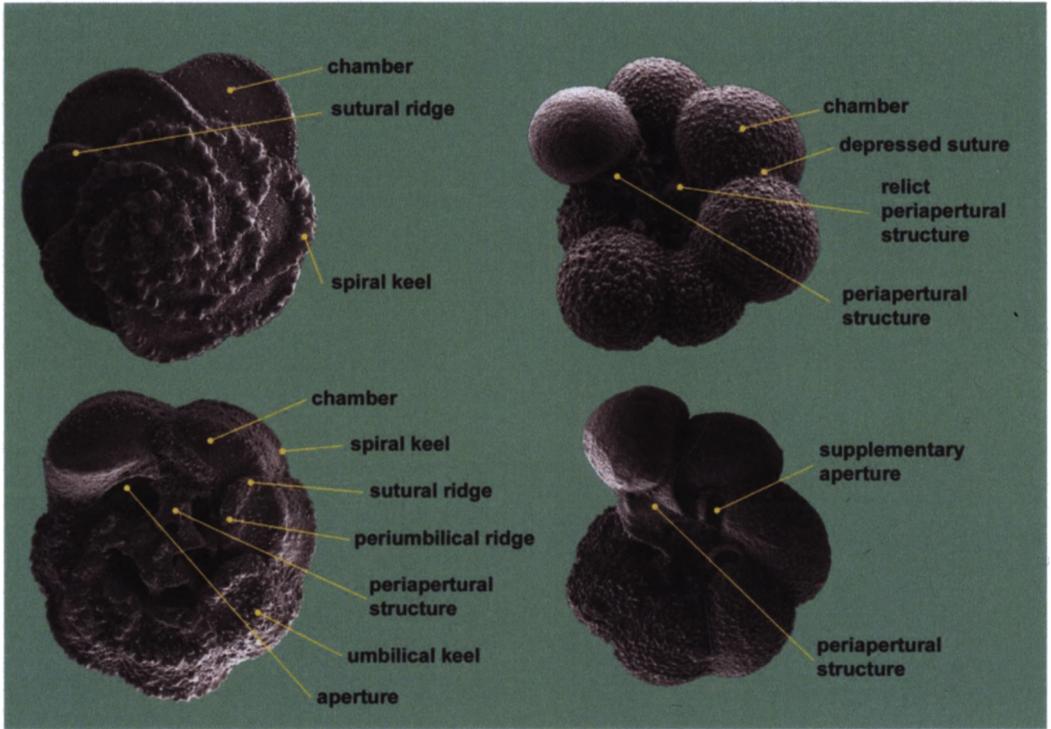


Figure 5. Major morphological features used in the illustration, description and identification of the trochospirally coiled Late Cretaceous planktics.

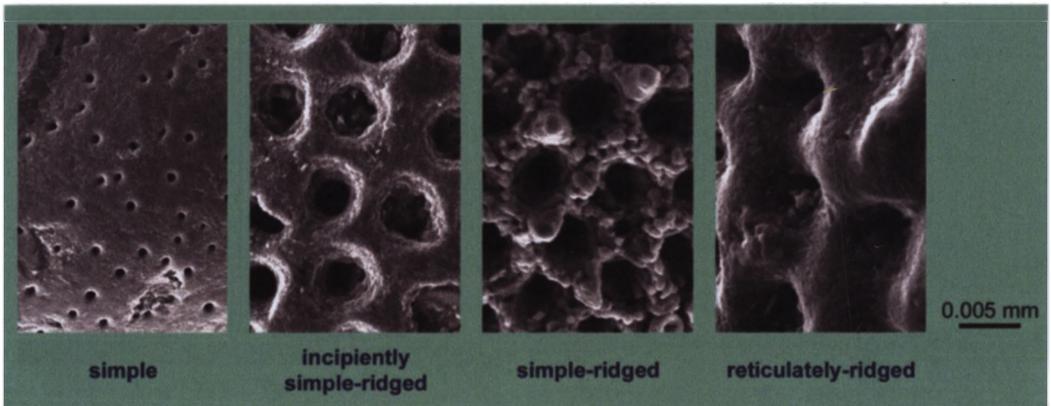


Figure 6. Illustrations of the four kinds of test wall recognized in the Late Cretaceous planktic foraminifera.

GLOSSARY OF MORPHOLOGICAL TERMS AND EXPRESSIONS

- Adult stage:** growth stage in foraminiferal test that follows the juvenile stage.
- Aperture/apertures:** test opening or openings.
- Axial elongation:** chamber elongation along the dorso-ventral direction that occurs especially in the globular-chambered taxa in the late adult and gerontic stages. Synonym: dorso-ventral elongation.
- Axis of growth:** virtual straight or coiled line defined by the general direction of chamber addition in a foraminiferal test.
- Band with low pore density and smaller pore size:** peripheral structure with a more solid appearance, which is given by the low pore density and smaller pore size, when compared to the adjacent chamber wall on both test sides.
- Biaperturate chamber:** chamber with two apertures that occurs in the serial taxa with multichamber growth in the adult stage and planispiral tests that evolved opposing chambers.
- Biconvex:** term that describes a certain test shape as seen in edge view especially in trochospiral tests, in which the spiral and umbilical sides are convex.
- Biserial:** chamber arrangement in the serial foraminiferal taxa in which the chambers are alternately added with respect to the test growth axis.
- Biumbilicate:** descriptive term applied to the planispiral and some trochospiral tests with two umbilici, one on each side.
- Bulbous distal projection:** quasi-spherical termination of the radially elongate chambers in some planispiral and trochospiral taxa (e.g., *Asymetria*).
- Central suture:** suture situated in the central portion of the biserial test and along the growth axis as seen in lateral view; it was referred sometimes in the past as 'zigzag suture.'
- Chamber:** one component of the foraminiferal test, which is added during one growth step; tests in which more than one chamber is added at time are also known.
- Chamber backward extension:** single or double extension of the last-formed chambers that occurs in some biserial taxa; the extensions are peripheral when are single and on the two lateral sides of the test when double.
- Chamberlet:** smaller chamber from the adult stage with chamber proliferation in some biserial foraminifera.
- Clavate:** term that describes a slightly radially elongate chamber without a tapering distal end or one bulbous distal projection.
- Convex-concave:** term used to describe one test shape in trochospiral tests in which the spiral side is convex and the umbilical one concave.
- Costa, costae:** general term that refers to more or less elongate ornamentation elements that occur over the test surface.
- Costellae:** elongate ornamentation structures that occur in some trochospiral taxa (e.g., *Costellagerina pilula*).
- Detached flanges:** periapertural structures that are connected to the previous chamber only at the distal end (e.g., *Lunatriella spinifera*).
- Dorsal side:** a less used synonym for 'spiral side.'
- Dorso-ventral elongation:** a synonym for 'axial elongation.'

- Doubled aperture:** kind of aperture that occurs occasionally in the last-formed chambers of some planispiral taxa; the doubled apertures are symmetrically arranged with respect to the plane of symmetry (e.g., *Globigerinelloides asperum*).
- Doubled chambers:** smaller chambers added in the gerontic stages of some planispiral taxa; the doubled chambers are symmetrically arranged with respect to the test plane of symmetry (e.g., *Globigerinelloides asperum*).
- Early planispiral coil:** growth stage in some serial taxa in which the proloculus is followed by one incomplete or complete whorl (e.g., *Paraspiroplecta clarae*).
- Edge view:** view of a foraminiferal test in which the thickness/height can be observed; usually the edge view presents a good view of the aperture.
- Equatorial aperture:** case of peripheral aperture that stretches the periphery and is symmetrically developed with respect to it.
- Extraumbilical-umbilical aperture:** aperture from the umbilical region to outside the umbilicus and most of it is situated outside the umbilical region.
- Flange:** general term for the symmetrical or asymmetrical periapertural structures in the shape of lamellar calcareous plates in biserial foraminifera.
- Flap:** kind of periapertural structure, which has a triangular shape and is mostly imperforate.
- Gerontic stage:** final growth stage of the test, which follows the adult stage and often displays aberrant growth.
- Globular:** descriptive term applied to the chambers which are almost equally developed in all the directions of space.
- Honeycomb-like ornamentation pattern:** kind of ornamentation in which ridges of almost equal height are arranged forming a honeycomb-like pattern (e.g., *Favusella washitensis*).
- Imperforate peripheral band:** structure characterized by the lack of pores that occurs at the periphery of some planispiral and trochospiral tests.
- Incipiently simple-ridged wall:** test wall with relatively large and closely-spaced pores; the space between the pores does not form a regular network (e.g., *Clavihedbergella amabilis*).
- Juvenile stage:** earlier portion of the test.
- Keel:** ornamentation structure consisting of fused pustules and rugosities that lines the peripheral region of some foraminiferal tests.
- Lateral view:** view of the serial foraminiferal test from above and perpendicular to the central suture and from above and perpendicular to the umbilicus in the planispiral tests; the edge view is sometimes referred to as 'lateral view.'
- Lax-uniserial:** kind of chamber arrangement in which the biserial one is altered resembling the uniserial arrangement (e.g., *Lunatriella spinifera*).
- Lip:** thin, delicate and imperforate periapertural structure; it is rarely preserved.
- Main aperture:** the largest of the apertures of the test, which corresponds to the aperture of the last-formed chamber; in rare cases the main aperture is doubled (e.g., *Globigerinelloides asperum*).
- Meridional ornamentation pattern:** pattern of distribution over the chamber surface in which the ornamentation elements are situated on meridian-like alignments between the test periphery and suture with the previous chamber (e.g., *Rugoglobigerina rugosa*).
- Multichamber growth:** kind of growth that occurs in the adult stage of some serial foraminifera in which more than one chamber are added in one growth step (e.g., *Ventilabrella*).

- Multiplane growth:** kind of growth in serial taxa in which the chambers of the adult stage are added in a multitude of planes that are different from the early stage plane of biseriality (e.g., *Racemiguembelina*).
- Ontogeny:** development of an organism during its life time.
- Ornamentation:** totality of the calcareous structures developed over the chamber surface.
- Parallel to the periphery ornamentation pattern:** pattern of distribution over chamber surface in which the ornamentation elements are situated on alignments parallel to the test periphery (e.g., *Rugotruncana circumnodifer*).
- Perforate calcareous plate:** calcareous structure developed in the central portion of the test on both sides in some biserial tests (e.g., *Heterohelix semicostata*).
- Periapertural structures:** calcareous structures that border the aperture.
- Peripheral aperture:** aperture situated in peripheral position or close to it.
- Periphery:** marginal portion of the test.
- Periumbilical ridge:** calcareous elongate structure with a regular or irregular appearance, consisting of fused pustules and rugosities and developed around the umbilicus.
- Petaloid:** descriptive term used in the description of the chamber shape; petaloid chambers are more or less circular and with the anterior margin curvature in the direction of coiling.
- Pinched periphery:** kind of peripheral morphology that occurs in the tests with tubulospines (e.g., *Hastigerinoides*).
- Plane of biseriality:** the plane in which chambers are alternately added with respect to the test growth axis; occurs in serial taxa with biserial stage and corresponds to the plane of symmetry.
- Plane of coiling:** general term used especially in planispiral foraminifera, which is a synonym of the plane of symmetry.
- Planispiral:** coiling mode characterized by chambers added in a coil situated in one plane (e.g., *Globigerinelloides*).
- Plano-convex:** term that describes a certain test shape as seen in edge view in trochospiral tests, with the spiral side flat or nearly flat and strongly convex umbilical side (e.g., *Concavatotruncana concavata*).
- Pore:** perforation in the wall through which pseudopodia can be extruded to the exterior of the test.
- Pore mound:** ornamentation element in the shape of a truncated cone; in general have a diameter at the base of less than 0.005 mm.
- Porosity:** the totality of the pores of a foraminiferal test and their characteristics.
- Porticus:** kind of periapertural structure with triangular elongate shape that can be perforate or imperforate and is often attached to the previous chambers across the umbilicus.
- Progressive chamber:** first chamber of the adult portion of the test with multichamber growth stage, which occurs in some biserial foraminifera.
- Proloculus:** first chamber of the test.
- Pustule:** element of ornamentation with a small size (in general <0.005 mm) and a dome-like or irregular shape.
- Pustulose periapertural area:** area ornamented with small-sized pustules that occurs in the biserial planktics, in the anterior portion of the adult stage chambers.
- Relict apertures:** portions of the apertures of the previously formed chambers that occur in the umbilical region.

- Relict periapertural structures:** portions of the periapertural structures of the chambers formed before the last added one, which occur in the umbilical region.
- Reticulately-ridged test wall:** kind of test wall characterized by the development of inflated zones with vermicular appearance (e.g., *Ticinella primula*).
- Ridge:** angular to subrounded structure at the test surface that borders on one side the aperture in some asymmetrical serial tests (e.g., *Heterohelix washitensis*).
- Rim:** elongate calcareous structure with a circular to rectangular cross-section, which can border occasionally the periapertural flanges in serial taxa and periapertural structures in planispiral and trochospiral taxa.
- Rugosity:** element of ornamentation consisting of one or few fused pustules; most of the rugosities in the Late Cretaceous planktic foraminifera have a slightly elongate shape.
- Serial:** general term applied to the triserial and biserial tests; the occurrence of one biserial stage in the test architecture is sufficient to refer to a test as 'serial.'
- Set of chamberlets:** term referring to one group of chamberlets added in one growth step in the adult stage with multichamber growth of the serial planktic foraminifera.
- Simple wall:** test wall with solid appearance and pores situated at distances much longer than their diameters.
- Simple-ridged wall:** test wall with closely-spaced pores separated by a relatively regular network of ridges; it is the only type of test wall in which the pore surface is almost equal or wider when compared to the solid portion of the wall (e.g., *Hedbergella hillsi*).
- Smooth chambers:** chamber surface without ornamentation (e.g., *Heterohelix washitensis*).
- Spherical:** descriptive term applied to the chambers with a distinct spherical shape; can be considered in part a synonym of 'globular' (e.g., *Globigerinelloides globulosum*).
- Spine:** ornamentation structure in the shape of a narrow cone.
- Spiral keel:** peripheral keel situated towards the spiral (dorsal) side.
- Spiral side:** side of the trochospiral tests on which all the chambers and whorls can be seen; notably, the earliest chambers and whorls cannot be seen in some tests as the result of the successive addition of layers of calcite during the ontogenetic development. Synonym: dorsal side.
- Stellate outline:** descriptive term applied to the tests with strongly radially elongate chambers (e.g., *Hastigerinoides alexanderi*).
- Subglobular:** descriptive term applied to the chambers with globose aspect but more or less elongate in one or more directions of space.
- Subrectangular:** descriptive term used in the description of the chamber rectangular shape; the sides can be straight or curved and the corners angular to rounded.
- Subtrapezoidal:** descriptive term used in the description of the chamber trapezoidal shape; the sides can be straight or curved and the corners angular to rounded.
- Subtriangular:** descriptive term used in the description of the chamber triangular shape; the three sides can be straight or curved and the corners angular to rounded.
- Supplementary apertures:** additional apertures, which occur on the umbilical side, and are different from the main aperture.
- Sutural aperture:** term referring to the supplementary apertures situated along the sutures on the umbilical side of some trochospiral taxa (e.g., *Rotalipora cushmani*).
- Sutural ridge:** calcareous elongate structure consisting of fused pustules and rugosities that is developed over one suture of the test.
- Suture:** junction line between any two chambers that are in contact.

- Tegillum:** kind of periapertural structure that can be perforate or imperforate, relatively wide and is often attached to the previous chambers and previous periapertural structures; successive such structures can cover completely the umbilical region, creating the impression of one 'calcareous plate.'
- Test wall:** calcitic structure with hyaline appearance that form a planktic foraminiferal test; all the planktic foraminiferal tests are perforate.
- Test wall flexure:** gentle curvature of the test wall in the peripheral region of some biserial taxa (e.g., *Heterohelix carinata*).
- Transverse ridges:** ornamentation elements that connect the ridges from the two test sides across the periphery in the tests with serial chamber arrangement (e.g., *Gublerina cuvillieri*).
- Transversal elongation:** chamber elongation that occurs in certain serial taxa in which there is a significant width increase especially in the adult stage (e.g., *Heterohelix nuttalli*); chambers with such a feature were frequently described in the past as 'deeper than wide.'
- Triserial:** basic test architecture in which the chambers are regularly added in a trochospiral coil at angles of 120° resulting in three series, which start at the proloculus and diverge in the direction of growth (e.g., *Guembelitra*).
- Trochospiral:** coiling mode characterized by chambers added following a three dimensional coil of variable height (e.g., *Hedbergella*).
- Truncation:** test wall folding in the peripheral region or, more rarely around the umbilical region.
- Tubulospine:** hollow radial extension of the last-formed chambers in some planispiral and trochospiral tests that confer the tests a stellate outline (e.g., *Schackoia*).
- Umbilical aperture:** aperture situated entirely in the umbilical region.
- Umbilical-extraumbilical aperture:** aperture from the umbilical region to outside the umbilicus, but most of it is situated in the umbilical region.
- Umbilical keel:** peripheral keel situated towards the umbilical (ventral) side.
- Umbilical-peripheral:** aperture stretching from the umbilical region to the periphery.
- Umbilical side:** side of the trochospiral tests on which the umbilicus is situated. Synonym: ventral side.
- Umbilicus:** depressed region in the central portion of the lateral sides in planispiral tests and on the umbilical (ventral) side of the tests with trochospiral coil.
- Ventral side:** a less used synonym for 'umbilical side.'
- Wall:** see 'Test wall.'

Chapter 3

GENUS DESCRIPTIONS AND IDENTIFICATION

Genera are immediately supraspecific units and they play a major role in the current micropaleontological applied studies. By identifying a genus specialists usually recognize major kinds of test architecture and focus the search for identification at species level. The development of the evolutionary classification is an ongoing process that revealed in the fossil record a vast number of species with intermediate morphological features between the known genera, therefore often making the definition of generic units separated by sharp boundaries impossible.

A practical and easy-to-use classification based on a small number of genera was attempted for this handbook having in mind that the most important level of classification in practical studies is that of species. Therefore, it is recommended that a generic assignment of one or more tests to be followed by a specific identification in order to achieve a higher accuracy.

The practical classification framework proposed in this handbook does not include the achievements in the study of iterative evolution. As a result one specialist should not expect in the practical classification the same level of accuracy achieved at the lineage definition in the evolutionary classification. The parallel development of the distinct practical and evolutionary classification reveals the existence of a directly proportional relationship between the number of genera or lineages respectively and the level of accuracy achieved in the classification at this taxonomic level.

Four practical keys that can be used in genus identification are given at the end of this chapter. They are provided in narrative and graphic forms and the recommendation is that the two should be considered complementary.

3.1. DESCRIPTIONS OF GENERA

Guembelitra Cushman 1933

Original report. *Gümbelitra* Cushman 1933, p. 37.

Original work. Cushman, J.A., 1933. Some new foraminiferal genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 9, 32-38.

Age. Aptian-Maastrichtian, Paleogene.

Description. Test consists of the proloculus followed by chambers trochospirally at angles of 120° added resulting in a triserial arrangement. The chambers are globular, separated by depressed sutures and present a gradual size increase. Aperture has the shape of an arch and is situated at the base of the last-formed chamber, in umbilical position. Chamber surface is smooth or ornamented with scattered pore mounds. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *G. cenomana*, *G. harrisi* and *G. cretacea*.

Heterohelix Ehrenberg 1841

Original report. *Heterohelix* Ehrenberg 1841, p. 429.

Original work. Ehrenberg, C.G., 1841. Verbreitung und Einfluss des mikroskopischen Lebens in Süd- und Nord- Amerika. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin*, 1841, 291-445. [published in 1843]

Age. Late Albian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis throughout the ontogeny; multichamber growth can occur occasionally in the adult stage. Test growth axis is straight or twisted. Chambers are globular to laterally compressed, overlap at various rates and present a gradual size increase. Aperture is simple, has the shape of an arch and is situated at the base of the last-formed chamber. Periapertural structures are mostly symmetrical, more rarely asymmetrical and consist of flanges or rims. Chamber surface is smooth or ornamented with costae, pore mounds and irregular ornamentation structures. Wall is calcitic, hyaline and perforate.

Remarks. *Heterohelix* is a temporary name used by Ehrenberg (1841) and *Spiroplecta* was proposed by Ehrenberg (1844) for the same tests. Cushman (1927) considered *Heterohelix* the valid genus, whereas Georgescu (2013) opted for *Spiroplecta*, following the idea of Ehrenberg (1841, 1844). *Heterohelix* is herein used because it was accepted and used for several decades and the continuation of its usage is more convenient from a practical perspective.

Additional citations.

Cushman, J.A., 1927. An outline of a re-classification of the Foraminifera. *Contributions from the Cushman Foundation for Foraminiferal Research*, 3, 1-105.

Ehrenberg, C.G., 1844. Eine Mittheilung über 2 neue Lager von Gebirgsmassen aus Infusorien als Meeres-Absatz in Nord-Amerika und eine Vergleichung derselben mit den organischen Kreide-Gebilden in Europa und Afrika. *Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preussischen Akademie der Wissenschaften zu Berlin*, 1844, 57-98.

Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49.

Species included (in stratigraphical order): *H. washitensis*, *H. obscura*, *H. moremani*, *H. postmoremani*, *H. mihaii*, *H. paraglobulosa*, *H. fayose*, *H. directa*, *H. reussi*, *H. planata*, *H. steinecki*, *H. papula*, *H. plummerae*, *H. striata*, *H. sphenoides*, *H. incipiens*, *H. initialis*, *H. stenopos*, *H. euryconus*, *H. magellani*, *H. hendersoni*, *H. carinata*, *H. pacificus*, *H. globocarinata*, *H. pseudotessera*, *H. nuttalli*, *H. sphaeralis*, *H. punctulata*, *H. rajagopalani*, *H. semicostata*, *H. brauni*, *H. elegans*, *H. prima*, *H. glabrans*.

***Lunatriella* Eicher and Worstell 1970**

Original report. *Lunatriella* Eicher and Worstell 1970, p. 117.

Original work. Eicher, D.L., Worstell, P., 1970. *Lunatriella*, a Cretaceous heterohelicid foraminifer from the western interior of the United States. *Micropaleontology*, 16, 117-121.

Age. Latest Cenomanian-early Turonian.

Description. Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement; the adult stage can present a loosely biserial and then a lax-uniserial arrangement. Chambers are laterally compressed, overlap at various rates and present a gradual size increase. The last-formed chambers present one peripheral backward extension. Aperture is simple, has the shape of an arch and is situated at the base of the last-formed chamber; periapertural structures consist of symmetrical flanges that can be simple or detached. Chamber surface is smooth. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *L. digitata*, *L. spinifera*.

***Spiroplecta* Ehrenberg 1844**

Original report. *Spiroplecta* Ehrenberg 1844, p. 75.

Original work. Ehrenberg, C.G., 1844. Eine Mittheilung über 2 neue Lager von Gebirgsmassen aus Infusorien als Meeres-Absatz in Nord-Amerika und eine Vergleichung derselben mit den organischen Kreide-Gebilden in Europa und Afrika. *Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preussischen Akademie der Wissenschaften zu Berlin*, 1844, 57-98.

Age. Late Santonian.

Description. Test consists of the proloculus followed by a juvenile stage with chambers added in a planispiral coil and the adult in which the successive chambers are alternately added with respect to the test growth axis resulting in a biserial arrangement; proloculus is eccentric, adjacent to the periphery. Chambers are subglobular and the last-formed ones present one lateral projection. Sutures are distinct and depressed throughout. Test is symmetrical and compressed in edge view. Aperture has the shape of an arch, is situated at the base of the last-formed chamber and is bordered by two symmetrically developed

rimmed flanges. Chamber surface is ornamented with longitudinal discontinuous costae. Wall is calcitic, hyaline and perforate.

Species included: *S. americana*.

***Pseudoguembelina* Brönnimann and Brown 1953**

Original report. *Pseudoguembelina* Brönnimann and Brown 1953, p. 150.

Original work. Brönnimann, P., Brown, N.K. Jr., 1953. Observations on some planktonic Heterohelicidae from the Upper Cretaceous of Cuba. *Contributions from the Cushman Foundation for Foraminiferal Research*, 4, 150-156.

Age. Turonian-Maastrichtian.

Description. Test consists of the proloculus followed by the chambers alternately with respect to the test growth axis resulting in a biserial arrangement. Chambers are subrectangular to reniform and the last-formed ones with two symmetrical backward projections, one on each side of the test; supplementary apertures can occur at the posterior end of the backward projections. Sutures are distinct and depressed throughout or lined with sutural ridges. Test is symmetrical and compressed in edge view. Aperture has the shape of an arch, is situated at the base of the last-formed chamber and is bordered by two symmetrically developed flanges that can be rimmed or not. Chamber surface is smooth to costate. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *P. praehuberi*, *P. huberi*, *P. leptobimodalis*, *P. praecostulata*, *P. costulata*, *P. costellifera*, *P. excolata*, *P. kempensis*, *P. palpebra*, *P. shatskyensis*.

***Paraspiroplecta* Georgescu and Abramovich 2008**

Original report. *Paraspiroplecta* Georgescu and Abramovich 2008, 108.

Original work. Georgescu, M.D., Abramovich, S., 2008. Taxonomic revision and phylogenetic classification of the Late Cretaceous (Upper Santonian-Maastrichtian) serial planktonic foraminifera (Family Heterohelicidae Cushman, 1927) with peripheral test wall flexure. *Revista Española de Micropaleontología*, 40, 97-114.

Age. Late Santonian-Maastrichtian.

Description. Test consists of the proloculus followed a juvenile planispiral stage with the chambers added to form a complete whorl and the adult stage with chamber added alternately with respect to the test growth axis resulting in a biserial arrangement. Chambers are globular, spherical or laterally compressed. Sutures are distinct and depressed. Test is symmetrical in edge view and often with compressed early stage; periphery is simple, without peripheral structures. Aperture has the shape of an arch, is situated at the base of the last-formed chambers and is bordered by symmetrical flanges

that can be rimmed or not. Chamber surface is ornamented with longitudinal costae. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *P. clarae*, *P. navarroensis*, *P. lazarusi*, *P. harti*.

***Pseudoplanoglobulina* Aliyulla 1977**

Original report. *Pseudoplanoglobulina* Aliyulla 1977, p. 204.

Original work. Aliyulla, K., 1977. *Upper Cretaceous and foraminiferal development in the Lesser Caucasus (Azerbaijan)*. Akademiya Nauk Azerbajjanskoy SSR, Institut Geologii im Akad. I. M. Gubkina, Elm-Baku, 232 pp. [in Russian]

Age. Turonian-Campanian.

Description. Test consists of the proloculus followed by the juvenile stage with the chambers alternately added with respect to the test growth axis resulting is a biserial arrangement and the adult stage with multichamber growth; the adult stage begins with the progressive biaperturate chamber, which is followed by one or more rarely two sets of chamberlets. Chambers are subglobular and then subrectangular to reniform and present a gradual size increase. Sutures are distinct and depressed throughout. Test is symmetrical in edge view, with a simple and rounded periphery. Aperture is single in the juvenile stage with biserial arrangement and multiple in the adult stage with multichamber growth; periapertural structures consist of symmetrically developed flanges. Chamber surface is smooth or ornamented with pore mounds. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *P. nakhitschevanica*, *P. reniformis*.

***Sigalia* Reiss 1957**

Original report. *Sigalia* Reiss 1957, p. 243.

Original work. Reiss, Z. 1957. Notes on foraminifera from Israel: *Sigalia* - a new genus of foraminifera. *Bulletin of the Research Council of Israel*, 6b, 239-244.

Age. Late Santonian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers added alternately with respect to the test growth axis resulting in a biserial appearance, which can be followed by an adult one with multichamber growth; the multichamber growth stage consists of the progressive biaperturate chamber followed by up to ten sets of chamberlets. Chamber shape is subrectangular to petaloid. Sutures are lined with ridges Test is compressed in edge view and with the periphery with transverse ridges. Aperture is single in the biserial stage and multiple in the stage with multichamber growth. Chamber surface is smooth or ornamented with longitudinal costae. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *S. carpatica*, *S. decoratissima*, *S. deflaensis*, *S. proliferans*, *S. lipsonae*.

***Ventilabrella* Cushman 1928**

Original report. *Ventilabrella* Cushman 1928, p. 2.

Original work. Cushman, J.A., 1928. Additional genera of foraminifera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 4, 1-10.

Age. Late Coniacian-Maastrichtian.

Description. Test consists of the proloculus followed by a juvenile stage with chambers alternately added with respect to the test growth axis resulting in a biserial arrangement and an adult one with multichamber growth; the adult stage begins with the biaperturate progressive chamber and is followed by up to six eleven of chamberlets. Chambers are globular to subglobular. Sutures are distinct and depressed throughout or indistinct especially over the earlier portion of the test due to the additions of successive layers of calcite during the ontogeny. Test is symmetrical in edge view, with a rounded periphery. Aperture is simple in the juvenile biserial stage and multiple in the adult stage with multichamber growth. Chamber surface is ornamented with fine to strong longitudinal costae, vermicular or irregular structures; multiple ornamentation patterns can be developed in certain species. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *V. austinana*, *V. eggeri*, *V. alpina*, *V. glabrata*, *V. acervulinoides*, *V. riograndensis*, *V. meyerhoffi*, *V. multicamerata*, *V. hariaensis*.

***Gublerina* Kikoïne 1948**

Original report. *Gublerina* Kikoïne 1948, p. 26.

Original work. Kikoïne, J., 1948. Les Heterohelicidae du Crétacé supérieur pyrénéen. *Bulletin de la Société Géologique de France*, 18, 15-35.

Age. Late Campanian-Maastrichtian.

Description. Proloculus is followed by the juvenile stage in which the chambers are alternately added with respect to the test growth axis resulting in a biserial arrangement and the adult stage with multichamber growth. The two rows of chambers of the early stage are divergent, leaving a distinct V-shaped central area at the center of the test; the adult stage begins with the biaperturate progressive chamber and is followed by up to three sets of chamberlets. Chambers of the early stage are subrectangular to reniform and those of the adult stage with multichamber growth mostly petaloid. Sutures are distinct and depressed or covered on the earlier portion of the test by the successive layers of calcite added during the ontogeny. Test is symmetrical in edge view, with a rounded periphery, which can be simple or with transverse ridges. Aperture is simple in the juvenile biserial stage and multiple in the adult stage with multichamber growth. Chamber surface is smooth or ornamented with costae, a reticulate pattern or irregular structures; multiple ornamentation patterns occur on the same test. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *G. acuta*, *G. robusta*, *G. cuvillieri*.

***Racemiguembelina* Montanaro Gallitelli 1957**

Original report. *Racemiguembelina* Montanaro Gallitelli 1957, p. 142.

Original work. Montanaro Gallitelli, E., 1957. A revision of the foraminiferal family Heterohelicidae. In: *Studies in foraminifera* (Loeblich, A.R. Jr., Ed.). Washington, D.C.: *United States National Museum History Bulletin*, 215, 133-154.

Age. Late Campanian-Maastrichtian.

Description. Test consists of the proloculus followed by a juvenile stage with chambers alternately added with respect to the test growth axis resulting in a biserial arrangement and the adult staged with multiplane chamber proliferation; the adult stage begins with the sets of chamberlets and lacks a progressive chamber. Chambers are globular to subglobular in shape. Sutures are distinct and depressed throughout. Aperture is simple in the juvenile stage and multiple in the adult stage. Periapertural structures consist of imperforate ridges across the central cavity of the cone-like test. Chamber surface is ornamented with longitudinal costae. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *R. intermedia*, *R. fructicosa*, *R. varians*.

***Globigerinelloides* Cushman and ten Dam 1948**

Original report. *Globigerinelloides* Cushman and ten Dam 1948, p. 42.

Original work. Cushman, J.A., ten Dam, A., 1948. *Globigerinelloides*, a new genus of the Globigerinidae. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 24, 42-43.

Age. Barremian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers added in a planispiral coil; chambers are subglobular, globular, spherical, laterally compressed and rarely with a weak radial elongation; the final chambers can be occasionally replaced by two chamberlets, which are symmetrically arranged with respect to the coiling plane. Sutures are distinct, depressed and radial. Test is symmetrical in edge view and with a broadly rounded to angular periphery; periphery can have an imperforate peripheral band and a weak keel. Aperture has the shape of an arch and is situated at the base of the last-formed chamber; two smaller apertures symmetrically arranged with respect to the coiling plane occur occasionally. The aperture is bordered by an imperforate lip. Tests are symmetrically biumbilicate; relict apertures and periapertural structures occur in the umbilical regions. Chamber surface is smooth or ornamented with pustules or more rarely spines. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *G. bentonensis*, *G. pulchella*, *G. eaglefordensis*, *G. ehrenbergi*, *G. clavata*, *G. asperum*, *G. prairiehillensis*, *G. bollii*, *G. praevolutus*, *G. planispiralis*, *G. megathyra*, *G. globulosum*, *G. rosebudensis*, *G. impensus*, *G. subcarinata*, *G. compressa*.

Planomalina Loeblich and Tappan 1946

Original report. *Planomalina* Loeblich and Tappan 1946, p. 257.

Original work. Loeblich, A.R. Jr., Tappan, H., 1946. New Washita foraminifera. *Journal of Paleontology*, 20, 238-258.

Age. Late Albian.

Description. Test consists of the proloculus followed by chambers added successively in a planispiral coil and present a gradual size increase. Chambers have a trapezoidal to crescentic shape and arched in the direction of growth. Sutures are often lined with well-developed ridges and rarely depressed. Test is symmetrical in edge view and compressed, with a subangular, angular or double truncated periphery; one or two peripheral keels occur at the periphery. Test is symmetrically biumbilicate, with relict periapertural structures occurring in the umbilical regions. Umbilici are surrounded by well-developed periumbilical ridges or agglomerations of pustules. Chamber surface is smooth or with rare scattered pustules over the earlier chambers. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *P. praebuxtorfi*, *P. buxtorfi*, *P. banneri*, *P. bicarinata*.

Biticinella Sigal 1956

Original report. *Biticinella* Sigal 1956, p. 35.

Original work. Sigal, J. 1956. Notes micropaléontologiques nord-africaines. 4. *Biticinella breggiensis*, nouveau morphogénre. *Compte Rendu Sommaire des Séances de la Société Géologique de France*, 3-4, 35-37.

Age. Late Albian.

Description. Test is biumbilicate and consists of chambers added in an early very low trochospiral coil followed by an adult planispiral stage. Chambers are subglobular and with a distinct transversal elongation resulting in a reniform appearance in edge view. Sutures are depressed and radial throughout. Test is symmetrical to slightly asymmetrical in edge view, with a simple periphery, without peripheral structures. Aperture is a low to medium high arch at the base of the last-formed chamber and is bordered by an imperforate lip. Relict periapertural structures and supplementary apertures occur in the umbilical regions. Chamber surface is smooth. Wall is calcitic, hyaline, reticulately-ridged and perforate.

Species included: *B. breggiensis*.

Schackoina Thalmann 1932

Original report. *Hantkenina* (*Schackoina*) Thalmann 1932, p. 288.

Original work. Thalmann, H.E., 1932. Die Foraminiferen-Gattung *Hantkenina* Cushman, 1924, und ihre regional-stratigraphische Verbreitung. *Eclogae Geologicae Helvetiae*, 26, 287-292.

Age. Late Albian-Maastrichtian.

Description. Test consists of the proloculus followed by a very low trochospiral juvenile stage and the adult stage with planispiral coil. Earlier chambers are globular to subglobular and the last-formed ones radially elongate, flask-like to subtetrahedral and with one to three tubulospines on each chamber. Sutures are deeply incised resulting in a stellate outline. Test is symmetrical in edge view, with a pinched periphery. Aperture has the shape of an arch, is situated in peripheral position at the base of the last-formed chamber and is bordered by an imperforate lip. Relict periapertural structures occur in the symmetrical umbilici. Chamber surface is ornamented with scattered small-sized pustules. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *S. trituberculata*, *S. cenomana*, *S. bicornis*, *S. gandolfii*, *S. moliniensis*, *S. multispinata*, *S. tappanae*, *S. sellaeforma*.

***Hastigerinoides* Brönnimann 1952**

Original report. *Hastigerinella* (*Hastigerinoides*) Brönnimann 1952, p. 52.

Original work. Brönnimann, P., 1952. Globigerinidae of the Upper Cretaceous (Cenomanian-Maastrichtian) of Trinidad, B.W.I. *Bulletins of American Paleontology*, 34(140), 1-70.

Age. Santonian.

Description. Test consists of the proloculus followed by chambers added in a planispiral coil. Earlier chambers are globular to subglobular and the last-formed one to five strongly radially elongate, resembling tubulospines. Sutures are radial and deeply incised resulting in a stellate outline. Test is symmetrical and compressed in edge view, with a pinched periphery. Aperture has the shape of an arch, is situated in peripheral position at the base of the last-formed chamber and is bordered by an imperforate lip. Test is symmetrically biumbilicate; relict periapertural structures occur in the umbilical regions. Chamber surface is smooth or ornamented with scattered pustules, which are denser over the earlier chambers. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *H. atlanticus*, *H. alexanderi*.

***Leupoldina* Bolli 1957**

Original report. *Leupoldina* Bolli 1957, p. 275.

Original work. The foraminiferal genera *Schackoina* Thalmann, emended and *Leupoldina*, n. gen. in the Cretaceous of Trinidad B.W.I. *Eclogae Geologicae Helvetiae*, 50, 271-277.

Age. Aptian-Albian.

Description. Test consists of the proloculus followed by chambers added in a low trochospiral coil in the early stage and a planispiral one in the adult. Chambers are radially elongate and the last-formed ones present one distal bulbous projection. Test is compressed in edge view and with occasional chamber lateral tilting. Aperture has the shape of an arch, is situated in peripheral position at the base of the last-formed chamber and is bordered by an imperforate lip. Test is symmetrically biumbilicate and relict periapertural structures can occur in the umbilical region. Chamber surface is smooth. Wall is calcitic, hyaline, simple and perforate.

Species included: *L. pentagonalis*.

***Eohastigerinella* Morozova 1957**

Original report. *Eohastigerinella* Morozova 1957, p. 1112.

Original work. Morozova, V.G., 1957. Foraminiferal superfamily Globigerinidea, superfam. nov., and some of its representatives. *Doklady Akademii Nauk SSSR*, 114, 1109-1112. [in Russian]

Age. Late Santonian.

Description. Test consists of the proloculus, which is followed by chambers added in a planispiral coil; occasional specimens with low trochospiral coil in the adult stage are also known. Earlier chambers are globular and the last-formed one or two strongly radially elongate and with one distal bulbous projection. Sutures are radial and deeply incised resulting in a stellate outline. Test is symmetrical in edge view, compressed and with a rounded periphery. Aperture has the shape of a peripheral arch at the base of the last-formed chamber and is bordered by an imperforate lip. Test is symmetrically biumbilicate and with relict periapertural in the umbilici. Chamber surface is smooth, with rare scattered pustules concentrated especially over the earlier chambers. Wall is calcitic, hyaline, incipiently simple-ridged and perforate.

Species included: *E. watersi*.

***Hedbergella* Brönnimann and Brown 1958**

Original report. *Hedbergina* Brönnimann and Brown 1956, p. 529.

Original work. Brönnimann, P., Brown, N.K. Jr., 1956. Taxonomy of Globotruncanidae. *Eclogae Geologicae Helvetiae*, 48, 503-561.

Age. Valanginian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Chambers are subglobular, globular, spherical and more rarely dorsal compressed or with axial elongation. Sutures are depressed and radial on both test sides. Periphery is simple, without peripheral structures or with one imperforate band on the early or all the chambers of the final whorl. Aperture has the shape of an arch in umbilical-

extraumbilical to extraumbilical-peripheral position and is bordered by an imperforate lip; relict periapertural structures occur in the umbilical region. Chamber surface is smooth or ornamented with scattered pustules that can fuse occasionally; ornamentation is more prominent over the earlier chambers. Wall is calcitic, hyaline and perforate.

Remarks. The name was changed from *Hedbergina* to *Hedbergella* by Brönnimann and Brown (1958, p. 16).

Additional citation.

Brönnimann, P., Brown, N.K. Jr., 1958. *Hedbergella*, a new name for a Cretaceous planktonic foraminiferal genus. *Journal of the Washington Academy of Science*, 48, 15-17.

Species included (in stratigraphical order): *H. delrioensis*, *H. yezoana*, *H. planispira*, *H. portsdownensis*, *H. hillsi*, *H. hoelzli*, *H. crassa*, *H. electrae*, *H. flandrini*, *H. globulosa*, *H. falklandica*, *H. holmdelensis*, *H. oligosticta*.

***Whiteinella* Pessagno 1967**

Original report. *Whiteinella* Pessagno 1967, p. 298.

Original work. Pessagno, E.A. Jr., 1967. Upper Cretaceous planktonic foraminifera from the Western Gulf coastal plain. *Palaeontographica Americana*, 5(37), 243-445.

Age. Cenomanian-early Campanian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Chambers are subglobular to globular and rarely present an axial elongation. Sutures are depressed and radial on both test sides. Periphery is broadly rounded and simple, without peripheral structures. Aperture has the shape of an arch, is situated in umbilical-extraumbilical position and is bordered by a lip or a flap; relict periapertural structures occur in the umbilical region. Chamber surface is ornamented with scattered dome-like pustules that can fuse to form rugosities and costellae; in general there is no preferential orientation of the ornamentation, but a meridional pattern can occur on some chambers and especially on the spiral side. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *W. baltica*, *W. aprica*, *W. paradubia*, *W. loetterlei*, *W. kingi*.

***Favusella* Michael 1972**

Original report. *Favusella* Michael 1972, p. 212.

Original work. Michael, F.Y., 1972. Planktonic foraminifera from the Comanchean Series (Cretaceous) of Texas. *Journal of Foraminiferal Research*, 2, 200-220. [published in 1973]

Age. Late Albian-middle Cenomanian.

Description. Test consists of the proloculus followed by chambers added in a coil of variable height. Chambers are globular to spherical, overlap at various rates and present a gradual size increase. Sutures are distinct and depressed throughout. Periphery is broadly rounded and simple, without peripheral structures. Aperture has the shape of an arch in umbilical-extraumbilical position, occasionally reaching the periphery and is bordered by an imperforate lip. Chamber surface is ornamented with a network or ridges forming a honeycomb-like pattern, with the pores situated at the interior of the polygons. Wall is calcitic, simple and perforate.

Species included: *F. washitensis*.

***Clavihedbergella* Banner and Blow 1959**

Original report. *Praeglobotruncana (Clavihedbergella)* Banner and Blow 1959, p. 18.

Original work. Banner, B.T., Blow, W.H., 1959. The classification and stratigraphical distribution of the Globigerinaceae. *Palaeontology*, 2, 1-27.

Age. Late Albian-Santonian.

Description. Test consists of the proloculus followed by chambers added in a low to medium high trochospiral coil. Chambers are globular to subglobular and the last-formed one to three radially elongate, subcylindrical to clavate in shape. Sutures are radial and depressed, deeply incised between the elongate chambers resulting in a stellate outline. Periphery is rounded to broadly rounded and often with an imperforate peripheral band or a band of low pore density and smaller pore size on the earlier chambers of the final whorl. Aperture has the shape of an arch situated in umbilical-peripheral position and is bordered by an imperforate lip; relict periapertural structures occur in the umbilical region. Chamber surface is smooth or ornamented with scattered pustules, which are more prominent over the earlier chambers. Wall is calcitic, simple and perforate.

Species included (in stratigraphical order): *C. subcretacea*, *C. simplicissima*, *C. amabilis*, *C. simplex*, *C. elongans*, *C. subdigitata*.

***Asymetria* Georgescu 2012**

Original report. *Asymetria* Georgescu 2012, p. 27.

Original work. Georgescu, M.D., 2012. Morphology, taxonomy, stratigraphic distribution and evolutionary classification of the schackoinid planktic foraminifera (late Albian-Maastrichtian, Cretaceous). In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 1-62.

Age. Late Albian-earliest Cenomanian.

Description. Test consists of the proloculus followed by chambers added in a low trochospire. Earlier chambers are globular, then reniform and the last-formed one to three radially elongate and with one distal bulbous projection. Sutures are radial and depressed and

those between the radially elongate chambers deeply incised resulting in a stellate outline. Periphery is rounded and simple, without peripheral structures. Aperture has the shape of an arch, is situated in extraumbilical-peripheral position and is bordered by a tunnel-shaped lip; relict periapertural structures occur in the umbilicus. Chamber ornamentation occurs only on the umbilical side and consists of scattered pustules concentrated around the umbilicus; spiral side is smooth. Wall is calcitic, hyaline, simple and perforate.

Species included: *A. asymetrica*.

***Pessagnoina* Georgescu 2009**

Original report. *Pessagnoina* Georgescu 2009, p. 280.

Original work. Georgescu, M.D., 2009. Upper Albian-lower Turonian non-schackoinid planktic foraminifera with elongate chambers: morphology reevaluation, taxonomy and evolutionary classification. *Revista Española de Micropaleontología*, 41, 255-293.

Age. Late Cenomanian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Chambers are globular to subglobular and the last-formed ones radially elongate and with one bulbous distal projection. Sutures are radial and depressed and those between those with radial elongation are deeply incised resulting in a stellate outline. Periphery is rounded and simple, without peripheral structures. Aperture has the shape of an arch in umbilical-peripheral position and is bordered by an imperforate lip; relict periapertural structures occur in the umbilical region. Chamber surface is smooth, but rare scattered pustules occur occasionally. Wall is calcitic, hyaline, incipiently simple-ridged and perforate.

Species included: *P. moremani*.

***Ticinella* Reichel 1950**

Original report. *Globotruncana* (*Ticinella*) Reichel 1950, p. 600.

Original work. Reichel, M., 1950. Observations sur les *Globotruncana* du gisement de la Breggia (Tessin). *Eclogae Geologicae Helvetiae*, 42, 596-617.

Age. Albian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Chambers are globular and subglobular and in some species with an axial elongation or a slight elongation in the direction of coiling. Sutures are radial and depressed. Periphery is rounded to broadly rounded and simple, or with a band of low pore density and smaller pore size or prominent wall structures resulting in an incipient keel appearance. Aperture has the shape of an arch in umbilical-peripheral position and is bordered by an imperforate lip; supplementary apertures occur on the umbilical side and

are adjacent to the sutures between the last-formed chambers. Chamber surface is smooth. Wall is calcitic, hyaline, reticulately-ridged and perforate.

Species included (in stratigraphical order): *T. madecassiana*, *T. primula*, *T. praeticinensis*, *T. roberti*, *T. digitalis*.

***Archaeoglobigerina* Pessagno 1967**

Original report. *Archaeoglobigerina* Pessagno 1967, p. 315.

Original work. Pessagno, E.A. Jr., 1967. Upper Cretaceous planktonic foraminifera from the Western Gulf coastal plain. *Palaeontographica Americana*, 5(37), 243-445.

Age. Late Coniacian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Chambers are globular to subglobular and present a gradual size increase. Sutures are depressed and radial on both test sides. Periphery is rounded and simple or with one imperforate peripheral band bordered by two weak keels consisting of aligned pustules. Aperture has the shape of an arch, is situated in umbilical position and is bordered by a porticus or a tegillum. Chamber surface is ornamented with scattered dome-like pustules, which can fuse to form rugosities; ornamentation does not present a preferential ornamentation. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *A. blowi*, *A. globigerinoides*, *A. cretacea*, *A. australis*.

***Kuglerina* Brönnimann and Brown 1956**

Original report. *Kuglerina* Brönnimann and Brown 1956, p. 557.

Original work. Brönnimann, P., Brown, N.K. Jr., 1956. Taxonomy of Globotruncanidae. *Eclogae Geologicae Helveticae*, 48, 503-561.

Age. Late Campanian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Chambers are globular to subglobular and present a gradual size increase. Sutures are radial and depressed on both test sides. Periphery is broadly rounded and simple, without peripheral structures. Aperture has the shape of an arch, is situated in umbilical position and is bordered by a porticus or a tegillum. Chamber surface is ornamented with large-sized scattered pustules with dome-like or irregular shape that can fuse to form rugosities; in general the ornamentation elements do not display a preferential arrangement but a weakly-defined meridional pattern can be developed over certain chambers. Wall is calcitic, hyaline and perforate.

Species included: *K. rotundata*.

***Costellagerina* Petters, El-Nakhal and Cifelli 1983**

Original report. *Costellagerina* Petters, El-Nakhal and Cifelli 1983, p. 248.

Original work. Petters, S.W., El-Nakhal, H.A., Cifelli, R., 1983. *Costellagerina*, a new Late Cretaceous globigerine foraminiferal genus. *Journal of Foraminiferal Research*, 13, 247-251.

Age. Late Albian-early Campanian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Chambers are globular to subglobular and present a gradual size increase. Sutures are depressed and radial throughout. Periphery is rounded to broadly rounded and simple, without peripheral structures. Aperture has the shape of an arch, is situated in extraumbilical-umbilical position and is bordered by an imperforate lip; relict periapertural structures occur in the umbilical region. Chamber surface is ornamented with scattered pustules, rugosities and costellae, which present a meridional arrangement on both test sides or are parallel to the periphery on the spiral side. Wall is calcitic, hyaline, simple and perforate.

Species included (in stratigraphical order): *C. libyca*, *C. pettersi*, *C. pilula*.

***Rugoglobigerina* Brönnimann 1952**

Original report. *Rugoglobigerina* Brönnimann 1952, p. 16.

Original work. Brönnimann, P., 1952. Globigerinidae of the Upper Cretaceous (Cenomanian-Maestrichtian) of Trinidad, B.W.I. *Bulletins of American Paleontology*, 34(140), 1-70.

Age. Middle Campanian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Chambers are globular to subglobular, or with a weak radial elongation. Sutures are radial and depressed throughout. Periphery is rounded and without peripheral structures or with an imperforate peripheral band over the earlier chambers of the final whorl. Aperture has the shape of an arch, is situated in umbilical to extraumbilical-umbilical position and is bordered by tegillum. Chamber surface is ornamented with costellae, pustules and rugosities, which display a meridional arrangement on both test sides. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *R. rugosa*, *R. pennyi*, *R. texana*.

***Plummerita* Brönnimann 1952**

Original report. *Rugoglobigerina* (*Plummerella*) Brönnimann 1952, p. 37.

Original work. Brönnimann, P., 1952. Globigerinidae of the Upper Cretaceous (Cenomanian-Maestrichtian) of Trinidad, B.W.I. *Bulletins of American Paleontology*, 34(140), 1-70.

Age. Latest Maastrichtian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Chambers are globular to subglobular and present a gradual size increase; the

chambers of the final whorl present one or more rarely two tubulospines resulting in a stellate outline. Sutures are radial and depressed on both test sides. Aperture has the shape of an arch, is situated in umbilical position and is bordered by tegillum. Chamber surface is ornamented with pustules, rugosities and costellae, which present a meridional arrangement on both test sides. Wall is calcitic, hyaline and perforate.

Remarks. Brönnimann (1952, p. 146) changed the name from *Plummerella* to *Plummerita*.

Additional citation.

Brönnimann, P., 1952. *Plummerita* new name for *Plummerella* Brönnimann, 1952 (non *Plummerella* DeLong, 1942). *Contributions from the Cushman Foundation for Foraminiferal Research*, 3, 146.

Species included: *P. hantkeninoides*.

***Trinitella* Brönnimann 1952**

Original report. *Trinitella* Brönnimann 1952, p. 56.

Original work. Brönnimann, P., 1952. Globigerinidae of the Upper Cretaceous (Cenomanian-Maestrichtian) of Trinidad, B.W.I. *Bulletins of American Paleontology*, 34(140), 1-70.

Age. Maastrichtian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Earlier chambers are globular to subglobular and the last-formed ones with dorsal compression resulting in a nearly flat surface. Sutures are depressed and radial on both test sides. Periphery is rounded in the earlier portion of the test and subrounded to subangular in the last-formed chambers. Aperture has the shape of an arch, is situated in umbilical position and is bordered by a wide tegillum, which can be attached to the previous chambers across the umbilical region. Chamber surface is ornamented with pustules, rugosities and costellae and present a meridional arrangement on both test sides. Wall is calcitic, hyaline and perforate.

Species included: *T. scotti*.

***Praeglobotruncana* Bermúdez 1952**

Original report. *Praeglobotruncana* Bermúdez 1952, p. 52.

Original work. Bermúdez, P.J., 1952. Estudio sistemático de los foraminíferos rotaliformes. *Boletín de Geología, Venezuela*, 2, 1-230.

Age. Late Albian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Earlier chambers are globular to subglobular and the last-formed ones with a dorso-ventral compression. Sutures on the spiral side are depressed or lined with a weak ridge and those on the spiral side are radial and depressed. Periphery is angular to subangular

and with an imperforate peripheral band, agglomerations of pustules and one keel on the earlier or all the chambers of the final whorl. Aperture has the shape of an arch in umbilical-extraumbilical or extraumbilical-umbilical position and is bordered by a lip, flap or porticus. Chamber surface is ornamented with scattered pustules that occasionally fuse to form rugosities and costellae. The ornamentation elements do not present in general a preferential arrangement, but a meridional or parallel to the periphery pattern can occur. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *P. delrioensis*, *P. stephani*, *P. dicarinelliformis*, *P. inornata*, *P. aumalensis*, *P. turbinata*, *P. wilsoni*, *P. hilalensis*, *P. praeglobotruncaniformis*, *P. havanensis*, *P. subpetaloidea*, *P. pschadae*, *P. peripherospinata*.

***Bucherina* Brönnimann and Brown 1956**

Original report. *Bucherina* Brönnimann and Brown 1956, p. 557.

Original work. Brönnimann, P., Brown, N.K. Jr., 1956. Taxonomy of Globotruncanidae. *Eclogae Geologicae Helvetiae*, 48, 503-561.

Age. Late Cenomanian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers added in a low, nearly flat trochospiral coil. Earlier chambers are globular or subglobular and those of the last whorls are dorsally compressed on the spiral side and strongly inflated on the umbilical one. Sutures on the spiral side are depressed or lined with ridges; on the umbilical side the sutures are depressed and radial. Test shape in edge view is strongly asymmetrical, often plano-convex. Periphery is truncated to angular and with agglomerations of pustules to one well-developed keel. Aperture has the shape of an arch in umbilical to extraumbilical-umbilical position and is bordered by a flap or porticus. Chamber surface is ornamented with scattered pustules and rugosities that can fuse to form irregular ornamentation structures; ornamentation is more prominent over the earlier chambers. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *B. praehelvetica*, *B. helvetica*, *B. pettersi*, *B. gansseri*, *B. praesandidegi*, *B. sandidegi*.

***Rotalipora* Brotzen 1942**

Original report. *Rotalipora* Brotzen 1942, p. 32.

Original work. Brotzen, F., 1942. Die Foraminiferengattung *Gavelinella* nov.gen. und die Systematik des Rotaliiformis. *Sveriges Geologiska Undersökning*, 36, 1-60.

Age. Late Albian-Cenomanian.

Description. Test consists of the proloculus followed by chambers added in a trochospiral coil. Earlier chambers are globular to subglobular and those of the subsequent whorls

with a dorsal compression or dorso-ventrally compressed. Sutures are lined with ridges or depressed between the last-formed chambers and especially on the umbilical side. Test shape is high spiral to plano-convex. Periphery is truncated to angular and with one well-developed peripheral keel on the earlier or all the chambers of the final whorl. Aperture has the shape of an arch in umbilical-extraumbilical to extraumbilical-umbilical position and is bordered by an imperforate lip or flap; supplementary apertures occur within the umbilicus and/or in sutural position on the umbilical side. Chamber surface is mostly smooth; scattered pustules occur over the earlier chambers of the test. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *R. praebalernaensis*, *R. ticinensis*, *R. appenninica*, *R. brotzeni*, *R. micheli*, *R. globotruncanoides*, *R. greenhornensis*, *R. reicheli*, *R. cushmani*.

Anaticinella Eicher 1972

Original report. *Anaticinella* Eicher 1972.

Original work. Eicher, D.L., 1972. Phylogeny of the late Cenomanian planktonic foraminifer *Anaticinella multiloculata* (Morrow). *Journal of Foraminiferal Research*, 2, 184-190. [published in 1973]

Age. Late Cenomanian-early Turonian.

Description. Test consists of the proloculus, which is followed by chambers added in a trochospiral coil. Chambers are subglobular to globular and present a gradual size increase. Sutures are depressed and radial on both test sides. Periphery is rounded to broadly rounded and with a weak keel developed over the earlier chambers of the final whorl. Aperture has the shape of an arch, is situated in extraumbilical-umbilical position and is bordered by a porticus; supplementary apertures occur in the umbilical region. Chamber surface is ornamented with scattered pustules that occasionally fuse to form rugosities especially over the earlier chambers. Wall is calcitic, hyaline and perforate.

Species included: *A. multiloculata*.

Globotruncana Cushman 1927

Original report. *Globotruncana* Cushman 1927, p. 91.

Original work. Cushman, J.A., 1927. An outline of a re-classification of the Foraminifera. *Contributions from the Cushman Foundation for Foraminiferal Research*, 3, 1-105.

Age. Late Cenomanian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers added successively in a trochospiral coil. Earlier chambers are globular to subglobular and those of the final whorls with a distinct dorso-ventral or dorsal compression. Sutures between the earlier chambers are lined with ridges and are frequently depressed between the last-formed

chambers. Test shape is biconvex to plano-convex and presents a truncate to double truncate periphery. Peripheral structures consist of one imperforate peripheral band, which is bordered by two keels; the keels are frequently more prominent over the earlier chambers and the umbilical one can be weaker than the spiral keel. Aperture has the shape of an arch in umbilical-extraumbilical to extraumbilical-umbilical position and is bordered by a lip, a porticus or a tegillum; portici and tegilla are often attached to the previous chambers across the umbilical region. Periumbilical ridges can occur around the umbilical region and consist of agglomerations of pustules to well-developed, keel-like structures. Chambers surface is smooth or ornamented with scattered pustules, which are more prominent over the earlier chambers; pustules can fuse to form rugosities, which can present a preferential display, namely meridional or parallel to the periphery. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *G. algeriana*, *G. roddai*, *G. canaliculata*, *G. renzi*, *G. angusticarinata*, *G. linneiana*, *G. biconvexa*, *G. marginata*, *G. cachensis*, *G. arca*, *G. rosetta*, *G. crétacea*, *G. orientalis*, *G. pembergeri*, *G. ventricosa*, *G. rugosa*, *G. subcircumnodifer*, *G. mississippiica*, *G. aegyptiaca*, *G. intermedia*, *G. nothi*, *G. falsostuarti*, *G. mayaroensis*.

***Concavatotruncana* Korchagin 1982**

Original report. *Concavatotruncana* Korchagin 1982, p. 118.

Original work. Korchagin, V.I., 1982. Globotruncanid systematics. *Byulletin Moskovskogo Obshchestva Ispitateley Prirodi, otdel geologicheskoyi*, 57, 114-121. [in Russian]

Age. Late Turonian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers added in a very low, nearly flat trochospiral coil. Earlier chambers are globular to subglobular and those of the final whorls dorsally compressed and strongly inflated ventrally. Sutures on the spiral side are depressed or lined with ridges; on the umbilical side the sutures are radial and depressed. Test shape is plano-convex. Periphery is broadly rounded to truncated and with two closely-spaced and equally developed keels. Aperture has the shape of an arch in umbilical-extraumbilical position and is bordered by a flap or a porticus; well-developed portici can be attached to the previous chambers across the umbilical region. Periumbilical structures consist of agglomeration of pustules to keel-like structures. Chamber surface is smooth or ornamented with scattered pustules, which are more prominent over the earlier chambers. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *C. venezuelana*, *C. vridhachalensis*, *C. concavata*, *C. dentata*, *C. asymerica*, *C. subpennyi*, *C. gagnebini*, *C. wiedenmayeri*.

***Contusotruncana* Korchagin 1982**

Original report. *Contusotruncana* Korchagin 1982, p. 119.

Original work. Korchagin, V.I., 1982. Globotruncanid systematics. *Byulletin Moskovskogo Obschestva Ispitateley Prirodi, otdel geologicheskyyi*, 57, 114-121. [in Russian]
Age. Latest Turonian-Maastrichtian.

Description. Test consists of the proloculus followed by chambers added in a low to high trochospire. Earlier chambers are globular to subglobular and those of the final whorl dorso-ventrally compressed. Sutures are lined with ridges on both test sides, but can appear absent between the last-formed chambers of the final whorl due to the chamber overlapping. Test often presents a high spiral side, with undulated surface. Periphery is truncate or double-truncate with two well-developed keels; the umbilical keel can be shifted towards the umbilical side and is often weaker than the umbilical keel. Aperture has the shape of an arch, is situated in umbilical to umbilical-extraumbilical position and is bordered by an imperforate flap or porticus. Chamber surface is smooth or with scattered pustules, which are denser and more prominent over the earlier chambers. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *C. bouldinensis*, *C. plummerae*, *C. fornicata*, *C. ackermanni*, *C. walfischensis*, *C. contusa*, *C. orphanensis*, *C. alta*.

***Rugotruncana* Brönnimann and Brown 1956**

Original report. *Rugotruncana* Brönnimann and Brown 1956, p. 546.

Original work. Brönnimann, P., Brown, N.K. Jr., 1956. Taxonomy of Globotruncanidae. *Eclogae Geologicae Helvetiae*, 48, 503-561.

Age. Late Cenomanian-Maastrichtian.

Description. Test consists of the proloculus followed by the chambers added in a trochospiral coil. Chambers are globular to subglobular and present a gradual size increase. Sutures are depressed and radial on both test sides. Periphery is broadly rounded and with one imperforate band on all the chambers of the final whorl; two keels consisting of aligned pustules and rugosities border the imperforate band and occasionally a third keel occurs between them on the earlier chambers of the final whorl. Aperture has the shape of an arch, is situated in umbilical-extraumbilical position and is bordered by a tegillum. Chamber surface is ornamented with scattered pustules, rugosities and costellae that present either a meridional arrangement on both test sides or are parallel to the periphery on the spiral side and meridional on the umbilical one. Wall is calcitic, hyaline and perforate.

Species included. *R. circumnodifer*.

***Globotruncanita* Reiss 1957**

Original report. *Globotruncanita* Reiss 1957, p. 136.

Original work. Reiss, Z., 1957. The Bilamellidea, nov. superfam., and remarks on Cretaceous globorotaliids. *Contributions from the Cushman Foundation for Foraminiferal Research*, 8, 127-145.

Age. Turonian-Maastrichtian.

Description. Test consists of the proloculus followed by the subsequent chambers added in a trochospiral coil. Earlier chambers are globular to subglobular and the last formed ones dorso-ventrally compressed or only with a dorsal compression. Sutures are lined with well-developed ridges on the spiral side; on the umbilical side the sutures are depressed and radial or lined with ridges. Test shape is biconvex to plano-convex. Periphery is angular and with one peripheral keel, which is equally developed on all the chambers of the final whorl or appears more prominent over the earlier chambers; a second keel over the earlier chambers of the final whorl occurs occasionally. Aperture has the shape of an arch, is situated in umbilical to extraumbilical-umbilical position and is bordered by a porticus or a tegillum. Periumbilical structures consisting of agglomerations of pustules or well-developed ridges occur on all the chambers or are less prominent over the earlier chambers on the umbilical side. Chamber surface is mostly smooth; ornamentation elements consist of scattered pustules, which are denser and more prominent over the earlier chambers and on the umbilical side. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *G. carpathica*, *G. posthelvetica*, *G. sigali*, *G. stuartiformis*, *G. elevata*, *G. esnehensis*, *G. atlantica*, *G. subspinosa*, *G. stuarti*, *G. conica*, *G. angulata*.

Radotruncana El-Nakhal 1971

Original report. *Plummerita (Radotruncana)* El-Naggar 1971, p. 434.

Original work. El-Naggar, Z.R., 1971. On the classification, evolution and stratigraphical distribution of the Globigerinacea. In: *Proceedings of the II Planktonic Conference Roma 1970* (Farinacci, A., Ed.). Roma: Edizioni Tecnoscienza, 1, 421-476.

Age. Late Campanian-Maastrichtian.

Description. Test consists of the proloculus followed by the subsequent chambers added in a low trochospiral coil. Earlier chambers are globular to subglobular; the chambers of the final whorls are dorsally compressed and strongly inflated on the umbilical side. Sutures are lined with ridges on both test sides. Test shape is plano-convex, with an angular periphery. One peripheral keel occurs at the periphery on all the chambers of the final whorl; one to all of the chambers of the final whorl presents one peripheral spine resulting in a stellate outline. Aperture has the shape of an arch in umbilical position and is bordered by a tegillum that can be perforate or not. Chamber surface is mostly smooth; rare scattered pustules occur over the test earlier chambers and are more prominent on the umbilical side. Wall is calcitic, hyaline and perforate.

Species included (in stratigraphical order): *R. calcarata*, *R. falsocalcarata*.

3.2. GENERA IDENTIFICATION

Narrative Key for the Identification of the Taxa with Serial Chamber Arrangement

This key starts from the premise that a serial chamber arrangement can be easily differentiated from planispiral and trochospiral ones. We deal with serial taxa in case there is at least one uncoiled stage in the test gross architecture. The first step is identifying the genus is to assess the kind of serial arrangement: a triserial one indicates the genus *Guembelitria*. Further steps have to be taken if at least one of the growth stages displays a biserial chamber arrangement. At this stage it is very important to note the nature of the sutures. Sutures lined with ridges have a raised appearance and genus *Sigalia* can be recognized in case the sutural ridges occur between all the chambers or only between those of the earlier portion of the test. Notably, sutures lined with weak ridges that can be recognized only with the aid of a SEM or ESEM also occur in the species *Heterohelix incipiens* and *H. initialis*. They are included in a different genus than *Sigalia* based on the observation that they can be assigned easier to *Heterohelix* when only the optical stereomicroscope is used. Additional morphological features have to be taken in consideration for the identification of other genera because most of the Cretaceous serial planktic foraminifers present depressed sutures.

Morphology and growth stages succession as reflected in the chamber arrangement can be used to recognize three groups of genera. The first one includes the genera with biserial arrangement throughout and this represents the basic architecture of the heterohelicid group; a second group consists of the genera that evolved an early planispiral coil, whereas the tests that developed multichamber growth in the adult stage are included in the third group of genera.

There are three genera in the group with biserial chamber arrangement throughout the ontogeny. They are separated by the occurrence/absence and morphology of the cameral backward extensions. The tests without cameral backward extensions are included in the genus *Heterohelix*. *Lunatriella* presents one chamber backward extension, which is situated at the test periphery and occurs only in the last-formed one or more rarely two chambers. Two chamber backward extensions occur in the representatives of the genus *Pseudoguembelina*. The two are symmetrically arranged, one on each lateral test sides and occur in the last-formed one to three chambers.

The next group of genera includes those that developed a planispiral coil in the earlier portion of the test. They are separated according to the degree of development of the chamber arrangement in the juvenile stage. The tests with incipient planispiral coil can be recognized by the proloculus situated in an eccentric position, adjacent to the periphery; therefore, it is not completely surrounded by the chambers of the planispiral coil. Such tests are herein included in the genus *Spiroplecta*. The well-developed stage of this feature is when the proloculus is completely surrounded by the chambers of the early planispiral coil; these tests are included within the genus *Paraspiroplecta*.

Development of multichamber growth in the adult stage resulted in two basic test architectures. Most of the tests present chamber proliferation in the plane of biseriality of the early stage, but proliferation in multiple planes also occurs. The latter can be recognized in general by the lack of a progressive chamber at the beginning of the adult stage and such tests are included in the genus *Racemiguembelina*. Notably, the tests do not have a conical

appearance where there are only one or very few sets of chamberlets in the adult stage (e.g., *R. intermedia*, *R. varians*).

Test ornamentation and additional features pertaining of the gross test architecture should be taken in consideration in the case the chamber proliferation is developed in the plane of biseriality. In all three genera of this group the adult stage begins with a progressive biaperturate chamber, which is followed by chamberlets added in sets through the late portion of ontogeny. The tests with smooth surface or ornamented with pore mounds are included in the genus *Pseudoguembelina*; the species of this genus present a small number of sets of chamberlets following the progressive chamber. The representatives of the genus *Gublerina* have divergent rows of chambers in the early stage with biserial arrangement; the resulted V-shaped central area is bordered on the two lateral sides by the well-developed periapertural flanges. The remaining tests are included within the genus *Ventilabrella* and are in general characterized by the following combination of morphological features: small periapertural structures, costate or more complex ornamentation and well-developed adult stage with multichamber growth. Chamber proliferation is not occasionally less developed and with irregular addition of the sets of chamberlets (e.g., *Ventilabrella hariaensis*).

Narrative Key for the Identification of the Taxa with Planispiral Coil at Least in the Adult Stage

The group of planispirally coiled taxa includes those tests that present such architecture throughout ontogeny and those with an early trochospiral coil in the juvenile stage and become planispiral only in the later stage of the ontogenetical development. However, the occurrence of an early trochospiral coil is not used in this identification key in order to assure a faster and easier method of the genus recognition. Chamber shape presents an important role in the genus identification and two distinct groups of genera can be recognized by the morphology of this feature: genera in which the chambers are spherical, globular or radially compressed and present slight to no radial elongation and those with well-developed radial elongation, which result in the development of a stellate outline in lateral view.

There are three genera in the group without a well-developed chamber elongation. Test wall ultrastructure can be further used in the next step in their identification. A reticulately-ridged wall occurs only in the case of the *Biticinella*, whereas a simple to simple-ridged test wall is known in the other group. The general appearance of the sutures can be used in the next step of the identification key. Simple and depressed sutures, without sutural ridges, occur in all the species of *Globigerinelloides*. Raised sutures are known only in the representatives of *Planomalina*. A special remark should be made on the species *Planomalina praebuxtorfi*, which presents simple and depressed sutures; it is included in *Planomalina* based on the general planomalinid test aspect.

The occurrence of well-developed radially elongate chambers can be recognized by the test stellate outline in lateral view. Only the last-formed one to five chambers present such a chamber elongation and at the distal end they can be either pointed or with a bulbous projection. Observations with the aid of a SEM or ESEM from this point forward are necessary for a precise identification. Two genera with one distal bulbous projection at the end of the radially elongate chambers can be recognized: *Leupoldina* has a simple test wall and *Eohastigerinella* presents frequently an incipiently simple-ridged wall, more rarely simple. In the case of the tests in which the radially elongate chambers are tapering at the

distal edge the separation between genera can be made function of the occurrence of tubulospines. One to three tubulospines per chamber occur in *Schackoina*, whereas strongly elongate conical chambers are known in *Hastigerinoides*. It should be mentioned that two species of *Schackoina*, namely *S. gandolfii* and *S. moliniensis* also present strongly elongate conical chambers; the two species are herein included within *Schackoina* based on the general test appearance.

Narrative Key for the Identification of the Non-keeled Trochospiral Genera

Most of the Late Cretaceous planktic foraminiferal genera present a trochospiral coil. Herein two categories are separated function of the occurrence of peripheral keels at the test periphery: non-keeled and keeled. Notably, some trochospiral genera present at the periphery one imperforate peripheral band, one band with lower pore density and lower pore size, or tubulospines; such genera are included in this section.

The first separation of the genera in this category is function of the general appearance of the test ultrastructure and ornamentation; in general this can be realized under the optical stereomicroscope although this involves features that often require high resolution observations with the aid of a SEM or ESEM. *Ticinella* is the only genus that presents a reticulately-ridged wall, which is apparent on the earlier or on all the chambers of the test; this feature can be recognized under the optical microscope especially by the vermicular aspect. *Favusella* is probably the Cretaceous planktic foraminiferal genus with the most spectacular ornamentation, which consists of a network of narrow ridges arranged to form a honeycomb-like pattern at the test surface. All the other genera are included in the third category, in which the chamber surface is smooth or is ornamented with pustules, rugosities and costellae.

Three groups of genera can be further recognized by using a variety of morphological features related to the chamber shape and ornamentation: tests without well-developed chamber elongation and ornamentation with meridional pattern, tests without a well-developed chamber elongation and with the chamber surface smooth or ornamented with pustules and tests in which the last-formed chambers have a well-developed elongation resulting in a stellate outline.

The tests with well-developed chamber elongation and ornamentation with meridional pattern includes three genera, in which the morphology of the periapertural structures and chamber dorsal compression are paramount. The tests in which the chambers are globular to subglobular and the aperture is bordered by an imperforate lip are assigned to the genus *Costellagerina*, whereas *Rugoglobigerina* includes those tests with a similar gross architecture and aperture bordered by a tegillum. *Trinitella* resembles *Rugoglobigerina* by having the aperture bordered by a tegillum, but is the only known genus in this category in which the last-formed chambers present a dorsal compression.

Three genera are included in the category of the tests without a well-developed chamber elongation and with the chamber surface smooth or ornamented with pustules. *Hedbergella* is a genus with wide morphological variability in the chamber surface, which ranges from smooth to ornamented with scattered pustules; aperture is in general bordered by a lip. *Whiteinella* resembles *Hedbergella* in the gross test architecture, but it differs from it by having more complex periapertural structures, which consist of a lip or a flap. The definition of these two genera requires further study, including a critical perspective on the separation

based on the periapertural structure morphology. The tests in which the ornamentation consists of relatively large-sized and dense pustules that can be dome-like or with irregular shape belong to the genus *Kuglerina*; notably, the representatives of this genus have more complex periapertural structures, which consist of one porticus or tegillum, when compared to the species included with *Hedbergella* or *Whiteinella*.

Four genera are included in the tests with the last-formed chambers with a well-developed elongation resulting in a stellate outline. The tests in which the last-formed chambers are clavate are included in *Clavihedbergella*. One distal bulbous projection occurs in two genera: *Pessagnoina*, which has a smooth chamber surface, and *Asymetria* in which the ornamentation consisting of small-sized scattered pustules is developed only on the umbilical side of the test. *Plummerita* is the only known non-keeled trochospiral genus with tubulospines developed in the peripheral region.

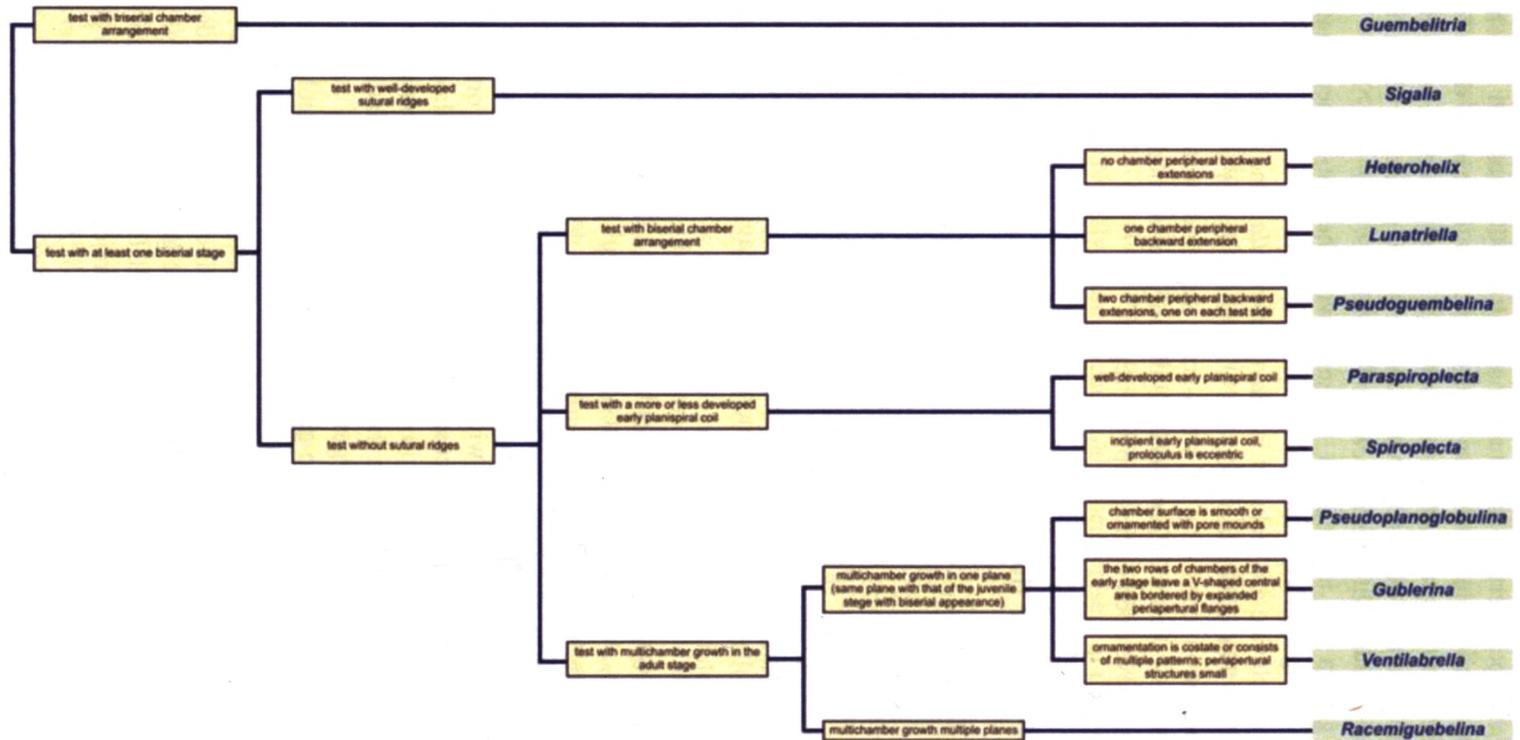
Narrative Key for the Identification of the Keeled Trochospiral Genera

This group includes those foraminiferal tests of Late Cretaceous age that present one or two keels at the periphery; the tests with globotruncanid or rotaliporid appearances, which are the most used planktics in the Upper Cretaceous biostratigraphy are included in this group. The development of peripheral keels is often associated with dorso-ventral chamber compression but tests with globular or subglobular chambers and peripheral keels are also known. *Radotruncana* is a genus with globotruncanid appearance that developed peripheral spines resulting in a stellate outline; none of the remaining genera of this category developed such a feature.

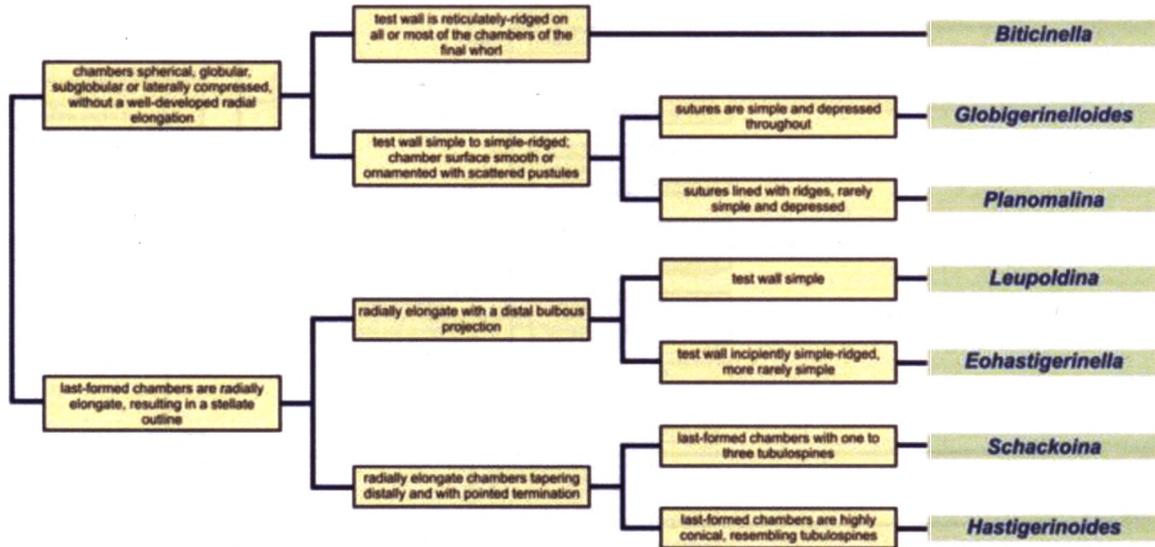
The tests without stellate outline are next subdivided according to the chamber shape and general test appearance. Those with globular or subglobular chambers can present one or two peripheral keels. *Anaticinella* presents one peripheral keel, usually developed on the earlier chambers. A next subdivision can be done by taking in consideration the chamber ornamentation. The tests with two peripheral keels that have the chambers ornamented with scattered pustules and rugosities without a preferential orientation are included within the genus *Archaeoglobigerina*. Tests with two peripheral keels and ornamentation consisting of scattered pustules, rugosities and costellae that have a meridional or parallel to the periphery arrangement pattern are included in *Rugotruncana*; notably, concentrated and partly fused pustules between the two keels on the earlier chambers of the final whorl often result in the development of a third keel in this genus.

The next category includes the genera with one peripheral keel, which can be developed on the earlier or all the chambers of the final whorl; the praeglobotruncanid, rotaliporid and bucherinid foraminifera are included. The tests with dorso-ventrally compressed chambers and without supplementary apertures on the umbilical side are included within the genus *Praeglobotruncana*. Only the representatives of the genus *Rotalipora* present supplementary apertures on the umbilical side and they can be situated within the umbilical region or along the sutures especially between the last-formed chambers; chambers can present dorso-ventral or only dorsal compression in the representatives of *Rotalipora*. *Bucherina* is characterized by a dorsal compression of the chambers and one peripheral keel; the peripheral keel is not developed in *B. praesandidgei*, but this species is herein included within *Bucherina* due to the general test aspect.

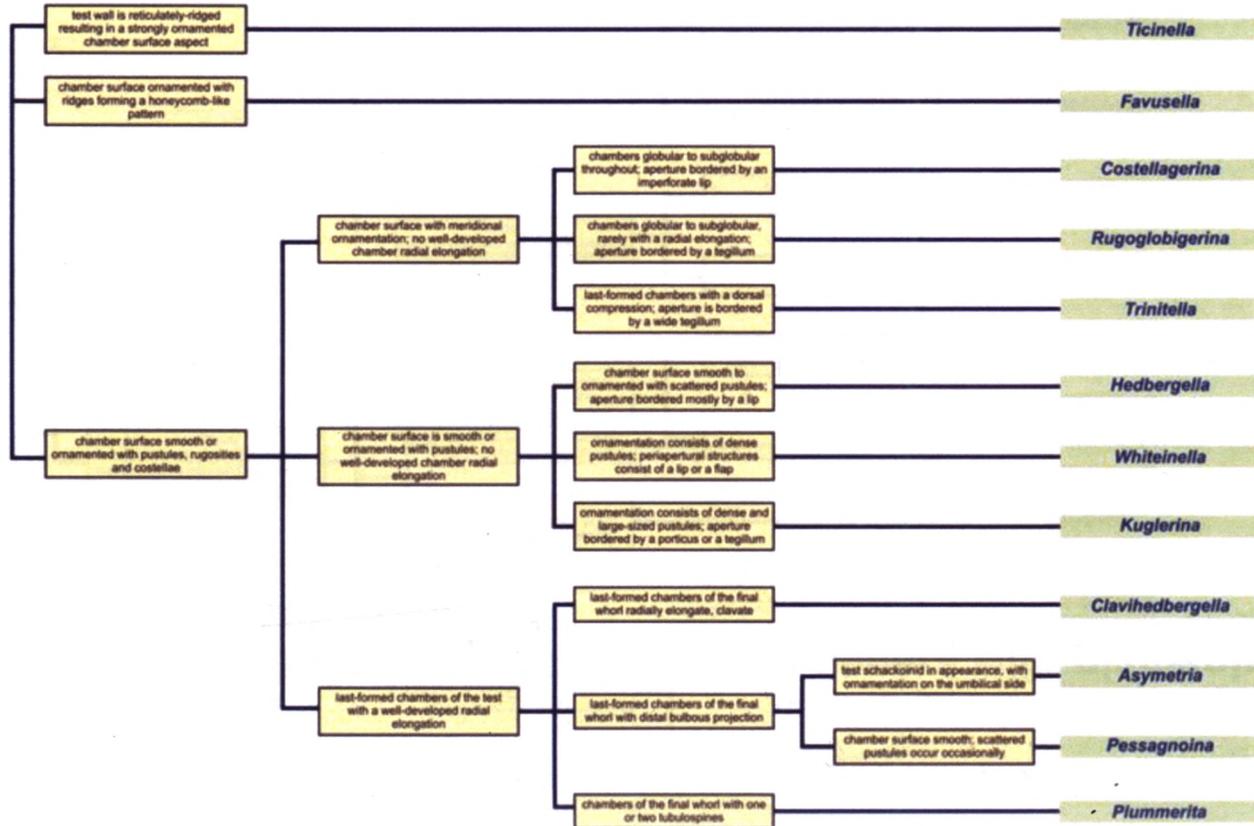
1. Graphical key for the identification of the genera with serial chamber arrangement



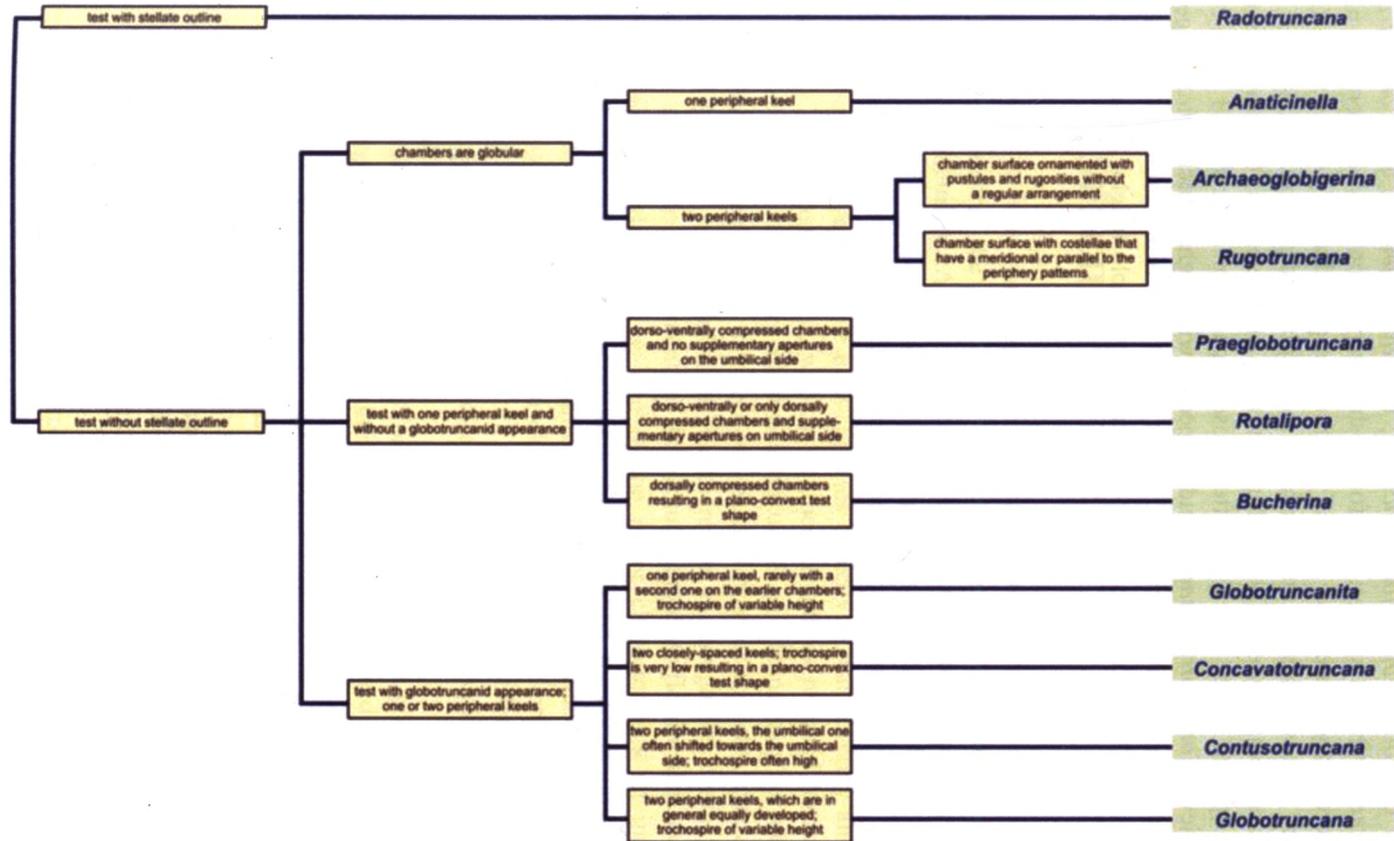
2. Graphical key for the identification of the genera with planispiral coil at least in the adult stage



3. Graphical key for the identification of the non-keeled trochospiral genera



4. Graphical key for the identification of the keeled trochospiral genera



Four genera are included in the last category and they are characterized by tests with globotruncanid appearance and one or two keels at the periphery. All of the four genera, namely *Globotruncana*, *Globotruncanita*, *Concavatotruncana* and *Contusotruncana* consist of a large number of species; therefore, a sharp separation between them was hard to achieve. Therefore, only a brief and general diagnosis is provided for these genera. *Globotruncana* includes tests with low to medium high trochospire and presents two keels at the periphery, which are frequently equally developed in most of the species. *Concavatotruncana* presents two peripheral keels, which are often closely-spaced or adjacent and plano-convex tests in edge view. *Contusotruncana* includes species with higher trochospires in general and two peripheral keels; the umbilical keel is often tilted towards the umbilical side. *Globotruncanita* has one peripheral keel and presents tests with variable height, from very low to medium high.

SPECIES PRESENTATION

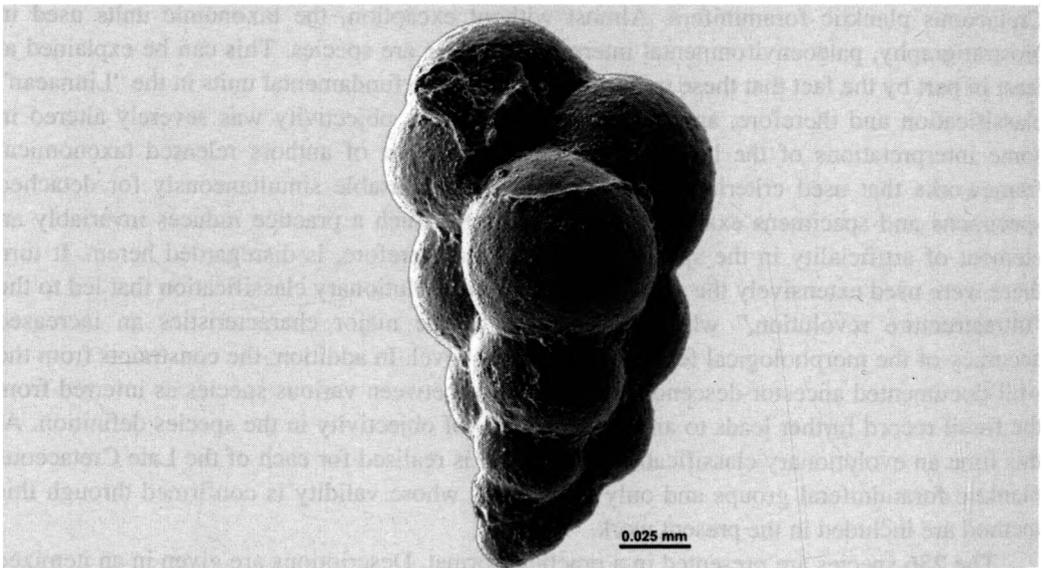
The largest portion of this handbook is dedicated to the species descriptions and illustrations. Species represent the basic units in the practical applications of the Late Cretaceous planktic foraminifera. Almost without exception, the taxonomic units used in biostratigraphy, paleoenvironmental interpretations, etc are species. This can be explained at least in part by the fact that these units are considered the fundamental units in the “Linnaean” classification and therefore, are objective units. Species objectivity was severely altered in some interpretations of the last decades, when a number of authors released taxonomical frameworks that used criteria of species identification usable simultaneously for detached specimens and specimens examined in thin sections. Such a practice induces invariably an element of artificiality in the species definition and therefore, is disregarded herein. It turns out that there were used extensively the achievements of the evolutionary classification that led to the “ultrastructure revolution,” which has as one of the major characteristics an increased accuracy of the morphological features observation level. In addition, the constraints from the well-documented ancestor-descendant relationships between various species as inferred from the fossil record further leads to an increased level of objectivity in the species definition. At this time an evolutionary classification framework is realised for each of the Late Cretaceous planktic foraminiferal groups and only the species whose validity is confirmed through this method are included in the present work.

The 236 species are presented in a practical format. Descriptions are given in an itemized format and, whenever possible, equivalent or similar expressions are used for the species of the same informal groups (e.g., heterohelicids, hedbergellids, globotruncanids, etc) and formal units (e.g., genus). The terminology and various expressions used in the species descriptions are those presented in the “Glossary of terms and expressions”; a perfect coverage of the morphological terms is hard to achieve and therefore, we recommend the reader or user to consult the works mentioned under each species for additional information and clarification if necessary. Species descriptions are given in simplified form, which includes the diagnostic features together with and a number of other morphological features that can help in an accurate identification.

The “Remarks” section that follows the species description is in general very short, includes data that can help in species identification and should be considered a support for the description section. Most of the remarks focus on where high resolution data acquired with the aid of a SEM or ESEM are necessary, or on the differences between the presented species and those with close morphological resemblances. Throughout this chapter the number of

citations is kept at a minimum and includes the original report, namely that in which the species was described, and a recommended revision. Most of the species were revised more than once after the original report. The “Recommended revision” section represents the present author’s choice and in general includes works in which the species were revised in the past decade under the auspices of the evolutionary classification. Notably, all the cited works are given on the same page for each species rather than in a separate list at the end of the handbook; the goal was to achieve for each species a presentation close to the *stand alone* status. Problems of nomenclatural nature, synonymy lists and inferred evolutionary relationships are not considered directly related to a practical classification. The only remarks on nomenclature were included in the presentations of the heterohelicid species, for which an evolutionary classification framework and English-based nomenclature are developed; such mentions are intended as a continuous reminder that the practical classification, which is the topic of this handbook, should not be confused for the evolutionary classification.

***Guembelitria cenomana* (Keller 1935)**



Guembelitria cenomana from the upper Albian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C, which was previously illustrated by Georgescu (2009), plate 6, Figure 1.

Original report. *Gümbelina cenomana* Keller 1935, p. 557, pl. 3, Figures 13-14.

Original work. Keller, B.M., 1935. Microfauna of the Upper Cretaceous in the Dnjepr-Donets valley and some other adjacent regions. *Byulletin Moskovskovo Ovacestva Prirodii (Geologii)*, 43 (13), 522-558 [in Russian].

Age. Late Albian.

Main morphological features.

Test consists of the proloculus followed by chambers successively added around the test growth axis resulting in a triserial chamber arrangement.

Chambers are globular, with variable overlapping and gradual size increase.

Sutures are depressed, distinct and mostly slightly curved.

Aperture is situated at the base of the last-formed chamber, and is provided with a small relict toothplate.

Aperture is bordered by an imperforate thin lip, which presents an asymmetrical development.

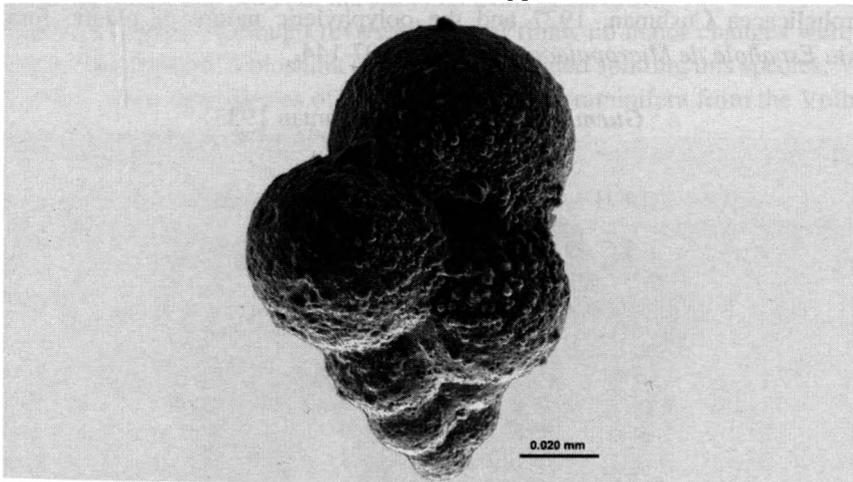
Chamber surface is smooth, lacking any ornamentation structures.

Test wall is calcitic, hyaline, simple and perforate.

Notes on identification. This small-sized species is the only known one with triserial chamber arrangement that occurs in upper Albian sediments. There was observed a significant variability in test general architecture, especially in the number of test chambers and aperture height. Good resolution in observing the wall structure and lack of ornamentation structures can be achieved only with the use of a SEM or ESEM.

Recommended revision. *Archaeoguembelitra cenomana* (Keller 1935). Georgescu 2009, p. 129, pl. 5, Figures 15-17, pl. 6, Figures 1-4. Georgescu, M.D., 2009. On the origins of Superfamily Heterohelicacea Cushman, 1927 and the polyphyletic nature of plantic foraminifera. *Revista Española de Micropaleontología*, 41, 107-144.

***Guembelitra harrisi* (Tappan 1940)**



Specimen of *Guembelitra harrisi* from the lower Cenomanian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Gümbelitra harrisi* Tappan 1940 p. 115, pl. 19, Figure 2.

Original work. Tappan, H., 1940. Foraminifera from the Grayson Formation of northern Texas. *Journal of Paleontology*, 14, 93-126.

Age. Latest Albian-Turonian.

Main morphological features.

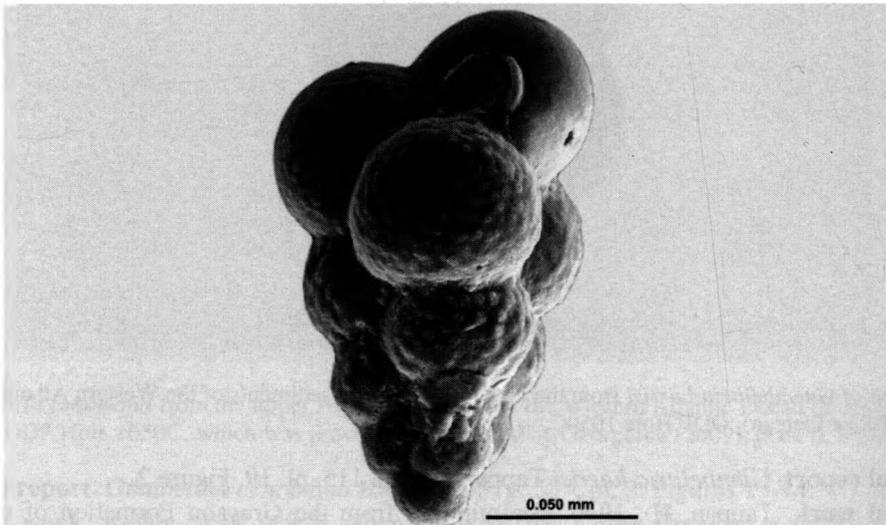
- Test consists of the proloculus followed by chambers added around the test growth axis resulting in a triserial chamber arrangement.
- Chambers are globular throughout, overlap at various rates and with gradual size increase.
- Sutures are depressed, distinct and mostly slightly curved.

- Aperture of each of the successive chambers is small-sized and situated at the base of the last-formed chamber, and is provided with a small, relict toothplate.
- Periapertural structures are represented by an asymmetrically developed thin imperforate lip.
- Ornamentation consists of small-sized pore mounds, which occur mostly over the last-formed chambers.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Guembelitra harrisi* is a small-sized species and this can affect its correct identification. Note that it differs from its ancestor only in the test ornamentation that consists of pore mounds over the adult portion of the test; with few exceptions such ornamentation structures can be correctly observed only with the aid of the SEM or ESEM. This is particularly recommended in the proximity of the Albian/Cenomanian boundary where the ranges of the pore-mounded *G. harrisi* and smooth *G. cenomana* overlap.

Recommended revision. *Archaeoguembelitra harrisi* (Tappan 1940). Georgescu 2009, p. 128, pl. 6, Figure 7. Georgescu, M.D., 2009. On the origins of Superfamily Heterohelicacea Cushman, 1927 and the polyphyletic nature of planitic foraminifera. *Revista Española de Micropaleontología*, 41, 107-144.

***Guembelitra cretacea* Cushman 1933**



Specimens of *Guembelitra cretacea* from the Prairie Bluff Chalk (early Maastrichtian in age) of Alabama (USA); McGugan Collection, University of Calgary.

Original report. *Guembelitra cretacea* Cushman 1933, p. 37, pl. 4, Figure 12.

Original work. Cushman, J.A., 1933. Some new foraminiferal genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 9, 32-38.

Age. Late Santonian-Maastrichtian-early Paleocene.

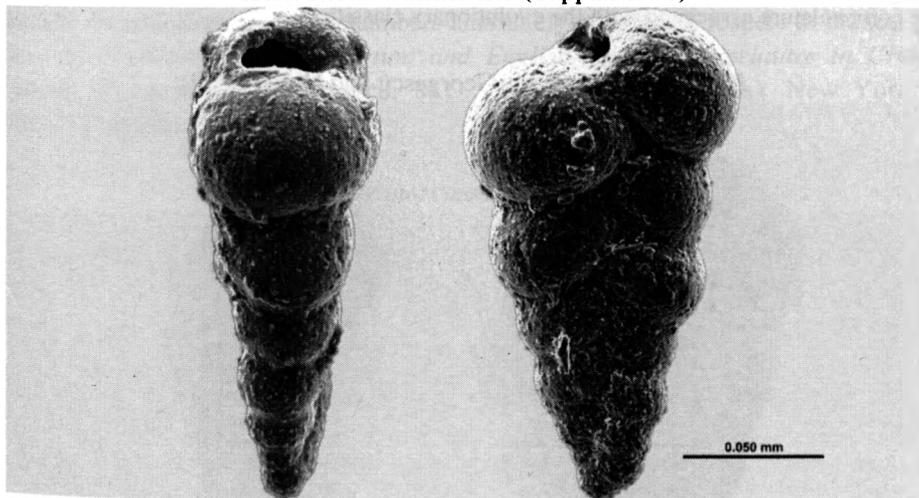
Main morphological features.

- The test consists of the proloculus, which is followed by chambers added around the test growth axis resulting in a triserial appearance.
- Chambers are globular throughout, overlap at various rates and present a gradual size increase.
- Irregular multichamber growth can occasionally occur in the adult portion of the test.
- Sutures are depressed, distinct and mostly curved.
- Aperture has the shape of an arch, which is mostly high, and is situated at the base of the last-formed chamber.
- Periapertural structures consist of an asymmetrically developed imperforate lip.
- Chamber surface is ornamented with pore mound, which can be absent over the earliest portion of the test.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. This small-sized species is rare in the lower portion of its stratigraphical range (upper Santonian-middle Campanian), but becomes more frequent in the fossil record during the upper Campanian-Maastrichtian interval. The ornamentation structures are best observed with the aid of an SEM or ESEM.

Recommended revision. Although reviewed several times no major changes were added to the original description. Voloshina (1961) recommended splitting this species. Voloshina, A.M., 1961. Some new species of Upper Cretaceous foraminifera from the Volhyn-Podol Platform. *Paleontologicheskyy Sbornik (Lvov)*, 1, 71-81.

Heterohelix washitensis (Tappan 1940)



Heterohelix washitensis from the lower Cenomanian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C previously illustrated by Georgescu and Huber (2009), plate 1, Figures 8-9.

Original report. *Gümbelina washitensis* Tappan 1940, p. 115, pl. 19, Figure 1.

Original work. Tappan, H., 1940. Foraminifera from the Grayson Formation of northern Texas. *Journal of Paleontology*, 14, 93-126.

Age. Late Albian-early Turonian.

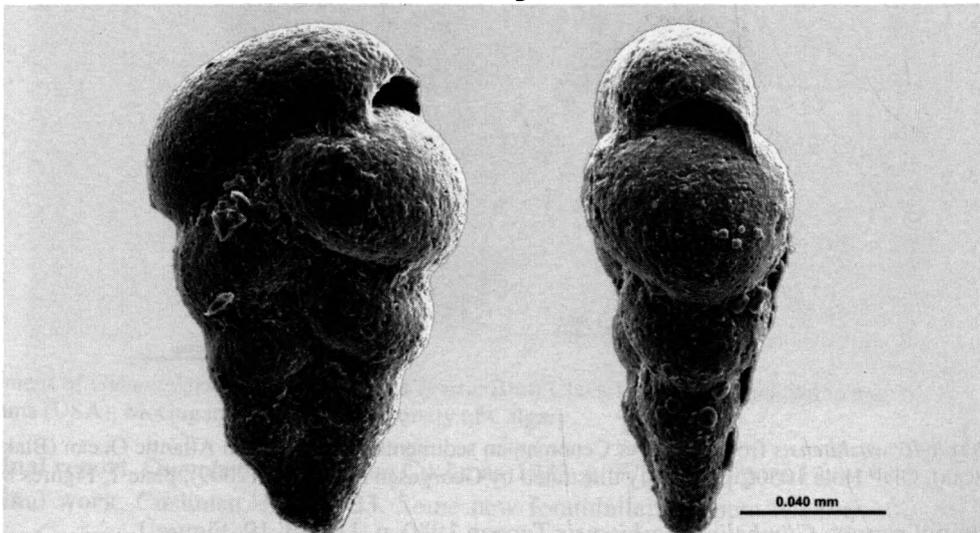
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- The test growth axis is twisted.
- Chambers are globular to subglobular, overlap at various rates, and present a gradual size increase.
- Sutures are depressed and distinct, straight to slightly curved.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Periapertural structures are asymmetrical: an imperforate lip on one side of the aperture and a ridge on the other side.
- Chamber surface is smooth.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. This small-sized species can be easily recognized with the optical stereomicroscope by the twisted test; it is the only known species of Cretaceous planktic foraminifer with chambers alternately added with respect to the test growth axis that presents this feature.

Recommended revision. *Protoheterohelix washitensis* (Tappan 1940). Georgescu and Huber 2009, p. 340, pl. 1, Figures 1-14, pl. 2, Figures 1-4. Georgescu, M.D., Huber, B.T., 2009. Early evolution of the Cretaceous serial planktic foraminifera (late Albian-Cenomanian). *Journal of Foraminiferal Research*, 39, 335-360. Georgescu (2014) revised its name as S1 in the nomenclature associated with the evolutionary classification.

Heterohelix obscura (Georgescu and Huber 2009)



Specimen of *Heterohelix obscura* from the lower Cenomanian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C previously illustrated by Georgescu and Huber (2009), plate 2, Figures 5-6.

Original report. *Protoheterohelix obscura* Georgescu and Huber 2009, p. 342, pl. 2, Figures 5-11, pl. 3, Figures 1-12.

Original work. Georgescu, M.D., Huber, B.T., 2009. Early evolution of the Cretaceous serial planktic foraminifera (late Albian-Cenomanian). *Journal of Foraminiferal Research*, 39, 335-360.

Age. Latest Albian-early Turonian.

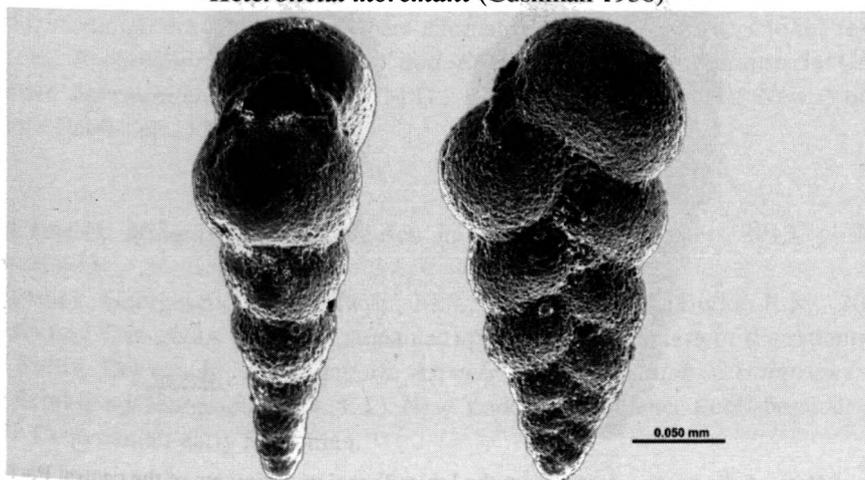
Main morphological features.

- Test consists of the proloculus and the subsequent chambers that are alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are mostly subglobular in the test early portion and reniform in the adult stage, oblique to the test growth axis.
- Sutures are depressed, distinct and straight to slightly curved.
- Aperture is in the form of an arch and is situated at the base of the last-formed chamber.
- Periapertural structures consist of archaeoflanges, which are thin calcareous lamellae.
- Chamber surface is smooth, without ornamentation elements.
- Test wall is calcitic, hyaline, simple and perforate.

Notes on identification. The asymmetrically developed flanges, or archaeoflanges, could be observed with the optical stereomicroscope only in the case of a couple of specimens.

Revision. The morphology of this species was not reviewed. Georgescu (2014) revised its name as S2 in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Heterohelix moremani (Cushman 1938)



Heterohelix moremani from the upper Cenomanian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C previously illustrated by Georgescu and Huber (2009), plate 4, Figures 6-7.

Original report. *Gümbelina moremani* Cushman 1938, p. 10, pl. 2, Figures 1-3.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

Age. Middle Cenomanian-early Turonian.

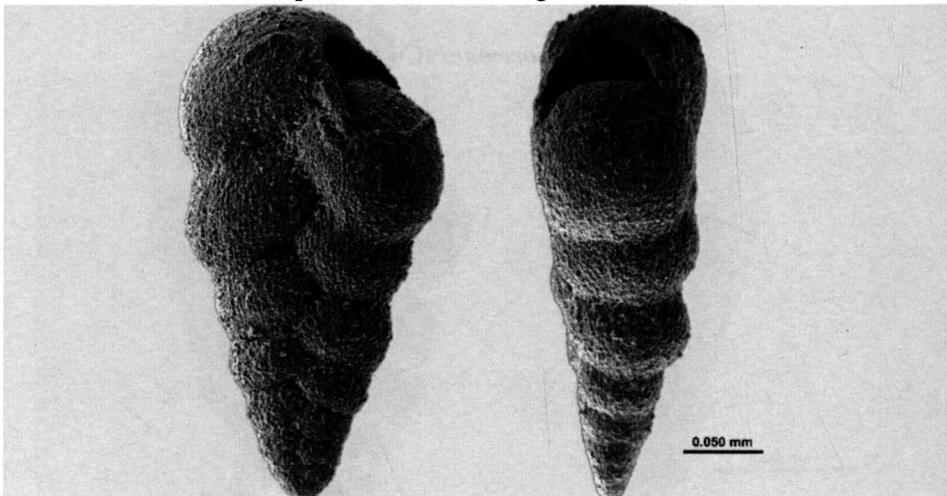
Main morphological features.

- Test consists of the proloculus followed of chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are subglobular in shape in the earlier portion of the test and reniform, and with the elongation axis oblique to the test growth axis in the adult stage.
- Test is symmetrical in edge view.
- Periphery is simple and rounded.
- Aperture is in the shape of an arch at the base of the last-formed chamber.
- Periapertural structures consist of two symmetrically developed flanges, which are not rimmed.
- Chamber surface is mostly smooth, but aligned pustules and faint costae can be observed occasionally over the earliest chambers of the test.
- Wall is calcitic, hyaline, simple, and perforate.

Notes on identification. Ornamentation structures, which occur only over the chambers of the earliest portion of the test, can be observed only with the aid of the SEM and ESEM.

Recommended revision. *Planoheterohelix moremani* (Cushman 1938). Georgescu and Huber 2009, p. 344, pl. 4, Figures 1-13. Georgescu, M.D., Huber, B.T., 2009. Early evolution of the Cretaceous serial planktic foraminifera (late Albian-Cenomanian). *Journal of Foraminiferal Research*, 39, 335-360. Georgescu (2014) revised this species as S3 in the nomenclature associated with the evolutionary classification.

Heterohelix postmoremani (Georgescu and Huber 2009)



Specimen of *Heterohelix postmoremani* from the lower Turonian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 previously illustrated by Georgescu and Huber (2009), plate 5, Figures 1-2.

Original report. *Planoheterohelix postmoremani* Georgescu and Huber 2009, p. 346, pl. 5, Figures 1-11.

Original work. Georgescu, M.D., Huber, B.T., 2009. Early evolution of the Cretaceous serial planktic foraminifera (late Albian-Cenomanian). *Journal of Foraminiferal Research*, 39, 335-360.

Age. Late Cenomanian-middle Coniacian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis.
- Earlier chambers are subglobular in the earlier portion of the test and reniform with the elongation axis oblique to the test growth axis in the adult stage. Sutures are distinct and depressed.
- Tests are symmetrical in edge view, with a rounded and simple periphery.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Periapertural structures consist of symmetrically developed flanges, which can be or not.
- Ornamentation consists of faint longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate.

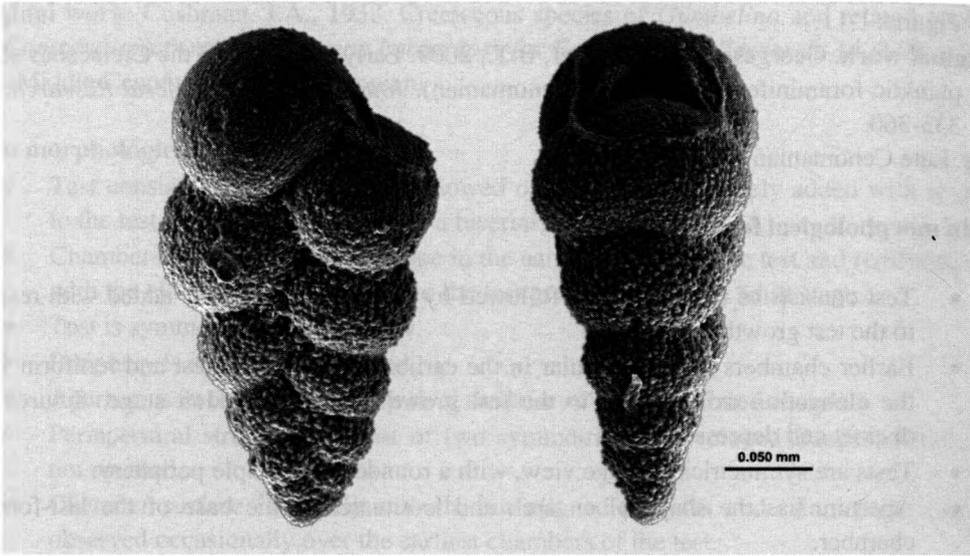
Notes on identification. The longitudinal ornamentation can be observed with an optical stereomicroscope in the case of the reasonably well-preserved specimens. The nature of the costae that consist of aligned pustules can be observed only with the aid of the SEM and ESEM.

Revision. The morphology of this species was not reviewed. Georgescu (2014) revised its name as S4 in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Original report. *Mihaia mihaei* Georgescu in Georgescu and others 2013, p. 75, pl. 6, Figures 1-13.

Original work. Georgescu, M.D., Sawyer, M.S., Heikkinen, C.J., Burke, R.M., 2013. New and revised Cretaceous (Albian-Campanian) planktic foraminifera of the Atlantic, Indian and Pacific Oceans. In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 59-100.

Age. Late Cenomanian-early Santonian.

Heterohelix mihaii (Georgescu 2013)

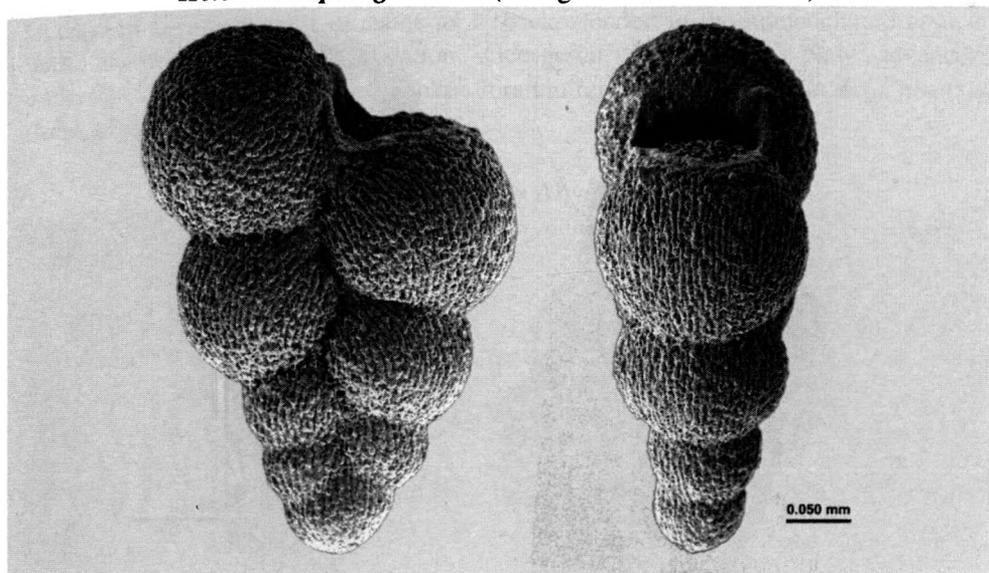
Heterohelix mihaii from the lower Turonian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 previously illustrated by Georgescu in Georgescu and others (2013), plate 6, Figures 1-2.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are subglobular throughout, overlap at variable rate and present a gradual size increase.
- Tests are symmetrical in edge view, with broadly rounded and simple periphery.
- Aperture has the shape of a medium high arch and is situated at the base of the last-formed chamber.
- Periapertural structures consist of narrow rimmed flanges (metaflanges).
- Chamber surface is ornamented with thin longitudinal costae, which have a more continuous appearance over the chambers of the earlier portion of the test.
- Wall is calcitic, hyaline, simple and perforate; pores are situated between the costae, rarely interrupting them.

Notes on identification. Under the optical stereomicroscope the ornamentation features can be observed only occasionally, and in reasonably well-preserved specimens. The aligned pustules that form the costae can be observed only with the aid of the SEM and ESEM.

Revision. Georgescu (2014) revised its name as I-1alternate in the nomenclature associated with the evolutionary classification (see citation under *Heterohelix postmoremani*).

Heterohelix paraglobulosa (Georgescu and Huber 2009)

Heterohelix paraglobulosa from the lower Turonian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 illustrated by Georgescu and Huber (2009), plate 7, Figures 1-2.

Original report. *Globoheterohelix paraglobulosa* Georgescu and Huber 2009, p. 349, pl. 6, Figures 7-12, pl. 7, Figures 1-8.

Original work. Georgescu, M.D., Huber, B.T., 2009. Early evolution of the Cretaceous serial planktic foraminifera (late Albian-Cenomanian). *Journal of Foraminiferal Research*, 39, 335-360.

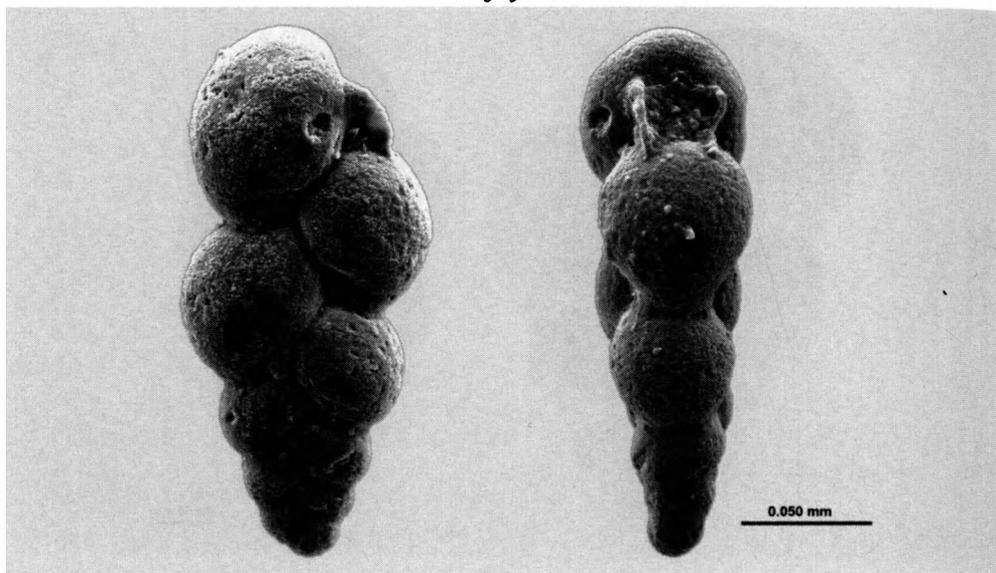
Age. Late Cenomanian-Coniacian.

Main morphological features.

- Test consists of the large-sized proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are globular in shape, overlap at various rates and present gradual size increase. Sutures are distinct and depressed throughout.
- Tests are symmetrical in edge view, and with a broad and rounded periphery.
- Aperture has the shape of an arch with variable height, and is situated at the base of the last-formed chamber.
- Chamber surface is covered with thin, more or less continuous longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae, rarely interrupting them.

Notes on identification. *Heterohelix paraglobulosa* is the species with the largest proloculus among the Cretaceous planktic foraminifer with biserial chamber arrangement; this feature if correctly observed is of paramount importance in identifying *H. paraglobulosa*.

Revision. The morphology of this species was not reviewed. Georgescu (2014) revised its name as F-1alternate in the nomenclature associated with the evolutionary classification (see citation under *Heterohelix postmoremani*).

Heterohelix fayose Petters 1983

Specimen of *Heterohelix fayose* from the lower Turonian sediments of Kansas, which was illustrated by Georgescu (2013), Figure 2: 8-9.

Original report. *Heterohelix fayose* Petters 1983, p. 43, pl. 1, Figures 8-10.

Original work. Petters, S.W., 1983. Gulf of Guinea planktonic foraminiferal biochronology and geological history of the South Atlantic. *Journal of Foraminiferal Research*, 13, 32-59.

Age. Latest Cenomanian-early Turonian.

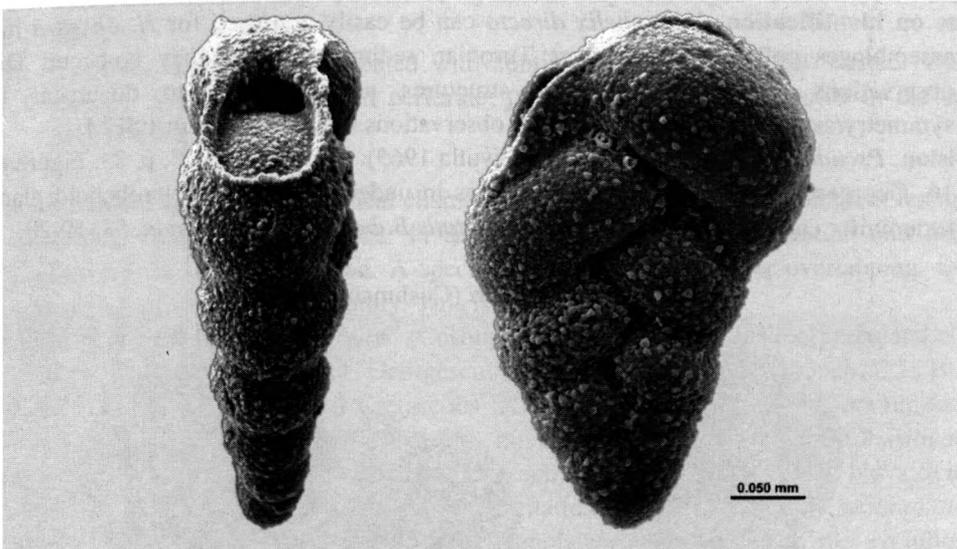
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are subglobular in the earlier portion of the test and reniform, distinctly oblique with respect to the test growth axis in the adult portion.
- Sutures are distinct and depressed throughout.
- Tests are compressed and symmetrical in edge view.
- Periphery is rounded and simple, without peripheral structures.
- Aperture is a high arch at the base of the last-formed chamber.
- Periapertural structures consist of symmetrically developed simple flanges.
- Chamber surface is smooth.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Heterohelix fayose* can be easily recognized by the well-developed reniform chambers in the adult portion of the test, which are tilted at a high angle with respect to the test growth axis.

Revision. *Lunatriella fayose* (Petters 1983). Georgescu 2013, p. 21, Figure 2: 1-16. Georgescu (2014) revised its name as I-1backextended in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2013. New advances in understanding the heterohelical planktic foraminifer early evolution. *Studia Universitatis Babeş-Bolyai, Geologia*, 58, 19-28.

***Heterohelix directa* Aliyulla 1965**



Specimen of *Heterohelix directa* from the Coniacian-lower Santonian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 illustrated by Georgescu (2013), Figure 6: 8-9.

Original report. *Heterohelix (Chiloguembelina) pseudotessera directa* Aliyulla 1965, p. 224, pl. 1, Figure 1.

Original work. Aliyulla, K., 1965. On the state of the knowledge of the family Heterohelicidae and the way of its subsequent study. *Voprosii Mikropaleontologii*, 9, 215-228. [in Russian]

Age. Turonian-early Maastrichtian.

Main morphological features.

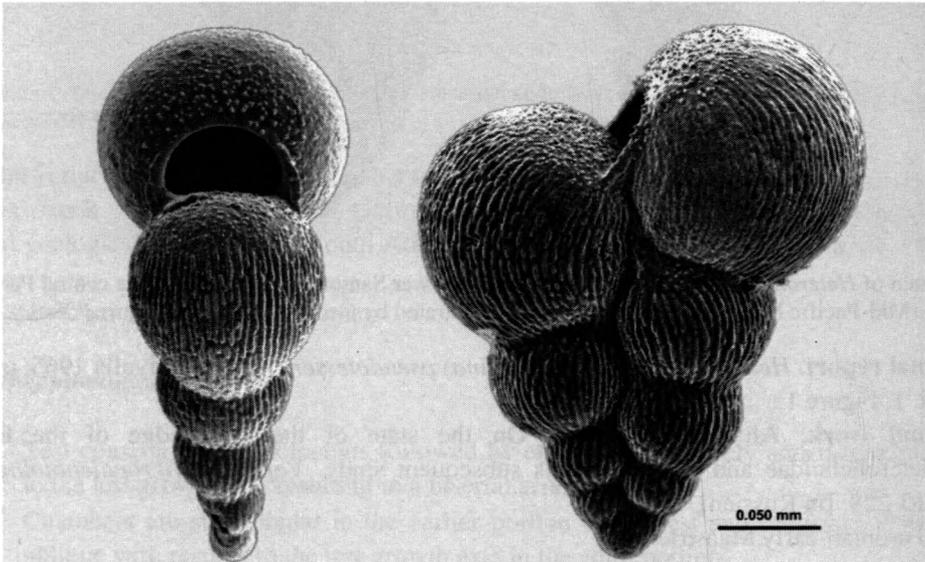
- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis.
- Chambers are subglobular in the earlier portion of the test and reniform, distinctly tilted with respect to the test growth axis in the adult portion.
- Small depression zones bound the chambers posteriorly and in the proximity of the central suture. Sutures are depressed, distinct and straight to slightly curved.
- Test is compressed in edge view. Periphery is rounded and simple, without peripheral structures.

- Aperture has the shape of a low to medium high arch, and is situated at the base of the last-formed chamber. Periapertural structures consist of symmetrically developed flanged, which are not rimmed.
- Chamber surface is smooth; a periapertural pustulose area occurs in the anterior portion of the chambers in occasional specimens.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Heterohelix directa* can be easily confused for *H. obscura* in the assemblages collected from lower Turonian sediments where they co-occur. Direct observations on the periapertural structures are necessary to document their symmetry/asymmetry. Most likely such observations require a SEM or ESEM.

Revision. *Pseudoplanoglobulina directa* (Aliyulla 1965). Georgescu 2013, p. 24, Figure 6: 1-16. Georgescu, M.D., 2013. New advances in understanding the heterohelicid planktic foraminifer early evolution. *Studia Universitatis Babeş-Bolyai, Geologia*, 58, 19-28.

***Heterohelix reussi* (Cushman 1938)**



Heterohelix reussi from the lower Campanian sediments of South Atlantic Ocean (Falkland Plateau), DSDP Site 511 illustrated by Georgescu in Georgescu and others (2013), plate 7, Figures 3-4.

Original report. *Gümbelina reussi* Cushman 1938, p. 11, pl. 2, Figures 6-8.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

Age. Late Turonian-Maastrichtian.

Main morphological features.

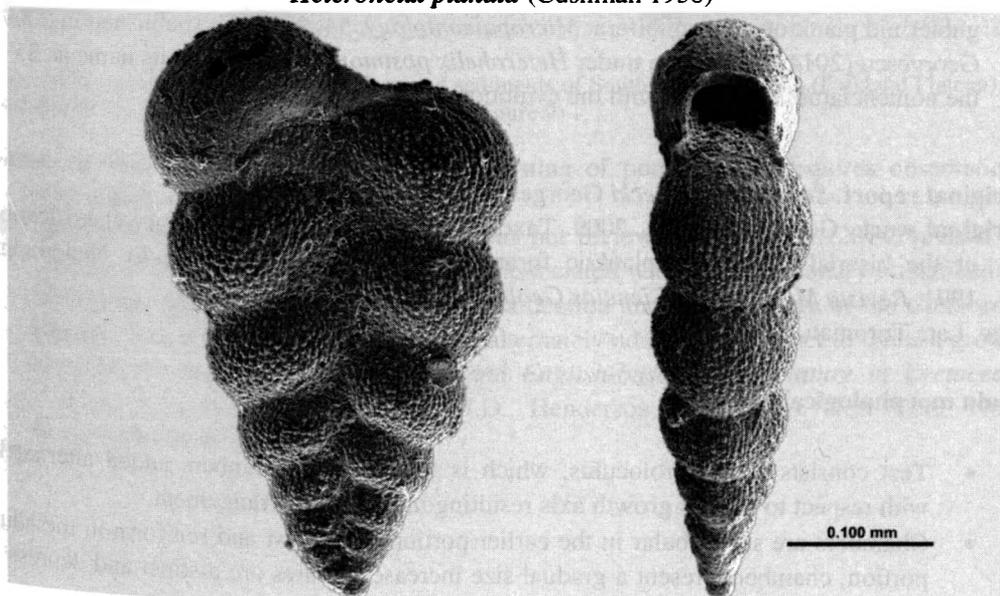
- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.

- Chambers are spherical, overlap at various rates and present a gradual size increase. Sutures are distinct and depressed throughout.
- Test is symmetrical in edge view. Periphery is broadly rounded and simple, without peripheral structures.
- Aperture has the shape of a medium high arch and is situated at the base of the last-formed chamber.
- Periapertural structures consist of symmetrically developed narrow and rimmed flanges.
- Chamber surface is ornamented with continuous longitudinal thin costae. Wall is calcitic, hyaline, simple and perforate; pores are simple and situated in the space between the costae.

Notes on identification. The spherical chambers represent a major morphological feature in identifying correctly this species. In addition, the costate ornamentation and narrow flanges help in its identification. A special note is on the chamber overlapping, which presents a high degree of variability. This is a large-sized species.

Recommended revision. *Mihaia reussi* (Cushman 1938). Georgescu in Georgescu and others 2013, p. 78, pl. 7, Figures 1-11. Georgescu, M.D., Sawyer, M.S., Heikkinen, C.J., Burke, R.M., 2013. New and revised Cretaceous (Albian-Campanian) planktic foraminifera of the Atlantic, Indian and Pacific Oceans. In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 59-100. Georgescu (2014, see citation under *Heterohelix postmoremani*) revised its name as *S-1*alternate in the nomenclature associated with the evolutionary classification.

***Heterohelix planata* (Cushman 1938)**



Heterohelix planata from the upper Maastrichtian sediments of the South Atlantic Ocean (Maud Rise), ODP Hole 690 illustrated by Georgescu and others (2008), plate 1, Figure 1.

Original report. *Gümbelina planata* Cushman 1938, p. 12, pl. 2, Figures 13-14.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

Age. Late Turonian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis.
- Chambers are subglobular in the early portion of the test and subrectangular to reniform in the adult portion. Sutures are distinct and depressed throughout.
- Test is symmetrical and compressed in edge view. Periphery is rounded and simple, without peripheral structures.
- Aperture has the shape of an arch, and is situated at the base of the last-formed chamber.
- Peripheral structures are symmetrically developed, and consist of rimmed or not flange (metaflanges and orthoflanges respectively).
- Chamber surface is ornamented with more or less continuous thin, longitudinal costae. Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae, rarely interrupting them.

Notes on identification. The test compressed appearance in edge view is of paramount importance in recognizing this species.

Recommended revision. *Heterohelix planata* (Cushman 1938). Georgescu and others 2008, p. 402, pl. 3, Figures 1-5. Georgescu, M.D., Saupe, E.E., Huber, B.T., 2008. Morphometric and stratophenetic basis for phylogeny and taxonomy in Late Cretaceous gublerinid planktonic foraminifera. *Micropaleontology*, 54, 397-424. [published in 2009]. Georgescu (2014, see citation under *Heterohelix postmoremani*) revised its name as S5 in the nomenclature associated with the evolutionary classification.

Original report. *Steineckia steinecki* Georgescu 2009, p. 325, Figure 9: 1-5.

Original work. Georgescu, M.D., 2009. Taxonomic revision and evolutionary classification of the biserial Cretaceous planktic foraminiferal genus *Laeviheterohelix* Nederbragt, 1991. *Revista Mexicana de Ciencias Geológicas*, 26, 315-334.

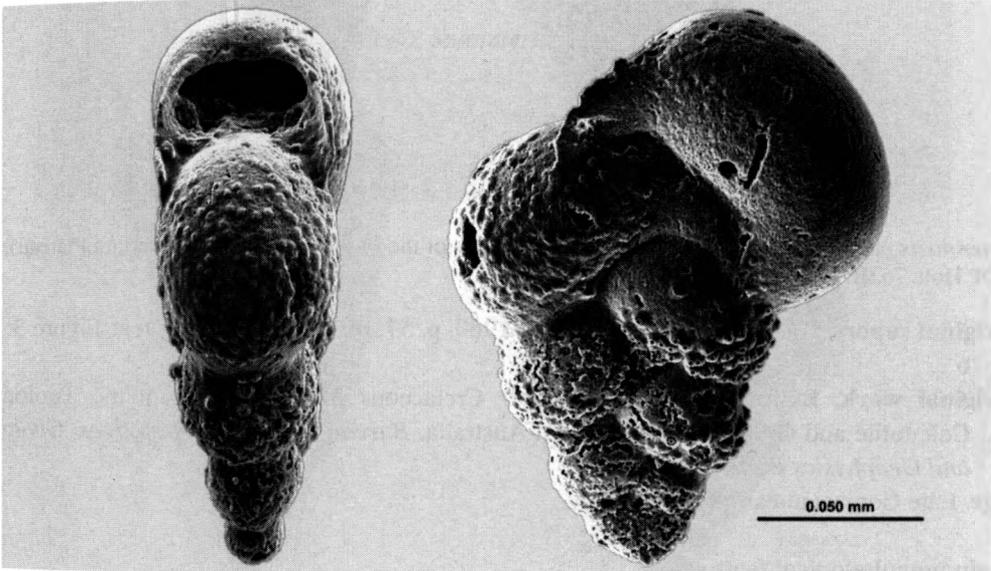
Age. Late Turonian.

Main morphological features.

- Test consists of the proloculus, which is followed by chambers added alternately with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are subglobular in the earlier portion of the test and reniform in the adult portion; chambers present a gradual size increase. Sutures are distinct and depressed throughout.

- Test is symmetrical in edge view. Periphery is rounded and simple, without peripheral structures.
- Aperture has the shape of an arch, and is situated at the base of the last-formed chamber.
- Periapertural structures consist of symmetrically developed flanges, which are not rimmed.
- Chamber surface is ornamented with large pore mounds.
- Wall is calcitic, hyaline, simple and perforate.

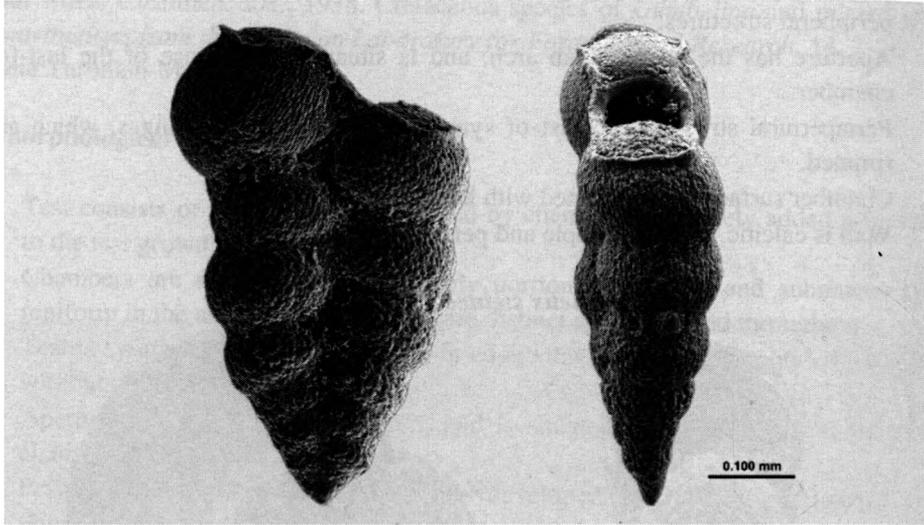
Heterohelix steinecki (Georgescu 2009)



Heterohelix steinecki from the upper Turonian sediments of South Atlantic Ocean (Falkland Plateau), DSDP Site 511 illustrated by Georgescu (2009), Figure 9: 1.

Notes on identification. Ornamentation consisting of pore mounds requires observations with a SEM or ESEM.

Revision. The morphology of this species was not reviewed. Georgescu (2014) revised its name as F-2alternate in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Heterohelix papula (Belford 1960)

Heterohelix papula from the upper Santonian sediments of the East Indian Ocean (Exmouth Plateau), ODP Hole 763B.

Original report. *Gümbelina papula* Belford 1960, p. 57, pl. 15, Figures 6-8, text-Figure 3: 1-6.

Original work. Belford, D.J., 1960. Upper Cretaceous foraminifera from the Toolonga Calcilutite and Gingin Chalk, Western Australia. *Bureau of Mineral Resources, Geology and Geophysics Bulletin*, 57, 1-198.

Age. Late Coniacian-early Campanian.

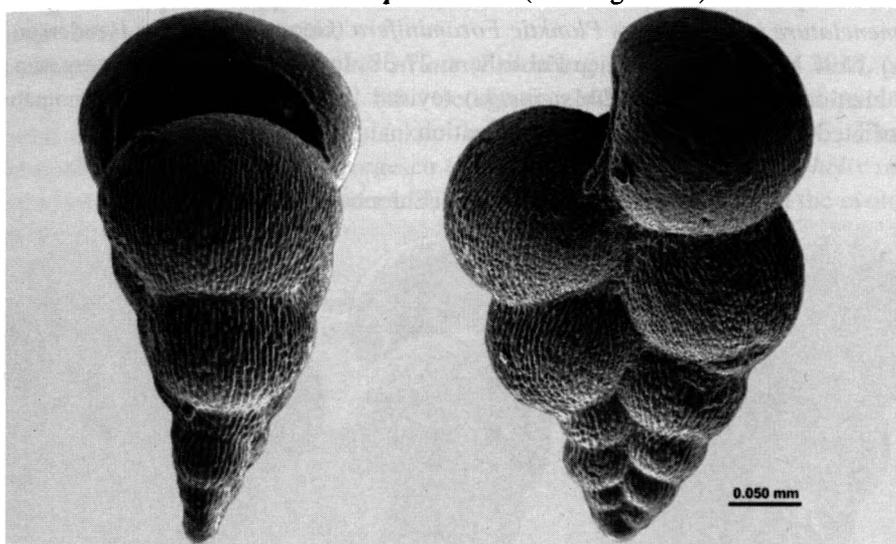
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement. Multichamber growth occasionally occurs in the adult portion of the test.
- Chambers are subglobular to globular, occasionally spherical, with variable overlapping and gradual size increase. Sutures are distinct and depressed, straight to slightly curved throughout.
- Test is symmetrical in edge view. Periphery is broadly rounded and simple, without peripheral structures.
- Aperture has the shape of an arch, and is situated at the base of the last-formed chamber. Periapertural structures consist of symmetrically developed narrow and rimmed flanges, which are often indistinct.
- Chamber surface is ornamented with more or less continuous longitudinal thin costae.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Heterohelix papula* is a large-sized species. The chamber size increase in the terminal portion of the test is often extremely reduced resulting in nearly parallel margins as seen in lateral and edge views.

Recommended revision. *Texasina papula* (Belford 1960). Georgescu 2010, p. 74, pl. 1, Figures 1-8. Georgescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118. Georgescu (2014, see citation under *Heterohelix steinecki*) revised its name as 1-2multichamber in the nomenclature associated with the evolutionary classification.

***Heterohelix plummerae* (Sandidge 1932)**



Heterohelix plummerae from the upper Santonian sediments of the Yucatan Outer Shelf (Caribbean region). Specimens illustrated by Georgescu (2014), Figure 1: 5-6.

Original report. *Ventilabrella plummerae* Sandidge 1932, p. 195, pl. 19, Figures 5-6.

Original work. Sandidge, J.R., 1932. Significant foraminifera from the Ripley Formation of Alabama. *American Midland Naturalist*, 13, 190-202.

Age. Santonian-Campanian.

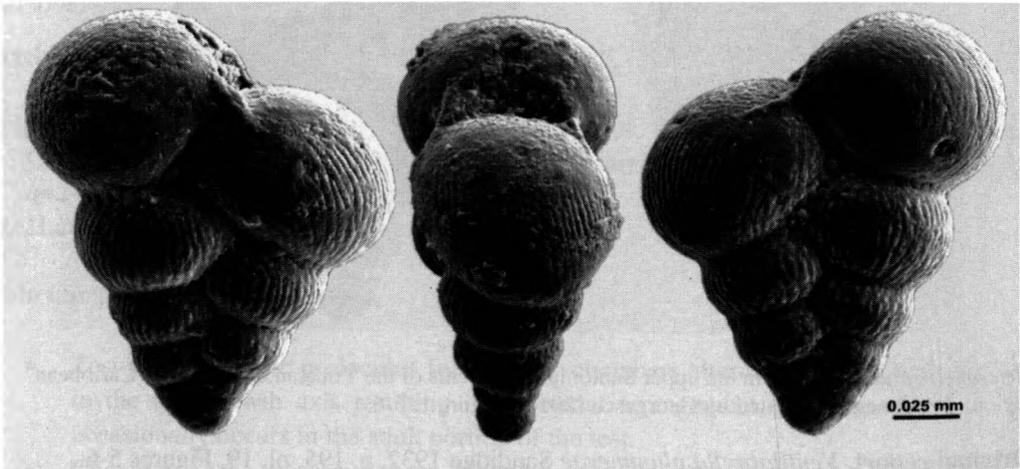
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers have a distinct but slight increase in thickness, which is more apparent in the adult stage, and present a gradual size increase. Sutures are distinct and deeply incised throughout.
- Test is symmetrical in edge view, with a high rate of size increase especially in the adult stage.

- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture has the shape of an arch, and is situated at the base of the last-formed chamber.
- Periapertural structures consist of symmetrically developed narrow and rimmed flanges.
- Chamber surface is ornamented with thin, continuous longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Bronnimannella plummerae* (Sandidge 1932). Georgescu 2014, p. 29, Figure 1: 10. Georgescu, M.D., 2014. Reinstatement of the Cretaceous planktic foraminifer *Bronnimannella* Montanaro Gallitelli 1956 as directional lineage in evolutionary classification. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 27-38. In a different work Georgescu (2014, see citation under *Heterohelix steinecki*) revised it as I-4alternate in the nomenclature associated with the evolutionary classification.

***Heterohelix striata* (Ehrenberg 1838)**



Heterohelix striata from the upper Campanian sediments of Missouri (USA) from the Ehrenberg Collection (Naturkundemuseum Berlin) illustrated by Georgescu (2013), plate 3, Figures 9-11.

Original report. *Textularia striata* Ehrenberg 1838, p. 135, pl. 4, Figure a.

Original work. Ehrenberg, C.G., 1838. Über die Bildung der Kreidefelsen und des Kreidemergels durch unsichtbare Organismen. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin*, 1838: 59–147. [published in 1839]

Age. Santonian-Maastrichtian.

Main morphological features.

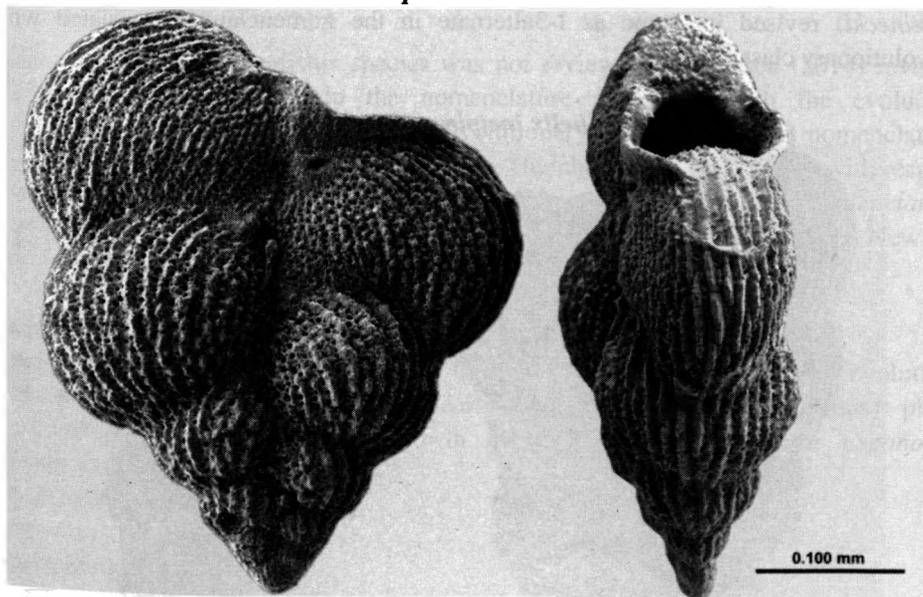
- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.

- Chambers are globular throughout, overlap at various rates and present a gradual size increase. Sutures are depressed and straight to slightly curved throughout.
- Test is symmetrical in edge view. Periphery is broadly rounded and simple, without peripheral structures.
- Aperture has the shape of a medium high arch and is situated at the base of the last-formed chamber. Periapertural structures consist of symmetrically developed flanges.
- Ornamentation consists of thin longitudinal costae. Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae, rarely interrupting them.

Notes on identification. This is a small-sized species, which differs from *Heterohelix reussi* mainly in the morphology of the periapertural structures, which are not rimmed and slower chamber increase in size.

Recommended revision. *Ehrenbergites striata* (Ehrenberg 1838). Georgescu 2013, p. 12, pl. 3, Figures 9-11, pl. 4, Figures 1-8. Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49. Georgescu (2014, see citation under *Heterohelix steinecki*) revised its name as I-3multichamber in the nomenclature associated with the evolutionary classification.

***Heterohelix sphenoides* Masters 1976**



Heterohelix sphenoides from the upper Santonian sediments of the Gulf of Mexico, Eureka 67-128 well illustrated by Georgescu (2010), plate 2, Figures 5, 7.

Original report. *Heterohelix sphenoides* Masters 1976, p. 1976, p. 318, pl. 1, Figures 1-3.

Original work. Masters, B.A., 1976. Planktic foraminifera from the Upper Cretaceous Selma Group, Alabama. *Journal of Paleontology*, 50, 318-330.

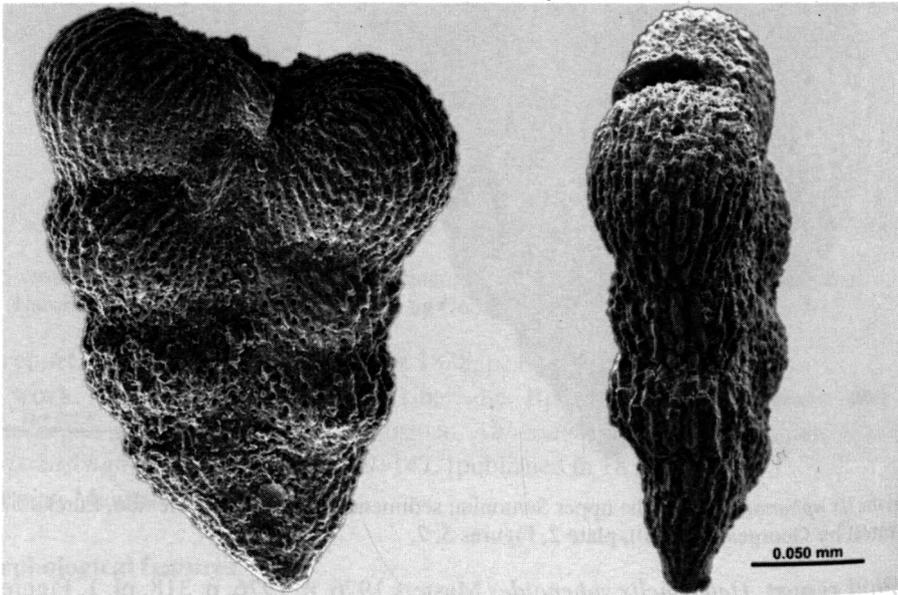
Age. Late Santonian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are subglobular in the earlier portion of the tests, and with petaloid shape in the adult; there is a gradual chamber size increase. Sutures are depressed and distinct, with the central suture almost straight.
- Tests are symmetrical and compressed in edge view. Periphery is rounded and simple, without peripheral structures.
- Aperture has the shape of an arch, and is situated at the base of the last-formed chambers; two small-sized accessory apertures, one on each test side occur occasionally in the posterior portion of the last-formed chamber. Periapertural structures consist of symmetrically developed flanges.
- Chamber surface is ornamented with thin longitudinal costae, which are more prominent in the test peripheral regions. Test wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae, rarely interrupting them.

Recommended revision. *Planulitella sphenoides* (Masters 1976). Georgescu 2010, p. 78, pl. 2, Figures 1-11. Georgescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118. Georgescu (2014, see citation under *Heterohelix steinecki*) revised its name as I-3alternate in the nomenclature associated with the evolutionary classification.

Heterohelix incipiens (Georgescu 2010)



Heterohelix incipiens from the upper Santonian sediments of the Yucatan Outer Shelf, DSDP Site 95, and Gulf of Mexico, Eureka well 67-128 respectively illustrated by Georgescu 2010, plate 4, Figures 5, 8.

Original report. *Sigalia incipiens* Geogrescu 2010, p. 82, pl. 4, Figures 1-12.

Original work. Geogrescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118.

Age. Late Santonian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement. Chambers of the final stage are subrectangular to petaloid in shape.
- Sutures are distinct and depressed, often perpendicular to the test growth axis; central suture is almost straight. Weak sutural ridges (calyptoridges) occur often between the chambers.
- Test is symmetrical and compressed in edge view. Periphery is rounded and simple.
- Aperture has the shape of an arch of variable height and is situated at the base of the last-formed chamber.
- Periapertural structures consist of symmetrically developed rimmed flanges.
- Chambers are ornamented with thin longitudinal costae, which are more prominent in the peripheral regions, and over the earlier chambers. Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the thin costae.

Revision. The morphology of this species was not reviewed. Geogrescu (2014) revised its name as I-5multichamber in the nomenclature associated with the evolutionary classification. Geogrescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Geogrescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

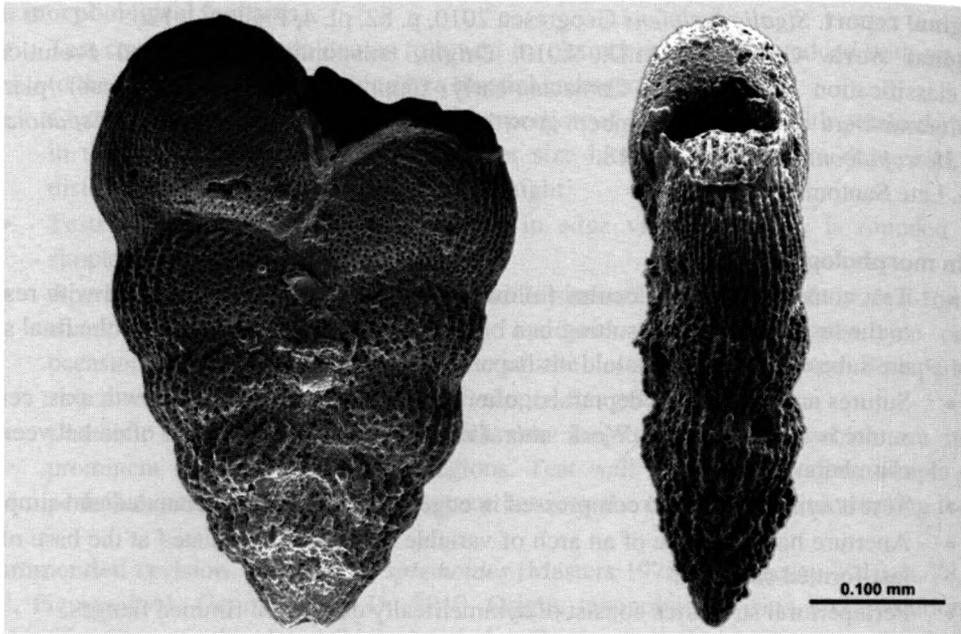
Original report. *Proliferania initialis* Geogrescu 2010, p. 92, pl. 8, Figures 1-12.

Original work. Geogrescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118.

Age. Late Santonian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers of the adult portion of the test present a subrectangular to, more rarely, petaloid shape.
- Sutures are distinct and depressed, but calyptoridges occur and are developed especially between the chambers of the early portion of the test.
- *Heterohelix initialis* (Geogrescu 2010)



Heterohelix initialis from the upper Santonian sediments of the Yucatan Outer Shelf, DSDP Site 95 illustrated by Georgescu (2010), plate 8, Figures 1, 4.

- Test is symmetrical and compressed in edge view. Periphery is simple and rounded, without peripheral structures.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed rimmed flanges border the aperture.
- Chamber surface is ornamented with thin longitudinal costae that often fuse to form a reticulate network over the earliest chambers. Wall is calcitic, hyaline, simple and perforate.

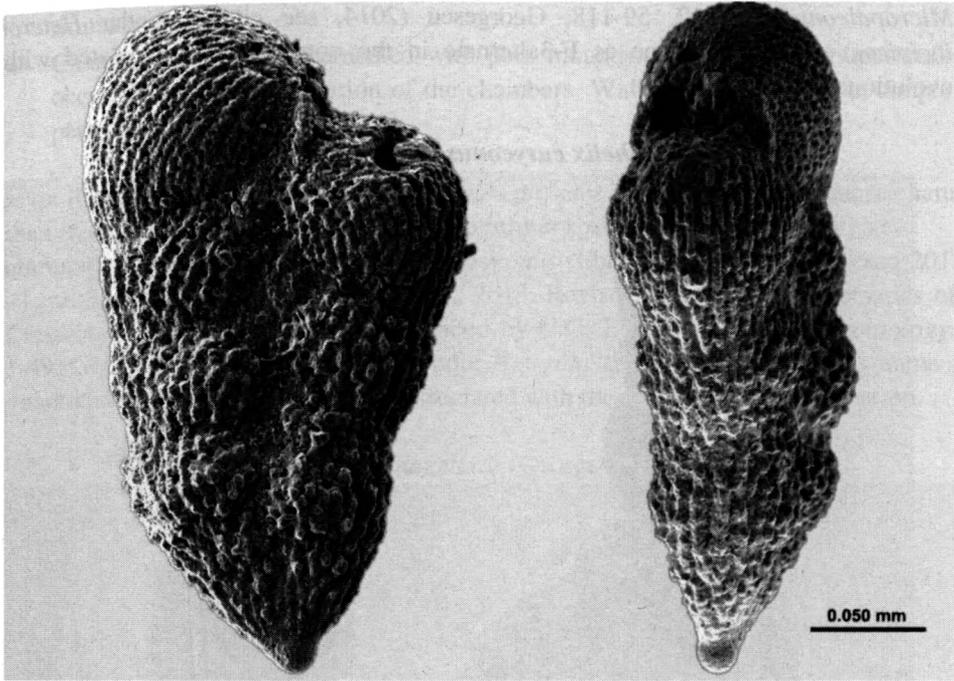
Notes on identification. *Heterohelix initialis* and *H. incipiens* can be easily confused under the optical stereomicroscope. Therefore, SEM and ESEM observations are necessary in order to correctly recognize them.

Revision. The morphology of this species was not reviewed. Georgescu (2014, see citation under *Heterohelix incipiens*) revised its name as I-6multichamber in the nomenclature associated with the evolutionary classification.

Original report. *Heterohelix stenopos* Masters 1976, p. 319, pl. 1, Figures 4-5.

Original work. Masters, B.A., 1976. Planktic foraminifera from the Upper Cretaceous Selma Group, Alabama. *Journal of Paleontology*, 50, 318-330.

Age. Late Santonian.

Heterohelix stenopos Masters 1976

Heterohelix stenopos from the upper Santonian sediments of the Gulf of Mexico, Eureka 67-128 well illustrated by Georgescu (2010), plate 3, Figures 1-2.

Main morphological features.

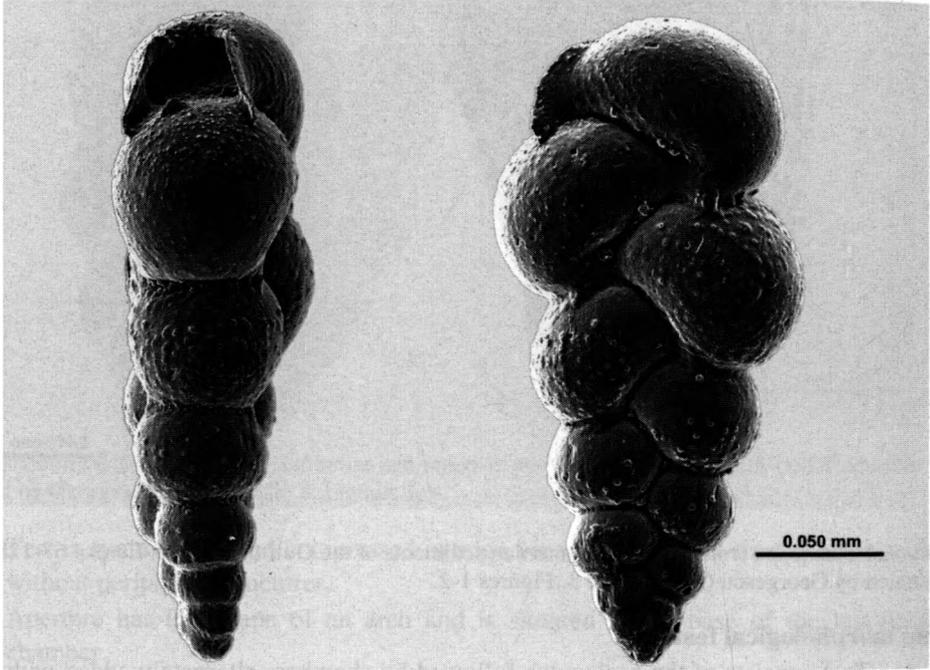
- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biseriate arrangement.
- Chambers are subglobular and with fast rate of size increase in the earlier portion of the test, and subrectangular to petaloid, and slower increase rate in the adult stage. Sutures are depressed and distinct throughout.
- Test is symmetrical and compressed in edge view. Periphery is rounded and simple, without peripheral structures.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Periapertural structures consist of symmetrically developed rimmed flanges.
- Chamber surface is ornamented with thin longitudinal costae. Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae, rarely interrupting them.

Notes on identification. The combination of compressed tests and changing rate of chamber size increase, faster in the juvenile stage and slower in the adult is helpful in the identification of this species.

Recommended revision. *Planulitella stenopos* (Masters 1976). Georgescu 2010, p. 80, pl. 3, Figures 1-4. Georgescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic

foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118. Georgescu (2014, see citation under *Heterohelix incipiens*) revised its name as F-3alternate in the nomenclature associated with the evolutionary classification.

***Heterohelix euryconus* (Ehrenberg 1854)**



Heterohelix euryconus from the lower Campanian sediments of South Atlantic Ocean, Site 511 illustrated by Georgescu (2009), Figure 7: 1. Georgescu, M.D., 2009. Taxonomic revision and evolutionary classification of the biserial Cretaceous planktic foraminiferal genus *Laeviheterohelix* Nederbragt, 1991. *Revista Mexicana de Ciencias Geológicas*, 26, 315-334.

Original report. *Textilaria euryconus* Ehrenberg 1854, p. 25, pl. 32, part I, Figure 9.

Original work. Ehrenberg, C.G., 1854. *Mikrogeologie*. Leipzig: L. Voss, 374 p.

Age. Late Santonian-Campanian.

Main morphological features.

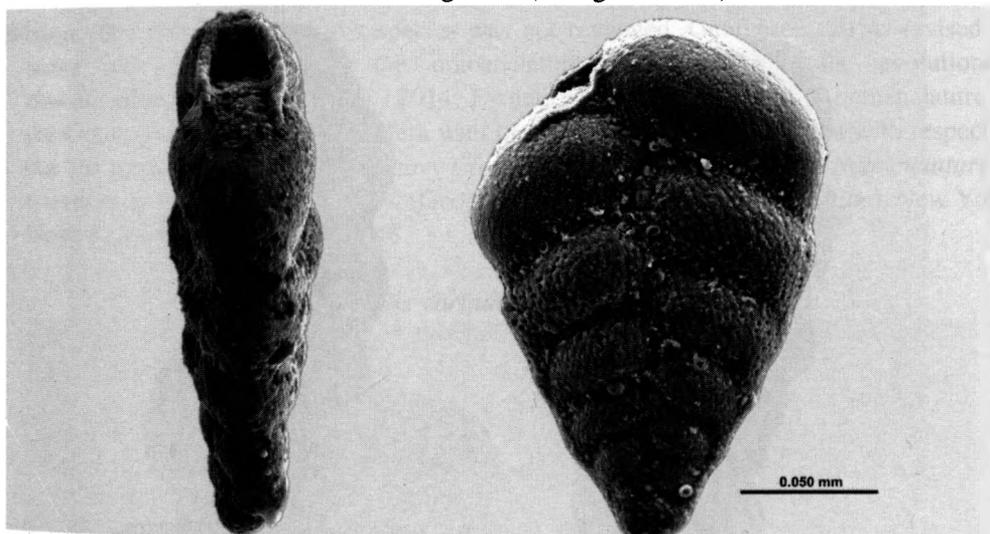
- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers present a variable shape: subglobular in the earlier portion of the test and reniform in the adult.
- Sutures are depressed, distinct and slightly curved throughout.
- Test is symmetrical and compressed in edge view. Periphery is rounded and simple, without peripheral structures.
- Aperture has the shape of an arch, and is situated at the base of the last-formed chamber.

- Periapertural structures consist of symmetrically developed flanges, which are not rimmed.
- Chamber surface is ornamented with pore mounds. A pustulose periapertural area occurs in the anterior portion of the chambers. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. In general *H. euryconus* presents a test consisting of more chambers than *H. steinecki*; therefore, the tests of the former species appear more elongate.

Recommended revision. *Laeviheterohelix euryconus* (Ehrenberg 1854). Georgescu 2013, p. 11, pl. 3, Figures 1-8. Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49. Georgescu (2014, see citation under *Heterohelix incipiens*) revised its name as I-4multichamber in the nomenclature associated with the evolutionary classification.

***Heterohelix magellani* (Georgescu 2014)**



Heterohelix magellani from the lower and middle Campanian of the central Pacific Ocean (Mid-Pacific Mountains) illustrated by Georgescu (2014), Figure 5: 9-10.

Original report. *Magellanina magellani* Georgescu 2014, p. 50, Figure 5: 1-12.

Original work. Georgescu, M.D., 2014. New Late Cretaceous (Santonian-Maastrichtian) heterohelid planktic foraminifera from the Pacific and Indian Oceans and their biostratigraphic and evolutionary significance. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 39-71.

Age. Late Santonian-Campanian.

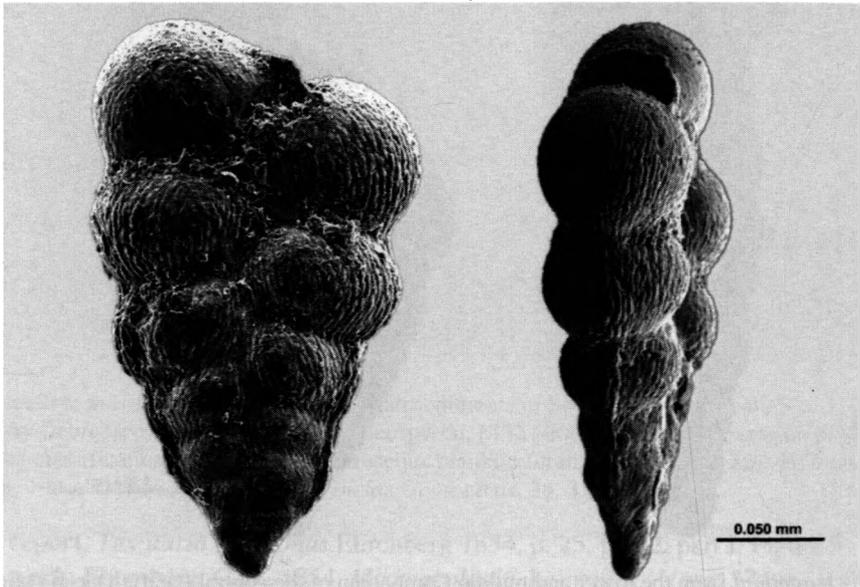
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.

- Earlier chambers of the test have a subrectangular shape and those of the adult stage are reniform. Sutures are depressed and distinct throughout.
- Test is symmetrical and compressed in edge view. Periphery is rounded to subangular and simple, without peripheral structures.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber. Two symmetrically developed rimmed flanges border the aperture.
- Chamber surface is ornamented with thin discontinuous longitudinal costae, which are more prominent in the central portion of the test. Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae.

Revision. The morphology of this species was not reviewed. In an article published in the same volume Georgescu (2014, see citation under *Heterohelix incipiens*) revised its name as I-8multichamber in the nomenclature associated with the evolutionary classification.\

Heterohelix hendersoni (Georgescu and Abramovich 2008)



Heterohelix hendersoni from upper Campanian sediments of the South Atlantic Ocean (Falkland Plateau), DSDP Site 511 illustrated by Georgescu and Abramovich (2008), plate 1, Figures 1, 4.

Original report. *Hendersonia hendersoni* Georgescu and Abramovich 2008, p. 101, pl. 1, Figures 1-10.

Original work. Georgescu, M.D., Abramovich, S., 2008. Taxonomic revision and phylogenetic classification of the Late Cretaceous (Upper Santonian-Maastrichtian) serial planktonic foraminifera (Family Heterohelicidae Cushman, 1927) with peripheral test wall flexure. *Revista Española de Micropaleontología*, 40, 97-114.

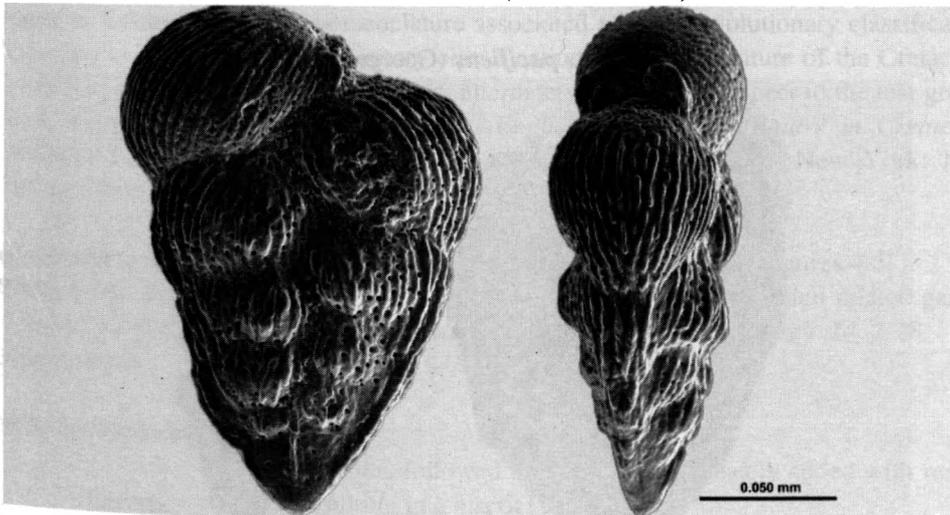
Age. Late Santonian-Campanian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are subrectangular in the early portion of the test and the last-formed one or two present a petaloid shape. Sutures are depressed and distinct throughout.
- Test is symmetrical and compressed in edge view. Periphery is subacute in the early portion of the test, with a weakly developed test wall flexure.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically flanges, rimmed or not, border the aperture.
- Chamber surface is ornamented thin longitudinal costae. Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae, rarely interrupting them.

Revision. The morphology of this species was not reviewed. Georgescu (2014) revised its name as I-2planispiral in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Heterohelix carinata (Cushman 1938)



Heterohelix carinata from the upper Santonian sediments of the New Jersey coastal plain illustrated by Georgescu and Abramovich (2008), plate 2, Figures 1, 4.

Original report. *Gümbelina carinata* Cushman 1938, p. 18, pl. 3, Figure 10.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

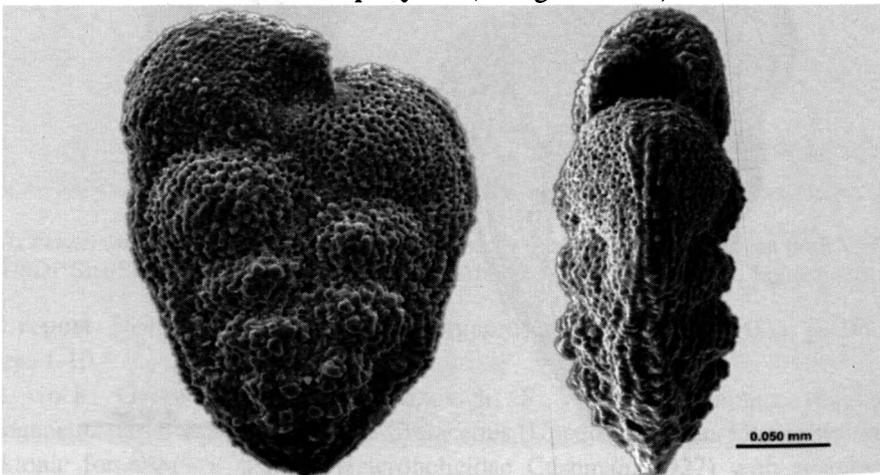
Age. Late Santonian-Campanian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers present in general a subrectangular shape and the last-formed one or two can be occasionally petaloid. Sutures are depressed and distinct throughout.
- Test is symmetrical and compressed in edge view.
- Periphery is subacute, and with a test wall flexure developed on all chambers.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed rimmed flanges border the aperture.
- Chamber surface is ornamented with thin longitudinal costae; the costae are thicker in the central portion of the chambers.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Hendersonia carinata* (Cushman 1938). Georgescu and Abramovich 2008, p. 104, pl. 2, Figures 1-12, pl. 3, Figures 1-2. Georgescu, M.D., Abramovich, S., 2008. Taxonomic revision and phylogenetic classification of the Late Cretaceous (Upper Santonian-Maastrichtian) serial planktonic foraminifera (Family Heterohelicidae Cushman, 1927) with peripheral test wall flexure. *Revista Española de Micropaleontología*, 40, 97-114. Georgescu (2014, see citation under *Heterohelix hendersoni*) revised its name as F-2planispiral in the nomenclature associated with the evolutionary classification.

***Heterohelix pacificus* (Georgescu 2011)**



Heterohelix pacificus from the uppermost Santonian-lower Campanian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Hendersonites pacificus* Georgescu 2011, p. 108, pl. 1, Figures 1-12, pl. 2, Figures 1-10.

Original work. Georgescu, M.D., 2011. A new type of test wall in the Late Cretaceous (Late Santonian-Campanian) heteroheliced planktic foraminifera. *Revue de Micropaléontologie*, 54, 105-114.

Age. Latest Santonian-early Campanian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are subrectangular in the earlier portion of the test and crescentic in the adult.
- Sutures are depressed throughout, often indistinct between the earlier chambers.
- Test is symmetrical in edge view. Periphery is subangular, with a well-developed test wall flexure on all chambers resulting in a rim-like structure around the test.
- Aperture has the shape of an arch, and is situated at the base of the last-formed chamber.
- Two symmetrically developed flanges border the aperture.
- Chamber surface is ornamented with thin longitudinal costae, which are more prominent over the earlier chambers of the test. Wall is calcitic, hyaline, simple-ridged in the adult and perforate.

Notes on identification. A correct identification of this species requires observations on the test wall ultrastructure.

Revision. The morphology of this species was not reviewed. Georgescu (2014) revised its name as I-5alternate in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

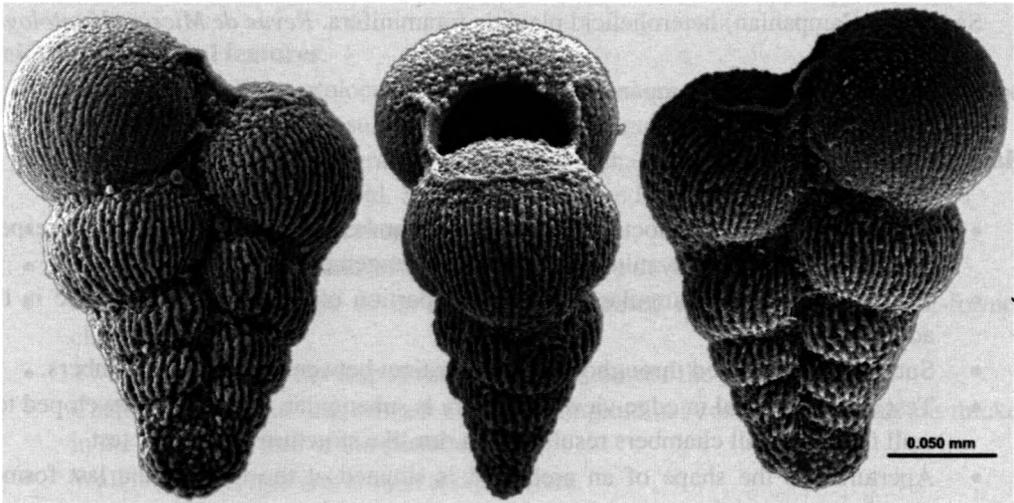
Original report. *Gümbelina globocarinata* Cushman 1938, p. 10, pl. 2, Figures 4-5.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

Age. Campanian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers in the earlier portion of the test are subglobular and globular to spherical in the adult, overlap at various rates and present a gradual size increase. Sutures are distinct and depressed throughout.

Heterohelix globocarinata (Cushman 1938)

Heterohelix globocarinata from the lower Campanian sediments of the Pacific Ocean (Shatsky Rise), DSDP Site 305 illustrated by Georgescu (2014), Figures 42: F.

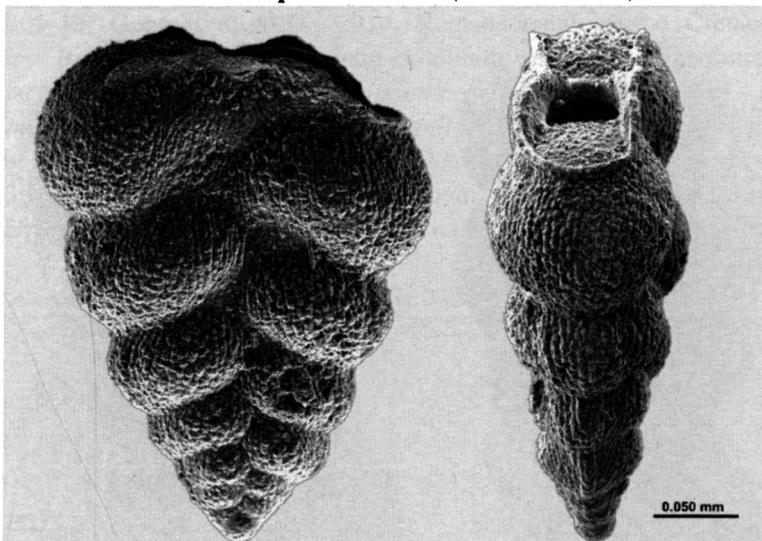
- Test is symmetrical in edge view, with the earliest portion slightly compressed.
- Periphery is broadly rounded in the adult portion and simple, without peripheral structures.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed narrow and rimmed flanges border the aperture.
- Chamber surface is ornamented with thin and continuous longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the costae, rarely interrupting them.

Revision. The morphology of this species was not reviewed. Georgescu (2014) revised its name as I-3planispiral in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Original report. *Gümbelina pseudotessera* Cushman 1938, p. 14, pl. 2, Figures 19-20.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

Age. Campanian-Maastrichtian.

Heterohelix pseudotessera (Cushman 1938)

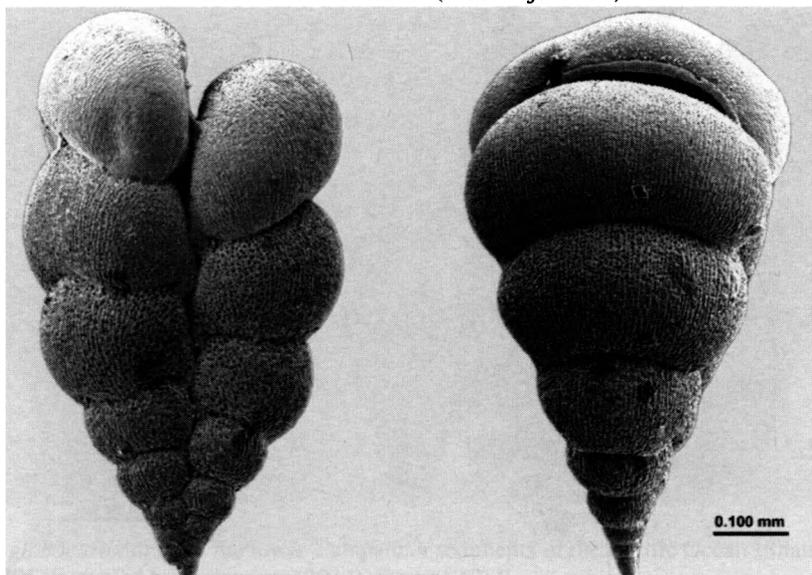
Heterohelix pseudotessera from the upper Maastrichtian sediments of the North Atlantic Ocean (Orphan Knoll), Hole 111A illustrated by Georgescu and others (2008), plate 3, Figures 7.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement. The two rows of chambers diverge towards the adult stage.
- Chambers of the earlier portion of the test are subrectangular and those of the adult stage reniform; chambers present a gradual size increase.
- Test is symmetrical and compressed in edge view. Periphery is rounded and simple, without peripheral structures.
- Aperture has the shape of an arc and is situated at the base of the last-formed chamber.
- Two symmetrically developed rimmed flanges border the aperture.
- Chamber surface is ornamented with thin longitudinal costae. Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae, rarely interrupting them.

Notes on identification. *Heterohelix pseudotessera* differs from *H. planata* mainly by the two rows of divergent chambers and well-developed periapertural structures.

Recommended revision. *Praegublerina pseudotessera* (Cushman 1938). Georgescu and others 2008, p. 404, pl. 3, Figures 6-12. Georgescu, M.D., Saupe, E.E., Huber, B.T., 2008. Morphometric and stratophenetic basis for phylogeny and taxonomy in Late Cretaceous gublerinid planktonic foraminifera. *Micropaleontology*, 54, 397-424. [published in 2009]. Georgescu (2014, see citation under *Heterohelix globocarinata*) revised its name as I-9multichamber in the nomenclature associated with the evolutionary classification.

Heterohelix nuttalli (Voorwijk 1937)

Heterohelix nuttalli from the upper Maastrichtian sediments of the North Atlantic Ocean (J-Anomaly , Ridge), DSDP Site 384 illustrated by Georgescu (2014), Figure 2: 9-10.

Original report. *Gümbelina nuttalli* Voorwijk 1937, p. 195, pl. 2, Figures 1-9.

Original work. Voorwijk, G.H., 1937. Foraminifera from the Upper Cretaceous of Habana, Cuba. *Proceedings of the Koninklijke Akademie van Wetenschappen te Amsterdam*, 40, 190-198.

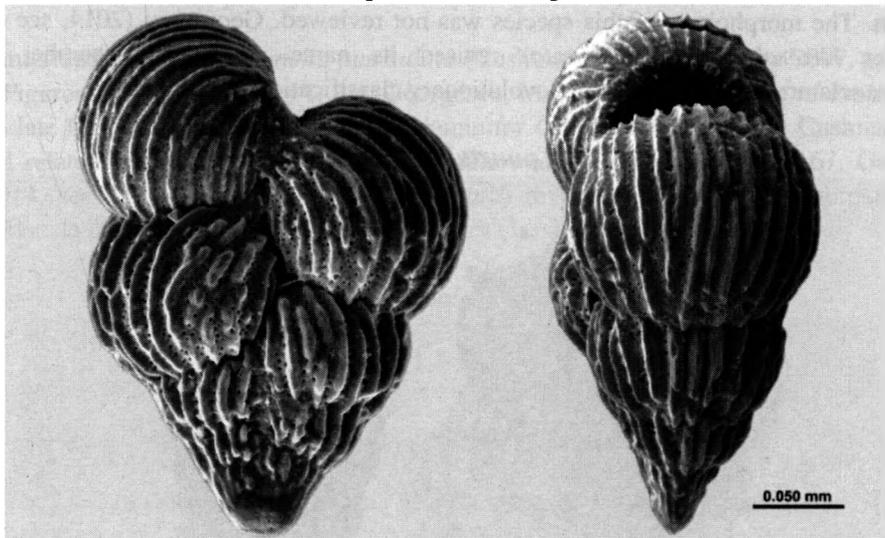
Age. Campanian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Earlier chambers are subglobular, and the last-formed ones of the adult stage almost spherical and with a well-developed transversal elongation.
- Sutures are depressed and distinct throughout. Test is symmetrical in edge view, with a rapid thickness increase in the adult stage. Periphery is broadly rounded and simple, without peripheral structures.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two narrow rimmed flanges border the aperture.
- Chamber surface is ornamented with continuous longitudinal thin costae. Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae, rarely interrupting them.

Recommended revision. *Bronnimannella nuttalli* (Voorwijk 1937). Georgescu 2014, p. 31, Figure 2: 1-10. Georgescu, M.D., 2014. Reinstatement of the Cretaceous planktic foraminifer *Bronnimannella* Montanaro Gallitelli 1956 as directional lineage in evolutionary classification. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 27-38. In an article published in the same volume Georgescu (2014, see citation under *Heterohelix globocarinata*) revised its name as F-4alternate in the nomenclature associated with the evolutionary classification.

Heterohelix sphaeralis (Georgescu 2014)



Heterohelix sphaeralis from the middle Campanian Demopolis Chalk from Alabama (USA) illustrated by Georgescu (2014), Figures 2: 1-2.

Original report. *Planoglobulina sphaeralis* Georgescu 2014, p. 77, Figures 3: 1-9, 4: 1-10.

Original work. Georgescu, M.D., 2014. Taxonomic revision of *Planoglobulina* Cushman 1927 as directional lineage in evolutionary classification. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 73-92.

Age. Middle Campanian-Maastrichtian.

Main morphological features.

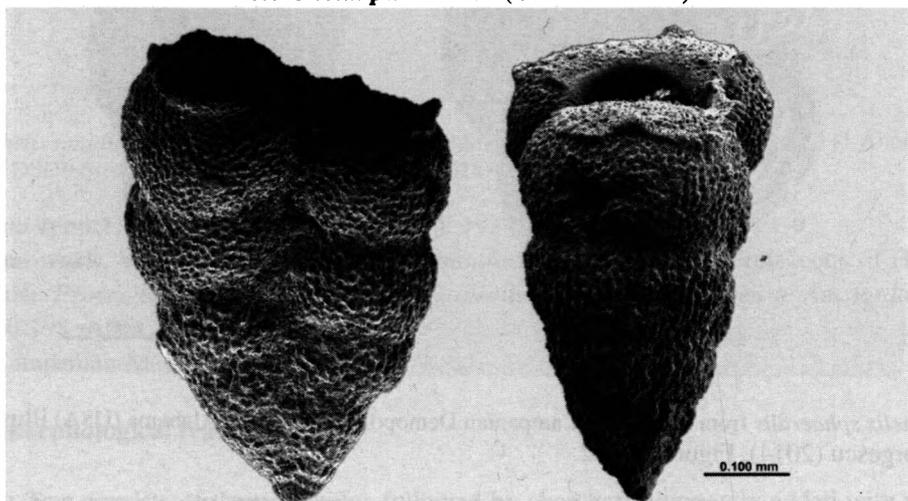
- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are globular to spherical throughout, overlap at various rates, and present a gradual size increase.
- Sutures are distinct and depressed throughout.
- Test is symmetrical in edge view. Periphery is broadly rounded and simple, without peripheral structures.

- Aperture has the shape of an arch, and is situated at the base of the last-formed chamber. Two symmetrically developed, narrow and rimmed periapertural flanges border the aperture.
- Chamber surface is ornamented with thick longitudinal costae. Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the pores, and do not interrupt them.

Notes on identification. This species can be recognized by the globular to spherical chambers ornamented with thick longitudinal costae. The periapertural structures are strongly reduced, often indistinct, and require SEM or ESEM observations.

Revision. The morphology of this species was not reviewed. Georgescu (2014, see citation under *Heterohelix globocarinata*) revised its name as I-10multichamber in the nomenclature associated with the evolutionary classification.

Heterohelix punctulata (Cushman 1938)



Heterohelix punctulata from the upper Campanian sediments of the Caribbean region (Nicaragua Rise), DSDP Site 152, which was illustrated by Georgescu (2007), pl. 1, Figure 1.

Original report. *Gümbelina punctulata* Cushman 1938, p. 13, pl. 2, Figures 15-16.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

Age. Late Campanian-Maastrichtian.

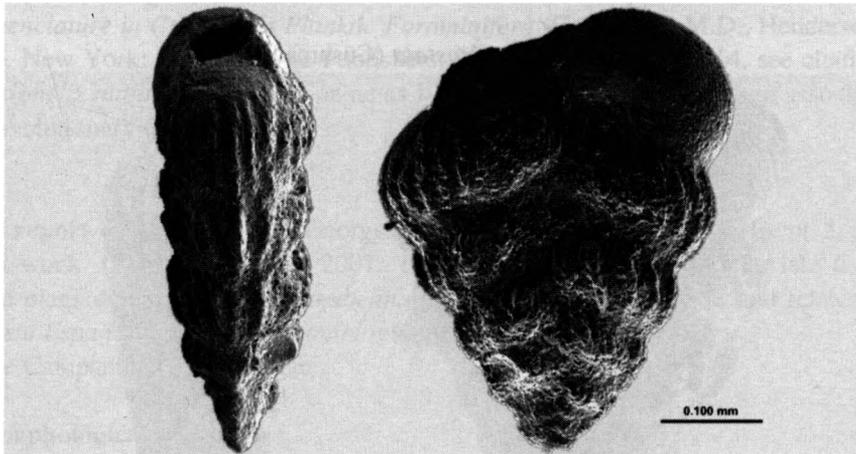
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are subspherical, overlap at variable rate, and present a gradual size increase.
- Chamber proliferation occurs occasionally in the adult stage.
- Sutures are depressed and distinct throughout.

- Test is symmetrical in edge view. Periphery is broadly rounded and simple, without peripheral structures.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed narrow and rimmed flanges border the aperture.
- Chamber surface is ornamented with thin discontinuous costae over the last-formed chambers and a reticulate network of structures resulted from the partial fusion of the costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae or the openings of the reticulate ornamentation.

Recommended revision. *Braunella punctulata* (Cushman 1938). Georgescu 2007, p. 158, pl. 1, Figures 1-5, pl. 3, Figures 1, 3-4. Georgescu, M.D., 2007. Taxonomic re-evaluation of the late Cretaceous serial planktonic foraminifer *Gümbelina punctulata* Cushman, 1938 and relates species. *Revista Española de Micropaleontología*, 39, 155-167. Georgescu (2014, see citation under *Heterohelix nuttalli*) revised its name as I-6alternata in the nomenclature associated with the evolutionary classification.

***Heterohelix rajagopalani* (Govindan 1972)**



Heterohelix rajagopalani from the upper Maastrichtian sediments of the South Atlantic Ocean (Sao Paulo Plateau), DSDP Site 356 illustrated by Georgescu and others (2008), plate 5, Figures 3.

Original report. *Gublerina rajagopalani* Govindan 1972, p. 170, pl. 2, Figures 1-5.

Original work. Govindan, A., 1972. Upper Cretaceous planktonic foraminifera from the Pondicherry area, south India. *Micropaleontology*, 19, 160-193.

Age. Late Campanian-Maastrichtian.

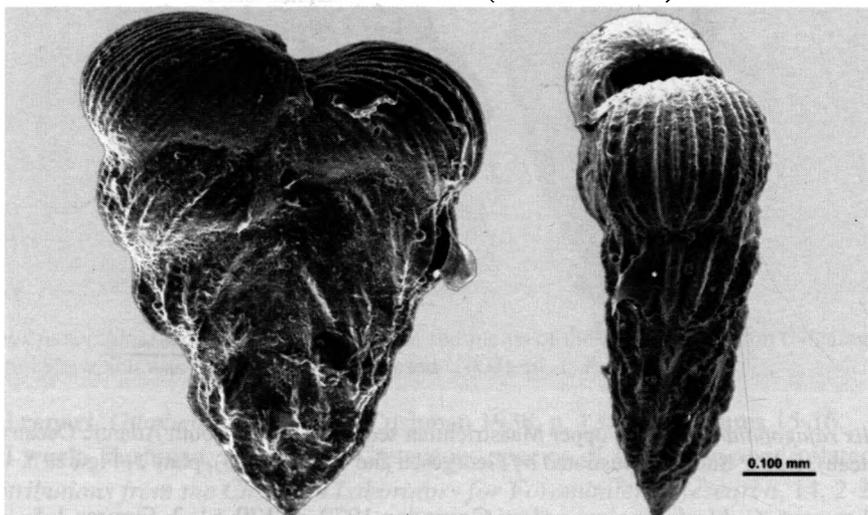
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement. The two rows of chambers diverge towards the anterior test portion.

- Chambers are subglobular in the early portion of the test and subrectangular to reniform in the adult, and present a gradual size increase. Sutures are distinct and depressed throughout.
- Test is symmetrical in edge view. Periphery is rounded, with one or two strong longitudinal costae that confer the test a keeled appearance.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber. Two symmetrically developed rimmed flanges border the aperture.
- Chamber ornamentation is more prominent over the earlier portion of the test, where large-sized irregular structures can develop as the result of the successive addition of calcite layers during the ontogeny; costate ornamentation occurs over the last-formed one or few chambers of the test.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Gublerina rajagopalani* Govindan 1972. Georgescu and others 2008, p. 410, pl. 5, Figures 1-5. Georgescu, M.D., Saupe, E.E., Huber, B.T., 2008. Morphometric and stratophenetic basis for phylogeny and taxonomy in Late Cretaceous gublerinid planktonic foraminifera. *Micropaleontology*, 54, 397-424. [published in 2009]. Georgescu (2014, see citation under *Heterohelix nuttalli*) revised its name as I-11 multichamber in the nomenclature associated with the evolutionary classification.

Heterohelix semicostata (Cushman 1938)



Heterohelix semicostata from the upper Campanian sediments of the Gulf of Mexico, well Eureka 67-128, which were illustrated by Georgescu (2014), Figure 2: 1-2.

Original report. *Gümbelina semicostata* Cushman 1938, p. 16, pl. 3, Figure 6.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

Age. Late Campanian-early Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Earlier chambers are subglobular, those of the adult stage subrectangular, with variable overlapping rate, and gradual size increase. Sutures are often indistinct, especially between the earlier chambers of the test.
- One finely perforate calcareous plate covers the central portion over the central suture.
- Test is symmetrical and compressed in edge view. Periphery is rounded and simple.
- Aperture has the shape of an arch, and is situated at the base of the last-formed chamber. Periapertural structures are symmetrically developed but rarely visible.
- Chamber surface is ornamented with thick longitudinal costae, which are developed in the test peripheral regions; ornamentation is absent in the central portion due to the development of the perforate calcareous plate. Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Eicheriella semicostata* (Cushman 1938). Georgescu 2014, p. 96, Figure 2: 1-11. Georgescu, M.D., 2014. Evolution of central perforate plate in the new condensed lineage *Eicheriella*. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 93-100. Georgescu (2014, see citation under *Heterohelix nuttalli*) revised its name as I-7alternate in the nomenclature associated with the evolutionary classification.

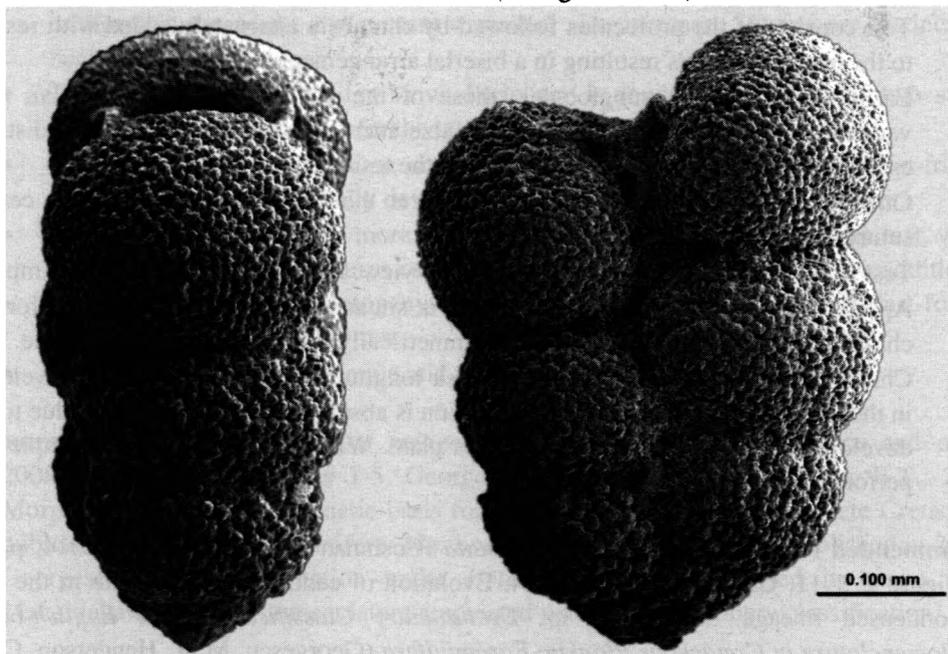
Original report. *Braunella brauni* Georgescu 2007, p. 160, pl. 2, Figures 1-6, pl. 3, Figure 2.

Original work. Georgescu, M.D., 2007. Taxonomic re-evaluation of the late Cretaceous serial planktonic foraminifer *Gümbelina punctulata* Cushman, 1938 and relates species. *Revista Española de Micropaleontología*, 39, 155-167.

Age. Late Campanian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers are subspherical or spherical, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed throughout.
- Test is symmetrical in edge view.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture has the shape of an arch, and is situated at the base of the last-formed chamber.

Heterohelix brauni (Georgescu 2007)

Heterohelix brauni from the upper Campanian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 illustrated by Georgescu (2007), plate 2, Figure 1.

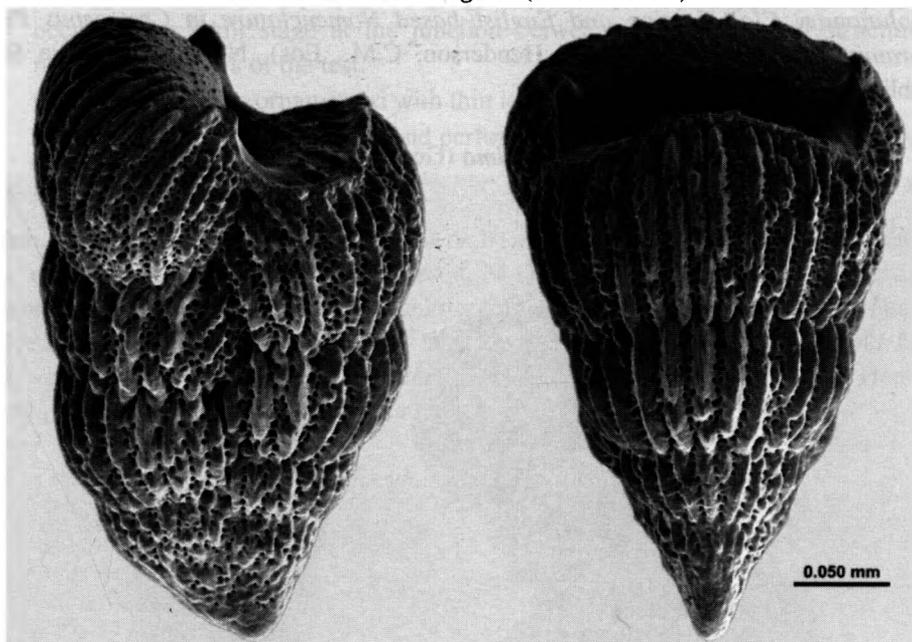
- Two symmetrically developed rimmed flanges border the aperture.
- The two flanges attach to the previous chamber leaving false supplementary apertures along the central suture, which are apparent in the region of the last-formed chambers.
- Chamber surface is ornamented present an irregularly reticulate pattern, but costate ornamentation can be observed occasionally over the last-formed chambers of the test.
- Wall is calcitic, hyaline, simple and perforate.

Revision. The morphology of this species was not reviewed. Georgescu (2014, see citation under *Heterohelix nuttalli*) revised its name as F-6alternate in the nomenclature associated with the evolutionary classification.

Original report. *Cuneolina elegans* Rzehak, p. 4.

Original work. Rzehak, A., 1891. Die Foraminiferenfauna der alttertiären Ablagerungen von Bruderndorf in Nieder-Osterreich, mit Berücksichtigung des angeblichen Kreidevorkommens von Leitersdorf. *Annalen des K.K. Naturhistorischen Hofmuseums*, 10, 213-230.

Age. Late Campanian-Maastrichtian.

Heterohelix elegans (Rzehak 1891)

Heterohelix elegans from the upper Maastrichtian sediments of Texas illustrated by Georgescu (2014), Figure 2: 3-4.

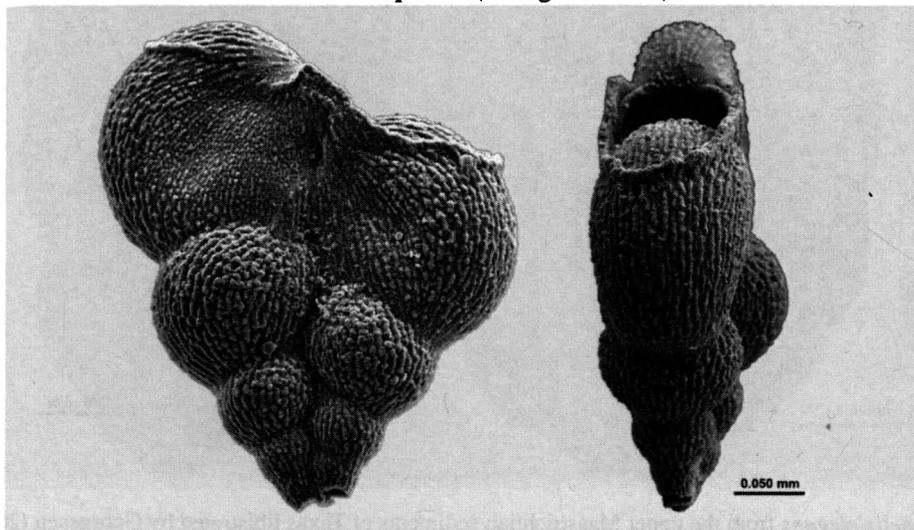
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Earlier chambers are subglobular and those of the adult stage present a well-developed transversal elongation; chamber overlap at variable rate and present a gradual size increase.
- Sutures are distinct and depressed throughout.
- Test is symmetrical in edge view. Periphery is broadly rounded and simple, without peripheral structures.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed narrow and rimmed flanges border the aperture.
- Chamber surface is ornamented with thick longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the thick costae.

Recommended revision. *Pseudotextularia elegans* (Rzehak 1891). Georgescu 2014, p. 105, Figure 2: 1-12. In the same volume Georgescu (2014, see citation under *Heterohelix brauni*) revised its name as I-12multichamber in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolution and evolutionary classification of the late Campanian-Maastrichtian planktic foraminifera that evolved

multiplane chamber proliferation (*Pseudotextularia* and *Racemiguembelina*). In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 101-125.

Heterohelix prima (Georgescu 2014)



Heterohelix prima from the upper Campanian sediments of the Pacific Ocean (Shatsky Rise), DSDP Site 305, illustrated by Georgescu (2014), Figures 13: 1-2.

Original report. *Nederbragtina prima* Georgescu 2014, p. 64, Figure 13: 1-12.

Original work. Georgescu, M.D., 2014. New Late Cretaceous (Santonian-Maastrichtian) heterohelid planktic foraminifera from the Pacific and Indian Oceans and their biostratigraphic and evolutionary significance. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 39-71.

Age. Late Campanian-Maastrichtian.

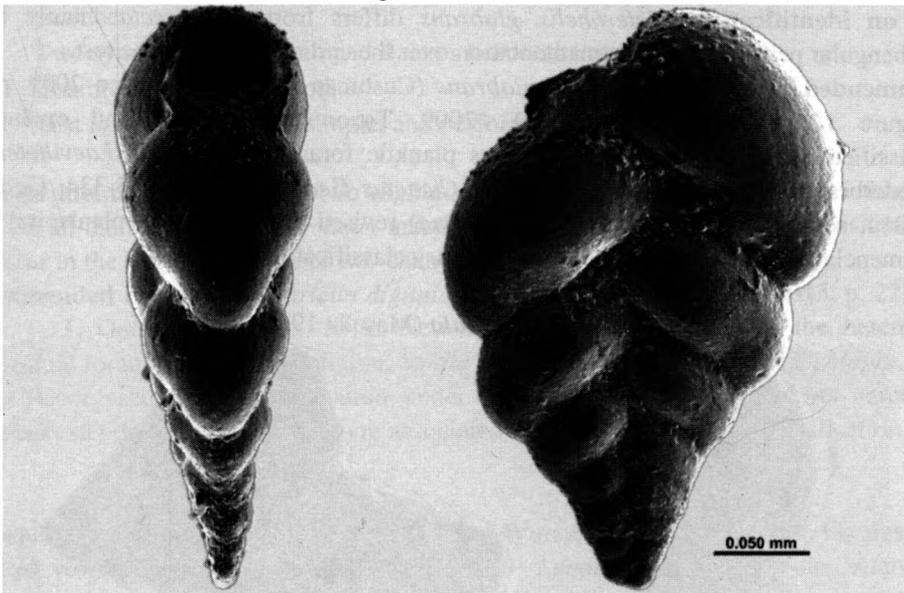
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Earlier chambers are subglobular, then subrectangular and the last-formed ones petaloid. Sutures are distinct and depressed throughout; the central suture is almost straight.
- Test is symmetrical and occasionally compressed in the adult portion in edge view. Periphery is rounded.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.

- Two symmetrically developed flanges border the aperture. Supplementary apertures occur in the adult stage at the junction between the periapertural structures and previous chambers of the test.
- Chamber surface is ornamented with thin longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the thin costae.

Revision. Georgescu (2014) revised its name as I-Imixed in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Heterohelix glabrans (Cushman 1938)



Heterohelix glabrans from the upper Maastrichtian sediments of Texas illustrated by Georgescu (2009), Figure 12: 1.

Original report. *Gümbelina glabrans* Cushman 1938, p. 15, pl. 3, Figures 1-2.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

Age. Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.

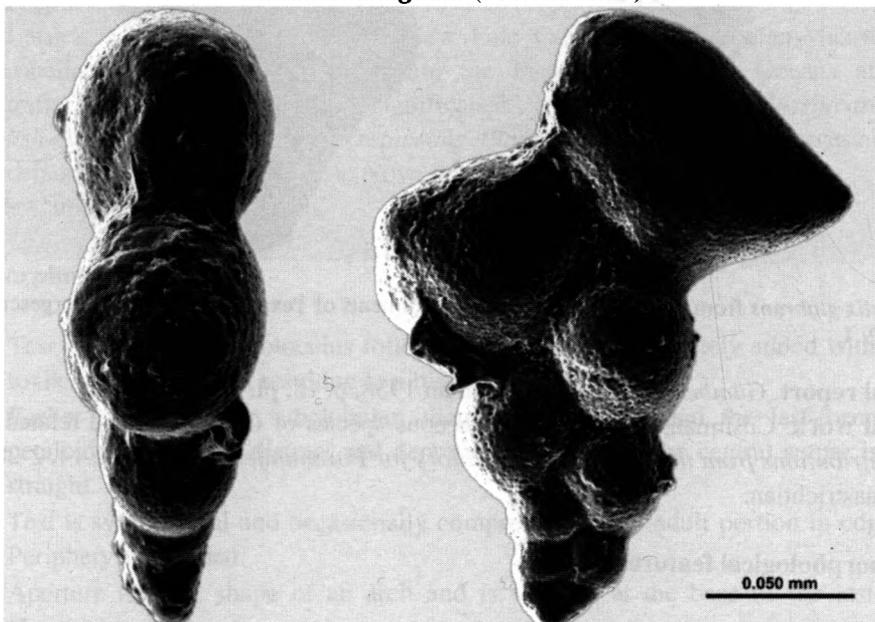
- Chambers are subrectangular in the earlier portion and petaloid in the adult stage, overlap at various rates and present a gradual size increase. Sutures are distinct and depressed throughout.
- Test is symmetrical and compressed in edge view. Periphery is subangular, mostly simple and without peripheral structures; rare specimens showing one imperforate peripheral band are known.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed flanges, which can be rimmed or not, border the aperture.
- Most of the test surface is smooth, but weak costae consisting of aligned pustules occur sometimes over the earlier chambers. A well-developed periapertural pustulose area occurs in the chamber anterior portion.

Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Heterohelix glabrans* differs from *H. directa* mainly by the subangular periphery, weak ornamentation over the earlier portion of the test.

Recommended revision. *Fleisherites glabrans* (Cushman 1938). Georgescu 2009, p. 326, Figure 12: 1-6. Georgescu, M.D., 2009. Taxonomic revision and evolutionary classification of the biserial Cretaceous planktic foraminiferal genus *Laeviheterohelix* Nederbragt, 1991. *Revista Mexicana de Ciencias Geológicas*, 26, 315-334. Georgescu (2014, see citation under *Heterohelix prima*) revised its name as I-4planispiral in the nomenclature associated with the evolutionary classification.

***Lunatriella digitata* (Masella 1959)**



Lunatriella digitata from uppermost Cenomanian-lowermost Turonian sediments of Senegal illustrated by Georgescu (2013), Figures 3: 6-7.

Original report. *Heterohelix digitata* Masella 1959, p. 15, pl. 1, Figures 1-10.

Original work. Masella, L., 1959. Una nuova specie di *Heterohelix* del Cretaceo della Sicilia. *Rivista Mineraria Siciliana*, 55, 15-17.

Age. Latest Cenomanian-early Turonian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Earlier chamber are subglobular, then reniform and the last-formed one or present one peripheral backward extension. Chambers have a gradual size increase.
- Test is compressed and symmetrical in edge view.
- Periphery is rounded in the test early portion and pinched in the chambers with peripheral backward extension.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed flanges border the aperture.
- Chamber surface is smooth.
- Test is calcitic, hyaline, simple, and perforate.

Notes on identification. *Lunatriella digitata* is a rare and small-sized species that differs from all the species of *Heterohelix* mainly by the peripheral backward extensions, which occur in the last-formed one or two chambers.

Recommended revision. *Lunatriella digitata* (Masella 1959). Georgescu 2013, p. 22, Figure 3: 1-13. Georgescu, M.D., 2013. New advances in understanding the heterohelid planktic foraminifer early evolution. *Studia Universitatis Babeş-Bolyai, Geologia*, 58, 19-28. Georgescu (2014, see citation under *Heterohelix prima*) revised its name as F-1backextended in the nomenclature associated with the evolutionary classification.

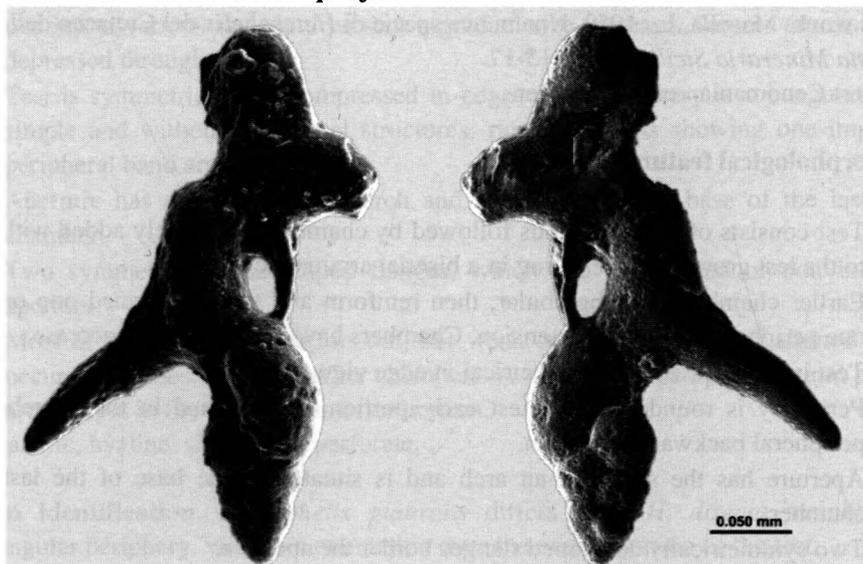
Original report. *Lunatriella spinifera* Eicher and Worstell 1970, p. 118, pl. 1, Figures 6-17.

Original work. Eicher, D.L., Worstell, P., 1970. *Lunatriella*, a Cretaceous heterohelid foraminifer from the Western Interior of the United States. *Micropaleontology*, 16, 117-121.

Age. Early Turonian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement. Later chambers are loosely biserial and then lax-uniserial.

Lunatriella spinifera Eicher and Worstell 1970

Lunatriella spinifera from the lower Turonian sediments of Kansas (US), illustrated by Georgescu (2013), Figure 4: 1-2.

- Early chambers are subglobular, then elongate and the last-formed ones have the elongation axis almost parallel to the test growth axis.
- The last-formed one or two chambers present a well-developed backward extension, which is perpendicular or mostly oblique to the test growth axis.
- Test is symmetrical and compressed in edge view. Periphery is rounded and simple in the earlier portion of the test and pinched in the chambers with backward extension.
- Aperture has the shape of a high arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed detached flanges that leave a large opening posteriorly border the aperture.
- Chamber surface is smooth. Wall is calcitic, hyaline, simple, and perforate.

Notes on identification. *Lunatriella spinifera* is a rare and small-sized species.

Recommended revision. *Lunatriella spinifera* Eicher and Worstell 1970. Georgescu 2013, p. 22, Figure 4: 1-12. Georgescu, M.D., 2013. New advances in understanding the heterohelcid planktic foraminifer early evolution. *Studia Universitatis Babeş-Bolyai, Geologia*, 58, 19-28. Georgescu (2014, see citation under *Heterohelix prima*) revised its name as S-1backextended in the nomenclature associated with the evolutionary classification.

Original report. *Textilaria americana* Ehrenberg 1841, p. 429.

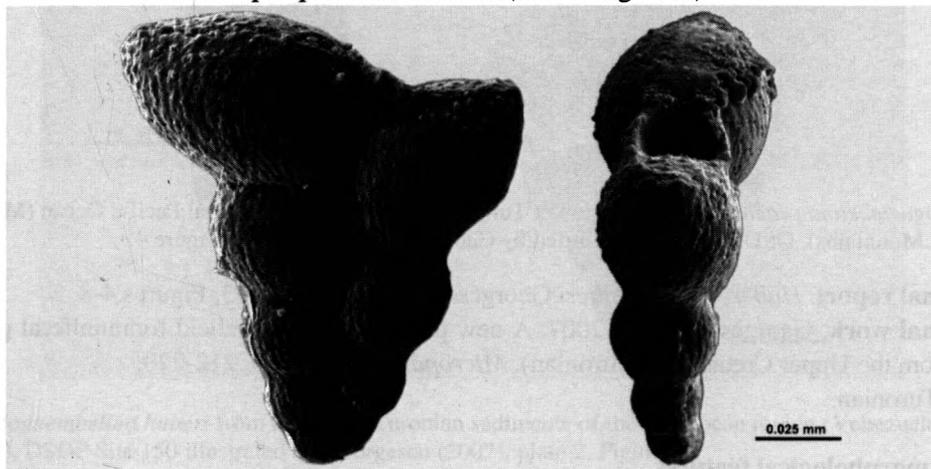
Original work. Ehrenberg, C.G., 1841. Verbreitung und Einfluss des mikroskopischen Lebens in Süd- und Nord- Amerika. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin*, 1841, 291-445. [published in 1843]

Age. Late Santonian.

Main morphological features.

- Test with the early stage consisting of the proloculus, which is situated in eccentric, peripheral position and is followed by three to four chambers arranged in one planispiral coil and do not enclose the proloculus completely. Adult stage consists of chambers alternately added with respect to the test growth axis.
- Chambers present a gradual size increase. The last-formed one to four chambers present well-developed lateral extensions. Sutures are distinct and depressed throughout.

Spiroplecta americana (Ehrenberg 1841)

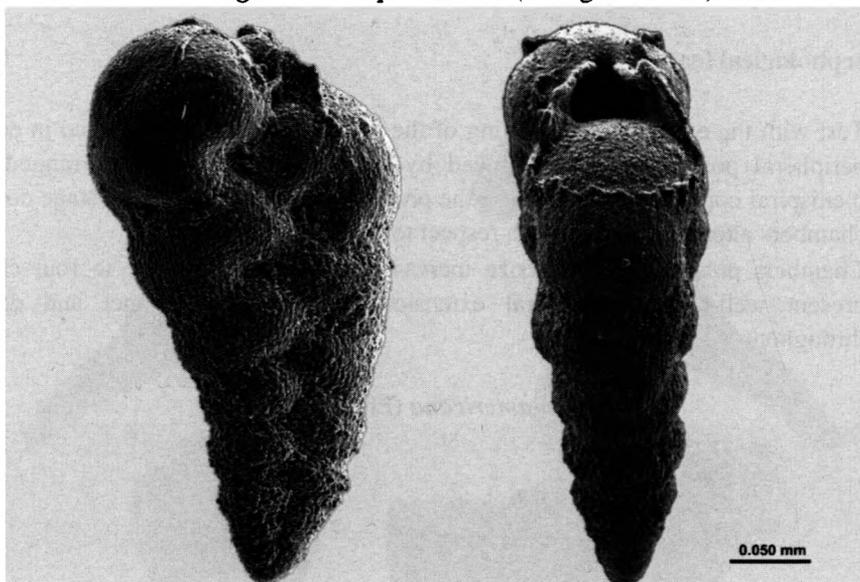


Spiroplecta americana from the Missouri River Basin (USA) illustrated by Georgescu (2013), plate 1, Figures 4-6.

- Test symmetrical and compressed in edge view. Periphery is rounded and simple in the juvenile stage and pinched in the adult stage.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber. Two symmetrically developed rimmed flanges border the aperture.
- Chamber surface is ornamented with thin discontinuous costae. Wall is calcitic, hyaline, simple, and perforate; pores are situated in the space between the costae, rarely interrupting them.

Notes on identification. This species can be recognized by the eccentric proloculus and last-formed chambers with peripheral extensions (one on each chamber) with the axis perpendicular to the test growth axis.

Recommended revision. *Spiroplecta americana* (Ehrenberg 1841). Georgescu 2013, p. 7, pl. 1, Figures 1-8. Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49. Georgescu (2014, see citation under *Heterohelix prima*) revised its name as I-planispiral in the nomenclature associated with the evolutionary classification.

Pseudoguembelina praehuberi (Georgescu 2007)

Pseudoguembelina praehuberi from the lower Turonian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 illustrated by Georgescu (2007), plate 3, Figure 4.

Original report. *Huberella praehuberi* Georgescu 2007, p. 216, pl. 3, Figures 4-8.

Original work. Georgescu, M.D., 2007. A new planktonic heterohelicid foraminiferal genus from the Upper Cretaceous (Turonian). *Micropaleontology*, 53, 212-220.

Age. Turonian.

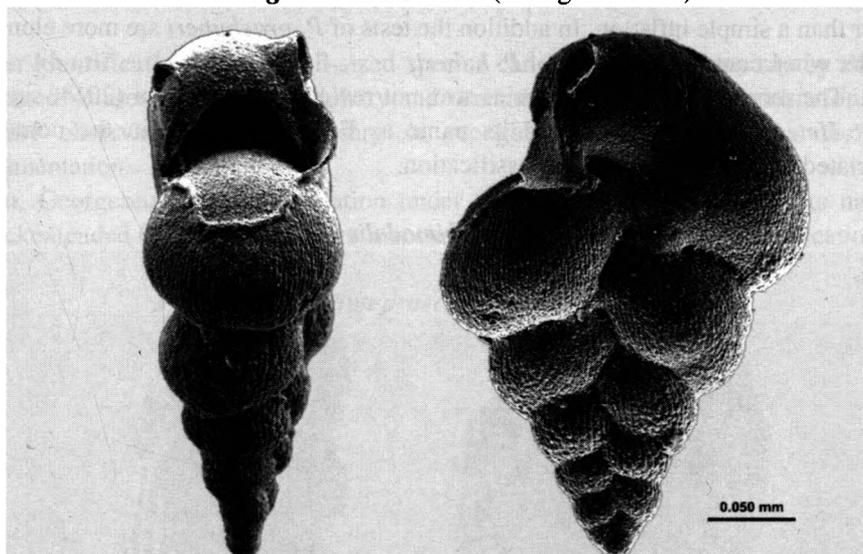
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Earlier chambers are subglobular, then subrectangular and the last-formed ones reniform; chambers overlap at various rates and present a gradual size increase.
- The last-formed chambers present two elongate extensions, one on each test side, which are backward oriented and attached to the previous chamber. Sutures are distinct and depressed throughout.
- Test is symmetrical and compressed in edge view.
- Periphery is rounded and simple, without peripheral structures.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber. Two symmetrically developed flanges border the aperture.
- Chamber surface is ornamented with thin longitudinal costae. Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the costae, rarely interrupting them.

Notes on identification. *Pseudoguembelina praehuberi* differs from *Heterohelix postmoremani* mainly in having the last-formed chambers with two elongate, backward oriented and symmetrical extensions, one on each test side.

Revision. The morphology of this species was not reviewed. Georgescu (2014, see citation under *Heterohelix prima*) revised its name as I-2backextended in the nomenclature associated with the evolutionary classification.

Pseudoguembelina huberi (Georgescu 2007)



Pseudoguembelina huberi from the upper Turonian sediments of the Caribbean region (Venezuelan Basin), DSDP Site 150 illustrated by Georgescu (2007), plate 2, Figure 6.

Original report. *Huberella huberi* Georgescu 2007, p. 214, pl. 2, Figures 1-6, pl. 3, Figures 1-3.

Original work. Georgescu, M.D., 2007. A new planktonic heterohelicid foraminiferal genus from the Upper Cretaceous (Turonian). *Micropaleontology*, 53, 212-220.

Age. Late Turonian.

Main morphological features.

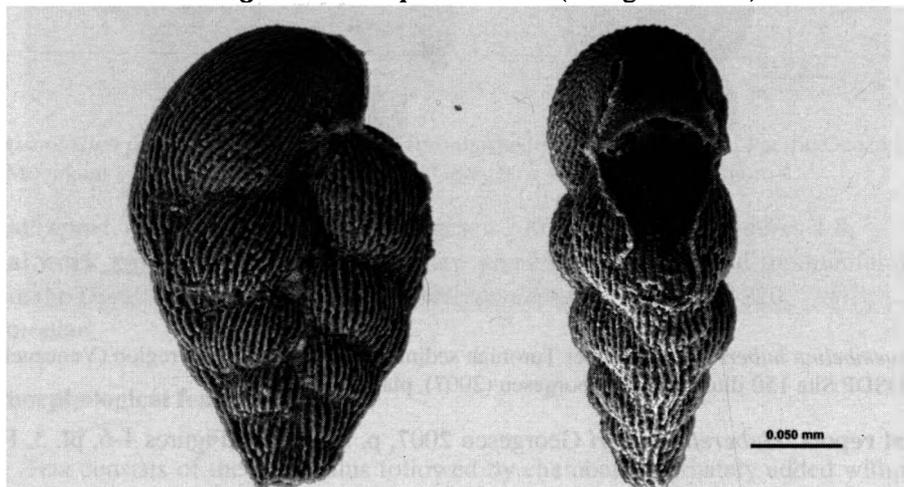
- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Earlier chambers are subrectangular, the last-formed ones reniform and with two symmetrically developed posteriorly oriented projections that attach to the previous chamber in the row.
- Chambers present a gradual size increase.
- Tests are symmetrical and compressed in edge view.
- Periphery is rounded and simple, without peripheral structures.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.

- Two symmetrically developed flanges oriented towards the central suture border the aperture.
- Chamber surface is ornamented with thin longitudinal costae.
- Wall is calcitic, hyaline, simple, and perforate; pores are situated in the spaces between the costae.

Notes on identification. *Pseudoguembelina huberi* differs from *P. praehuberi* especially by the occurrence of the symmetrical backward projections, which are tubular in shape rather than a simple inflation. In addition the tests of *P. praehuberi* are more elongate and slender when compared to those of *P. huberi*.

Revision. The morphology of this species was not reviewed. Georgescu (2014, see citation under *Heterohelix prima*) revised its name as F-2backextended in the nomenclature associated with the evolutionary classification.

Pseudoguembelina leptobimodalis (Georgescu 2014)



Pseudoguembelina leptobimodalis from the lower Campanian of the Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 illustrated by Georgescu (2014), Figure 9: 7-8.

Original report. *Leptobimodalina leptobimodalis* Georgescu 2014, p. 57, Figure 9: 1-11.

Original work. Original work. Georgescu, M.D., 2014. New Late Cretaceous (Santonian-Maastrichtian) heterohelicid planktic foraminifera from the Pacific and Indian Oceans and their biostratigraphic and evolutionary significance. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 39-71.

Age. Santonian-Campanian.

Main morphological features.

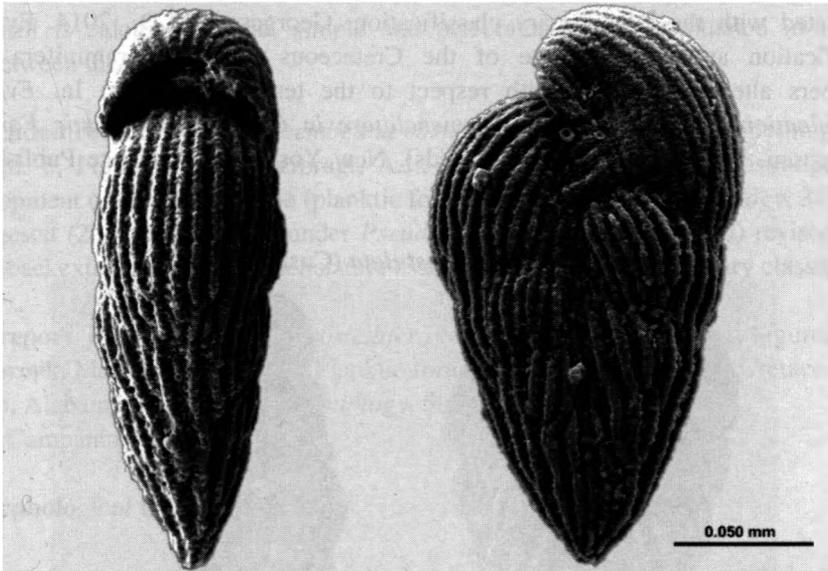
- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- The last-formed one or two chambers present one distinct bulbous backward projection on each side of the test. Sutures are distinct and depressed throughout.

- Test is symmetrical and compressed in edge view. Periphery is rounded and simple.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Chamber surface is ornamented with thin costae with dual orientation: parallel to the periphery in the marginal region and oblique to the test growth axis over the chamber central region.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae.

Notes on identification. This small-sized species can be recognized mainly by the weakly indented sutures at the test periphery and ornamentation with dual orientation. SEM or ESEM observations are necessary to recognize without equivoque the bimodal ornamentation.

Revision. Georgescu (2014, see citation under *Heterohelix prima*) revised its name as I-3backextended in the nomenclature associated with the evolutionary classification.

Pseudoguembelina praecostulata Georgescu 2014



Two specimens of *Pseudoguembelina praecostulata* from the lower Campanian sediments of the Pacific Ocean (Shatsky Rise), DSDP Site 305 illustrated by Georgescu (2014), Figure 11: 5-6.

Original report. *Pseudoguembelina praecostulata* Georgescu 2014, p. 60, Figure 11: 1-13.

Original work. Georgescu, M.D., 2014. New Late Cretaceous (Santonian-Maastrichtian) heterohelid planktic foraminifera from the Pacific and Indian Oceans and their biostratigraphic and evolutionary significance. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 39-71.

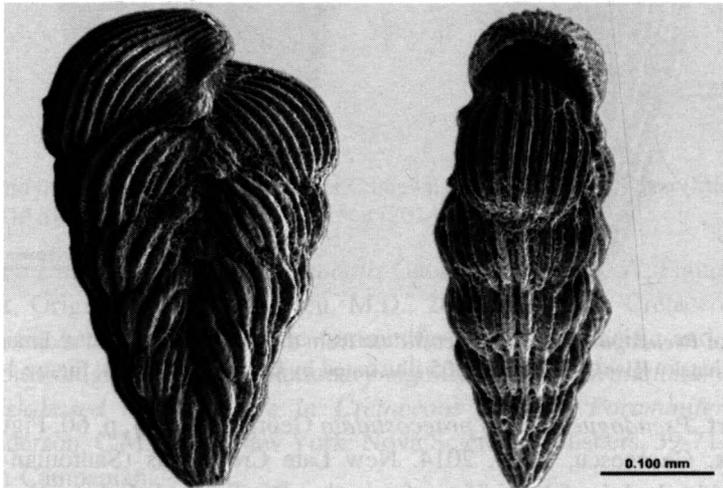
Age. Campanian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis.
- Chamber shape in the juvenile stage is often indistinct due to the development of the prominent ornamentation; the last-formed one or two chambers are reniform and present one distinct bulbous backward projection on each side of the test.
- Test is symmetrical and compressed in edge view.
- Periphery is rounded and simple.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed flanges oriented towards the central suture border the aperture.
- Chamber surface is ornamented with thick longitudinal costae. Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the costae.

Revision. Georgescu (2014) revised its name as I-4backextended in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Pseudoguembelina costulata (Cushman 1938)



Pseudoguembelina costulata from the middle Maastrichtian sediments of the Pacific Ocean (Shatsky Rise), DSDP Site 305 illustrated by Georgescu (2014), Figure 43: K. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Original report. *Gümbelina costulata* Cushman 1938, p. 16, pl. 3, Figures 7-9.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

Age. Late Campanian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- The last-formed one to five chambers present two backward oriented chamber extensions, one on each test side, that cover supplementary apertures.
- Test is symmetrical and compressed in edge view. Periphery is rounded and simple.
- Main aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed flanges oriented towards the central suture border the aperture.
- Chamber surface is ornamented with thick longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the costae.

Recommended revision. *Pseudoguembelina costulata* (Cushman 1938). Nederbragt 1991, p. 358, pl. 8, Figures 3-5. Nederbragt, A.J., 1991. Late Cretaceous biostratigraphy and development of Heterohelicidae (planktic foraminifera). *Micropaleontology*, 37, 329-372. Georgescu (2014, see citation under *Pseudoguembelina praecostulata*) revised its name as F-4backextended in the nomenclature associated with the evolutionary classification.

Original report. *Pseudoguembelina costellifera* Masters 1976, p. 319, pl. 1, Figures 6-8.

Original work. Masters, B.A., 1976. Planktic foraminifera from the Upper Cretaceous Selma Group, Alabama. *Journal of Paleontology*, 50, 318-330.

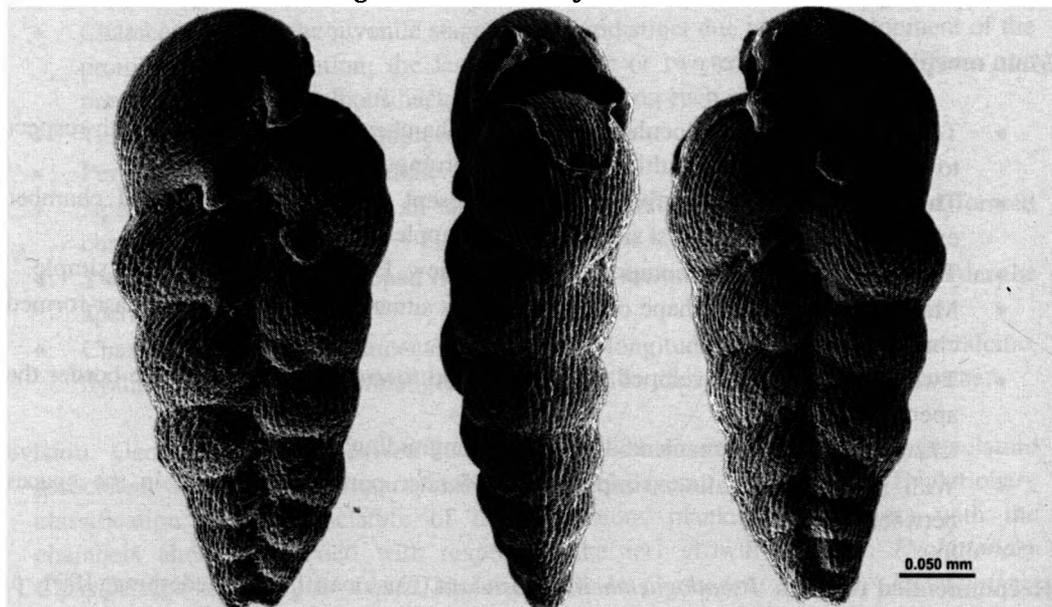
Age. Late Campanian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- The last-formed one to four chambers present two backward oriented chamber extensions, one on each test side, that cover supplementary apertures.
- Test is symmetrical and compressed in edge view. Periphery is rounded and simple.
- Main aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed flanges border the aperture.
- Ornamentation consists of thin costae, with dual orientation: parallel to the periphery in the marginal region and oblique to the test growth axis over the chamber central region.

- Wall is calcitic, simple and perforate; pores are situated in the spaces between the costae.

Pseudoguembelina costellifera Masters 1976



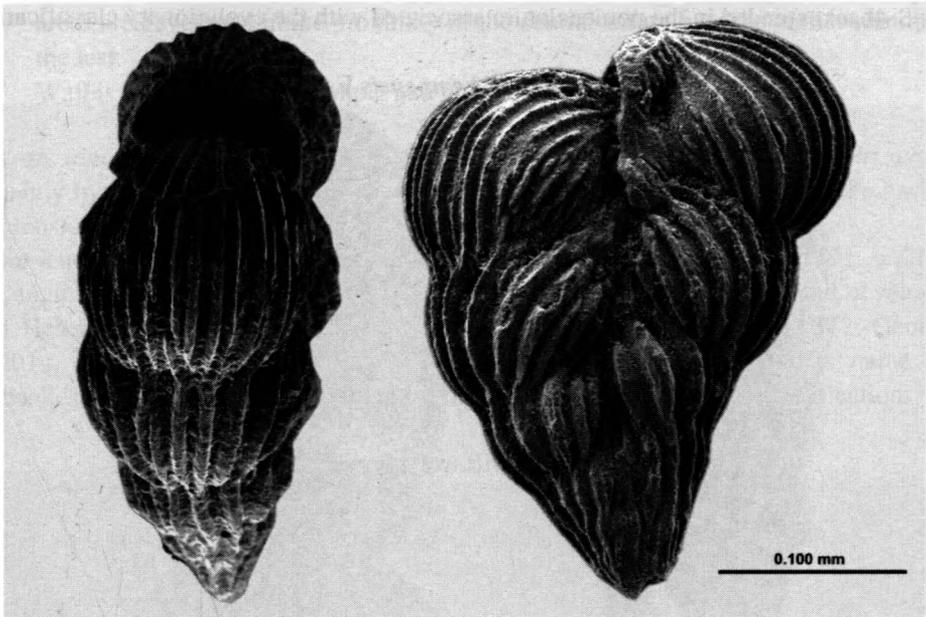
Pseudoguembelina costellifera from the upper Campanian ones of the Pacific Ocean (Shatsky Rise), DSDP Site 305 illustrated by Georgescu (2014), Figure 31: J.

Notes on identification. *Pseudoguembelina costellifera* differs from *P. leptobimodalis* mainly by the occurrence of supplementary apertures beneath the chamber backward extensions that occur in the adult portion of the test.

Recommended revision. *Pseudoguembelina costellifera* Masters 1976. Masters 1977, p. 370, pl. 4, Figure 5. Masters, B.A., 1977. Mesozoic planktonic foraminifera. A world-wide review and analysis. In: *Oceanic Micropaleontology* (A.T.S. Ramsay, Ed.). London-New York-San Francisco: Academic Press, 1, 301-731. Georgescu (2014, see citation under *Pseudoguembelina praecostulata*) revised its name as F-3backextended in the nomenclature associated with the evolutionary classification.

Original report. *Guembelina excolata* Cushman 1926, p. 20, pl. 2, Figure 9.

Original work. Cushman, J.A., 1926. Some foraminifera from the Mendez Shale of eastern Mexico. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 2, 16-26.

Pseudoguembelina excolata (Cushman 1926)

Pseudoguembelina excolata from the middle Maastrichtian sediments of the Pacific Ocean (Shatsky Rise), DSDP Site 305 illustrated by Georgescu (2014), Figure 43: N. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Age. Late Campanian-Maastrichtian.

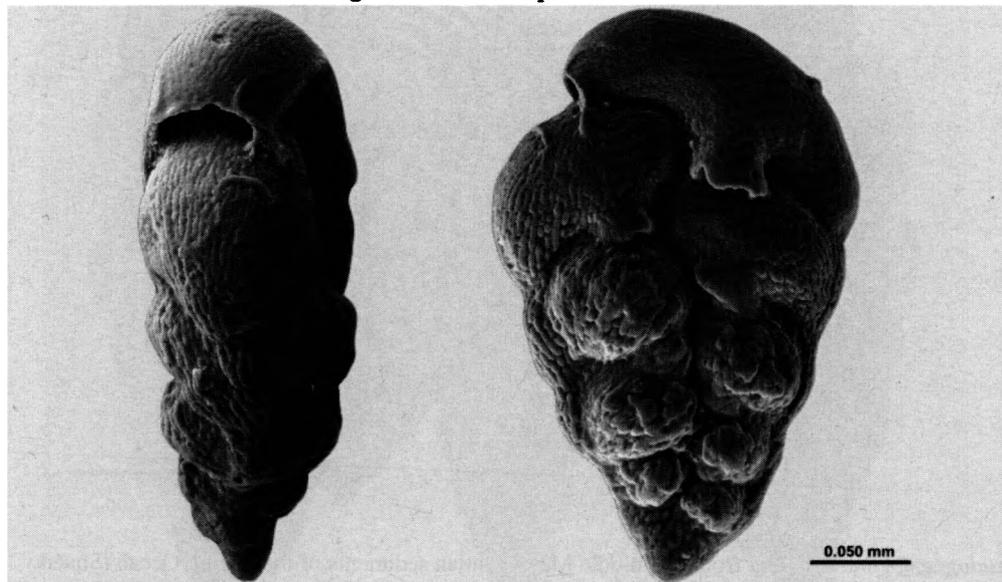
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Last-formed one to three chambers present two symmetrically developed backward extensions, one on each test side; supplementary apertures occur beneath the chamber extensions.
- Periphery is rounded and simple, without peripheral structures.
- Main aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed flanges border the aperture.
- Chamber surface is ornamented with thick longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the space between the costae.

Recommended revision. *Pseudoguembelina excolata* (Cushman 1926). Nederbragt 1991, p. 360, pl. 8, Figure 5. Nederbragt, A.J., 1991. Late Cretaceous biostratigraphy and development of Heterohelicidae (planktic foraminifera). *Micropaleontology*, 37, 329-372.

Georgescu (2014, see citation under *Pseudoguembelina praecostulata*) revised its name as S-4backextended in the nomenclature associated with the evolutionary classification.

***Pseudoguembelina kempensis* Esker 1968**



Pseudoguembelina kempensis from the lower Maastrichtian sediments of Alabama (USA).

Original report. *Pseudoguembelina kempensis* Esker 1968, p. 168, text-Figures 1-5.

Original work. Esker, G.C., 1968. A new species of *Pseudoguembelina* from the Upper Cretaceous of Texas. *Contributions from the Cushman Foundation for Foraminiferal Research*, 19, 168-169.

Age. Maastrichtian.

Main morphological features.

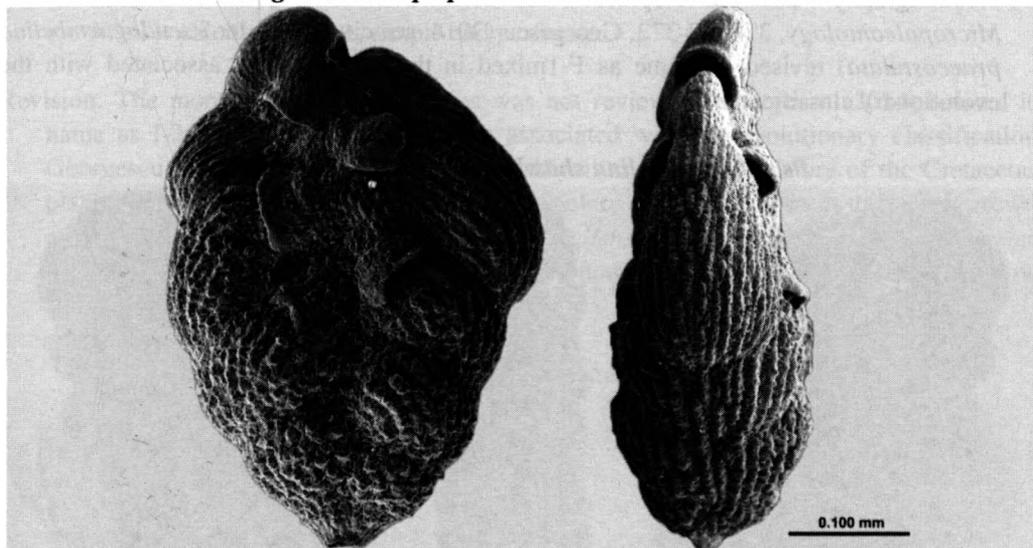
- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.
- Chambers of the earlier portion of the test are subrectangular and those of the adult stage reniform.
- Sutures are distinct and depressed throughout.
- A test wall flexure is developed around the test resulting in a rimmed appearance.
- The last-formed one to three chambers present two backward oriented chamber extensions, one on each test side, that cover supplementary apertures. Periphery is rounded and simple, without peripheral structures.
- Main aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed flanges border the aperture.

- Ornamentation consists of thin longitudinal costae; thickened irregular ornamentation areas are developed in the proximity of the central suture over the earlier chambers of the test.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Pseudoguembelina kempensis* differs from *Heterohelix carinata* mainly by the last-formed chambers with supplementary apertures beneath the backward extensions.

Recommended revision. *Pseudoguembelina kempensis* Esker. Nederbragt 1991, p. 362, pl. 9, Figures 3-4. Nederbragt, A.J., 1991. Late Cretaceous biostratigraphy and development of Heterohelicidae (planktic foraminifera). *Micropaleontology*, 37, 329-372. Georgescu (2014, see citation under *Pseudoguembelina praecostulata*) revised its name as *S-3backextended* in the nomenclature associated with the evolutionary classification.

Pseudoguembelina palpebra Brönnimann and Brown 1953



Pseudoguembelina palpebra from the middle Maastrichtian sediments of the Pacific Ocean (Shatsky Rise), DSDP Site 305.

Original report. *Pseudoguembelina palpebra* Brönnimann and Brown 1953, p. 155, text-Figures 9-10.

Original work. Brönnimann, P., Brown, N.K. Jr., 1953. Observations on some planktonic Heterohelicidae from the Upper Cretaceous of Cuba. Contributions from the Cushman Foundation for Foraminiferal Research, 4, 150-156.

Age. Maastrichtian.

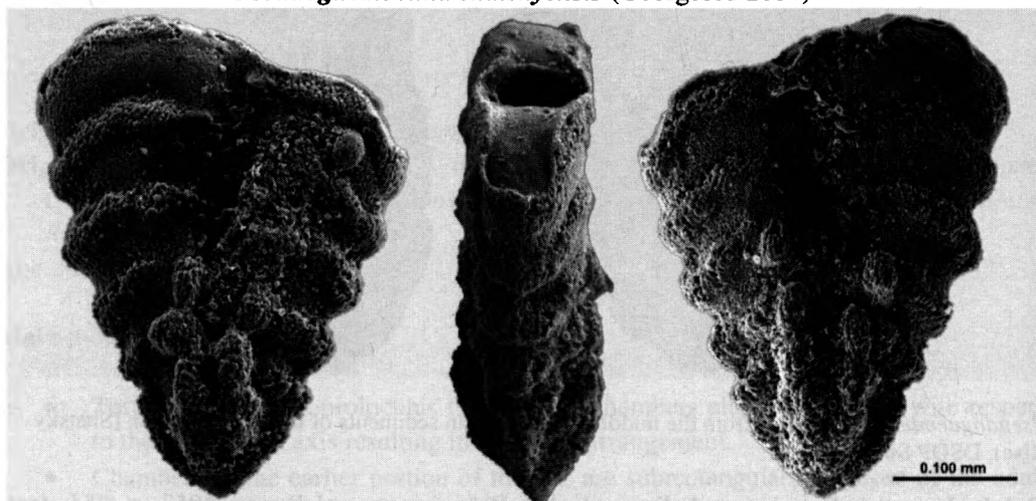
Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement.

- The last-formed one to five chambers present symmetrically developed backward extensions, one on each side of the test; supplementary apertures occur beneath the chamber extensions.
- Test is symmetrical and lanceolate in edge view, compressed towards the adult stage.
- Periphery is rounded and simple, without peripheral structures.
- Main aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed flanges border the aperture.
- Chamber surface is ornamented with thin longitudinal costae, which are more prominent over the earlier test chambers. Wall is calcitic, hyaline, simple and perforate, with the pores situated in the space between the costae.

Recommended revision. *Pseudoguembelina palpebra* Brönnimann and Brown 1953. Nederbragt 1991, p. 362, pl. 9, Figures 5-7. Nederbragt, A.J., 1991. Late Cretaceous biostratigraphy and development of Heterohelicidae (planktic foraminifera). *Micropaleontology*, 37, 329-372. Georgescu (2014, see citation under *Pseudoguembelina praecostulata*) revised its name as F-1mixed in the nomenclature associated with the evolutionary classification.

***Pseudoguembelina shatskyensis* (Georgescu 2014)**



Pseudoguembelina shatskyensis from the lower Maastrichtian sediments of the Pacific Ocean (Shatsky Rise), DSDP Site 305 illustrated by Georgescu (2014), Figure 7: 4-6.

Original report. *Lipsonia shatskyensis* Georgescu 2014, p. 53, Figure 7: 1-12.

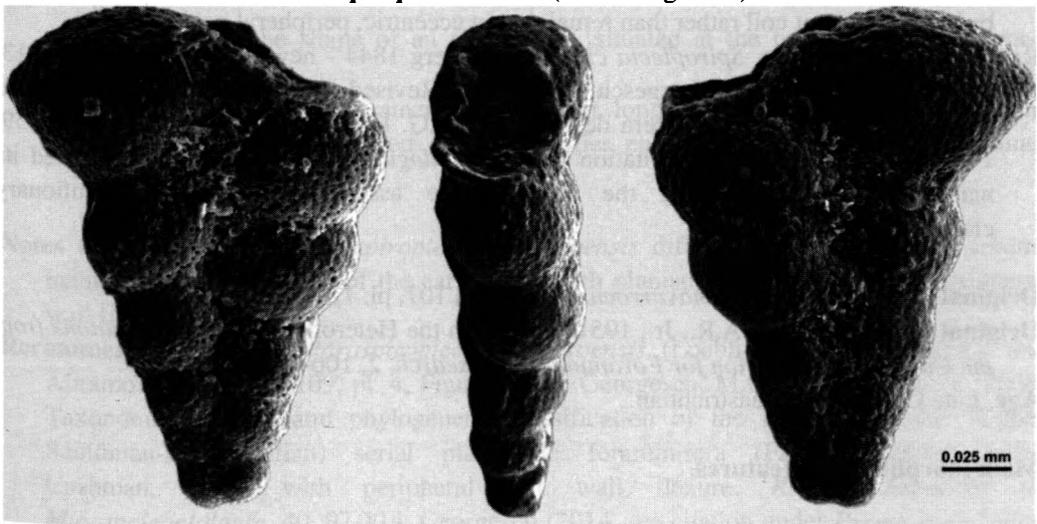
Original work. Georgescu, M.D., 2014. New Late Cretaceous (Santonian-Maastrichtian) heterohelcid planktic foraminifera from the Pacific and Indian Oceans and their biostratigraphic and evolutionary significance. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 39-71.

Age. Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement. Chambers are subrectangular throughout.
- The last-formed chamber present two symmetrically developed backward extensions, one on each side of the test; supplementary apertures occur beneath the chamber extensions.
- Sutures are curved towards the anterior part and lined with well-developed ridges.
- Test is symmetrical and compressed in edge view. Periphery is rounded and with transverse ridges.
- Main aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two more or less regular longitudinal ridges that parallel the central suture occur over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Revision. The morphology of this species was not reviewed. Georgescu (2014) revised its name as I-2mixed in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

***Paraspiroplecta clarae* (Ehrenberg 1844)**

Paraspiroplecta clarae from the Missouri River Basin (USA) illustrated by Georgescu (2013), plate 2, Figures 1-3.

Original report. *Spiroplecta americana* Ehrenberg 1844, p. 75.

Original work. Ehrenberg, C.G., 1844. Eine Mittbeilung über 2 neue Lager von Gebirgsmassen aus Infusorien als Meeres-Absatz in Nord-Amerika und eine Vergleichung derselben mit den organischen Kreide-Gebilden in Europa und Afrika. *Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preußischen Akademie der Wissenschaften zu Berlin*, 1844, 57-98.

Age. Late Santonian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed in one planispiral coil that completely encloses the first chamber and the adult stage with chambers alternately added with respect to the test growth axis resulting in a biserial arrangement. Sutures are distinct and depressed throughout.
- Test is symmetrical and compressed in edge view. Periphery is rounded and simple, more rarely pinched.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed rimmed flanges border the aperture.
- Chamber surface is ornamented with thin discontinuous costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the costae.

Notes on identification. The early planispiral coil can be best observed by using the classical technique of immersion in oil. *Paraspiroplecta clarae* differs from *Spiroplecta americana* especially by the juvenile stage where the proloculus is completely enclosed by the subsequent coil rather than remaining in eccentric, peripheral position.

Recommended revision. *Spiroplecta clarae* Ehrenberg 1844 - new name. Georgescu 2013, p. 9, pl. 2, Figures 1-11. Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49. Georgescu (2014, see citation under *Pseudoguembelina shatskyensis*) revised its name as F-1planispiral in the nomenclature associated with the evolutionary classification.

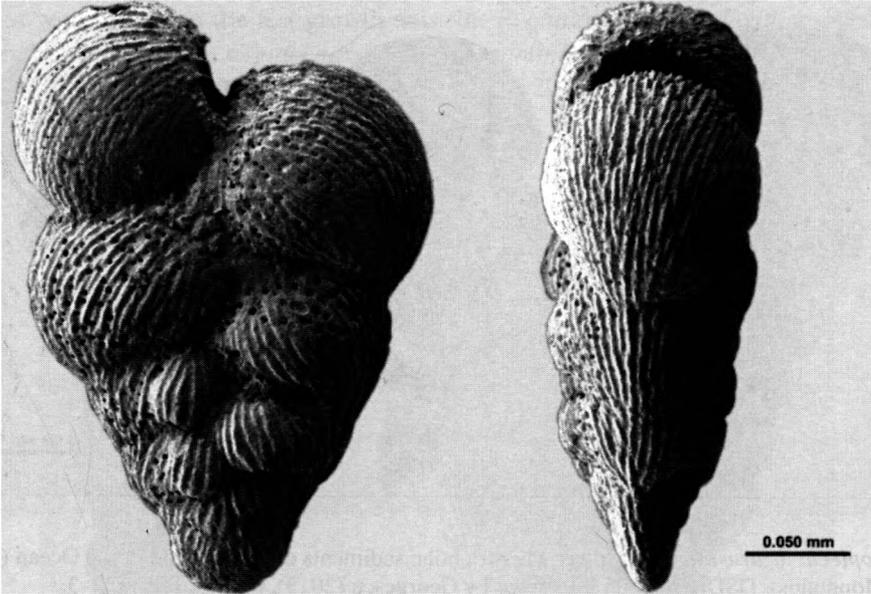
Original report. *Heterohelix navarroensis* Loeblich 107, pl. 12, Figures 1-3.

Original work. Loeblich, A.R., Jr., 1951. Coiling in the Heterohelicidae. *Contributions from the Cushman Foundation for Foraminiferal Research*, 2, 106-110.

Age. Late Campanian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus completely enclosed by the chambers of one planispiral coil and the adult stage with chambers alternately added with respect to the test growth axis.

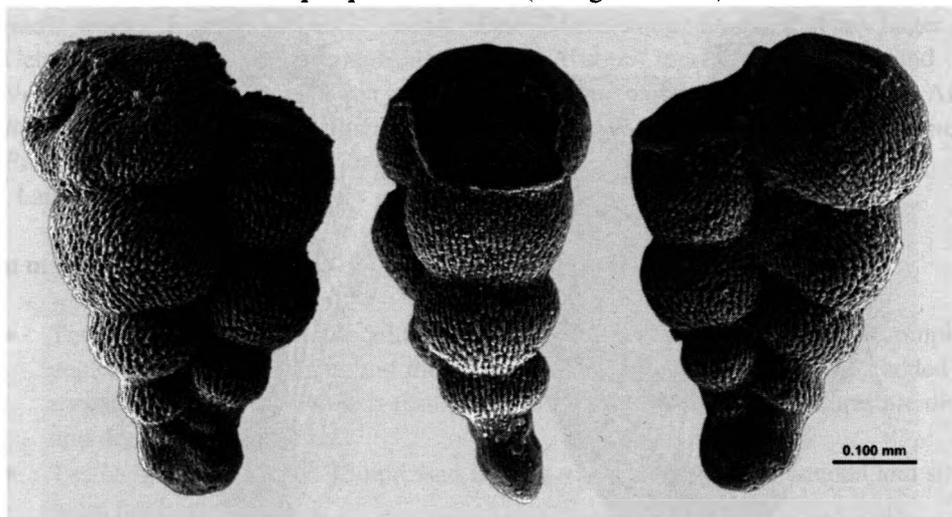
Paraspiroplecta navarroensis (Loeblich 1951)

Paraspiroplecta navarroensis from the upper Maastrichtian sediments of Texas illustrated by Georgescu and Abramovich (2008), plate 4, Figures 4-5.

- Chambers of the adult stage are subrectangular and present a gradual size increase.
- Sutures are distinct and depressed throughout.
- Periphery is subangular in the early portion and rounded in the adult stage; a weak test wall flexure occurs at the periphery over the chambers of the early portion of the test.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Chamber surface is ornamented with thin longitudinal costae; more prominent ornamentation is developed over the earlier chambers. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Paraspiroplecta navarroensis* differs from *Heterohelix carinata* mainly by the occurrence of the early stage with planispiral coil and weaker peripheral wall flexure.

Recommended revision. *Paraspiroplecta navarroensis* (Loeblich 1951). Georgescu and Abramovich 2008, p. 109, pl. 4, Figures 1-11. Georgescu, M.D., Abramovich, S., 2008. Taxonomic revision and phylogenetic classification of the Late Cretaceous (Upper Santonian-Maastrichtian) serial planktonic foraminifera (Family Heterohelicidae Cushman, 1927) with peripheral test wall flexure. *Revista Española de Micropaleontología*, 40, 97-114. Georgescu (2014, see citation under *Pseudoguembelina shatskyensis*) revised its name as S-2planispiral in the nomenclature associated with the evolutionary classification.

Paraspiroplecta lazarusi (Georgescu 2013)

Paraspiroplecta lazarusi from the lower Maastrichtian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 305 illustrated by Georgescu (2013), plate 6, Figures 1-3.

Original report. *Lazarusina lazarusi* Georgescu 2013, p. 18, pl. 5, Figures 4-10, pl. 6, Figures 1-11.

Original work. Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49.

Age. Late Campanian-Maastrichtian.

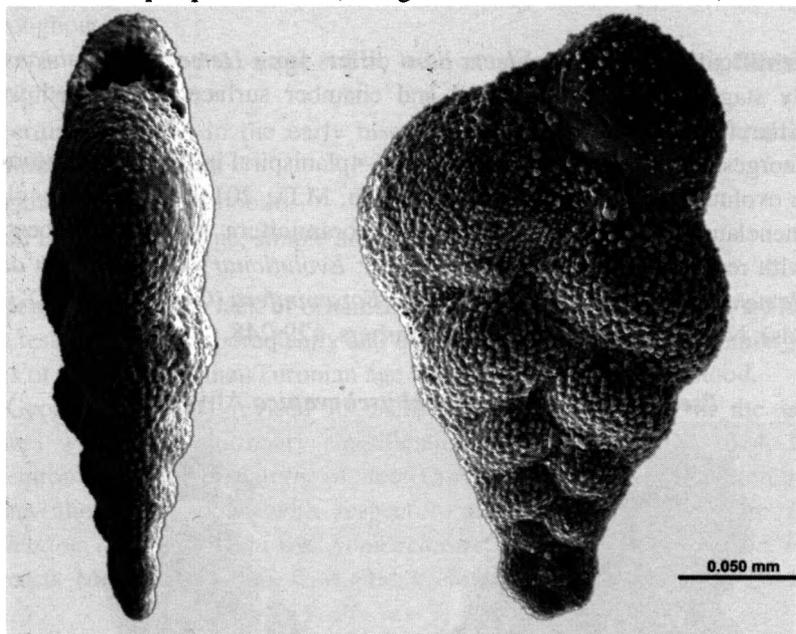
Main morphological features.

- Test consists of the proloculus completely enclosed by the chambers of one planispiral coil and the adult stage with chambers alternately added with respect to the test growth axis.
- Chambers of the adult stage are globular, almost spherical, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed in the adult stage and often indistinct in the early stage with planispiral coil.
- Test is symmetrical in edge view and compressed in the early portion.
- Periphery in the early stage is subangular and broadly rounded in the adult.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Chamber surface is ornamented with thin and continuous costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the costae.

Revision. The morphology of this species was not reviewed. In the same volume Georgescu (2014) revised its name as F-3planispiral in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and

nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Paraspiroplecta harti (Georgescu and Abramovich 2009)



Paraspiroplecta harti from the upper Maastrichtian of the Western Atlantic Ocean (Blake Plateau), Hole 1050C illustrated by Georgescu and Abramovich (2009), Figure 6: 1-2.

Original report. *Hartella harti* Georgescu and Abramovich 2009, p. 696, Figures 4: 1-4, 5: 3-4, 9-12, 6: 1-12, 7: 1-12.

Original work. Georgescu, M.D., Abramovich, S., 2009. A new Late Cretaceous (Maastrichtian) serial planktonic foraminifera (Family Heterohelicidae) with early planispiral coil and revision of *Spiroplecta* Ehrenberg, 1844. *Geobios*, 42, 687-698.

Age. Late Maastrichtian.

Main morphological features.

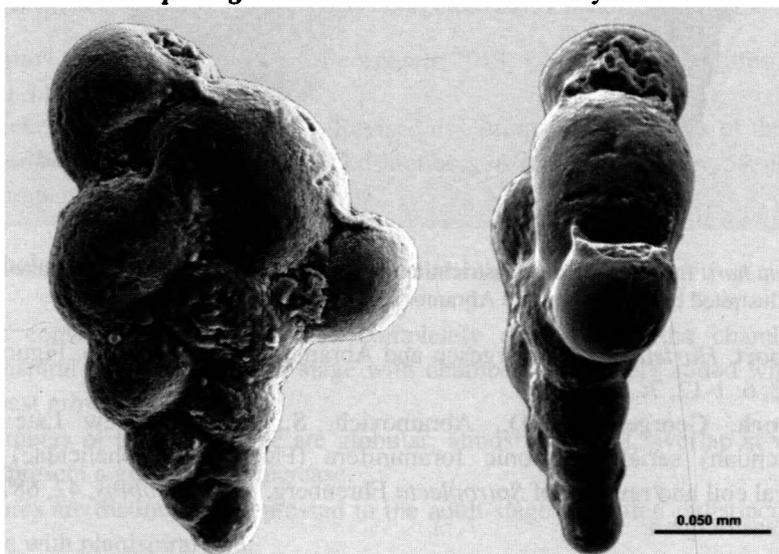
- Test consists of the proloculus completely enclosed by the chambers of one planispiral coil and the adult stage with chambers alternately added with respect to the test growth axis.
- Earlier chambers of the adult stage are subrectangular and the last-formed ones petaloid.
- Sutures are distinct and depressed throughout. Test is symmetrical and compressed in edge view.
- Periphery is subangular and frequently with agglomerations of pustules in the early portion of the test.

- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Two symmetrically developed rimmed flanges border the aperture.
- Chamber surface is ornamented with longitudinally aligned pustules that form granular costae.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Paraspiroplecta harti* differs from *Heterohelix glabrans* mainly by the early stage with planispiral coil and chamber surface ornamented with aligned pustules that form granular costae.

Revision. Georgescu (2014) revised its name as F-4planispiral in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

***Pseudoplanoglobulina nakhitschevanica* Aliyulla 1977**



Pseudoplanoglobulina nakhitschevanica from the lower Turonian sediments of Kansas (USA) illustrated by Georgescu (2014), Figure 27: P.

Original report. *Pseudoplanoglobulina nakhitschevanica* Aliyulla 1977, p. 204, pl. 2, Figure 5.

Original work. Aliyulla, K., 1977. *Upper Cretaceous and foraminiferal development in the Lesser Caucasus (Azerbaijan)*. Akademiya Nauk Azerbajjanskoy SSR, Institut Geologii im Akad. I. M. Gubkina, Elm-Baku, 232 pp. [in Russian]

Age. Early Turonian.

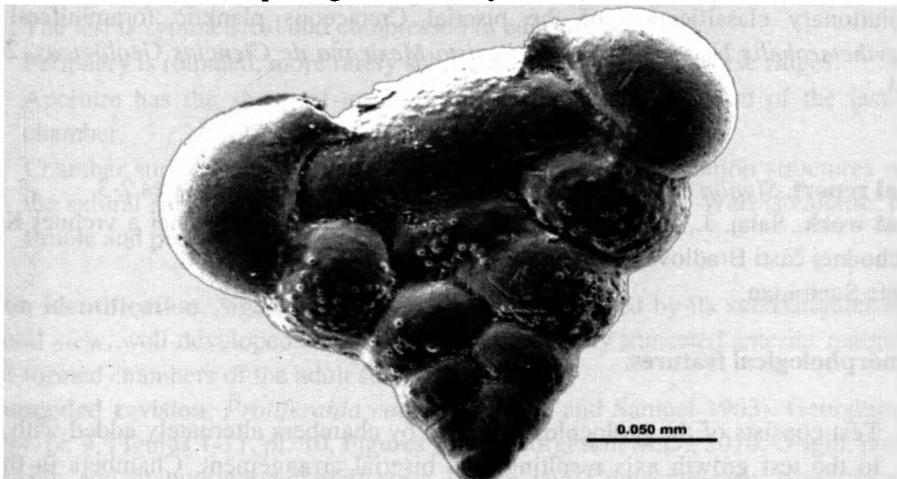
Main morphological features.

- Test consists of the proloculus followed by the juvenile stage with chambers alternately added with respect to the test growth axis and adult stage with multichamber growth.
- The adult stage with multichamber growth consists of the progressive biaperturate chamber followed by one set of two chamberlets. Sutures are distinct and depressed throughout.
- Test is compressed in edge view, with rounded and simple periphery, without peripheral structures.
- Aperture is simple in the early biserial stage and multiple in the adult one with multichamber growth.
- Chamber surface is smooth.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. The lack of ornamentation should be checked with a SEM or ESEM as such tests occur only sporadically and the development of multichamber growth in the lineages of late Cenomanian-Turonian age is relatively poorly understood.

Revision. Georgescu (2014) revised its name as F-1multichamber in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Pseudoplanoglobulina reniformis (Marie 1941)



Pseudoplanoglobulina reniformis from the lower Campanian of the South Atlantic Ocean (Falkland Plateau), DSDP Site 511 illustrated by Georgescu and others (2008), plate 2, Figure 1b. Georgescu, M.D., Saupe, E.E., Huber, B.T., 2008. Morphometric and stratophenetic basis for phylogeny and taxonomy in Late Cretaceous gublerinid planktonic foraminifera. *Micropaleontology*, 54, 397-424. [published in 2009].

Original report. *Ventilabrella reniformis* Marie 1941, p. 264, pl. 28, Figure 277.

Original work. Marie, P., 1941. Les foraminifères de la craie a *Belemnitella mucronata* du Bassin de Paris. *Mémoires du Muséum National d'Histoire Naturelle*, 12, 1-296.

Age. Campanian.

Main morphological features

- Test consists of the proloculus followed by the juvenile stage with chambers alternately added with respect to the test growth axis and adult stage with multichamber growth.
- The adult stage with multichamber growth consists of the progressive biaperturate chamber followed by one set of two chamberlets. Sutures are distinct and depressed throughout.
- Test presents a rounded and simple periphery, without peripheral structures.
- Aperture is simple in the early biserial stage and multiple in the adult one with multichamber growth.
- Chamber surface is ornamented with scattered pore mounds.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Pseudoplanoglobulina reniformis* differs from *P. nakhitschevanica* mainly by the test ornamentation consisting of scattered pore mounds rather than having the chamber surface smooth.

Recommended revision. *Laeviheterohelix reniformis* (Marie 1941). Georgescu 2009, p. 325, Figure 8: 4. Georgescu (2014, see citation under *Pseudoplanoglobulina nakhitschevanica*) revised its name as F-4multichamber in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2009. Taxonomic revision and evolutionary classification of the biserial Cretaceous planktic foraminiferal genus *Laeviheterohelix* Nederbragt, 1991. *Revista Mexicana de Ciencias Geológicas*, 26, 315-334.

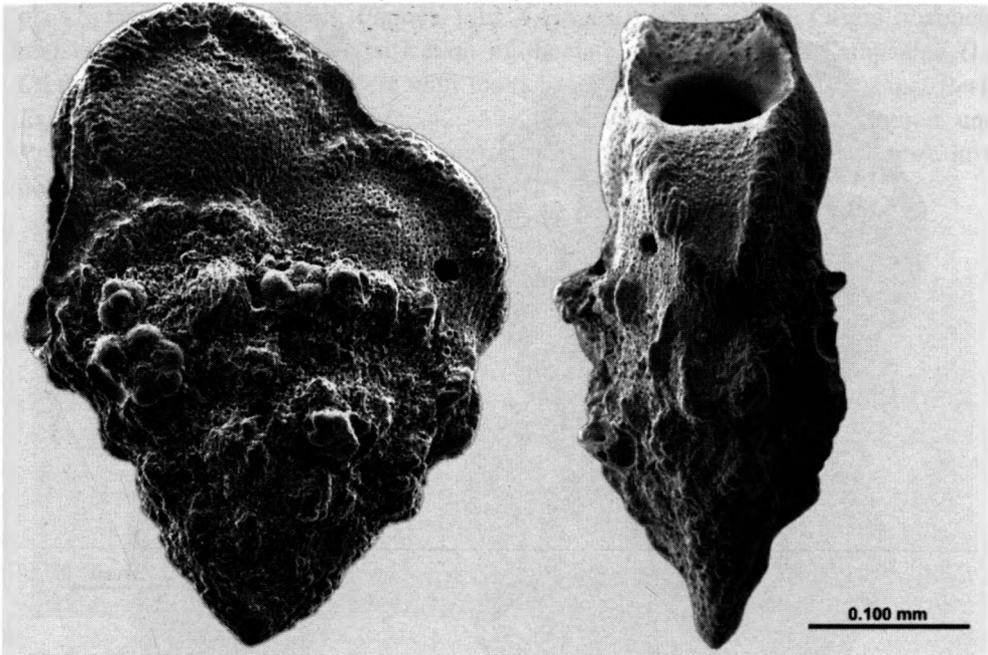
Original report. *Sigalia carpatica* Salaj and Samuel 1963, p. 105, Figures 2-3.

Original work. Salaj, J., Samuel, O. 1963. Mikrobiostratigrafia srednej a vrchnej Kreidy z východnej časti Bradlového Pásma. *Geologické Práce*, 30, 93-112.

Age. Late Santonian.

Main morphological features.

- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement. Chambers in the adult stage are subrectangular, occasionally petaloid.

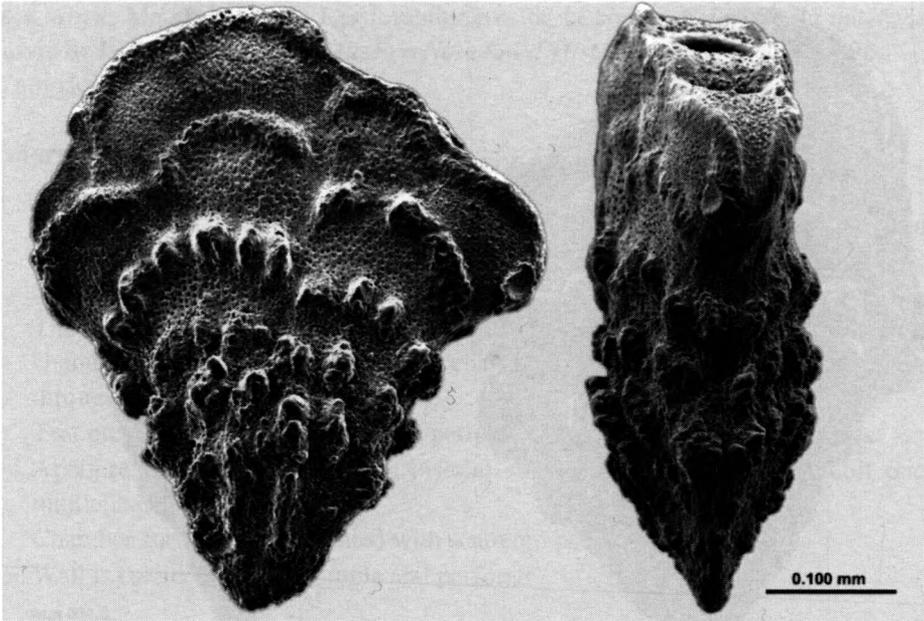
Sigalia carpatica (Salaj and Samuel 1963)

Sigalia carpatica from the upper Santonian sediments of the Caribbean region (Yucatan Outer Shelf), DSDP Site 95 illustrated by Georgescu (2010), plate 9, Figures 1-2.

- Sutures are distinct, curved anteriorly and lined with well-developed ridges. The anterior margin of the last-formed chambers of the adult stage is distinctly truncated and lined with ridges.
- The test is symmetrical and compressed in edge view.
- Periphery is rounded, more rarely subangular, and with transverse ridges.
- Aperture has the shape of an arch and is situated at the base of the last-formed chamber.
- Chamber surface is in general smooth; thickened ornamentation structures occur in the sutural ridges between the earlier chambers of the test. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Sigalia carpathica* can be recognized by its subtriangular shape in lateral view, well-developed sutural ridges and distinctly truncated anterior margin of the last-formed chambers of the adult stage.

Recommended revision. *Proliferania carpatica* (Salaj and Samuel 1963). Georgescu 2010, p. 94, pl. 9, Figures 1-11, pl. 10, Figures 1-11. Georgescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118. Georgescu (2014, see citation under *Pseudoplanoglobulina nakhitschevanica*) revised its name as F-6multichamber in the nomenclature associated with the evolutionary classification.

Sigalia decoratissima (de Klasz 1953)

Sigalia decoratissima from the upper Santonian sediments of the Caribbean region (Yucatan Outer Shelf), DSDP Site 95 illustrated by Georgescu (2010), plate 11, Figures 10-11.

Original report. *Ventilabrella decoratissima* de Klasz 1953, p. 238, pl. 4, Figure 5.

Original work. Klasz, I., de, 1953. Einige neue oder wenig bekannte Foraminiferen aus der helvetischen Oberkreide der bayerischen Alpen südlich Traunstein (Oberbayern). *Geologica Bavarica*, 17, 223-240.

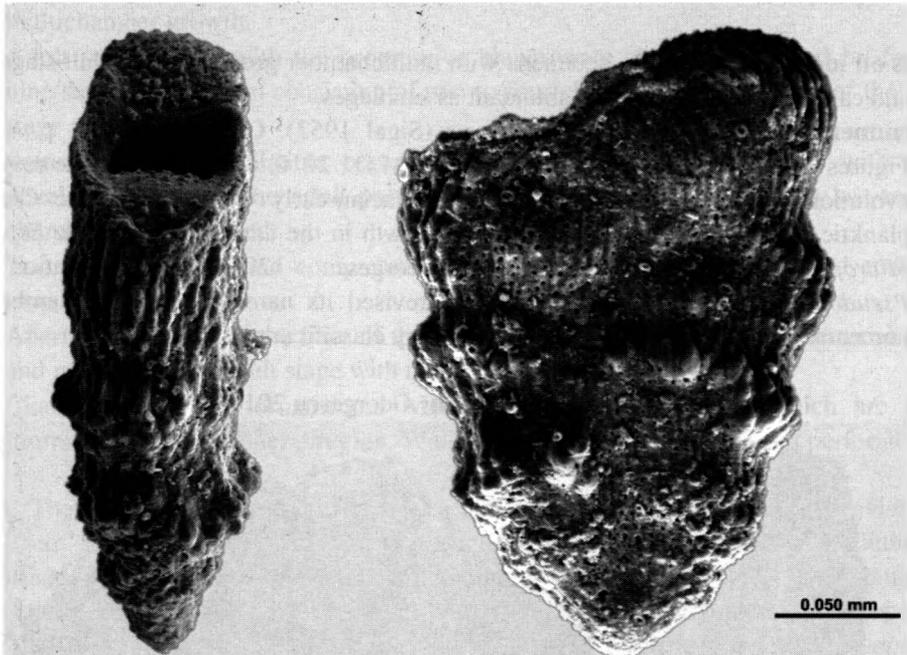
Age. Late Santonian.

Main morphological features.

- Test with two distinct stages; early stage is biserial and the adult one with multichamber growth.
- The adult stage consists of the progressive biaperturate chamber that is followed by one to five sets of chamberlets that present a gradual increase in number by one (two in the first set, three in the second, etc).
- Chambers of the adult stage present a petaloid shape.
- Sutures are curved anteriorly and lined with well-developed ridges.
- Test is compressed in edge view, with rounded periphery that presents well-developed transverse ridges.
- Aperture is simple, at the base of the last-formed chamber in the early stage with multichamber growth and multiple in the adult stage with multichamber growth.
- Chamber surface is smooth in the distal portion of the test but thickened ornamentation structures occur over the earliest chambers.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Proliferania decoratissima* (de Klasz 1953). Georgescu 2010, p. 96, pl. 11, Figures 1-12, pl. 12, Figures 1-12. Georgescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118. Georgescu (2014, see citation under *Pseudoplanoglobulina nakhitschevanica*) revised its name as S-6multichamber in the nomenclature associated with the evolutionary classification.

Sigalia deflaensis (Sigal 1952)



Sigalia deflaensis from the upper Santonian sediments of the Caribbean region (Yucatan Outer Shelf), DSDP Site 95 illustrated by Georgescu (2010), plate 5, Figures 1-2.

Original report. *Gümbelina* (*Gümbelina*, *Ventilabrella*) *deflaensis* Sigal 1952, p. 36, Figure 41.

Original work. Sigal, J., 1952. Aperçu stratigraphique sur la micropaléontologie du Crétacé. *Alger, 19th International Geological Congress, Monographies régionales, 1^e ser., Algerie*, 26, 1-52.

Age. Late Santonian.

Main morphological features.

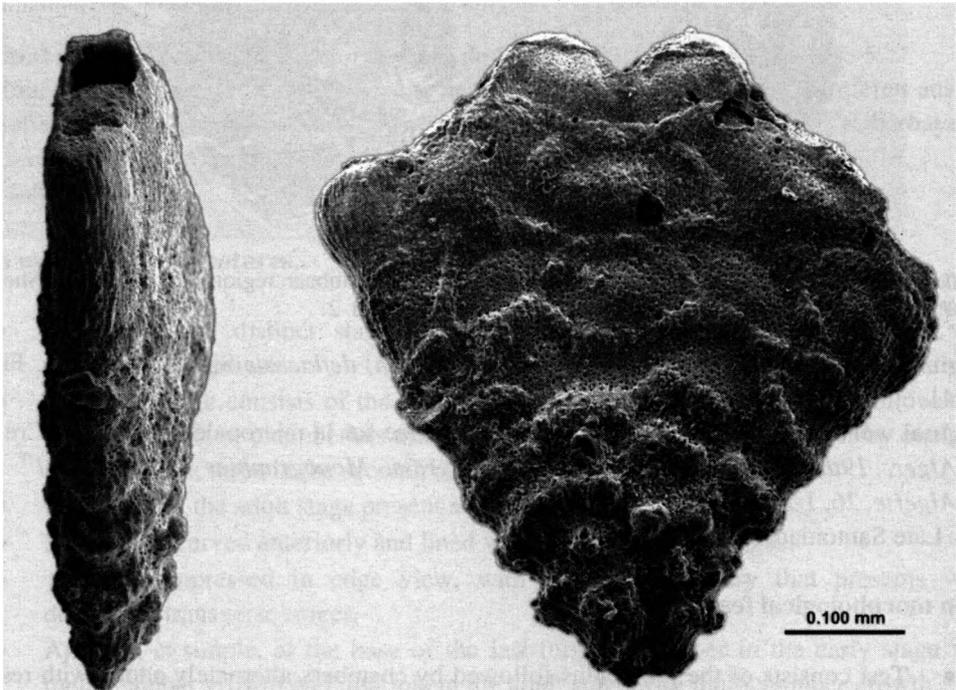
- Test consists of the proloculus followed by chambers alternately added with respect to the test growth axis resulting in a biserial arrangement; an adult stage consisting of the progressive biaperturate chamber followed by up to four chamberlets sets occurs occasionally.

- Chambers shape is subrectangular in the adult biserial stage and petaloid in the final stage.
- Sutures are lined with ridges in the earlier portion of the test and depressed between the last-formed chambers.
- Test is compressed in edge view, with rounded periphery and transversal ridges.
- Aperture is simple in the biserial stage and multiple in the adult one with multichamber growth,
- Chamber surface bears thin longitudinal costae. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. The specimens with multichamber growth in the adult stage are rare and can be recognized only in abundant assemblages.

Recommended revision. *Sigalia deflaensis* (Sigal 1952). Georgescu 2010, p. 84, pl. 5, Figures 1-12, pl. 6, Figures 1-9. Georgescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118. Georgescu (2014, see citation under *Pseudoplanoglobulina nakhitschevanica*) revised its name as F-5multichamber in the nomenclature associated with the evolutionary classification.

***Sigalia proliferans* Georgescu 2010**



Sigalia proliferans from the upper Santonian sediments of the Caribbean region (Yucatan Outer Shelf), DSDP Site 95 illustrated by Georgescu (2010), plate 7, Figures 1-2.

Original report. *Sigalia proliferans* Georgescu 2010, p. 88, pl. 7, Figures 1-10.

Original work. Georgescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118.

Age. Late Santonian.

Main morphological features.

- Test with two distinct stages; early stage is biserial and the adult one with multichamber growth.
- Adult stage begins with the progressive biaperturate chamber followed by four to nine sets, each of them consisting of two to four chamberlets. Chambers of the adult stage are petaloid.
- Sutures are often indistinct between the earliest chambers and lined with well-developed ridges in the adult portion of the test; sutures between the last-formed chambers are depressed.
- Test is symmetrical and compressed in edge view. Periphery is rounded and with transverse ridges.
- Aperture is simple, at the base of the last-formed chamber in the early biserial stage and multiple in the adult stage with multichamber growth.
- Chamber surface is ornamented with thin longitudinal costae, which are more prominent in the peripheral region. Wall is calcitic, hyaline, simple and perforate.

Revision. The morphology of this species was not reviewed. Georgescu (2014) revised its name as S-5multichamber in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

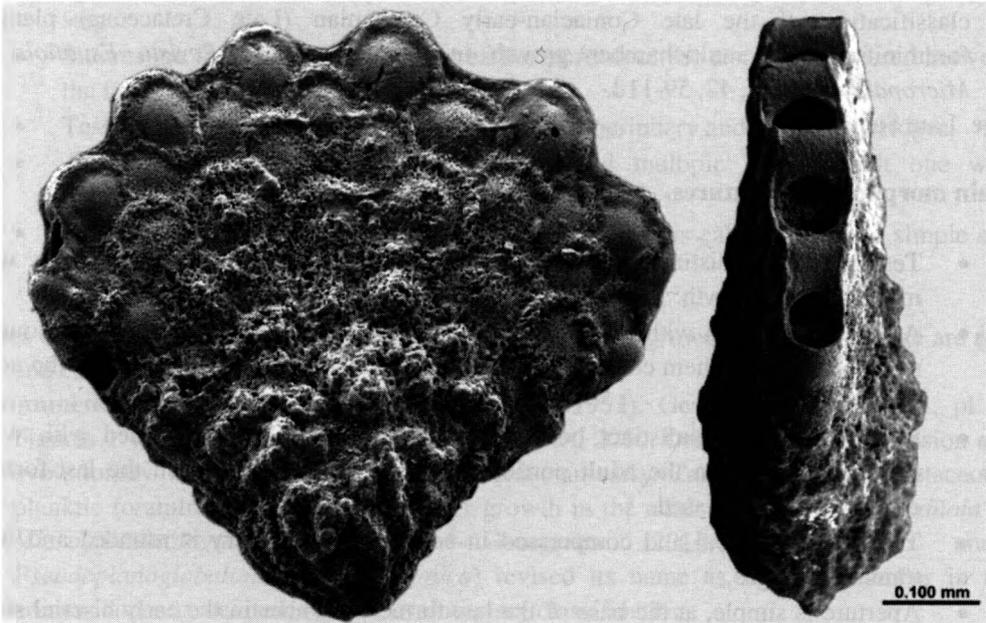
Original report. *Lipsonia lipsonae* Georgescu and Abramovich 2008, p. 119, pl. 1, Figures 1-4, pl. 2, Figures 1-2, pl. 3, Figures 1-6.

Original work. Georgescu, M.D., Abramovich, S. 2008. A new serial Cretaceous planktic foraminifer (Family Heterohelicidae Cushman, 1927) from the Upper Maastrichtian of the equatorial Central Pacific. *Journal of Micropaleontology*, 27, 117-123.

Age. Late Maastrichtian.

Main morphological features.

- Test with two distinct stages; early stage is biserial and the adult one with multichamber growth.

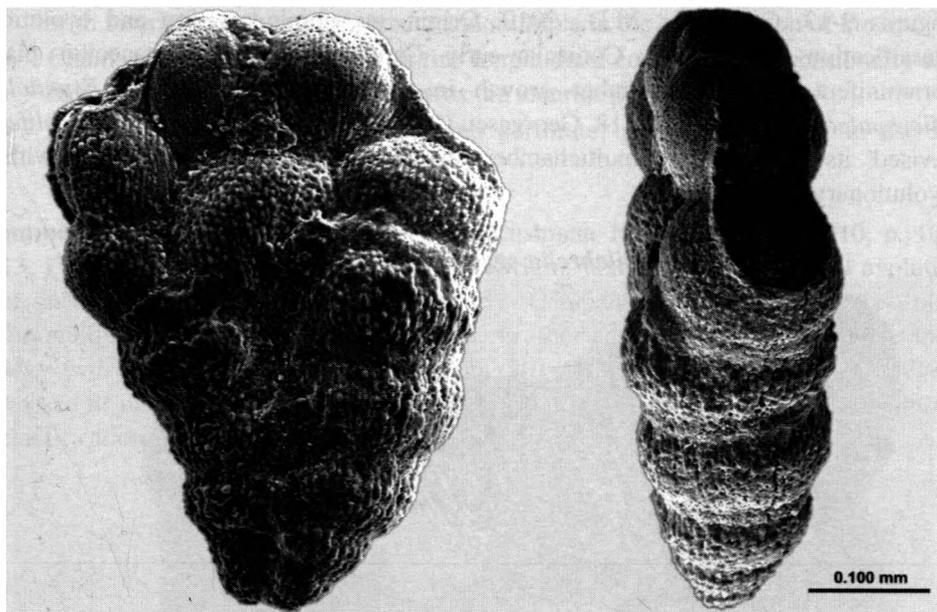
Sigalia lipsonae (Georgescu and Abramovich 2008)

Sigalia lipsonae from the upper Maastrichtian sediments of the central Pacific Ocean (Shatsky Rise), ODP Hole 1212B illustrated by Georgescu and Abramovich (2008), plate 2, Figure 1 and plate 1.

- The juvenile stage is often indistinct due to the addition of successive layers of calcite.
- Adult stage begins with the biaperturate progressive chamber.
- There are eight to ten sets of chamberlets in the adult stage with multichamber growth.
- Sutures between the earlier chambers are indistinct and those from the adult stage curved anteriorly and lined with well-developed ridges.
- Test is compressed at least in the anterior part in edge view, with rounded periphery and transverse ridges.
- Aperture is simple in the early stage and multiple in the adult.
- Chamber surface in the adult stage is smooth.
- Coarse irregular ornamentation structures occur over the earlier portion of the test.
- Wall is calcitic, hyaline, simple and perforate; vuggy pores occur in the earlier portion of the test.

Notes on identification. *Sigalia lipsonae* is the species with sutural ridges that present the most numerous chambers in the adult stage with multichamber growth. The vuggy pores can be observed only with a SEM or ESEM.

Revision. Georgescu (2014, see citation under *Sigalia proliferans*) revised its name as F-2mixed in the nomenclature associated with the evolutionary classification.

Ventilabrella austinana Cushman 1938

Specimen of Ventilabrella austinana from the Santonian sediments of British Columbia (Canada) illustrated by Georgescu (2010), plate 1, Figures 11, 13.

Original report. *Ventilabrella austinana* Cushman 1938, p. 26, pl. 4, Figure 19.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

Age. Coniacian-Santonian.

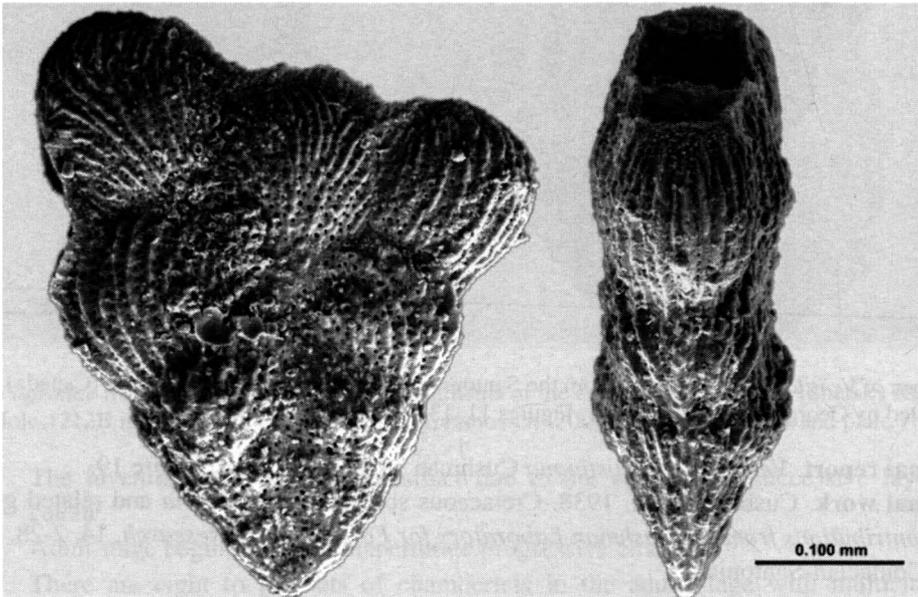
Main morphological features.

- Test with two distinct stages; early stage is biserial and the adult one with multichamber growth.
- The adult stage begins with the biaperturate progressive chamber, which is followed by two or three sets, each consisting of two chamberlets.
- Chambers are globular or subglobular. Sutures are distinct and depressed throughout.
- Test is symmetrical in edge view, with a broad and simple periphery, without peripheral structures.
- Aperture in the early stage is situated at the base of the last-formed chamber, and is multiple in the adult stage with multichamber growth.
- Chamber surface is ornamented with thin longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the costae.

Notes on identification. *Ventilabrella austinana* can be recognized by the globular chambers throughout and adult stage with multichamber growth. It is the only known species of Cretaceous serial planktic foraminifer in which there is no test compression in edge view.

Recommended revision. *Texasina austinana* (Cushman 1938). Georgescu 2010, p. 75, pl. 1, Figures 9-13. Georgescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118. Georgescu (2014, see citation under *Sigalia proliferans*) revised its name as F-2multichamber in the nomenclature associated with the evolutionary classification.

Ventilabrella eggeri Cushman 1928



Ventilabrella eggeri from the upper Santonian sediments of the Caribbean region (Yucatan Outer Shelf), DSDP Site 95 illustrated by Georgescu (2010), plate 13, Figures 1-2.

Original report. *Ventilabrella eggeri* Cushman, 1928, p. 2, pl. 1, Figures 10, 12.

Original work. Cushman, J.A., 1928. Additional genera of foraminifera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 4, 1-10.

Age. Late Santonian.

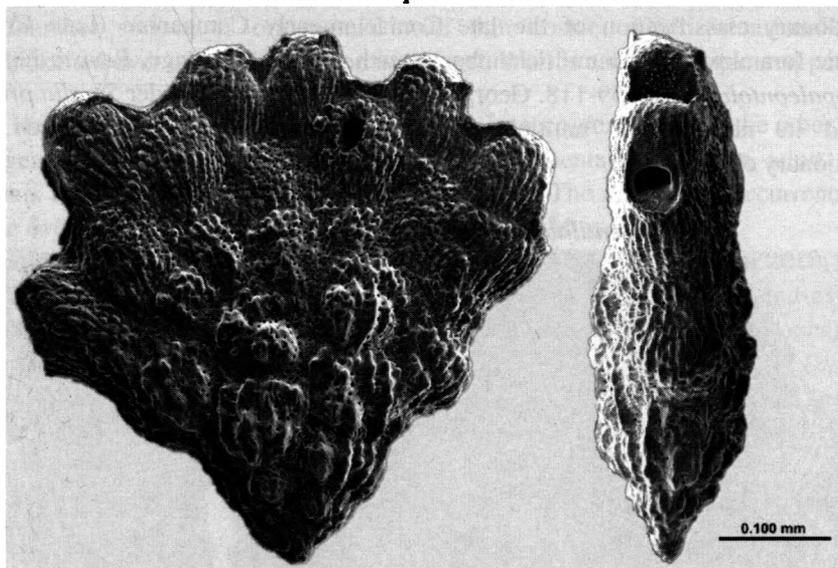
Main morphological features.

- Test consists of two stages: an early stage with biserial chamber arrangement and the adult one with chamber proliferation.
- The adult stage begins with the biaperturate progressive chamber, which is followed by one or rarely two rows, each consisting of two chamberlets.
- Earlier chambers are globular and those of the adult portion of the test subglobular.
- Sutures are distinct and depressed throughout.
- Test is symmetrical in edge view, with rounded and simple periphery, without periapertural structures.

- Aperture is simple, at the base of the last-formed chamber in the juvenile portion with biserial chamber arrangement and multiple in the adult portion of the test.
- Chamber surface is covered with fine longitudinal costae, which occasionally diverge from the base of the chamber towards the anterior part.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the costae.

Recommended revision. *Ventilabrella eggeri* Cushman 1928. Georgescu 2010, p. 100, pl. 13, Figures 1-11. Georgescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118. Georgescu (2014, see citation under *Sigalia proliferans*) revised its name as I-7 multichamber in the nomenclature associated with the evolutionary classification.

Ventilabrella alpina de Klasz 1953



Ventilabrella alpina from the upper Santonian sediments of the New Jersey coastal plain (USA) illustrated by Georgescu (2010), plate 14, Figures 1-2.

Original report. *Ventilabrella alpina* de Klasz 1953, p. 228, pl. 4, Figure 6.

Original work. Klasz, I., de, 1953. Einige neue oder wenig bekannte Foraminiferen aus der helvetischen Oberkreide der bayerischen Alpen südlich Traunstein (Oberbayern). *Geologica Bavarica*, 17, 223-240.

Age. Late Santonian-early Campanian.

Main morphological features.

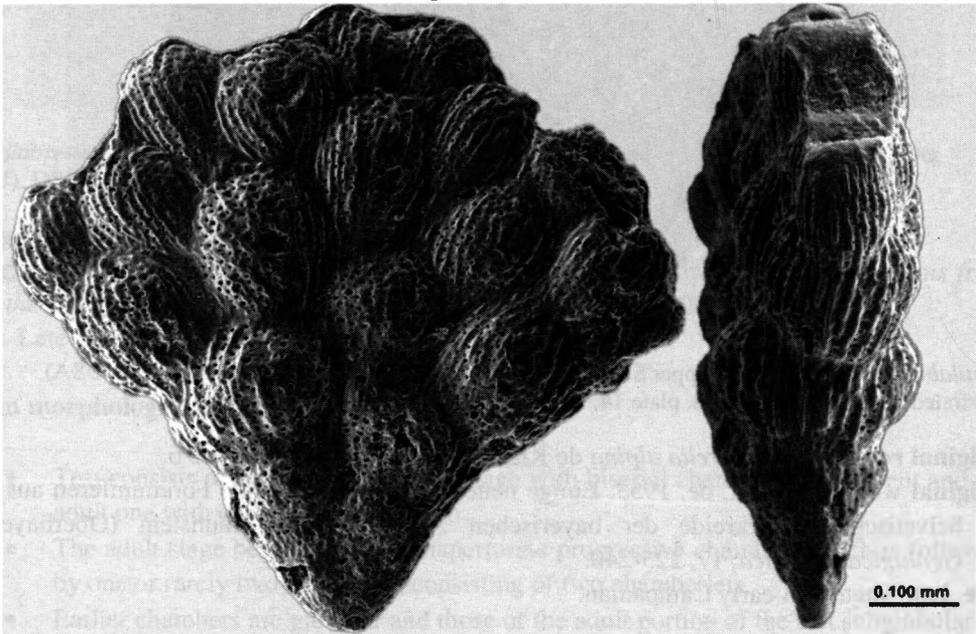
- Test with growth stages: a juvenile one with biserial chamber arrangement and the adult with multichamber growth.

- The adult stage begins with the biaperturate progressive chamber, which is followed by up to five sets of chamberlets; the number of chamberlets increases by one (two in the first, three in the second, etc).
- Sutures are in general distinct and depressed in the adult stage and hardly visible in the juvenile.
- Test is compressed in edge view, with a rounded and simple periphery, without peripheral structures.
- Aperture is simple in the juvenile stage and multiple in the adult.
- Chamber surface is ornamented with thin longitudinal costae; ornamentation is more prominent over the earlier portion of the test. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Ventilabrella alpina* can be recognized by the more prominent ornamentation over the earlier portion of the test.

Recommended revision. *Ventilabrella alpina* de Klasz 1953. Georgescu 2010, p. 102, pl. 14, Figures 1-9, pl. 15, Figures 1-9. Georgescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118. Georgescu (2014, see citation under *Sigalia proliferans*) revised its name as F-7multichamber in the nomenclature associated with the evolutionary classification.

***Ventilabrella glabrata* Cushman 1938**



Ventilabrella glabrata from the upper Santonian sediments of the New Jersey coastal plain (USA) illustrated by Georgescu (2010), plate 16, Figures 8-9.

Original report. *Ventilabrella eggeri glabrata* Cushman 1938, p. 26, pl. 4, Figures 15-17.

Original work. Cushman, J.A., 1938. Cretaceous species of *Gümbelina* and related genera. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 2-28.

Age. Late Santonian-early Campanian.

Main morphological features.

- Test consists of two stages: an early stage with biserial chamber arrangement and the adult one with well-developed chamber proliferation.
- The adult stage begins with the biaperturate progressive chamber, which is followed by up to six sets of chamberlets; the number of chamberlets in each set presents a non-linear increase in number.
- Test is compressed in edge view, with rounded and simple periphery, without periapertural structures.
- Aperture is situated at the base of the last-formed chamber in the juvenile stage and is multiple in the adult.
- Chamber surface is ornamented with thin costae, which occasionally can be thickened over the earlier portion of the test. Wall is calcitic, simple and perforate.

Notes on identification. *Ventilabrella glabrata* can be recognized among the other species of this genus by the relatively uniform costate ornamentation and the adult stage that presents the highest number of sets of chamberlets. The occasional occurrence of thick costae over the earlier can be best observed with a SEM or ESEM.

Recommended revision. *Ventilabrella glabrata* Cushman 1938. Georgescu 2010, p. 105, pl. 16, Figures 1-10. Georgescu, M.D., 2010. Origin, taxonomic revision and evolutionary classification of the late Coniacian-early Campanian (Late Cretaceous) planktic foraminifera with multichamber growth in the adult stage. *Revista Española de Micropaleontología*, 42, 59-118. Georgescu (2014, see citation under *Sigalia proliferans*) revised its name as S-7 multichamber in the nomenclature associated with the evolutionary classification.

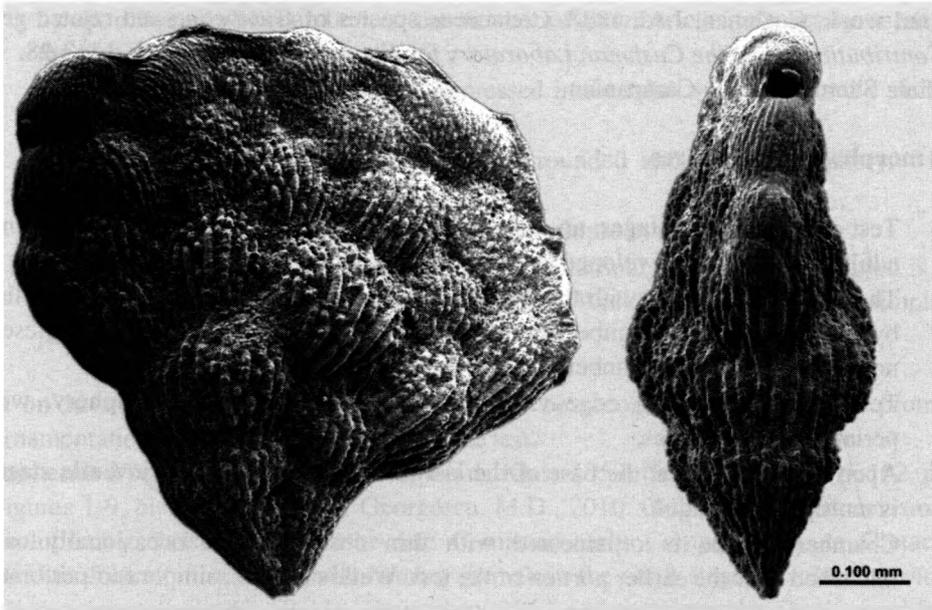
Original report. *Gümbelina acervulinoides* Egger 1899, p. 36, pl. 14, Figures 19-20.

Original work. Egger, J.G., 1899. Foraminiferen und Ostrakoden aus den Kreidemergeln der Oberbayerischen Alpen. *Abhandlungen der Mathematisch-Physikalischen Klasse der Königlich Bayerischen Akademie der Wissenschaften*, 21, 3-230. [published in 1902]

Age. Late middle Campanian-Maastrichtian.

Main morphological features.

- Test with two distinct growth stages: an early one with biserial chamber arrangement and the adult with multichamber growth.
- The adult stage begins with the biaperturate progressive chamber, which is followed by up to six sets of chamberlets; the number of chamberlets in the successive sets increases in ontogeny at variable increments.

Ventilabrella acervulinoides (Egger 1899)

Ventilabrella acervulinoides from the upper Maastrichtian sediments of the North Atlantic Ocean (Orphan Knoll), DSDP Hole 111A illustrated by Georgescu (2014), Figures 7: 1-2.

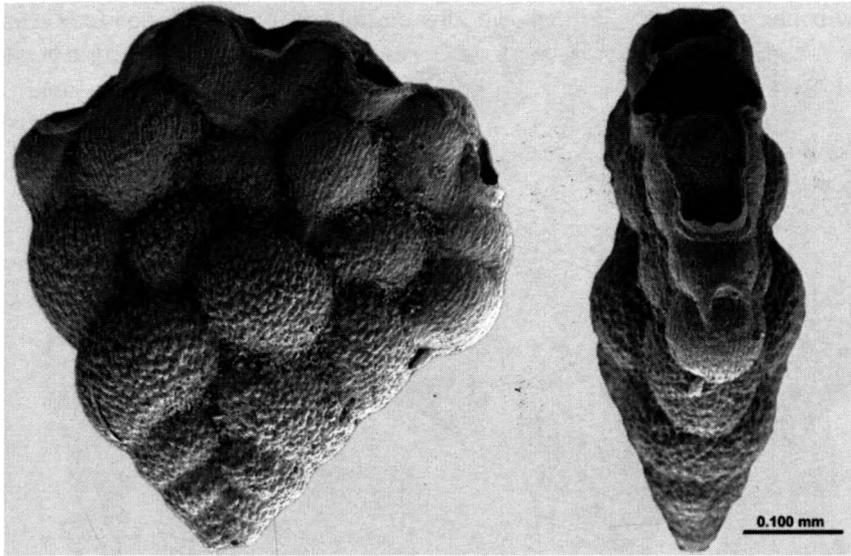
- Test is symmetrical in edge view with a broad and simple periphery, without peripheral structures.
- Aperture is simple in the juvenile stage and multiple in the adult.
- Chamber surface is ornamented with thick longitudinal costae; ornamentation is slightly more prominent over the chambers of the earlier portion of the test.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the thick costae.

Recommended revision. *Planoglobulina acervulinoides* (Egger 1899). Georgescu 2014, p. 81, Figures 5: 1-9, 6: 1-9, 7: 1-9. Georgescu, M.D., 2014. Taxonomic revision of *Planoglobulina* Cushman 1927 as directional lineage in evolutionary classification. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 73-92. In an article published in the same volume Georgescu (2014, see citation under *Sigalia proliferans*) revised its name as F-10multichamber in the nomenclature associated with the evolutionary classification.

Original report. *Ventilabrella riograndensis* Martin 1972, p. 88, pl. 2, Figures 1-4.

Original work. Martin, S.E., 1972. Reexamination of the Upper Cretaceous planktonic foraminiferal genera *Planoglobulina* Cushman and *Ventilabrella* Cushman. *Journal of Foraminiferal Research*, 2, 73-92.

Age. Late Campanian-Maastrichtian.

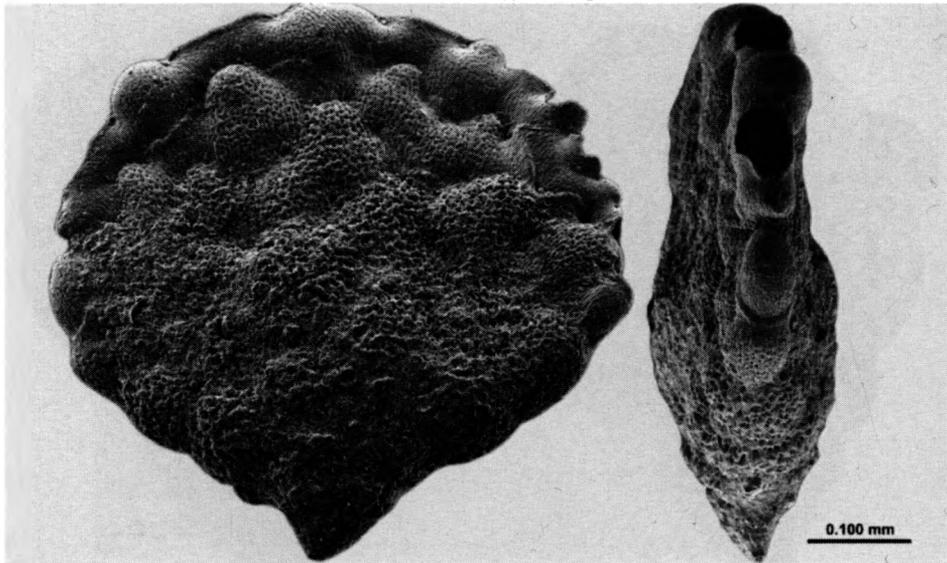
Ventilabrella riograndensis Martin 1972

Ventilabrella riograndensis from the Maastrichtian sediments of the East Indian Ocean (Wombat Plateau), ODP Hole 761B illustrated by Georgescu (2014), Figures 30: L. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Main morphological features.

- Test consists of two distinct growth stages: a juvenile one with the chambers presenting a biserial arrangement and the adult with multichamber growth.
- The adult stage begins with the biaperturate progressive chamber, which is followed by up to four sets of chamberlets; the number of chamberlets increases throughout the adult stage at variable increments.
- Sutures are distinct and depressed throughout.
- Test is slightly compressed in edge view especially in the adult stage with multichamber growth.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture is simple and at the base of the last-formed chamber in the juvenile stage and multiple in the adult.
- Ornamentation consists of thin longitudinal costae. Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Planoglobulina riograndensis* (Martin 1972). Nederbragt 1991, p. 358, pl. 7, Figures 6-7. Nederbragt, A.J., 1991. Late Cretaceous biostratigraphy and development of Heterohellicidae (planktic foraminifera). *Micropaleontology*, 37, 329-372. Georgescu (2014, see citation under *Sigalia proliferans*) revised its name as F-3multichamber in the nomenclature associated with the evolutionary classification.

Ventilabrella meyerhoffi (Seiglie 1960)

Ventilabrella meyerhoffi from the upper Campanian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2014) Figures 44: N.

Original report. *Planoglobulina meyerhoffi* Seiglie 1960, p. 122, text-Figures 2-3.

Original work. Seiglie, G.A., 1960. Una nueva especie de Heterohelicidae del Cretacico superior de Cuba. *Memorias de la Sociedad Cubana de Historia Natural*, 24, 121-124.

Age. Latest Campanian-early Maastrichtian.

Main morphological features.

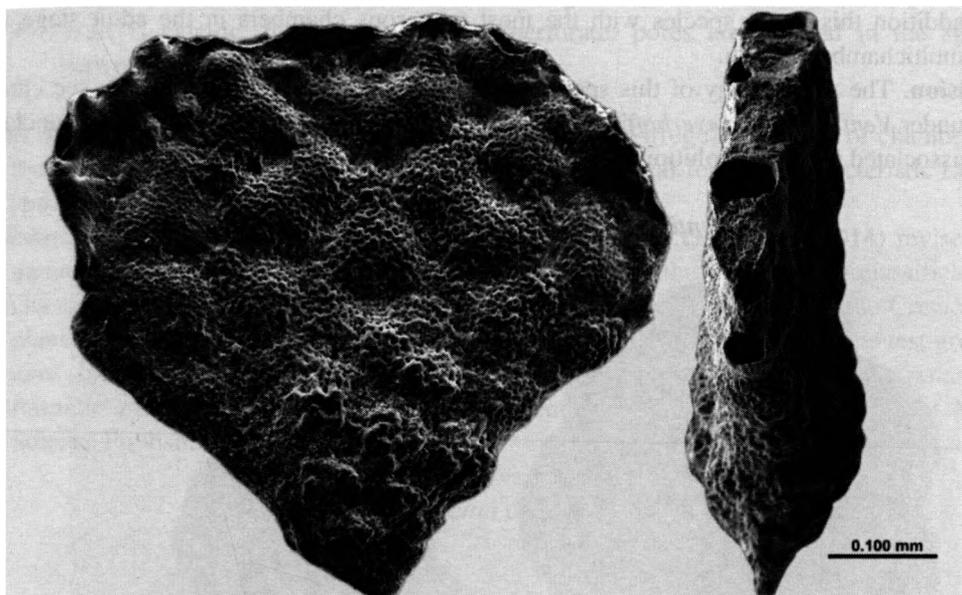
- Test consists of an early small stage consisting of chambers with biserial arrangement and the well-developed adult stage with multichamber growth.
- The adult stage begins with the biaperturate progressive chamber that is followed by up to eight sets of chamberlets; the adult stage forms over 80% of the test length.
- Sutures are distinct and depressed especially between the last-formed rows of chamberlets, and indistinct over the earlier chambers of the test due to the addition of successive layers of calcite during the ontogeny.
- Test is compressed in edge view, with a rounded and simple periphery.
- Aperture is simple and at the base of the last-formed chamber in the juvenile and multiple in the adult.
- Ornamentation presents multiple patterns: irregular over the earlier chambers, then reticulate and finally finely costate over the last-formed chamberlets. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Ventilabrella meyerhoffi* has a distinct hexagonal to hexagonal-rounded outline.

Revision. The morphology of this species was not reviewed. Georgescu (2014) revised its name as S-9multichamber in the nomenclature associated with the evolutionary

classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Ventilabrella multicamerata de Klasz 1953



Ventilabrella multicamerata from upper Maastrichtian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Ventilabrella multicamerata* de Klasz 1953, p. 230, pl. 5, Figure 1.

Original work. Klasz, I., de, 1953. Einige neue oder wenig bekannte Foraminiferen aus der helvetischen Oberkreide der bayerischen Alpen südlich Traunstein (Oberbayern). *Geologica Bavarica*, 17, 223-240.

Age. Maastrichtian.

Main morphological features.

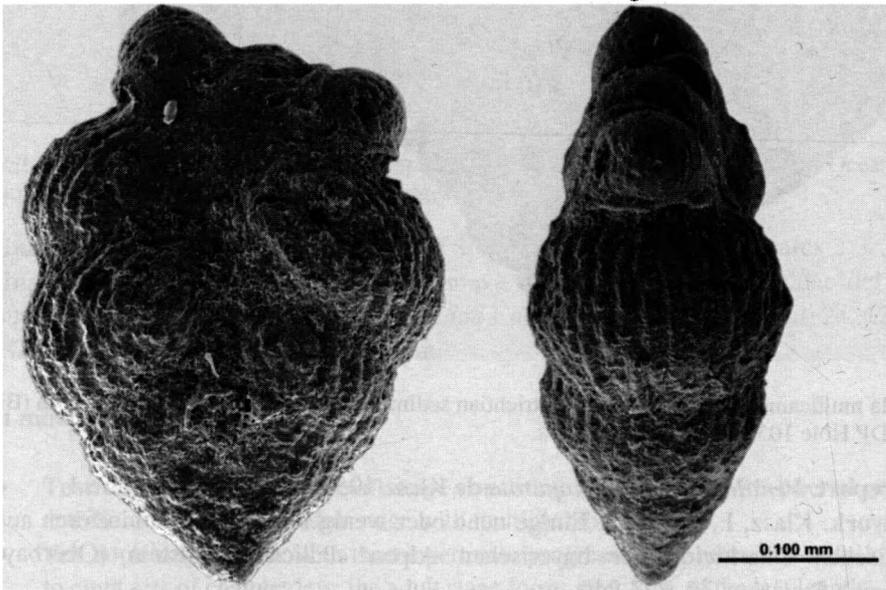
- Test consists of an early small stage consisting of chambers with biserial arrangement and the well-developed adult stage with multichamber growth.
- Chambers of the early stage are often indistinct due to the addition of successive layers of calcite.
- Adult stage is well-developed, representing over 80% of the test length; it begins with the biaperturate progressive chamber and continues with up to eleven sets of chamberlets.
- Test is compressed in edge view, distinctly thicker in the posterior part and with a rounded and simple periphery.
- Aperture is simple and at the base of the last-formed chamber in the juvenile and multiple in the adult.

- Ornamentation presents multiple patterns: irregular over the earlier chambers, then reticulate and finally finely costate over the last-formed chamberlets; vermicular ornamentation occurs occasionally over the earlier portion of the test. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Ventilabrella multicamerata* has a distinct subtriangular outline, with long and straight posterior branches and broadly rounded anterior margin. In addition this is the species with the most numerous chambers in the adult stage with multichamber growth.

Revision. The morphology of this species was not reviewed. Georgescu (2014, see citation under *Ventilabrella meyerhoffi*) revised its name as T-9multichamber in the nomenclature associated with the evolutionary classification.

Ventilabrella hariaensis (Nederbragt 1991)



Ventilabrella hariaensis from the upper Maastrichtian of the South Atlantic Ocean (Rio Grande Rise), DSDP Site 357 illustrated by Georgescu (2014), Figure 50: N.

Original report. *Pseudoguembelina hariaensis* Nederbragt 1991, p. 360, pl. 8, Figures 6-7, pl. 9, Figures 1-2.

Original work. Nederbragt, A.J., 1991. Late Cretaceous biostratigraphy and development of Heterohelicidae (planktic foraminifera). *Micropaleontology*, 37, 329-372.

Age. Late Maastrichtian.

Main morphological features.

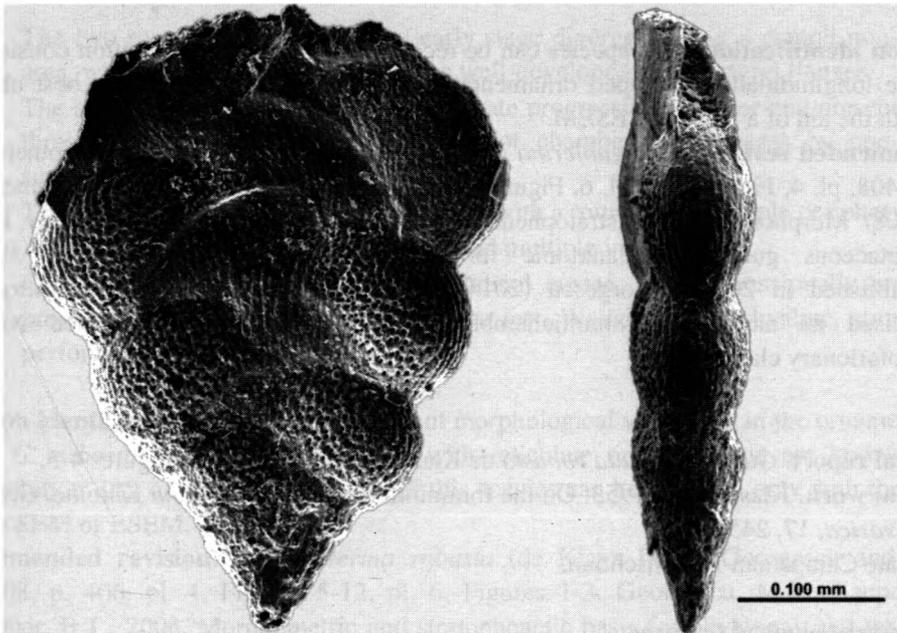
- Test with distinct growth stages: a juvenile one with the chambers presenting a biserial arrangement and the adult with multichamber growth; the juvenile stage frequently occupies more than 60% of the test length.

- The adult stage begins with the biaperturate progressive chamber and presents up to five sets of chamberlets; chamber addition in the sets of chamberlets is irregular.
- Chambers are subglobular to globular throughout.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture is simple and at the base of the last-formed chamber in the juvenile and multiple in the adult.
- Chamber surface is ornamented with thin longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the costae.

Notes on identification. The large-sized juvenile stage and irregular addition of chambers in the adult stage represents a combination of morphological features characteristic to this species.

Revision. The morphology of this species was not reviewed. Georgescu (2014) revised its name as S-1mixed in the nomenclature associated with the evolutionary classification. Georgescu, M.D., 2014. Evolutionary classification and nomenclature of the Cretaceous planktic foraminifera with the chambers alternately added with respect to the test growth axis. In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 129-248.

Gublerina acuta de Klasz 1953



Gublerina acuta from the upper Maastrichtian sediments of Western North Atlantic (Blake Plateau), ODP Hole 1050C illustrated by Georgescu and others (2008), plate 4, Figures 1.

Original report. *Gublerina acuta* de Klasz 1953, p. 246, pl. 8, Figures 3.

Original work. Klasz, I. de, 1953. On the foraminiferal genus *Gublerina* Kikoïne. *Geologica Bavarica*, 17, 245-251.

Age. Late Campanian-Maastrichtian.

Main morphological features.

- Test with early biserial chamber arrangement and adult stage with multichamber growth.
- The two rows of subrectangular to reniform chambers of the juvenile stage are divergent and separated by a central non-septate area bordered by the well-developed successive periapertural flanges.
- The adult stage begins with *the biaperturate progressive chamber followed by one set consisting of two elongate chamberlets. Sutures are distinct and depressed throughout.*
- *Test is strongly compressed in edge view and with a rounded and simple periphery.*
- Aperture is single in the early stage and multiple in the adult stage with multichamber growth.
- Chamber ornamentation consists of five longitudinal zones: costate in the two peripheral zones and over the central portion and reticulate over the central portion of the two chamber rows.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. This species can be recognized mainly ornamentation consisting of five longitudinally developed ornamentation zones; such feature can be best observed with the aid of a SEM and ESEM.

Recommended revision. *Praegublerina acuta* (de Klasz 1953). Georgescu and others 2008, p. 408, pl. 4, Figures 1-4, pl. 6, Figures 4-6. Georgescu, M.D., Saupe, E.E., Huber, B.T., 2008. Morphometric and stratophenetic basis for phylogeny and taxonomy in Late Cretaceous gublerinid planktonic foraminifera. *Micropaleontology*, 54, 397-424. [published in 2009]. Georgescu (2014, see citation under *Ventilabrella hariaensis*) revised its name as F-8multichamber in the nomenclature associated with the evolutionary classification.

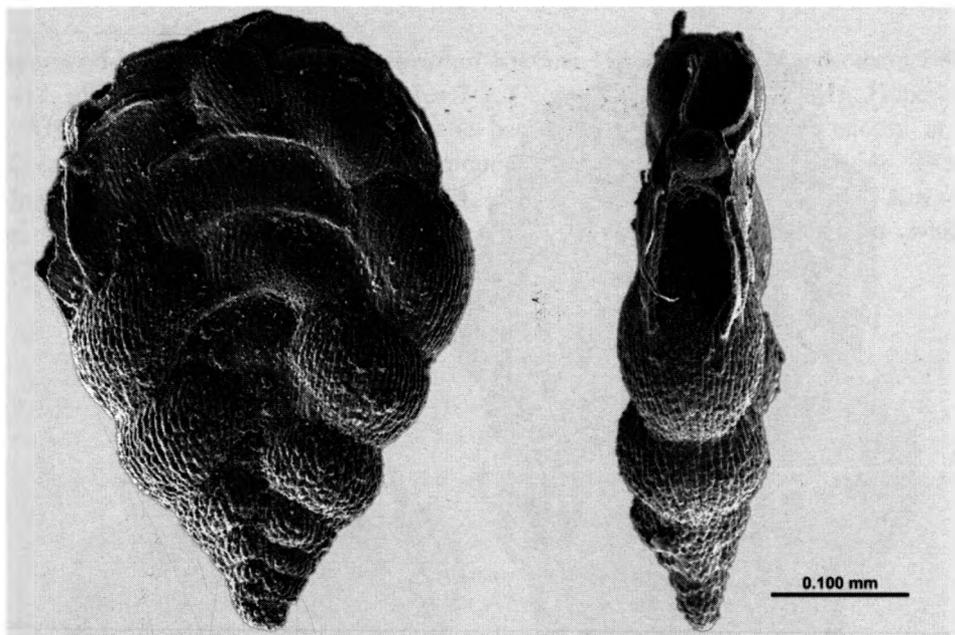
Original report. *Gublerina acuta robusta* de Klasz 1953, p. 247, pl. 8, Figures 4-5.

Original work. Klasz, I. de, 1953. On the foraminiferal genus *Gublerina* Kikoïne. *Geologica Bavarica*, 17, 245-251.

Age. Late Campanian-Maastrichtian.

Main morphological features.

- Test consists of two stages: one juvenile that presents subglobular to subrectangular chambers with biserial arrangement and the adult one with multichamber growth.

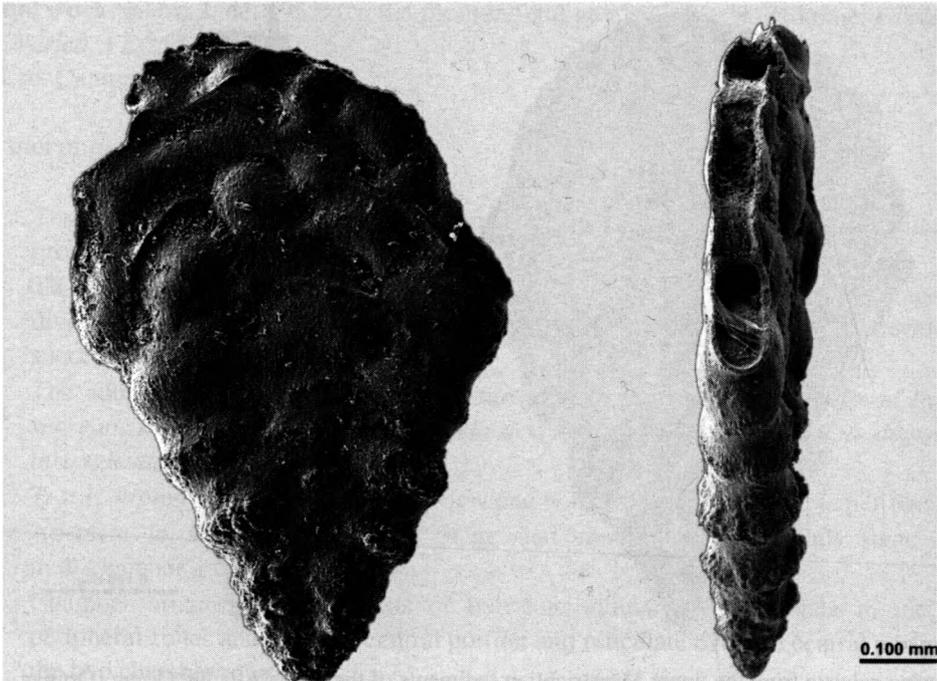
Gublerina robusta de Klasz 1953

Gublerina robusta from the upper Maastrichtian sediments of the North Atlantic Ocean (Orphan Knoll), DSDP Hole 111A illustrated by Georgescu and others (2008), plate 4, Figure 5.

- The two rows of chambers of the early stage diverge leaving a central non-septate area, which is bounded laterally by the well-developed periapertural flanges.
- The adult stage begins with the biaperturate progressive chamber and presents up to three sets of chamberlets; the number of chamberlets increases by one in the successive sets.
- Test is strongly compressed in edge view, with a rounded and simple periphery.
- Aperture is single in the juvenile stage and multiple in the adult.
- Ornamentation consists of thin longitudinal costae, which occasionally are more prominent over the earlier portion of the test. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. There is a significant morphological variability in the ornamentation of *G. robusta*, where rare specimens with reticulate ornamentation are known; high resolution data on the ornamentation of this species can be obtained only with the aid of the SEM or ESEM.

Recommended revision. *Praegublerina robusta* (de Klasz 1953). Georgescu and others 2008, p. 406, pl. 4, Figures 5-12, pl. 6, Figures 1-3. Georgescu, M.D., Saupe, E.E., Huber, B.T., 2008. Morphometric and stratophenetic basis for phylogeny and taxonomy in Late Cretaceous gublerinid planktonic foraminifera. *Micropaleontology*, 54, 397-424. [published in 2009]. Georgescu (2014, see citation under *Ventilabrella hariaensis*) revised its name as F-9multichamber in the nomenclature associated with the evolutionary classification.

Gublerina cuvillieri Kikoïne 1948

Gublerina cuvillieri from the Maastrichtian sediments of the East Indian Ocean (Wombat Plateau), ODP Hole 761B. illustrated by Georgescu and others (2008), plate 5, Figures 10.

Original report. *Gublerina cuvillieri* Kikoïne 1948, p. 26, pl. 2, Figure 10.

Original work. Kikoïne, J., 1948. Les Heterohelicidae du Crétacé supérieur pyrénéen. *Bulletin de la Société Géologique de France*, 18, 15-35.

Age. Maastrichtian.

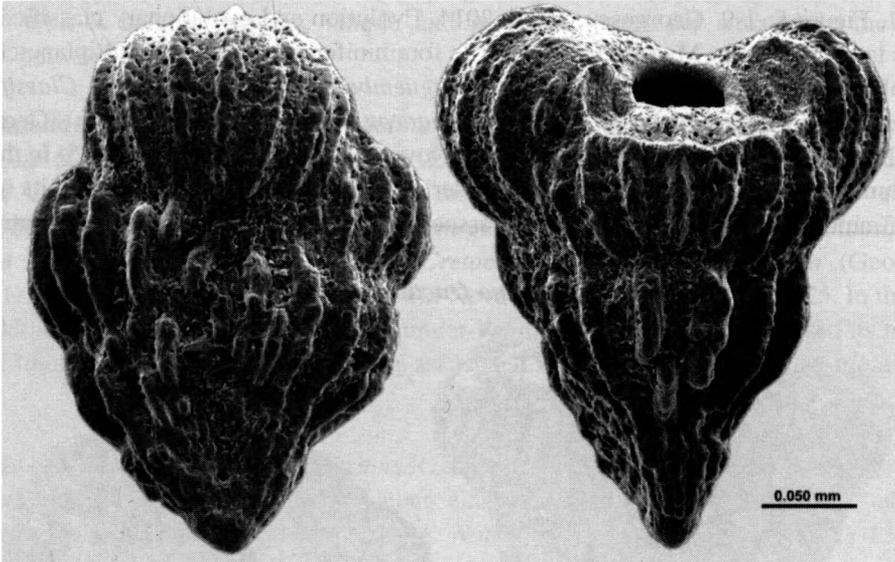
Main morphological features.

- Test with early biserial chamber arrangement and adult stage with multichamber growth.
- Chambers of the early stage are subrectangular and are arranged in two diverging rows, which are separated by a central non-septate area that is bordered laterally the well-developed periapertural flanges.
- Adult stage begins with the biaperturate progressive chamber, which is followed by up to three sets of chamberlets.
- Sutures are distinct and depressed throughout.
- Test is strongly compressed in edge view, with a rounded periphery and transverse ridges.
- Aperture is simple and at the base of the last-formed chamber in the juvenile stage and multiple in the adult.
- Ornamentation is concentrated over the surface leaving most of the test surface smooth; vestigial costate ornamentation can be occasionally observed.

- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Gublerina cuvillieri* Kikoïne 1948. Georgescu and others 2008, p. 412, pl. 5, Figures 6-11, pl. 6, Figures 7-9. Georgescu, M.D., Saupe, E.E., Huber, B.T., 2008. Morphometric and stratophenetic basis for phylogeny and taxonomy in Late Cretaceous gublerinid planktonic foraminifera. *Micropaleontology*, 54, 397-424. [published in 2009]. Georgescu (2014, see citation under *Ventilabrella hariaensis*) revised its name as F-11multichamber in the nomenclature associated with the evolutionary classification.

***Racemiguembelina intermedia* (de Klasz 1953)**



Racemiguembelina intermedia from the upper Maastrichtian sediments of the Western Atlantic Ocean (Blake Plateau) illustrated by Georgescu (2014), Figure 5: 1-2.

Original report. *Pseudotextularia intermedia* de Klasz 1953, p. 231, pl. 5, Figure 2.

Original work. Klasz, I., de, 1953. Einige neue oder wenig bekannte Foraminiferen aus der helvetischen Oberkreide der bayerischen Alpen südlich Traunstein (Oberbayern). *Geologica Bavarica*, 17, 223-240.

Age. Late Campanian-Maastrichtian.

Main morphological features.

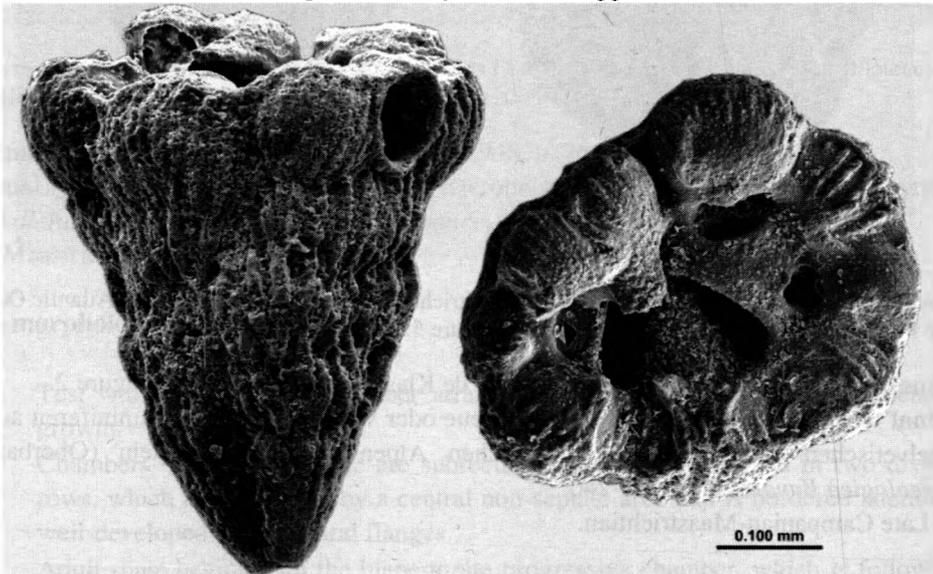
- Test with two distinct growth stages; the early stage consists of chambers alternately added with respect to the test growth axis resulting in a biserial arrangement and the adult one with chamber proliferation.
- There is no progressive chamber, and the adult stage consists of one, rarely two sets of two chamberlets; the first set is added in the central sutures zones (one on each side of the test) and in the anterior part.

- Chambers are subglobular and with a distinct transverse elongation in the terminal portion of the test.
- Periphery is broadly rounded and simple, without peripheral structures.
- Chamber surface is ornamented with thick longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the costae.

Notes on identification. *Racemiguembelina intermedia* can be recognized by the adult stage without progressive chamber and with the sets of chamberlets added successively at an angle of 90°.

Recommended revision. *Racemiguembelina intermedia* (de Klasz 1953). Georgescu 2014, p. 111, Figure 5: 1-9. Georgescu, M.D., 2014. Evolution and evolutionary classification of the late Campanian-Maastrichtian planktic foraminifera that evolved multiplane chamber proliferation (*Pseudotextularia* and *Racemiguembelina*). In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 101-125. In the same volume Georgescu (2014, see citation under *Ventilabrella hariaensis*) revised its name as I-13multichamber in the nomenclature associated with the evolutionary classification.

Racemiguembelina fructicosa (Egger 1899)



Racemiguembelina fructicosa from the upper Maastrichtian sediments of the South Atlantic Ocean (São Paulo Plateau), DSDP Site 356.

Original report. *Gümbelina fructicosa* Egger 1899, p. 35, pl. 14, Figures 8-9.

Original work. Egger, J.G., 1899. Foraminiferen und Ostrakoden aus den Kreidemergeln der Oberbayerischen Alpen. *Abhandlungen der Mathematisch-Physikalischen Klasse der Königlich Bayerischen Akademie der Wissenschaften*, 21, 3-230. [published in 1902]
Age. Maastrichtian.

Main morphological features.

- Test consists of two distinct growth stages: the juvenile portion presents chambers with biserial arrangement, whereas multiplane chamber proliferation occurs in the adult stage.
- Chambers of the adult stages are added in sets of chamberlets resulting in a con-like appearance with the opening towards the anterior part.
- The chamberlets of the adult stage are connected across the central cavity by extensions of the wall referred to as bridges, which can be simple or multiple depending of the degree of proliferation within one set of chamberlets.
- Chamber surface is ornamented with thick longitudinal costae.
- Wall is calcitic, hyaline, simple and perforate; pores are situated in the spaces between the costae.

Recommended revision. *Racemiguembelina fructicosa* Egger 1899. Georgescu 2014, p. 114, Figure 6: 5-8. Georgescu, M.D., 2014. Evolution and evolutionary classification of the late Campanian-Maastrichtian planktic foraminifera that evolved multiplane chamber proliferation (*Pseudotextularia* and *Racemiguembelina*). In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 101-125. In the same volume Georgescu (2014, see citation under *Ventilabrella hariaensis*) revised its name as S-13multichamber in the nomenclature associated with the evolutionary classification.

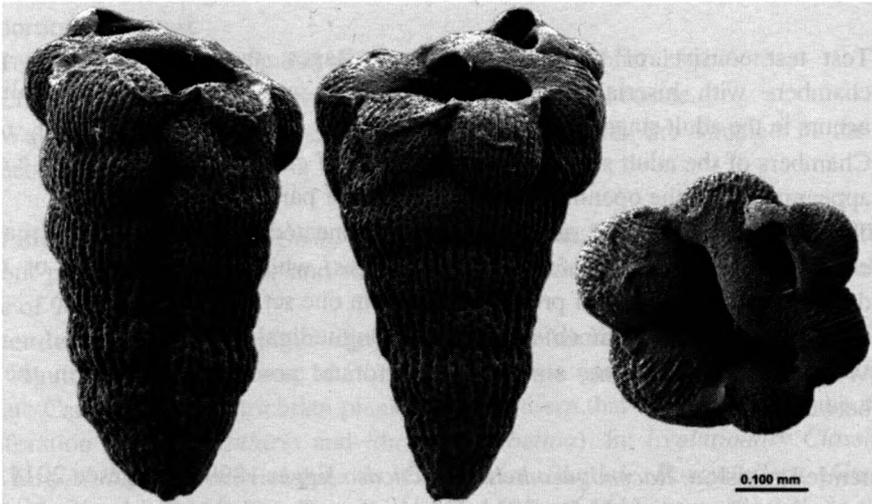
Original report. *Pseudotextularia varians* Rzehak 1895, p. 217, pl. 7, Figures 1-3.

Original work. Rzehak, A., 1895. Ueber einige merkwürdige Foraminiferen aus dem österreichischen Tertiär. *Annalen des K.K. Naturhistorischen Hofmuseums*, 6, 1-12.

Age. Late Maastrichtian.

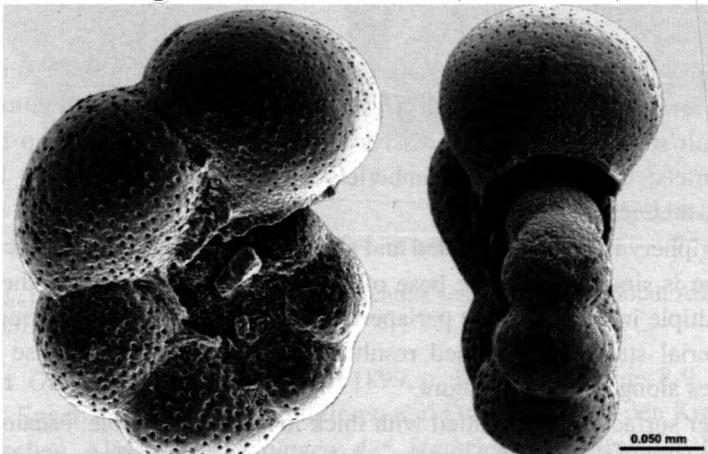
Main morphological features.

- Test with two distinct growth stage: an early one in which the chambers present a biserial arrangement and an adult with multiplane chamber proliferation.
- The adult stage lacks the progressive chamber, and consists of up to three sets of chamberlets; there are two chamberlets in the first set and three in each of the subsequent ones.
- Test periphery is broadly rounded and simple, without peripheral structures.
- Aperture is simple and at the base of the last-formed chamber in the juvenile stage and multiple in the adult; the periapertural structures of the last-formed chambers of the biserial stage are detached resulting in the formation of false supplementary apertures along the central suture.
- Chamber surface is ornamented with thick longitudinal costae; ornamentation is less prominent over the chambers of the adult stage with multiplane proliferation. Wall is calcitic, hyaline, simple and perforate.

Racemiguembelina varians (Rzehak 1895)

Racemiguembelina varians from the upper Maastrichtian sediments of the East Indian Ocean (Wombat Plateau), ODP Hole 761B illustrated by Georgescu (2014), Figure 4: 4-6.

Recommended revision. *Pseudotextularia varians* Rzehak 1895. Georgescu 2014, p. 108, Figures 3: 1-10, 4: 1-12. Georgescu, M.D., 2014. Evolution and evolutionary classification of the late Campanian-Maastrichtian planktic foraminifera that evolved multiplane chamber proliferation (*Pseudotextularia* and *Racemiguembelina*). In: *Evolutionary Classification and English-based Nomenclature in Cretaceous Planktic Foraminifera* (Georgescu, M.D., Henderson, C.M., Eds). New York: Nova Science Publishers, 101-125. In the same volume Georgescu (2014, see citation under *Ventilabrella hariaensis*) revised its name as F-12multichamber in the nomenclature associated with the evolutionary classification.

Globigerinelloides bentonensis (Morrow 1934)

Globigerinelloides bentonensis from the upper Albian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Anomalina bentonensis* Morrow 1934, p. 201, pl. 30, Figure 4.

Original work. Morrow, A.L., 1934. Foraminifera and ostracoda of the Upper Cretaceous of Kansas. *Journal of Paleontology*, 8, 186-205.

Age. Late Albian-early Turonian.

Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are subglobular to globular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, straight to slightly curved and radial on both test sides.
- Test is symmetrical in edge view, with a broad periphery.
- A peripheral zone with lower pore density occurs frequently over the earlier chambers of the final whorl.
- Umbilici are shallow and with diameters representing about one third of the maximum test diameter.
- Aperture has the shape of a low arch situated in peripheral position and extends on both test sides into the umbilici.
- The aperture is bordered by a thin imperforate lip; relict periapertural structures occur within the umbilical areas, where they can merge to form a rim-like structure around the umbilicus.
- Chamber surface is smooth. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. In the case of such specimens it is recommended to have SEM and ESEM observations. *Globigerinelloides bentonensis* was sometimes confused for *G. eaglefordensis* based on the resemblances in lateral view between the two species.

Revision. *Globigerinelloides bentonensis* (Morrow). Eicher and Worstell 1970, p. 297, pl. 8, Figure 17, 19, pl. 9, Figure 3. Eicher, D.L., Worstell, P., 1970. Cenomanian and Turonian foraminifera from the Great Plains, United States. *Micropaleontology*, 16, 269-324.

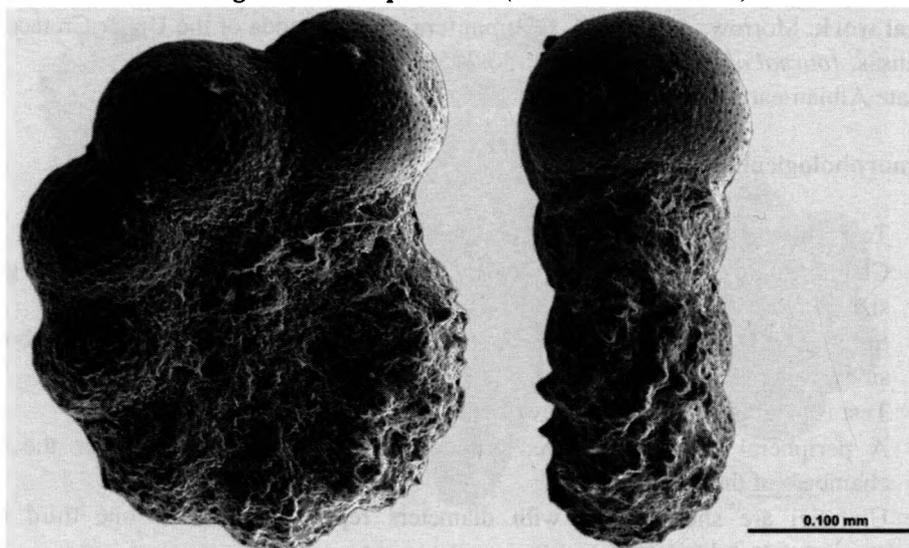
Original report. *Pseudotextularia varians* Rzehak 1895, p. 217, pl. 7, Figures 1-3.

Original work. Rzehak, A., 1895. Ueber einige merkwürdige Foraminiferen aus dem österreichischen Tertiär. *Annalen des K.K. Naturhistorischen Hofmuseums*, 6, 1-12.

Age. Late Maastrichtian.

Main morphological features.

- Test with two distinct growth stage: an early one in which the chambers present a biserial arrangement and an adult with multiplane chamber proliferation.
- The adult stage lacks the progressive chamber, and consists of up to three sets of chamberlets; there are two chamberlets in the first set and three in each of the subsequent ones.
- Test periphery is broadly rounded and simple, without peripheral structures.

Globigerinelloides pulchella (Todd and Low 1964)

Globigerinelloides pulchella from the upper Albian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Planomalina pulchella* Todd and Low 1964, p. 401, pl. 1, Figure 9.

Original work. Todd, R., Low, D., 1964. Cenomanian (Cretaceous) foraminifera from the Puerto Rico Trench. *Deep-Sea Research*, 11, 395-414.

Age. Late Albian.

Main morphological features.

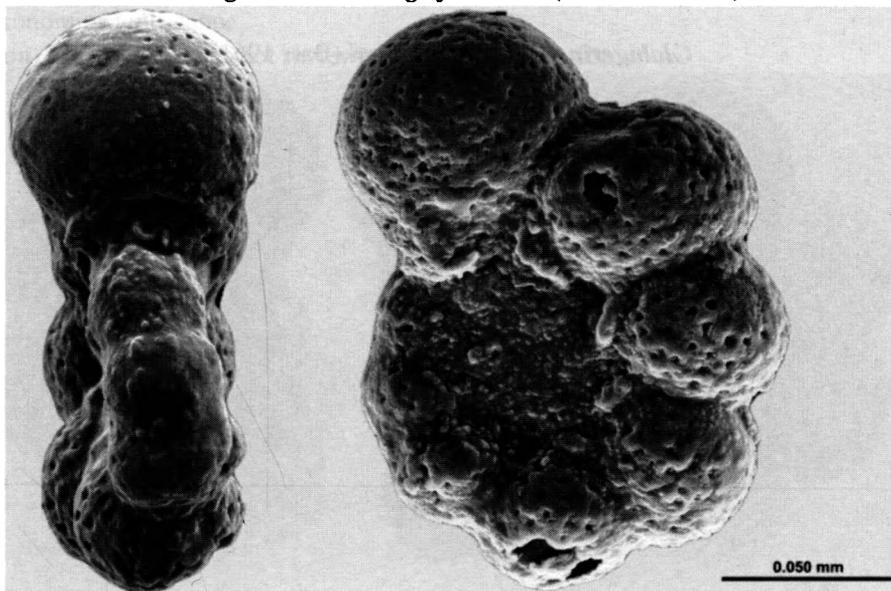
- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are subglobular to globular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, straight to slightly curved.
- In edge view the test is symmetrical and presents a broad and simple periphery.
- Umbilici are symmetrically developed on both test sides, shallow and with a diameter representing around one third of the maximum test diameter.
- Aperture has the shape of a low arch situated in peripheral position and extends on both test sides into the two umbilici.
- The aperture is bordered by a thin imperforate lip that is rarely preserved.
- Relict periapertural structures occur in the umbilical regions.
- Chamber surface is ornamented over the earlier chambers of the final whorl with well-developed more or less elongate structures with irregular height and orientation; the last-formed chambers are smooth.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globigerinelloides pulchella* differs from *G. bentonensis* mainly in having the earlier chambers of the final whorl ornamented with coarse irregular

structures. The two species occur together in deep water sediments. Observations with the aid of a SEM or ESEM can help in differentiating between the two species.

Revisions. This species was not reviewed since its description.

Globigerinelloides eaglefordensis (Moreman 1927)



Globigerinelloides eaglefordensis from the lower Turonian sediments of Kansas (USA).

Original report. *Anomalina eaglefordensis* Moreman 1927, p. 99, pl. 16, Figure 9.

Original work. Moreman, W.L., 1927. Fossil zone of the Eagle Ford of North Texas. *Journal of Paleontology*, 1, 89-101.

Age. Late Cenomanian-Turonian.

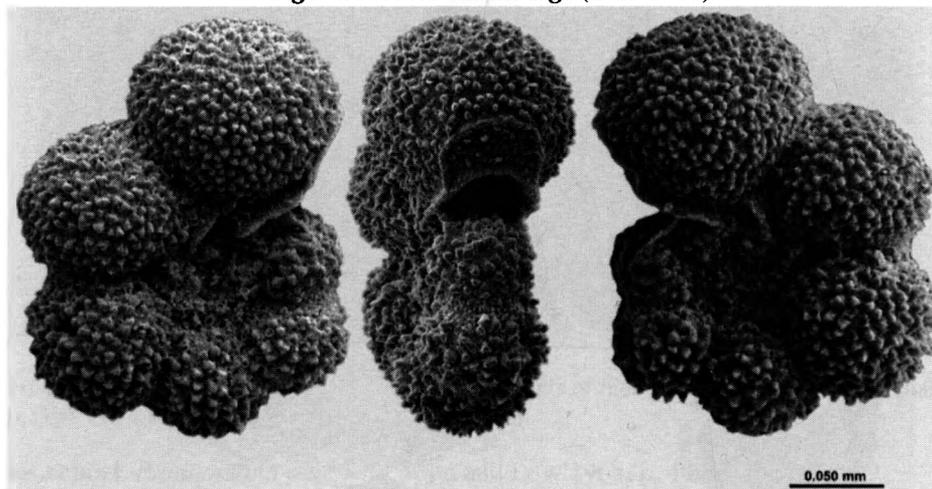
Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are subrectangular in shape, overlap at various rates and present a gradual and slow size increase.
- Sutures are distinct and depressed, straight to gently curved and often oblique to the previous whorl.
- Test is symmetrical and compressed in edge view, with rounded and simple periphery, without peripheral structures.
- Umbilici are symmetrically developed, shallow, with an elliptical shape and a diameter between one third and one half of the test maximum diameter.
- Aperture has the shape of a medium high arch, is situated in peripheral position and extends on both test sides into the symmetrical umbilici.
- The aperture is bordered by a thin imperforate lip that is rarely preserved.
- Relict periapertural structures are only rarely observed in the umbilical regions.
- Chamber surface is smooth. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globigerinelloides eaglefordensis* differs from *G. bentonensis* mainly by the compressed tests and higher apertures.

Recommended revision. *Planulina? eaglefordensis* (Moreman). Low 1964, p. 122, text-figure 1. Low, D., 1964. Redescription of *Anomalina eaglefordensis* Moreman. *Contributions from the Cushman Foundation for Foraminiferal Research*, 15, 122-123.

***Globigerinelloides ehrenbergi* (Barr 1961)**



Globigerinelloides ehrenbergi from the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Planomalina ehrenbergi* Barr 1961, p. 563, pl. 69, Figure 1.

Original work. Barr, F.T., 1961. Upper Cretaceous planktonic foraminifera from the Isle of Wight, England. *Palaeontology*, 4, 552-580. [published in 1962]

Age. Coniacian-lower Campanian.

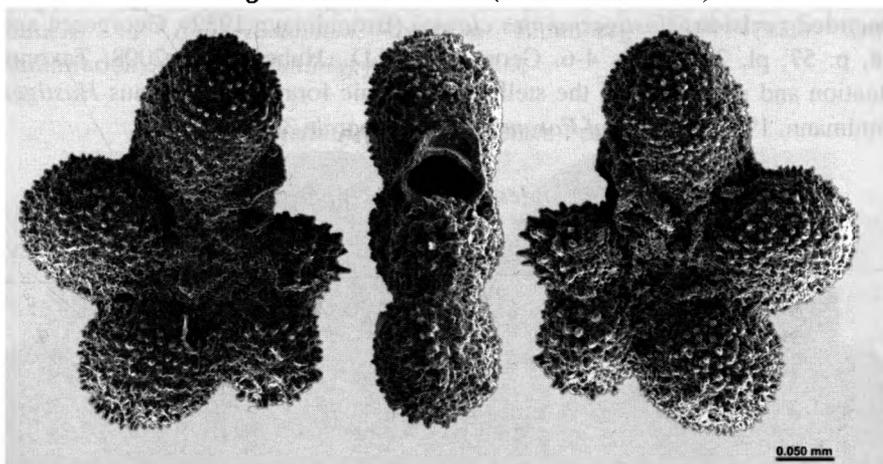
Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are subglobular to globular, overlap at various rates and present a gradual size increase; the rates of size increase vary from low to medium.
- Test is symmetrical in edge view, with a rounded and simple periphery, without peripheral structures.
- Umbilici are symmetrical, shallow and with a diameter between one fourth and one third of the test maximum diameter.
- Aperture has the shape of a medium high arch, is situated in peripheral position and extends on both test sides into the symmetrical umbilici.
- The aperture is bordered by a narrow imperforate lip.
- Relict periapertural structures occur in the umbilical regions.
- Chamber surface is uniformly ornamented with scattered pustules.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. There is significant variability in the number of chambers in the final whorl in *Globigerinelloides ehrenbergi*. Barr (1961) described to species primarily based on the number of chambers of the final whorl: *P. ehrenbergi* for those with 7-8 chambers and *P. rowei* for those with 4 ½-5. This framework was followed subsequently by some authors but herein such morphological differences are considered without taxonomic significance.

Revision. This species was not reviewed since its description.

Globigerinelloides clavata (Brönnimann 1952)



Globigerinelloides clavata from the upper Santonian sediments of the Gulf of Mexico illustrated by Georgescu and Huber (2008), plate 2, Figures 5.

Original report. *Globigerinella escheri clavata* Brönnimann 1952, p. 49, pl. 1, Figures 12-13.

Original work. Brönnimann, P., 1952. Globigerinidae of the Upper Cretaceous (Cenomanian-Maestrichtian) of Trinidad, B.W.I. *Bulletins of American Paleontology*, 34(140), 1-70.

Age. Coniacian-Santonian.

Main morphological features.

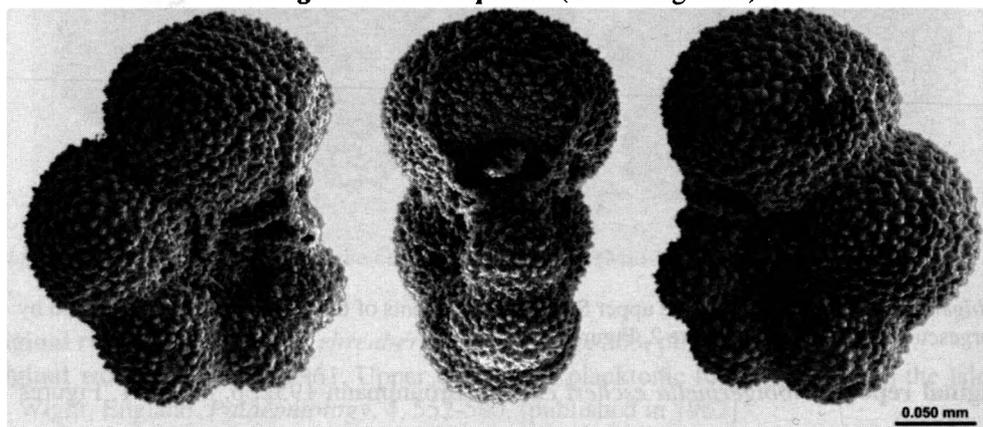
- Test with the proloculus followed by chambers added in a planispiral coil.
- Earlier chambers are globular to subglobular and the last-formed ones distinctly radially elongate; chambers overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, straight and radial.
- Test is symmetrical and compressed in edge view, with a rounded and simple periphery.
- Test is symmetrically biumbilicate, with the shallow umbilici presenting a diameter of around one third to one half of the maximum test diameter.

- Aperture has the shape of a medium high to high arch, is situated in peripheral position and extends on both test sides into the umbilici; aperture is bordered by an imperforate lip and relict periapertural structures occur in the umbilical regions.
- Chamber surface is ornamented with scattered pustules and the ornamentation is more prominent over the earlier chambers of the final whorl. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globigerinelloides clavata* differs from all the species of the genus mainly by the radially elongate last-formed one to three chambers.

Recommended revision. *Hastigerinoides clavata* (Brönnimann 1952). Georgescu and Huber 2008, p. 57, pl. 2, Figures 4-6. Georgescu, M.D., Huber, B.T., 2008. Taxonomic re-evaluation and phylogeny of the stellate planktonic foraminiferal genus *Hastigerinoides* Brönnimann, 1952. *Journal of Foraminiferal Research*, 38, 52-58.

Globigerinelloides asperum (Ehrenberg 1854)



Globigerinelloides asperum from the lower Maastrichtian sediments of Rügen Island (Germany) illustrated by Georgescu (2012), plate 2, Figures 7-9.

Original report. *Phanerostomum asperum* Ehrenberg 1854, pl. 30, Figure 26 a-b.

Original work. Ehrenberg, C.G., 1854. *Mikrogeologie*. Leipzig: L. Voss, 374 p.

Age. Santonian-Maastrichtian.

Main morphological features.

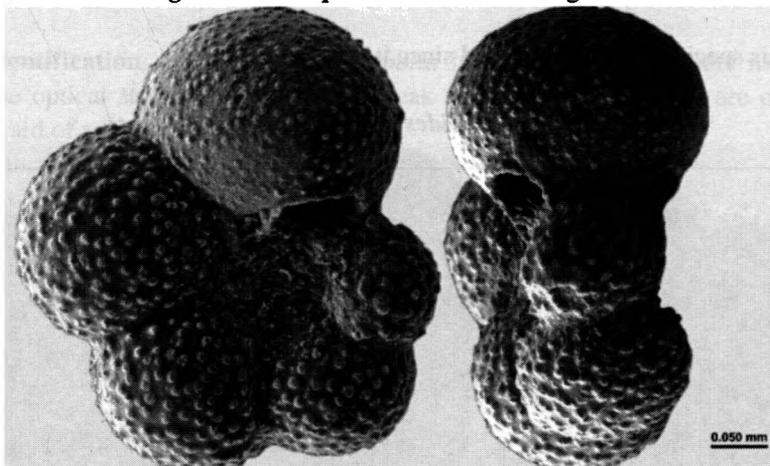
- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase; the size increase rate is mostly rapid, more rarely moderate.
- Sutures are distinct, depressed, radial and straight to slightly curved on both test sides.
- Test is symmetrically biumbilicate and with the umbilical diameter representing one fourth or less of the maximum test diameter.
- Test is symmetrical in edge view, with a broadly rounded and simple periphery.
- Aperture has the shape of a low to medium high arch, is situated in peripheral position and extends in the symmetrical umbilical regions; one distal biaperturate

chamber occurs rarely and in this case the two apertures are smaller and symmetrically positioned with respect to the test coiling plane.

- The aperture is bordered by a narrow imperforate lip; relict periapertural structures occur in the umbilical regions.
- Chamber surface is ornamented with uniformly distributed scattered pustules.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Globigerinelloides asperum* Georgescu 2012, p. 294, pl. 2, Figures 1-13, pl. 3, Figures 1-5, text-Figure 2: 1-7. Georgescu, M.D., 2012. Restudy of the type specimens of *Phanerostomum asperum* Ehrenberg 1854 (Late Cretaceous, Foraminiferida). *Micropaleontology*, 58, 291-303.

Globigerinelloides prairiehillensis Pessagno 1967



Globigerinelloides prairiehillensis from the late Santonian sediments of the Caribbean region (Yucatan Outer Shelf), DSDP Site 95.

Original report. *Globigerinelloides prairiehillensis* Pessagno 1967, p. 277, pl. 60, Figures 2-3, pl. 83, Figure 1, pl. 90, Figures 1-2, 4, pl. 97, Figures 3-4.

Original work. Pessagno, E.A. Jr., 1967. Upper Cretaceous planktonic foraminifera from the Western Gulf coastal plain. *Palaeontographica Americana*, 5(37), 243-445.

Age. Late Santonian-Maastrichtian.

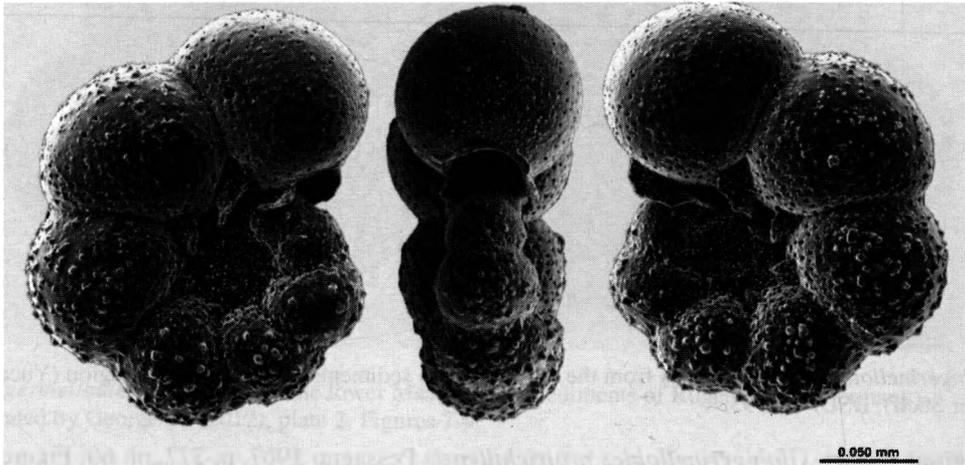
Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are globular to spherical in shape, overlap at various rates and present a gradual size increase in ontogeny; the rate of size increase is low, rarely moderate.
- The last-formed chamber can be occasionally replaced by two smaller chamberlets symmetrically positioned with respect to the test coiling plane.
- Test is biumbilicate, with the umbilici with a diameter of around one fourth of the maximum test diameter.

- Sutures are distinct, depressed, radial and straight to slightly curved on both test sides.
- Test is symmetrical in edge view, with a broad and simple periphery, without peripheral structures.
- Aperture has the shape of a low to medium high arch, is situated in peripheral position and extends on both test sides into the two symmetrical umbilici; occasionally the last-formed chamber is biaperturate and the two smaller apertures occupy symmetrical positions with respect to the test coiling plane. Apertures are bordered by delicate imperforate rims or lips, which are rarely preserved; relict periapertural structures occur in the umbilical region.
- Chamber surface is ornamented with uniformly distributed scattered pustules; ornamentation is slightly more prominent over the earlier chamber of the final whorl. Wall is calcitic, hyaline, simple and perforate.

Revision. This species was not reviewed since its description.

Globigerinelloides bollii Pessagno 1967



Globigerinelloides bollii from the lower Cretaceous sediments of the South Atlantic Ocean (Falkland Plateau), DSDP Site 511.

Original report. *Globigerinelloides bollii* Pessagno 1967, p. 275, pl. 62, Figure 5, pl. 81, Figures 7-8, pl. 97, Figures 1-2, pl. 100, Figure 3.

Original work. Pessagno, E.A. Jr., 1967. Upper Cretaceous planktonic foraminifera from the Western Gulf coastal plain. *Palaeontographica Americana*, 5(37), 243-445.

Age. Late Santonian-early Campanian.

Main morphological features.

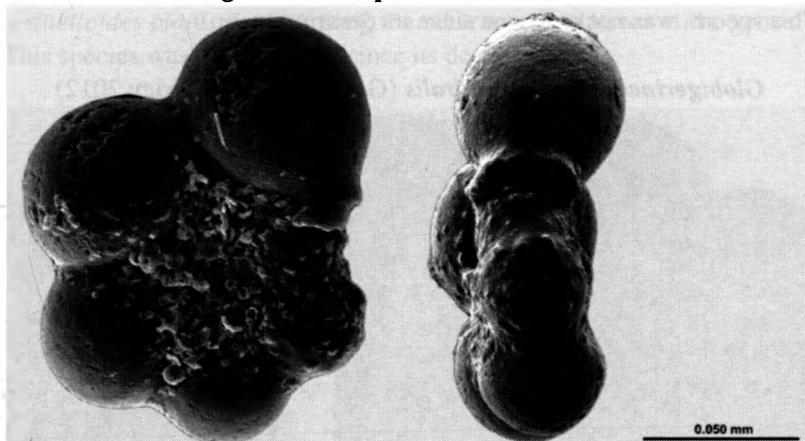
- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are globular in shape, overlap at various rates and present a gradual size increase at low rate.

- Sutures are distinct, depressed and radial on both test sides.
- Test is symmetrically biumbilicate, with umbilical regions presenting a diameter of around one fourth to one third of the maximum test diameter.
- Test is symmetrical in edge view, with a broad and simple periphery, without peripheral structures.
- Aperture has the shape of a medium high arch, is situated in peripheral position and extends on both test sides into the symmetrical umbilici.
- Aperture is bordered by a thin imperforate lip, which is rarely preserved; relict periapertural structures occur in the umbilical regions.
- Chamber surface is weakly ornamented with scattered pustules, which are denser and more prominent on the earlier chambers of the final whorl; the last-formed few chambers are smooth.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globigerinelloides bollii* is a species that appears mostly smooth under the optical stereomicroscope; the weak ornamentation features are observed best with the aid of a SEM and ESEM.

Revision. This species was not reviewed since its description.

***Globigerinelloides praevolutus* Petters 1977**



Globigerinelloides praevolutus from the upper Santonian sediments of the Missouri River Basin (USA).

Original report. *Globigerinelloides praevolutus* Petters 1977, p. 180, pl. 2, Figures 15-16.

Original work. Petters, S.W., 1977. Upper Cretaceous planktonic foraminifera from the subsurface of the Atlantic coastal plain of New Jersey. *Journal of Foraminiferal Research*, 7, 165-187.

Age. Late Santonian-early Campanian.

Main morphological features.

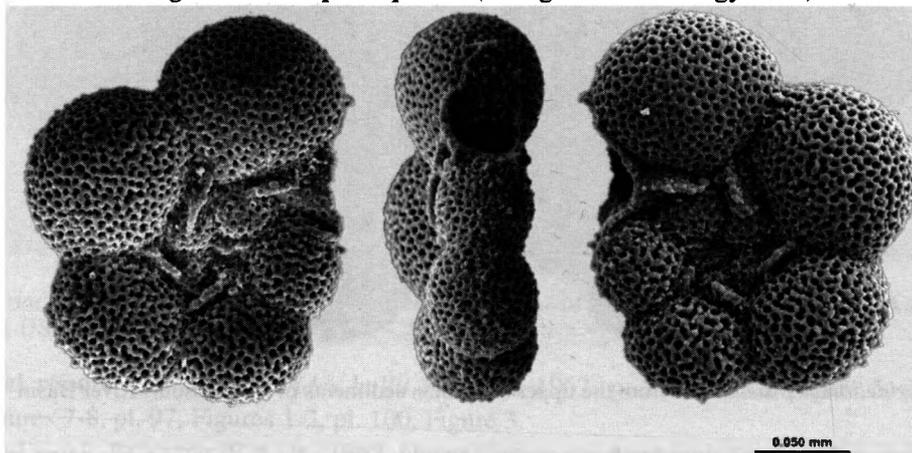
- Test with the proloculus followed by chambers added in a planispiral coil.

- Chambers are petaloid in lateral view and slightly compressed in edge view, overlap at low rates resulting in a lobate outline and present a gradual size increase.
- Test is symmetrically biumbilicate, with the umbilici representing about one third of the maximum test diameter.
- Test is symmetrical and slightly compressed in edge view; periphery is rounded and with an imperforate peripheral band throughout the final whorl.
- Aperture has the shape of a low arch, is situated in peripheral position and extends in the umbilical regions.
- The aperture is bordered by wide lip; relict periapertural lips occur within the umbilici.
- Chamber surface is smooth or with rare generally small-sized scattered pustules.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globigerinelloides praevolutus* is a small-sized species that can be easily confused for the juveniles of the co-occurring larger *Globigerinelloides* species. The chamber surface appears smooth and this can be observed under the optical stereomicroscope. The occasional hispid appearance is given by either the primary pustulose ornamentation or the secondary calcite; therefore, observations with the aid of the SEM and ESEM are necessary for a correct identification of this species. SEM and ESEM observations are necessary to observe the imperforate peripheral band.

Revision. This species was not reviewed since its description.

***Globigerinelloides planispiralis* (Georgescu and Carrigy 2012)**



Globigerinelloides planispiralis from the lower Campanian sediments of the central Pacific Ocean (Mid-Pacific Mountains). DSDP Site 463 illustrated by Georgescu and Carrigy (2012), plate 4, Figures 1-3.

Original report. *Hillsella planispiralis* Georgescu and Carrigy 2012, p. 90, pl. 4, Figures 1-11.

Original work. Georgescu, M.D., Carrigy, C., 2012. Evolutionary classification of the coiled Upper Cretaceous (Turonian-Lower Campanian) planktic foraminifera with simple-ridged test wall. *Revista Española de Micropaleontología*, 44, 79-98.

Age. Early Campanian.

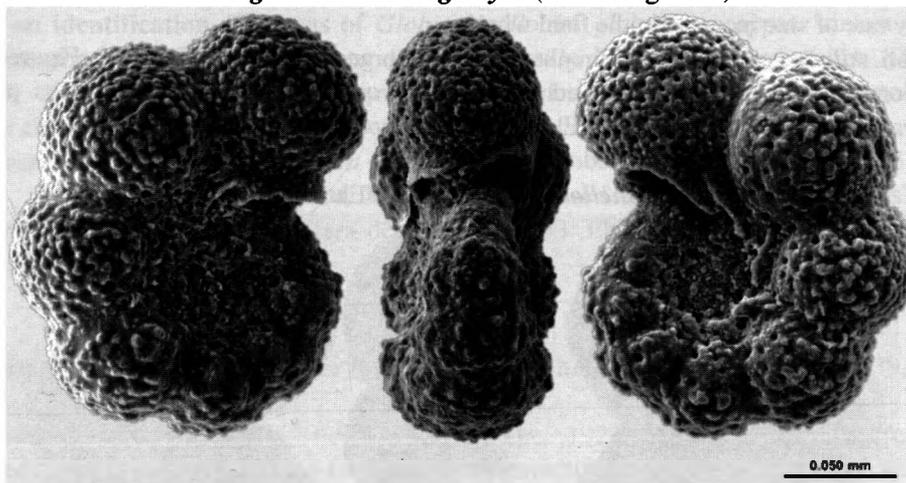
Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are subglobular to globular, overlap at various rates and present a gradual size increase; the rate of size increase is slow, rarely moderate.
- Test is symmetrically biumbilicate, with the umbilical diameter representing one fourth to one third of the maximum test diameter.
- Test is symmetrical in edge view, with a rounded periphery; a peripheral imperforate band occurs on the earlier chambers of the final whorl.
- Aperture has the shape of a low to medium high arch, is situated in peripheral position and extends on a small distance in the symmetrical umbilical regions. The aperture is bordered by an imperforate lip; relict periapertural structures occur in the umbilical regions.
- Chamber surface is smooth and only with rare, irregularly distributed scattered pustules.
- Wall is calcitic, hyaline, simple-ridged and perforate; rare specimens with last-formed chambers with simple wall are known.

Notes on identification. The simple-ridged wall of this species is a characteristic of *Globigerinelloides planispiralis* among the other representatives of the genus.

Revision. This species was not reviewed since its description.

Globigerinelloides megathyra (Ehrenberg 1841)



Globigerinelloides megathyra from the upper Maastrichtian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2013), plate 10, Figures 6-8.

Original report. *Allothea megathyra* Ehrenberg 1841, p. 426, pl. 3, Figure 49.

Original work. Ehrenberg, C.G., 1841. Verbreitung und Einfluss des mikroskopischen Lebens in Süd- und Nord- Amerika. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin*, 1841: 291–445. [published in 1843]

Age. Campanian-Maastrichtian.

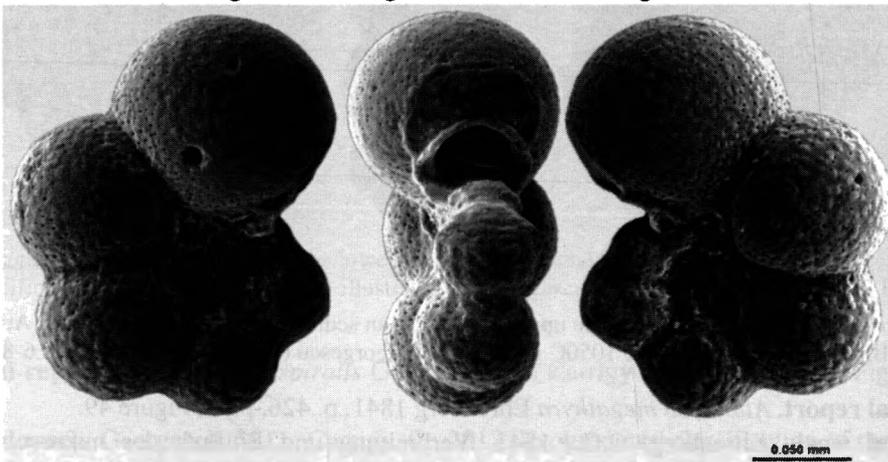
Major morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are subglobular, overlap at various rates and present a gradual size increase.
- Sutures are distinct, depressed, radial and straight to slightly curved on both test sides.
- Test is symmetrically biumbilicate, with the umbilical regions representing about one fourth to one third of the maximum test diameter.
- Test is symmetrical and slightly compressed in edge view, with a round periphery and an imperforate peripheral band developed over the earlier chambers of the final whorl.
- Aperture has the shape of a medium high arch, is situated in peripheral position and extends in the umbilical regions; a biaperturate last-formed chamber occurs occasionally.
- Aperture is bordered by one imperforate lip; relict periapertural structures occur in the umbilical regions.
- Chamber surface is ornamented with scattered pustules that can fuse to form rugosities over the earlier chambers of the final whorl. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globigerinelloides megathyra* presents mostly 6-8 chambers with a low rate of size increase in the final whorl.

Revision. *Allothecca megathyra* Ehrenberg 1841. Georgescu 2013, p. 28, pl. 10, Figures 1-10. Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49.

***Globigerinelloides globulosum* (Ehrenberg 1854)**



Globigerinelloides globulosum from the upper Maastrichtian sediments of Texas.

Original report. *Phanerostomum globulosum* Ehrenberg 1854, p. 23, pl. 32, part II, Figure 44.

Original work. Ehrenberg, C.G., 1854. *Mikrogeologie*. Leipzig: L. Voss, 374 p.

Age. Late Campanian-Maastrichtian.

Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are spherical and present a rapid and gradual size increase throughout the ontogeny.
- Sutures are distinct, depressed, radial and straight to slightly curved on both test sides.
- Test is symmetrically biumbilicate, with the umbilical regions representing about one fourth to one third of the maximum test diameter.
- Test is symmetrical in edge view, with a broadly rounded periphery; an imperforate peripheral band is developed over the earlier chambers of the final whorl.
- Aperture has the shape of a medium high arch, is situated in peripheral position and extends in the umbilical regions.
- The aperture is bordered by an imperforate lip, which is rarely preserved; relict periapertural lips occur in the umbilici.
- Ornamentation is weakly developed and consists of scattered pustules, which are more prominent over the earlier chambers of the final whorl. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. The tests of *Globigerinelloides globulosum* appear almost smooth under the optical stereomicroscope due to the weakly developed ornamentation. The high rate of chamber size increase is another useful element in recognizing this small-sized species.

Recommended revision. *Vanhintella globulosum* (Ehrenberg 1854). Georgescu 2013, p. 30, pl. 11, Figures 5-9. Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49.

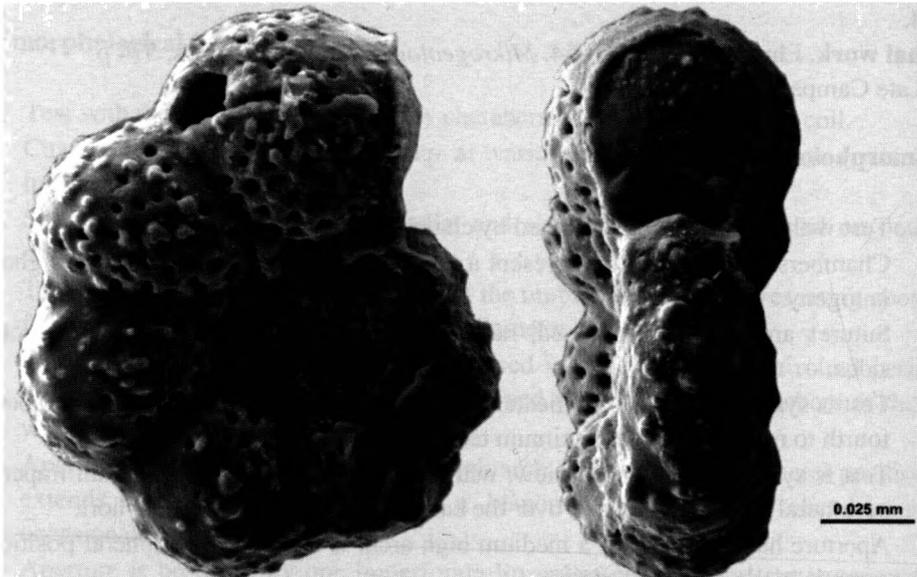
Original report. *Globigerinelloides (?) rosebudensis* Smith and Pessagno 1973, p. 39, pl. 15, Figures 1-12.

Original work. Smith, C.C., Pessagno, E.A. Jr., 1973. Planktonic foraminifera and stratigraphy of the Corsicana Formation (Maestrichtian), north-central Texas. *Cushman Foundation for Foraminiferal Research, Special Publications*, 13, 5-68.

Age. Late Campanian-Maastrichtian.

Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil; slightly trochospiral specimens are also known.

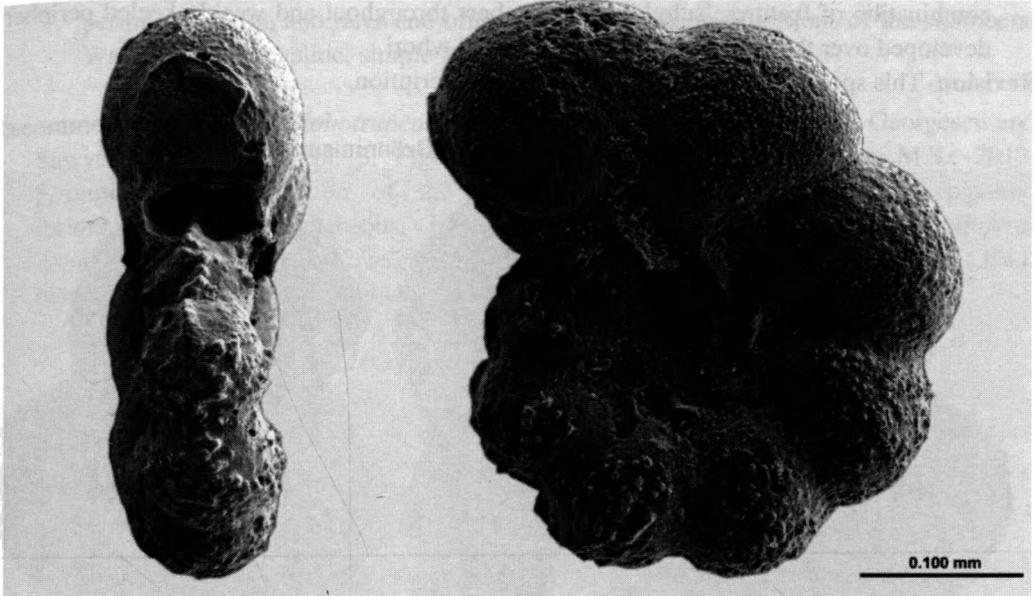
Globigerinelloides rosebudensis Smith and Pessagno 1973

Globigerinelloides rosebudensis from the upper Campanian sediments of the New Jersey coastal plain.

- Chambers present a subrectangular shape in edge view, overlap at low rates and present a gradual and low size increase.
- Test is symmetrically or asymmetrically biumbilicate, with the umbilici representing about one third of the maximum test diameter.
- Test is symmetrical or slightly asymmetrical in edge view, with a broadly rounded periphery; an imperforate peripheral band is developed over the earlier chambers of the final whorl.
- Aperture has the shape of a medium high arch and it can be symmetrical or slightly asymmetrical.
- The aperture is bordered by an imperforate lip; relict periapertural structures occur in the umbilical regions.
- Chamber surface is ornamented with rare scattered pustules. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globigerinelloides rosebudensis* consists of a mixture of tests with planispiral and very low trochospiral coil; our observations show that such tests occur in the same samples. Observations on both test sides are necessary for a correct evaluation of this feature. The tests of *G. rosebudensis* appear often smooth under the optical stereomicroscope; assessing correctly the ornamentation consisting of scattered pustules requires the use of a SEM or ESEM.

Revision. This species was not reviewed since its description.

Globigerinelloides impensus Sliter 1977

Globigerinelloides impensus from the upper Campanian sediments of the South Atlantic Ocean (Falkland Plateau), DSDP Site 511.

Original report. *Globigerinelloides impensus* Sliter 1977, p. 541, pl. 6, Figures 1-3.

Original work. Sliter, W.V., 1977. Cretaceous foraminifers from the southwestern Atlantic Ocean, Leg 36, Deep Sea Drilling Project. In: *Initial Reports of the Deep Sea Drilling Project Volume 36* (Barker, P. and others, Eds). Washington, DC: United States Government Printing Office, 519-573.

Age. Late Campanian-Maastrichtian.

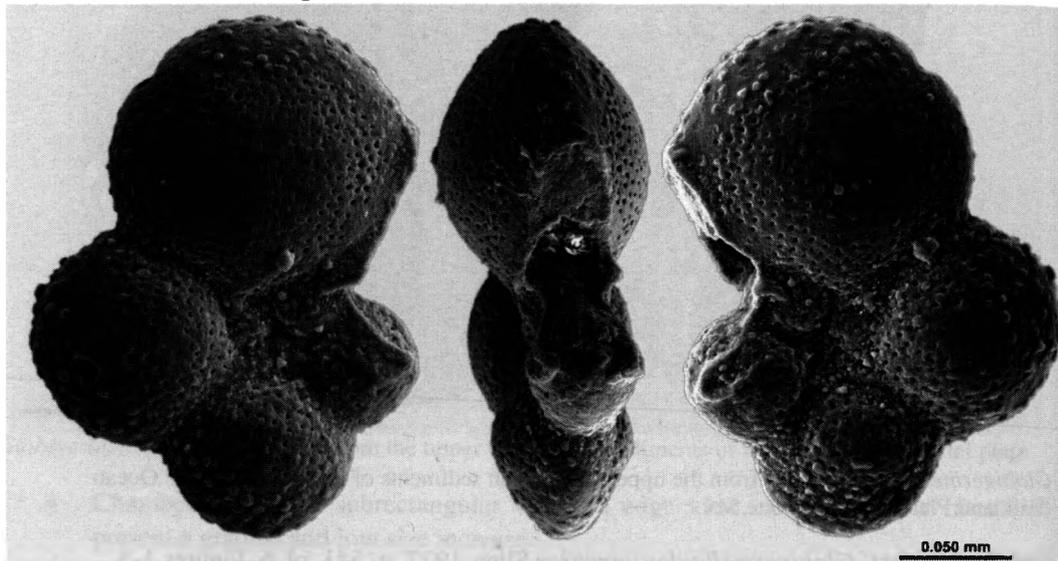
Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are subglobular, overlap at various rates and present a gradual size increase.
- Test is symmetrically biumbilicate, with the umbilical regions representing about one fourth to one third of the maximum test diameter.
- Test is symmetrical and compressed in edge view, with a rounded periphery.
- A peripheral imperforate band occurs on the earlier chambers of the final whorl.
- Aperture has the shape of a medium high arch, is situated in peripheral position and extends in the symmetrical umbilical regions.
- Aperture is bordered by an imperforate lip; relict periapertural structures occur in the umbilical regions.
- Chamber surface is mostly smooth but scattered pustules occur over the earlier chambers of the final whorl; in addition, the ornamentation elements fuse to form rugosities aligned to the periphery resulting in a weakly keeled appearance. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globigerinelloides impensus* can be recognized by the following combination of features: subglobular chambers throughout and weakly keeled periphery developed over the earlier chambers of the final whorl.

Revision. This species was not reviewed since its description.

***Globigerinelloides subcarinata* (Brönnimann 1952)**



Globigerinelloides subcarinata from the upper Maastrichtian sediments of North Atlantic Ocean (Orphan Knoll), DSDP Hole 111A illustrated by Georgescu and Sawyer (2013), plate 3, Figures 4-6.

Original report. *Globigerinella messinae subcarinata* Brönnimann 1952, p. 44, pl. 1, Figures 10-11.

Original work. Brönnimann, P., 1952. Globigerinidae of the Upper Cretaceous (Cenomanian-Maastrichtian) of Trinidad, B.W.I. *Bulletins of American Paleontology*, 34(140), 1-70.

Age. Late Campanian-Maastrichtian.

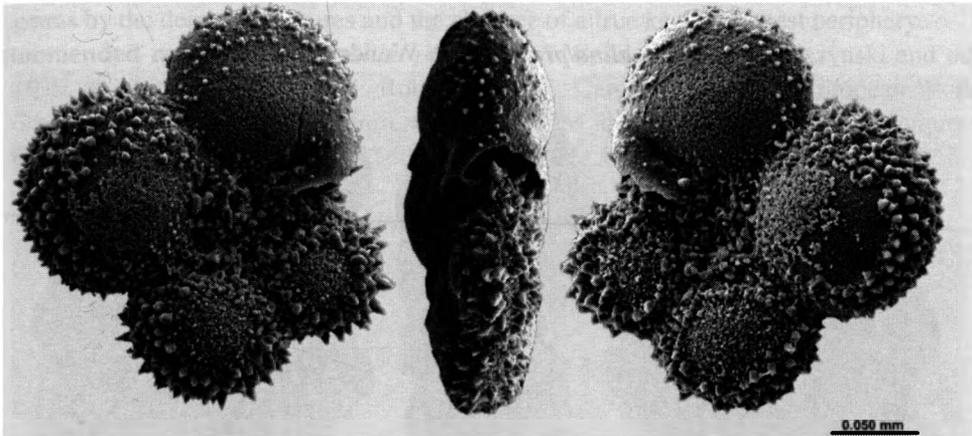
Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers have a subtrapezoidal shape, overlap at low rate and present gradual and moderate size increase; chambers are distinctly laterally compressed. Sutures are deeply incised resulting in a lobate test outline.
- Test is symmetrical and compressed in edge view, with a subangular periphery and an imperforate peripheral band throughout the final whorl.
- Umbilical regions represent about one fourth of the maximum test diameter.
- Aperture has the shape of a medium high arch, is situated in peripheral position and extends on a short distance in the symmetrical umbilical regions. Aperture is bordered by a lip, which in most individuals is imperforate; relict periapertural structures occur in the umbilical regions.

- Chamber surface is ornamented with scattered pustules, which are denser in the peripheral region and rarer and often absent in the central portions of the chambers. Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Globotruncanella subcarinata* (Brönnimann 1952). Georgescu and Sawyer 2013, p. 134, pl. 3, Figures 1-15. Georgescu, M.D., Sawyer, M.S., 2013. Evolutionary classification of the globotruncanellid and abathomphalid planktic foraminifera (Late Cretaceous, Late Campanian-Maastrichtian). In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 119-162.

***Globigerinelloides compressa* (Georgescu and Sawyer 2013)**



Globigerinelloides compressa from the upper Campanian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 illustrated by Georgescu and Sawyer (2013), plate 10, Figures 14-16.

Original report. *Spinoglobotruncanella compressa* Georgescu and Sawyer 2013, p. 151, pl. 10, Figures 14-16.

Original work. Georgescu, M.D., Sawyer, M.S., 2013. Evolutionary classification of the globotruncanellid and abathomphalid planktic foraminifera (Late Cretaceous, Late Campanian-Maastrichtian). In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 119-162.

Age. Late Campanian.

Main morphological features.

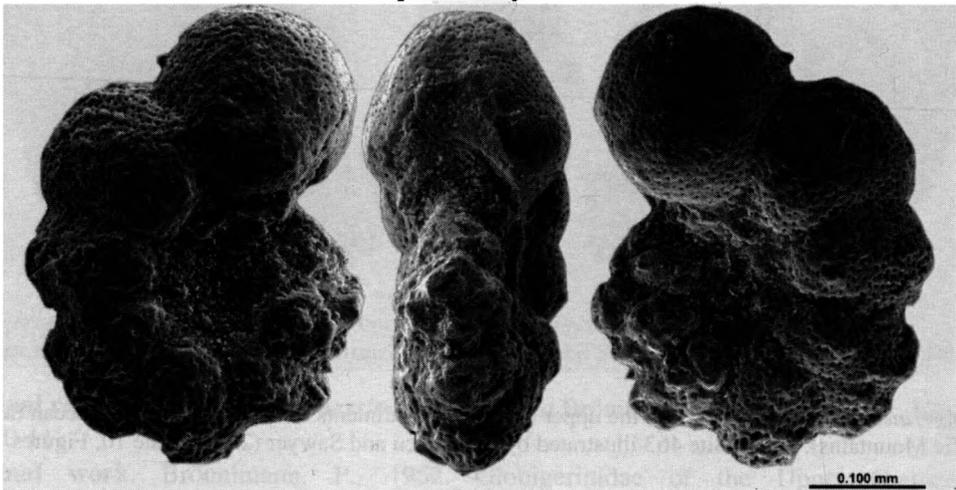
- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers have a subtrapezoidal shape, overlap at low rate and present gradual and moderate size increase; chambers present a well-developed lateral compression.
- Test is symmetrically biumbilicate, with the umbilical regions representing about one fourth of the maximum test diameter.

- Test is symmetrical and compressed in edge view, with an angular periphery and an imperforate peripheral band with pustules and spines throughout the final whorl.
- Aperture has the shape of a medium high arch, is situated in peripheral position and extends on a short distance in the umbilical regions; aperture is bordered by an imperforate lip and relict periapertural structures occur in the umbilical regions.
- Ornamentation consists of scattered pustules and spines concentrated in the peripheral region.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globigerinelloides compressa* differs from *G. subcarinata* by the pustules and spines that occur in the peripheral region.

Revision. This species was not reviewed since its description.

Planomalina praebuxtofti Wonders 1975



Planomalina praebuxtofti from the upper Albian sediments of the Eastern Atlantic Ocean (Vigo Seamount), DSDP Site 398. Specimen selected and photographed by Melissa S. Sawyer.

Original report. *Planomalina praebuxtofti* Wonders 1975, p. 90, pl. 1, Figures 1-2, text-Figure 4: 2.

Original work. Wonders, A.A.H., 1975. Cretaceous planktonic foraminifera of the *Planomalina buxtofti* group from El Burrueco, southern Spain. *Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen*, 78, 83-93.

Age. Late Albian.

Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are subtrapezoidal in shape, overlap at various rates and present a gradual and low size increase.
- Test symmetrically biumbilicate, with the umbilici of about one fifth of the maximum test diameter.

- Test is symmetrical and compressed in edge view, with subangular periphery; ornamentation elements consisting of thickened rugosities are concentrated in the peripheral region of the earlier chambers.
- Aperture has the shape of a medium high arch, is situated in peripheral position at the base of the last-formed chamber and extends on a short distance in the umbilical regions; aperture is bordered by an imperforate lip and relict periapertural structures occur in the umbilici.
- Earlier chambers of the final whorl are ornamented with coarse rugosities with irregular shape; the last-formed chambers of the test are smooth. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Planomalina praebuxtorfi* differs from any other species of this genus by the depressed sutures and the absence of a true keel at the test periphery.

Recommended revision. *Planomalina praebuxtorfi* Wonders 1975. Robaszynski and others 1979, p. 47, 50, pl. 1, Figure 1. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

***Planomalina buxtorfi* (Gandolfi 1942)**



Planomalina buxtorfi from the upper Albian sediments of the Eastern Atlantic Ocean (Vigo Seamount), DSDP Site 398. Specimen selected and photographed by Melissa S. Sawyer.

Original report. *Planulina buxtorfi* Gandolfi 1942, p. 103, pl. 3, Figure 7.

Original work. Gandolfi, F., 1942. Ricerche micropaleontologiche e stratigrafiche sulla scaglia e sul flysch cretacicci dei dintorni di Balerna (Canton Ticino). *Rivista Italiana di Paleontologia*, 20(4), 5-160.

Age. Late Albian.

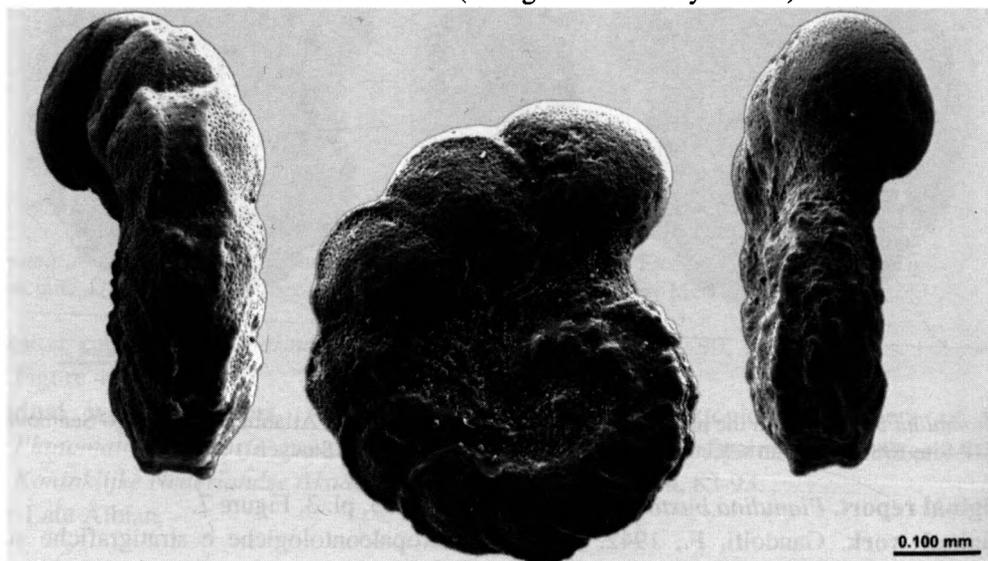
Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.

- Chambers with a crescentic shape, arched in the direction of growth and with a slow size increase.
- Sutures are curved in the direction of growth and lined with sutural ridges, which are more prominent between the earlier chambers of the last whorl.
- Test is symmetrically biumbilicate, with the umbilici of about one fifth of the maximum test diameter.
- Test is symmetrical and compressed in edge view, with an angular periphery and a well-developed keel that occurs on all the chambers of the final whorl.
- Aperture has the shape of a medium high arch, is situated in peripheral position at the base of the last-formed chamber and extends on a short distance in the umbilici; aperture is bordered by an imperforate lip and relict periapertural structures occur in the umbilical regions.
- Chamber surface is smooth but scattered pustules, which can be denser and more prominent over the earlier chambers of the final whorl, can occur. Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Planomalina buxtorfi* Wonders 1975. Robaszynski and others 1979, p. 45, 46, pl. 1, Figures 2-4. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

Planomalina banneri (Georgescu and Sawyer 2013)



Planomalina banneri from the East Indian Ocean (Exmouth Plateau), ODP Hole 762C illustrated by Georgescu and Sawyer in Georgescu and others (2013), plate 3, Figures 9-10, 12.

Original report. *Bannerina banneri* Georgescu and Sawyer 2013, p. 68, pl. 3, Figures 1-12, pl. 4, Figures 1-12.

Original work. Georgescu, M.D., Sawyer, M.S., Heikkinen, C.J., Burke, R.M., 2013. New and revised Cretaceous (Albian-Campanian) planktic foraminifera of the Atlantic, Indian

and Pacific Oceans. In: *Foraminifera: Classification, Biology, and Evolutionary Significance* (M.D. Georgescu, Ed.). New York: Nova Science Publishing, 59-100.

Age. Late Albian.

Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are crescentic in shape, arched towards the direction of growth and with a slow size increase.
- Sutures are curved towards in the direction of growth and are lined with well-developed ridges between the earlier chambers of the final whorl; sutural ridges are absent between the last-formed chambers.
- Test is symmetrically or slightly asymmetrically biumbilicate, with the umbilical regions representing about one fourth to one third of the maximum test diameter.
- Test is symmetrical and compressed in edge view, with truncate periphery. Periphery presents two well-developed peripheral keel on all the chambers of the final whorl that is bordered by two parallel keels.
- Aperture has the shape of a medium high arch, is situated in peripheral position at the base of the last-formed chamber and extends on a short distance in the umbilici; aperture is bordered by an imperforate lip and relict periapertural structures occur in the umbilical regions.
- Chamber surface is smooth; periumbilical ridges that are often asymmetrical occur occasionally. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Planomalina banneri* differs from all the species assigned to this genus by the two well-developed parallel keels at the test periphery that border a wide imperforate peripheral band.

Revision. This species was not reviewed since its description.

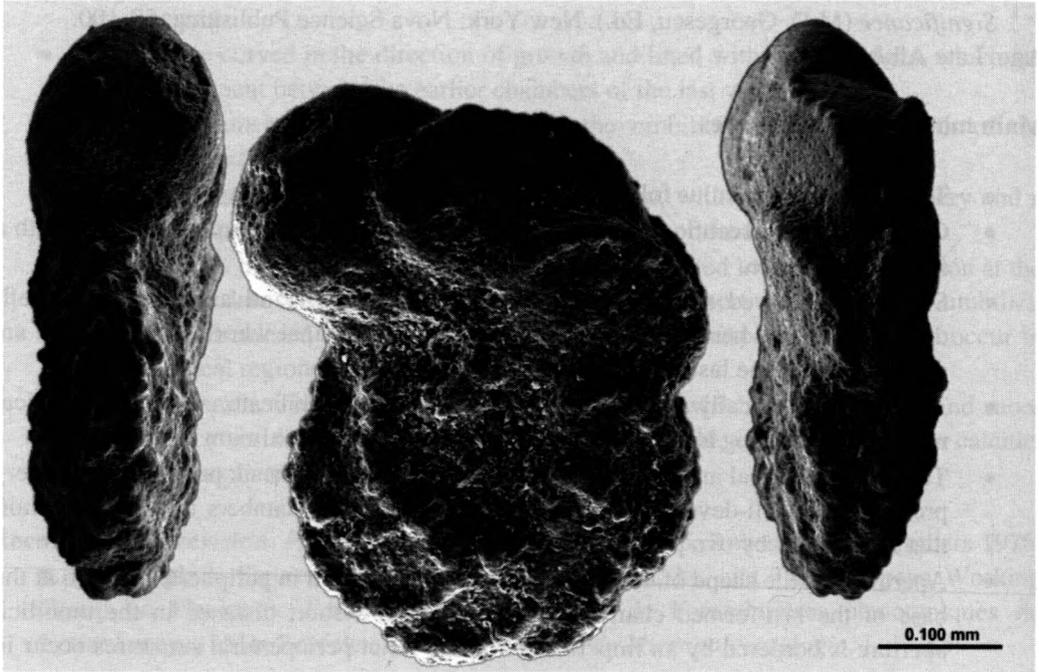
Original report. *Planomalina buxtorfi bicarinata* Randrianasolo and Anglada 1989, p. 809, pl. 3, Figures 4-9, pl. 4, Figures 7-9.

Original work. Randrianasolo, A., Anglada, R., 1989. La lignée *Hedbergella wondersi* n.sp. - *Planomalina buxtorfi* (Gandolfi) (foraminifères planctoniques) dans l'Albo-Cénomanién du Bassin d'Antsiranana (Nord de Madagascar). *Geobios*, 22, 803-823.

Age. Late Albian.

Main morphological features.

- Test with the proloculus followed by chambers added in a planispiral coil.
- Chambers are crescentic in shape, arched towards the direction of growth and with slow size increase.
- Sutures are curved towards in the direction of growth and are lined with well-developed ridges.

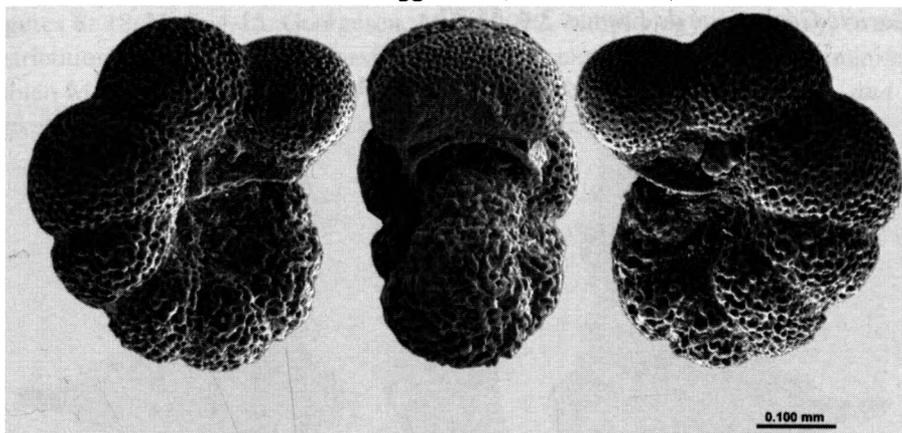
Planomalina bicarinata Randrianasolo and Anglada 1989

Planomalina bicarinata from the East Indian Ocean (Exmouth Plateau), ODP Hole 762C illustrated by Georgescu and Sawyer in Georgescu and others (2013), plate 5, Figures 2-4.

- Test is symmetrical and compressed in edge view, with angular periphery. Two keels that merge towards the chamber posterior side are developed on almost all the chambers of the final whorl.
- Aperture has the shape of a medium high arch, is situated in peripheral position at the base of the last-formed chamber and extends on a short distance in the umbilici; aperture is bordered by an imperforate lip and relict periapertural structures occur in the umbilical regions.
- Chamber surface is smooth. Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Notes on identification. *Planomalina bicarinata* can be recognized by the keels V-shaped pattern in edge view.

Recommended revision. *Bannerina bicarinata* (Randrianasolo and Anglada 1989). Georgescu and Sawyer in Georgescu and others 2013, p. 70, pl. 5, Figures 1-12. Georgescu, M.D., Sawyer, M.S., Heikkinen, C.J., Burke, R.M., 2013. New and revised Cretaceous (Albian-Campanian) planktic foraminifera of the Atlantic, Indian and Pacific Oceans. In: *Foraminifera: Classification, Biology, and Evolutionary Significance* (M.D. Georgescu, Ed.). New York: Nova Science Publishing, 59-100.

Biticinella breggiensis (Gandolfi 1942)

Biticinella breggiensis from the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C. Specimen selected and photographed by Melissa S. Sawyer.

Original report. *Anomalina breggiensis* Gandolfi 1942, p. 102, pl. 3, Figure 6.

Original work. Gandolfi, F., 1942. Ricerche micropaleontologiche e stratigrafiche sulla scaglia e sul flysch cretacici dei Dintorni di Balerna (Canton Ticino). *Rivista Italiana di Paleontologia*, 20(4), 5-160.

Age. Late Albian.

Main morphological features.

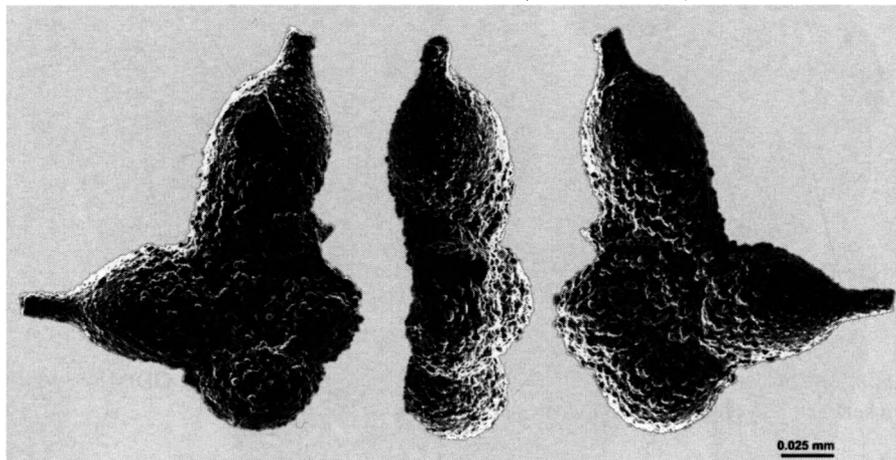
- Test with the early chambers added in a very low trochospiral coil and those of the adult stage planispiral with or without a slight asymmetry.
- Chambers are subglobular and often with a distinct transversal elongation.
- Test is symmetrically or asymmetrically biumbilicate; umbilici present a circular to elliptical shape and a diameter or one fourth to one third, rarely more, of the maximum test diameter.
- Test is symmetrical to slightly asymmetrical in edge view and with a broad and simple periphery.
- Aperture has the shape of a low to medium high arch, is situated in peripheral position at the base of the last-formed chamber and extends on a short distance in the umbilici; relict periapertural structures occur in both umbilical regions.
- Chamber surface does not bear ornamentation elements. Wall is calcitic, hyaline, reticulately-ridged and perforate.

Notes on identification. The study under the SEM shows that the network of ridges surrounding the pores is the result on the modifications of the test wall although the test appears coarsely ornamented when examined under the optical stereomicroscope. The periapertural structures are delicate and therefore, rarely observed.

Recommended revision. *Biticinella breggiensis* (Gandolfi) 1942). Sigal 1956, p. 35, text-Figure at page 35. Sigal, J. 1956. Notes micropaléontologiques nord-africaines. 4.

Biticinella breggiensis, nouveau morphogénre. *Compte Rendu Sommaire des Séances de la Société Géologique de France*, 3-4, 35-37.

Schackoina trituberculata (Morrow 1934)



Schackoina trituberculata from the upper Albian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2012), Figure 8: 18-20.

Original report. *Hantkenina trituberculata* Morrow 1934, p. 195, pl. 29, Figures 25-27.

Original work. Morrow, A.L., 1934. Foraminifera and ostracoda of the Upper Cretaceous of Kansas. *Journal of Paleontology*, 8, 186-205.

Age. Late Albian-Cenomanian.

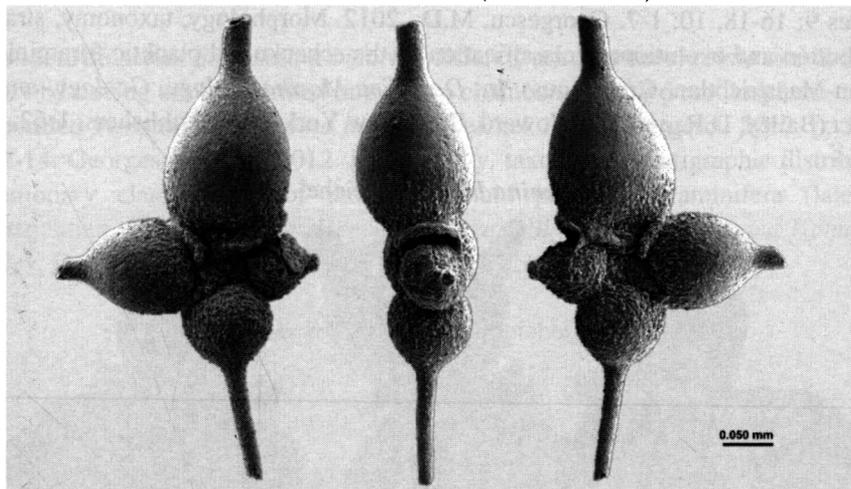
Main morphological features.

- Test is very low trochospiral in the juvenile stage and planispiral in the adult.
- Earlier chambers are subglobular and the last-formed one to three flask-like, and with one tubulospine.
- Sutures are deeply incised especially between the last-formed chambers resulting in a stellate outline, depressed, radial and straight on both test sides.
- Test is biumbilicate with the umbilici with a diameter of one fourth to one half of the maximum test diameter measured at the tubulospine base.
- Aperture has the shape of a low to medium high arch, is situated in peripheral position and extends on a short distance into the umbilical regions on both test sides; the aperture is bordered by an imperforate lip.
- Chamber surface is ornamented with scattered pustules concentrated around the umbilici on both test sides.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Schackoina trituberculata* presents the earlier chambers of the final whorl without tubulospines, which are developed only on the last-formed one to three chambers. Ornamentation and wall ultrastructure can be studied only with the aid of a SEM or ESEM.

Recommended revision. *Schackoina trituberculata* (Morrow 1934). Georgescu 2012, p. 31, Figures 8: 18-21, 9: 4-15. Georgescu, M.D., 2012. Morphology, taxonomy, stratigraphic distribution and evolutionary classification of the schackoinid planktic foraminifera (late Albian-Maastrichtian, Cretaceous). In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 1-62.

Schackoina cenomana (Schacko 1897)



Schackoina cenomana from the upper Cenomanian from the South Atlantic Ocean (Falkland Plateau), DSDP Site 511 illustrated by Georgescu (2012), Figures 10: 1-3.

Original report. *Siderolina cenomana* Schacko 1897, p. 166, pl. 4, Figures 3-5.

Original work. Schacko, G., 1897. Beitrag über Foraminiferen aus der Cenoman-Kreide von Molzow in Mecklenburg. *Archiv des Vereins der Freunde de Naturgeschichte in Mecklenburg* (1896), 50, 161-168.

Age. Late Albian-early Campanian.

Main morphological features.

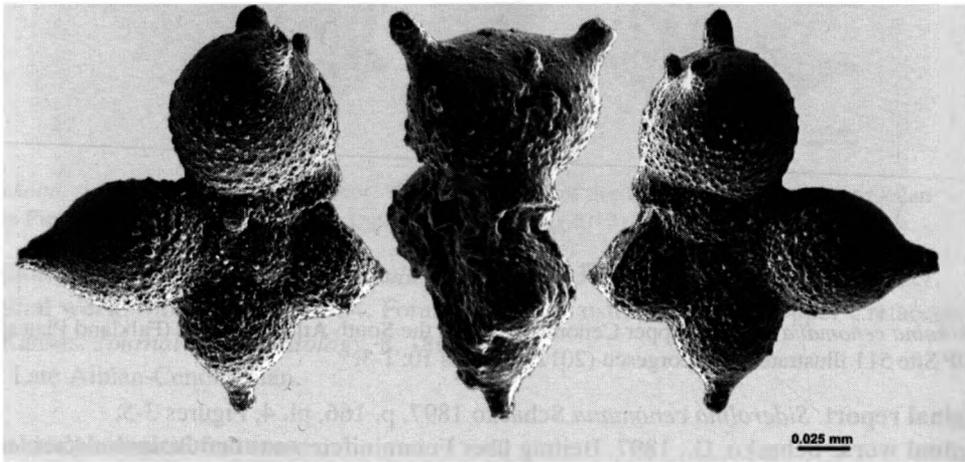
- Test is very low trochospiral in the juvenile stage and planispiral in the adult.
- Earlier chambers are subglobular and those of the last whorl flask-like, radially elongate and with one tubulospine per chamber.
- Sutures are deeply incised resulting in a stellate outline in lateral view, radial and straight throughout.
- Test is symmetrical in edge view, biumbilicate and with the umbilici with a diameter of one fourth to one half of the maximum test diameter measured at the tubulospine base.
- Aperture has the shape of a low to medium high arch, is situated in peripheral position and extends on a short distance into the umbilical regions on both test sides; the aperture is bordered by an imperforate lip and relict periapertural structures occur in the umbilici.

- Chamber surface is ornamented with scattered pustules that are denser around the umbilici and rarer in the peripheral region. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Schackoina cenomana* differs from *S. trituberculata* mainly by having tubulospines developed on all the chambers of the final whorl.

Recommended revision. *Schackoina cenomana* (Schacko 1897). Georgescu 2012, p. 32, Figures 9: 16-18, 10: 1-7. Georgescu, M.D., 2012. Morphology, taxonomy, stratigraphic distribution and evolutionary classification of the schackoinid planktic foraminifera (late Albian-Maastrichtian, Cretaceous). In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 1-62.

Schackoina bicornis Reichel 1948



Schackoina bicornis from the upper Turonian sediments of the Caribbean region (Venezuelan Basin), DSDP Site 150 illustrated by Georgescu (2012), Figure 10: 8-10.

Original report. *Schackoina cenomana bicornis* Reichel 1948, p. 401, Figures 4: a-g, 6: 4, 7: 4, 8: b, 10: 8, 15.

Original work. Reichel, M., 1948. Les Hantkéninidés de la Scaglia et des Couches rouges (Crétacé supérieur). *Eclogae Geologicae Helveticae*, 40: 390-409.

Age. Late Albian-Santonian.

Main morphological features.

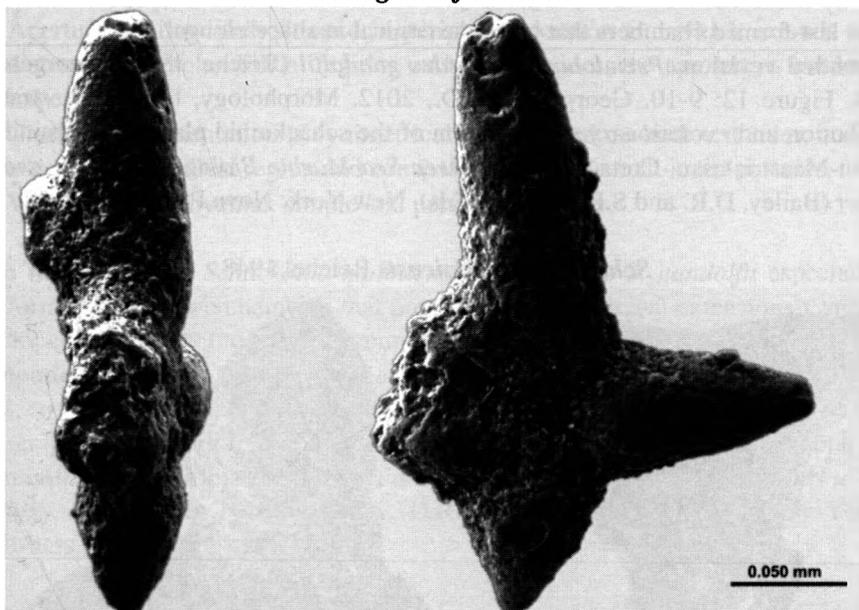
- Test is very low trochospiral in the juvenile stage and planispiral in the adult.
- Earlier chambers are subglobular, the earlier ones of the last whorl flask-like, radially elongate and with one tubulospine per chamber, and the last-formed one or two chambers with two tubulospines symmetrically arranged with respect to the plane of coiling. Sutures are deeply incised.
- Test is symmetrical in edge view, biumbilicate with the umbilici with a diameter of about one half of the maximum test diameter measured at the tubulospine base.

- Aperture has the shape of a low to medium high arch, is situated in peripheral position and extends on a short distance into the umbilical regions on both test sides; the aperture is bordered by an imperforate lip but no relict periapertural structures were observed in the umbilical regions.
- Chamber surface is ornamented with scattered pustules that are denser around the umbilici and rarer in the peripheral region. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Schackoina bicornis* differs from *S. trituberculata* and *S. cenomana* mainly by having the last-formed one or two chambers with two tubulospines.

Recommended revision. *Schackoina bicornis* Reichel 1948. Georgescu 2012, p. 38, Figure 10: 8-14. Georgescu, M.D., 2012. Morphology, taxonomy, stratigraphic distribution and evolutionary classification of the schackoinid planktic foraminifera (late Albian-Maastrichtian, Cretaceous). In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 1-62.

Schackoina gandolfii Reichel 1948



Schackoina gandolfii from the lower Turonian of Romania illustrated by Georgescu (2012), Figure 12: 9-10.

Original report. *Schackoina gandolfii* Reichel 1948, p. 397, Figures 3: a-g, 6: 3, 7: 3, 8: a, 10: 1, 3-4, pl. 8, Figure 1.

Original work. Reichel, M., 1948. Les Hantkéninidés de la Scaglia et des Couches rouges (Crétacé supérieur). *Eclogae Geologicae Helveticae*, 40: 390-409.

Age. Cenomanian-early Turonian.

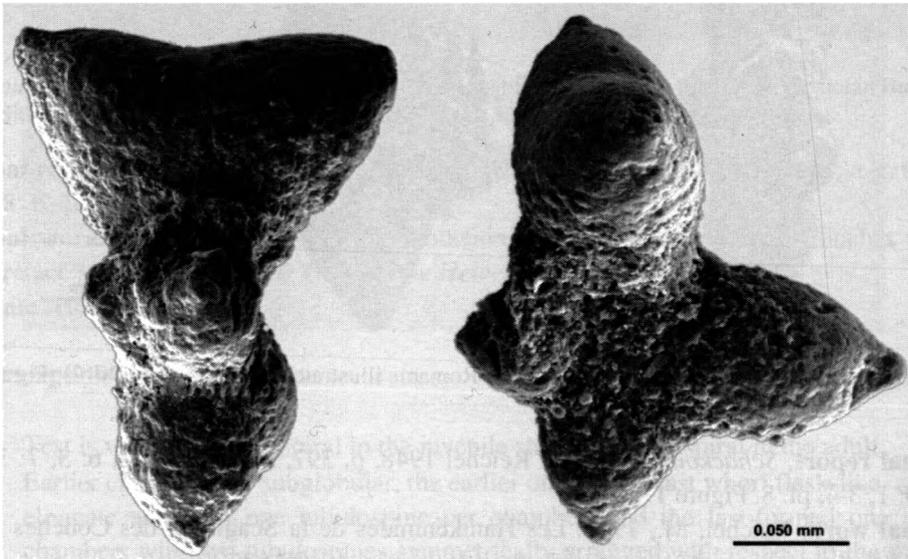
Main morphological features.

- Test is very low trochospiral in the juvenile stage and planispiral in the adult.
- Earliest chambers are subglobular to globular, the early ones of the last whorl conical or flask-like and the last-formed one highly conical.
- Sutures are deeply incised resulting in a stellate outline in lateral view, radial and straight throughout.
- Test is symmetrical in edge view and with pinched periphery.
- Test is symmetrically biumbilicate; umbilici are shallow and with a diameter of one third to one half of the test diameter at the base of successive chambers junctions.
- Aperture has the shape of a low arch, is situated in peripheral position and extends on a short distance into the umbilical regions on both test sides; the aperture is bordered by an imperforate lip and relict periapertural structures occur occasionally in the umbilical regions.
- Chamber ornamentation is symmetrically developed on both test sides and consists of scattered small-sized pustules. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Schackoina gandolfii* differs from all the other species of this genus by the last-formed chambers that have one conical in shape elongation.

Recommended revision. *Pseudohastigerinoides gandolfii* (Reichel 1948). Georgescu 2012, p. 44, Figure 12: 9-10. Georgescu, M.D., 2012. Morphology, taxonomy, stratigraphic distribution and evolutionary classification of the schackoinid planktic foraminifera (late Albian-Maastrichtian, Cretaceous). In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 1-62.

Schackoina moliniensis Reichel 1948



Schackoina moliniensis from the lower Turonian of Romania illustrated by Georgescu (2012), Figure 12: 12-13.

Original report. *Schackoina moliniensis* Reichel 1948, Figures 5: a-d, 6: 5, 7: 5, 8: c, 10: 10, 13.

Original work. Reichel, M., 1948. Les Hantkéninidés de la Scaglia et des Couches rouges (Crétacé supérieur). *Eclogae Geologicae Helvetiae*, 40: 390-409.

Age. Latest Cenomanian-early Turonian.

Main morphological features.

- Test is very low trochospiral in the juvenile stage and planispiral in the adult.
- Earlier chambers of the final whorl are conical and the last formed one or two with two conical extensions symmetrically developed with respect to the test plane of symmetry.
- Sutures are deeply incised resulting in a stellate outline in lateral view, radial and straight throughout.
- Test is symmetrical in edge view and with a pinched periphery.
- Test is symmetrically biumbilicate; umbilici are shallow and with a diameter of about one half of the test diameter at the base of successive chambers junctions.
- Aperture is a low arch situated in peripheral position and which extends on a short distance into the umbilical regions on both test sides; the aperture is bordered by an imperforate lip.
- Chamber ornamentation is symmetrically developed on both test sides, concentrated around the umbilical region and consists of scattered small-sized pustules.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Schackoina moliniensis* differs from *S. gandolfii* especially by the last-formed one or two chambers that present two high conical extensions symmetrically developed with respect to the test symmetry plane.

Recommended revision. *Pseudohastigerinoides moliniensis* (Reichel 1948). Georgescu 2012, p. 45, Figures 12: 11-13. Georgescu, M.D., 2012. Morphology, taxonomy, stratigraphic distribution and evolutionary classification of the schackoinid planktic foraminifera (late Albian-Maastrichtian, Cretaceous). In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 1-62.

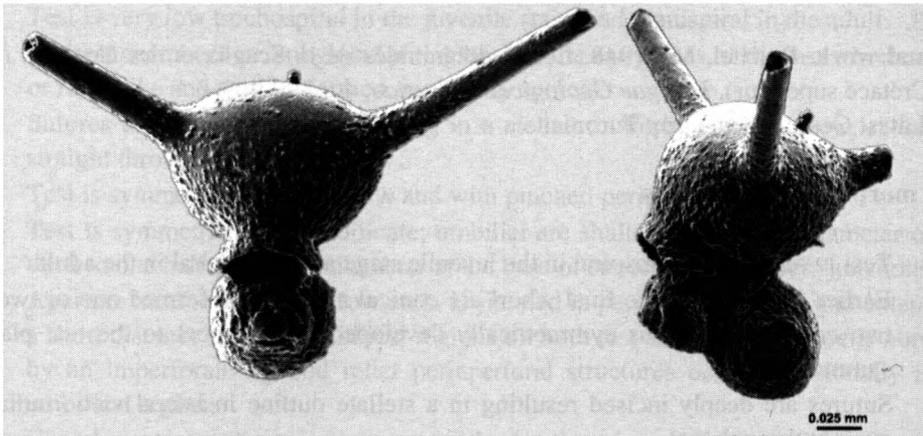
Original report. *Hantkenina multispinata* Cushman and Wickenden 1930, p. 40, pl. 4, Figures 4-6.

Original work. Cushman, J.A., Wickenden, R.T.D., 1930. The development of *Hantkenina* in the Cretaceous with a description of a new species. *Contribution from the Cushman Laboratory for Foraminiferal Research*, 6, 39-43.

Age. Late Santonian-Maastrichtian.

Main morphological features.

- Test is very low trochospiral in the juvenile stage and planispiral in the adult.

Schackoina multispinata (Cushman and Wickenden 1930)

Schackoina multispinata from the Campanian sediments of Texas illustrated by Georgescu (2012), Figure 11: 6-7.

- Earlier chambers are globular to subglobular; the earlier ones of the last whorl flask-like, radially elongate and with one or two tubulospines per chamber and the last-formed one or two chambers are subtetrahedral with three tubulospines.
- Test is symmetrical in edge view and with a pinched, double-pinched or triple-pinched periphery.
- Test is biumbilicate with the umbilici with a diameter of about one half of the maximum test diameter measured at the tubulospine base.
- Aperture has the shape of a low to medium high arch, is situated in peripheral position and extends on a short distance into the umbilical regions on both test sides; the aperture is bordered by an imperforate lip and relict periapertural structures occur in the umbilical regions.
- Chamber surface is ornamented with scattered pustules that are denser around and rarer in the peripheral region. Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Schackoina multispinata* (Cushman and Wickenden 1930). Georgescu 2012, p. 2012, Figures 10: 15-17, 11: 1-12, 12: 1-8. Georgescu, M.D., 2012. Morphology, taxonomy, stratigraphic distribution and evolutionary classification of the schackoinid planktic foraminifera (late Albian-Maastrichtian, Cretaceous). In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 1-62.

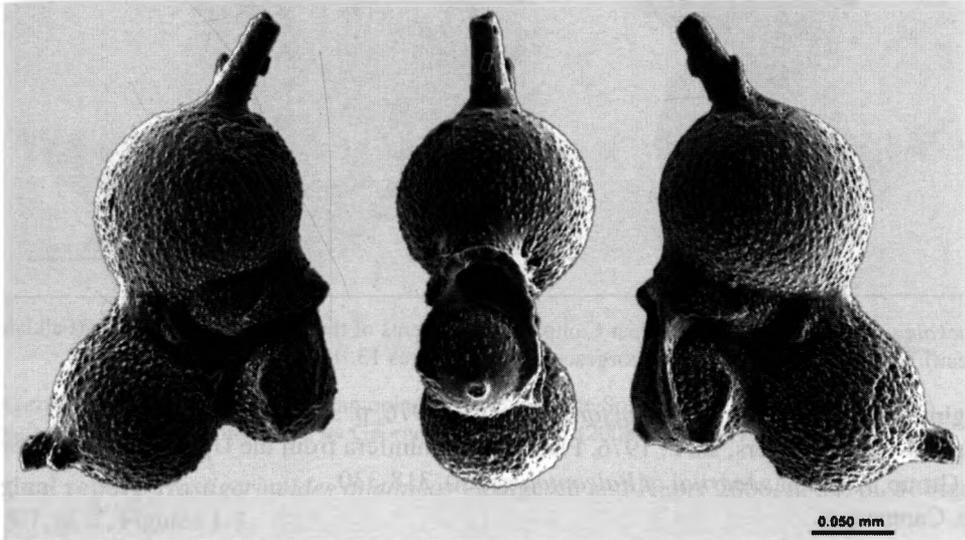
Original report. *Schackoina tappanae* Montanaro Gallitelli 1955, p. 142, pl. 1, Figures 1-10.

Original work. Montanaro Gallitelli, E., 1955. *Schackoina* from the Upper Cretaceous of the northern Apennines, Italy. *Micropaleontology*, 1, 141-146.

Age. Late Santonian-early Maastrichtian.

Main morphological features.

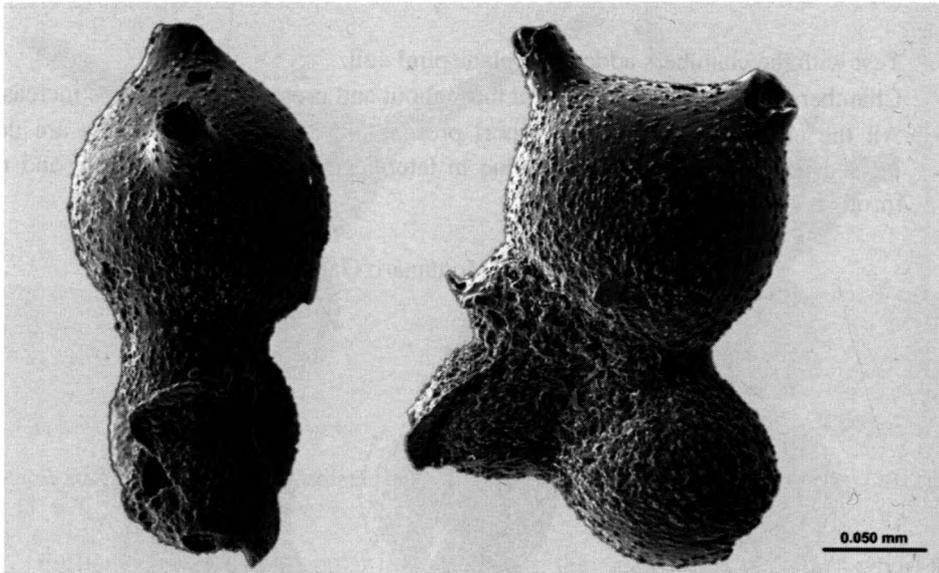
- Test with the chambers added in a planispiral coil.
- Chambers are globular to spherical throughout and present a gradual size increase.
- All the chambers of the final whorl present one tubulospine. Sutures are deeply incised resulting in a stellate outline in lateral view, depressed, limbate and radial throughout.

***Schackoina tappanae* Montanaro Gallitelli 1955**

Schackoina tappanae from the upper Campanian sediments of the South Atlantic Ocean (Falkland Plateau), DSDP Site 511 illustrated by Georgescu (2012), Figure 13: 10-12.

- Test is symmetrical in edge view and with a pinched periphery.
- Test is biumbilicate with the umbilici with a diameter of about one third of the maximum test diameter measured at the tubulospine base.
- Aperture has the shape of a medium high to high arch, is situated in peripheral position and extends symmetrically in the two umbilici.
- The aperture is bordered by a wide perforate lip and relict periapertural structures occur in the umbilici.
- Chamber surface is ornamented with scattered pustules, which are distributed all over the chambers.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Neoschackoina tappanae* Montanaro Gallitelli 1955. Georgescu 2012, p. 47, Figures 12: 14-18, 13: 1-15. Georgescu, M.D., 2012. Morphology, taxonomy, stratigraphic distribution and evolutionary classification of the schackoinid planktic foraminifera (late Albian-Maastrichtian, Cretaceous). In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 1-62.

Schackoina sellaeforma Masters 1976

Schackoina sellaeforma from the upper Campanian sediments of the South Atlantic Ocean (Falkland Plateau), DSDP 511 illustrated by Georgescu (2012), Figures 13: 17-18.

Original report. *Schackoina sellaeforma* Masters 1976, p. 327, pl. 1, Figures 13-16.

Original work. Masters, B.A., 1976. Planktic foraminifera from the Upper Cretaceous Selma Group, Alabama. *Journal of Paleontology*, 50, 318-330.

Age. Campanian.

Main morphological features.

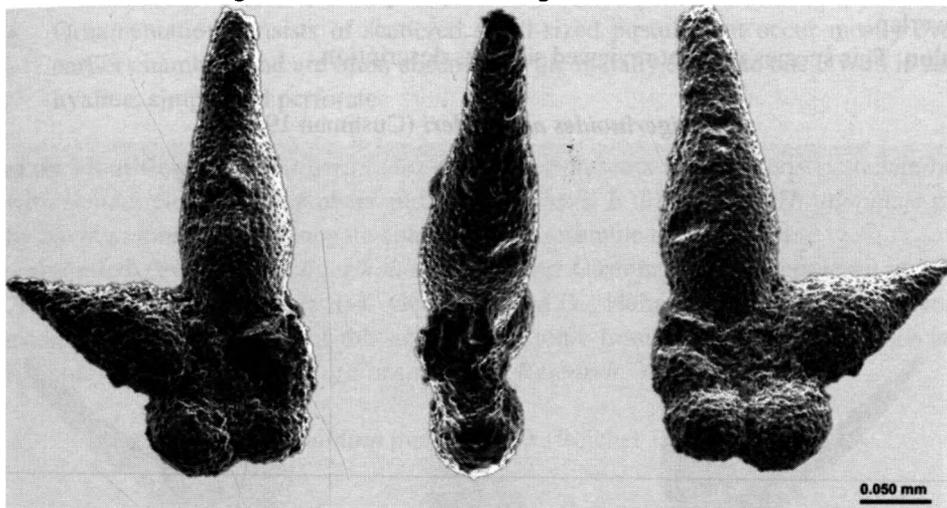
- Test with the chambers added in a planispiral coil.
- Earlier chambers are globular to subglobular and those of the last whorl subrectangular to subtrapezoidal.
- Earlier chambers of the final whorl bear one tubulospine and the last-formed ones two tubulospines situated in the plane of symmetry.
- Test is biumbilicate with the umbilici with a diameter of about one third of the maximum test diameter measured at the tubulospine base.
- Aperture has the shape of a medium high arch, is situated in peripheral position, extends symmetrically in the umbilici and is bordered by a wide and sparsely perforate lip; relict periapertural structures occur within the umbilici.
- Chamber surface is ornamented with scattered pustules, which are uniformly distributed all over the chambers. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Schackoina sellaeforma* is the only schackoinid species with two tubulospines situated within the plate of symmetry.

Recommended revision. *Neoschackoina sellaeforma* (Masters 1976). Georgescu 2012, p. 47, Figure 13: 16-18. Georgescu, M.D., 2012. Morphology, taxonomy, stratigraphic

distribution and evolutionary classification of the schackoinid planktic foraminifera (late Albian-Maastrichtian, Cretaceous). In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 1-62.

***Hastigerinoides atlanticus* Georgescu and Huber 2008**



Hastigerinoides atlanticus from the Santonian sediments of the South Atlantic Ocean (São Paulo Plateau), DSDP Site 356 illustrated by Georgescu and Huber (2008), plate 2, Figure 2.

Original report. *Hastigerinoides atlanticus* Georgescu and Huber 2008, p. 54, pl. 1, Figures 5-7, pl. 2, Figures 1-3.

Original work. Georgescu, M.D., Huber, B.T., 2008. Taxonomic re-evaluation and phylogeny of the stellate planktonic foraminiferal genus *Hastigerinoides* Brönnimann, 1952. *Journal of Foraminiferal Research*, 38, 52-58.

Age. Santonian.

Main morphological features.

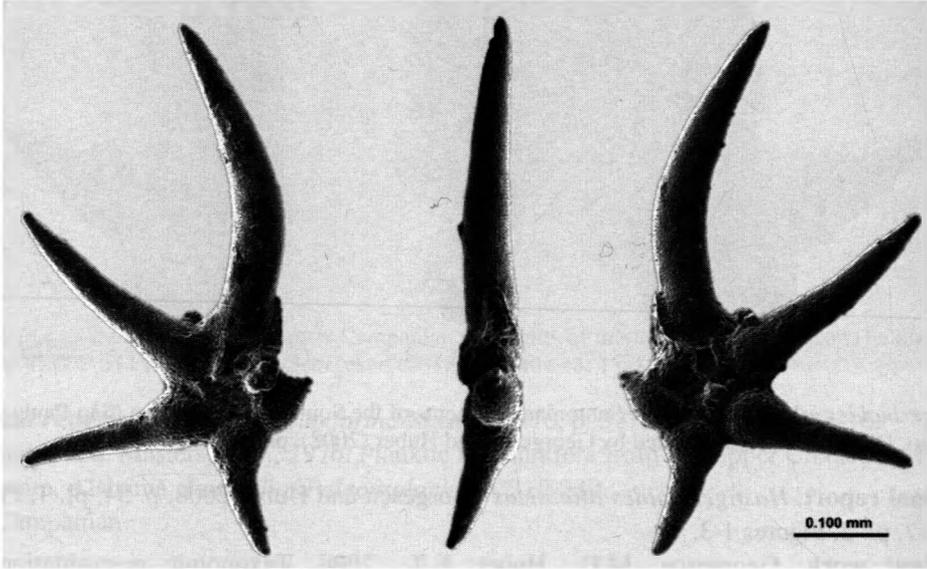
- Test with the proloculus followed by chambers added in a planispiral coil.
- Earlier chambers are globular to subglobular and the last-formed ones radially elongate and conical, resembling tubulospines.
- Sutures are deeply incised resulting in a stellate outline, depressed, radial and straight throughout.
- Test is symmetrical in edge view and with a pinched periphery.
- Test is symmetrically biumbilicate, with the umbilical regions representing about one half of the maximum test diameter at the base of the radially elongate portion of the chambers.
- Aperture has the shape of a medium high arch, is situated in peripheral position and extends in the umbilici; relict periapertural structures occur in the umbilical regions.
- Ornamentation consists of scattered pustules, which are more prominent over the earlier chambers of the final whorl; the radially elongate chambers are often smooth.

- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Hastigerinoides atlanticus* can be recognized from *Schackoina gandolfii* mainly by having globular chambers in the early portion of the final whorl and less radially elongate chambers. The stratigraphical ranges of the two species do not overlap.

Revision. This species was not reviewed since its description.

Hastigerinoides alexanderi (Cushman 1931)



Hastigerinoides alexanderi from the Santonian sediments of Texas illustrated by Georgescu and Huber (2008), plate 1, Figure 3.

Original report. *Hastigerinella alexanderi* Cushman 1931, p. 87, pl. 11, Figures 6-9.

Original work. Cushman, J.A. 1931. *Hastigerinella* and other interesting foraminifera from the Upper Cretaceous of Texas. *Contributions from the Cushman Foundation for Foraminiferal Research*, 7, 83-90.

Age. Late Santonian.

Main morphological features.

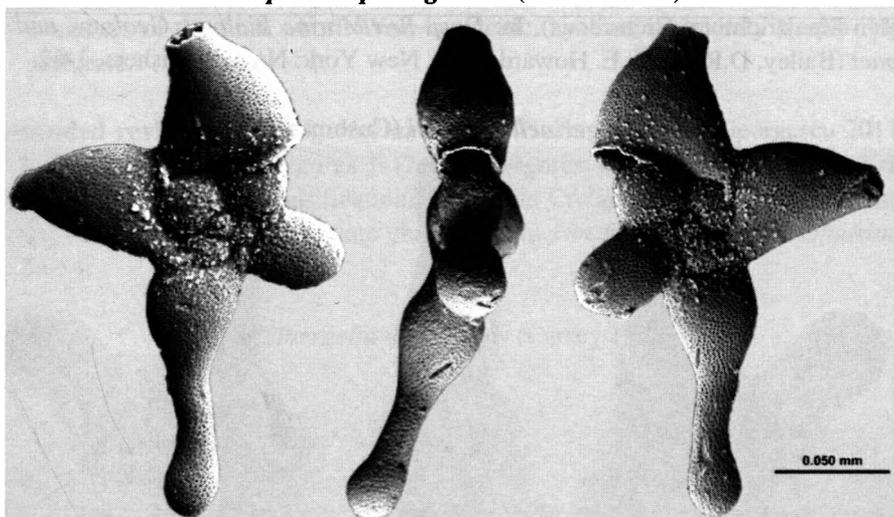
- Test with the proloculus followed by chambers added in a planispiral coil.
- Earlier chambers are globular to subglobular and the last-formed three to five ones radially elongate with a straight or curved axis and highly conical, resembling tubulospines.
- Sutures are deeply incised resulting in a stellate outline, depressed, radial and straight throughout.
- Test is symmetrical in edge view and with a pinched periphery.

- Test is symmetrically biumbilicate; umbilici are shallow and with a diameter representing about one half of the maximum test diameter measured at the base of the radially elongate portion of the chambers.
- Aperture has the shape of a medium high arch, is situated in peripheral position and extends in the umbilici; relict periapertural structures occur in the umbilical regions.
- Ornamentation consists of scattered small-sized pustule that occur mostly over the earlier chambers and are often absent over the radially elongate ones. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Hastigerinoides alexanderi* presents a characteristic stellate outline with slender elongated chambers and very thin tests. It differs from *H. atlanticus* mainly by having more radially elongate chambers that resemble tubulospines.

Recommended revision. *Hastigerinoides alexanderi* Cushman 1931. Georgescu and Huber 2008, p. 53, pl. 1, Figures 1-4. Georgescu, M.D., Huber, B.T., 2008. Taxonomic re-evaluation and phylogeny of the stellate planktonic foraminiferal genus *Hastigerinoides* Brönnimann, 1952. *Journal of Foraminiferal Research*, 38, 52-58.

***Leupoldina pentagonalis* (Reichel 1948)**



Leupoldina pentagonalis from the upper Albian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2012), Figure 7: 1-3.

Original report. *Schackoina pentagonalis* Reichel 1948, p. 395, Figures 1, 6:1, 7:1.

Original work. Reichel, M., 1948. Les Hantkéninidés de la Scaglia et des Couches rouges (Crétacé supérieur). *Eclogae Geologicae Helveticae*, 40: 390-409.

Age. Late Albian.

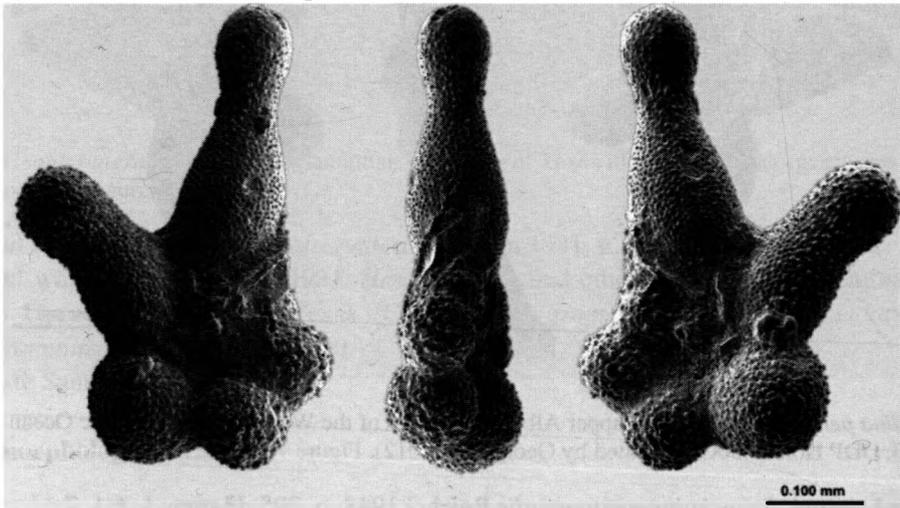
Main morphological features.

- Test is very low trochospiral in the juvenile stage and planispiral in the adult.

- Earlier chambers are globular, then clavate and the last-formed one to four strongly radially elongate and with a distal bulbous projection; chambers are often backward oriented and the elongation axis is either tangential or oblique to the previous whorl.
- Sutures are deeply incised resulting in a stellate outline, radial and straight to slightly curved throughout.
- Test is symmetrical in edge view; the apparent asymmetry can be the result of the chamber random tilting towards one side or the other.
- Test is biumbilicate with the umbilici with a diameter of about one half of the maximum test diameter measured at base of the radially elongate portion of the chambers.
- Aperture has the shape of a medium high arch, is situated in peripheral position, extends symmetrically in the two umbilici and is bordered by a wide and imperforate lip; relict periapertural structures occur within the umbilici.
- Chamber surface is smooth. Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Groshenyia pentagonalis* (Reichel 1948). Georgescu 2012, p. 24, Figures 6: 10-18, 7: 1-12. Georgescu, M.D., 2012. Morphology, taxonomy, stratigraphic distribution and evolutionary classification of the schackoinid planktic foraminifera (late Albian-Maastrichtian, Cretaceous). In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 1-62.

***Eohastigerinella watersi* (Cushman 1931)**



Eohastigerinella watersi from the upper Santonian sediments of Texas (USA) illustrated by Georgescu (2011), plate 3, Figures 5-7.

Original report. *Hastigerinella watersi* Cushman 1931, p. 86, pl. 11, Figures 4-5.

Original work. Cushman, J.A. 1931. *Hastigerinella* and other interesting foraminifera from the Upper Cretaceous of Texas. *Contributions from the Cushman Foundation for Foraminiferal Research*, 7, 83-90.

Age. Late Santonian.

Main morphological features.

- Test is planispiral but occasional specimens with trochospiral coil in the gerontic stage are known.
- Earlier chambers are globular and overlap at a very low rate and the last-formed one or two strongly radially elongate, with a distal bulbous projection and the elongation axis perpendicular to the previous whorls.
- Sutures are deeply incised resulting in a stellate outline, radial and straight to slightly curved.
- Test is symmetrical in edge view and with a rounded periphery; an imperforate peripheral band at the periphery of the earlier chambers of the final whorl can occur occasionally.
- Test is biumbilicate with the umbilici with a diameter of about one third to one half of the maximum test diameter measured at the base of the radially elongate portion of the last-formed chambers.
- Aperture has the shape of a medium high arch, is situated in peripheral position and extends in the two umbilical regions; relict periapertural structures occur in the umbilical regions.
- Chamber surface is mostly smooth but scattered pustules often occur over the earlier chambers of the final whorl. Wall is calcitic, hyaline, incipiently simple-ridged and perforate.

Recommended revision. *Eohastigerinella watersi* (Cushman 1931). Georgescu 2011, p. 44, pl. 2, Figures 1-13, pl. 3, Figures 1-12, pl. 4, Figures 1-6. Georgescu, M.D., 2011. New data on the evolutionary classification of the Late Cretaceous (late Coniacian-Santonian) planktic foraminifera with elongate chambers. *Revista Española de Micropaleontología*, 43, 39-54.

***Hedbergella delrioensis* (Carsey 1926)**

Hedbergella delrioensis from upper Albian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2008), plate 1, Figures 4-6.

Original report. *Globigerina cretacea del rioensis* Carsey 1926, p. 43.

Original work. Carsey, D.O., 1926. Foraminifera of the Cretaceous of central Texas. *University of Texas Bulletin*, 2612, 5-56.

Age. Albian-Turonian.

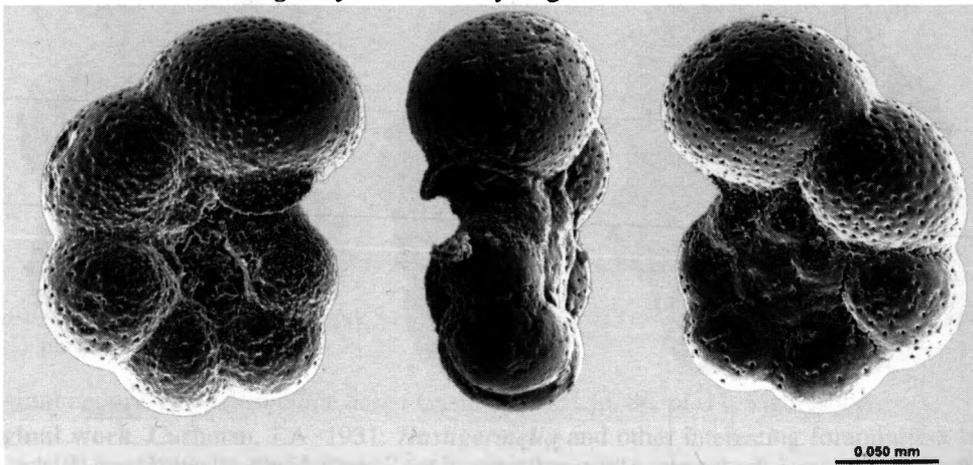
Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Chambers are globular to subglobular and present a gradual size increase and variable overlapping.
- Sutures are distinct, depressed, straight and radial on both test sides.
- Test is asymmetrically biconvex in edge view, with a rounded to broadly rounded simple periphery, without peripheral structures.
- Aperture is a low arch in extraumbilical-umbilical position and is bordered by an imperforate lip; relict periapertural structures occur in the umbilical region.
- Umbilicus is small and deep, with a diameter of about one sixth of the maximum test diameter.
- Chamber surface is ornamented with scattered pustules, which are more prominent over the earlier chambers. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Hedbergella delrioensis* presents a high degree of variability in the chamber number on the final whorl, trochospire height and ornamentation and a few synonyms were proposed for various test varieties of this species.

Recommended revision. *Hedbergella delrioensis* (Carsey 1926). Georgescu 2008, p. 591, pl. 1, Figures 1-6. Georgescu, M.D., 2008. Transition from the typological to evolutionary classification of the Cretaceous planktic foraminifera: case study of *Anaticinella* Eicher 1973. *Micropaleontology*, 55, 589-616. [published in 2009].

***Hedbergella yezoana* Takayanagi and Iwamoto 1962**



Hedbergella yezoana from the upper Albian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2009), plate 1, Figure 1.

Original report. *Hedbergella trocoidea yezoana* Takayanagi and Iwamoto 1962, p. 191, pl. 29, Figures 1-2.

Original work. Takayanagi, Y., Iwamoto, H., 1962. Cretaceous planktic foraminifera from the middle Yezo Group from the Ikushumbetsu, Miruto and Hatonosu areas. *Transactions of the Paleontological Society of Japan*, 45, 183-196.

Age. Albian-early Cenomanian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a very low trochospire.
- Chambers are subglobular in shape and the last-formed one can be occasionally incipiently subcylindrical, overlap at low rates and present a gradual size increase.
- Sutures are distinct and depressed, straight and radial throughout.
- Test is slightly asymmetrical in edge view and the last-formed chamber often presents a weak axial elongation.
- Periphery is rounded to broadly rounded, often simple and occasionally with a band of low pore density and smaller pore size at the periphery of the earlier chambers of the final whorl.
- Aperture is a low to medium high arch in extraumbilical-umbilical position and is bordered by a wide imperforate lip; relict periapertural structures occur in the umbilical region.
- Umbilicus has a diameter of about one sixth of the maximum test diameter.
- Chamber surface is mostly smooth but small-sized scattered pustules can occur in the periapertural and peripheral regions. Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Clavihedbergella yezoana* (Takayanagi and Iwamoto 1962). Georgescu 2009, p. 266, pl. 1, Figures 1-3. Georgescu, M.D., 2009. Upper Albian-lower Turonian non-schackoinid planktic foraminifera with elongate chambers: morphology reevaluation, taxonomy and evolutionary classification. *Revista Española de Micropaleontología*, 41, 255-293.

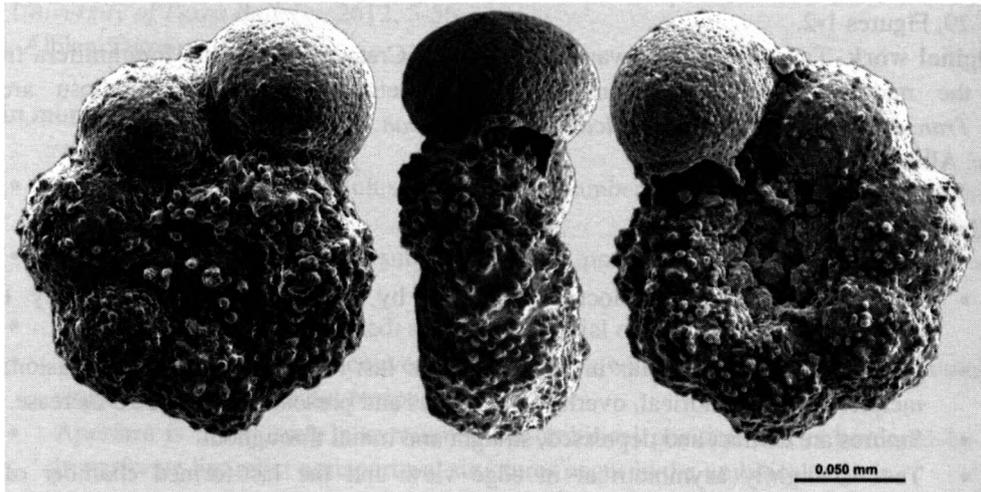
Original report. *Globigerina planispira* Tappan 1940, p. 122, pl. 19, Figure 12.

Original work. Tappan, H., 1940. Foraminifera from the Grayson Formation of northern Texas. *Journal of Paleontology*, 14, 93-126.

Age. Albian-Turonian (? Coniacian-Santonian).

Main morphological features.

- Test consists of the proloculus followed by chambers added in a very low trochospire.
- Chambers are globular to subglobular, present a gradual size increase and overlap at various rates.
- In general chambers present a slow size increase.

Hedbergella planispira (Tappan 1940)

Hedbergella planispira from the Cenomanian sediments of Texas (USA).

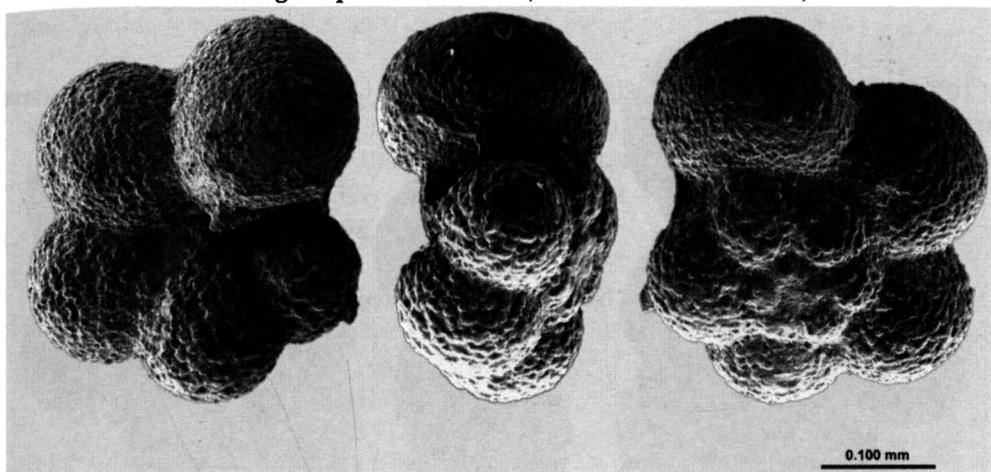
- Sutures are distinct, depressed, straight and radial on both test sides.
- Test is slightly asymmetrical in edge view, with a rounded to broadly rounded periphery.
- An imperforate peripheral band or with low pore density is developed over the earlier chambers of the final whorl.
- Aperture is a medium high arch in extraumbilical-umbilical position and is bordered by an imperforate lip; relict periapertural structures occur in the umbilical region.
- Umbilicus presents a diameter of one fourth to one third of the maximum test diameter.
- Chamber surface is ornamented with scattered pustules, which are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Hedbergella planispira* (Tappan 1940). Robaszynski and others 1979, p. 139, 144, pl. 27, Figures 1-3, pl. 28, Figures 1-3. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

Original report. *Globigerina portsmouthensis* Williams-Mitchell 1948, p. 96, pl. 8, Figure 4.

Original work. Williams-Mitchell, E., 1948. The zonal value of foraminifera in the Chalk of England. *Proceedings of the Geological Association*, 59, 91-112.

Age. Late Albian-Turonian.

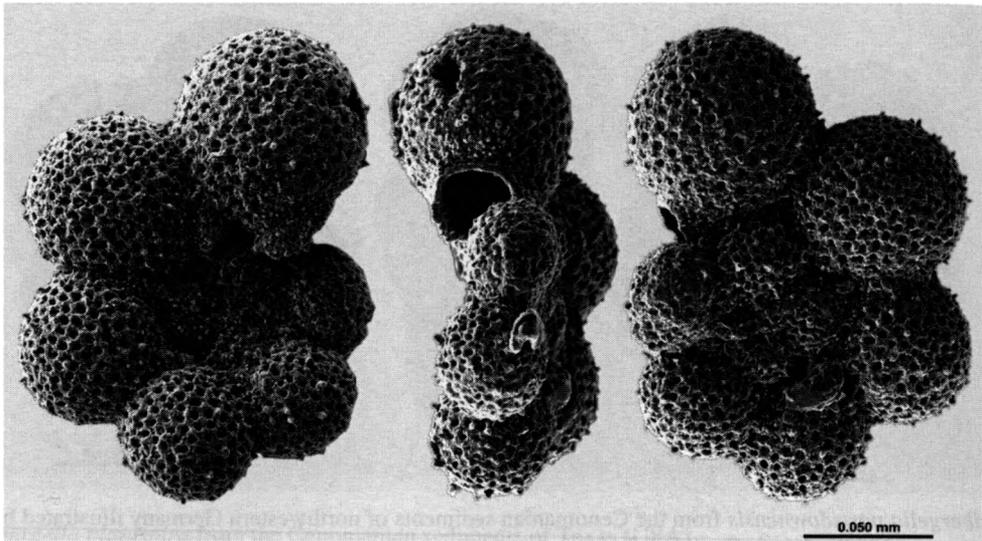
Hedbergella portsdownensis (Williams-Mitchell 1948)

Hedbergella portsdownensis from the Cenomanian sediments of northwestern Germany illustrated by Georgescu (2008), plate 3, Figures 1-3.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to moderately high trochospire.
- Chambers are globular to subglobular and the last-formed ones present occasionally a slight axial elongation.
- Sutures are distinct, depressed, straight and radial on both test sides.
- Test is slightly asymmetrical in edge view, with a rounded to broadly rounded and simple periphery, without peripheral structures.
- Aperture is a low to medium high arch in extraumbilical-umbilical position and is bordered by an imperforate lip.
- Umbilicus is small, with a diameter of about one fifth of the maximum test diameter.
- Chamber surface is ornamented with scattered pustules, which are more prominent over the earlier chambers.
- Pustules over the earlier chambers tend to fuse and form rugosities that do not present a preferential orientation.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Anaticinella portsdownensis* (Williams-Mitchell 1948). Georgescu 2008, p. 594, pl. 1, Figures 7-9, pl. 3, Figures 1-9, pl. 4, Figures 1-6. Georgescu, M.D., 2008. Transition from the typological to evolutionary classification of the Cretaceous planktic foraminifera: case study of *Anaticinella* Eicher 1973. *Micropaleontology*, 55, 589-616. [published in 2009].

Hedbergella hillsi (Georgescu 2008)

Hedbergella hillsi from the upper Turonian sediments of the Caribbean region (Venezuelan Basin), DSDP Site 150 illustrated by Georgescu (2008), plate 1, Figure 1.

Original report. *Hillsella hillsi* Georgescu 2008, p. 59, pl. 1, Figures 1-4, pl. 2, Figures 1-3, pl. 3, Figures 1-4.

Original work. Georgescu, M.D., 2008. A new planktonic foraminiferal taxon of the Family Hedbergellidae Loeblich and Tappan 1961 from the Upper Cretaceous (Upper Turonian-Coniacian) of the Caribbean region. *Israel Journal of Earth Sciences*, 57, 55-63.

Age. Late Turonian-early Campanian.

Main morphological features.

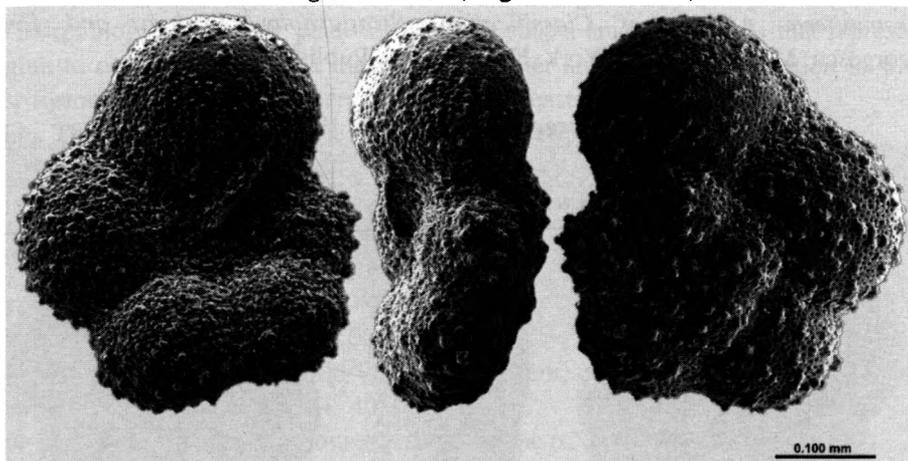
- Test consists of the proloculus followed by chambers added in a very low trochospire.
- Chambers are globular to subglobular and those of the final whorl often petaloid; the last-formed one is occasionally slightly radially elongate.
- Test is slightly asymmetrical in edge view, with a rounded and simple periphery.
- Aperture has the shape of a medium to high arch in peripheral-extraumbilical position and is bordered by an imperforate lip; relict periapertural structures occur in the umbilical regions.
- Umbilicus is shallow and with a diameter of about one third of the maximum test diameter.
- Chamber surface is mostly smooth but randomly distributed scattered pustules can occur.
- Wall is calcitic, hyaline, simple-ridged and perforate.

Notes on identification. This species differs from all the others assigned to the genus *Hedbergella* by having simple-ridged wall. This feature can be observed under the optical

stereomicroscope but the best observations can be realized only with the aid of a SEM and ESEM.

Recommended revision. *Hillsella hillsi* Georgescu 2008. Georgescu and Carrigy 2012, p. 86, pl. 1, Figures 1-11, pl. 2, Figures 1-7. Georgescu, M.D., Carrigy, C., 2012. Evolutionary classification of the coiled Upper Cretaceous (Turonian-Lower Campanian) planktic foraminifera with simple-ridged test wall. *Revista Española de Micropaleontología*, 44, 79-98.

***Hedbergella hoelzli* (Hagn and Zeil 1954)**



Hedbergella hoelzli from the upper Turonian sediments of the East Indian Ocean (Exmouth Plateau), ODP Hole 763B.

Original report. *Globigerina h lzl* Hagn and Zeil 1954, p. 50, pl. 2, Figure 8.

Original work. Hagn, H., Zeil, W., 1954. Globotruncanen aus dem Ober-Cenoman und Unter-Turon der Bayerischen Alpen. *Eclogae Geologicae Helveticae*, 47, 1-60.

Age. Late Turonian.

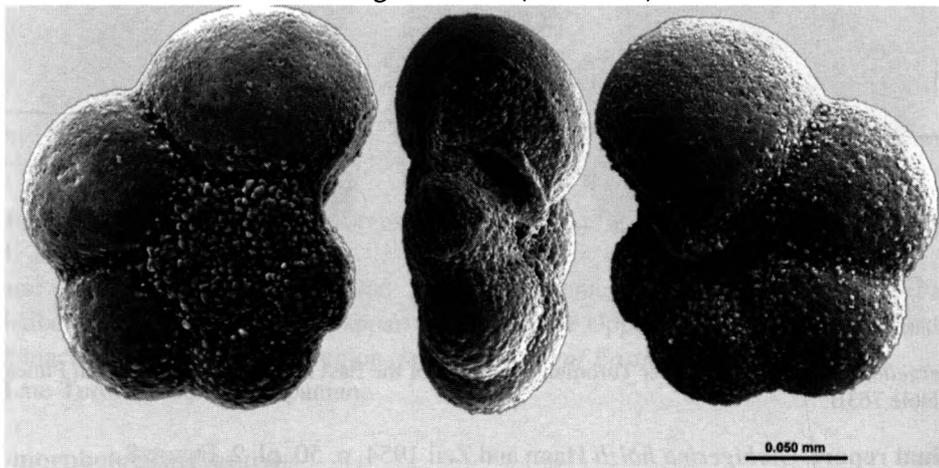
Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Earlier chambers are subglobular and those of the final whorl petaloid on the spiral side and subrectangular on the umbilical one; occasionally the last-formed chamber are slightly radially elongate.
- Chambers are slightly dorso-ventrally compressed.
- Test is asymmetrical in edge view, convex-concave and a subrounded to rounded simple periphery, without peripheral structures.
- Aperture is a umbilical-extraumbilical low to medium high and is bordered by an imperforate lip.
- Umbilicus is small, with a diameter of about one third of the maximum test diameter.

- Chamber surface is ornamented with scattered pustules, which are denser over the earlier chambers; pustules tend to fuse and form rugosities, which are often parallel to the periphery on the spiral side and with meridional arrangement on the umbilical one.
- Wall is calcitic, hyaline, simple to incipiently reticulate and perforate.

Recommended revision. *Falsotruncana hoelzli* (Hagn and Zeil 1954). Georgescu and Heikkinen in Georgescu and others 2013, p. 82, pl. 8, Figures 1-9. Georgescu, M.D., Sawyer, M.S., Heikkinen, C.J., Burke, R.M., 2013. New and revised Cretaceous (Albian-Campanian) planktic foraminifera of the Atlantic, Indian and Pacific Oceans. In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 59-100.

***Hedbergella crassa* (Bolli 1959)**



Hedbergella crassa from the Coniacian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Praeglobotruncana crassa* Bolli 1959, p. 265, pl. 21, Figures 1-2.

Original work. Bolli, H.M., 1959. Planktic foraminifera from the Cretaceous of Trinidad, B.W.I. *Bulletins of American Paleontology*, 39(179), 255-277.

Age. Late Turonian-early Campanian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a very low trochospire.
- Chambers are subglobular, with dorsal compression and tilted towards the umbilicus on the opposite side; chambers overlap slightly and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight on both test sides.
- Test is distinctly asymmetrical in edge view, plano-convex, with a rounded and simple periphery, without peripheral structures.

- Aperture has the shape of a low to medium arch in extraumbilical-umbilical position and is bordered by an imperforate lip.
- Umbilicus is small and deep, with a diameter of one eighth to one fifth of the test maximum diameter.
- Chamber surface is ornamented with scattered pustules that are concentrated over the earlier chambers; the last-formed one to four chambers are smooth at least on the spiral side.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Hedbergella crassa* can be recognized by the following combination of morphological features: plano-convex test shape, small umbilicus that represents one eighth to one fifth of the test maximum diameter and light ornamentation in which the last-formed one to four chambers are smooth at least on the spiral side.

Revision. This species was not reviewed since its description.

Hedbergella electrae - new species

(Plate 1, Figures 1-2)

Holotype. Specimen WKB 010161.

Paratypes. Seven specimens. WKB 010162-010168.

Type locality. DSDP Site 463 (Mid-Pacific Mountains, central Pacific Ocean), geographical coordinates: 21° 21' N and 174° 40' E.

Type level. Coniacian-lower Santonian chalk, Sample 62-463-26-5, 53-58 cm.

Derivation. Species named after Electra Georgescu.

Diagnosis. *Hedbergella* with biumbilicate test appearance and pustulose ornamentation.

Description.

- Test consists of the proloculus followed by chambers added in a very low trochospire.
- Chambers are globular to spherical and present a gradual size increase throughout the ontogeny; there are 6-7 chambers in the final whorl that have a moderate to slow size increase.
- Sutures are distinct and depressed, radial and straight to slightly curved throughout.
- Test is symmetrical to slightly asymmetrical in edge view and biumbilicate aspect, which is given by the low trochospire and significant increase in chamber thickness.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture is a low to medium high arch and stretches from the umbilicus center to the test periphery; it is bordered by an imperforate lip.
- Umbilicus is deep and with a diameter of about one fourth of the maximum test diameter; relict periapertural structures occur occasionally within the umbilical region.
- Chamber surface is ornamented with dense dome-like pustules with a diameter of 0.0035-0.0062 mm.

- Wall is calcitic, hyaline, simple and perforate; pores are circular to elliptical in shape and with a diameter or maximum dimension of 0.0011-0.0037 mm.

Remarks. *Hedbergella electrae* differs from *H. delrioensis* and *H. portdownensis* mainly by the very low trochospire resulting in a biumbilicate aspect of the test and aperture that can stretch outside the umbilicus reaching the periphery.

Age. Latest Turonian-Santonian.

Geographical distribution. Central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

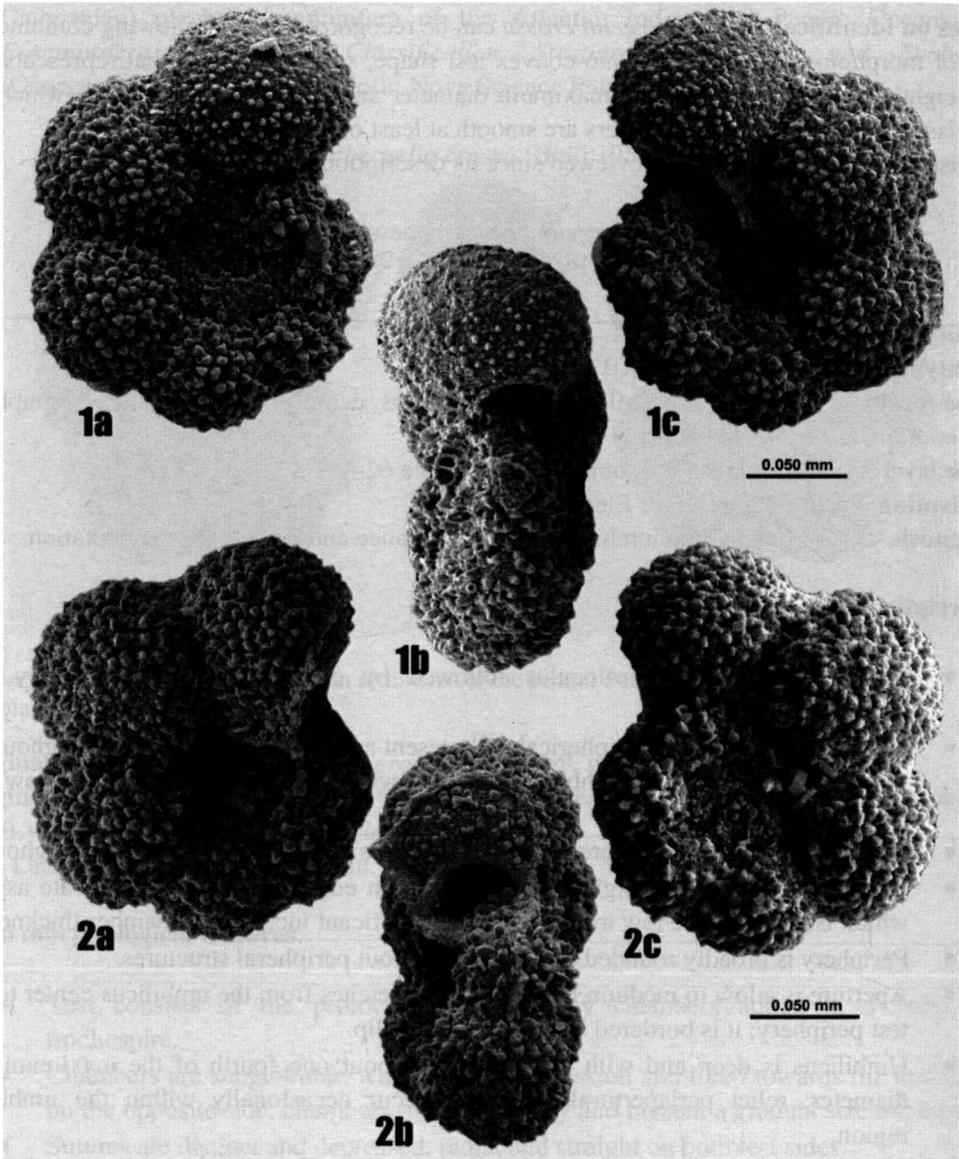
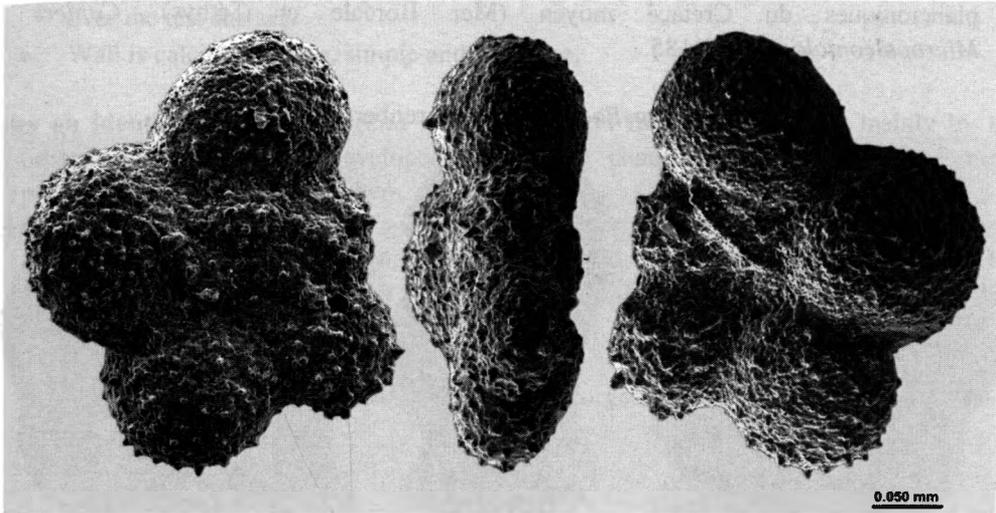


Plate 1. Two specimens of *Hedbergella electrae* from the Mid-Pacific Mountains (central Pacific Ocean), DSDP Site 463, Sample 62-463-26-5, 53-58 cm. 1-holotype, 2-paratype.

Hedbergella flandrini Porthault 1970

Hedbergella flandrini from the Santonian sediments of the South Atlantic Ocean (São Paulo Plateau), DSDP Site 356.

Original report. *Hedbergella flandrini* Porthault in Donze and others 1970, p. 64, pl. 10, Figures 1-3.

Original work. Donze, P., Porthault, B., Thomel, B., Villoutreys, O. de, 1970. La Sénonien inférieur de Puget-Théniers (Alpes-Maritimes) et sa microfaune. *Geobios*, 3, 41-106.

Age. (? Late Coniacian) - Santonian.

Main morphological features.

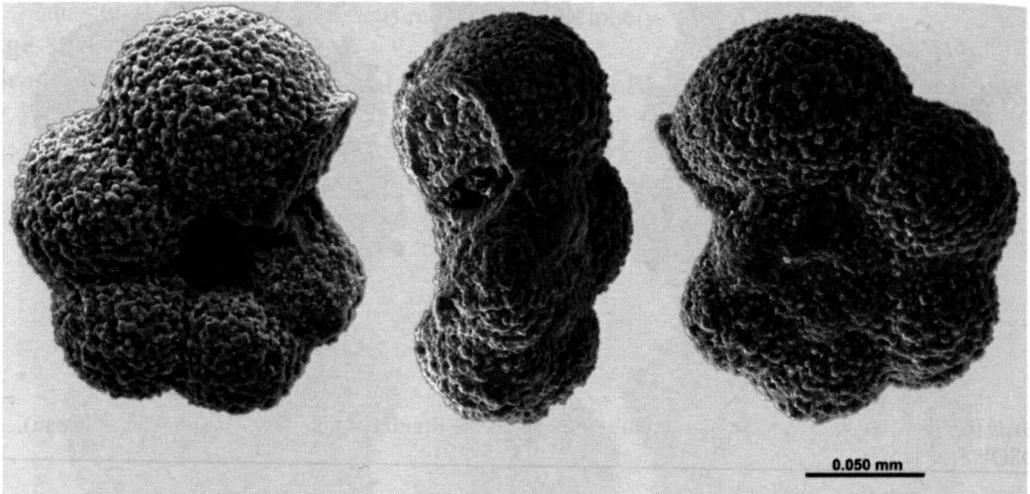
- Test consists of the proloculus followed by chambers added in a low trochospire.
- Chambers of the final whorl are dorso-ventrally compressed, petaloid and with a gradual size increase.
- Sutures are deeply incised resulting in a strongly lobate outline, radial and straight on both test sides.
- Test is biconvex and compressed in edge view, with a rounded to subangular and simple periphery, without peripheral structures.
- Aperture has the shape of a low arch in extraumbilical-umbilical position and is bordered by an imperforate lip.
- Umbilicus is wide and shallow, with a diameter of about one third of the maximum test diameter.
- Chamber surface is ornamented with dense pustules, which are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Hedbergella flandrini* can be recognized by the dorso-ventrally compressed and petaloid chambers of the final whorl.

Recommended revision. *Hedbergella flandrini* Porthault 1970. Robaszynski and others 1979, p. 129, 134, pl. 24, Figures 1-2, pl. 25, Figures 1-2. Robaszynski, F., Caron, M. and

The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

Hedbergella globulosa (Ehrenberg 1838)



Hedbergella globulosa from the Campanian-Maastrichtian sediments of the Moen Island (Denmark) illustrated by Georgescu (2013), plate 8, Figures 1-3.

Original report. *Rotalia globulosa* Ehrenberg 1838, p. 134, pl. 4, Figure 1.

Original work. Ehrenberg, C.G., 1838. Über die Bildung der Kreidefelsen und des Kreidemergels durch unsichtbare Organismen. *Abhandlungen der Königlich Akademie der Wissenschaften zu Berlin*, 1838, 59-147. [published in 1839]

Age. Santonian-Maastrichtian.

Main morphological features.

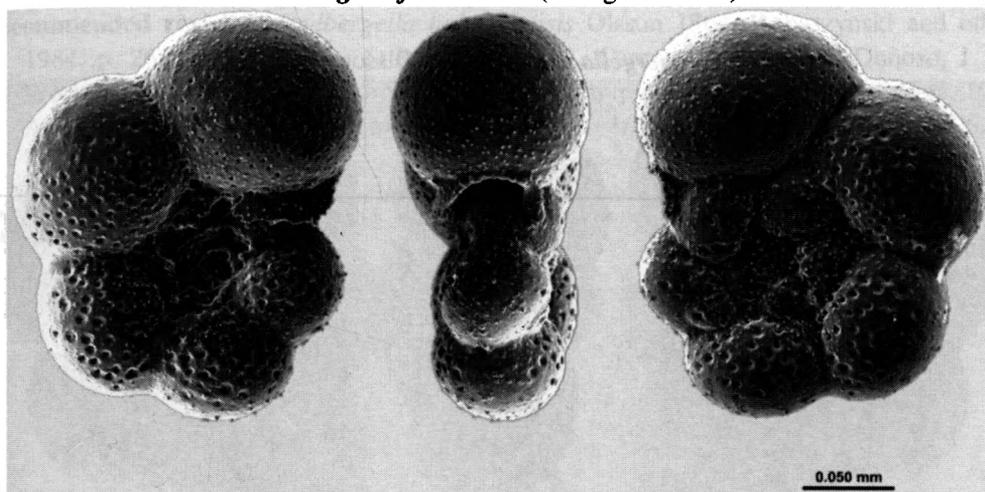
- Test consists of the proloculus followed by chambers added in a low trochospire.
- Chambers are subglobular to globular throughout, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight to slightly curved on both test sides.
- Test is slightly asymmetrical in edge view and with a broadly rounded periphery; one peripheral band with lower pore density can be developed occasionally over the earlier chambers of the final whorl.
- Aperture has the shape of a low to medium high arch in extraumbilical-umbilical position and is bordered by an imperforate lip, which is rarely preserved.
- Umbilicus is deep and narrow, with a diameter of about one third of the maximum test diameter.

- Chamber surface is ornamented with dense pustules, which are uniformly distributed over the test surface.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Hedbergella globulosa* differs from *H. planispira* mainly by the ornamentation uniformly developed on all the chambers rather than being more prominent on the earlier chambers.

Recommended revision. *Allothecha globulosa* (Ehrenberg 1838). Georgescu 2013, p. 24, pl. 8, Figures 1-8. Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49.

***Hedbergella falklandica* (Georgescu 2008)**



Hedbergella falklandica from the lower Campanian sediments of the South Atlantic Ocean (Falkland Plateau), DSDP Site 511 illustrated by Georgescu (2008), plate 1, Figures 1-3.

Original report. *Liueella falklandica* Georgescu 2008, p. 158, pl. 1, Figures 1-10.

Original work. Georgescu, M.D., 2008. A new planktonic foraminifer (family Hedbergellidae Loeblich and Tappan, 1961) from the lower Campanian sediments of the Falkland Plateau, South Atlantic Ocean (DSDP Site 511). *Journal of Foraminiferal Research*, 38, 157-161.

Age. Late Santonian-Campanian.

Main morphological features.

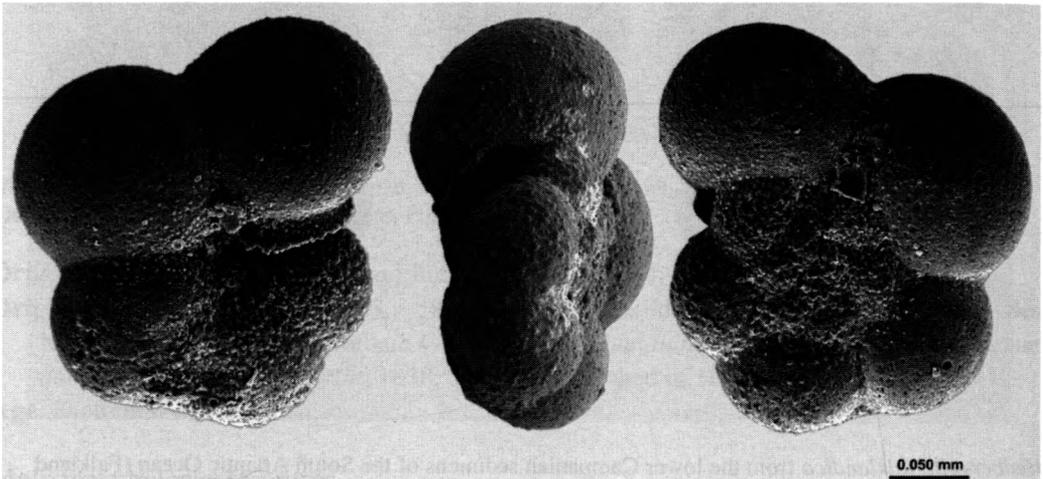
- Test consists of the proloculus followed by chambers added in a very low trochospire resulting in a nearly planispiral arrangement.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, straight and radial throughout.

- Test is slightly asymmetrical in edge view and with a broadly rounded periphery; one wide peripheral band is developed on all the chambers of the final whorl.
- Aperture has the shape of a low to medium high arch in umbilical-peripheral position and is bordered by an imperforate lip.
- Umbilicus shallow, with a diameter of about one third of the maximum test diameter; relict periapertural structures occur in the umbilical region.
- Chamber surface is smooth.
- Wall is calcitic, hyaline, simple and perforate; crater-like pores (scalaropores) occur especially over the earlier chambers of the test.

Notes on identification. *Hedbergella falklandica* is a small-sized species that can be confused for a planispiral one due to the biumbilicate test appearance.

Revision. This species was not reviewed since its description.

Hedbergella holmdelensis Olsson 1964



Hedbergella holmdelensis from the middle Campanian sediments of the central Pacific Ocean (Mid-Cretaceous Mountains), DSDP Site 463.

Original report. *Hedbergella holmdelensis* Olsson 1964, p. 160, pl. 1, Figures 1-2.

Original work. Olsson, R.K., 1964. Late Cretaceous planktonic foraminifera from New Jersey and Delaware. *Micropaleontology*, 10, 157-188.

Age. Campanian-Maastrichtian.

Main morphological features.

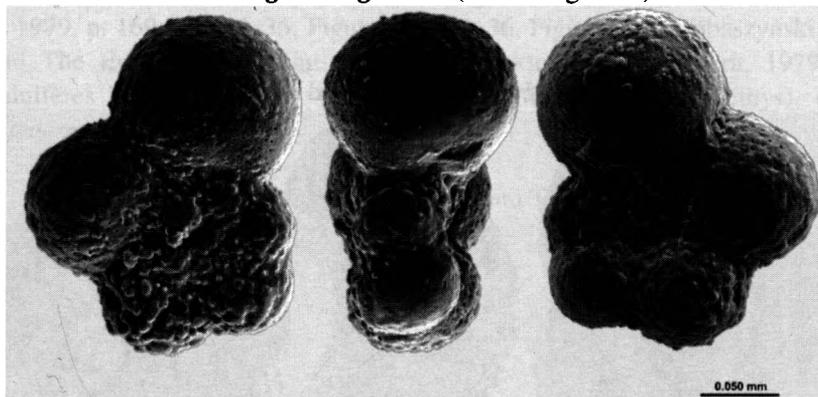
- Test consists of the proloculus followed by chambers added in a very low trochospire.
- Chambers are subglobular, with a distinct dorsal compression and tilted towards the umbilicus on the opposite side; chambers overlap slightly and present a gradual size increase.

- Test is asymmetrical, plano-convex in edge view and with a rounded and simple periphery, without peripheral structures.
- Aperture has the shape of a low to medium arch in umbilical-peripheral position and is bordered by an imperforate lip.
- Umbilicus is deep and narrow, with a diameter of one eighth to one sixth of the maximum test diameter.
- Chamber surface is ornamented with dense small-sized dome-like pustules, which are concentrated over the test earlier chambers; the last-formed chambers are smooth on both sides.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Hedbergella holmdelensis* is a homoeomorph of *H. crassa* of which it differs mostly in having larger sizes.

Recommended revision. *Hedbergella holmdelensis* Olsson 1964. Robaszynski and others 1984, p. 261, pl. 43, Figure 1. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Hedbergella oligosticta (Ehrenberg 1854)



Hedbergella oligosticta from the upper Campanian sediments of Mississippi (USA) illustrated by Georgescu (2013), plate 11, Figures 1-3.

Original report. *Planulina oligosticta* Ehrenberg 1854, p. 23, pl. 32, part II, Figure 43.

Original work. Ehrenberg, C.G., 1854. *Mikrogeologie*. Leipzig: L. Voss, 374 p.

Age. Late Campanian.

Main morphological features.

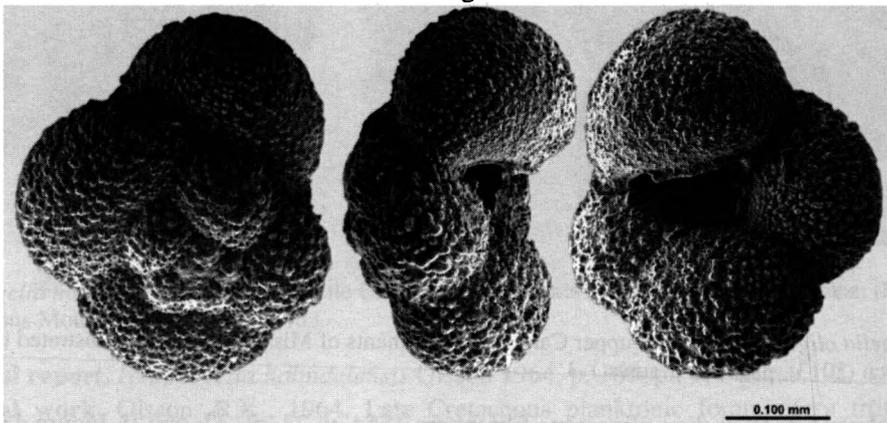
- Test consists of the proloculus followed by chambers added in a very low trochospire resulting in a quasi-biumbilicate test aspect.
- Chambers are globular to spherical, overlap at various rates and present a gradual size increase.

- Sutures are distinct and depressed, radial and straight on both test sides; occasionally they are less distinct between the earlier chambers due to the successive layers of calcite added during the ontogeny.
- Test is slightly asymmetrical in edge view and with a broadly rounded periphery; one wide imperforate peripheral band occurs on all the chambers of the final whorl.
- Aperture has the shape of a low to medium high arch in umbilical-extraumbilical position and is bordered by an imperforate lip.
- Umbilicus is deep and narrow, with a diameter of about one fourth of the maximum test diameter; relict periapertural structures occur occasionally within the umbilical region.
- Chamber surface is ornamented with scattered pustules, which are denser and slightly more prominent over the earlier chambers. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. Observations with the aid of a SEM and ESEM are necessary to observe accurately the imperforate peripheral band of *Hedbergella oligosticta*.

Recommended revision. *Vanhintella oligosticta* (Ehrenberg 1854). Georgescu 2013, p. 30, pl. 11, Figures 1-4. Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49.

***Whiteinella baltica* Douglas and Rankin 1969**



Whiteinella baltica from the Turonian sediments of the South Atlantic Ocean (Falkland Plateau), DSDP Site 511.

Original report. *Whiteinella baltica* Douglas and Rankin 1969, p. 197, text-Figure 9.

Original work. Douglas, R.G., Rankin, C., 1969. Cretaceous planktic foraminifera from Bornholm and their zoogeographic significance. *Lethaia*, 2, 185-217.

Age. Cenomanian-early Campanian.

Main morphological features.

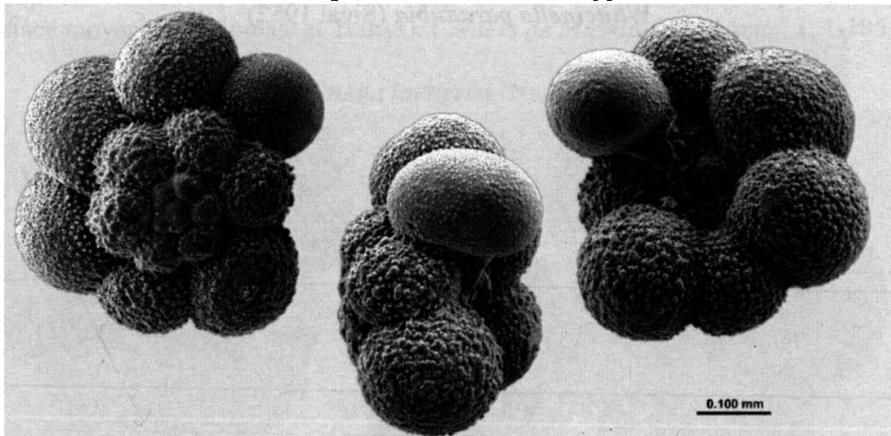
- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.

- Chambers are subglobular to globular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight on both test sides.
- Test is asymmetrical in edge view and with a broadly rounded and simple periphery, without peripheral structures.
- Aperture has the shape of a low to medium high arch in umbilical-extraumbilical position and is bordered by a delicate imperforate lip or flap, which is rarely preserved.
- Umbilicus is deep and narrow, with a diameter of about one fourth of the maximum test diameter; relict periapertural structures merge into a rim at the periphery of the umbilical region.
- Chamber surface is ornamented with scattered and relatively uniformly distributed pustules, which can present a conical shape resulting in hispid aspect of the test. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. The periapertural structures are rarely preserved but the rim around the umbilicus resulted from the merged successive periapertural structures can be often observed even in some cases of relatively poorly preserved specimens.

Recommended revision. *Whiteinella baltica* Douglas and Rankin 1969. Robaszynski and others 1979, p. 169, 174, pl. 35, Figures 1-5, pl. 36, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

***Whiteinella aprica* (Loeblich and Tappan 1961)**



Whiteinella aprica from the uppermost Cenomanian sediments of San Juan Island, Washington State (USA) illustrated by Georgescu (2008), plate 5, Figures 1-3.

Original report. *Ticinella aprica* Loeblich and Tappan 1961, p. 292, pl. 4, Figures 14-16.

Original work. Loeblich, A.R. Jr., Tappan, H., 1961. Cretaceous planktic foraminifera: Part 1 - Cenomanian. *Micropaleontology*, 30, 1-70.

Age. Middle Cenomanian-early Turonian.

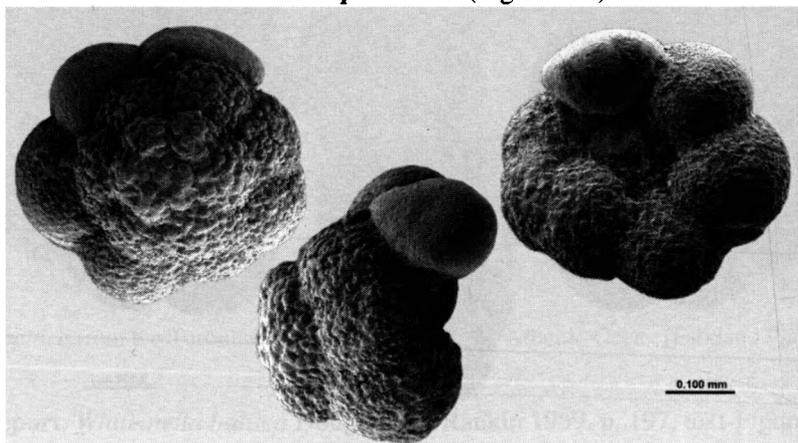
Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Chambers are subglobular to globular, overlap at various rates and present a gradual size increase and occasionally have an axial elongation.
- Test is asymmetrical in edge view, with a distinctly convex spiral side and rounded periphery; the periphery is simple, without peripheral structures.
- Aperture is a low arch in extraumbilical-umbilical position and bordered by an imperforate porticus.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter; relict periapertural structures occur in the umbilical region.
- Chamber surface is ornamented with scattered pustules, which are denser and slightly more prominent over the earlier chambers; pustules tend to fuse and form larger ornamentation structures that do not present a preferential arrangement. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Whiteinella aprica* differs from *Hedbergella portdownensis* mainly by having larger umbilical region and more complex periapertural structure consisting of a porticus rather than an imperforate lip.

Recommended revision. *Anaticinella aprica* (Loeblich and Tappan 1961). Georgescu 2008, p. 596, pl. 5, Figures 1-9, pl. 6, Figures 1-7. Georgescu, M.D., 2008. Transition from the typological to evolutionary classification of the Cretaceous planktic foraminifera: case study of *Anaticinella* Eicher 1973. *Micropaleontology*, 55, 589-616. [published in 2009].

Whiteinella paradubia (Sigal 1952)



Whiteinella paradubia from the lower Turonian sediments of Kansas (USA).

Original report. *Globigerina paradubia* Sigal 1952, p. 28, Figure 28.

Original work. Sigal, J. 1952. Aperçu stratigraphique sur la micropaléontologie du Crétacé. *Alger, 19th International Geological Congress, Monographies régionales, 1^{re} série, Alger*, 26, 1-52.

Age. Late Cenomanian-Turonian.

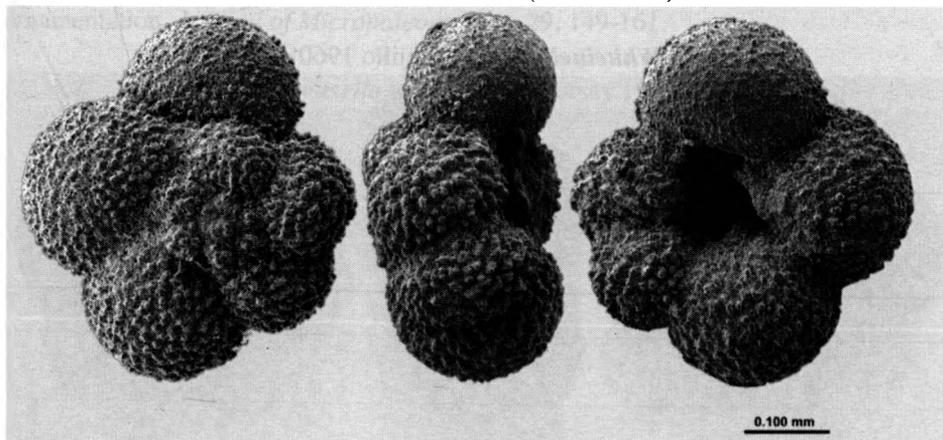
Main morphological features.

- Test consists of the proloculus followed by chambers added in a high trochospire.
- Chambers are subglobular to globular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight to slightly curved on both test sides.
- Test is asymmetrical in edge view, with a very high spiral side and a nearly flat umbilical side.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture has the shape of a low arch in extraumbilical-umbilical position and is bordered by a flap or porticus.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter.
- Chamber surface is ornamented with scattered and relatively uniformly distributed pustules.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. The very high trochospire characterizes *Whiteinella paradubia* among the other species of the genus *Whiteinella*.

Recommended revision. *Whiteinella paradubia* (Sigal 1952). Robaszynski and others 1979, p. 181, 184, pl. 39, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

***Whiteinella loetterlei* (Nauss 1947)**



Whiteinella loetterlei from the lower Turonian sediments of the central Pacific Ocean (Mid-Pacific Mountains), Site 463 illustrated by Georgescu (2010), plate 1, Figure 5.

Original report. *Globigerina loetterlei* Nauss 1947, p. 336, pl. 49, Figure 11.

Original work. Nauss, A.W., 1947. Cretaceous microfossils of the Vermillion area, Alberta. *Journal of Paleontology*, 21, 329-343.

Age. Latest Cenomanian-Turonian.

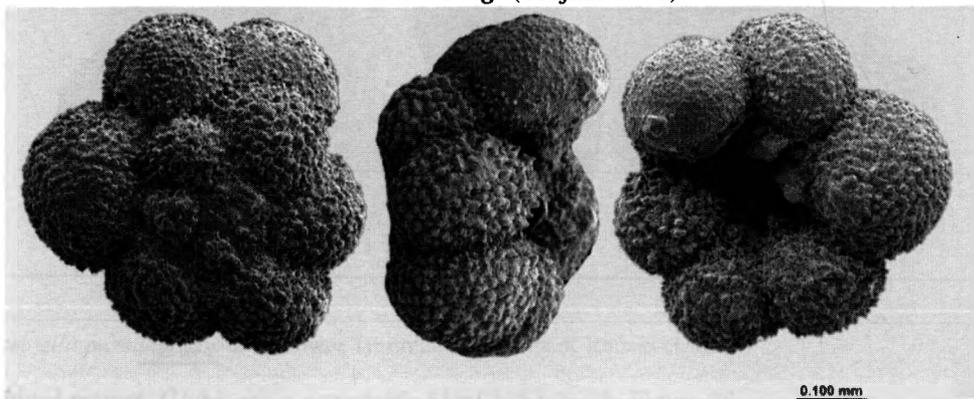
Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Chambers are globular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight to slightly curved throughout.
- Test is asymmetrical in edge view, with a convex spiral side and broadly rounded and simple periphery, without peripheral structures.
- Aperture has the shape of a low arch in umbilical-extraumbilical position and is bordered by a flap, which is rarely preserved.
- Umbilicus presents a diameter of about one fifth to one third of the maximum test diameter; relict periapertural structures often occur in the umbilical region.
- Chamber surface is ornamented with scattered pustules, which can fuse to form rugosities; the ornamentation elements present occasionally a meridional arrangement.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. This species can be recognized in assemblages consisting of a large number of well-preserved specimens and preferably in successions of samples.

Recommended revision. *Fingeria loetterlei* (Nauss 1947). Georgescu 2010, p. 154, pl. 1, Figures 1-6. Georgescu, M.D., 2010. Evolutionary classification of the Upper Cretaceous (Turonian-lower Campanian) planktic foraminifera with incipient meridional ornamentation. *Journal of Micropaleontology*, 29, 149-161.

Whiteinella kingi (Trujillo 1960)



Whiteinella kingi from the lower Turonian sediments of the central Pacific Ocean (Mid-Pacific Mountains), Site 463 illustrated by Georgescu (2010), plate 2, Figure 4.

Original report. *Rugoglobigerina kingi* Trujillo 1960, p. 339, pl. 49, Figure 5.

Original work. Trujillo, E.F., 1960. Upper Cretaceous foraminifera from near Redding, Shasta County, California. *Journal of Paleontology*, 34, 290-346.

Age. Turonian-early Campanian.

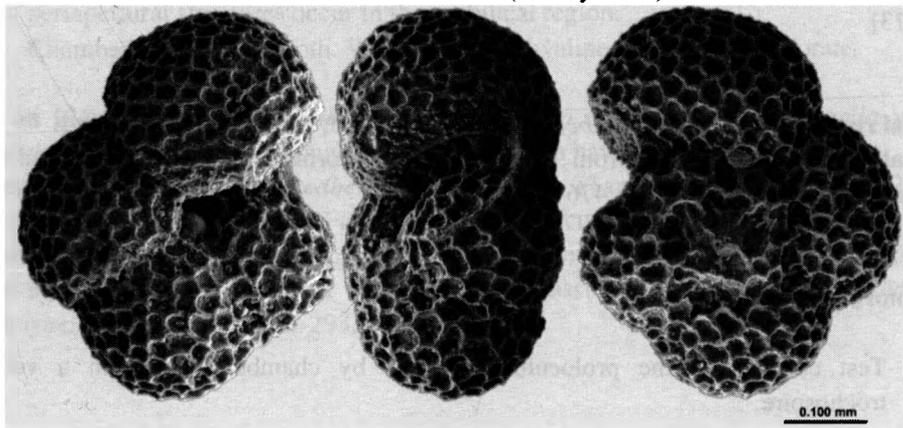
Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Chambers are globular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight to slightly curved.
- Test is distinctly asymmetrical in edge view, with a convex spiral side and broadly rounded and simple periphery; there are no peripheral structures.
- Aperture has the shape of a low arch in umbilical-extraumbilical position and is bordered by a flap, which is rarely preserved.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter.
- Chamber surface is ornamented with scattered pustules, which can fuse to form rugosities; the ornamentation elements present occasionally a meridional arrangement especially on the umbilical side.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Whiteinella kingi* is almost a homoeomorph of *W. loetterlei*; the two species can be recognized in successions of samples that cover a significant stratigraphical range and large assemblages.

Recommended revision. *Fingeria kingi* (Trujillo 1960). Georgescu 2010, p. 157, pl. 2, Figures 1-6. Georgescu, M.D., 2010. Evolutionary classification of the Upper Cretaceous (Turonian-lower Campanian) planktic foraminifera with incipient meridional ornamentation. *Journal of Micropaleontology*, 29, 149-161.

Favusella washitensis (Carsey 1926)



Favusella washitensis from the upper Albian sediments of Texas.

Original report. *Globigerina washitensis* Carsey 1926, p. 44, pl. 7, Figure 10, pl. 8, Figure 2.
Original work. Carsey, D.O., 1926. Foraminifera of the Cretaceous of central Texas. *University of Texas Bulletin*, 2612, 5-56.
Age. Late Albian-middle Cenomanian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Chambers are globular to spherical, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight to slightly curved on both test sides.
- Test is asymmetrical in edge view, with a convex spiral side and broadly rounded and simple periphery, without peripheral structures.
- Aperture has the shape of a low arch in umbilical-extraumbilical position that can reach the peripheral region and is bordered by an imperforate lip, which is rarely preserved.
- Umbilicus is deep and presents a diameter of about one sixth to one third of the maximum test diameter.
- Chamber surface is ornamented with a network of ridges with a constant height that define a polygonal pattern uniformly developed over all test chambers.
- Wall is calcitic, hyaline, simple and perforate; pores are situated within the polygons defined by the ridges.

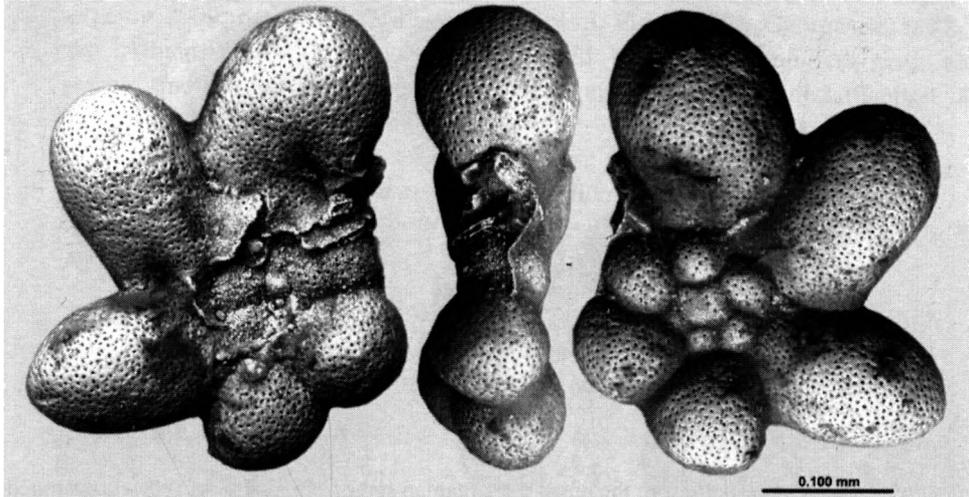
Notes on identification. *Favusella washitensis* presents a wide morphological variability. The ornamentation consisting ridges forming a polygonal pattern is a characteristic of this species in the upper Albian-Maastrichtian stratigraphical interval.

Recommended revision. *Favusella washitensis* (Carsey). Michael 1972, p. 215, pl. 5, Figures 1-5. Michael, F.Y., 1972. Planktonic foraminifera from the Comanchean Series (Cretaceous) of Texas. *Journal of Foraminiferal Research*, 2, 200-220. [published in 1973]

Original report. *Hastigerinella subcretacea* Tappan 1943, p. 513, pl. 83, Figure 4.
Original work. Foraminifera from the Duck Creek Formation of Oklahoma and Texas. *Journal of Paleontology*, 17, 476-517.
Age. Late Albian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a very low trochospire.

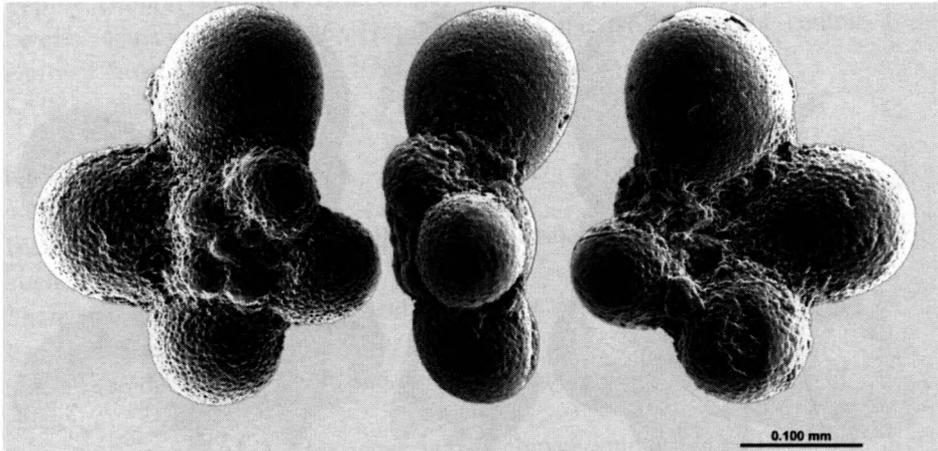
Clavihedbergella subcretacea (Tappan 1943)

Clavihedbergella subcretacea from the upper Albian sediments of Oklahoma (USA) illustrated by Georgescu (2009), plate 2, Figure 2.

- Earlier chambers are globular to subglobular and the last-formed one to three subcylindrical and elongate, with the elongation axis tangential to the previous whorl.
- Sutures are deeply incised and depressed, radial and straight to slightly curved throughout.
- Test is slightly asymmetrical in edge view, with a rounded periphery; a peripheral band of low pore density and smaller pore size is developed on the first one or two chambers of the final whorl.
- Aperture has the shape of a medium to high arch, is situated in umbilical-peripheral position and is bordered by a wide imperforate lip.
- Umbilicus is shallow and wide, with a diameter of one third to one half of the maximum test diameter measured at the base of the elongate chambers; relict periapertural structures occur in the umbilical region.
- Chamber surface is smooth. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Clavihedbergella subcretacea* differs from *Hedbergella yezoana* mainly by the last-formed elongate chambers, which have a subcylindrical shape.

Recommended revision. *Clavihedbergella subcretacea* (Tappan 1943). Georgescu 2009, p. 266, pl. 2, Figures 1-3, pl. 3, Figures 1-2. Georgescu, M.D., 2009. Upper Albian-lower Turonian non-schackoinid planktic foraminifera with elongate chambers: morphology reevaluation, taxonomy and evolutionary classification. *Revista Española de Micropaleontología*, 41, 255-293.

Clavhedbergella simplicissima (Magné and Sigal 1954)

Clavhedbergella simplicissima from the upper Cenomanian sediments of Kansas (USA) illustrated by Georgescu (2009), plate 7, Figure 3.

Original report. *Hastigerinella simplicissima* Magné and Sigal in Cheylan and others 1954, p. 487, pl. 14, Figure 11.

Original work. Cheylan, G., Magné, J., Sigal, J., Grekoff, N., 1954. Résultats géologiques et micropaléontologiques du sondage d'El Krachem (Haut plateau Algérois). Description de quelques espèces nouvelles. *Bulletin de la Société Géologique de France*, 3(4-6), 471-492.

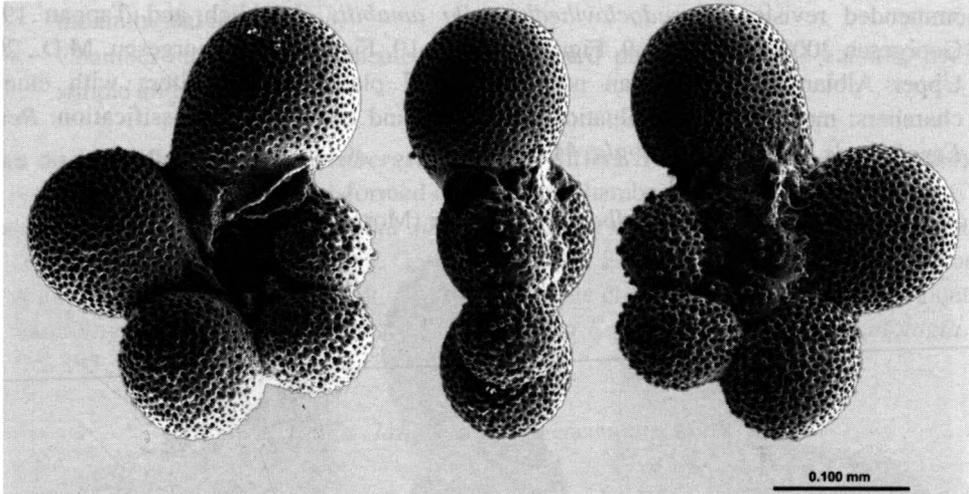
Age. Late Albian-Cenomanian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a very low trochospire.
- Earlier chambers are globular and those of the final whorl present a slight radial elongation resulting in a petaloid shape as seen from the spiral side; chambers overlap at a variable rate and present a gradual size increase.
- Test is slightly asymmetrical in edge view, with a rounded periphery; a peripheral band of low pore density and smaller pore size is developed on the earlier chambers of the final whorl.
- Aperture has the shape of a medium arch, is situated in umbilical-peripheral position and is bordered by a narrow imperforate lip.
- Umbilicus is shallow and presents a diameter of one fourth to one third of the maximum test diameter measured at the base of the elongate chambers; relict periapertural structures occur in the umbilical region.
- Chamber surface is ornamented with scattered pustules, which are denser over the earlier chambers of the final whorl; the last-formed chamber can be smooth. Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Pseudoclavihedbergella simplicissima* (Magné and Sigal 1954). Georgescu 2009, p. 276, pl. 7, Figures 1-3, pl. 8, Figures 1-2. Georgescu, M.D., 2009. Upper Albian-lower Turonian non-schackoinid planktic foraminifera with elongate chambers: morphology reevaluation, taxonomy and evolutionary classification. *Revista Española de Micropaleontología*, 41, 255-293.

***Clavihedbergella amabilis* (Loeblich and Tappan 1961)**



Clavihedbergella amabilis from the upper Cenomanian sediments of Texas illustrated by Georgescu (2009), plate 9, Figure 2.

Original report. *Hedbergella amabilis* Loeblich and Tappan 1961, p. 274, pl. 3, Figures 1-10.

Original work. Loeblich, A.R. Jr., Tappan, H., 1961. Cretaceous planktic foraminifera: Part 1 - Cenomanian. *Micropaleontology*, 30, 1-70.

Age. Latest Albian-early Turonian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and the last-formed one or two with a distinct radial elongation; chambers present little overlapping and a gradual size increase.
- Test is slightly asymmetrical in edge view, with a rounded periphery; a peripheral band of low pore density and smaller pore size is developed on the earlier chambers of the final whorl.
- Aperture has the shape of a low to medium high arch, is situated in umbilical-peripheral position and is bordered by a narrow imperforate lip.
- Umbilicus presents a diameter of one third to one half of the maximum test diameter measured at the base of the elongate chambers; relict periapertural structures occur in the umbilical region.

- Chamber surface is ornamented with scattered pustules, which are denser over the earlier chambers of the final whorl. Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Notes on identification. *Clavihedbergella amabilis* differs from *C. simplicissima* mainly by having more elongate chambers in the final whorl and simple to incipiently simple-ridged wall rather than simple throughout.

Recommended revision. *Pseudoclavihedbergella amabilis* (Loeblich and Tappan 1961). Georgescu 2009, p. 278, pl. 9, Figures 1-3, pl. 10, Figures 1-2. Georgescu, M.D., 2009. Upper Albian-lower Turonian non-schackoinid planktic foraminifera with elongate chambers: morphology reevaluation, taxonomy and evolutionary classification. *Revista Española de Micropaleontología*, 41, 255-293.

Clavihedbergella simplex (Morrow 1934)



Clavihedbergella simplex from the lowermost Turonian sediments of the San Juan Island, Washington State (USA) illustrated by Georgescu (2009), plate 11, Figure 2.

Original report. *Hastigerinella simplex* Morrow 1934, p. 198, pl. 30, Figure 6.

Original work. Morrow, A.L., 1934. Foraminifera and ostracoda of the Upper Cretaceous of Kansas. *Journal of Paleontology*, 8, 186-205.

Age. Late Cenomanian-early Turonian.

Main morphological features.

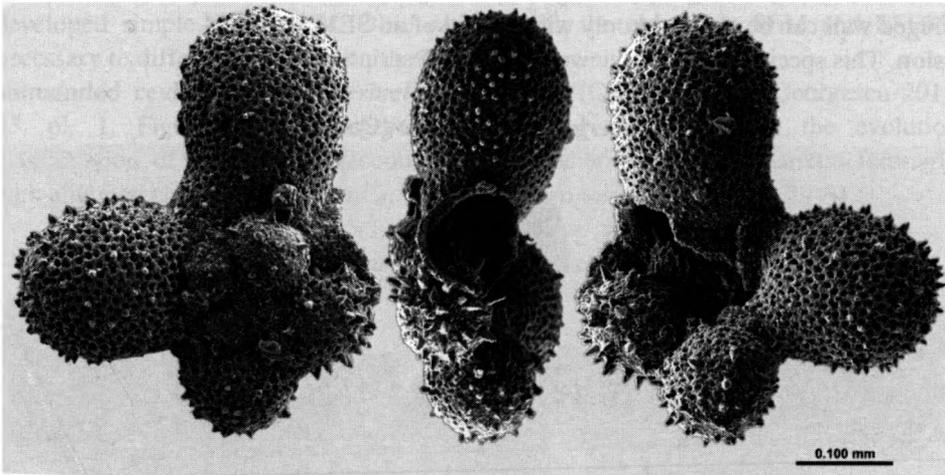
- Test consists of the proloculus followed by chambers added in a very low trochospire.
- Earlier chambers are globular to subglobular and the last-formed ones radially elongate, clavate and occasionally backward oriented.
- Sutures are deeply incised and depressed, radial and straight to slightly curved.

- Test is slightly asymmetrical in edge view, with a rounded periphery; a peripheral band of low pore density and smaller pore size is occasionally developed on the earlier chambers of the final whorl.
- Aperture is a low to medium arch situated in umbilical-peripheral position and is bordered by a narrow imperforate lip.
- Umbilicus presents a diameter of one third to one half of the maximum test diameter measured at the base of the elongate chambers; relict periapertural structures occur in the umbilical region.
- Chamber surface is ornamented with scattered pustules. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Clavhedbergella simplex* differs from *C. simplicissima* mainly by presenting more elongate last-formed one to three chambers.

Recommended revision. *Pessagnoina simplex* (Morrow 1934). Georgescu 2009, p. 280, pl. 11, Figures 1-3, pl. 12, Figure 1. Georgescu, M.D., 2009. Upper Albian-lower Turonian non-schackoinid planktic foraminifera with elongate chambers: morphology reevaluation, taxonomy and evolutionary classification. *Revista Española de Micropaleontología*, 41, 255-293.

***Clavhedbergella elongans* (Georgescu and Carrigy 2012)**



Clavhedbergella elongans from the upper Turonian sediments of the Caribbean region (Venezuelan Basin), DSDP Site 150 illustrated by Georgescu and Carrigy (2012), plate 2, Figures 8-10.

Original report. *Hillsella elongans* Georgescu and Carrigy 2012, p. 86, pl. 2, Figures 8-11, pl. 3, Figures 1-11.

Original work. Georgescu, M.D., Carrigy, C., 2012. Evolutionary classification of the coiled Upper Cretaceous (Turonian-Lower Campanian) planktic foraminifera with simple-ridged test wall. *Revista Española de Micropaleontología*, 44, 79-98.

Age. Late Turonian.

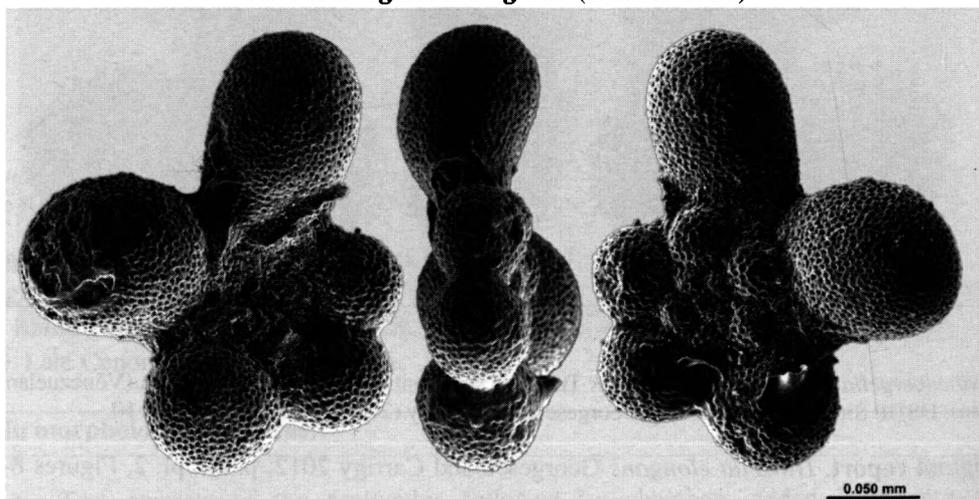
Main morphological features.

- Test consists of the proloculus followed by chambers added in a very low trochospire.
- Earlier chambers are globular to subglobular and the last-formed one to four radially elongate, clavate and occasionally with one bulbous distal projection.
- Sutures are deeply incised and depressed, radial and straight to slightly curved.
- Test is slightly asymmetrical in edge view, with a rounded periphery; an imperforate peripheral band is occasionally developed on the earlier chambers of the final whorl.
- Aperture is a medium high to high arch situated in extraumbilical-peripheral position and is bordered by an imperforate lip.
- Umbilicus presents a diameter of about one half of the maximum test diameter measured at the base of the elongate portion of the chambers; relict periapertural structures occur in the umbilical region.
- Earlier chambers are ornamented with rare scattered pustules; the last-formed chambers are smooth.
- Wall is calcitic, hyaline, simple-ridged and perforate.

Notes on identification. *Clavihedbergella elongans* is a homoeomorph of *C. simplex* of which it differs mainly by having simple-ridged rather than simple wall. The simple-ridged wall can be observed only with the aid of an SEM or ESEM.

Revision. This species was not reviewed since its description.

Clavihedbergella subdigitata (Carman 1929)



Original report. *Globigerina subdigitata* Carman 1929, p. 315, pl. 34, Figures 4-5.

Original work. Carman, K., 1929. Some foraminifera from the Niobrara and Benton formations of Wyoming. *Journal of Paleontology*, 3, 309-315.

Age. Late Coniacian-Santonian.

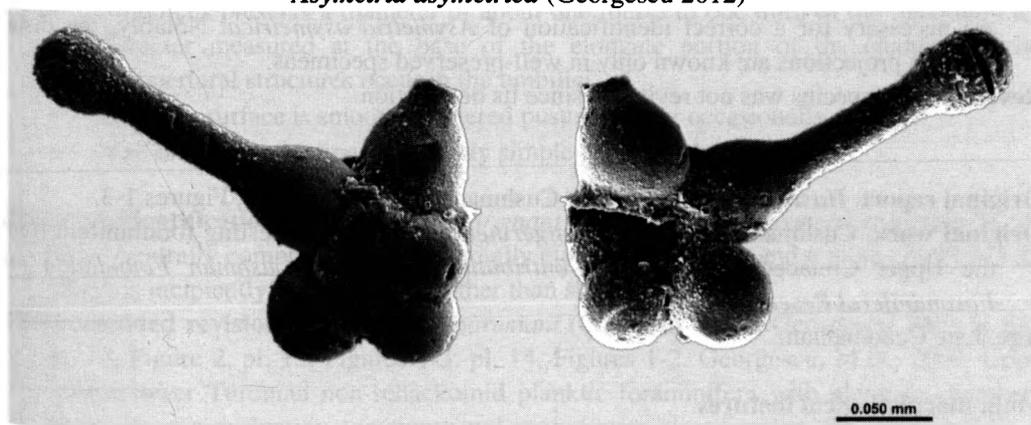
Main morphological features.

- Test consists of the proloculus followed by chambers added in a very low trochospire.
- Earlier chambers are globular to subglobular and the last-formed one or two radially elongate, clavate.
- Sutures are deeply incised and depressed, radial and straight to slightly curved.
- Test is biconvex, almost symmetrical in edge view and with a rounded periphery, without peripheral structures.
- Aperture is a medium high arch situated in extraumbilical-peripheral position and is bordered by an imperforate lip.
- Umbilicus presents a diameter of about one half of the maximum test diameter measured at the base of the elongate portion of the chambers.
- Relict periapertural structures occur in the umbilical region.
- Earlier chambers are ornamented with rare scattered pustules; the last-formed chambers are smooth.
- Wall is calcitic, hyaline, incipiently simple-ridged and perforate.

Notes on identification. *Clavhedbergella subdigitata* is almost a homoeomorph of *C. elongans* of which it differs mainly by having incipiently simple-ridged rather than fully developed simple-ridged wall. Observations with the aid of an SEM and ESEM are necessary to differentiate between the two species.

Recommended revision. *Eohastigerinella subdigitata* (Carman 1929). Georgescu 2011, p. 43, pl. 1, Figures 1-9. Georgescu, M.D., 2011. New data on the evolutionary classification of the Late Cretaceous (late Coniacian-Santonian) planktic foraminifera with elongate chambers. *Revista Española de Micropaleontología*, 43, 39-54.

Asymetria asymetrica (Georgescu 2012)



Asymetria asymetrica from the upper Albian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2012), Figure 8: 1-3.

Original report. *Asymetria asymetrica* Georgescu 2012, p. 29, Figures 7: 17-23, 8: 1-17.

Original work. Georgescu, M.D., 2012. Morphology, taxonomy, stratigraphic distribution and evolutionary classification of the schackoinid planktic foraminifera (late Albian-Maastrichtian, Cretaceous). In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 1-62.

Age. Late Albian-earliest Cenomanian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a very low trochospire.
- Earlier chambers are globular, then reniform and the last-formed one to three radially elongate and with one distal bulbous projection.
- Sutures are deeply incised resulting in a stellate outline, depressed, radial and straight to slightly curved.
- Test shape is asymmetrical, with a convex spiral side and rounded and simple periphery, without peripheral structures.
- Aperture is a medium high arch situated in extraumbilical-peripheral position and is bordered by a wide tunnel-shaped lip.
- Umbilicus presents a diameter of about one third to one half of the maximum test diameter measured at the base of the elongate portion of the chambers; relict periapertural structures occur in the umbilical region.
- Chamber ornamentation is asymmetrical: smooth on the spiral side and with scattered pustules concentrated around the umbilicus on the umbilical side. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. The asymmetrical ornamentation consisting of scattered pustules on the umbilical side whereas the spiral one is smooth together with the tunnel-shaped lip that border the aperture are characteristics of this species; SEM and ESEM observations are necessary for a correct identification of *Asymetria asymetrica*. Notably, the distal bulbous projections are known only in well-preserved specimens.

Revision. This species was not reviewed since its description.

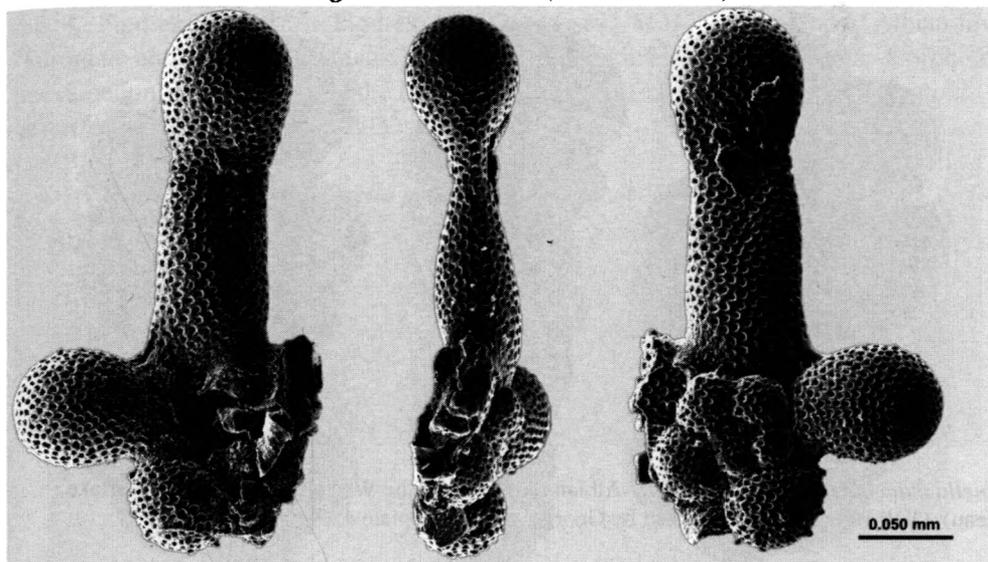
Original report. *Hastigerinella moremani* Cushman 1931, p. 86, pl. 11, Figures 1-3.

Original work. Cushman, J.A. 1931. *Hastigerinella* and other interesting foraminifera from the Upper Cretaceous of Texas. *Contributions from the Cushman Foundation for Foraminiferal Research*, 7, 83-90.

Age. Late Cenomanian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a very low trochospire.

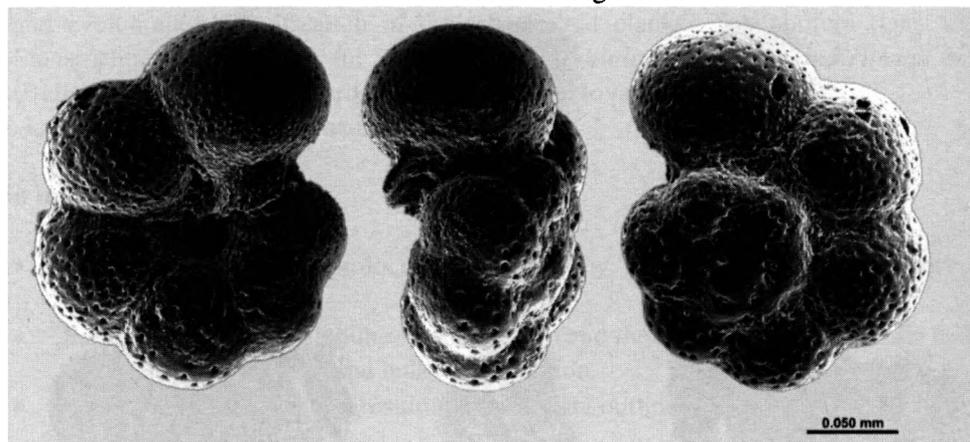
Pessagnoina moremani (Cushman 1931)

Pessagnoina moremani from the upper Cretaceous sediments of Texas (USA) illustrated by Georgescu (2009), plate 14, Figure 1.

- Earlier chambers are globular to subglobular and the last-formed one or two radially elongate, with dorso-ventral compression and one distal bulbous projection.
- Sutures are deeply incised, depressed, radial, straight to slightly curved and limbate.
- Test is asymmetrical in edge view, with convex spiral side; periphery is rounded and simple.
- Aperture is a low to medium high umbilical-peripheral arch and is bordered by a wide imperforate lip.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter measured at the base of the elongate portion of the chambers; relict periapertural structures occur in the umbilici.
- Chamber surface is smooth; scattered pustules occur occasionally.
- Wall is calcitic, hyaline, incipiently simple-ridged and perforate.

Notes on identification. *Pessagnoina moremani* differs from *P. asymetrica* mainly by the dorso-ventrally compression of the radially elongate chambers and a more complex wall, which is incipiently simple-ridged rather than simple.

Recommended revision. *Pessagnoina moremani* (Cushman 1931). Georgescu 2009, p. 282, pl. 12, Figure 2, pl. 13, Figures 1-3, pl. 14, Figures 1-2. Georgescu, M.D., 2009. Upper Albian-lower Turonian non-schackoinid planktic foraminifera with elongate chambers: morphology reevaluation, taxonomy and evolutionary classification. *Revista Española de Micropaleontología*, 41, 255-293.

Ticinella madecassiana Sigal 1966

Ticinella madecassiana from the upper Albian sediments of the Western North Atlantic (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2009), plate 4, Figure 3.

Original report. *Ticinella madecassiana* Sigal 1966, p. 197, pl. 3, Figures 7-9.

Original work. Sigal, J. 1966, Contribution á une monographie des Rosalines 1. Le genre *Ticinella* Reichel, souche des Rotalipores. *Eclogae Geologicae Helvetiae*, 59, 185-207.

Age. Albian.

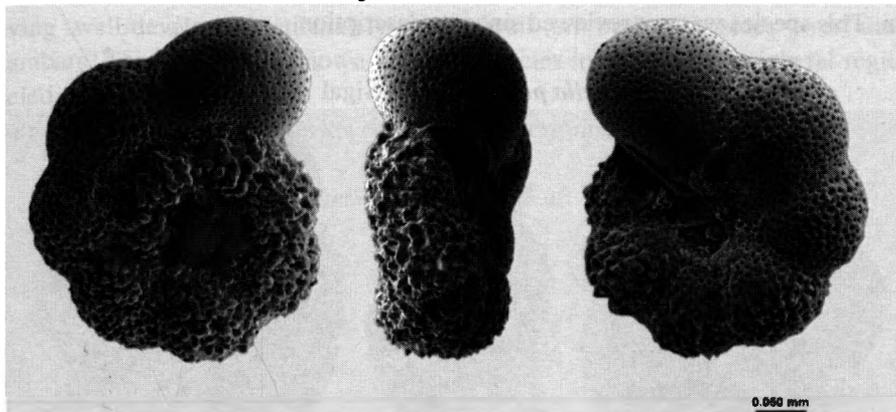
Main morphological features.

- Test consists of the proloculus followed by chambers added in a low trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Test is asymmetrical in edge view, with a convex to nearly flat spiral side; the last-formed chambers present a distinct dorso-ventral elongation and are tilted towards the umbilical region.
- Periphery is broadly rounded; one peripheral band of low pore density and smaller pore size is occasionally developed on the earlier chambers of the final whorl.
- Aperture is a low to medium high umbilical-peripheral arch and is bordered by a wide imperforate lip.
- Umbilicus presents a diameter of about one eighth to one sixth of the maximum test diameter.
- One or two small supplementary apertures adjacent to the sutures between the last-formed chambers occur occasionally within the umbilicus.
- Chamber surface is smooth.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Notes on identification. *Ticinella madecassiana* differs from *Hedbergella yezoana* mainly by having occasional supplementary apertures within the umbilical region and more complex test wall, which is often incipiently reticulately-ridged.

Recommended revision. *Claviticinella madecassiana* (Sigal 1966). Georgescu 2009, p. 270, pl. 4, Figures 1-3, pl. 5, Figures 1-3. Georgescu, M.D., 2009. Upper Albian-lower Turonian non-schackoinid planktic foraminifera with elongate chambers: morphology reevaluation, taxonomy and evolutionary classification. *Revista Española de Micropaleontología*, 41, 255-293.

***Ticinella primula* Luterbacher 1963**



Ticinella primula from the upper Albian sediments of the Eastern Atlantic Ocean (Vigo Seamount), DSDP Site 398. Specimen selected and photographed by Melissa S. Sawyer.

Original report. *Ticinella primula* Luterbacher in Renz and others 1963, p. 1085, text-Figure 4.

Original work. Renz, O., Luterbacher, H., Schneider, A., 1963. Stratigraphisch-paläontologische Untersuchungen im Albien und Cénomaniens des Neuenburger Jura. *Eclogae Geologicae Helvetiae*, 56, 1073-1116.

Age. Albian.

Main morphological features.

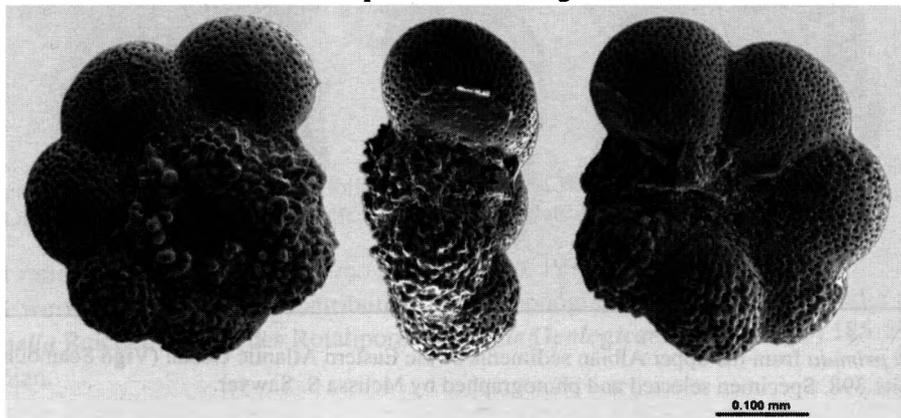
- Test consists of the proloculus followed by chambers added in a low or occasionally flat trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight to slightly curved on both test sides.
- Test is slightly asymmetrical in edge view, with a rounded and simple periphery, without peripheral structures.
- Aperture is a low to medium high arch situated in extraumbilical-peripheral position and is bordered by a delicate imperforate lip, which is rarely preserved.
- Umbilicus presents a diameter of about one sixth to one fourth of the maximum test diameter.
- One to two small supplementary apertures, which are adjacent to the sutures between the last-formed chambers, occur at the umbilicus margin.

- Chamber surface is smooth.
- Wall is calcitic, hyaline, reticulately-ridged and perforate; the last-formed chambers have a simple wall.

Notes on identification. *Ticinella primula* differs from *T. madecassiana* by having a slightly wider umbilicus and aperture in extraumbilical-peripheral rather than umbilical-peripheral position. Both *T. primula* and *T. madecassiana* are small-sized species.

Revision. This species was not reviewed since its description.

Ticinella praeticinensis Sigal 1966



Ticinella praeticinensis from the upper Albian sediments of the Eastern Atlantic Ocean (Vigo Seamount), DSDP Site 398. Specimens selected and photographed by Melissa S. Sawyer.

Original report. *Ticinella praeticinensis* Sigal 1966, p. 195, pl. 2, Figures 3-8, pl. 3, Figures 1-6.

Original work. Sigal, J. 1966, Contribution á une monographie des Rosalines 1. Le genre *Ticinella* Reichel, souche des Rotalipores. *Eclogae Geologicae Helvetiae*, 59, 185-207.

Age. Late Albian.

Main morphological features.

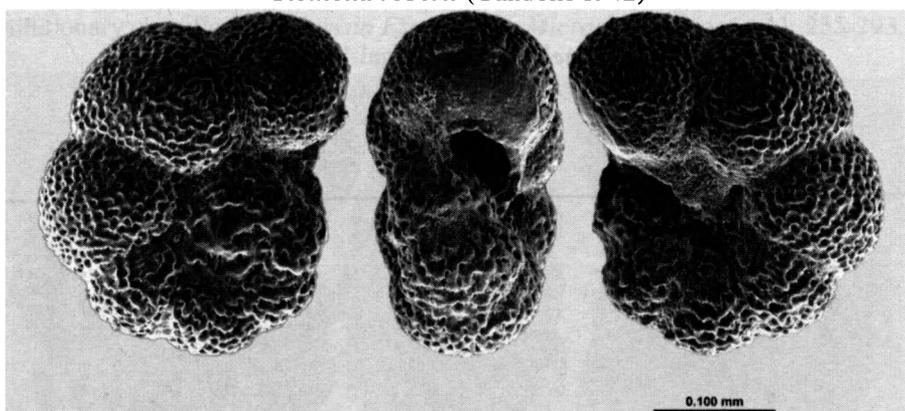
- Test consists of the proloculus followed by chambers added in a low trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight to slightly curved on both test sides.
- Test is asymmetrical in edge view, with a rounded periphery.
- Wall structures developed in the peripheral region of the earliest chambers of the final whorl result in a keeled appearance.
- Aperture is a low to medium high arch situated in umbilical-peripheral position and is bordered by a delicate imperforate lip, which is rarely preserved.
- Umbilicus presents a diameter of about one eighth to one sixth of the maximum test diameter.

- One to three small supplementary apertures adjacent to the sutures between the last-formed chambers occur within the umbilicus.
- Chamber surface is smooth.
- Wall is calcitic, hyaline, reticulately-ridged and perforate; the last-formed chambers present a simple wall.

Notes on identification. *Ticinella praeticinensis* differs from *T. madecassiana* mainly by having well-developed reticulately-ridged wall on both test sides over the earlier chambers. This is the only known ticinellid species in which the peripheral region has a keeled appearance.

Revision. This species was not reviewed since its description.

Ticinella roberti (Gandolfi 1942)



Ticinella roberti from the upper Albian sediments of the Western North Atlantic (Blake Plateau), ODP Hole 1050C.

Original report. *Anomalina roberti* Gandolfi 1942, p. 100, pl. 2, Figure 2.

Original work. Gandolfi, F., 1942. Ricerche micropaleontologiche e stratigrafiche sulla scaglia e sul flysch cretacicci dei Dintorni di Balerna (Canton Ticino). *Rivista Italiana di Paleontologia*, 20(4), 5-160.

Age. Late Albian.

Main morphological features.

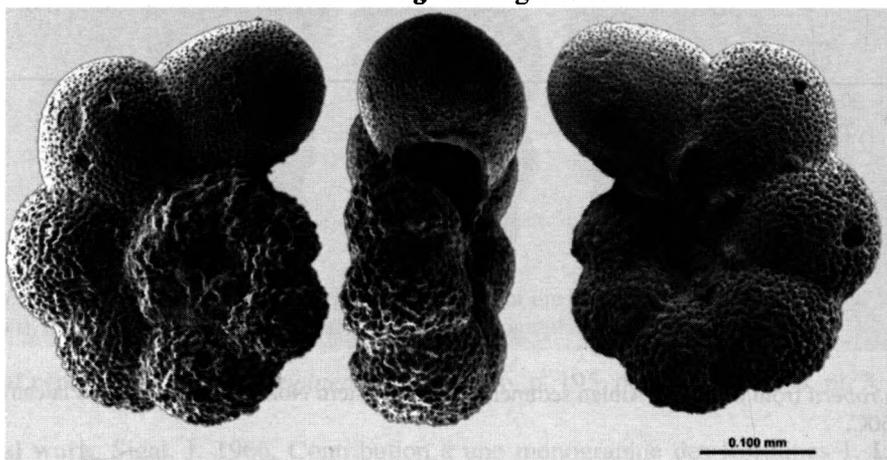
- Test consists of the proloculus followed by chambers added in a low or occasionally flat trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase; the last-formed chambers are often tilted towards the umbilical region.
- Sutures are distinct and depressed, radial and straight to slightly curved on both test sides.
- Test is asymmetrical in edge view, with a rounded to broadly rounded periphery.
- Aperture is a low to medium high arch situated in umbilical-peripheral position and is bordered by a delicate imperforate lip, which is rarely preserved.

- Umbilicus presents a diameter of about one fourth of the maximum test diameter; one to three small supplementary apertures adjacent to the sutures between the last-formed chambers occur within the umbilicus.
- Chamber surface is smooth.
- Wall is calcitic, hyaline, reticulately-ridged and perforate.

Notes on identification. *Ticinella roberti* is a large-sized ticinellid species that presents reticulately-ridged wall on all the chambers of the final whorl. It differs from *Biticinella breggiensis* mainly by having trochospiral rather than planispiral tests.

Recommended revision. *Ticinella roberti* (Gandolfi 1942). Sigal 1966, pl. 4, Figures 10-12, pl. 5, Figures 1-4. Sigal, J. 1966, Contribution á une monographie des Rosalines 1. Le genre *Ticinella* Reichel, souche des Rotalipores. *Eclogae Geologicae Helvetiae*, 59, 185-207.

Ticinella digitalis Sigal 1966



Ticinella digitalis from the upper Albian sediments of the Western North Atlantic (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2009), plate 6, Figure 2.

Original report. *Ticinella raynaudi digitalis* Sigal 1966, p. 202, pl. 6, Figures 6-8.

Original work. Sigal, J. 1966, Contribution á une monographie des Rosalines 1. Le genre *Ticinella* Reichel, souche des Rotalipores. *Eclogae Geologicae Helvetiae*, 59, 185-207.

Age. Late Albian.

Main morphological features.

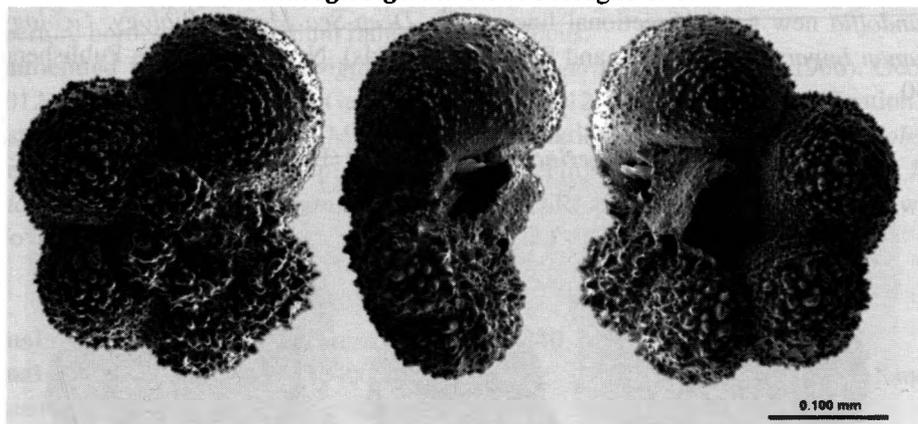
- Test consists of the proloculus followed by chambers added in a low trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase; the last-formed chamber is slightly elongate in the direction of growth.
- Sutures are distinct and depressed, radial and straight to slightly curved on both test sides.
- Test is asymmetrical in edge view, with a rounded to broadly rounded periphery.

- Aperture is a low to medium high arch situated in umbilical-peripheral position and is bordered by a delicate imperforate lip, which is rarely preserved.
- Umbilicus presents a diameter of about one eighth to one sixth of the maximum test diameter; one to four small supplementary apertures adjacent to the sutures between the last-formed chambers occur within the umbilicus.
- Chamber surface is smooth. Wall is calcitic, hyaline, reticulately-ridged and perforate.

Notes on identification. *Ticinella digitalis* differs from all the other species of *Ticinella* by the last-formed chamber, which is slightly elongate in the direction of coiling.

Recommended revision. *Claviticinella digitalis* (Sigal 1966). Georgescu 2009, p. 270, pl. 6, Figures 1-3. Georgescu, M.D., 2009. Upper Albian-lower Turonian non-schackoinid planktic foraminifera with elongate chambers: morphology reevaluation, taxonomy and evolutionary classification. *Revista Española de Micropaleontología*, 41, 255-293.

***Archaeoglobigerina blowi* Pessagno 1967**



Archaeoglobigerina blowi from the upper lower Campanian sediments of the New Jersey coastal plain (USA).

Original report. *Archaeoglobigerina blowi* Pessagno 1967, p. 316, pl. 59, Figures 1-10.

Original work. Pessagno, E.A. Jr., 1967. Upper Cretaceous planktonic foraminifera from the Western Gulf coastal plain. *Palaeontographica Americana*, 5(37), 243-445.

Age. Late Coniacian-Campanian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight on both test sides.
- Test is asymmetrical in edge view, with a convex spiral side.
- Periphery is rounded with an imperforate peripheral band on the first one to four chambers of the last whorl, which is bordered by two rows of isolated pustules that

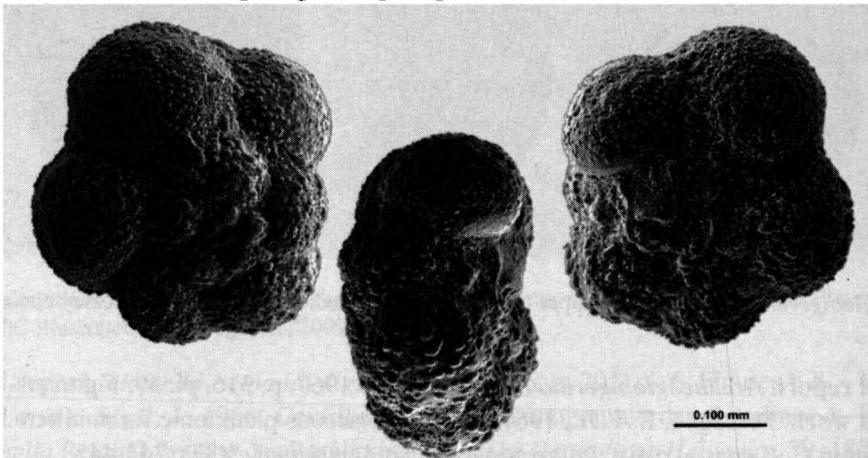
can fuse occasionally and form rugosities that do not present a preferential arrangement.

- Aperture is a medium high arch situated in umbilical position and is bordered by a narrow imperforate or perforate porticus.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter.
- Chamber surface is ornamented with scattered pustules that can be dome-like or conical.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Archaeoglobigerina blowi* differs from all the species of *Hedbergella* and *Whiteinella* mainly in having the aperture in umbilical position and periapertural structures consisting of an imperforate or perforate porticus.

Recommended revision. *Archaeoglobigerina blowi* Pessagno 1967. Georgescu 2012, p. 104, Figure 2: 1-9. Georgescu, M.D., 2012. Evolutionary classification of the Late Cretaceous (Coniacian-Maastrichtian) planktic foraminifera *Archaeoglobigerina* Pessagno, 1967 and *Gandolfia* new genus/directional lineage. In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 101-130.

Archaeoglobigerina globigerinoides (Brotzen 1936)



Archaeoglobigerina globigerinoides from the upper Santonian sediments of the New Jersey coastal plain (USA) illustrated by Georgescu (2012) Figure 3: 5-7.

Original report. *Globotruncana globigerinoides* Brotzen 1936, p. 138, pl. 12, Figure 3.

Original work. Brotzen, F., 1936. Foraminiferen aus dem Schwedischen, Untersten Senon von Eriksdal in Schonen. *Sveriges Geologiska Undersökning Årsbok*, 30, 1-206.

Age. Santonian-Campanian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Test is asymmetrical in edge view.
- Periphery is rounded with an imperforate peripheral band developed commonly on all chambers of the last whorl and bordered by two rows of isolated pustules that can fuse occasionally to form rugosities.
- Aperture is a medium high arch situated in umbilical position and is bordered by an imperforate or perforate tegillum.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter.
- Chamber surface is ornamented with scattered dome-like or conical pustules.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Archaeoglobigerina globigerinoides* differs from *A. blowi* mainly in having the peripheral structures developed on all the chambers of the final whorl and aperture bordered by a tegillum rather than a porticus.

Recommended revision. *Archaeoglobigerina ? globigerinoides* (Brotzen 1936). Georgescu 2012, p. 107, Figure 3: 1-8. Georgescu, M.D., 2012. Evolutionary classification of the Late Cretaceous (Coniacian-Maastrichtian) planktic foraminifera *Archaeoglobigerina* Pessagno, 1967 and *Gandolfia* new genus/directional lineage. In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 101-130.

Original report. *Globigerina cretacea* d'Orbigny 1840, p. 34, pl. 3, Figures 12-14.

Original work. Orbigny, A.d', 1840. Mémoire sur les foraminifères de la Craie Blanche du Bassin de Paris. *Mémoires de la Société Géologique de France*, 4, 1-51.

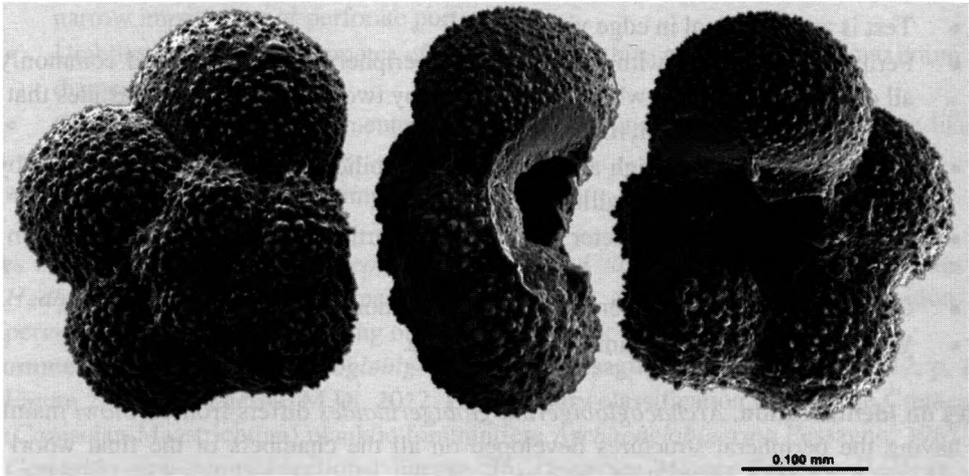
Age. Late Santonian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase; commonly the growth rate is low.
- Sutures are distinct and depressed, radial and straight on both test sides.
- Test is distinctly asymmetrical in edge view, with a convex spiral side and often with concave umbilical side.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture is a medium high arch situated in umbilical position and is bordered by a perforate porticus.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter.
- Chamber surface is ornamented with scattered dome-like or conical pustules that present an uniform distribution over the test chambers.

- Wall is calcitic, hyaline, simple and perforate.

Archaeoglobigerina cretacea (d'Orbigny 1840)

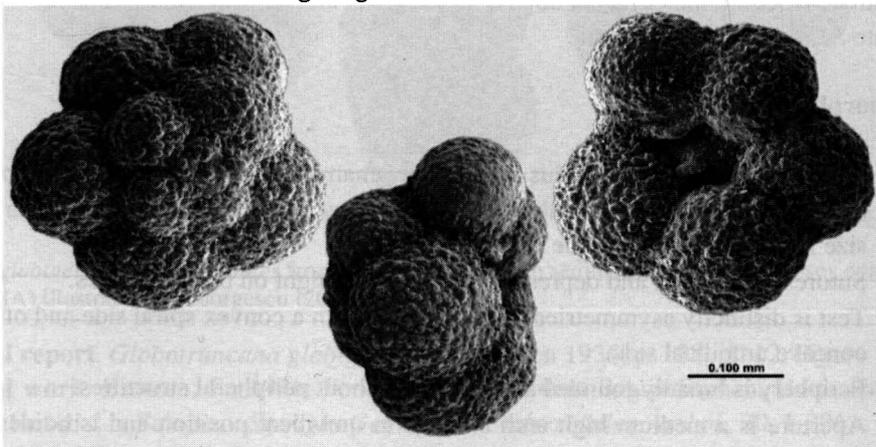


Archaeoglobigerina cretacea from the upper Campanian-Maastrichtian sediments of England illustrated by Georgescu (2013), plate 12, Figures 5-7.

Notes on identification. *Archaeoglobigerina cretacea* differs from *A. blowi* mainly in having a simple periphery, without peripheral structures.

Recommended revision. *Dorbignya cretacea* (d'Orbigny 1840). Georgescu 2013, p. 32, pl. 12, Figures 1-10. Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49.

Archaeoglobigerina australis Huber 1990



Archaeoglobigerina australis from the upper Maastrichtian sediments of the South Atlantic Ocean (Maud Rise, Weddell Sea), ODP Hole 690C.

Original report. *Archaeoglobigerina australis* Huber 1990, p. 504, pl. 2, Figures 11-13, pl. 3, Figures 1-7, pl. 6, Figures 7-9.

Original work. Huber, B.T., 1990. Maestrichtian planktonic foraminifer biostratigraphy of the Maud Rise (Weddell Sea, Antarctica): ODP Leg 113 Holes 689B and 690C. In: *Proceedings of the Ocean Drilling Program, Scientific Results, Volume 113* (Barker, P.F. and others, Eds). College Station: Ocean Drilling Program, 489-513.

Age. Late Campanian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a medium high to high trochospire.
- Chambers are globular to subglobular.
- Chambers overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight on both test sides.
- Test is distinctly asymmetrical in edge view, with a convex spiral side and often with a flat umbilical side.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture is a medium high arch situated in umbilical position and is bordered by a porticus or a tegillum.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter.
- Chamber surface is ornamented with scattered pustules that can be dome-like or conical and present a relatively uniform distribution over the chamber surface.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Archaeoglobigerina australis* can be differentiated from the other representatives of the genus *Archaeoglobigerina* mainly by a medium high to high trochospire. Observations with the aid of a SEM or ESEM are necessary for an accurate assessment of the nature of the periapertural structures.

Revision. This species was not reviewed since its description.

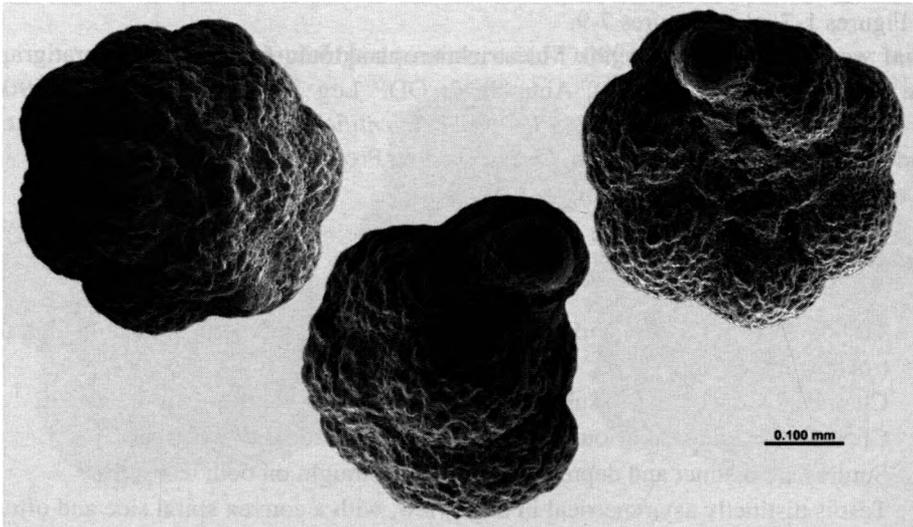
Original report. *Rugoglobigerina rugosa rotundata* Brönnimann 1952, p. 34, pl. 4, Figures 7-8, text-Figures 15-16.

Original work. Brönnimann, P., 1952. Globigerinidae of the Upper Cretaceous (Cenomanian-Maastrichtian) of Trinidad, B.W.I. *Bulletins of American Paleontology*, 34(140), 1-70.

Age. Late Campanian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a high trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.

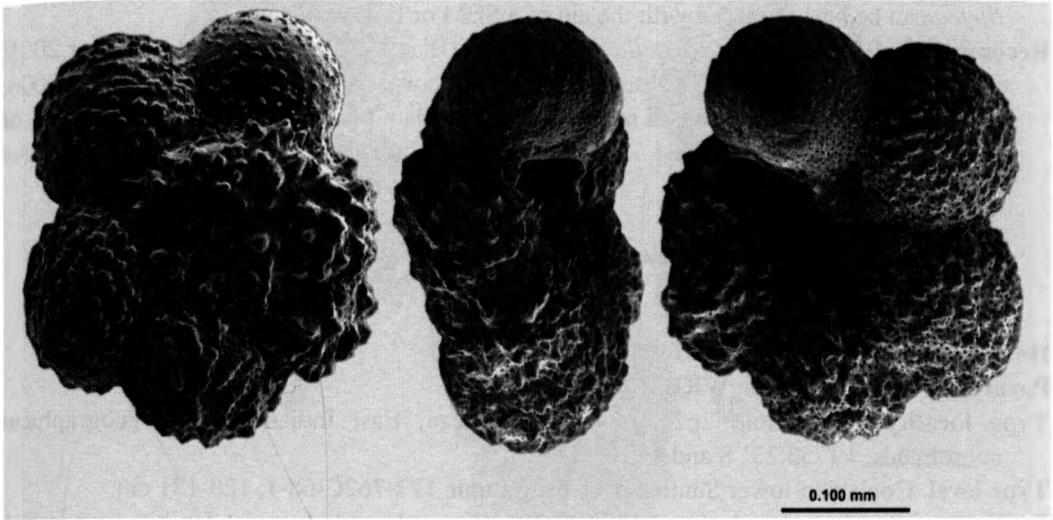
Kuglerina rotundata (Brönnimann 1952)

Kuglerina rotundata from the upper Maastrichtian sediments of the North Atlantic Ocean (Orphan Knoll), DSDP Hole 111A.

- Sutures are distinct and depressed, radial and straight on both sides of the test.
- Test is distinctly asymmetrical in edge view, with a convex spiral side and a flat umbilical side.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture is a medium high arch situated in umbilical position and is bordered by a porticus or a tegillum.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter.
- Chamber surface is ornamented with large-sized scattered pustules that can be dome-like or with irregular shape and fuse to form rugosities that in general do not present a preferential arrangement; meridional arrangement can be observed on certain chambers.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Kuglerina rotundata* differs from *Archaeoglobigerina australis* mainly by having coarser ornamentation in which the pustules can be dome-like or with irregular shape and fuse to form rugosities.

Recommended revision. *Rugoglobigerina rotundata* Brönnimann 1952. Robaszynski and others 1984, p. 288, pl. 50, Figure 2. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Costellagerina libyca (Barr 1972)

Costellagerina libyca from the uppermost Albian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Hedbergella libyca* Barr 1972, p. 14, pl. 10, Figure 5.

Original work. Barr, F.T., 1972. Cretaceous biostratigraphy and planktonic foraminifera of Libya. *Micropaleontology*, 18, 1-46.

Age. Latest Albian-earliest Cenomanian.

Main morphological features.

Test consists of the proloculus followed by chambers added in a low trochospire.

- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight on both sides of the test.
- Test is asymmetrical in edge view, with a convex spiral side and a flat to slightly concave umbilical side.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture is a low to medium high arch situated in extraumbilical-umbilical position and is bordered by a delicate imperforate lip, which is rarely preserved.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter; relict periapertural structures occur frequently in the umbilical region.
- Chamber surface is ornamented with pustules, rugosities and costellae that present a meridional pattern on umbilical side and meridional to parallel to the periphery on the spiral side.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. The ornamentation and periapertural structures of *Costellagerina libyca* can be best observed with the aid of a SEM or ESEM.

Recommended revision. *Paracostellagerina libyca* (Barr 1972). Georgescu and Huber 2006, p. 370, pl. 1, Figures 4-6, text-Figure 2. Georgescu, M.D., Huber, B.T., 2006. *Paracostellagerina* nov. gen., a meridionally costellate planktonic foraminiferal genus of the Middle Cretaceous (latest Albian-earliest Cenomanian). *Journal of Foraminiferal Research*, 36, 368-373.

***Costellagerina pettersi* - new species**
(Plate 2, Figures 1-2)

Holotype. Specimen WKB 010169.

Paratypes. Five specimens. WKB 010170-010174.

Type locality. ODP Hole 762C (Exmouth Plateau, East Indian Ocean), geographical coordinates: 19° 53.23' S and 112° 15.24' E.

Type level. Coniacian-lower Santonian chalk, Sample 122-762C-68-1, 120-121 cm.

Derivation. Species named after Dr S.W. Petters as acknowledgement for his outstanding achievements in foraminiferal study.

Diagnosis. *Costellagerina* with ornamentation consisting of scattered pustules and rugosities.

Description.

- Test consists of the proloculus followed by chambers added in a low or more rarely medium high trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight on both sides of the test.
- Test is asymmetrical in edge view, with a convex spiral side.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture is a low arch in extraumbilical-umbilical position and is bordered by a delicate imperforate lip, which is rarely preserved.
- Umbilicus presents a diameter of about one third of the maximum test diameter; relict periapertural structures occur rarely in the umbilical region.
- Chamber surface is ornamented with pustules and rugosities that occasionally develop an incipient meridional pattern.
- Wall is calcitic, hyaline, simple and perforate.

Remarks. *Costellagerina pettersi* is the only species of *Costellagerina* that do not present costellae among the ornamentation elements. Therefore, SEM and ESEM observations are necessary for a correct and unequivocal identification of this species.

Age. Late Coniacian-Santonian.

Geographical distribution. East Indian Ocean (Exmouth Plateau, Holes 762C and 763B), USA (South Dakota).

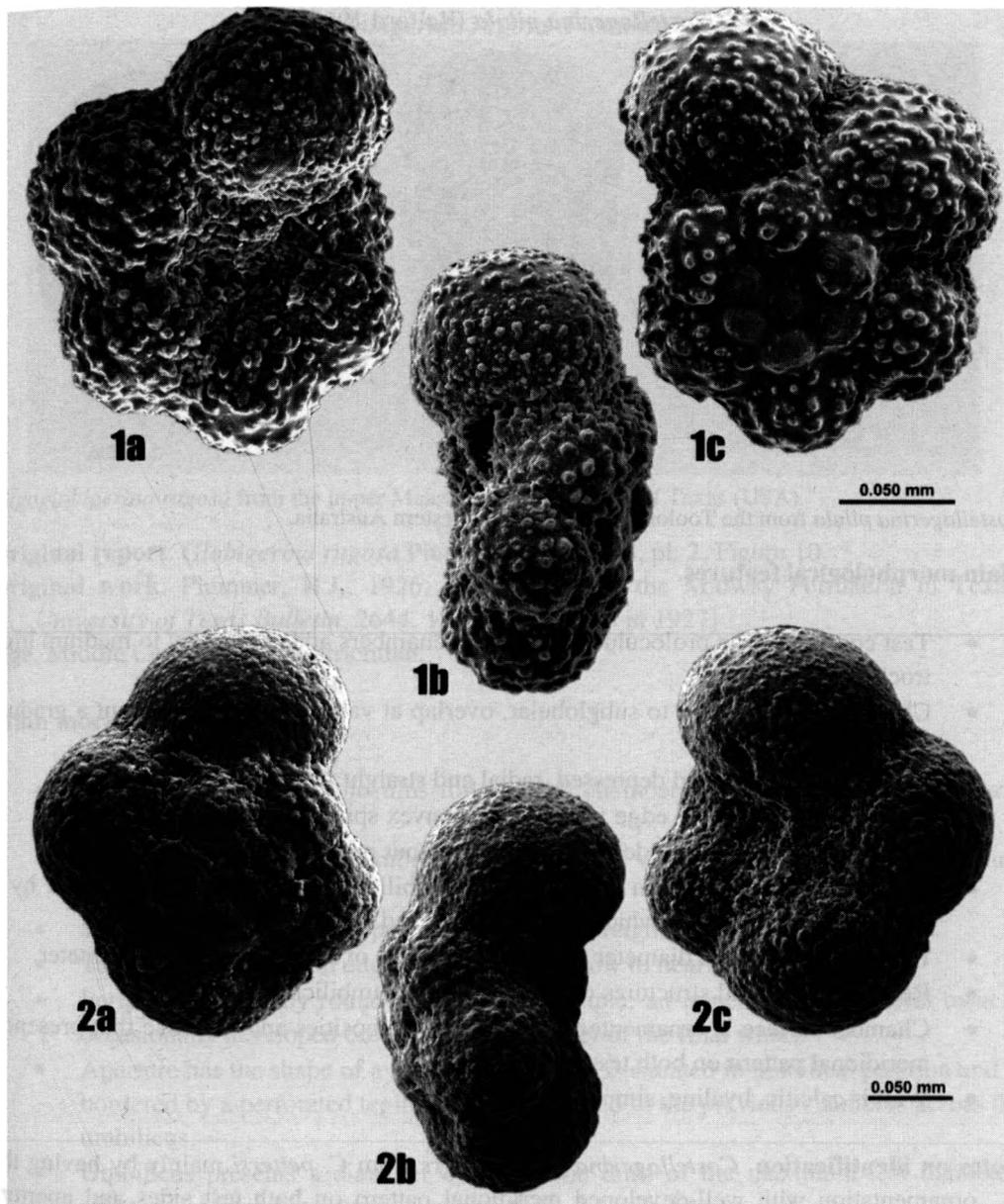
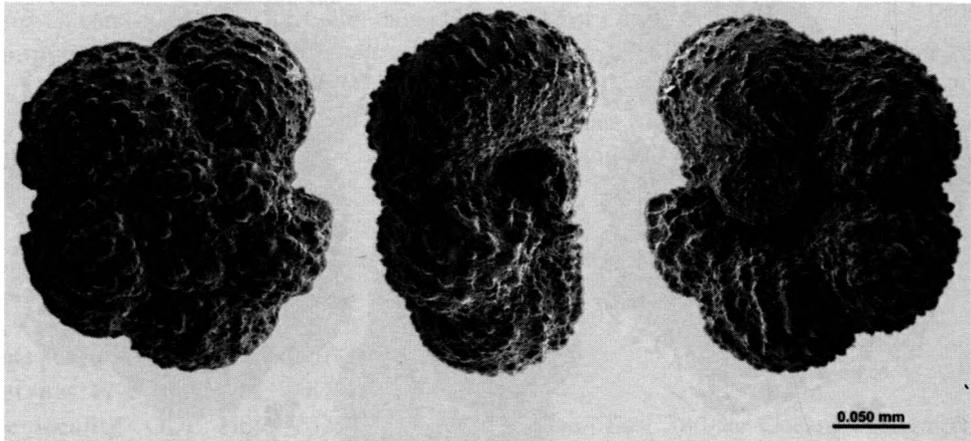


Plate 2. Two specimens of *Costellagerina pettersi* from the Santonian sediments of the Missouri River Basin (USA) and upper Coniacian-Santonian ones from East Indian Ocean (Exmouth Plateau), ODP Hole 762C respectively. 1-paratype, 2-holotype.

Original report. *Rugoglobigerina (Rugoglobigerina) pilula* Belford 1960, p. 92, pl. 25, Figures 7-13, text-Figure 6: 1-6.

Original work. Belford, D.J., 1960. Upper Cretaceous foraminifera from the Toolonga Calcilutite and Gingin Chalk, Western Australia. *Bulletin of the Bureau of Mineral Resources, Geology and Geophysics*, 57, 1-118.

Age. Santonian-early Campanian.

Costellagerina pilula (Belford 1960)

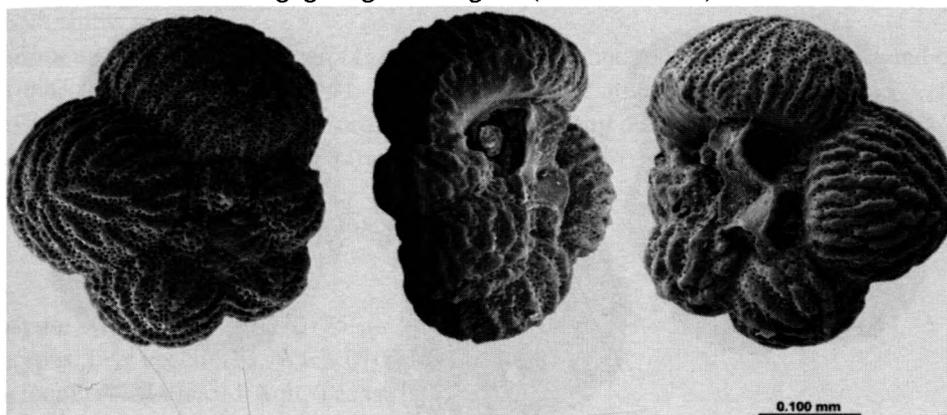
Costellagerina pilula from the Toolonga Calcilutite of Western Australia.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight on both sides of the test.
- Test is asymmetrical in edge view, with a convex spiral side.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture is a low arch in umbilical-extraumbilical position, and is bordered by a delicate imperforate lip, which is rarely preserved.
- Umbilicus presents a diameter of about one fourth of the maximum test diameter.
- Relict periapertural structures occur rarely in the umbilicus.
- Chamber surface is ornamented with pustules, rugosities and costellae that present a meridional pattern on both test sides.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Costellagerina pilula* differs from *C. pettersi* mainly by having the ornamentation with well-developed meridional pattern on both test sides and aperture situated in umbilical-extraumbilical rather than extraumbilical-umbilical position.

Recommended revision. *Rugoglobigerina pilula* Belford 1960. Robaszynski and others 1984, p. 285, pl. 49, Figures 1-3. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Rugoglobigerina rugosa (Plummer 1926)

Rugoglobigerina rugosa from the upper Maastrichtian sediments of Texas (USA).

Original report. *Globigerina rugosa* Plummer 1926, p. 38, pl. 2, Figure 10.

Original work. Plummer, H.J., 1926. Foraminifera of the Midway Formation in Texas. *University of Texas Bulletin*, 2644, 1-206. [published in 1927]

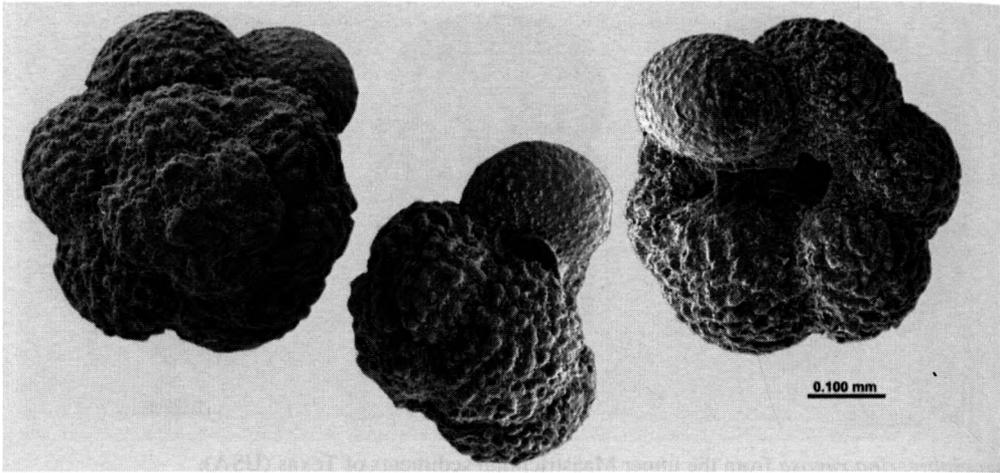
Age. Middle Campanian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low, often nearly flat trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight on both sides of the test.
- Test is asymmetrical in edge view, with very low to nearly flat spiral side.
- Periphery is broadly rounded and mostly simple; an imperforate peripheral band is occasionally developed on the earliest chamber of the final whorl.
- Aperture has the shape of a medium high arch, is situated in umbilical position and is bordered by a perforated tegillum that is attached to the previous chambers across the umbilicus.
- Umbilicus presents a diameter of about one third of the maximum test diameter; relict periapertural structures occur rarely in the umbilicus.
- Chamber surface is ornamented with long costellae that present a meridional arrangement on both test sides.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Rugoglobigerina rugosa* differs from *Costellagerina pilula* mainly by the ornamentation consisting of long costellae with meridional arrangement on both test sides and aperture bordered by a tegillum rather than a wide lip.

Recommended revision. *Rugoglobigerina rugosa* (Plummer 1926). Robaszynski and others 1984, p. 288, pl. 49, Figures 4-6. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Rugoglobigerina pennyi Brönnimann 1952

Rugoglobigerina pennyi from the upper Maastrichtian sediments of the East Indian Ocean (Wombat Plateau), ODP Hole 761B.

Original report. *Rugoglobigerina rugosa pennyi* Brönnimann 1952, p. 34, pl. 4, Figures 1-3, text-Figure 14.

Original work. Brönnimann, P., 1952. Globigerinidae of the Upper Cretaceous (Cenomanian-Maastrichtian) of Trinidad, B.W.I. *Bulletins of American Paleontology*, 34(140), 1-70.

Age. Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a medium high to high trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight on both sides of the test.
- Test is asymmetrical in edge view, with a convex to highly convex spiral side and slightly convex to nearly flat umbilical side.
- Periphery is broadly rounded and simple, without peripheral structures.
- Aperture has the shape of a medium high arch, is situated in umbilical position and is bordered by a delicate tegillum, which is rarely preserved.
- Umbilicus presents a diameter of about one third of the maximum test diameter; relict periapertural structures occur within the umbilical region.
- Chamber surface is ornamented with thick costellae that present a meridional arrangement on both test sides. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Rugoglobigerina pennyi* differs from *R. rugosa* mainly by having a medium high to high trochospire rather than a low, nearly flat one; it differs from

Kuglerina rotundata mainly by having the chambers with meridional ornamentation on both sides.

Recommended revision. *Rugoglobigerina pennyi* Brönnimann 1952. Robaszynski and others 1984, p. 285, pl. 50, Figure 1. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

***Rugoglobigerina texana* - new species**

(Plate 3, Figures 1-2)

Holotype. Specimen WKB 010175.

Paratypes. Five specimens. WKB 010176-010180.

Type locality. Mullinax-1 well, Texas (USA).

Type level. Upper Maastrichtian, Kemp Clay, Sample 26-1, 379 m.

Derivation. Species named after the State of Texas (USA) where the type locality is situated.

Diagnosis. *Rugoglobigerina* with the last-formed one to two chambers slightly elongated.

Description.

- Test consists of the proloculus followed by chambers added in a low trochospire.
- Earlier chambers are globular to subglobular, overlap at various rates and present a gradual size increase; the last-formed one or two chambers are slightly radially elongated.
- Sutures are distinct and depressed, radial and straight on both sides of the test.
- Test is asymmetrical in edge view, with a convex spiral side and concave umbilical side.
- Periphery is rounded and with one imperforate peripheral band developed over the earlier one to three chambers of the final whorl.
- Aperture is a medium high arch in umbilical-extraumbilical position; periapertural structures could not be observed.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter.
- Chamber surface is ornamented with long costellae that present a meridional arrangement on both sides of the test.
- Wall is calcitic, hyaline, simple and perforate.

Remarks. *Rugoglobigerina texana* differs from any other species of the genus by the slightly elongated last-formed one or two chambers and the aperture in umbilical-extraumbilical rather than umbilical position.

Age. Late Maastrichtian.

Geographical distribution. USA (Texas).

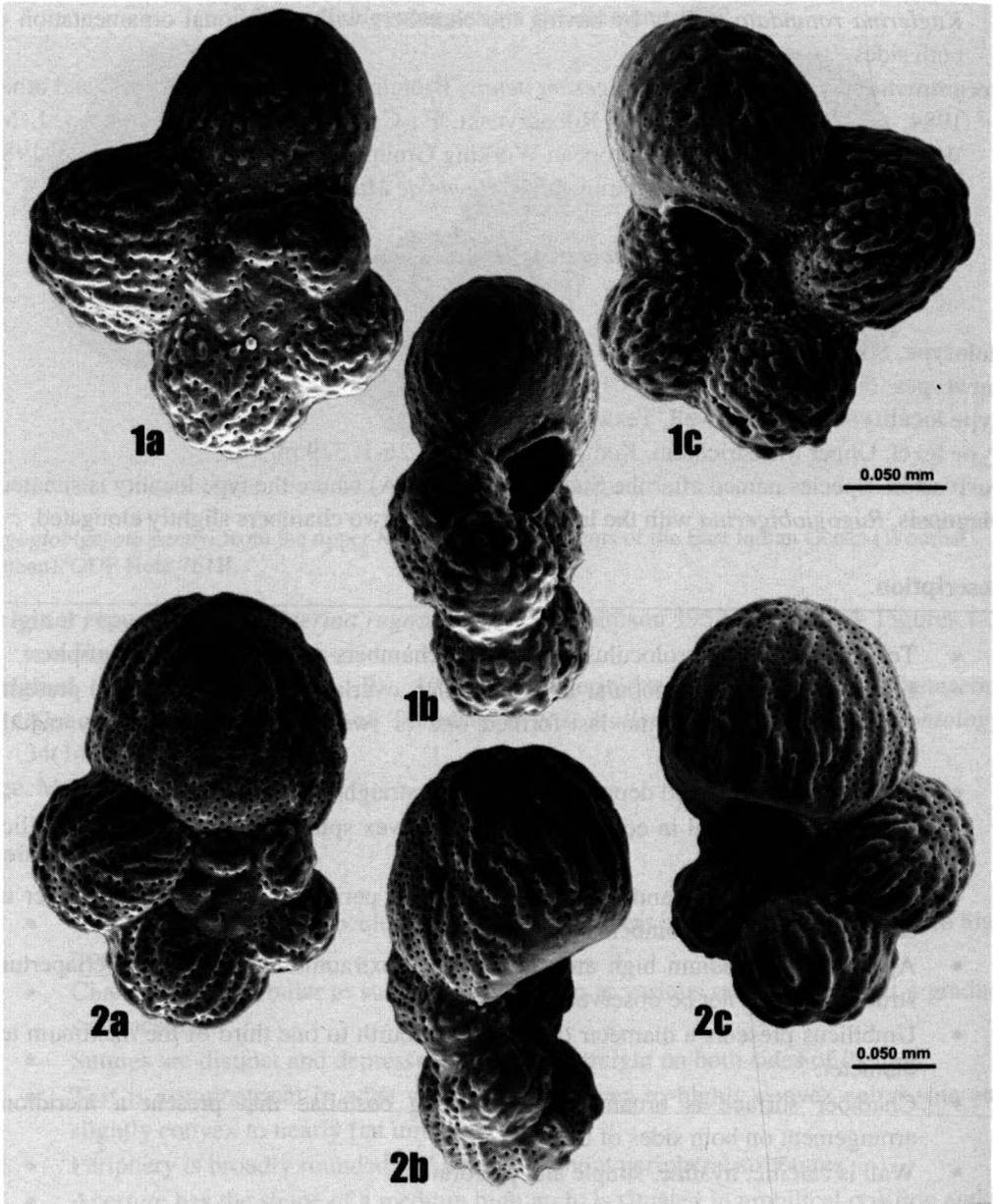
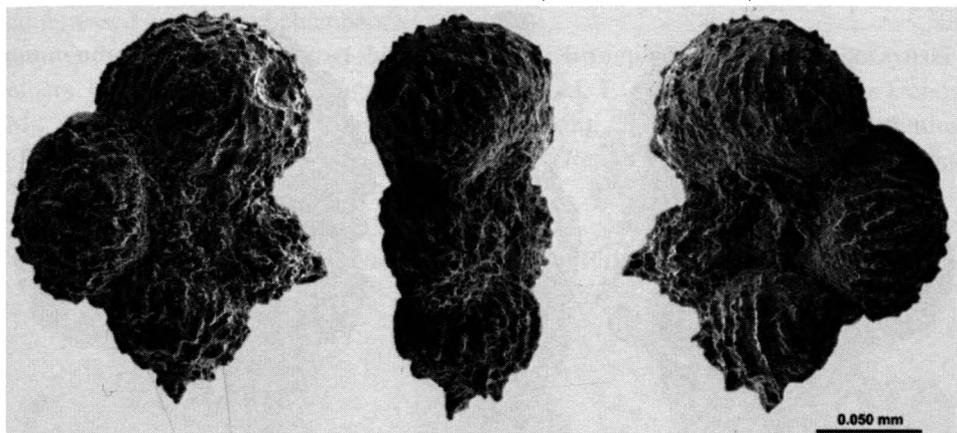


Plate 3. Two specimens of *Rugoglobigerina texana* from the upper Maastrichtian sediments of Texas (USA). 1-holotype, 2-paratype.

Original report. *Rugoglobigerina (Plummerella) hantkeninoides hantkeninoides* Brönnimann 1952, p. 37, pl. 3, Figures 1-3, text-Figure 17.

Original work. Brönnimann, P., 1952. Globigerinidae of the Upper Cretaceous (Cenomanian-Maastrichtian) of Trinidad, B.W.I. *Bulletins of American Paleontology*, 34(140), 1-70.

Age. Late Maastrichtian.

Plummerita hantkeninoides (Brönnimann 1952)

Plummerita hantkeninoides from the upper Maastrichtian sediments of the Atlantic Ocean (Demerara Rise), ODP Hole 1259C.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to nearly flat trochospire.
- Earlier chambers are globular to subglobular, those of the final whorl with one, or more rarely two tubulospine-like radial extensions.
- Test is symmetrical to slightly asymmetrical in edge view.
- Periphery is rounded in the globular or subglobular chambers and pinched in the case of those with tubulospine-like radial extensions.
- Aperture is a medium high arch in umbilical position and is bordered by a tegillum, which is attached to the previous chambers across the umbilicus.
- Umbilicus presents a diameter of about one third of the maximum test diameter measured at the base of the tubulospine-like radial extensions.
- Chamber surface is ornamented with long costellae that present a meridional arrangement on both sides of the test. Wall is calcitic, hyaline, simple and perforate.

Notes of identification. There is significant morphological variability in *Plummerita hantkeninoides*, which is mostly apparent in the chamber shape in the final whorl and occurrence and number of the tubulospine-like radial extensions. This species is the only rugoglobigerinid known with tubulospine-like chamber extensions.

Recommended revision. *Plummerita hantkeninoides* (Brönnimann 1952). Robaszynski and others 1984, p. 291, pl. 50, Figures 7-8. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Trinitella scotti Brönnimann 1952

Two specimens of *Trinitella scotti* from the upper Maastrichtian sediments of Texas (USA).

Original report. *Trinitella scotti* Brönnimann 1952, p. 57, pl. 4, Figures 4-6, text-Figure 30.

Original work. Brönnimann, P., 1952. Globigerinidae of the Upper Cretaceous (Cenomanian-Maastrichtian) of Trinidad, B.W.I. *Bulletins of American Paleontology*, 34(140), 1-70.

Age. Maastrichtian.

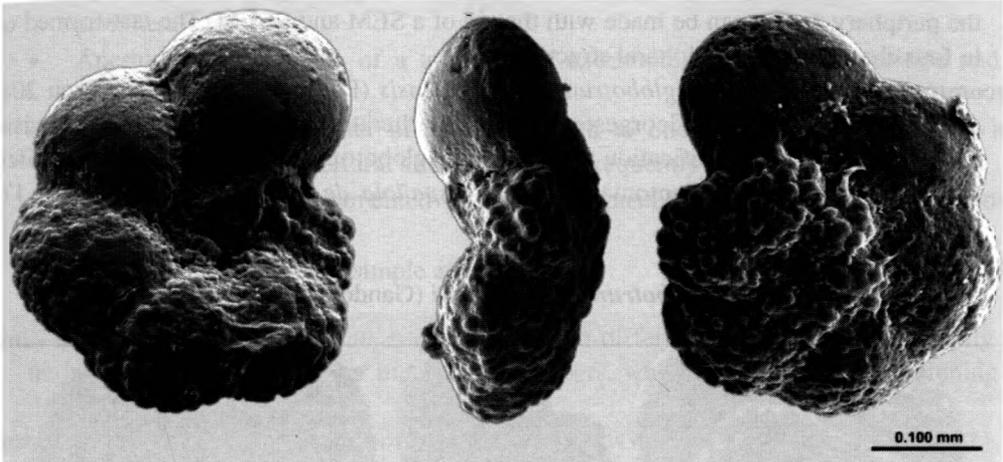
Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to nearly flat trochospire.
- Earlier chambers are globular to subglobular and the last-formed ones present a distinct dorsal compression.
- Chambers present variable overlapping rates and a gradual size increase.
- Sutures are distinct and depressed, radial and straight on both test sides.
- Test is asymmetrical in edge view, with a nearly flat spiral side and convex umbilical side.
- Periphery is rounded in the globular or subglobular chambers and subrounded to subangular in the last-formed one to three.
- Aperture is a medium high arch in umbilical position and is bordered by a wide tegillum, which is often attached to the previous chambers across the umbilical region.
- Umbilicus has a diameter of about one third of the maximum test diameter.
- Chamber surface is ornamented with pustules, rugosities and costellae that present a meridional arrangement on both test sides.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Trinitella scotti* can be recognized by the dorso-ventrally compressed last-formed chambers.

Recommended revision. *Rugoglobigerina scotti* (Brönnimann 1952). Robaszynski and others 1984, p. 289, pl. 50, Figure 4. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

***Praeglobotruncana delrioensis* (Plummer 1931)**



Praeglobotruncana delrioensis from the lower Cenomanian sediments of Texas (USA) illustrated by Georgescu (2011), plate 1, Figures 4-6.

Original report. *Globorotalia delrioensis* Plummer 1931, p. 199, pl. 13, Figure 2.

Original work. Plummer, H.J., 1931. Some Cretaceous Foraminifera in Texas. *The University of Texas Bulletin*, 3101, 109-203.

Age. Late Albian-Cenomanian.

Main morphological features.

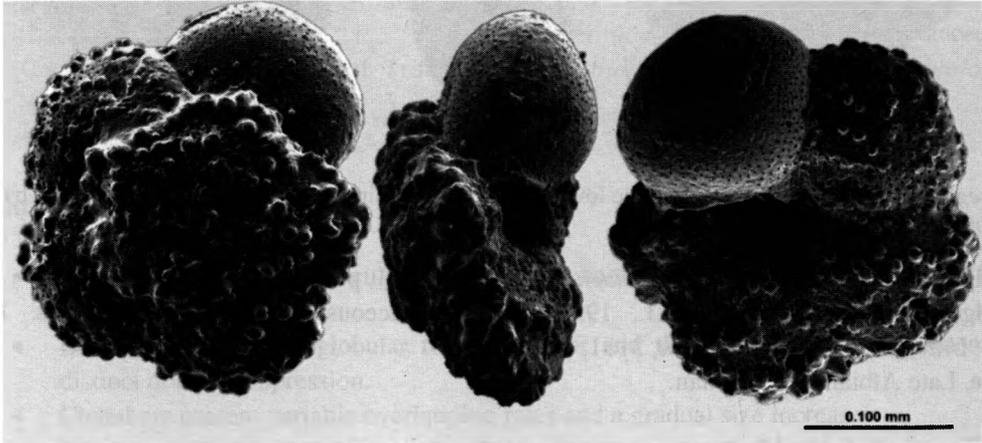
- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorl axially compressed; chamber shape is petaloid on the spiral side and mostly subtrapezoidal on the umbilical one.
- Sutures are distinct and depressed on both test sides and perpendicular to oblique to the previous whorl on the spiral side.
- Test is asymmetrical in edge view, with a convex spiral side and concave umbilical one.
- Periphery is subangular with agglomerations of pustules on the earlier chambers resulting in a keeled appearance.

- Aperture has the shape of a low arch in extraumbilical-umbilical position and is bordered by a thin lip or more rarely a triangular flap.
- Umbilicus has a diameter of about one fifth to one fourth of the maximum test diameter; relict periapertural structures occur frequently within the umbilicus.
- Chamber surface is ornamented with scattered pustules, which are concentrated over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. The most accurate observations on the agglomerations of pustules in the periphery region can be made with the aid of a SEM and ESEM. The last-formed one to four chambers lack peripheral structures.

Recommended revision. *Praeglobotruncana delrioensis* (Plummer 1931). Georgescu 2011, p. 178, pl. 1, Figures 4-9. Georgescu, M.D., 2011. Iterative evolution, taxonomic revision and evolutionary classification of the praeglobotruncanid planktic foraminifera, Cretaceous (late Albian-Santonian). *Revista Española de Micropaleontología*, 43, 173-207. [published in 2012]

***Praeglobotruncana stephani* (Gandolfi 1942)**



Praeglobotruncana stephani from the uppermost Albian sediments of Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2011), plate 1, Figures 13-15.

Original report. *Globotruncana stephani* Gandolfi 1942, p. 130, pl. 3, Figures 4-5, pl. 14, Figure 2.

Original work. Gandolfi, F., 1942. Ricerche micropaleontologiche e stratigrafiche sulla scaglia e sul flysch cretacici dei Dintorni di Balerna (Canton Ticino). *Rivista Italiana di Paleontologia*, 20(4), 5-160.

Age. Latest Albian-Cenomanian.

Main morphological features.

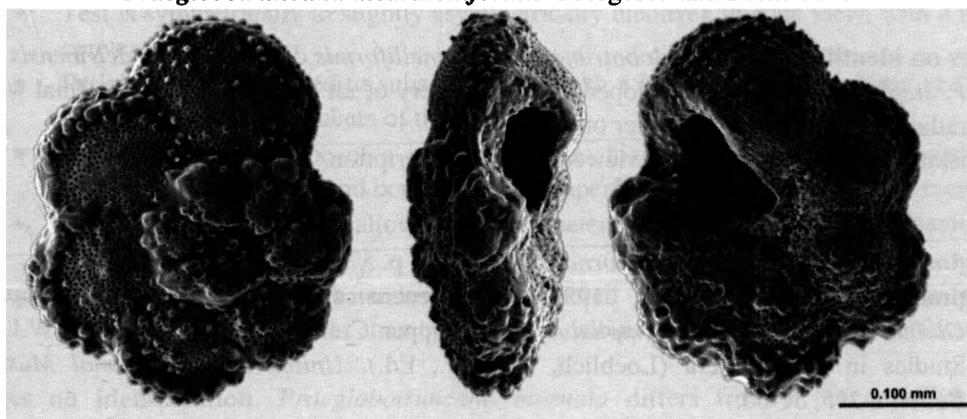
- Test consists of the proloculus followed by chambers added in a medium high trochospire.

- Earlier chambers are globular to subglobular and those of the last whorl axially compressed; chamber shape is petaloid on the spiral side and mostly subtrapezoidal on the umbilical one.
- Sutures between the earlier chambers are lined with ridges on the spiral side and on the umbilical side the sutures are distinct, depressed and radial.
- Test is asymmetrical in edge view, with a convex spiral side and concave umbilical one.
- Periphery is subangular with agglomerations of pustules that frequently fuse on the earlier chambers resulting in a weak keel; the last-formed one or two chambers lack peripheral structures.
- Aperture has the shape of a low arch in extraumbilical-umbilical position and is bordered by a thin lip.
- Umbilicus has a diameter of about one fifth to one fourth of the maximum test diameter; relict periapertural structures occur frequently within the umbilicus.
- Chamber surface is ornamented with scattered pustules, which are concentrated over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Praeglobotruncana stephani* differs from *P. delrioensis* mainly by the weak keel developed over the earlier chambers, which is visible at the beginning of the final whorl.

Recommended revision. *Praeglobotruncana stephani* (Gandolfi 1942). Georgescu 2011, p. 180, pl. 1, Figures 10-18. Georgescu, M.D., 2011. Iterative evolution, taxonomic revision and evolutionary classification of the praeglobotruncanid planktic foraminifera, Cretaceous (late Albian-Santonian). *Revista Española de Micropaleontología*, 43, 173-207. [published in 2012].

***Praeglobotruncana dicarinelliformis* Georgescu and Burke 2013**



Praeglobotruncana dicarinelliformis from the lower Cenomanian sediments of the Eastern North Atlantic Ocean (offshore Morocco), DSDP Site 370 illustrated by Georgescu and Burke in Georgescu and others 2013, plate 1, Figures 1-3.

Original report. *Praeglobotruncana dicarinelliformis* Georgescu and Burke in Georgescu and others 2013, p. 63, pl. 1, Figures 1-9, pl. 2, Figures 1-9.

Original work. Georgescu, M.D., Sawyer, M.S., Heikkinen, C.J., Burke, R.M., 2013. New and revised Cretaceous (Albian-Campanian) planktic foraminifera of the Atlantic, Indian and Pacific Oceans. In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 59-100.

Age. Latest Albian-Cenomanian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal to subtriangular on the umbilical one.
- Sutures on the spiral side are lined with weak ridges between the earlier chambers and depressed between the last-formed ones; sutures on the umbilical side are depressed and radial.
- Test is symmetrical to slightly asymmetrical in edge view, with a more convex spiral side.
- Periphery is angular and with a wide keel consisting of fused pustules on all the chambers of the final whorl; the keel is more prominent on the earlier chambers of the final whorl and can present a double-keeled appearance.
- Aperture has the shape of a medium high to high arch, is situated in umbilical-extraumbilical position and is bordered by an imperforate lip.
- Chamber surface is ornamented with scattered pustules, which are denser and more prominent on the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

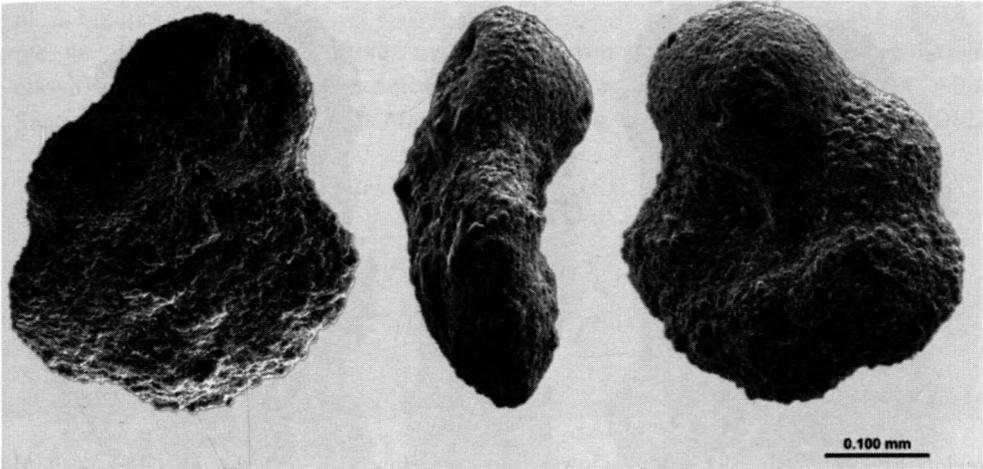
Notes on identification. *Praeglobotruncana dicarinelliformis* differs from *P. delrioensis* and *P. stephani* by the keel developed at the periphery of all the chambers of the final whorl rather than only over the earlier ones..

Revision. This species was not reviewed since its description.

Original report. *Globotruncana inornata* Bolli 1957, p. 57, pl. 13, Figures 5-6.

Original work. Bolli, H.M., 1957. The genera *Praeglobotruncana*, *Rotalipora*, *Globotruncana*, and *Abathomphalus* in the Upper Cretaceous of Trinidad, B.W.I. In: *Studies in Foraminifera* (Loeblich, A.R. Jr., Ed.). *United States National Museum Bulletin*, 215, 51-60.

Age. Late Cenomanian-middle Turonian.

Praeglobotruncana inornata (Bolli 1957)

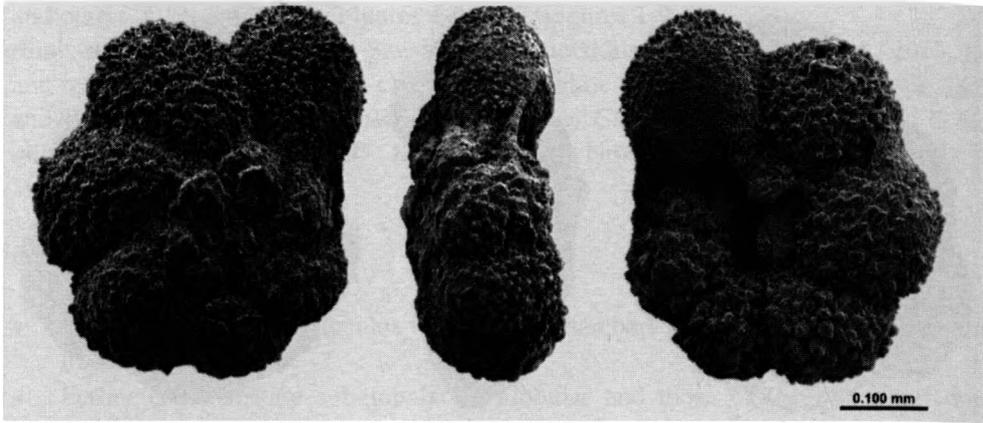
Praeglobotruncana inornata from the lower Turonian sediments of the East Indian Ocean (Exmouth Plateau), ODP Hole 762C.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Earlier chambers are subglobular to globular and the last-formed ones dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are lined with weak ridges between the earlier chambers and depressed between the last-formed ones; sutures on the umbilical side are depressed and radial.
- Test is symmetrically to slightly asymmetrically biconvex in edge view, with a more convex spiral side.
- Periphery is subrounded to subangular and with a keel consisting of dense or fused pustules on all the chambers of the final whorl.
- Aperture has the shape of a medium high to high arch, is situated in umbilical-extraumbilical position and bordered by an imperforate lip, which is rarely preserved.
- Umbilicus is small and shallow, with a diameter of about one third of the maximum test diameter.
- Chamber surface is ornamented with scattered pustules; ornamentation is more prominent over the earlier chambers. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Praeglobotruncana inornata* differs from *P. dicarinelliformis* mainly in having a more rounded periphery and less prominent keel.

Revision. This species was not reviewed since its description.

Praeglobotruncana aumalensis (Sigal 1952)

Praeglobotruncana aumalensis from the lower Turonian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 illustrated by Georgescu (2011), plate 2, Figures 1-3.

Original report. *Globigerina aumalensis* Sigal 1952, p. 28, Figure 29.

Original work. Sigal, J. 1952. Aperçu stratigraphique sur la micropaléontologie du Crétacé. *Alger, 19th International Geological Congress, Monographies régionales, 1^{re} série, Algerie*, 26, 1-52.

Age. Late Cenomanian-early Turonian.

Main morphological features.

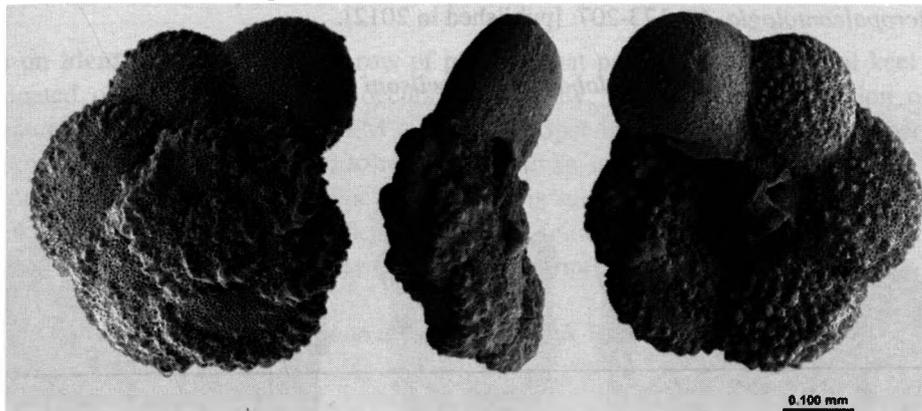
- Test presents the chambers added in a low to medium high trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are lined with weak ridges between the earlier chambers; on the umbilical side they are depressed and radial.
- Test is symmetrical to slightly asymmetrical in edge view.
- Periphery shape is rounded to subangular and with agglomerations of pustules in the peripheral region of the earlier chambers of the final whorl.
- Aperture is a low to medium high arch, situated in extraumbilical-umbilical position and bordered by an imperforate lip.
- Umbilicus presents a diameter of one fourth to one third of the maximum test diameter; relict periapertural structures occur in the umbilical region.
- Chamber surface is ornamented with scattered pustules, which can fuse to form rugosities; ornamentation is more prominent on the earlier chambers. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. The peripheral structures of *Praeglobotruncana aumalensis* are difficult to observe with an optical stereomicroscope; therefore, observations with the aid of a SEM or ESEM are recommended.

Recommended revision. *Bermudeziana aumalensis* (Sigal 1952). Georgescu 2011, p. 184, pl. 2, Figures 1-9.

Georgescu, M.D., 2011. Iterative evolution, taxonomic revision and evolutionary classification of the praeglobotruncanid planktic foraminifera, Cretaceous (late Albian-Santonian). *Revista Española de Micropaleontología*, 43, 173-207. [published in 2012].

Praeglobotruncana turbinata (Reichel 1950)



Praeglobotruncana turbinata from the lower Turonian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 illustrated by Georgescu (2011), plate 2, Figures 10-12.

Original report. *Globotruncana (Globotruncana) stephani turbinata* Reichel 1950, p. 609.

Original work. Reichel, M., 1950. Observations sur les *Globotruncana* du gisement de la Breggia (Tessin). *Eclogae Geologicae Helveticae*, 42, 596-617.

Age. Late Cenomanian-Turonian.

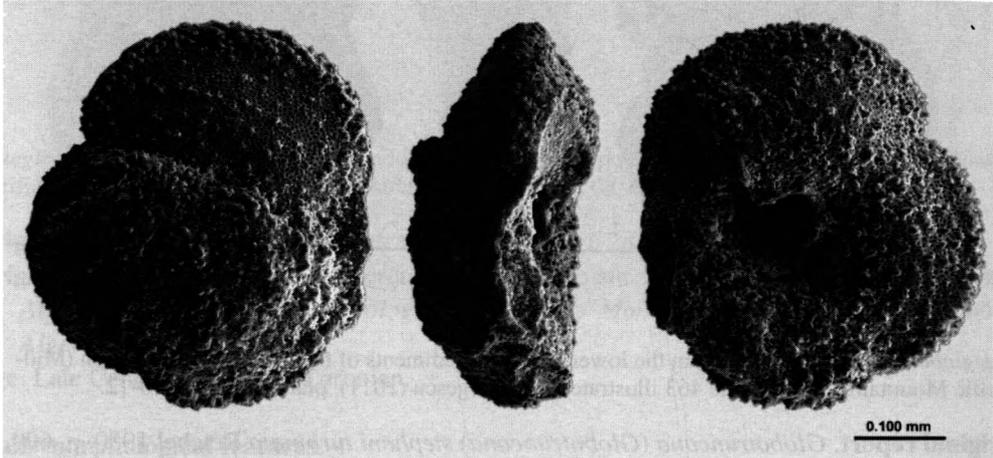
Main morphological features.

- Test presents the chambers added in a medium high to high trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are lined with ridges, which are weaker between the last-formed chambers; sutures on the umbilical side are depressed and radial.
- Test shape is asymmetrical in edge view, with a convex spiral side.
- Periphery is subangular to angular and with one keel, which is more prominent on the earlier chambers and consists of agglomerated and fused pustules.
- Aperture is a low to medium high arch, situated in extraumbilical-umbilical position and bordered by an imperforate flap or porticus.
- Umbilicus presents a diameter of one fourth to one third of the maximum test diameter; relict periapertural structures occur in the umbilical region.
- Chamber surface is ornamented with scattered pustules; ornamentation is more prominent over the earlier chambers. Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Praeglobotruncana turbinata* differs from *P. dicarinelliformis* mainly by the lower trochospire and periapertural structures consisting of an imperforate flap or porticus rather than a lip.

Recommended revision. *Bermudeziana turbinata* (Reichel 1950). Georgescu 2011, p. 185, pl. 2, Figures 10-18, pl. 3, Figures 1-9. Georgescu, M.D., 2011. Iterative evolution, taxonomic revision and evolutionary classification of the praeglobotruncanid planktic foraminifera, Cretaceous (late Albian-Santonian). *Revista Española de Micropaleontología*, 43, 173-207. [published in 2012].

Praeglobotruncana wilsoni (Bolli 1957)



Praeglobotruncana wilsoni from the lower Turonian sediments of the central Pacific Ocean (Shatsky Rise), DSDP Site 463.

Original report. *Globotruncana wilsoni* Bolli 1957, p. 58, pl. 14, Figure 4.

Original work. Bolli, H.M., 1957. The genera *Praeglobotruncana*, *Rotalipora*, *Globotruncana*, and *Abathomphalus* in the Upper Cretaceous of Trinidad, B.W.I. In: Studies in Foraminifera (Loeblich, A.R. Jr., Ed.). *United States National Museum Bulletin*, 215, 51-60.

Age. Turonian-early Coniacian.

Main morphological features.

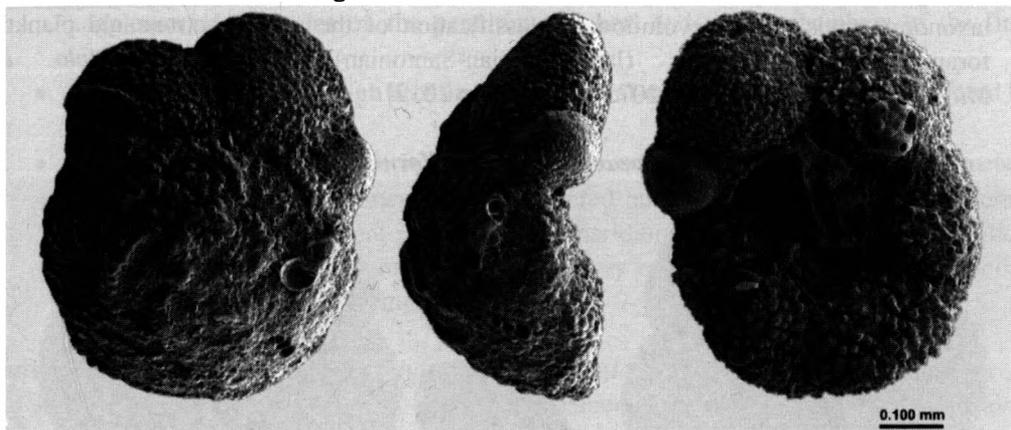
- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Earlier chambers are subglobular to globular and the last-formed ones dorso-ventrally compressed.
- Chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved and lined with well-developed ridges.
- Sutures on the umbilical side are depressed and radial between all the chambers.
- Test is asymmetrically biconvex in edge view, with a more convex spiral side.
- Periphery is angular, with a wide keel consisting of dense or fused pustules on all the chambers of the final whorl.

- Aperture has the shape of a medium high to high arch, is situated in umbilical-extraumbilical position and bordered by an imperforate lip, which is rarely preserved.
- Umbilicus is small and shallow, with a diameter of about one third of the maximum test diameter.
- Chamber surface is ornamented with scattered pustules.
- Ornamentation is slightly more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. A second row of pustules that parallels the peripheral keel and is situated on the umbilical side occurs occasionally; the accurate observation of such feature requires the use of a SEM and ESEM. Specimens in which the chamber shape shows transition from petaloid to reniform occur in small numbers, and they are known from throughout the stratigraphical range of this species. Trochospire height is variable but the dominant specimens present a low trochospiral coil.

Revision. This species was not reviewed since its description.

Praeglobotruncana hilalensis Barr 1972



Praeglobotruncana hilalensis from the lower Turonian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2011), plate 3, Figures 13-15.

Original report. *Praeglobotruncana hilalensis* Barr 1972, p. 188, pl. 3, Figures 10-18, pl. 4, Figures 1-4.

Original work. Barr, F.T., 1972. Cretaceous biostratigraphy and planktonic foraminifera of Libya. *Micropaleontology*, 18, 1-46.

Age. Turonian-early Coniacian.

Main morphological features.

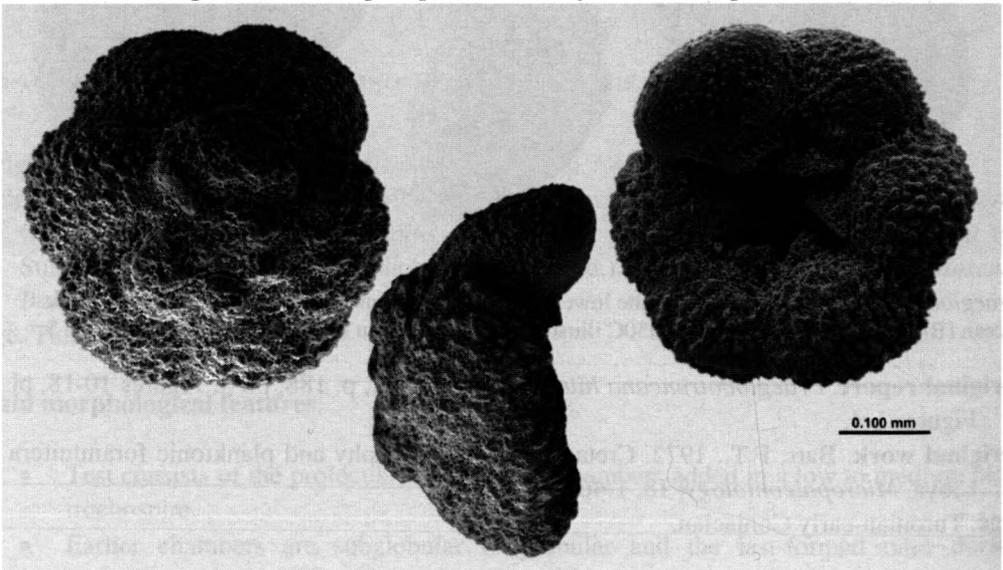
- Test presents the chambers added in a medium high to high trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.

- Sutures on the spiral side are lined with ridges between most of the chambers of the final whorl; sutures on the umbilical side are depressed and radial.
- Test shape is asymmetrical in edge view, with highly convex spiral side.
- Periphery is angular and with one keel on all the chambers of the final whorl.
- Aperture is a low to medium high arch, situated in extraumbilical-umbilical position and bordered by an imperforate flap or porticus.
- Umbilicus presents a diameter of one fourth to one third of the maximum test diameter; relict periapertural structures occur in the umbilical region.
- Chamber surface is ornamented with scattered pustules; ornamentation is more prominent on the earlier chambers.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Praeglobotruncana hilalensis* differs from *P. turbinata* mainly by having in general higher trochospire and peripheral keel developed on all the chambers of the final whorl.

Recommended revision. *Bermudeziana hilalensis* (Barr 1972). Georgescu 2011, p. 188, pl. 3, Figures 10-18, pl. 4, Figures 1-9. Georgescu, M.D., 2011. Iterative evolution, taxonomic revision and evolutionary classification of the praeglobotruncanid planktic foraminifera, Cretaceous (late Albian-Santonian). *Revista Española de Micropaleontología*, 43, 173-207. [published in 2012].

***Praeglobotruncana praeglobotruncaniformis* (Georgescu 2011)**



Praeglobotruncana praeglobotruncaniformis from the upper Santonian sediments of the Caribbean region (Yucatan Outer Shelf), DSDP Site 95 illustrated by Georgescu (2011), plate 5, Figures 10-12.

Original report. *Fingeria praeglobotruncaniformis* Georgescu 2011, p. 196, pl. 5, Figures 7-15, pl. 6, Figures 1-8.

Original work. Georgescu, M.D., 2011. Iterative evolution, taxonomic revision and evolutionary classification of the praeglobotruncanid planktic foraminifera, Cretaceous (late Albian-Santonian). *Revista Española de Micropaleontología*, 43, 173-207. [published in 2012]

Age. Late Santonian.

Main morphological features.

- Test presents the chambers added in a medium high to high trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures are distinct and depressed on both test sides.
- Test shape is asymmetrical in edge view, with distinctly convex spiral side.
- Periphery is rounded to subangular and with one weak keel consisting of agglomerated pustules on the penultimate whorl and earlier chambers of the final whorl.
- Aperture is a medium high arch in extraumbilical-umbilical position and bordered by an imperforate flap.
- Umbilicus presents a diameter of one third to one half of the maximum test diameter.
- Chamber surface is ornamented with scattered pustules, rugosities and more rarely short costellae and present occasionally a meridional arrangement on the umbilical side and meridional to parallel to the periphery on the spiral side. Wall is calcitic, hyaline, simple to simple-ridged and perforate.

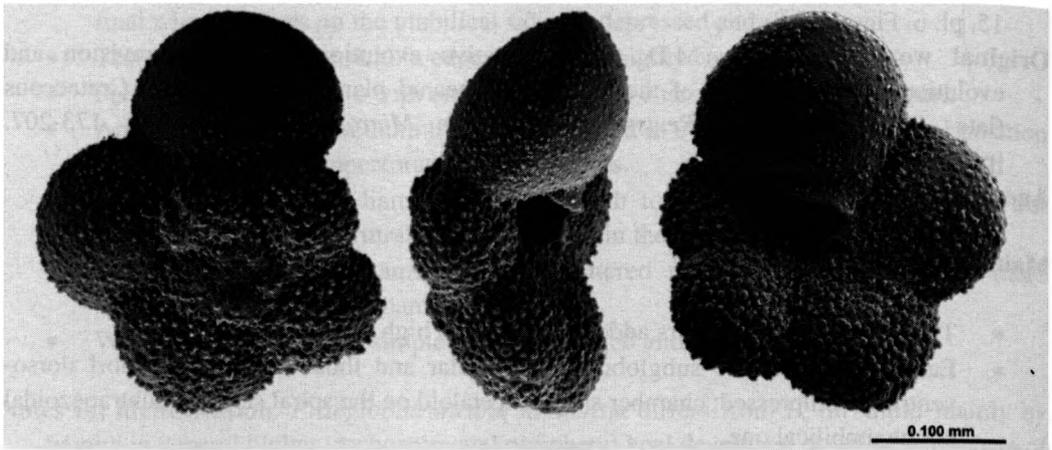
Notes on identification. *Praeglobotruncana praeglobotruncaniformis* differs from *P. stephani* and *P. turbinata* by the test ornamentation with occasional meridional arrangement on the umbilical side and meridional to parallel to the periphery on the spiral side.

Revision. This species was not reviewed since its description.

Original report. *Globotruncana havanensis* Voorwijk 1937, p. 195, pl. 1, Figures 25-26, 29.

Original work. Voorwijk, G.H., 1937. Foraminifera from the Upper Cretaceous of Habana, Cuba. *Proceedings of the Koninklijke Akademie van Wetenschappen te Amsterdam*, 40, 190-198.

Age. Middle Campanian-Maastrichtian.

Praeglobotruncana havanensis (Voorwijk 1937)

Praeglobotruncana havanensis from the upper Maastrichtian sediments of the North Atlantic Ocean (Orphan Knoll), DSDP Hole 111A illustrated by Georgescu and Sawyer (2013), plate 1, Figures 13-15.

Main morphological features.

- Test presents the chambers added in a medium low to medium high trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures are distinct and depressed throughout, oblique to the previous whorl on the spiral side and radial on the umbilical one.
- Test shape is asymmetrical in edge view, with convex spiral side and concave umbilical side.
- Periphery presents a subangular shape and agglomerated pustules on the earlier chambers of the final whorl that can fuse to form rugosities that do not have a preferential orientation; a peripheral imperforate band occurs occasionally.
- Aperture is a medium high arch, situated in extraumbilical-umbilical position and bordered by an imperforate or perforate porticus that is attached to the previous chambers across the umbilical region.
- Umbilicus presents a diameter of one third to one half of the maximum test diameter.
- Chamber surface is ornamented with scattered pustules; ornamentation is more prominent over the earlier chambers. Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. The periapertural structures in *Praeglobotruncana havanensis* can be observed only in the case of well-preserved specimens.

Recommended revision. *Globotruncanella havanensis* (Voorwijk 1937). Georgescu and Sawyer 2013, pl. 1, Figures 4-15, pl. 2, Figures 1-15). Georgescu, M.D., Sawyer, M.S., 2013. Evolutionary classification of the globotruncanellid and abathomphalid planktic foraminifera (Late Cretaceous, Late Campanian-Maastrichtian). In: *Foraminifera*.

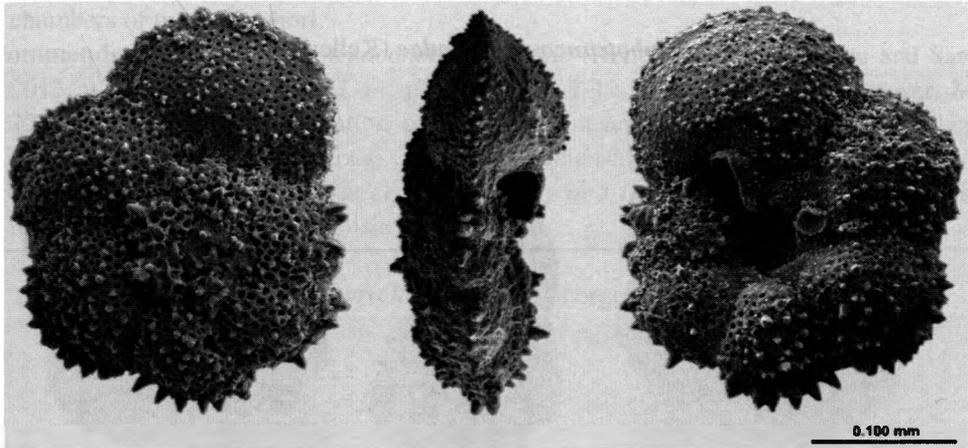
Aspects of Classification, Stratigraphy, Ecology and Evolution (Georgescu, M.D., Ed.).
New York: Nova Science Publishers, 119-162.

Original report. *Globotruncana (Rugoglobigerina) petaloidea subpetaloidea* Gandolfi 1955, p. 52, pl. 3, Figure 12.

Original work. Gandolfi, F., 1955. The genus *Globotruncana* in northeastern Colombia. *Bulletins of American Paleontology*, 36(155), 1-118.

Age. Late Campanian-Maastrichtian.

***Praeglobotruncana subpetaloidea* (Gandolfi 1955)**



Praeglobotruncana subpetaloidea from the upper Campanian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 illustrated by Georgescu and Sawyer (2013), plate 6, Figures 10-12.

Main morphological features.

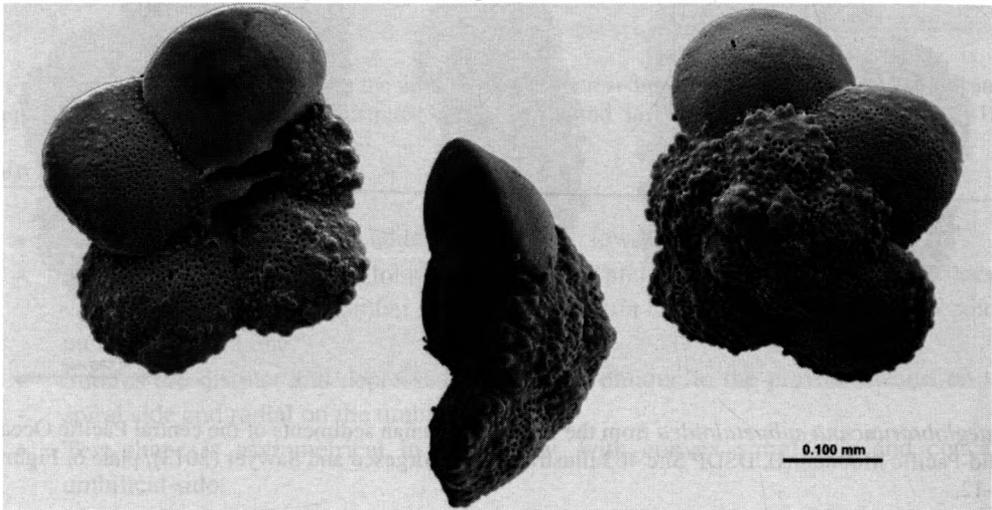
- Test presents the chambers added in a medium low to medium high trochospire.
- Chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures are depressed or lined with weak ridges and oblique to the previous whorl on the spiral side, and depressed and radial on the umbilical one.
- Test shape varies from slightly asymmetrically biconvex to convex-concave.
- Periphery is angular and with an imperforate band to one prominent keel throughout the chambers of the final whorl.
- Aperture is a medium high arch, is situated in umbilical-extraumbilical position and bordered by an imperforate porticus that is attached to the previous chambers across the umbilical region.
- Umbilicus presents a diameter of one third to one half of the maximum test diameter; relict periapertural structures fuse in the umbilicus to form an umbilical rim.
- Chamber surface is ornamented with scattered pustules, rugosities and costellae that present occasionally a meridional arrangement on the umbilical side and meridional to parallel to the periphery on the spiral side.

- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Praeglobotruncana subpetaloidea* presents the highest known morphological variability at ultrastructure level among the Cretaceous planktic foraminifera.

Recommended revision. *Abathomphalus subpetaloidea* (Gandolfi 1955). Georgescu and Sawyer 2013, p. 142, pl. 6, Figures 1-16, pl. 7, Figures 1-16. Georgescu, M.D., Sawyer, M.S., 2013. Evolutionary classification of the globotruncanellid and abathomphalid planktic foraminifera (Late Cretaceous, Late Campanian-Maastrichtian). In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 119-162.

***Praeglobotruncana pschadae* (Keller 1946)**



Praeglobotruncana pschadae from the Maastrichtian sediments of the North Atlantic Ocean (Orphan Knoll), DSDP Hole 111A illustrated by Georgescu and Sawyer (2013), plate 5, Figures 4-6.

Original report. *Globorotalia pschadae* Keller 1946, p. 137, p. 59, pl. 2, Figures 4-6.

Original work. Foraminifera of the Upper Cretaceous deposits in the Sochi region. *Bulletin of the Natural Sciences Society of Moscow, series Geology*, 21, 83-108. [in Russian]

Age. Late Campanian-Maastrichtian.

Main morphological features.

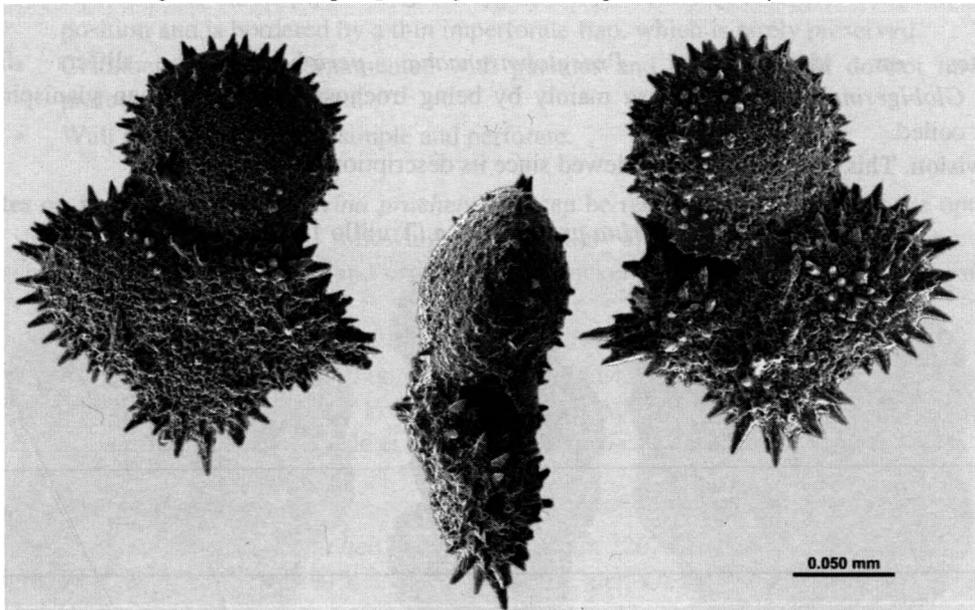
- Test presents the chambers added in a medium low to medium high trochospire.
- Chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures are lined with weak ridges between the earlier chambers and depressed between the last-formed ones, oblique to the previous whorl on the spiral side and depressed and radial on the umbilical one.
- Test shape is asymmetrical in edge view, with convex spiral side and concave umbilical side.

- Periphery is angular and with a keel on the earlier or all the chambers of the final whorl.
- Aperture is a medium high arch, is situated in umbilical-extraumbilical position and bordered by an imperforate porticus that is attached to the previous chambers across the umbilical region.
- Chamber surface is ornamented with scattered pustules; ornamentation is more prominent on the earlier chambers. Wall is calcitic, hyaline, simple to incipiently reticulate and perforate.

Notes on identification. *Praeglobotruncana pschadae* differs from *P. havanensis* mainly by having well-developed peripheral structures consisting of one keel on most of the chambers of the final whorl.

Recommended revision. *Globotruncanella pschadae* (Keller 1946). Georgescu and Sawyer 2013, p. 137, pl. 4, Figures 1-14, pl. 5, Figures 1-12. Georgescu, M.D., Sawyer, M.S., 2013. Evolutionary classification of the globotruncanellid and abathomphalid planktic foraminifera (Late Cretaceous, Late Campanian-Maastrichtian). In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 119-162.

Praeglobotruncana peripherospinata (Georgescu and Sawyer 2013)



Praeglobotruncana peripherospinata from the Pacific Ocean (Shatsky Rise), DSDP Site 305 illustrated by Georgescu and Sawyer (2013), plate 10, Figures 1-3.

Original report. *Spinoglobotruncanella peripherospinata* Georgescu and Sawyer 2013, p. 150, pl. 10, Figures 1-13.

Original work. Georgescu, M.D., Sawyer, M.S., 2013. Evolutionary classification of the globotruncanellid and abathomphalid planktic foraminifera (Late Cretaceous, Late

Campanian-Maastrichtian). In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 119-162.

Age. Late Campanian.

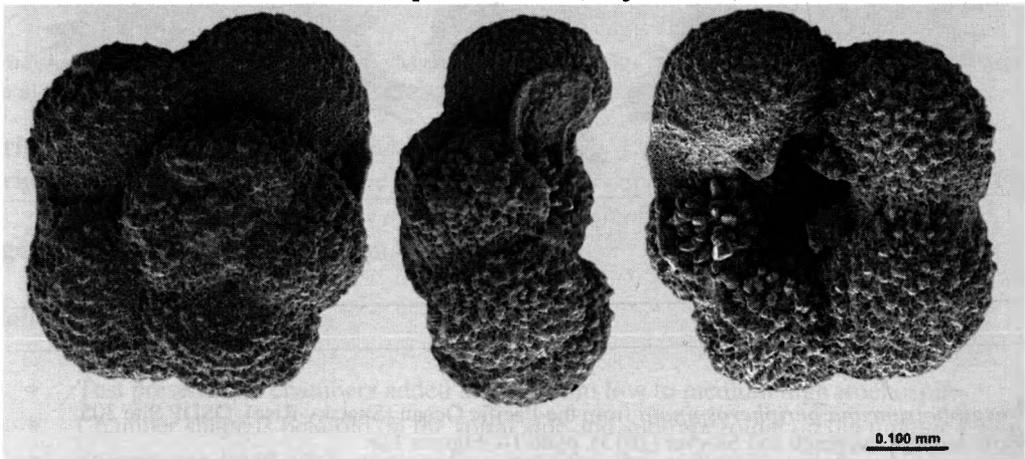
Main morphological features.

- Test presents the chambers added in a medium low to medium high trochospire.
- Chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures are distinct and depressed throughout, nearly perpendicular to the previous whorl on the spiral side and radial on the umbilical one.
- Test shape is asymmetrical in edge view, with convex spiral side and concave umbilical side.
- Periphery is angular and with a keel consisting of pustules and spines on the earlier or all the chambers of the final whorl resulting in a spiny appearance.
- Aperture is a medium high arch, is situated in umbilical-extraumbilical position and bordered by an imperforate lip, which is rarely preserved.
- Umbilicus presents a diameter of around one fourth of the maximum test diameter; relict periapertural structures fuse in the umbilicus to form an umbilical rim.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Praeglobotruncana peripherospinata* differs from *Globigerinelloides compressa* mainly by being trochospirally rather than planispirally coiled.

Revision. This species was not reviewed since its description.

***Bucherina praehelvetica* (Trujillo 1960)**



Bucherina praehelvetica from the lower Turonian sediments of the central Pacific Ocean (Mid-Pacific Ocean), DSDP Site 463.

Original report. *Rugoglobigerina praehelvetica* Trujillo 1960, p. 340, pl. 49, Figure 6.

Original work. Trujillo, E.F., 1960. Upper Cretaceous foraminifera from near Redding, Shasta County, California. *Journal of Paleontology*, 34, 290-346.

Age. Late Cenomanian-middle Turonian.

Main morphological features.

- Test presents the chambers added in a very low, nearly flat to low trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase; those of the final whorl are slightly but distinctly compressed on the spiral side.
- Chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures are in mostly depressed, oblique to the previous whorl on the spiral side and depressed and radial on the umbilical one; sutures between the earlier chambers of the final whorl are lined with agglomerations of pustules but not true ridges.
- Test shape is asymmetrical, almost plano-convex, with a nearly flat spiral side and strongly inflated umbilical one; there is not a true keel at the periphery but agglomerations of dense pustules and rugosities, which are more prominent on the earlier chambers of the final whorl.
- Aperture has the shape of a medium high arch, is situated in umbilical-extraumbilical position and is bordered by a thin imperforate flap, which is rarely preserved.
- Chamber surface is ornamented with pustules and rugosities that do not have a preferential ornamentation.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Bucherina praehelvetica* can be recognized easily under the optical stereomicroscope by the following combination of features: slightly compressed chambers on the spiral side and ornamentation thickening at the periphery of the earlier chambers of the final whorl.

Recommended revision. *Praeglobotruncana praehelvetica* (Trujillo 1960). Robaszynski and others 1979, p. 43, 46, pl. 47, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 2, 1-181.

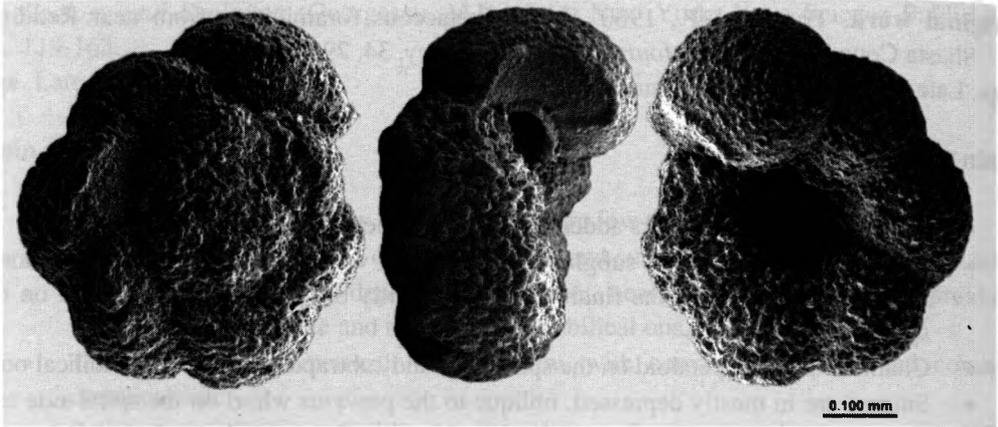
Original report. *Globotruncana helvetica* Bolli 1945, p. 226, pl. 9, Figures 6-8.

Original work. Bolli, H., 1945. Zur Stratigraphie der Oberen Kreide in den höheren helvetischen Decken. *Eclogae Geologicae Helveticae*, 37, 217-329.

Age. Early-middle Turonian.

Main morphological features.

- Test presents the chambers added in a very low, nearly flat to low trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase; those of the final whorl are compressed on the spiral side.

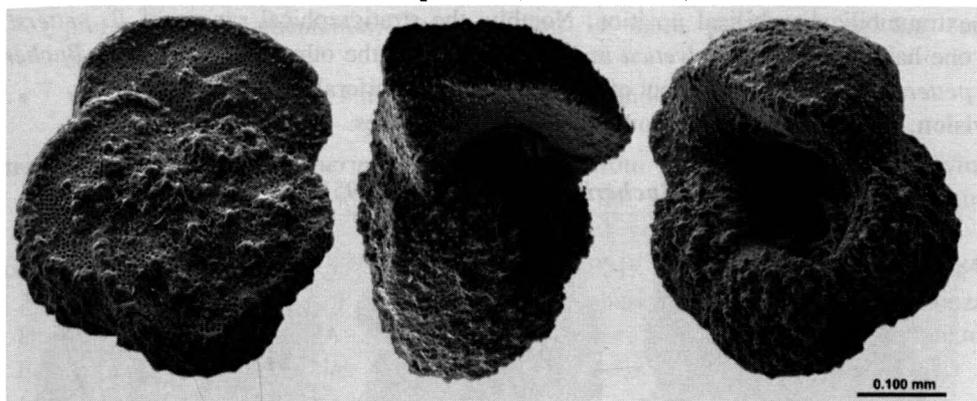
Bucherina helvetica (Bolli 1945)

Bucherina helvetica from the lower Turonian sediments of the central Pacific Ocean (Mid-Pacific Ocean), DSDP Site 463.

- Chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical side.
- Sutures are oblique to the previous whorl on the spiral side and depressed and radial on the umbilical one.
- Sutures on the spiral side are lined with ridges that are the continuation of the peripheral keel.
- Test shape is asymmetrical, plano-convex, with a nearly flat spiral side and strongly inflated umbilical one.
- Periphery is truncated and with one peripheral keel on all the chambers of the final whorl.
- Aperture has the shape of a medium high arch, is situated in extraumbilical-umbilical position and is bordered by a thin imperforate flap, which is rarely preserved.
- Umbilicus presents a diameter of around one third of the maximum test diameter.
- Chamber surface is ornamented with pustules, rugosities and short costellae that do not have a preferential ornamentation.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Bucherina helvetica* differs from *B. praeHelvetica* mainly by having one well-developed peripheral keel rather than agglomerations of ornamentation elements without a preferential arrangement.

Recommended revision. *Praeglobotruncana helvetica* (Bolli 1945). Robaszynski and others 1979, p. 39, 42, pl. 46, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 2, 1-181.

Bucherina pettersi (Gandolfi 1955)

Bucherina pettersi from the upper Maastrichtian sediments of the South Atlantic Ocean (São Paulo Plateau), DSDP Site 356.

Original report. *Globotruncana rosetta pettersi* Gandolfi 1955, p. 68, pl. 6, Figures 3-4.

Original work. Gandolfi, F., 1955. The genus *Globotruncana* in northeastern Colombia. *Bulletins of American Paleontology*, 36(155), 1-118.

Age. Late Campanian-Maastrichtian.

Main morphological features.

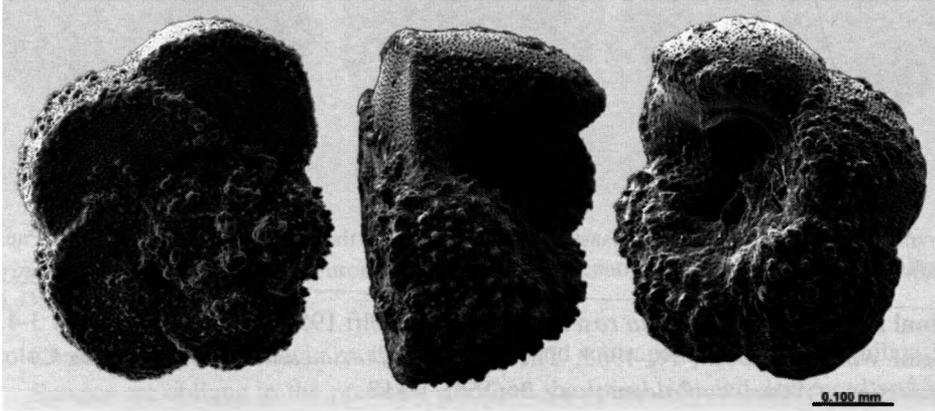
- Test presents the chambers added in a very low, nearly flat to low trochospire.
- Chambers are flat on the spiral side and strongly inflated on the umbilical one, overlap at various rates and present a gradual size increase; chamber shape is crescentic-petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures are lined with ridges that are the continuation of the peripheral keel on the spiral side and depressed, straight and radial on the umbilical side.
- Test shape is asymmetrical, plano-convex, with a nearly flat spiral side and strongly inflated umbilical one.
- Periphery is truncated and with one peripheral keel on all the chambers of the final whorl.
- Aperture has the shape of a medium high to a high arch, is situated in umbilical position.
- A thin imperforate flap or porticus borders the aperture.
- Umbilicus presents a diameter of around one third to one half of the maximum test diameter.
- Weak periumbilical ridges occur on all the chambers.
- Chamber surface is ornamented with pustules and rugosities that do not present a preferential ornamentation.
- Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Notes on identification. *Bucherina pettersi* differs from *B. praeHelvetica* mainly by having one peripheral keel and periumbilical ridges on all the chambers of the final whorl. It

differs from *B. helvetica* mainly by having the aperture in umbilical rather than extraumbilical-umbilical position. Notably, the stratigraphical ranges of *B. pettersi* on one hand and *B. praehelvetica* and *B. helvetica* on the other do not overlap. *Bucherina pettersi* is a minor component of the planktic foraminiferal assemblages.

Revision. No revision can be recommended for this species.

***Bucherina gansseri* (Bolli 1951)**



Bucherina gansseri from the upper Campanian-lower Maastrichtian sediments of the central Pacific Ocean (Mid-Cretaceous Mountains), DSDP Site 463.

Original report. *Globotruncana gansseri* Bolli 1951, p. 196, pl. 35, Figures 1-3.

Original work. Bolli, H.M., 1951. The genus *Globotruncana* in Trinidad, B.W.I. *Journal of Paleontology*, 25, 187-199.

Age. Latest Campanian-Maastrichtian.

Main morphological features.

- Test presents the chambers added in a very low, nearly flat to low trochospire.
- Chambers are flat on the spiral side and strongly inflated on the umbilical one, overlap at various rates and present a gradual size increase; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures are lined with ridges that are the continuation of the peripheral keel on the spiral side and depressed, straight and radial on the umbilical side.
- Test shape is asymmetrical, plano-convex, with a flat spiral side and strongly inflated umbilical one.
- Periphery is truncated and with one peripheral keel on all the chambers of the final whorl.
- Aperture has the shape of a medium high arch, is situated in umbilical position and is bordered by a thin imperforate porticus.
- Umbilicus presents a diameter of around one third to one half of the maximum test diameter; weak periumbilical ridges occur on all the chambers.

- Chamber surface is ornamented with pustules and rugosities that do not present a preferential ornamentation; ornamentation is more prominent on the earlier chambers.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Bucherina gansseri* differs from *B. pettersi* mainly in having a stronger peripheral keel and sutural ridges on the spiral side and less prominent ornamentation.

Recommended revision. *Gansserina gansseri* (Bolli 1951). Robaszynski and others 1984, p. 294, pl. 52, Figures 1-5, pl. 53, Figures 1-5. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

***Bucherina praesandidgei* - new species**

(Plate 4, Figures 1-2)

Holotype. Specimen WKB 010181.

Paratypes. Five specimens. WKB 010182-010186.

Type locality. DSDP Site 463, central Pacific Ocean (Mid-Pacific Mountains).

Type level. Upper Campanian-lower Maastrichtian white chalk, Sample 62-463-14-4, 50-52 cm.

Derivation. The Latin prefix *-prae* is added to the pre-existing species name *sandidgei*.

Diagnosis. Species of *Bucherina* with coarse ornamentation and without a peripheral keel.

Description.

- Test presents the chambers added in a very low, nearly flat to low trochospire.
- Earlier chambers are subglobular to globular and those of the final whorl almost spherical or with an axial elongation; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures are oblique to the previous whorl on the spiral side and depressed and radial on the umbilical one.
- Test shape is plano-convex, with subangular to subrounded periphery and without a true keel but a concentration of ornamentation elements.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a triangular flap.
- Umbilicus is deep and with a diameter of around one third to one fourth of the maximum test diameter.
- Chamber surface is ornamented with large dome-like pustules or irregular structures (0.0063-0.0713 mm) on both test sides.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate; pores are circular, elliptical or irregular and with a diameter that occasionally can be over 0.0100 mm.

Remarks. *Bucherina praesandidegi* differs from *B. sandidegi* mainly by the lack of a well-developed peripheral keel.

Age. Latest Campanian-Maastrichtian.

Geographical distribution. Pacific Ocean (Mid-Pacific Mountains, DSDP Site 463 and Shatsky Rise, DSDP Site 305) and East Indian Ocean (Exmouth Plateau, ODP Hole 762C and Wombat Plateau, ODP Hole 761B).

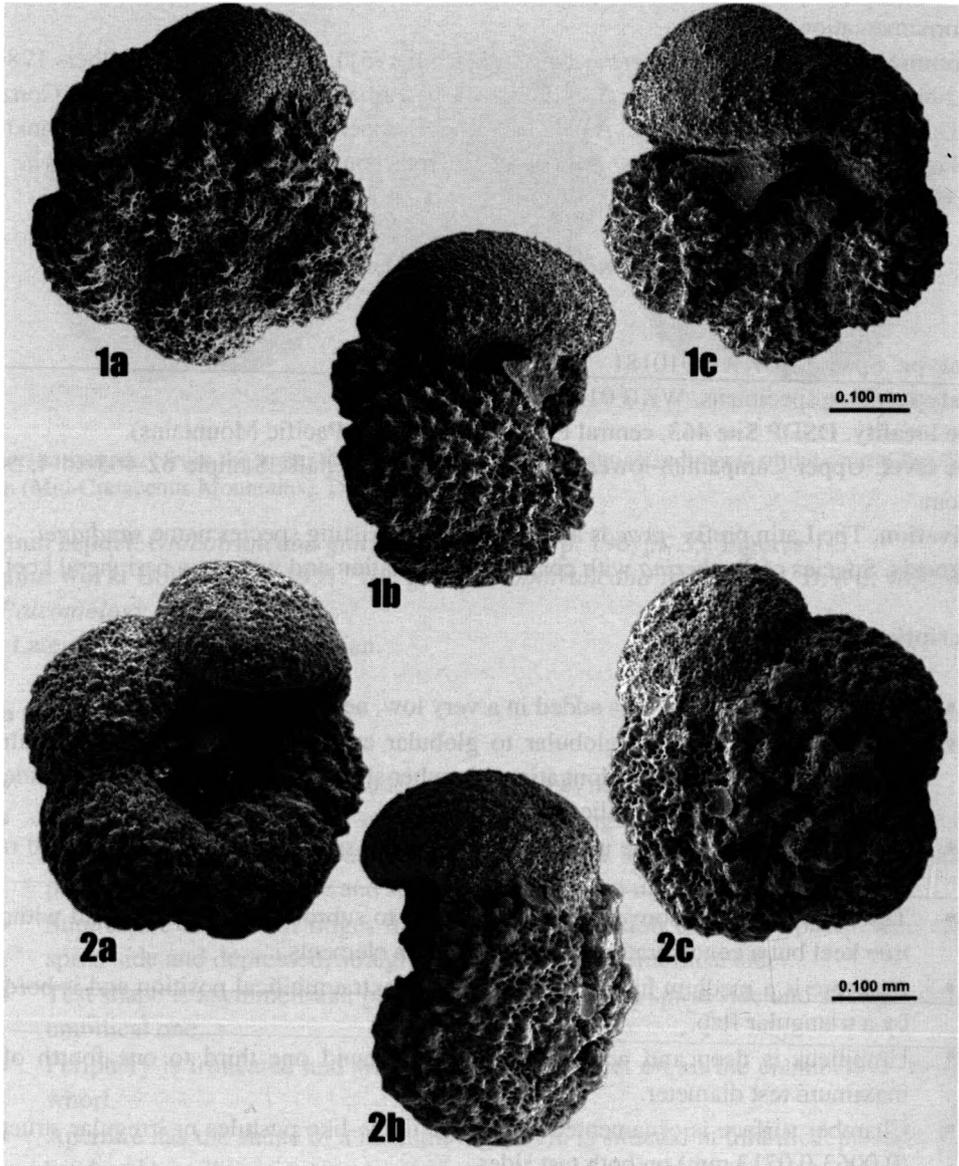
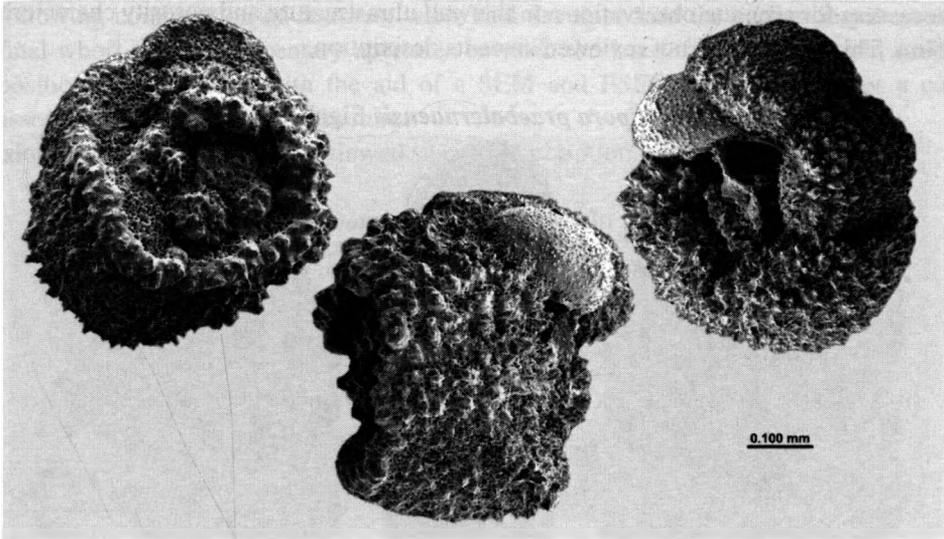


Plate 4. Two specimens of *Bucherina praesandidegi* from the upper Campanian-lower Maastrichtian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463. 1-holotype, 2-paratype.

Bucherina sandidgei Brönnimann and Brown 1956

Bucherina sandidgei from the Maastrichtian sediments of the Pacific Ocean (Shatsky Rise), DSDP Site 305.

Original report. *Bucherina sandidgei* Brönnimann and Brown 1956, p. 557, pl. 21, Figure 19, pl. 22, Figures 19-21.

Original work. Brönnimann, P., Brown, N.K. Jr., 1956. Taxonomy of Globotruncanidae. *Eclogae Geologicae Helvetiae*, 48, 503-561.

Age. Maastrichtian.

Main morphological features.

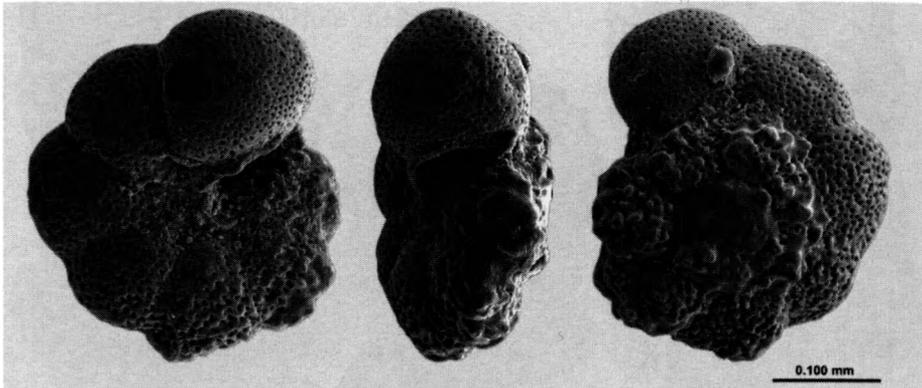
- Test presents the chambers added in a very low, nearly flat to low trochospire.
- Earlier chambers are subglobular to globular and those of the final whorl almost spherical or with an axial elongation; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures are oblique to the previous whorl and often indistinct due to the thickened ornamentation on the spiral side and depressed and radial on the umbilical one.
- Test shape is plano-convex, with subangular to subrounded periphery and a well-developed and often perforate keel on all the chambers of the final whorl.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate porticus.
- Chamber surface is ornamented with large dome-like pustules or irregular structures, which do not present a preferential arrangement.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate; pores are circular, elliptical or with irregular shape.

Notes on identification. *Bucherina sandidgei* differs from *B. praesandidgei* mainly by having a well-developed keel throughout the final whorl and the aperture bordered by a

porticus rather than a triangular flap. Observations with the aid of a SEM and ESEM are necessary for accurate observations on the wall ultrastructure and porosity characteristics.

Revision. This species was not reviewed since its description.

Rotalipora praebalernaensis Sigal 1969



Rotalipora praebalernaensis from the upper Albian sediments of the Eastern Atlantic Ocean (Vigo Seamount), DSDP Site 398. Specimen selected and photographed by Melissa S. Sawyer.

Original report. *Rotalipora praebalernaensis praebalernaensis* Sigal 1969, p. 635, pl. 1, Figures 1-12, pl. 2, Figures 1, 3.

Original work. Sigal, J., 1969. Contribution à une monographie der rosalines. 2. L'espèce *Rotalipora appenninica* (O. Renz, 1936), origine phylétique et taxinomie. In: *Proceedings of the First International Conference on Planktonic Microfossils, Geneva 1967* (Brönnimann, P. and Renz, H.H., Eds). Leiden: E.J. Brill, 622-639.

Age. Late Albian.

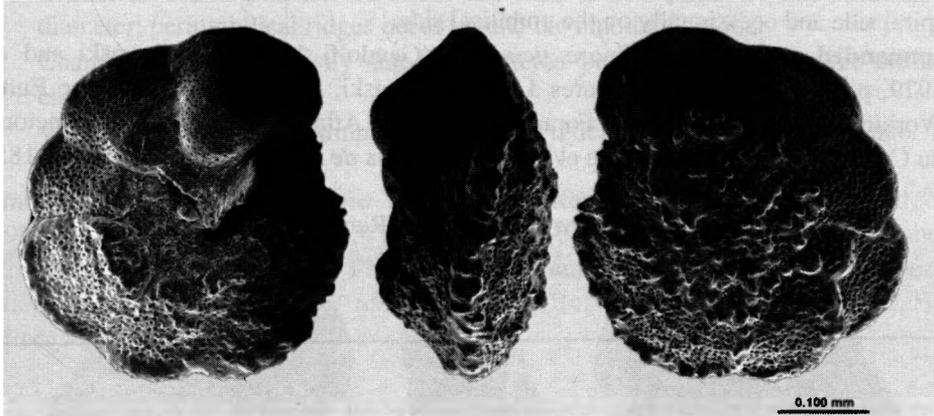
Main morphological features.

- Test presents the chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and then with a distinct dorso-ventral compression; chambers have a petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures are depressed and often indistinct between the earlier chambers due to the addition of successive layers of calcite, oblique to the previous whorl on the spiral side and radial on the umbilical one.
- Test is slightly asymmetrical biconvex in edge view; periphery is subangular to angular and with a weak keel on the earlier chambers of the final whorl.
- Main aperture is a medium high arch in extraumbilical-umbilical position and is bordered by a delicate imperforate lip; supplementary apertures occur in the umbilical region at the suture base between the last-formed chambers.
- Umbilicus has a diameter of about one fourth of the maximum test diameter.
- Chamber surface is mostly smooth; scattered pustules can occur over the earlier chambers.
- Wall is calcitic, hyaline, simple to reticulately-ridged and perforate.

Notes on identification. *Rotalipora praebalernaensis* can be recognized mainly by the following combination of features: weak keel developed on the earlier chambers of the final whorl and supplementary apertures between the last-formed chambers in umbilical position. Observations with the aid of a SEM and ESEM are necessary for a correct assessment of the wall ultrastructure.

Revision. This species was not reviewed since its description.

Rotalipora ticinensis (Gandolfi 1942)



Rotalipora ticinensis from the upper Albian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Globotruncana ticinensis* Gandolfi 1942, p. 113, pl. 2, Figure 3, pl. 13, Figure 14.

Original work. Gandolfi, F., 1942. Ricerche micropaleontologiche e stratigrafiche sulla scaglia e sul flysch cretacici dei Dintorni di Balerna (Canton Ticino). *Rivista Italiana di Paleontologia*, 20(4), 5-160.

Age. Late Albian.

Main morphological features.

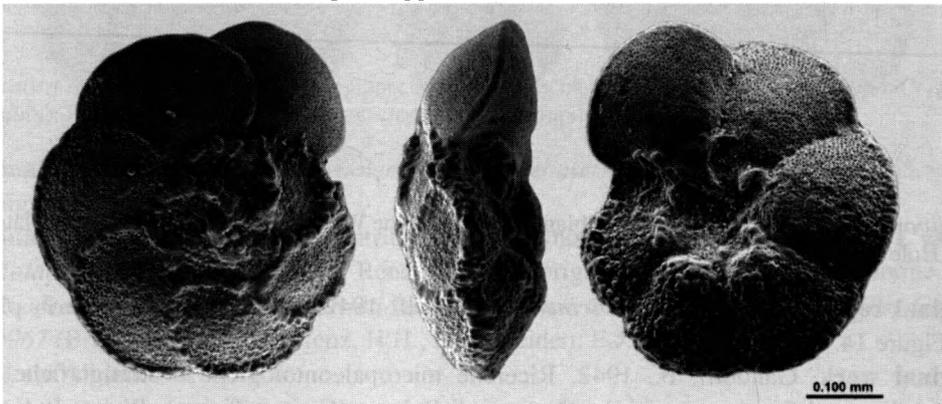
- Test presents the chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorso-ventral compression; chambers have a petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight and oblique to the previous whorl and lined with weak ridges; on the umbilical side they are radial, straight to slightly curved and occasionally with weak ridges.
- Test is asymmetrically biconvex in edge view; periphery is angular and with a keel on all the chambers of the final whorl.
- Main aperture is a medium high arch in extraumbilical-umbilical position and is bordered by a delicate imperforate lip; supplementary apertures occur at the suture base between the last-formed chambers.

- Umbilicus has a diameter of about one fourth of the maximum test diameter; periumbilical ridges occur around the umbilical region.
- Chamber surface is mostly smooth; scattered pustules can occur over the earlier chambers.
- Wall is calcitic, hyaline, simple to reticulately-ridged and perforate.

Notes on identification. *Rotalipora ticinensis* differs from *R. praebalernaensis* mainly by the keel developed on all the chambers of the final whorl and sutural ridges developed on the spiral side and occasionally on the umbilical side.

Recommended revision. *Rotalipora ticinensis* (Gandolfi 1942). Robaszynski and others 1979, p. 111, 114, pl. 20, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

***Rotalipora appenninica* (Renz 1936)**



Rotalipora appenninica from the uppermost Albian sediments of the Eastern Atlantic Ocean (Vigo Seamount), DSDP Site 398. Specimen selected and photographed by Melissa S. Sawyer.

Original report. *Globotruncana appenninica* Renz 1936, p. 20, Figure 2.

Original work. Renz, O., 1936. Stratigraphische und mikropalaeontologische Untersuchung der Scaglia (Obere Kreide-Tertiär) im zentralen Apennin. *Eclogae Geologicae Helveticae*, 29, 1-135.

Age. Late Albian-Cenomanian.

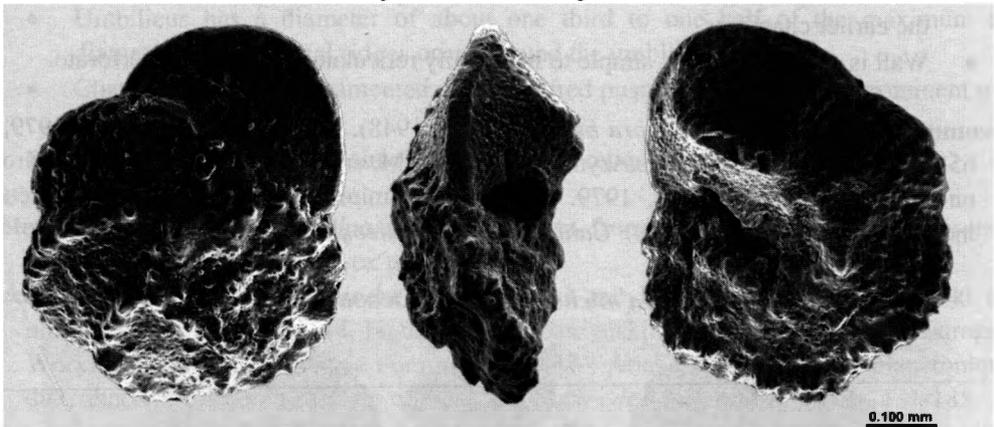
Main morphological features.

- Test presents the chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorso-ventral compression; chambers have a petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved and oblique to the previous whorl and lined with ridges; on the umbilical side they are radial, straight to slightly curved and depressed.

- Test is symmetrical to slightly asymmetrically biconvex in edge view; periphery is angular and with a keel on all the chambers of the final whorl.
- Main aperture is a medium high arch in extraumbilical-umbilical position and is bordered by an imperforate lip.
- Supplementary apertures are situated at the suture base in the umbilical region between the earlier chambers of the final whorl and on the sutures between the last-formed ones.
- Umbilicus has a diameter of about one fifth to one fourth of the maximum test diameter; periumbilical ridges occur around the umbilical region.
- Chamber surface is mostly smooth; scattered pustules can occur over the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Recommended revision. *Rotalipora appenninica* (Renz 1936). Robaszynski and others 1979, p. 59, 64, pl. 4, Figures 1-3, pl. 5, Figures 1-3. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

***Rotalipora brotzeni* (Sigal 1948)**



Rotalipora brotzeni from the lower Cenomanian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Thalmaninella brotzeni* Sigal 1948, p. 102, pl. 1, Figure 5, pl. 2, Figures 6-7.

Original work. Sigal, J., 1948. Notes sur les genres de Foraminifères *Rotalipora* Brotzen 1942 et *Thalmaninella*. Famille des Globorotaliidae. *Revue de l'Institut Français du Pétrole et Annales des Combustibles liquides*, 3(4), 95-103.

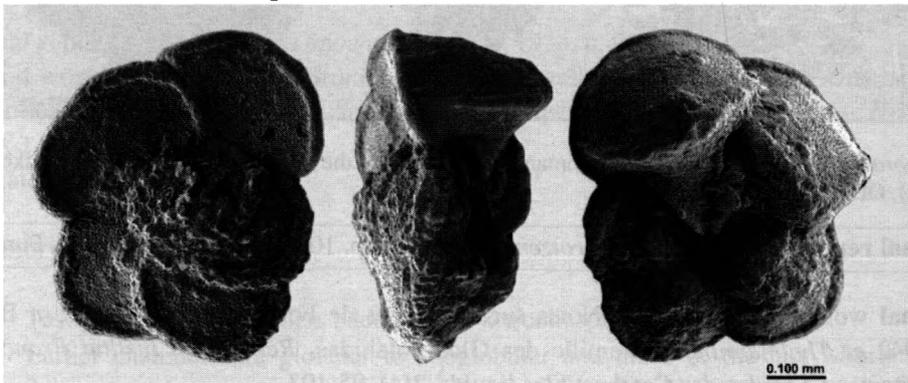
Age. Latest Albian-Cenomanian.

Main morphological features.

- Test presents the chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorso-ventral compression; chambers have a petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight to slightly curved, oblique to the previous whorl and lined with ridges; on the umbilical side they are radial, straight to slightly curved and lined with weak ridges.
- Test is asymmetrically biconvex in edge view, with a more convex umbilical side.
- Periphery is angular and with a keel on all the chambers of the final whorl.
- Main aperture is a medium high arch in extraumbilical-umbilical position and is bordered by an imperforate lip.
- Supplementary apertures are situated at the suture base in the sutures between the last-formed one or two chambers.
- Umbilicus has a diameter of about one fourth to one fifth of the maximum test diameter.
- Periumbilical ridges occur around the umbilical region.
- Chamber surface is ornamented with scattered pustules that are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Recommended revision. *Rotalipora brotzeni* (Sigal 1948). Robaszynski and others 1979, p. 65, 68, pl. 6, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

Rotalipora micheli Sacal and Debourle 1957



Rotalipora micheli from the lower Cenomanian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Rotalipora (Rotalipora) micheli* Sacal and Debourle 1957, p. 58, pl. 25, Figures 4-5.

Original work. Sacal, V., Debourle, A., 1957. Foraminifères d'Aquitaine 2^e partie. Peneroplidae a Victoriellidae. *Mémoires de la Société Géologique de France*, 78, 1-87.
Age. Latest Albian-Cenomanian.

Main morphological features.

- Test presents the chambers added in a very low, nearly flat to low trochospire.
- Earlier chambers are globular to subglobular and dorsally compressed; chambers have a petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight to slightly curved, oblique to the previous whorl and lined with well-developed ridges; on the umbilical side they are radial, straight to slightly curved and lined with weak ridges between the earlier chambers of the final whorl and depressed between the last-formed ones.
- Test is plano-convex, with a strongly inflated umbilical side; one peripheral keel occurs on all the chambers of the final whorl.
- Main aperture is a medium high arch in extraumbilical-umbilical position and is bordered by an imperforate lip; supplementary apertures are situated at the suture base in the umbilical region between the earlier chambers of the final whorl and on the sutures between the last-formed ones.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter; periumbilical ridges occur around the umbilical region.
- Chamber surface is ornamented with scattered pustules that are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Notes on identification. *Rotalipora micheli* differs from *R. appenninica* and *R. brotzeni* mainly by having plano-convex test.

Recommended revision. *Rotalipora micheli* Sacal and Debourle 1957. Robaszynski and others 1979, p. 91, 94, pl. 14, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

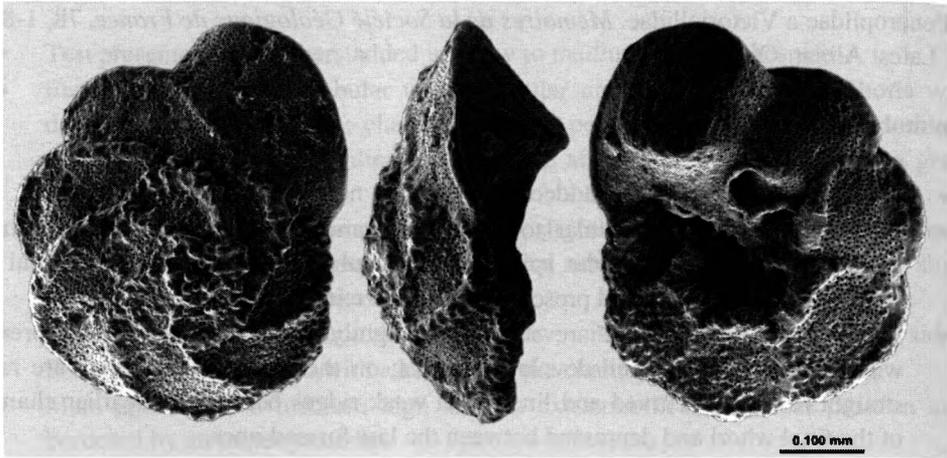
Original report. *Rotalipora globotruncanoides* Sigal 1948, p. 100, pl. 1, Figure 4, pl. 2, Figures 3-5.

Original work. Sigal, J., 1948. Notes sur les genres de Foraminifères *Rotalipora* Brotzen 1942 et *Thalmaninella*. Famille des Globorotaliidae. *Revue de l'Institut Français du Pétrole et Annales des Combustibles liquides*, 3(4), 95-103.

Age. Cenomanian.

Main morphological features.

- Test presents the chambers added in a low to medium high trochospire.

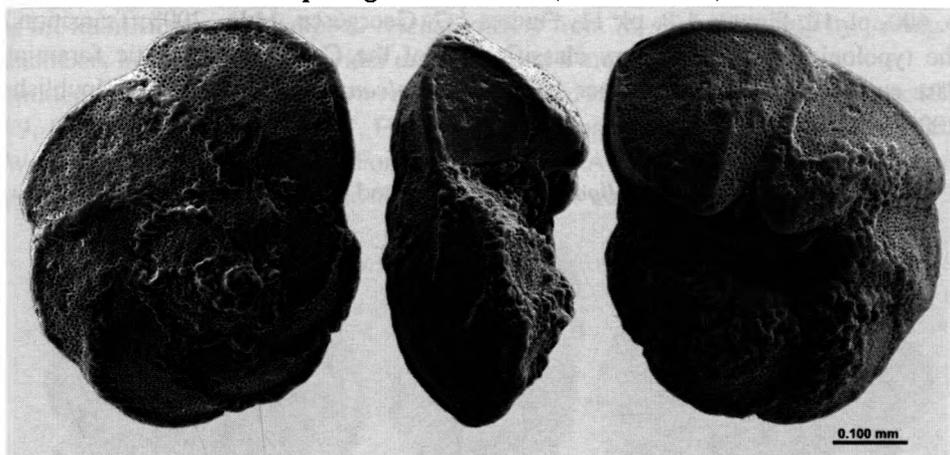
Rotalipora globotruncanoides Sigal 1948

Rotalipora globotruncanoides from the lower Cenomanian sediments of the Western Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

- Earlier chambers are globular to subglobular and those of the last whorls with a dorso-ventral compression; chambers have a subtriangular shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight to curved, oblique to the previous whorl and lined with well-developed ridges; on the umbilical side they are radial, straight to curved and lined with well-developed ridges between the earlier chambers of the final whorl and depressed between the last-formed ones.
- Test is slightly asymmetrically biconvex in edge view, with a more convex spiral side; periphery is angular and with a keel on all the chambers of the final whorl.
- Main aperture is a medium high arch in extraumbilical-umbilical position and is bordered by an imperforate lip; supplementary apertures are situated at the suture base in the umbilical region between the earlier chambers of the final whorl and on the sutures between the last-formed ones.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter; periumbilical ridges occur around the umbilical region.
- Chamber surface is ornamented with scattered pustules that are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Notes on identification. *Rotalipora globotruncanoides* differs from *R. brotzeni* mainly by having higher trochospire and sutural ridges that occur on between most of the chambers on the umbilical side.

Revision. This species was not reviewed since its description.

Rotalipora greenhornensis (Morrow 1934)

Rotalipora greenhornensis from the uppermost Cenomanian sediments of the Washington State (USA) illustrated by Georgescu (2008), plate 10, Figures 1-2.

Original report. *Globorotalia greenhornensis* Morrow 1934, p. 199, pl. 31, Figure 1.

Original work. Morrow, A.L., 1934. Foraminifera and ostracoda of the Upper Cretaceous of Kansas. *Journal of Paleontology*, 8, 186-205.

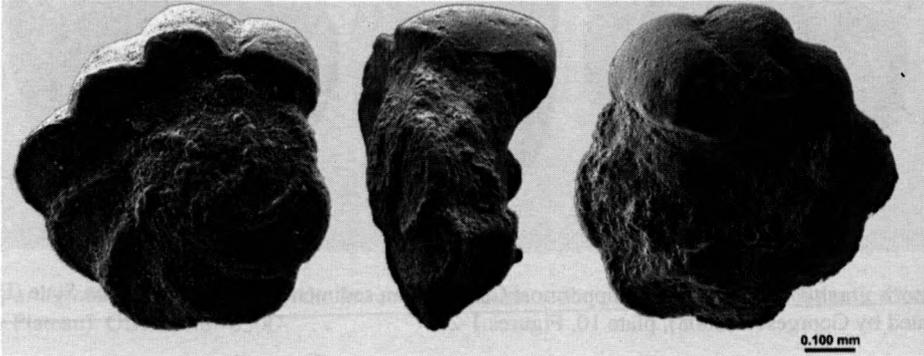
Age. Cenomanian.

Main morphological features.

- Test presents the chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorso-ventral compression; chambers have a subtriangular to petaloid shape on the spiral side and occasionally with a backward extension, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight to curved, oblique to the previous whorl and lined with well-developed ridges; on the umbilical side they are radial, straight to curved and lined with well-developed ridges between the earlier chambers of the final whorl and depressed between the last-formed ones.
- Test is asymmetrically biconvex in edge view, with a more convex umbilical side; periphery is angular and with a keel on all the chambers of the final whorl.
- Main aperture is a medium high arch in extraumbilical-umbilical position and is bordered by a backward oriented porticus.
- Supplementary apertures are situated at the suture base in the umbilical region.
- Umbilicus is often irregular in shape, with a maximum dimension of one third to one half of the maximum test diameter; periumbilical ridges occur around the umbilical region.
- Chamber surface is ornamented with scattered pustules that are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Recommended revision. *Thalmaninella greenhornensis* (Morrow 1934). Georgescu 2008, p. 600, pl. 10, Figures 1-8, pl. 11, Figures 1-7. Georgescu, M.D., 2008. Transition from the typological to evolutionary classification of the Cretaceous planktic foraminifera: case study of *Anaticinella* Eicher 1973. *Micropaleontology*, 55, 589-616. [published in 2009].

***Rotalipora reicheli* Mornod 1949**



Rotalipora reicheli from the middle Cenomanian sediments of the East Indian Ocean (Exmouth Plateau), ODP Hole 762C.

Original report. *Globotruncana (Rotalipora) reicheli* Mornod 1949, p. 583, Figures 5: 4, 6: 1-3.

Original work. Mornod, L., 1949. Les Globorotalidés du Crétacé supérieur du Montsalvens (Prealpes fribourgeoises). *Eclogae Geologicae Helvetiae*, 42, 573-596. [published in 1950]

Age. Middle-late Cenomanian.

Main morphological features.

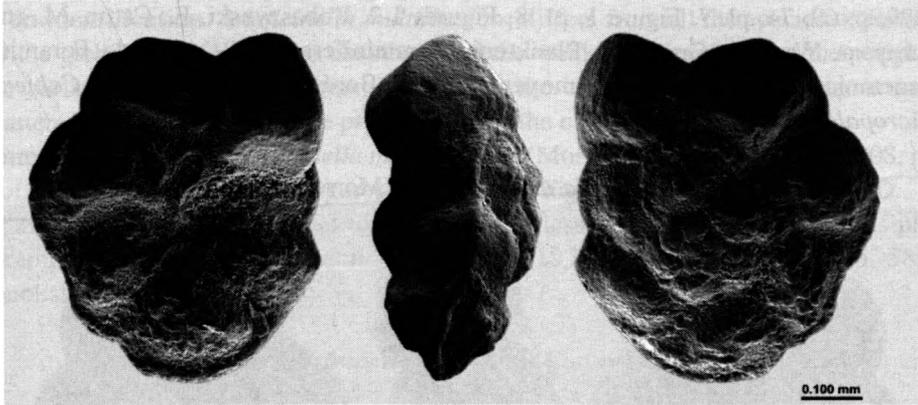
- Test presents the chambers added in a low, nearly flat trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorsal compression; chambers have a subtriangular to petaloid shape on the spiral side and subrectangular on the umbilical side.
- Sutures on the spiral side are straight to curved, oblique to the previous whorl and lined with well-developed ridges; on the umbilical side they are straight to curved and oblique to the umbilical region.
- Test is plano-convex, with a strongly inflated umbilical side; one peripheral keel is developed on all the chambers of the final whorl.
- Main aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a backward oriented porticus; supplementary apertures are situated at the suture base between the last-formed chambers in the umbilical region.
- Umbilicus is circular or irregular in shape; well-developed periumbilical ridges occur around it.
- Chamber surface is ornamented with scattered pustules that are more prominent over the earlier chambers.

- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Notes on identification. *Rotalipora reicheli* differs from *R. micheli* mainly by having more chambers in the final whorl, wider umbilicus and a more irregular coiling.

Recommended revision. *Rotalipora reicheli* Mornod 1950. Robaszynski and others 1979, p. 99, 106, pl. 16, Figure 1, pl. 17, Figure 1. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

***Rotalipora cushmani* (Morrow 1934)**



Rotalipora cushmani from the upper Cenomanian sediments of the East Indian Ocean (Exmouth Plateau), ODP Hole 762C.

Original report. *Globorotalia cushmani* Morrow 1934, p. 199, pl. 31, Figures 2, 4.

Original work. Morrow, A.L., 1934. Foraminifera and ostracoda of the Upper Cretaceous of Kansas. *Journal of Paleontology*, 8, 186-205.

Age. Late Cenomanian.

Main morphological features.

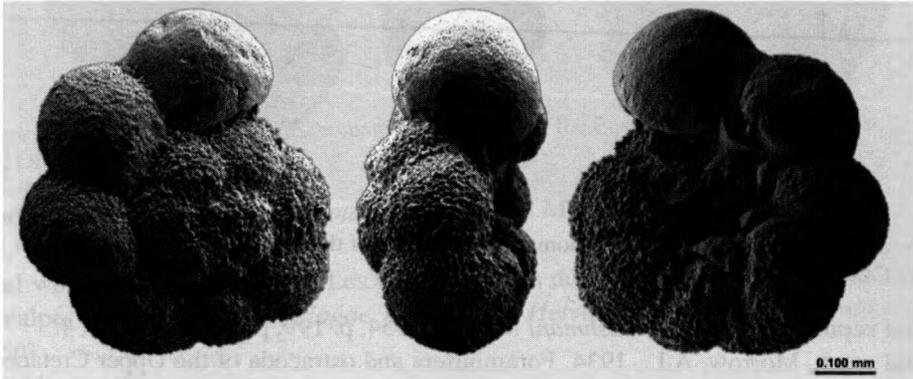
- Test presents the chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorso-ventral compression; chambers have a subrectangular shape on the spiral side, are subtriangular on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved and oblique to the previous whorl and lined with well-developed ridges.
- On the umbilical side the sutures are radial, straight to slightly curved and depressed.
- Test is asymmetrically biconvex or convex-concave in edge view; periphery is angular and with a keel on all the chambers of the final whorl.
- Main aperture is a medium high arch in extraumbilical-umbilical position and is bordered by an imperforate flap.
- Supplementary apertures are situated in sutural position.

- Umbilicus has a diameter of about one third to one half of the maximum test diameter.
- Chamber surface is ornamented with scattered large-sized pustules with irregular shape, which are concentrated over the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Notes on identification. *Rotalipora cushmani* is characterized by the supplementary apertures in sutural position.

Recommended revision. *Rotalipora cushmani* (Morrow 1934). Robaszynski and others 1979, p. 69, 74, pl. 7, Figure 1, pl. 8, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 1, 1-185.

***Anaticinella multiloculata* (Morrow 1934)**



Anaticinella multiloculata from the uppermost Cenomanian sediments of the Washington State (USA) illustrated by Georgescu (2008), plate 7, Figures 1-3.

Original report. *Globorotalia ? multiloculata* Morrow 1934, p. 200, pl. 31, Figures 3, 5.

Original work. Morrow, A.L., 1934. Foraminifera and ostracoda of the Upper Cretaceous of Kansas. *Journal of Paleontology*, 8, 186-205.

Age. Late Cenomanian-early Turonian.

Main morphological features.

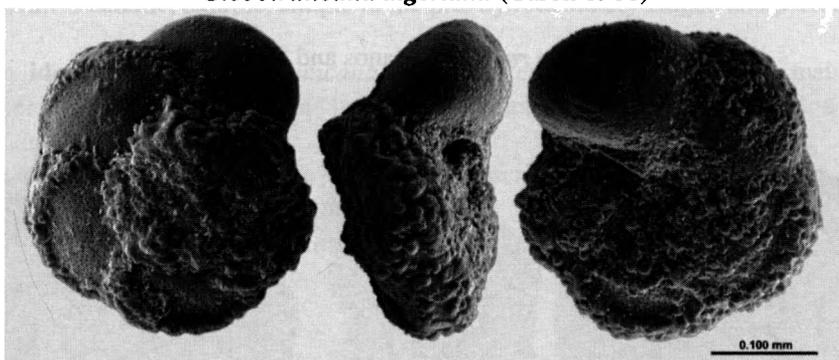
- Test presents the chambers added in a low to medium high trochospire.
- Chambers are globular to subglobular, have a subrectangular shape on both test sides, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, straight to slightly curved and radial on both sides of the test.
- Test is asymmetrically biconvex or convex-concave in edge view, with a more convex spiral side; periphery is rounded to broadly rounded and with a weak keel in incipient state of development on the earlier one to four chambers of the final whorl.

- Main aperture is a medium high arch in extraumbilical-umbilical position and is bordered by an imperforate porticus; supplementary apertures are situated in umbilical position.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.
- Chamber surface is ornamented with scattered pustules, which can fuse to form rugosities especially over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Anaticinella multiloculata* differs from all the species of *Rotalipora* by the globular to subglobular chambers and the weak keel developed at the periphery of the earlier one to four chambers. In addition the chamber surface is ornamented with scattered pustules that are more prominent over the earlier chambers.

Recommended revision. *Anaticinella multiloculata* (Morrow 1934). Georgescu 2008, p. 598, pl. 7, Figures 1-7, pl. 8, Figures 1-6, pl. 9, Figures 1-7. Georgescu, M.D., 2008. Transition from the typological to evolutionary classification of the Cretaceous planktic foraminifera: case study of *Anaticinella* Eicher 1973. *Micropaleontology*, 55, 589-616. [published in 2009].

Globotruncana algeriana (Caron 1966)



Globotruncana algeriana from the lower Turonian sediments of the East Indian Ocean (Exmouth Plateau), ODP Hole 762C.

Original report. *Praeglobotruncana algeriana* Caron 1966, p. 74, pl. 2, Figure 5.

Original work. Caron, M., 1966. Globotruncanidae du Crétacé supérieur du synclinal de la Gruyère (Préalpes Médiannes, Suisse). *Revue de Micropaléontologie*, 9, 68-93.

Age. Late Cenomanian-middle Turonian.

Main morphological features.

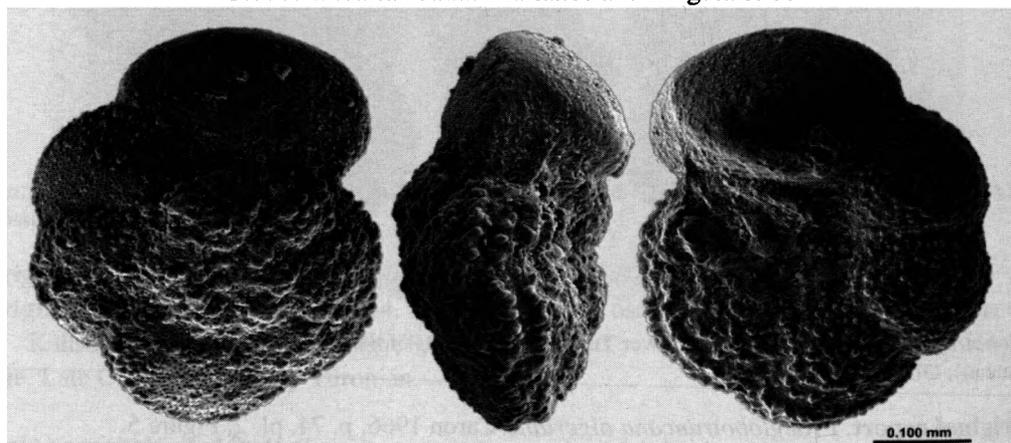
- Test presents the chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorso-ventral compression; chambers have a petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.

- Sutures on the spiral side are curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel.
- Sutures on the umbilical side are radial, straight to slightly curved and depressed.
- Test is convex-concave in edge view; periphery presents a double truncation and two keels separated by an imperforate peripheral band; the two keels are well-developed over the earlier chambers of the final whorl and can be absent over the last-formed one or two chambers.
- Aperture is a medium high arch in extraumbilical-umbilical position and is bordered by an imperforate lip.
- Chamber surface is ornamented with scattered pustules that are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Notes on identification. *Globotruncana algeriana* differs from the species of *Praeglobotruncana* mainly by the periphery with one imperforate peripheral band bordered by two well-developed keels over the earlier chambers of the final whorl.

Recommended revision. *Dicarinella algeriana* (Caron 1966). Robaszynski and others 1979, p. 57, 60, pl. 50, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 2, 1-181.

***Globotruncana roddai* Marianos and Zingula 1966**



Dicarinella roddai from the uppermost Cenomanian sediments of the Washington State (USA).

Original report. *Globotruncana roddai* Marianos and Zingula 1966, p. 340, pl. 39, Figure 5.

Original work. Marianos, A.W., Zingula, R.P., 1966. Cretaceous planktonic foraminifers from Dry Creek, Tehama County, California. *Journal of Paleontology*, 40, p. 328-342.

Age. Latest Cenomanian-middle Turonian.

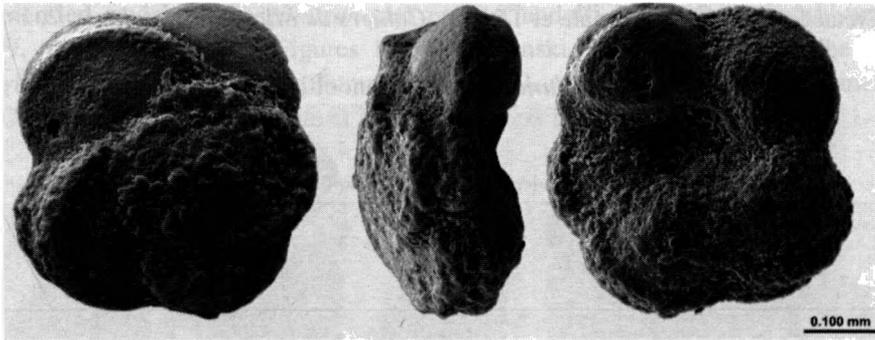
Main morphological features.

- Test presents the chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorso-ventral compression; chambers have a petaloid shape on the spiral side, and subtrapezoidal on the umbilical one.
- Chambers overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved and oblique to the previous whorl and lined with ridges, which are more prominent between the earlier chambers, and represent the continuation of the peripheral keel.
- Sutures on the umbilical side are radial, straight to slightly curved and depressed.
- Test is biconvex in edge view, symmetrical to slightly asymmetrical.
- Periphery is subangular, with one imperforate peripheral keel ordered by two weak keels consisting of aligned pustules; the two keels are more prominent over the earlier chambers.
- Umbilicus has a diameter of about one third of the maximum test diameter.
- Aperture is a low arch in extraumbilical-umbilical position and is bordered by an imperforate lip.
- Chamber surface is ornamented with scattered pustules that are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Notes on identification. *Globotruncana roddai* differs from *G. algeriana* mainly by the weaker keels consisting of aligned pustules and more prominent ornamentation consisting of scattered pustules.

Revision. This species was not reviewed since its description.

***lobotruncana canaliculata* (Reuss 1854)**



Globotruncana canaliculata from the lower Turonian sediments of the East Indian Ocean (Exmouth Plateau), ODP Hole 763B.

Original report. *Rosalina canaliculata* Reuss 1854, p. 70, pl. 26, Figure 4.

Original work. Reuss, A.E., 1854. Beiträge zur Charakteristik der Kreideschichten in den Ostalpen, besonders im Gosauthale und am Wolfgangsee. *Denkschriften der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe* 7, 1-156.

Age. Turonian-Santonian.

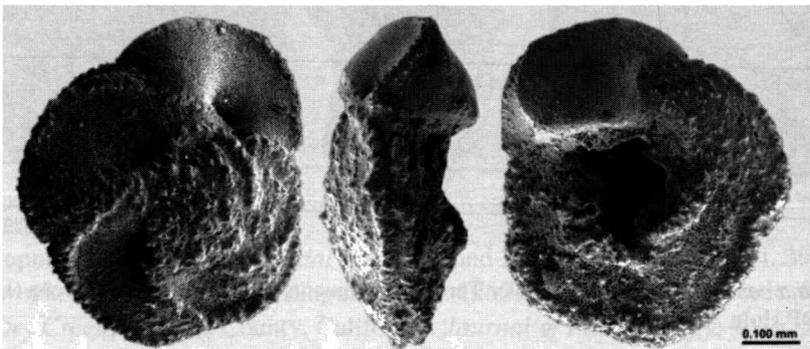
Main morphological features.

- Test presents the chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorso-ventral compression.
- Chambers have a petaloid to subtriangular shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel.
- Sutures on the umbilical side are radial, straight to curved and depressed.
- Test is convex-concave or with quasi-parallel sides in edge view; periphery presents a double truncation and two keels separated by an imperforate peripheral band; the two keels are well-developed on all the chambers of the final whorl.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate lip.
- Chamber surface is ornamented with scattered pustules that are more prominent over the earlier chambers.
- The last-formed one to four chambers appear smooth.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Notes on identification. *Globotruncana canaliculata* differs from *G. algeriana* mainly by the two well-developed keels that occur on all the chambers of the final whorl.

Recommended revision. *Dicarinella canaliculata* (Reuss 1854). Robaszynski and others 1979, p. 67, 70, pl. 53, Figures 1-3. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 2, 1-181.

Globotruncana renzi Gandolfi 1942



Two specimens of *Globotruncana renzi* from the upper Turonian sediments of the Caribbean region (Venezuelan Basin), DSDP Site 150.

Original report. *Globotruncana renzi* Gandolfi 1942, p. 124, pl. 3, Figure 1, text-Figure 45.

Original work. Gandolfi, F., 1942. Ricerche micropaleontologiche e stratigrafiche sulla scaglia e sul flysch cretacici dei Dintorni di Balerna (Canton Ticino). *Rivista Italiana di Paleontologia*, 20(4), 5-160.

Age. Turonian-Santonian.

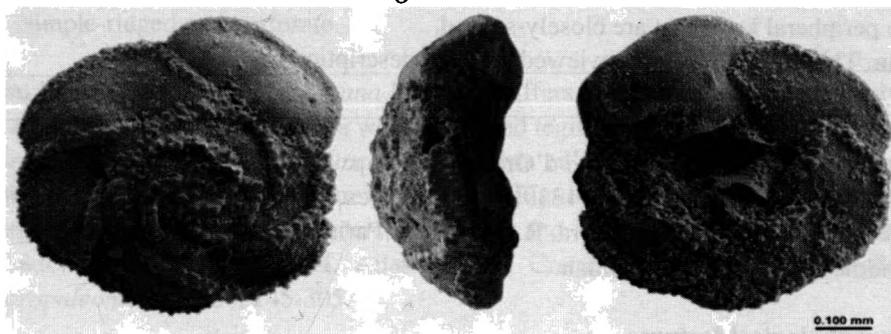
Main morphological features.

- Test presents the chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorso-ventral compression; chambers have subtriangular, occasionally petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight to curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel and the periumbilical ridges.
- Test is symmetrical or slightly asymmetrically biconvex.
- Periphery is angular, with two well-developed keels on the earlier chambers of the final whorl and one keel on the last-formed chambers.
- Aperture is a medium high arch in umbilical position and is bordered by an imperforate porticus, which is rarely preserved.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Notes on identification. *Globotruncana renzi* differs from *G. canaliculata* mainly by the peripheral structures, which are reduced to one keel on the last-formed chambers.

Recommended revision. *Marginotruncana renzi* (Gandolfi 1942). Robaszynski and others 1979, p. 129, 133, pl. 69, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 2, 1-181.

***Globotruncana angusticarinata* Gandolfi 1942**



Globotruncana angusticarinata from the Coniacian sediments of the Caribbean region (Yucatan Outer Shelf), DSDP Site 95.

Original report. *Globotruncana linnei angusticarinata* Gandolfi 1942, p. 127, text-Figure 46.

Original work. Gandolfi, F., 1942. Ricerche micropaleontologiche e stratigrafiche sulla scaglia e sul flysch cretacici dei Dintorni di Balerna (Canton Ticino). *Rivista Italiana di Paleontologia*, 20(4), 5-160.

Age. Turonian-earliest Campanian.

Main morphological features.

- Test presents the chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with dorso-ventral compression; chambers have subtriangular, occasionally petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Test surface on the spiral side is undulated, with one central depression on each of the last-formed one to four chambers.
- Sutures on the spiral side are straight to curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges, which are more prominent over the earlier chambers that connect the umbilical keel with the periumbilical ridges.
- Test is symmetrical or slightly asymmetrically biconvex in edge view.
- Periphery is angular, with two well-developed and closely-spaced keels on the earlier chambers of the final whorl and one keel on the last-formed chambers.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical position and is bordered by a perforate or imperforate porticus.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Notes on identification. *Globotruncana angusticarinata* differs from *G. renzi* mostly by the two peripheral keels that are closely-spaced.

Revision. This species was not reviewed since its description.

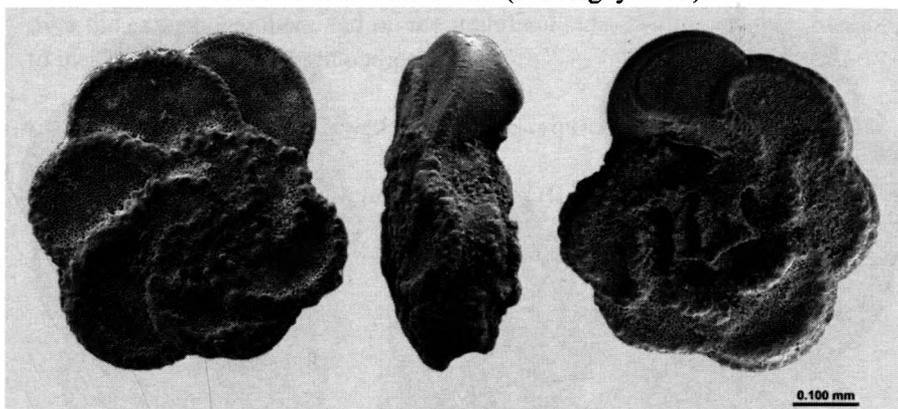
Original report. *Rosalina linneiana* d'Orbigny 1839, p. 101, pl. 5, Figures 10-12.

Original work. Orbigny, A. d', 1839. Foraminifères. In: *Histoire physique, politique et naturelle de l'Île de Cuba* (Sagra, R. de la, Ed.). Paris: Bouchard-Huzard, 1-224.

Age. Middle Turonian-Maastrichtian.

Main morphological features.

- Test presents the chambers added in a low, nearly flat to medium high trochospire.

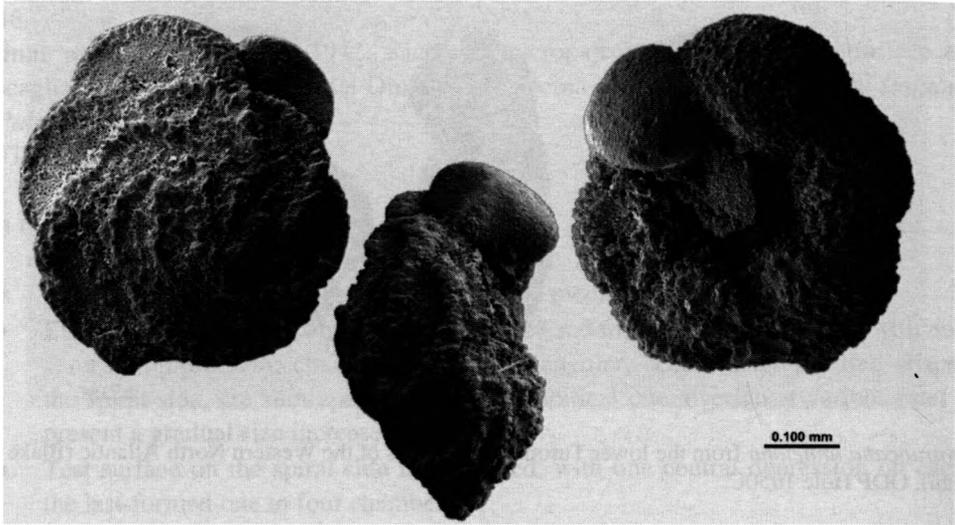
Globotruncana linneiana (d'Orbigny 1839)

Globotruncana linneiana from the lower Turonian sediments of the Western North Atlantic (Blake Plateau), ODP Hole 1050C.

- Earlier chambers are globular to subglobular and those of the last whorls with dorso-ventral compression; chambers have subtriangular, occasionally petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges.
- Test is convex-concave or has nearly parallel sides in edge view.
- Periphery presents a double truncation, with two well-developed and keels bordering a wide imperforate band on all the chambers of the final whorl.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a tegillum.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers. Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Notes on identification. *Globotruncana linneiana* differs from *G. canaliculata* mainly by the periapertural structure, which is a well-developed tegillum rather than an imperforate lip.

Recommended revision. *Globotruncana linneiana* (d'Orbigny 1839). Robaszynski and others 1984, p. 200, pl. 13, Figures 1-4, pl. 14, Figures 1-5. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Globotruncana biconvexa Samuel and Salaj 1962

Globotruncana biconvexa from the lower Turonian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Globotruncana biconvexa biconvexa* Samuel and Salaj 1962, p. 316, pl. 9, Figure 4.

Original work. Samuel, O., Salaj, J. 1962, Nové druhy foraminifer z kridley a paleogénu Západných Karpát. *Geologické Prace*, 62, 313-320.

Age. Late Turonian.

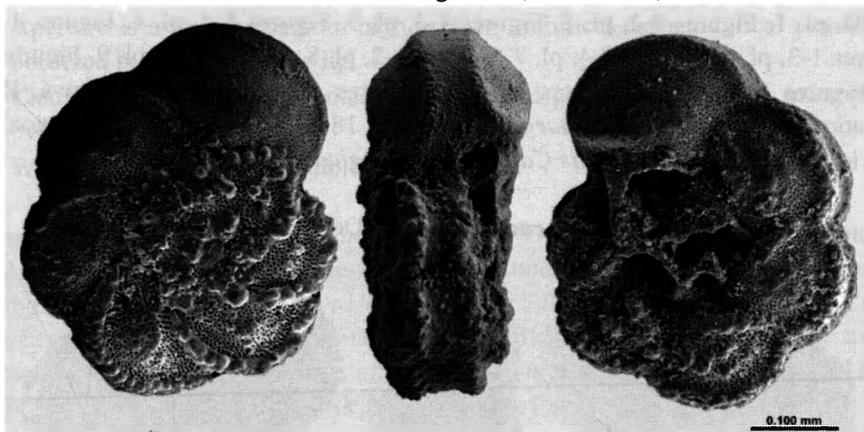
Main morphological features.

- Test presents the chambers added in a medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with dorso-ventral compression; chambers have subtriangular-petaloid shape on the spiral side, subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved, more rarely straight, and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are depressed and radial.
- Test is symmetrically or slightly asymmetrically biconvex in edge view.
- Periphery is angular and with one peripheral keel on most of the chambers of the final whorl; a second keel is weaker, situated on the umbilical side and consists of aligned pustules.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter; there are no peripheral ridges but irregular agglomerations of pustules around the umbilical region.
- Aperture is a medium high arch in extraumbilical-umbilical position and is bordered by a tegillum.

- Chamber surface is ornamented with scattered pustules, which are more prominent over the earlier chambers and on the umbilical side. Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Revision. This species was not reviewed since its description.

Globotruncana marginata (Reuss 1845)



Globotruncana marginata from the upper Santonian sediments of the Caribbean region (Yucatan outer shelf), DSDP Site 95.

Original report. *Rosalina marginata* Reuss 1845, p. 36, pl. 8, Figures (54-?), 74, pl. 13, Figure 68.

Original work. Reuss, A.E., 1845. *Die Versteinerungen der Böhmisches Kreideformation*. Stuttgart: E. Schweizerbart'sche Verlagsbuchhandlung und Druckerei, 58 p.

Age. Late Turonian-Maastrichtian.

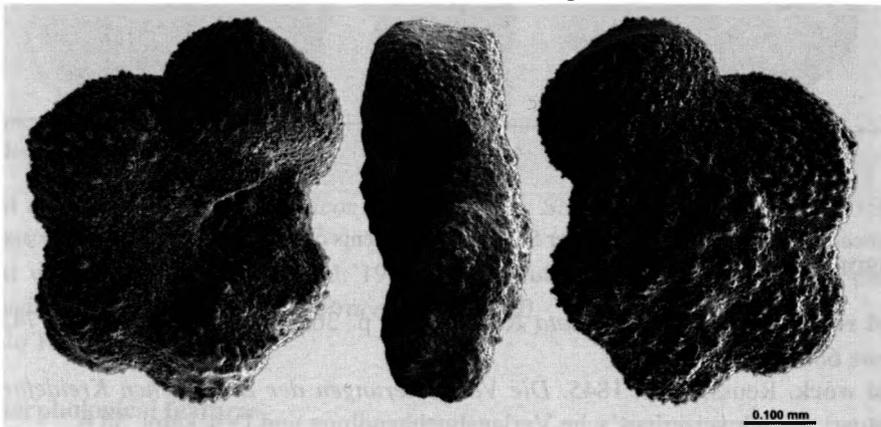
Main morphological features.

- Test presents the chambers added in a low, nearly flat to medium high trochospire.
- Earlier chambers are globular to subglobular, those of the last whorls with dorso-ventral compression but retain a distinct inflation; chambers have subtriangular then petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges.
- Test is symmetrically or slightly asymmetrically biconvex in edge view, with a higher spiral side.
- Periphery presents a double truncation, with two well-developed keels bordering a wide imperforate band on all the chambers of the final whorl.

- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a tegillum.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers. Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Recommended revision. *Globotruncana marginata* Reuss 1845. Štemproková-Jírová 1970, p. 304, pl. 1, Figures 1-2, pl. 2, Figures 1-3, pl. 3, Figures 1-4, pl. 4, Figures 1-4, pl. 5, Figures 1-3, pl. 6, Figures 1-4, pl. 7, Figures 1-2, pl. 8, Figures 1-3, pl. 9, Figures 1-4, pl. 10, Figures 1-4, pl. 11, Figures 1-3, text-Figures 1-2. Štemproková-Jírová, D., 1970. Variation of *Globotruncana marginata* (Reuss, 1845) (Foraminifera, Protozoa) and its type locality. *Acta Universitatis Carolinae-Geologica*, 4, 303-318.

Globotruncana cachensis Douglas 1966



Globotruncana cachensis from the upper Turonian sediments of the East Indian Ocean (Exmouth Plateau), ODP Hole 763B illustrated by Georgescu and Heikkinen in Georgescu and others (2013), plate 9, Figures 1-3.

Original report. *Globotruncana cachensis* Douglas in Douglas and Sliter 1966, p. 108, pl. 5, Figure 5.

Original work. Douglas, R.G., Sliter, W.V., 1966. Regional distribution of some Cretaceous Rotaliporidae and Globotruncanidae (Foraminiferida) within North America. *Tulane Studies in Geology*, 4, 89-131.

Age. Late Turonian.

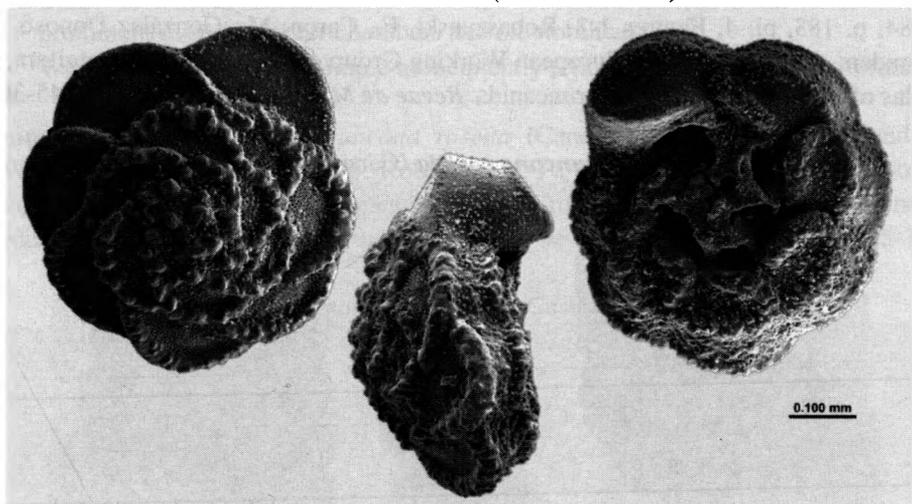
Main morphological features.

- Test presents the chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorso-ventral compression; chambers have a petaloid shape on the spiral side and are subtrapezoidal on the umbilical one.
- Sutures on the spiral side are depressed, oblique to the previous whorl and straight to slightly curved; on the umbilical side the sutures depressed and radial.

- Test is asymmetrical in edge view, convex-concave.
- Periphery presents a double truncation and two weak keels separated by a wide imperforate peripheral band; the two keels are often more prominent over the earlier chambers of the final whorl and can be absent over the last-formed one or two chambers.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter.
- Aperture is a low to medium high arch in umbilical-extraumbilical position and is bordered by an imperforate lip.
- Chamber surface is ornamented with scattered pustules, which are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Falsotruncana cachensis* (Douglas in Douglas and Sliter 1966). Georgescu and Heikkinen in Georgescu and others 2013, p. 83, pl. 9, Figures 1-9. Georgescu, M.D., Sawyer, M.S., Heikkinen, C.J., Burke, R.M., 2013. New and revised Cretaceous (Albian-Campanian) planktic foraminifera of the Atlantic, Indian and Pacific Oceans. In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 59-100.

Globotruncana arca (Cushman 1926)



Globotruncana arca from the upper Maastrichtian sediments of the East Indian Ocean (Wombat Plateau), ODP Hole 761B.

Original report. *Pulvinulina arca* Cushman 1926, p. 23, pl. 3, Figure 1.

Original work. Cushman, J.A., 1926. Some foraminifera from the Mendez Shale of eastern Mexico. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 2, 16-28.

Age. Late Santonian-Maastrichtian.

Main morphological features.

- Test presents the chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with dorso-ventral compression; chambers have subtriangular to petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges.
- Test is asymmetrical in edge view, convex-concave.
- Periphery presents a double truncation, with two well-developed keels bordering a wide imperforate band on all the chambers of the final whorl; the umbilical keel is tilted towards the umbilical side.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a tegillum.
- Chamber surface is ornamented with rare scattered pustules.
- Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Recommended revision. *Globotruncana arca* (Cushman 1926). Robaszynski and others 1984, p. 183, pl. 4, Figures 1-3. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Globotruncana rosetta (Carsey 1926)



Globotruncana rosetta from the upper Maastrichtian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Globigerina rosetta* Carsey 1926, p. 44, pl. 5, Figure 3.

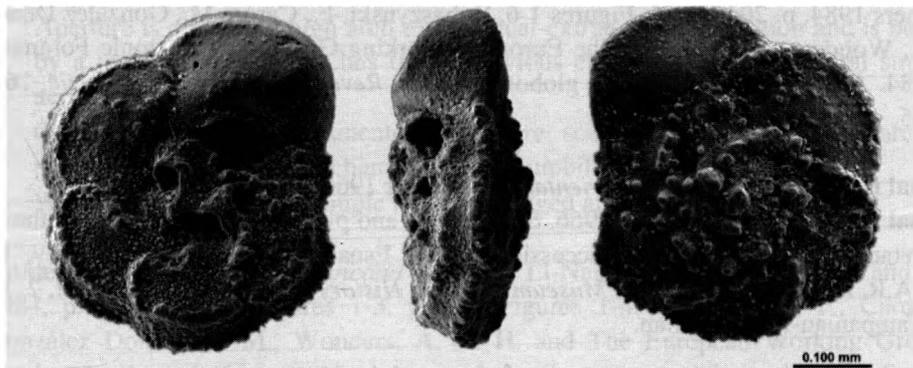
Original work. Carsey, D.O., 1926. Foraminifera of the Cretaceous of central Texas. *University of Texas Bulletin*, 2612, 5-56.

Age. Campanian-Maastrichtian.

Main morphological features.

- Test presents the chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with dorso-ventral compression; chambers have subtriangular to petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel.
- Sutures on the umbilical side are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges; the sutural ridges are often obscured due to the overlapping by the successively added chambers.
- Test is asymmetrically biconvex in edge view, with a more inflated umbilical side.
- Periphery is angular, with two keels bordering an imperforate band on all the chambers of the final whorl; the umbilical keel is weaker than the spiral one and is tilted towards the umbilical side.
- Umbilicus has a diameter of about one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a tegillum, which attaches to the previous chambers across the umbilical area.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Recommended revision. *Globotruncana rosetta* (Carsey 1926). Robaszynski and others 1984, p. 210, pl. 18, Figures 1-5. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

***Globotruncana cretacea* Cushman 1938**

Globotruncana cretacea from the upper Campanian sediments of the Eastern Indian Ocean (Wombat Plateau), ODP Hole 761B.

Original report. *Globotruncana cretacea* Cushman 1938, p. 67, pl. 11, Figure 6.

Original work. Cushman, J.A., 1938. Some new species of rotaliform foraminifera from the American Cretaceous. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 14, 66-71.

Age. Campanian-Maastrichtian.

Main morphological features.

- Test presents the chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with dorso-ventral compression; chambers have petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel.
- Sutures on the umbilical side are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges; the sutural ridges between the last-formed chambers are often obscured due to the successively added chambers and overlapping.
- Test is compressed, convex-concave in edge view; chambers are slightly inflated.
- Periphery is angular, with two keels bordering an imperforate band on all the chambers of the final whorl; the umbilical keel is weaker than the spiral one and tilted towards the umbilical side.
- Umbilicus has a diameter of about one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a tegillum, which attaches to the previous chambers across the umbilical area.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Globotruncana mariei* Banner and Blow 1960. Robaszynski and others 1984, p. 204, pl. 15, Figures 1-6. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

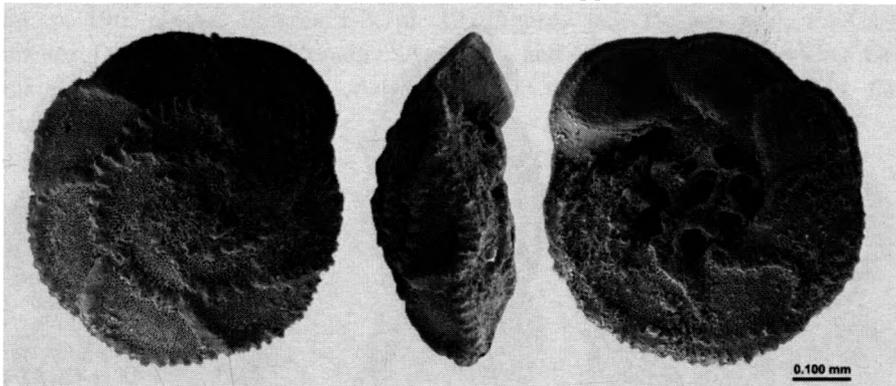
Original report. *Globotruncana orientalis* El-Naggar 1966, p. 125, pl. 12, Figure 4.

Original work. El-Naggar, Z.R., 1966. Stratigraphy and planktonic foraminifera of the Upper Cretaceous-Lower Tertiary succession in the Esna-Idfu region, Nile Valley, Egypt, U.A.R. *Bulletin of the British Museum (Natural History), Geology, Supplement*, 2, 1-291.

Age. Campanian-Maastrichtian.

Main morphological features.

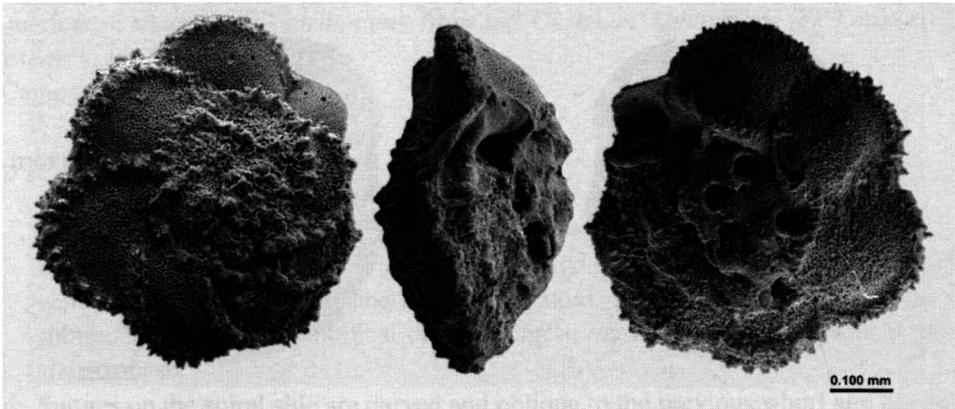
- Test presents the chambers added in a low to medium high trochospire.

Globotruncana orientalis El-Naggar 1966

Globotruncana orientalis from the middle Campanian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

- Earlier chambers are globular to subglobular and those of the last whorls with dorso-ventral compression; chambers have subrectangular shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges.
- Test is asymmetrical in edge view, convex-concave or with a nearly flat umbilical side.
- Periphery is truncate to angular, with two keels bordering an imperforate band; the umbilical keel is weaker, tilted towards the umbilical side and developed only on the earlier chambers of the final whorl.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a tegillum, which attaches to the previous chambers or periapertural structures across the umbilicus.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Recommended revision. *Globotruncana orientalis* El-Naggar 1966. Robaszynski and others 1984, p. 206, pl. 16, Figures 1-3, pl. 17, Figures 1-4. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Globotruncana pembergeri Papp and Küpper 1953

Globotruncana pembergeri from the lower Maastrichtian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Globotruncana (Globotruncana) rosetta pembergeri* Papp and Küpper 1953, p. 35, pl. 1, Figure 1.

Original work. Papp, A., Küpper, K., 1953. Die Foraminiferenfauna von Guttaring und Klein St. Paul (Kärnten). 1. Über Globotruncanen südlich Pemberger bei Klein St. Paul. *Sitzungsberichte der Österreichischen Akademie der Wissenschaften. Mathematisch-Naturwissenschaftliche Klasse*, 162, 31-48.

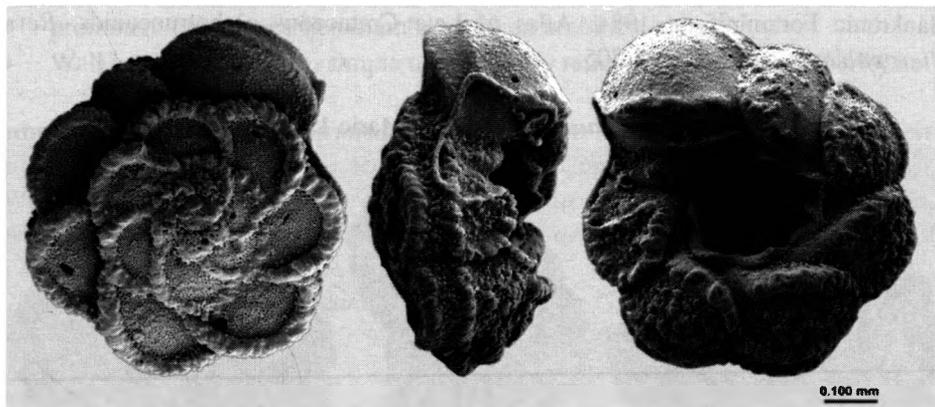
Age. Middle Campanian-Maastrichtian.

Main morphological features.

- Test presents the chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with dorsal compression; chambers have petaloid shape on the spiral side, are subtrapezoidal on the umbilical one and present a gradual size increase.
- Sutures on the spiral side are curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel.
- Sutures on the umbilical side are curved in the direction of coiling and lined with ridges that connect the peripheral structures with the periumbilical ridges.
- Test is asymmetrical in edge view, nearly plano-convex, with a strongly inflated umbilical side.
- Periphery is angular, with one or two keels in the final whorl; the umbilical keel is weaker and can be absent on one to all the chambers of the last whorl.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a tegillum, which attaches to the previous chambers across the umbilical area.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Recommended revision. *Globotruncana* (?) *insignis* Gandolfi 1955. Robaszynski and others 1984, p. 196, pl. 11, Figures 1-3, pl. 12, Figures 1-3. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Globotruncana ventricosa White 1928



Globotruncana ventricosa from the upper Maastrichtian sediments of the North Atlantic Ocean (Orphan Knoll), DSDP Hole 111A.

Original report. *Globotruncana canaliculata ventricosa* White 1928, p. 284, pl. 38, Figure 5.

Original work. White, M.P., 1928. Some index foraminifera of the Tampico Embayment area of Mexico. Part II. *Journal of Paleontology*, 2, 280-317.

Age. Middle Campanian-Maastrichtian.

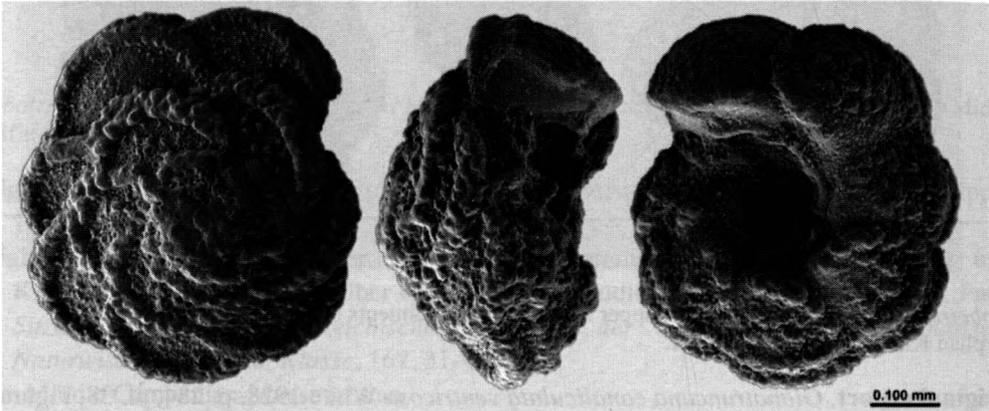
Main morphological features.

- Test presents the chambers added in a low to nearly flat trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with a dorsal compression; chambers have petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel.
- Sutures on the umbilical side are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges.
- Test is plano-convex in edge view, with a strongly inflated umbilical side.
- Periphery presents a double truncation, with two well-developed and keels bordering a wide imperforate band on all the chambers of the final whorl.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position.
- Periapertural structures consist of tegilla.

- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Globotruncana ventricosa* White 1928. Robaszynski and others 1984, p. 214, pl. 20, Figures 1-3, pl. 21, Figures 1-4. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

***Globotruncana rugosa* (Marie 1941)**



Globotruncana rugosa from the upper Maastrichtian sediments of the East Indian Ocean (Wombat Plateau), ODP Hole 761B.

Original report. *Rosalinella rugosa* Marie 1941, p. 240, pl. 36, Figure 340.

Original work. Marie, P., 1941. Les foraminifères de la craie à *Belemnitella mucronata* du Basin de Paris. *Mémoires du Muséum National d'Histoire Naturelle*, 12, 1-296.

Age. Middle Maastrichtian.

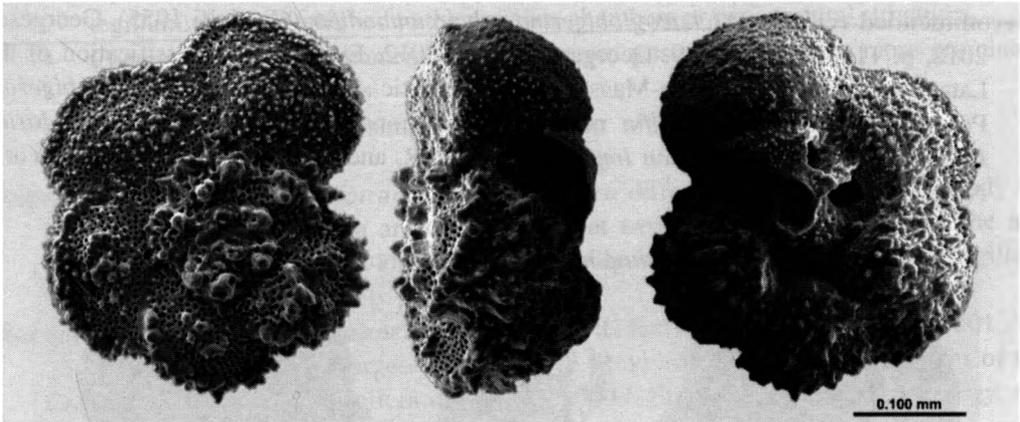
Main morphological features.

- Test presents the chambers added in a medium high to high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls with dorso-ventral compression; chambers have petaloid shape on the spiral side, are subtrapezoidal on the umbilical one, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel.
- Sutures on the umbilical side are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges.
- Test is asymmetrical in edge view, with a highly convex spiral side and flat to slightly concave umbilical side.

- Periphery presents a double truncation and two keels bordering an imperforate band on all the chambers of the final whorl.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a porticus, which is rarely preserved.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple to incipiently reticulately-ridged and perforate.

Recommended revision. *Globotruncana rugosa* (Marie 1941). Robaszynski and others 1984, p. 212, pl. 19, Figures 1-5. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

***Globotruncana subcircumnodifer* Gandolfi 1955**



Globotruncana subcircumnodifer from the uppermost Campanian sediments of Alabama (USA) illustrated by Georgescu (2012), Figures 5: 4-6.

Original report. *Globotruncana* (*Rugoglobigerina*) *circumnodifer subcircumnodifer* Gandolfi 1955, p. 44, pl. 2, Figure 8.

Original work. Gandolfi, F., 1955. The genus *Globotruncana* in northeastern Colombia. *Bulletins of American Paleontology*, 36(155), 1-118.

Age. Late Campanian-Maastrichtian.

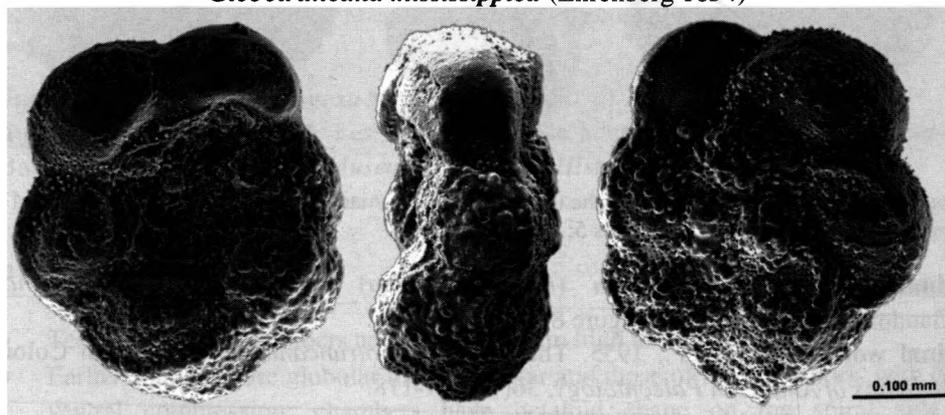
Main morphological features.

- Test presents the chambers added in a low trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl slightly dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.

- Sutures on the spiral side are curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are radial, straight to curved and depressed.
- Test is symmetrically to slightly asymmetrically biconvex in edge view, with a truncate periphery.
- Peripheral structures consist of one imperforate peripheral band bordered by two weak and equally developed keels consisting of aligned pustules.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical position and is bordered by a porticus, which is attached to the previous chambers or periapertural structures.
- Chamber surface is ornamented with scattered pustules, which are more prominent over central portion of the chambers on the spiral side and earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple and perforate.

Recommended revision. *Archaeoglobigerina subcircumnodifer* (Gandolfi 1955). Georgescu 2012, p. 110, Figure 5: 1-9. Georgescu, M.D., 2012. Evolutionary classification of the Late Cretaceous (Coniacian-Maastrichtian) planktic foraminifera *Archaeoglobigerina* Pessagno, 1967 and *Gandolfia* new genus/directional lineage. In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 101-130.

Globotruncana mississippi (Ehrenberg 1854)



Globotruncana mississippi from the upper Campanian of Mississippi (USA) and Alabama (USA) respectively.

Original report. *Planulina mississippi* Ehrenberg 1854, p. 23, pl. 32, part II, Figure 41.

Original work. Ehrenberg, C.G., 1854. *Mikrogeologie*. Leipzig: L. Voss, 374 p.

Age. Late Campanian-early Maastrichtian.

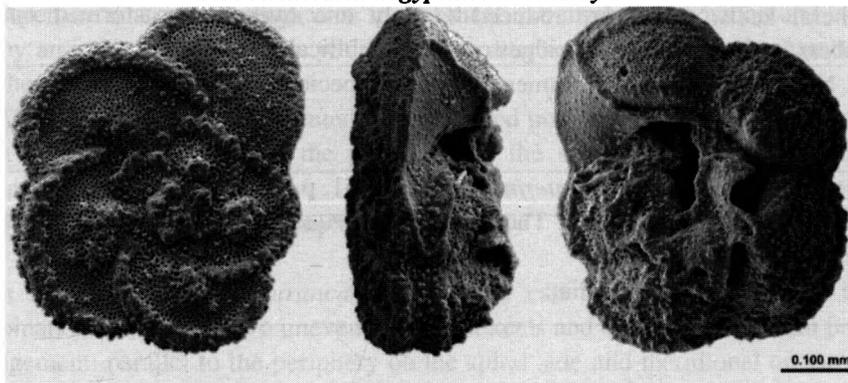
Main morphological features.

- Test presents the chambers added in a low trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved and oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are radial, straight to curved and depressed.
- Test shape is slightly asymmetrical, with almost parallel spiral and umbilical side.
- Periphery is double truncate and with a wide imperforate band bordered by two weak keels, which are more prominent over the earlier chambers.
- Umbilicus has a diameter of about one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical position and is bordered by a perforate tegillum, which is attached to the previous chambers or periapertural structures.
- Chamber surface is ornamented with scattered pustules, which are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globotruncana mississippiica* differs from *G. linneiana* mainly by having weaker keels, which are more prominent over the earlier chambers at the test periphery and lacking sutural and periumbilical ridges on the umbilical side. The tegillum bordering the aperture is rarely preserved.

Recommended revision. *Edgarinella mississippiica* (Ehrenberg 1854). Georgescu 2013, p. 36, pl. 13, Figures 4-8. Georgescu, M.D., 2013. Revised evolutionary systematics of the Cretaceous planktic foraminifera described by C.G. Ehrenberg. *Micropaleontology*, 59, 1-49.

***Globotruncana aegyptiaca* Nakkady 1950**



Two specimens of *Globotruncana aegyptiaca* from the upper Campanian-lower Maastrichtian specimens of the central Pacific Ocean (Mid-Pacific Ocean), Site 463.

Original report. *Globotruncana aegyptiaca* Nakkady 1950, p. 690, pl. 90, Figures 20-22.

Original work. Nakkady, S.E., 1950. Foraminiferal fauna from the Esna Shales and Upper Cretaceous chalk of Egypt. *Journal of Paleontology*, 24, 675-692.

Age. Late Campanian-Maastrichtian.

Main morphological features.

- Test presents the chambers added in a very low, nearly flat trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl with a well-defined dorsal compression; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with weak ridges that connect the umbilical keel with the periumbilical ridges.
- Test shape is plano-convex, with a flat spiral side and strongly inflated umbilical side.
- Periphery is angular with one imperforate peripheral band developed on all the chambers of the final whorl; the peripheral band is bordered by two well-developed keels, which are more prominent over the earlier chambers and are often reduced to only one over the last-formed one or two chambers.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a perforate tegillum.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over central portion of the chambers on the spiral side and earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

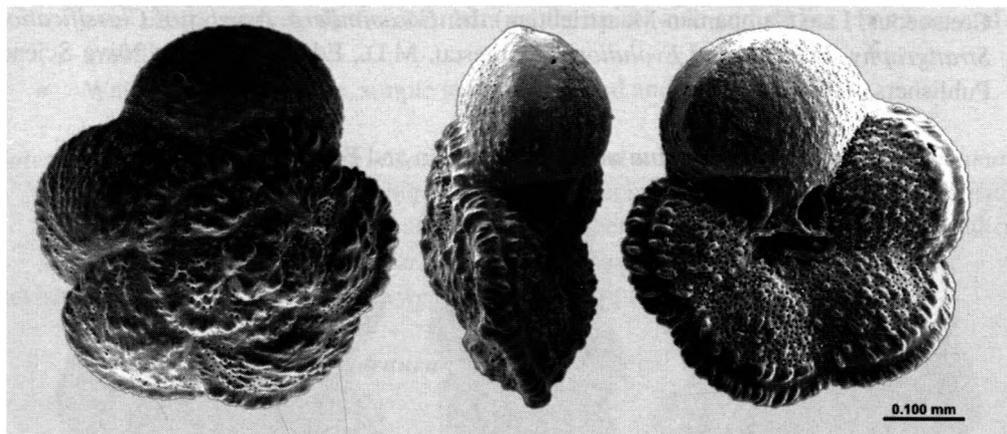
Note on identification. *Globotruncana aegyptiaca* differs from *G. ventricosa* mainly by the peripheral keels, which are reduced to only one over the last-formed one or two chambers, and weaker sutural ridges over the umbilical side.

Revision. No revision can be recommended for this species.

Original report. *Globotruncana intermedia* Bolli 1951, p. 197, pl. 35, Figures 7-9.

Original work. Bolli, H.M., 1951. The genus *Globotruncana* in Trinidad, B.W.I. *Journal of Paleontology*, 25, 187-199.

Age. Late Campanian-Maastrichtian.

Globotruncana intermedia Bolli 1951

Globotruncana intermedia from the upper Campanian-lower Maastrichtian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Main morphological features.

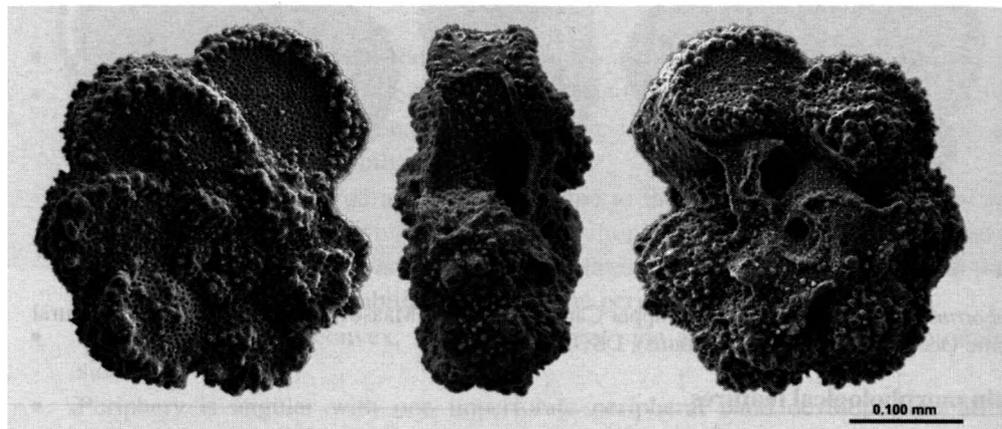
- Test presents the chambers added in a low to medium high trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved and oblique to the previous whorl, lined with ridges between the earlier chambers and depressed between the last-formed ones; on the umbilical side the sutures are depressed, straight and radial.
- Test shape is convex-concave, with the spiral side of variable height.
- Periphery is angular with one imperforate peripheral band developed on all the chambers of the final whorl. The peripheral band is bordered by two keels; the spiral keel is well-developed on all the chambers of the final whorl and the umbilical one is weaker and tilted towards the umbilicus.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate porticus, which is often attached to the previous chambers across the umbilical region.
- Chamber surface is ornamented with scattered pustules and rugosities, which present a distribution parallel to the periphery on the spiral side and meridional on the umbilical one.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globotruncana intermedia* can be recognized by the following combination of features: two uneven peripheral keels and ornamentation with preferential arrangement: parallel to the periphery on the spiral side and meridional on the umbilical side.

Recommended revision. *Abathomphalus intermedia* (Bolli 1951). Georgescu and Sawyer 2013, p. 145, pl. 8, Figures 1-16. Georgescu, M.D., Sawyer, M.S., 2013. Evolutionary

classification of the globotruncanellid and abathomphalid planktic foraminifera (Late Cretaceous, Late Campanian-Maastrichtian). In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 119-162.

***Globotruncana nothi* Brönnimann and Brown 1956**



Two specimens of *Globotruncana nothi* from the upper Campanian-lower Maastrichtian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Globotruncana nothi* Brönnimann and Brown 1956, p. 551, pl. 22, Figures 16-18.

Original work. Brönnimann, P., Brown, N.K. Jr., 1956. Taxonomy of Globotruncanidae. *Eclogae Geologicae Helvetiae*, 48, 503-561.

Age. Maastrichtian.

Main morphological features.

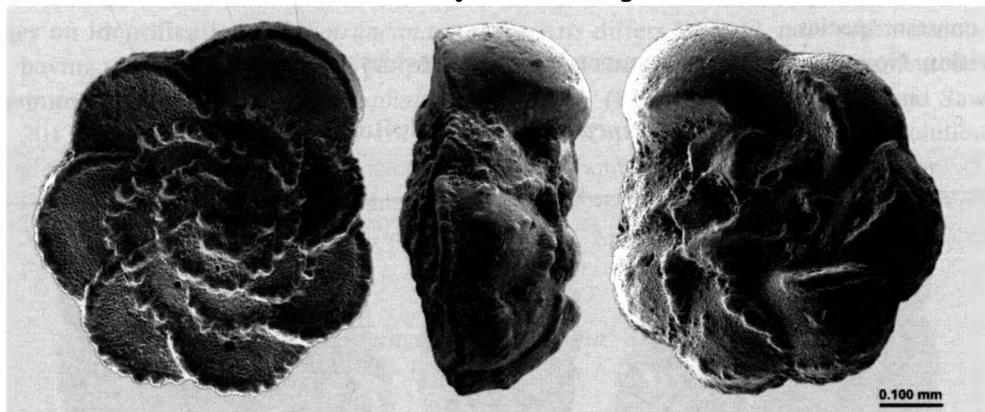
- Test presents the chambers added in a very low, nearly flat trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges.
- Test shape is slightly asymmetrical, with almost parallel spiral and umbilical side.
- Periphery has a double truncation and with a wide imperforate band bordered by two keels, which are more prominent over the earlier chambers.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a tegillum attached to the previous chambers across the umbilicus.

- Chamber surface is ornamented with scattered pustules, which are more prominent over central portion of the chambers on the spiral side and earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Globotruncana nothi* is almost a homoeomorph of *G. linneiana* of which it differs mainly by having ornamentation consisting of denser scattered pustules and test wall that is dominantly simple-ridged. Therefore, observations with the aid of a SEM and ESEM are necessary for a correct identification of this species.

Revision. This species was not reviewed since its description.

Globotruncana falsostuarti Sigal 1952



Globotruncana falsostuarti from the lower Maastrichtian sediments of the East Indian Ocean (Exmouth Plateau), ODP Hole 762C.

Original report. *Globotruncana falsostuarti* Sigal 1952, p. 43, Figure 46.

Original work. Original work. Sigal, J. 1952. Aperçu stratigraphique sur la micropaléontologie du Crétacé. *Alger, 19th International Geological Congress, Monographies régionales, 1^{re} série, Algerie*, 26, 1-52.

Age. Maastrichtian.

Main morphological features.

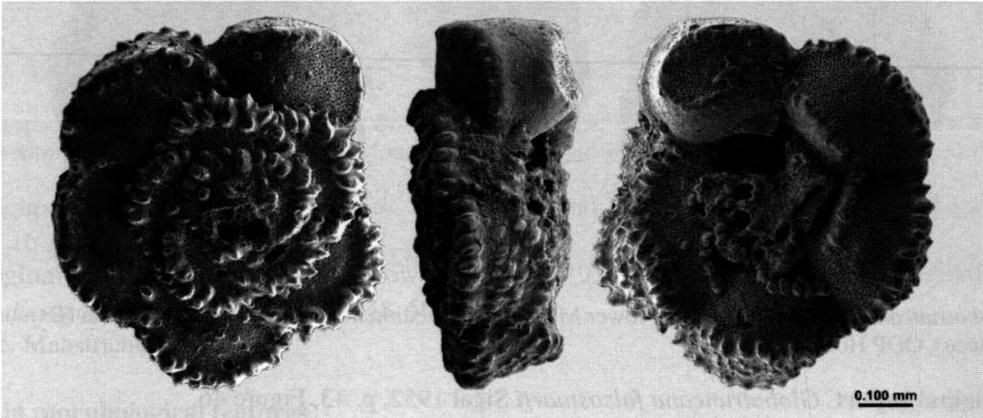
- Test presents the chambers added in a low trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl unevenly compressed, with nearly flat dorsal side and inflated umbilical side; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges.
- Test shape is plano-convex, with a nearly spiral side and inflated umbilical side.

- Periphery has a double truncation and with a wide imperforate band bordered by two keels, which are more prominent over the earlier chambers; the umbilical keel is weaker than the spiral one.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a perforate tegillum attached to the previous chambers across the umbilicus.
- Chamber surface appears smooth.
- Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Notes on identification. *Globotruncana falsostuarti* presents in general smooth chambers but rare scattered pustules can occur over some chambers, but this does not appear to be a constant species.

Revision. No revision can be recommended for this species.

Globotruncana mayaroensis Bolli 1951



Globotruncana mayaroensis from the upper Maastrichtian sediments of the East Indian Ocean (Wombat Plateau), ODP Hole 761B.

Original report. *Globotruncana mayaroensis* Bolli 1951, p. 198, pl. 35, Figures 10-12.

Original work. Bolli, H.M., 1951. The genus *Globotruncana* in Trinidad, B.W.I. *Journal of Paleontology*, 25, 187-199.

Age. Late Maastrichtian.

Main morphological features.

- Test presents the chambers added in a very low, nearly flat trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorso-ventrally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved and oblique to the previous whorl, lined with ridges between the earlier chambers and depressed between the last-formed ones; on the umbilical side the sutures are depressed, straight and radial.
- Test shape in edge view is slightly asymmetrical, with nearly parallel sides.

- Periphery has a double truncation and with a wide imperforate band bordered by two equally developed keels, which are more prominent over the earlier chambers.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter; periumbilical ridges around the umbilicus occur especially in the large-sized specimens.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a perforate tegillum, which is often attached to the previous chambers across the umbilical region.
- Chamber surface is mostly smooth but scattered pustules can occur in the chamber central portion on the spiral side.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globotruncana mayaroensis* differs from *G. intermedia* mainly by having two equally developed peripheral keels and chamber surface less ornamented.

Recommended revision. *Abathomphalus mayaroensis* (Bolli 1951). Georgescu and Sawyer 2013, p. 147, pl. 9, Figures 1-16. Georgescu, M.D., Sawyer, M.S., 2013. Evolutionary classification of the globotruncanellid and abathomphalid planktic foraminifera (Late Cretaceous, Late Campanian-Maastrichtian). In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 119-162.

***Concavatotruncana venezuelana* - new species**
(Plate 5, Figures 1-2)

Holotype. Specimen WKB 010187.

Paratypes. Five specimens. WKB 010188-010192.

Type locality. DSDP Site 150 (Venezuelan Basin, Caribbean region), geographical coordinates: 14° 30.69' N and 69° 21.35' W.

Type level. Upper Turonian chalk, Sample 10-150-10-1, 58-73 cm.

Derivation. Species named after the Venezuelan Basin, where the type location is situated.

Diagnosis. *Concavatotruncana* with depressed sutures on both test sides and ornamentation consisting of scattered pustules.

Description.

- Test presents the chambers added in a very low, nearly flat trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl are dorsally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures are depressed and straight to slightly curved on both test sides; on the spiral side the sutures are oblique to the previous whorl.
- Test is strongly asymmetrical, plano-convex, with nearly flat spiral side and strongly inflated umbilical side.

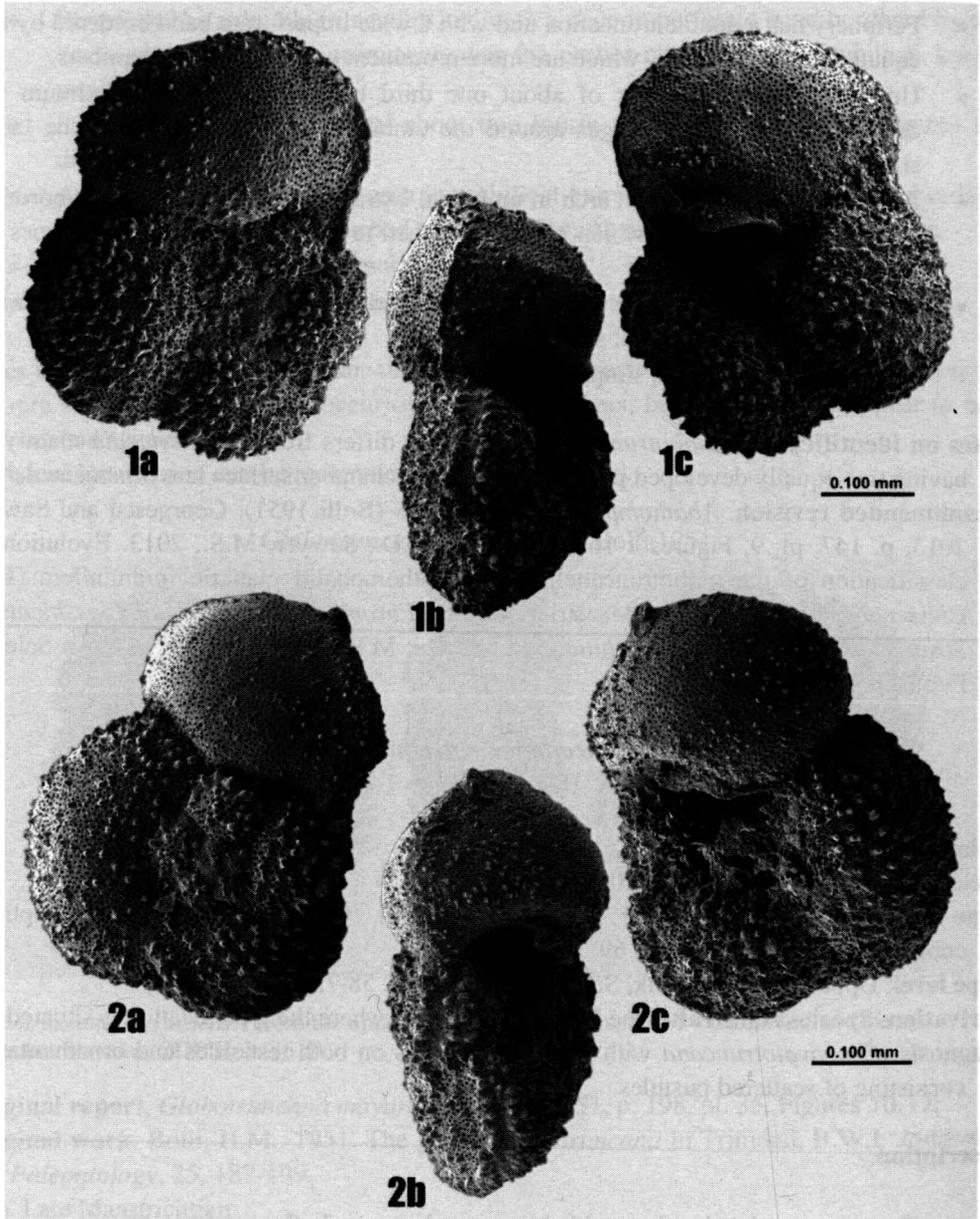


Plate 5. Two specimens of *Concavototruncana venezuelana* from the upper Turonian sediments of the Caribbean region (Venezuelan Basin), DSDP Site 150. 1-paratype, 2-holotype.

- Periphery is truncated, with one narrow imperforate peripheral band bordered by two keels consisting of aligned pustules; in most of the specimens the two keels are reduced to an agglomeration of pustules over the last-formed one to two chambers.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.

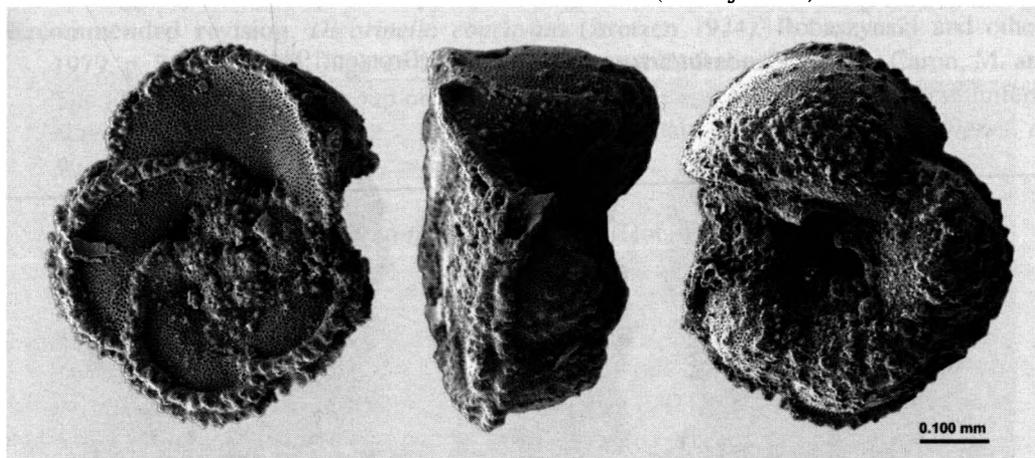
- Aperture is a medium high to high arch in umbilical-extraumbilical position and is bordered by an imperforate or perforate flap or porticus.
- Chamber surface is ornamented with scattered pustules, which are denser and larger over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Remarks. *Concavatotruncana venezuelana* differs from *C. concavata* and *C. asymetrica* mainly by having depressed sutures on the spiral side rather than lined with ridges, and lacking periumbilical ridges or agglomerations of pustules.

Age. Late Turonian.

Geographical distribution. Caribbean region (Venezuelan Basin, DSDP Site 150).

Concavatotruncana vridhachalensis (Banerji 1966)



Concavatotruncana vridhachalensis from the uppermost Turonian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Globotruncana vridhachalensis* Banerji 1966, p. 67, pl. 5, Figures 1-2, 5.

Original work. Banerji, R.K., 1966. The genus *Globotruncana* and biostratigraphy of the lower Ariyalur Stage (Upper Cretaceous) of Vridhachalam, south India. *Journal of the Geological Society of India*, 7, 51-69.

Age. Latest Turonian.

Main morphological features.

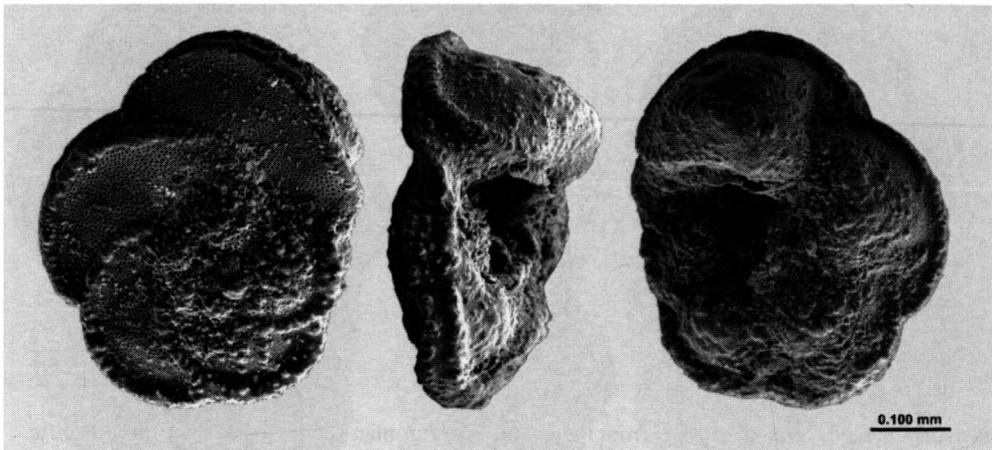
- Test presents the chambers added in a very low, nearly flat trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorsally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved and oblique to the previous whorl, lined with strong ridges; on the umbilical side the sutures are depressed, straight and radial.
- Test is strongly asymmetrical, plano-convex, with nearly flat spiral side and strongly inflated umbilical side.

- Periphery is truncated, with one narrow imperforate peripheral band bordered by two closely spaced keels developed on all the chambers of the final whorl.
- Umbilicus has a diameter of about one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate flap.
- Chamber surface is smooth on the spiral side and ornamented with scattered pustules, which are denser and larger over the earlier chambers on the umbilical side.
- Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Notes on identification. *Concavatotruncana vridhachalensis* differs from *C. venezuelana* mainly by the well-developed sutural ridges on the spiral side and two closely spaced and well-developed keels on all the chambers of the final whorl.

Revision. This species was not reviewed since its description.

Concavatotruncana concavata (Brotzen 1934)



Concavatotruncana concavata from the Coniacian sediments of the Caribbean region (Yucatan Outer Shelf), DSDP Site 95.

Original report. *Rotalia concavata* Brotzen 1934, p. 66, pl. 3, Figure b.

Original work. Brotzen, F., 1934. Foraminiferen aus dem Senon Palästinas. In: *Zeitschrift des Deutschen Palästina-Vereins* (Noth, D.M., Ed.). Leipzig: J.C. Hinrichs'sche Buchhandlung, 28-72.

Age. Latest Turonian-Santonian.

Main morphological features.

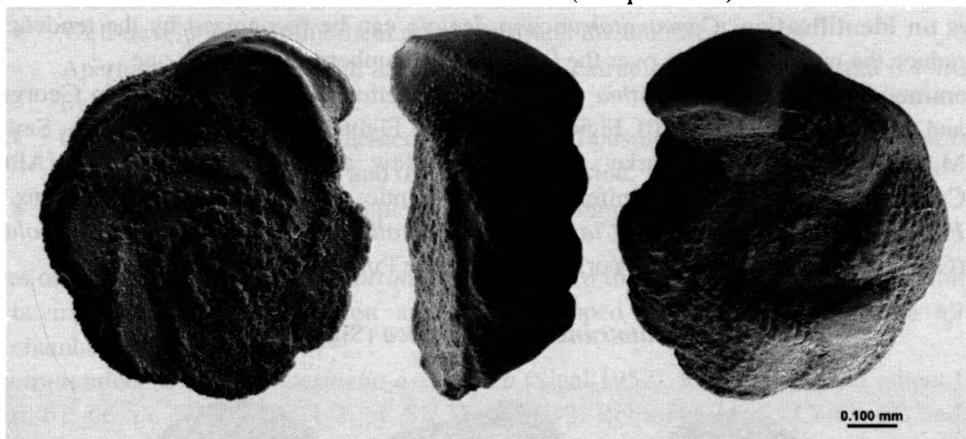
- Test presents the chambers added in a very low, nearly flat trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorsally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved and oblique to the previous whorl, lined with strong ridges; on the umbilical side the sutures are depressed, straight and radial.
- Test is plano-convex, with nearly flat spiral side and strongly inflated umbilical side.

- Periphery is truncated, with one narrow imperforate peripheral band bordered by two closely spaced keels, which are developed on all the chambers of the final whorl and in most of the specimens are weaker on the last-formed one or two chambers.
- Umbilicus has a diameter of about one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate flap.
- Chamber surface is ornamented with scattered pustules, which are denser and larger over the earlier chambers and on the umbilical side.
- Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Notes on identification. *Concavatotruncana concavata* differs from *C. vridhachalensis* mainly by having a narrower peripheral angle and incipient periumbilical ridges rather than agglomerations of pustules.

Recommended revision. *Dicarinella concavata* (Brotzen 1934). Robaszynski and others 1979, p. 71, 77, pl. 54, Figures 1-2, pl. 55, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 2, 1-181.

Concavatotruncana dentata (Hooper 1977)



Concavatotruncana dentata from the Coniacian-lower Santonian sediments of the East Indian Ocean (Exmouth Plateau), Site 763B illustrated by Georgescu in Georgescu and others (2013), plate 10, Figures 7-9.

Original report. *Globotruncana dentata* Hooper 1977, p. 362, pl. 1, Figures 1-3.

Original work. Hooper, K., 1977. *Globotruncana dentata*, a new species of planktonic foraminifer from the Toolonga Calcilutite of Western Australia. *Micropaleontology*, 23, 361-364.

Age. Coniacian-Santonian, early Campanian (?).

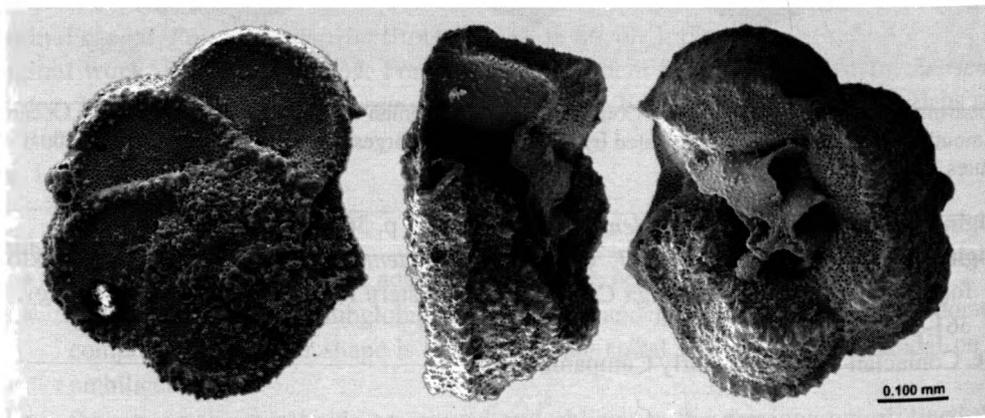
Main morphological features.

- Test consists of the proloculus followed by chambers added in a low trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorsally compressed; chamber shape is subtriangular to petaloid on the spiral side and subrectangular on the umbilical one.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with more or less developed ridges that connect the peripheral keel and the periumbilical ridges.
- Test is plano-convex in edge view with two closely spaced keels, which are reduced to only one over the last-formed one to three chambers in occasional specimens.
- Umbilicus has a diameter of about one third to two thirds of the maximum test diameter; periumbilical ridges occur around the umbilical region.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate porticus.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers and on umbilical side. Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Concavatotruncana dentata* can be recognized by the tendency to reduce the number of keels over the last-formed chambers from two to one.

Recommended revision. *Exmouthia vescicarinata* (Belford 1981). Georgescu in Georgescu and others 2013, p. 86, pl. 10, Figures 1-9, pl. 11, Figures 1-6. Georgescu, M.D., Sawyer, M.S., Heikkinen, C.J., Burke, R.M., 2013. New and revised Cretaceous (Albian-Campanian) planktic foraminifera of the Atlantic, Indian and Pacific Oceans. In: *Foraminifera. Aspects of Classification, Stratigraphy, Ecology and Evolution* (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 59-100.

Concavatotruncana asymetrica (Sigal 1952)



Concavatotruncana asymetrica from the upper Santonian sediments of the Caribbean region (Yucatan Outer Shelf), DSDP Site 95.

Original report. *Globotruncana asymetrica* Sigal 1952, p. 35, Figure 35.

Original work. Original work. Sigal, J. 1952. Aperçu stratigraphique sur la micropaléontologie du Crétacé. *Alger, 19th International Geological Congress, Monographies régionales, 1^{re} série, Algérie*, 26, 1-52.

Age. Late Santonian.

Main morphological features.

- Test presents the chambers added in a very low, nearly flat trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorsally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved and oblique to the previous whorl, lined with strong ridges.
- Sutures on the umbilical side are depressed, straight and radial.
- Test is plano-convex, with nearly flat spiral side and strongly inflated umbilical side.
- Periphery is truncated, with one narrow imperforate peripheral band bordered by two closely spaced keels, which are developed on all the chambers of the final whorl.
- Umbilicus has a diameter of about one third to two thirds of the maximum test diameter.
- Well-developed periumbilical ridges surround the umbilical region.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate porticus.
- Chamber surface is ornamented with scattered pustules, which are denser and larger over the earlier chambers and on the umbilical side.
- Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

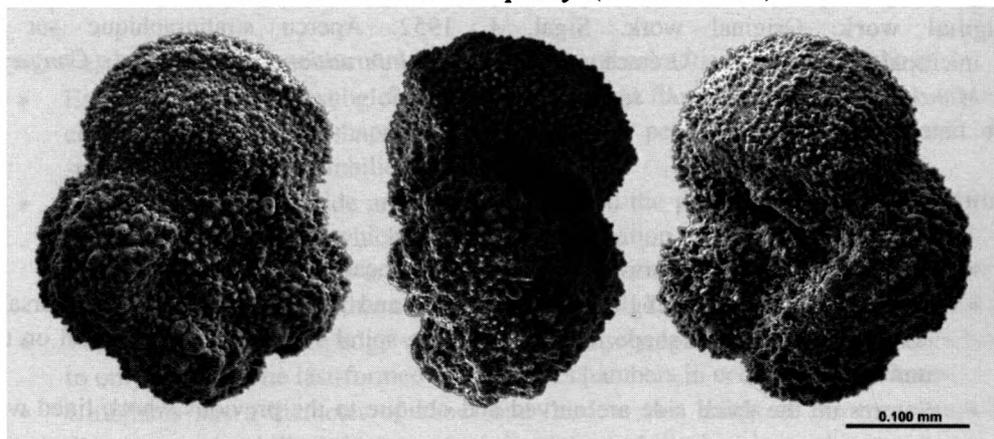
Notes on identification. *Concavototrancana asymetrica* differs from *C. concavata* mainly by having wider umbilical region and well-developed periumbilical ridges on all the chambers.

Recommended revision. *Dicarinella asymetrica* (Sigal 1952). Robaszynski and others 1979, p. 61, 66, pl. 51, Figures 1-2, pl. 52, Figures 1-2. Robaszynski, F., Caron, M. and The European Working Group on Planktonic Foraminifera, 1979. Atlas de Foraminifères planctoniques du Crétacé moyen (Mer Boréale et Téthys). *Cahiers de Micropaléontologie*, 2, 1-181.

Original report. *Globotruncana (Rugoglobigerina) penny subpennyi* Gandolfi 1955, p. 73, pl. 7, Figure 7.

Original work. Gandolfi, F., 1955. The genus *Globotruncana* in northeastern Colombia. *Bulletins of American Paleontology*, 36(155), 1-118.

Age. Late Campanian-middle Maastrichtian.

Concavatotruncana subpennyi (Gandolfi 1955)

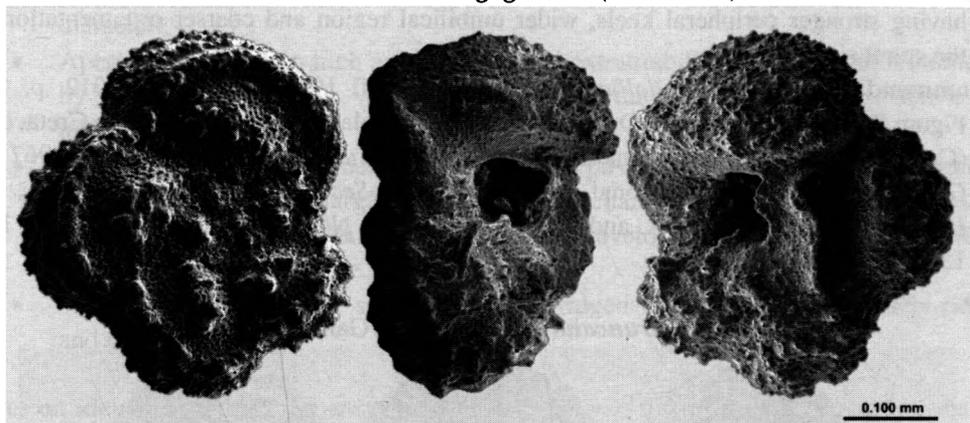
Concavatotruncana subpennyi from the upper Campanian sediments of the central Pacific Ocean (Mid-Pacific Mountains), Site 463 illustrated by Georgescu (2012), Figure 6: 1-3.

Main morphological features.

- Test presents the chambers added in a very low, nearly flat trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorsally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal to subtriangular on the umbilical one.
- Sutures on the spiral side are curved and oblique to the previous whorl and depressed; on the umbilical side the sutures are depressed, straight and radial.
- Test is plano-convex, with nearly flat spiral side and strongly inflated umbilical side.
- Periphery is broadly rounded, with one imperforate peripheral band bordered by two weak keels, which are developed on all the chambers of the final whorl.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate porticus, which is rarely preserved.
- Chamber surface is ornamented with scattered pustules, rugosities and short costellae, which are denser and larger over the earlier chambers.
- Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Notes on identification. *Concavatotruncana subpennyi* differs from *C. venezuelana* mainly by having coarser ornamentation, which frequently presents rugosities and short costellae without a preferential arrangement.

Recommended revision. *Gandolfia subpennyi* (Gandolfi 1955). Georgescu 2012, p. 114, Figure 6: 1-9. Georgescu, M.D., 2012. Evolutionary classification of the Late Cretaceous (Coniacian-Maastrichtian) planktic foraminifera *Archaeoglobigerina* Pessagno, 1967 and *Gandolfia* new genus/directional lineage. In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 101-130.

Concavatotruncana gagnebini (Tilev 1951)

Two specimens of *Concavatotruncana gagnebini* from the middle Maastrichtian sediments of the Caribbean region (Nicaragua Rise), Site 152 illustrated by Georgescu (2012), Figure 7: 1-3.

Original report. *Globotruncana gagnebini* Tilev 1950, p. 50, pl. 3, Figures 2-5, text-Figures 14-17.

Original work. Tilev, N., 1951. Étude des Rosalines Maastrichtiennes (genre *Globotruncana*) du sud-est de la Turquie (Sondage de Ramandag). *Bulletin de la Laboratoires de Géologie, Minéralogie, Géophysique et Museum Géologique, Université du Lausanne*, 103, 1-101.

Age. Late Campanian-middle Maastrichtian.

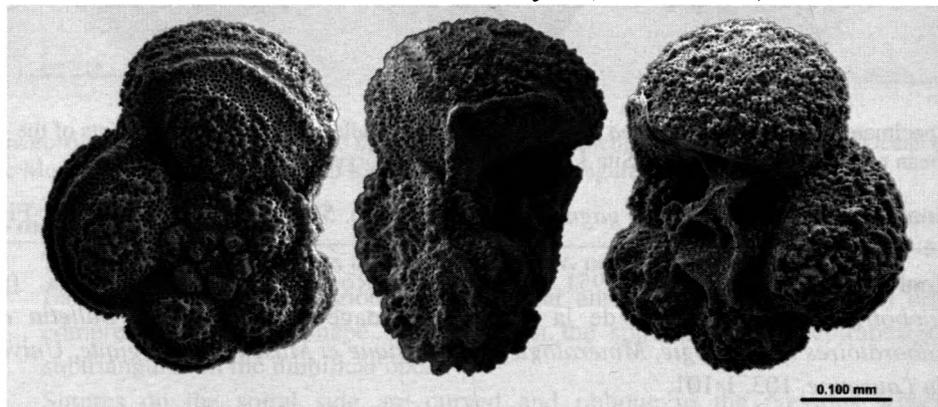
Main morphological features.

- Test presents the chambers added in a very low, nearly flat trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorsally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved and oblique to the previous whorl and depressed; on the umbilical side the sutures are depressed, straight and radial.
- Test is plano-convex, with nearly flat spiral side and strongly inflated umbilical side.
- Periphery is truncated, with one imperforate peripheral band bordered by two weak keels, which have a rope appearance are developed on all the chambers of the final whorl.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a perforate porticus, which is attached to the previous chambers across the umbilicus.
- Chamber surface is ornamented with scattered pustules and rugosities, which are denser and larger over the earlier chambers; ornamentation structures with elongate or irregular shape are developed in the central portion of the chambers on the spiral side. Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Concavototruncana gagnebini* differs from *G. subpennyi* mainly by having stronger peripheral keels, wider umbilical region and coarser ornamentation on the spiral side.

Recommended revision. *Gandolfia gagnebini* (Gandolfi 1955). Georgescu 2012, p. 116, Figure 7: 1-9. Georgescu, M.D., 2012. Evolutionary classification of the Late Cretaceous (Coniacian-Maastrichtian) planktic foraminifera *Archaeoglobigerina* Pessagno, 1967 and *Gandolfia* new genus/directional lineage. In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 101-130.

Concavototruncana wiedenmayeri (Gandolfi 1955)



Concavototruncana wiedenmayeri from the uppermost Campanian-lower Maastrichtian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463 illustrated by Georgescu (2012), Figure 8: 1-3.

Original report. *Globotruncana wiedenmayeri wiedenmayeri* Gandolfi 1955, p. 71, pl. 7, Figure 4.

Original work. Gandolfi, F., 1955. The genus *Globotruncana* in northeastern Colombia. *Bulletins of American Paleontology*, 36(155), 1-118.

Age. Latest Campanian-Maastrichtian.

Main morphological features.

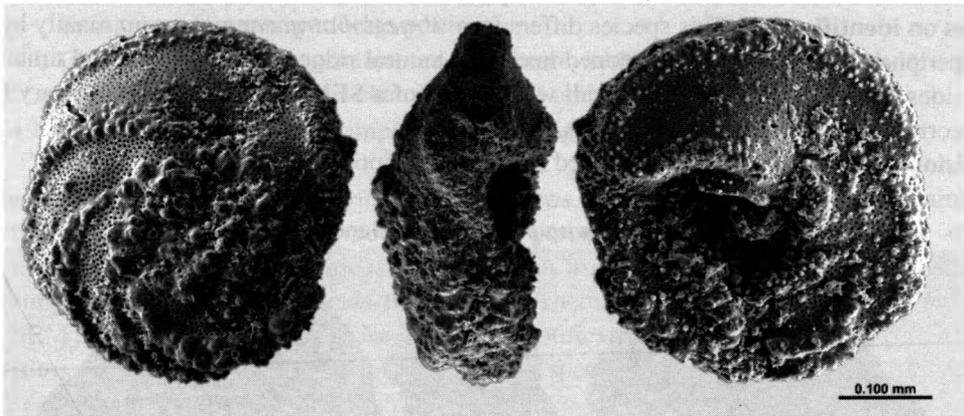
- Test presents the chambers added in a very low, nearly flat trochospire.
- Earlier chambers are subglobular to globular and dorsally compressed in the last whorl; chambers are petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved and oblique to the previous whorl and depressed, or lined by weak ridges towards the periphery; on the umbilical side the sutures are depressed, straight and radial.
- Test is plano-convex, with nearly flat spiral side and strongly inflated umbilical side.
- Periphery is truncated, with one imperforate peripheral band bordered by two well-developed keels, which are developed on all the chambers of the final whorl.

- Umbilicus has a diameter of about one third to one half of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a perforate porticus, which is attached to the previous chambers across the umbilicus.
- Chamber surface is ornamented with scattered pustules, rugosities and rare costellae, which are denser and larger over the earlier chambers; large-sized ornamentation structures with elongate or irregular shape are developed in the central portion of the chambers on the spiral side.
- Wall is calcitic, hyaline, simple to simple-ridged or incipiently reticulately-ridged and perforate.

Notes on identification. *Concavatotruncana wiedenmayeri* differs from *C. gagnebini* mainly by having more chambers in the final whorl.

Recommended revision. *Gandolfia wiedenmayeri* (Gandolfi 1955). Georgescu 2012, p. 119, Figures 8: 1-8, 9: 1-8. Georgescu, M.D., 2012. Evolutionary classification of the Late Cretaceous (Coniacian-Maastrichtian) planktic foraminifera *Archaeoglobigerina* Pessagno, 1967 and *Gandolfia* new genus/directional lineage. In: *Deep-Sea Marine Biology, Geology, and Human Impact* (Bailey, D.R. and S.E. Howard, Eds). New York: Nova Publishers, 101-130.

Contusotruncana bouldinensis (Pessagno 1967)



Contusotruncana bouldinensis from the Coniacian sediments of the Caribbean region (Yucatan Outer Shelf), DSDP Site 95.

Original report. *Marginotruncana bouldinensis* Pessagno 1967, pl. 54, Figures 13-15, pl. 56, Figures 4-9.

Original work. Pessagno, E.A. Jr., 1967. Upper Cretaceous planktonic foraminifera from the Western Gulf coastal plain. *Palaeontographica Americana*, 5(37), 243-445.

Age. Latest Turonian-Santonian.

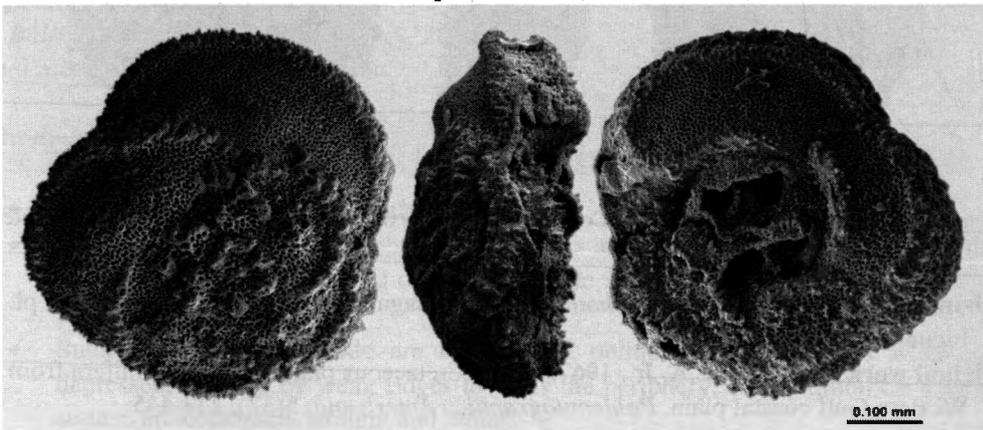
Main morphological features.

- Test presents the chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and those of the last whorl subtriangular to petaloid on the spiral side and with dorso-ventral compression; chambers have a subtrapezoidal shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Chamber surface on the spiral side is slightly undulated.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel and the periumbilical ridges.
- Test is convex-concave, with an angular periphery; peripheral structures consist of one imperforate peripheral band bordered by two closely spaced keels developed on all the chambers of the final whorl.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate flap.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. This species differs from *Praeglobotruncana inornata* mainly by the periphery with two well-developed keels and sutural ridges on both spiral and umbilical sides. Observations on the test wall with the aid of a SEM and ESEM are necessary for a correct identification of this species.

Revision. This species was not reviewed since its description.

Contusotruncana plummerae (Gandolfi 1955)



Contusotruncana plummerae from the lower Campanian sediments from the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Globotruncana fornicata plummerae* Gandolfi 1955, p. 42, pl. 2, Figures 3-4.

Original work. Gandolfi, F., 1955. The genus *Globotruncana* in northeastern Colombia. *Bulletins of American Paleontology*, 36(155), 1-118.

Age. Late Santonian-Maastrichtian.

Main morphological features.

- Test presents the chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and those of the last whorl subtriangular to petaloid on the spiral side and with dorso-ventral compression; chambers have a subtrapezoidal shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Chamber surface on the spiral side is undulated.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel and the periumbilical ridges.
- Test is convex-concave, with periphery with double truncation; periphery has one imperforate peripheral band, which is bordered by two keels developed on all the chambers of the final whorl.
- Umbilicus has a diameter of about one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate or perforate porticus.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Contusotruncana plummerae* differs from *C. bouldinensis* mainly by having higher trochospire, more complex periapertural structures consisting of an imperforate or perforate porticus rather than an imperforate flap and test wall which is simple-ridged over larger areas than simple. Therefore, observations with the aid of a SEM and ESEM are necessary for a correct identification of this species.

Revision. No revision can be recommended for this species.

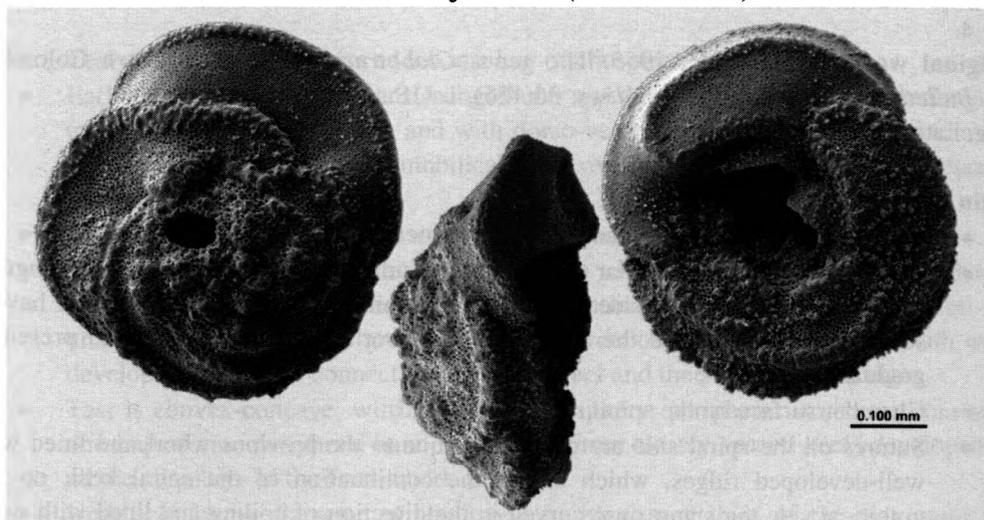
Original report. *Globotruncana fornicata* Plummer 1931, p. 198, pl. 13, Figures 4-6.

Original work. Plummer, H.J., 1931. Some Cretaceous Foraminifera in Texas. *The University of Texas Bulletin*, 3101, 109-203.

Age. Campanian-Maastrichtian.

Main morphological features.

- Test presents the chambers added in a low to medium high trochospire.

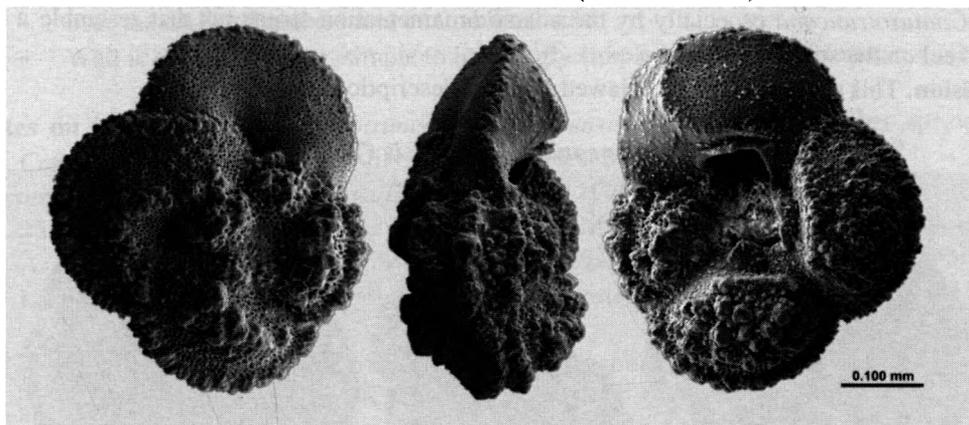
Contusotruncana fornicata (Plummer 1931)

Contusotruncana fornicata from the middle Campanian sediments from the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

- Earlier chambers are globular to subglobular and those of the last whorl subtriangular to crescentic on the spiral side and with dorso-ventral compression; chambers have a subtrapezoidal shape on the umbilical side. On the spiral side the chamber surface is undulated.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel and the periumbilical ridges.
- Test is convex-concave, with a double truncated periphery; periphery presents one imperforate peripheral band, which is bordered by two well-developed keels on all the chambers of the final whorl.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate porticus, which is rarely preserved.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers and on umbilical side. Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Contusotruncana fornicata* differs from *C. plummerae* mainly by having higher trochospire and more undulated chamber surface on the spiral side.

Recommended revision. *Rosita fornicata* (Plummer 1931). Robaszynski and others 1984, p. 250, pl. 38, Figures 1-5. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Contusotruncana ackermanni (Gandolfi 1955)

Contusotruncana ackermanni from the upper Campanian-lower Maastrichtian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Globotruncana fornicata ackermanni* Gandolfi 1955, p. 42, pl. 2, Figures 5-7.

Original work. Gandolfi, F., 1955. The genus *Globotruncana* in northeastern Colombia. *Bulletins of American Paleontology*, 36(155), 1-118.

Age. Late Campanian-middle Maastrichtian.

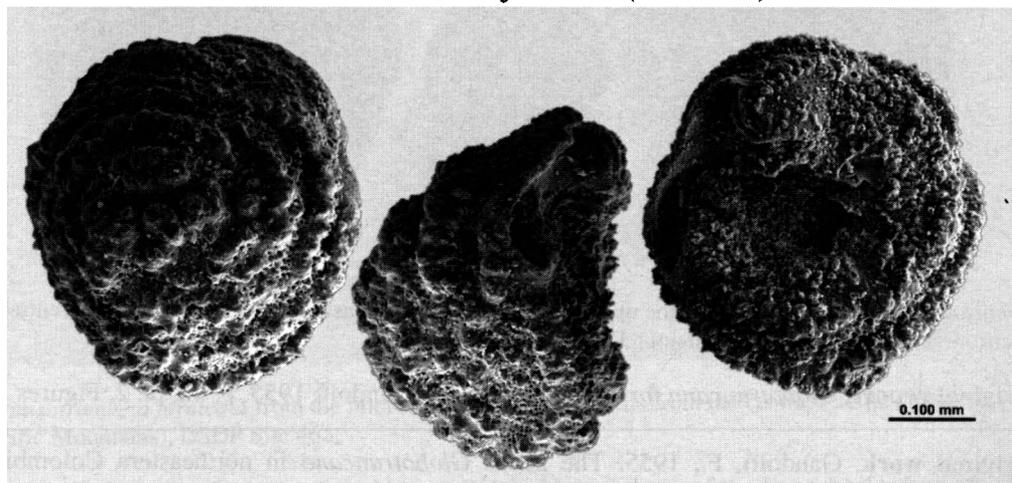
Main morphological features.

- Test presents the chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and those of the last whorl petaloid on the spiral side; chambers have a subtrapezoidal shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Chamber surface on the spiral side is undulated.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures depressed, straight and radial.
- Test is convex-concave, with a truncated periphery; periphery presents one imperforate peripheral band, which is bordered by two well-developed keels on the early chambers of the final whorl and one on the last-formed one or two chambers.
- Umbilicus has a diameter of about one third of the maximum test diameter; periumbilical ridges occur on all the chambers around the umbilicus.
- Aperture is a medium high arch in umbilical position; periapertural structures are not known.
- Chamber surface is ornamented with scattered pustules, which are more prominent over the earlier chambers and on umbilical side; large, more or less elongated ornamentation structures that occasionally resemble a true keel occur especially over the earlier chambers on the spiral side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Contusotruncana ackermanni* differs from all the species of *Contusotruncana* especially by the coarse ornamentation structures that resemble a true keel on the spiral side.

Revision. This species was not reviewed since its description.

Contusotruncana walfischensis (Todd 1970)



Contusotruncana walfischensis from the upper Maastrichtian sediments of the East Indian Ocean (Wombat Plateau), ODP Hole 761B.

Original report. *Globotruncana walfischensis* Todd 1970, p. 153, pl. 5, Figure 8.

Original work. Todd, R., 1970. Maastrichtian (Late Cretaceous) foraminifera from a deep-sea core off southwestern Africa. *Revista Española de Micropaleontología*, 2, 131-154.

Age. Middle-late Maastrichtian.

Main morphological features.

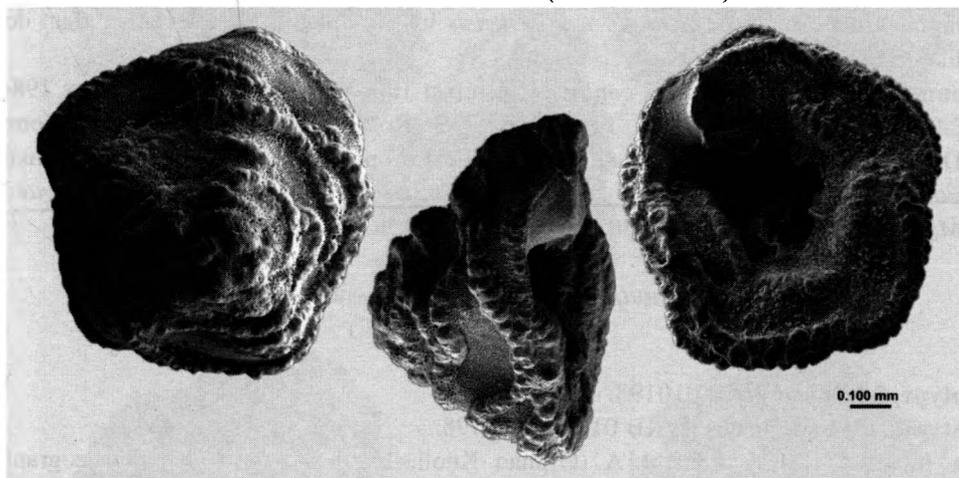
- Test presents the chambers added in a high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls crescentic on the spiral side and with dorso-ventral compression; chambers have a subtrapezoidal shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures depressed, straight and radial.
- Test is highly convex with dome-like shape and with a truncated periphery; periphery presents one imperforate peripheral band, which is bordered by two well-developed keels on the early chambers of the final whorl and one on the last-formed one or two chambers.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical position; periapertural structures are not known.

- Chamber surface is ornamented with scattered pustules, which are more prominent over the earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple to incipiently simple-ridged and perforate.

Notes on identification. *Contusotruncana walfischensis* differs from the other species of *Contusotruncana* by the dome-like shape of the test in edge view.

Recommended revision. *Rosita walfischensis* (Todd 1970). Robaszynski and others 1984, p. 258, pl. 42, Figures 1-4. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Contusotruncana contusa (Cushman 1926)



Contusotruncana contusa from the upper Maastrichtian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Pulvinulina arca contusa* Cushman 1926, p. 23.

Original work. Cushman, J.A., 1926. Some foraminifera from the Mendez Shale of eastern Mexico. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 2, 16-28.

Age. Middle-late Maastrichtian.

Main morphological features.

- Test presents the chambers added in a high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls crescentic on the spiral side; chambers have a subtrapezoidal shape on the umbilical side, overlap at various rates and present a gradual size increase. Chamber surface on the spiral side is undulated.
- Sutures on the spiral side are straight, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling, lined with well-

developed ridges that connect the umbilical keel with the periumbilical ridges and often obscured due to the chamber overlapping.

- Test is highly convex and with a truncated periphery; periphery presents one imperforate peripheral band, which is bordered by two well-developed keels; umbilical keel is distinctly shifted towards the umbilical side.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate porticus.
- Chamber surface is ornamented with scattered pustules, which are more prominent over the earlier chambers and on umbilical side. Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Contusotruncana contusa* differs from *C. fornicata* mainly by the higher trochospire and from *C. walfischensis* by the apically narrow rather than dome-like test shape.

Recommended revision. *Rosita contusa* (Cushman 1926). Robaszynski and others 1984, p. 246, pl. 36, Figures 1-2, pl. 37, Figures 1-3. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Concavatotruncana orphanensis - new species

(Plate 5, Figures 1-2)

Holotype. Specimen WKB 010193.

Paratypes. Five specimens. WKB 010194-010198.

Type locality. DSDP Hole 111A (Orphan Knoll, North Atlantic Ocean), geographical coordinates: 50° 25.57' N and 46° 22.05' W.

Type level. Upper Maastrichtian chalk, Sample 12-111A-11-1, 145-146 cm.

Derivation. Species named after the Orphan Knoll, where the type location is situated.

Diagnosis. *Contusotruncana* having the chamber surface ornamented with large-sized pustules and mostly simple test wall.

Description.

- Test presents the chambers added in a medium high to high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls subtriangular to subrectangular on the spiral side; chambers have a subtrapezoidal shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges.
- Sutural ridges are often obscured due to the chamber overlapping.

- Test is highly convex and with a truncated periphery; periphery presents one imperforate peripheral band, which is bordered by two well-developed keels; umbilical keel is situated on the umbilical side.

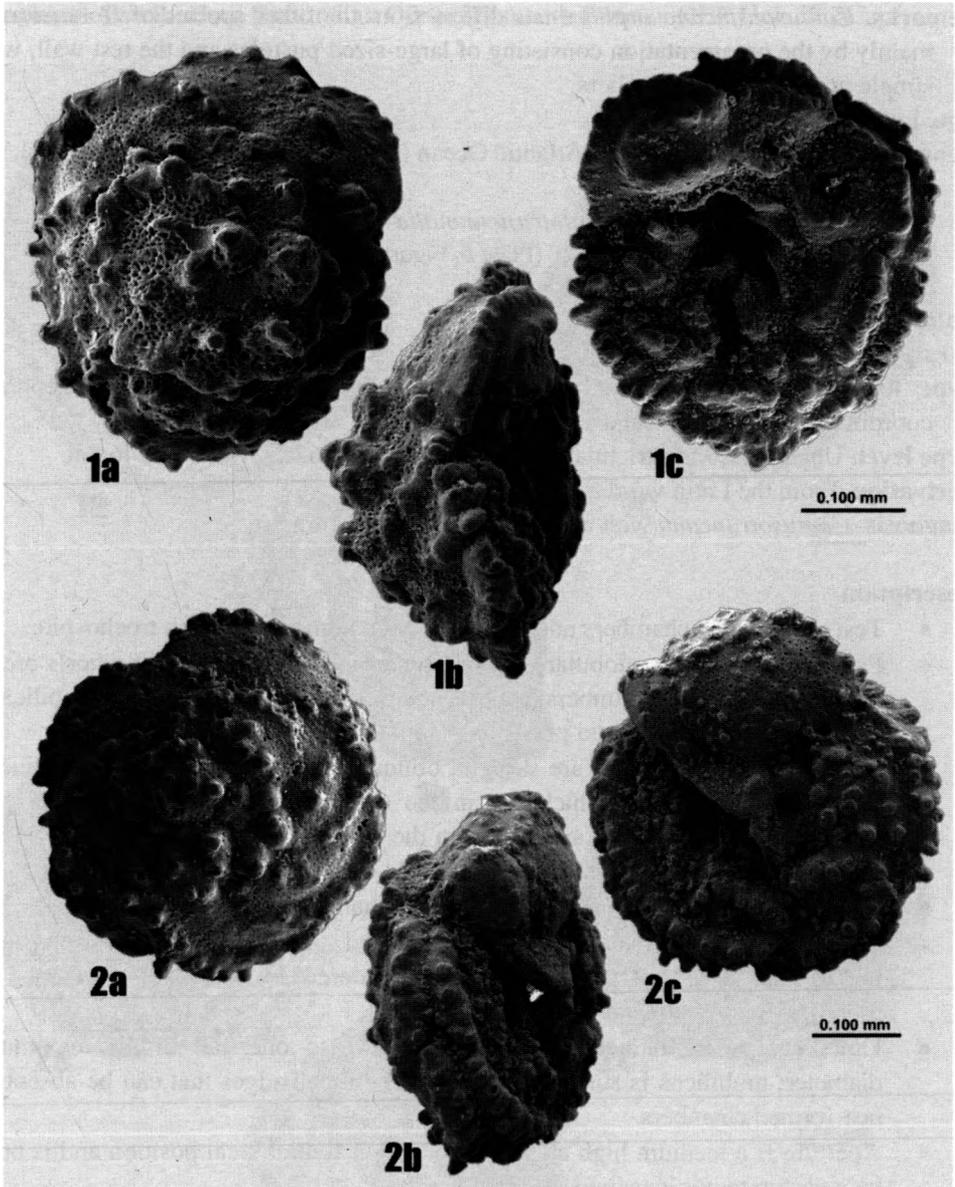


Plate 5. Two specimens of *Contusotruncana orphanensis* from the upper Maastrichtian sediments of the North Atlantic Ocean (Orphan Knoll), DSDP Hole 111A. 1-holotype, 2-paratype.

- Umbilicus has a diameter of about one fourth of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a perforate or imperforate porticus.

- Chamber surface is ornamented with scattered large-sized pustules, which are more prominent over the earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Remarks. *Contusotruncana orphanensis* differs from the other species of *Contusotruncana* mainly by the ornamentation consisting of large-sized pustules and the test wall, which is simple on most of the chambers.

Age. Late Maastrichtian.

Geographical distribution. North Atlantic Ocean (Orphan Knoll, DSDP Hole 111A).

Concavatotruncana alta - new species

(Plate 6, Figures 1-2)

Holotype. Specimen WKB 010199.

Paratypes. Five specimens. WKB 010200-010204.

Type locality. ODP Hole 762C (Exmouth Plateau, East Indian Ocean), geographical coordinates: 19° 53.23' S and 112° 15.24' E.

Type level. Uppermost Maastrichtian chalk, Sample 122-762C-21-4, 145-146 cm.

Derivation. From the Latin word *alta* (=high, tall).

Diagnosis. *Contusotruncana* with extremely high trochospire.

Description.

- Test presents the chambers added in a medium high to very high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls crescentic on the spiral side; chambers have a subtrapezoidal shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the spiral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the umbilical keel with the periumbilical ridges.
- Sutural ridges are often obscured due to the chamber overlapping.
- Test is highly convex and with a truncated periphery; periphery presents one imperforate peripheral band, which is bordered by two well-developed keels; umbilical keel is situated on the umbilical side.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter; umbilicus is surrounded by periumbilical ridges that can be absent on the last-formed chambers.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a perforate porticus, which is rarely preserved.
- Chamber surface is ornamented with scattered pustules, which are more prominent over the earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Remarks. *Contusotruncana alta* differs from *C. walfischensis* mainly by having higher trochospire and from *C. contusa* mainly by having chamber surface on the spiral side without undulation.

Age. Latest Maastrichtian.

Geographical distribution. East Indian Ocean (Exmouth Plateau, ODP Hole 762C).

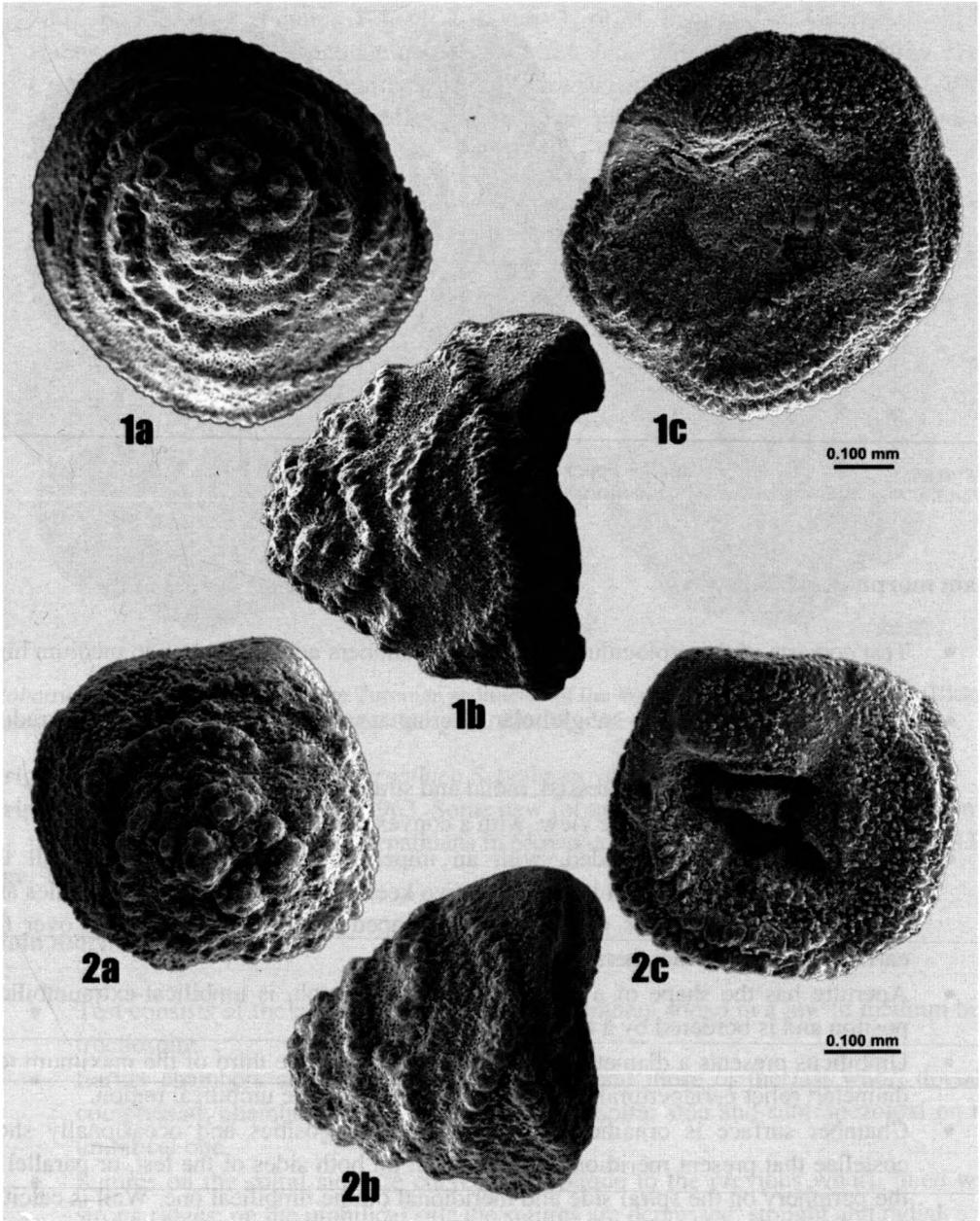


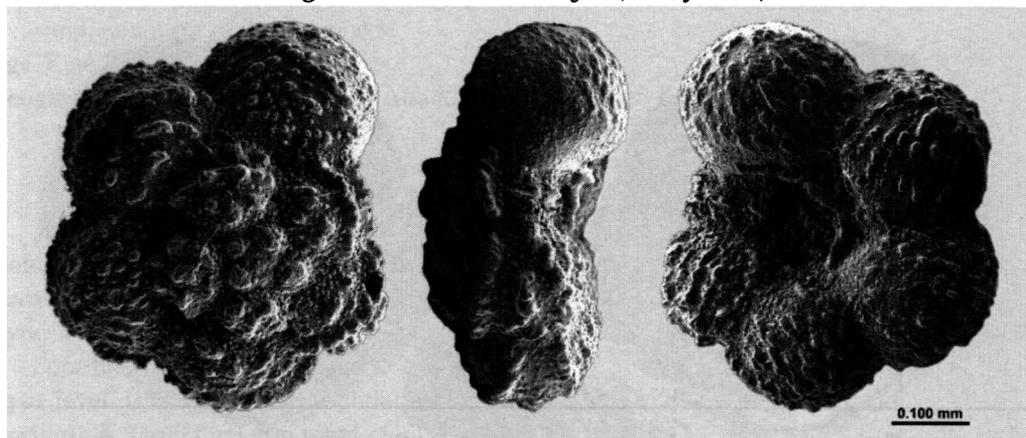
Plate 6. Two specimens of *Contusotruncana alta* from the uppermost Maastrichtian sediments of the East Indian Ocean (Exmouth Plateau), ODP Hole 762C. 1-holotype, 2-paratype.

Original report. *Globigerina circumnodifer* Finlay 1940, p. 469, pl. 65, Figures 150-151.

Original work. Finlay, H.J., 1940. New Zealand foraminifera: key species in stratigraphy-
No. 4. *Transactions of the Royal Society of New Zealand*, 69, 448-472.

Age. Late Campanian-Maastrichtian.

***Rugotruncana circumnodifer* (Finlay 1940)**



Rugotruncana circumnodifer from the upper Maastrichtian sediments of the South Atlantic Ocean (Weddell Sea, Maud Rise), ODP Hole 690C.

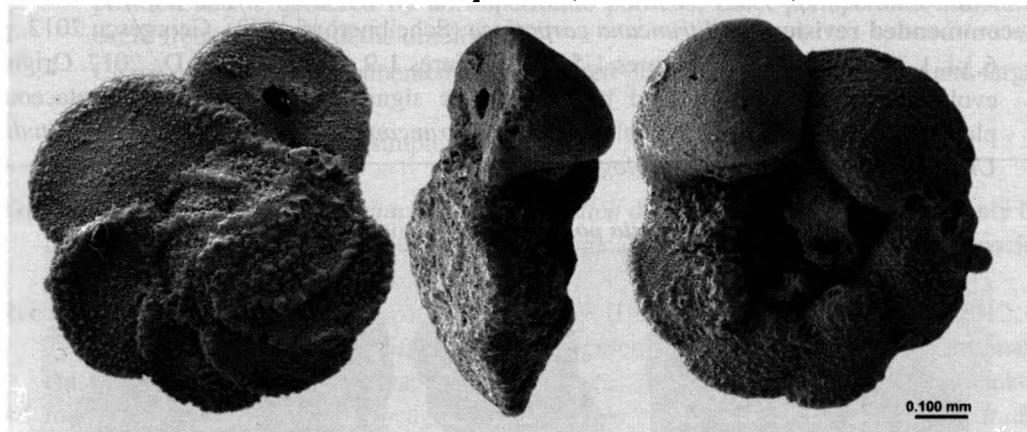
Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Chambers are globular to subglobular, overlap at various rates and present a gradual size increase.
- Sutures are distinct and depressed, radial and straight on both test sides.
- Test is asymmetrical in edge view, with a convex spiral side.
- Periphery is broadly rounded, with an imperforate peripheral band on all the chambers of the final whorl bordered by two keels consisting or aligned pustules and rugosities; a third keel is occasionally developed between the two keels over the earlier one to three chambers of the final whorl.
- Aperture has the shape of a low to medium high arch, is umbilical-extraumbilical position and is bordered by a tegillum.
- Umbilicus presents a diameter of about one fourth to one third of the maximum test diameter; relict periapertural structures occur rarely in the umbilical region.
- Chamber surface is ornamented with pustules, rugosities and occasionally short costellae that present meridional arrangement on both sides of the test, or parallel to the periphery on the spiral side and meridional on the umbilical one. Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Rugotruncana circumnodifer* can be recognized by the following combination of morphological features: a third peripheral keel developed on the earlier chambers of the final whorl and ornamentation with meridional arrangement on both sides of the test, or parallel to the periphery on the spiral side and meridional on the umbilical one.

Recommended revision. *Rugotruncana circumnodifer* (Finlay 1940). Georgescu and Huber 2007, p. 153, pl. 1, Figures 1-4, pl. 2, Figure 1, pl. 3, Figures 1-5. Georgescu, M.D., Huber, B.T., 2007. Taxonomic revision of the late Campanian-Maastrichtian (Late Cretaceous) planktonic foraminiferal genus *Rugotruncana* Brönnimann and Brown, 1956, and a new paleontological species concept for planktonic foraminifera. *Journal of Foraminiferal Research*, 37, 150-159.

***Globotruncanita carpathica* (Scheibnerová 1963)**



Globotruncanita carpathica from the Turonian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2012), plate 1, Figures 1-3.

Original report. *Globotruncana carpathica* Scheibnerová 1963, p. 140, text-Figure 2.

Original work. Scheibnerová, V., 1963. Some new foraminifera from the middle Turonian of the Klippen Belt of the West Carpathians in Slovakia. *Geologický Sborník*, 14, 139-143.

Age. Turonian.

Main morphological features.

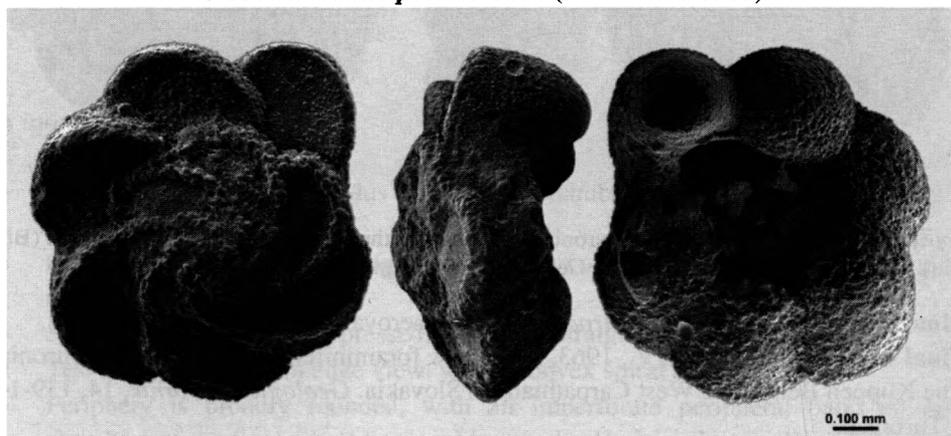
- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Earlier chambers are subglobular to globular and those of the last whorl dorsally compressed; chamber shape is petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved and oblique to the previous whorl, lined with strong ridges; on the umbilical side the sutures are depressed, straight and radial.
- Test is asymmetrically biconvex, with the umbilical side slightly more convex than the spiral one; periphery is angular, with one keel consisting of closely spaced and partly fused pustules on all the chambers of the final whorl.

- Umbilicus has a diameter of about one third to one half of the maximum test diameter.
- Weak periumbilical structures consist of irregular agglomerations of pustules.
- Aperture has the shape of a medium high arch, is situated in extraumbilical-umbilical position and is bordered by an imperforate porticus; relict periapertural structures occur frequently within the umbilicus.
- Chamber surface is ornamented with scattered pustules, which are denser and larger over the earlier chambers and on the umbilical side.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globotruncanita carpathica* can be recognized by the following combination of features: one peripheral keel on all the chambers on the final whorl, slightly asymmetrically biconvex test shape and simple test wall.

Recommended revision. *Bollitruncana carpathica* (Scheibnerová 1963). Georgescu 2012, p. 6, pl. 1, Figures 1-7, pl. 2, Figures 1-5, pl. 3, Figures 1-9. Georgescu, M.D., 2012. Origin, evolutionary classification, and biostratigraphic significance of the Late Cretaceous planktic foraminiferal directional lineage *Bollitruncana* O.A. Korchagin, 2001. *Studia Universitatis Babeş-Bolyai, Geologia*, 57, 3-16.

***Globotruncanita posthelvetica* (Hanzliková 1963)**



Globotruncanita posthelvetica from the lower Turonian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C illustrated by Georgescu (2012), plate 4, Figures 6-8.

Original report. *Globotruncana helvetica posthelvetica* Hanzliková 1963, p. 325, pl. 1, Figures 1-4.

Original work. Hanzliková, E., 1963. *Globotruncana helvetica posthelvetica* n. subsp. from the Carpathian Cretaceous. *Věstník Ústředního Ústavu Geologického*, 38, 325-328.

Age. Early Turonian.

Main morphological features.

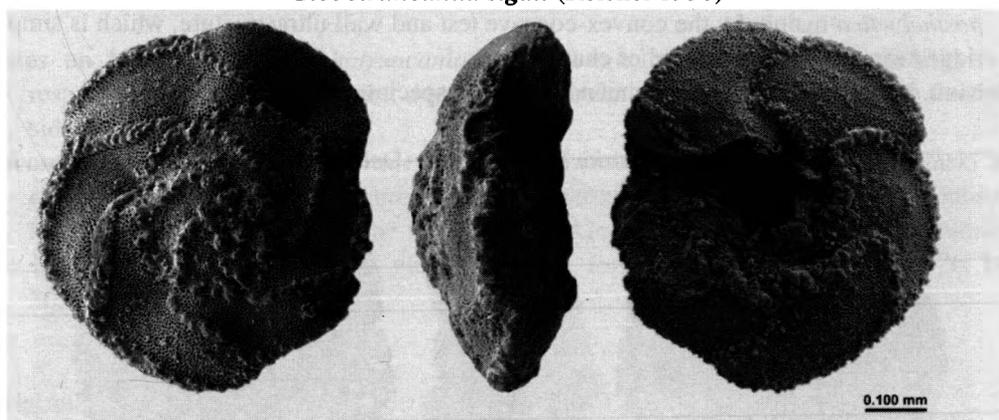
- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.

- Earlier chambers are subglobular to globular and those of the last whorl dorsally compressed; chamber shape is crescentic to petaloid on the spiral side and subtrapezoidal on the umbilical one.
- Sutures on the spiral side are curved and oblique to the previous whorl, lined with strong ridges; on the umbilical side the sutures are depressed, straight and radial.
- Test is asymmetrically biconvex, with the umbilical side significantly more convex than the spiral one resulting in a nearly plano-convex shape.
- Periphery is angular, with one keel consisting of closely spaced and partly fused pustules on all the chambers of the final whorl.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter; weak periumbilical ridges occur around the umbilical region.
- Aperture has the shape of a medium high arch, is situated in extraumbilical-umbilical position and is bordered by an imperforate porticus; relict periapertural structures occur frequently within the umbilicus.
- Chamber surface is ornamented with scattered pustules, which are denser and larger over the earlier chambers.
- Wall is calcitic, hyaline, simple and perforate.

Notes on identification. *Globotruncanita posthelvetica* differs from *G. carpathica* mainly by having nearly plano-convex tests; the morphological differences between the two species can be best seen in large assemblages.

Recommended revision. *Bollitruncana posthelvetica* (Hanzliková 1963). Georgescu 2012, p. 7, pl. 4, Figures 1-8, pl. 5, Figures 1-8. Georgescu, M.D., 2012. Origin, evolutionary classification, and biostratigraphic significance of the Late Cretaceous planktic foraminiferal directional lineage *Bollitruncana* O.A. Korchagin, 2001. *Studia Universitatis Babeş-Bolyai, Geologia*, 57, 3-16.

***Globotruncanita sigali* (Reichel 1950)**



Globotruncanita sigali from the upper Turonian sediments of the Caribbean region (Venezuelan Basin), DSDP Site 150.

Original report. *Globotruncana sigali* Reichel 1950, p. 610, pl. 16, Figure 7, pl. 17, Figure 7, text-Figure 5.

Original work. Reichel, M., 1950. Observations sur les *Globotruncana* du gisement de la Breggia (Tessin). *Eclogae Geologicae Helvetiae*, 42, 596-617.

Age. Late Turonian-Santonian.

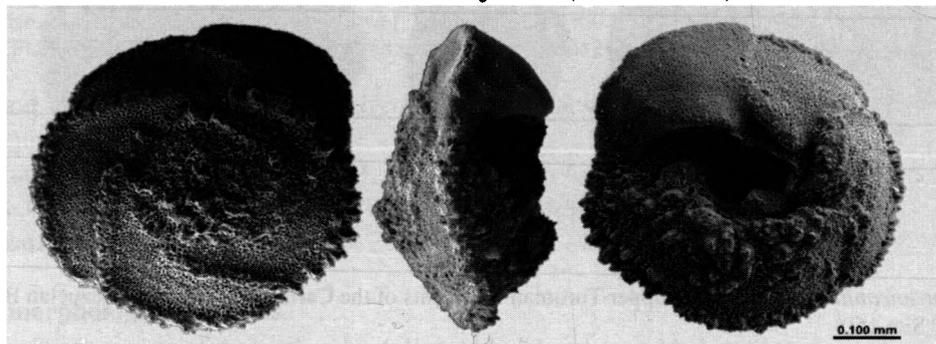
Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls subtriangular to subrectangular on the spiral side and with dorso-ventral compression; chambers have a subtrapezoidal shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Chamber surface on the spiral side can be undulated or not.
- Sutures on the spiral side are curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the peripheral keel and the periumbilical ridges.
- Test is convex-concave and with an angular periphery; one peripheral keel occurs on all the chambers of the final whorl and is often less prominent over the last-formed chambers.
- Umbilicus has a diameter of about one third of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a perforate or imperforate porticus or tegillum.
- Chamber surface is ornamented with rare scattered pustules, which are more prominent over the earlier chambers and on umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Globotruncanita sigali* differs from *G. carpathica* and *G. posthelvetica* mainly by the convex-concave test and wall ultrastructure, which is simple-ridged especially over the earlier chambers.

Revision. No revision can be recommended for this species.

***Globotruncanita stuartiformis* (Dalbiez 1955)**



Globotruncanita stuartiformis from the lower Campanian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Globotruncana (Globotruncana) elevata stuartiformis* Dalbiez 1955, p. 169, text-Figure 10.

Original work. Dalbiez, F., 1955. The genus *Globotruncana* in Tunisia. *Micropaleontology*, 1, 161-171.

Age. Late Santonian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls subtriangular, petaloid or subrectangular on the spiral side and with dorso-ventral compression; chambers have a subrectangular shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the peripheral keel and the periumbilical ridges.
- Test is symmetrically or slightly asymmetrically biconvex and with an angular periphery; one peripheral keel occurs on all the chambers of the final whorl.
- Umbilicus has a diameter of about one fourth of the maximum test diameter.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate porticus; periapertural structures of the successive chambers can merge in the umbilical region.
- Chamber surface is mostly smooth; rare small-sized scattered pustules occur over the earlier chambers on the umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and reticulately-ridged and perforate.

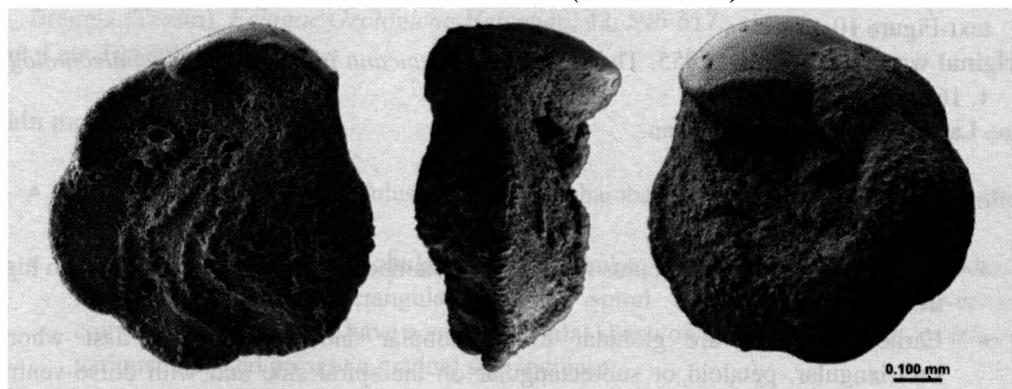
Notes on identification. *Globotruncanita stuartiformis* presents a wide variability with respect to the trochospire height, umbilical side inflation and chamber shape on the spiral side.

Recommended revision. *Globotruncanita stuartiformis* (Dalbiez 1955). Robaszynski and others 1984, p. 238, pl. 32, Figures 1-4. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Original report. *Rotalia elevata* Brotzen 1934, p. 66, pl. 3, Figure c.

Original work. Brotzen, F., 1934. Foraminiferen aus dem Senon Palästinas. In: *Zeitschrift des Deutschen Palästina-Vereins* (Noth, D.M., Ed.). Leipzig: J.C. Hinrichs'sche Buchhandlung, 28-72.

Age. Late Santonian-early Campanian.

Globotruncanita elevata (Brotzen 1934)

Globotruncanita elevata from the upper Santonian sediments of the East Indian Ocean (Exmouth Plateau), ODP Hole 763B.

Main morphological features.

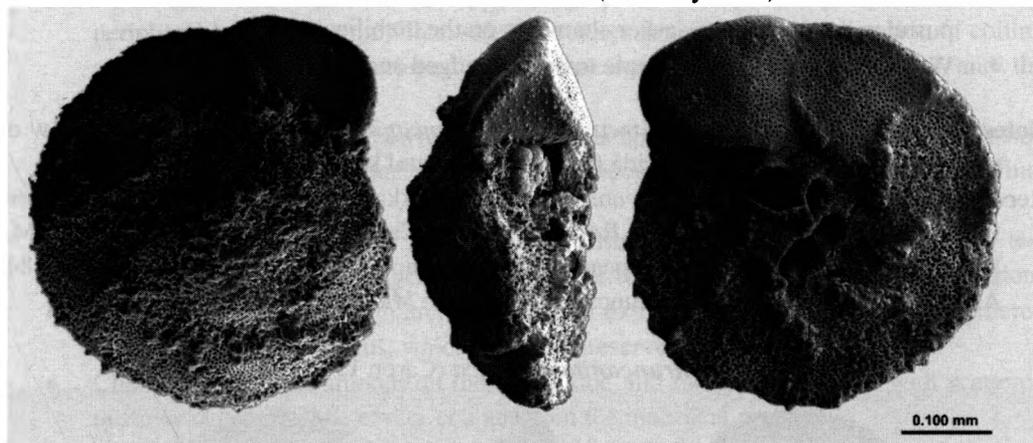
- Test consists of the proloculus followed by chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls subtriangular to petaloid spiral side and with a distinct dorso-ventral compression; chambers have a subrectangular shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel; on the umbilical side the sutures are curved in the direction of coiling, with depressed appearance and lined with well-developed ridges that connect the peripheral keel and the periumbilical ridges.
- Test is plano-convex in edge view with truncate periphery and one keel on all the chambers of the final whorl.
- Umbilicus has a diameter of about one half of the maximum test diameter.
- Aperture is a low to medium high arch in umbilical-extraumbilical position and is bordered by an imperforate porticus; periapertural structures of the successive chambers occur in the umbilicus.
- Chamber surface is smooth on the spiral side and ornamented with scattered pustules occur over the earlier chambers on the umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Globotruncanita elevata* resembles in the general appearance *Concavototruncana dentata* of which it differs mainly by the periphery with one keel on all the chambers of the final whorl.

Recommended revision. *Exmouthia elevata* (Brotzen 1934). Georgescu in Georgescu and others 2013, p. 88, pl. 11, Figures 7-9. Georgescu, M.D., Sawyer, M.S., Heikkinen, C.J., Burke, R.M., 2013. New and revised Cretaceous (Albian-Campanian) planktic foraminifera of the Atlantic, Indian and Pacific Oceans. In: *Foraminifera. Aspects of*

Classification, Stratigraphy, Ecology and Evolution (Georgescu, M.D., Ed.). New York: Nova Science Publishers, 59-100.

Globotruncanita esnehensis (Nakkady 1950)



Globotruncanita esnehensis from the lower Campanian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Globotruncana arca esnehensis* Nakkady 1950, p. 690, pl. 90, Figures 23-26.

Original work. Nakkady, S.E., 1950. Foraminiferal fauna from the Esna Shales and Upper Cretaceous chalk of Egypt. *Journal of Paleontology*, 24, 675-692.

Age. Campanian-Maastrichtian.

Main morphological features.

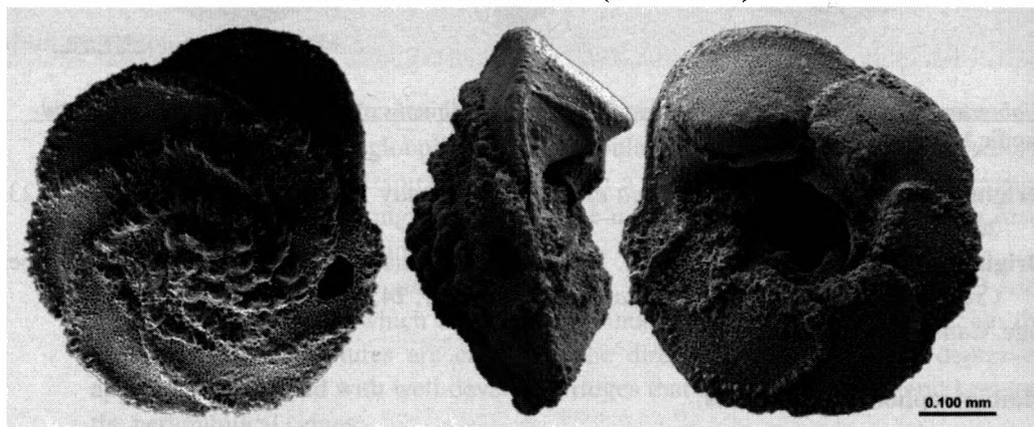
- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls subtriangular to subrectangular on the spiral side and with dorso-ventral compression; chambers have a subrectangular shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight or slightly curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the peripheral keel and the periumbilical ridges.
- Test is symmetrically or asymmetrically biconvex, with a higher spiral side and with angular periphery; one peripheral keel occurs on all the chambers of the final whorl.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter.

- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a perforate porticus or tegillum; periapertural structures of the successive chambers can merge in the umbilical region.
- Chamber surface is smooth on the spiral side and rarely ornamented with scattered pustules occur over the earlier chambers on the umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. Rare specimens of *Globotruncanita esnehensis* with a faint row of pustules towards the umbilical side from the peripheral keel are known.

Recommended revision. *Globotruncana esnehensis* Nakkady 1950. Robaszynski and others 1984, p. 192, pl. 9, Figures 1-4. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Globotruncanita atlantica (Caron 1972)



Globotruncanita atlantica from the lower Campanian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Globotruncana atlantica* Caron 1972, p. 553, pl. 1, Figure 5, text-Figures 1-2, 3c.

Original work. Caron, M., 1972. Planktonic foraminifera from the Upper Cretaceous of Site 98, Leg 11, DSDP. In: *Initial Reports of the Deep Sea Drilling Project, Volume 11* (Hollister, C.D., Ewing, J.I. and others, Eds). Washington, D.C.: United States Government Printing Office, 551-559.

Age. Campanian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls subtriangular on the spiral side and with dorso-ventral compression; chambers have a

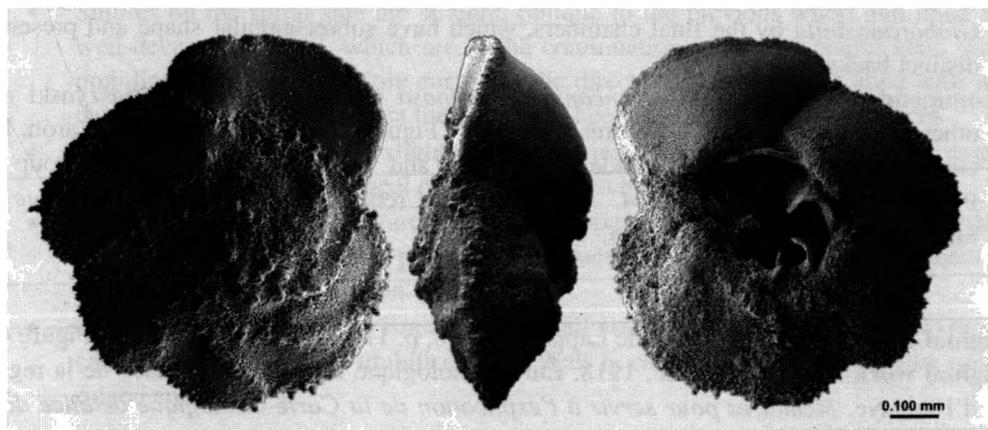
subrectangular shape on the umbilical side, overlap at various rates and present a gradual size increase.

- Sutures on the spiral side are straight or slightly curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the peripheral keel and the periumbilical ridges.
- Test is asymmetrically biconvex, with a higher spiral side, often with a flat spiral side and angular periphery; one peripheral keel occurs on all the chambers of the final whorl.
- Umbilicus has a diameter of about one fifth to one third of the maximum test diameter; periumbilical ridges occur on all the chambers around the umbilical region.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate porticus, which is rarely preserved.
- Chamber surface is smooth on the spiral side and rarely ornamented with scattered pustules occur over the earlier chambers on the umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Globotruncanita atlantica* was described and subsequently identified as having a flat umbilical side; the study of large assemblages showed that specimens with biconvex test shape occur frequently.

Recommended revision. *Globotruncanita atlantica* (Caron 1972). Robaszynski and others 1984, p. 222, pl. 24, Figures 1-4. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Globotruncanita subspinosa (Pessagno 1960)



Globotruncanita subspinosa from the upper Campanian sediments of the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Globotruncana (Globotruncana) subspinosa* Pessagno 1960, p. 101, pl. 1, Figures 1-9, pl. 5, Figure 5.

Original work. Pessagno, E.A. Jr., 1960. Stratigraphy and micropaleontology of the Cretaceous and lower Tertiary of Puerto Rico. *Micropaleontology*, 6, 87-110.

Age. Middle Campanian-early Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls subtriangular to subrectangular with a distinct backward extension on the spiral side and with dorso-ventral compression; chambers have a subrectangular shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Chamber surface on the spiral side is slightly undulated. Sutures on the spiral side are straight or slightly curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel.
- On the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the peripheral keel and the periumbilical ridges.
- Test is asymmetrically biconvex to nearly plano-convex, with an inflated umbilical side and angular periphery; one peripheral keel occurs on all the chambers of the final whorl.
- Umbilicus has a diameter of about one fifth to one third of the maximum test diameter; periumbilical ridges occur on all the chambers around the umbilical region and are more prominent over the earlier chambers of the final whorl.
- Chamber surface is smooth on the spiral side and rarely ornamented with scattered pustules occur over the earlier chambers on the umbilical side.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Globotruncanita subspinoso* differs from all the other species of *Globotruncanita* by the final chambers, which have subrectangular shape and present a distinct backward extension.

Recommended revision. *Globotruncanita subspinoso* (Pessagno 1960). Robaszynski and others 1984, p. 240, pl. 33, Figures 1-3, pl. 34, Figures 1-3. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

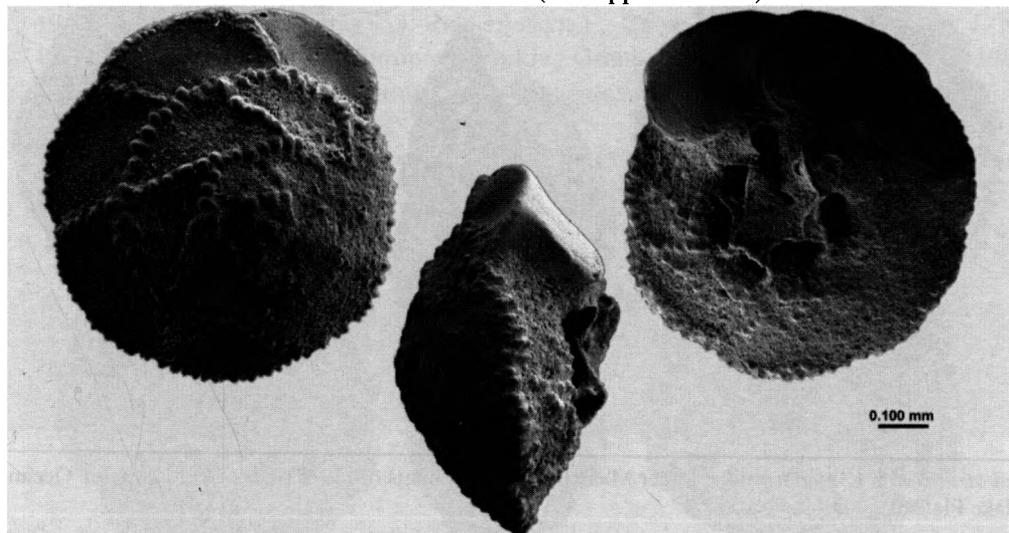
Original report. *Rosalina stuarti* de Lapparent 1918, p. 11, pl. 1, Figures 5-6, text-Figure 4.

Original work. Lapparent, J. de, 1918. Étude lithologique des terrains Crétacé de la région d'Hendaye. *Mémoires pour servir à l'explication de la Carte Géologique détaillée de la France*. Paris: Imprimerie Nationale, 1-115.

Age. Latest Campanian-Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low to medium high trochospire.

***Globotruncanita stuarti* (de Lapparent 1918)**

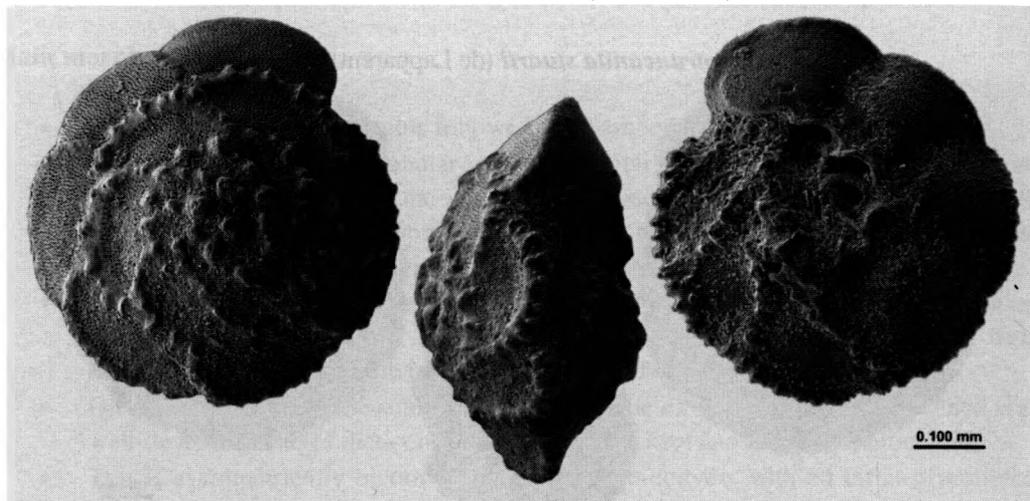
Globotruncanita stuarti from the upper Maastrichtian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

- Earlier chambers are globular to subglobular and those of the last whorls subrectangular or more rarely subtriangular on the spiral side and with dorso-ventral compression.
- Sutures on the spiral side are straight, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the peripheral keel and the periumbilical ridges.
- Test is symmetrically or slightly asymmetrically biconvex and with an angular periphery; one peripheral keel occurs on all the chambers of the final whorl.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by an imperforate porticus; periapertural structures of the successive chambers can merge in the umbilical region.
- Chamber surface is mostly smooth; rare small-sized scattered pustules occur over the earlier chambers on the umbilical side. Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Recommended revision. *Globotruncanita stuarti* (de Lapparent 1918). Robaszynski and others 1984, p. 234, pl. 30, Figures 1-3, pl. 31, Figures 1-3. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on

Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

Globotruncanita conica (White 1928)



Globotruncanita conica from the upper Maastrichtian sediments of the Western North Atlantic Ocean (Blake Plateau), ODP Hole 1050C.

Original report. *Globotruncana conica* White 1928, p. 285, pl. 38, Figure 7.

Original work. White, M.P., 1928. Some index foraminifera of the Tampico Embayment area of Mexico. Part II. *Journal of Paleontology*, 2, 280-317.

Age. Maastrichtian.

Main morphological features.

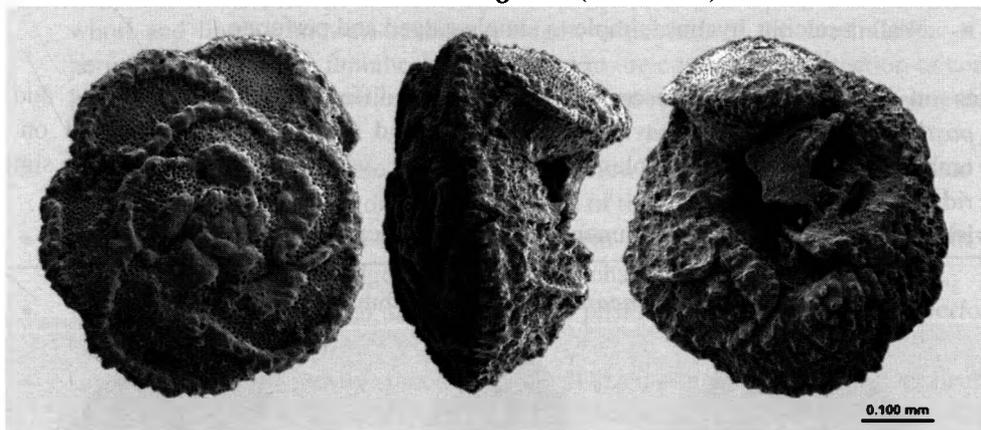
- Test consists of the proloculus followed by chambers added in a low to medium high to high trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls subrectangular on the spiral side and with dorso-ventral compression; chambers have a subrectangular shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the peripheral keel and the periumbilical ridges.
- Test is symmetrically or slightly asymmetrically biconvex and with an angular periphery; one peripheral keel occurs on all the chambers of the final whorl, but specimens with an umbilical keel developed over the earlier chambers of the final whorl also occur.
- Aperture is a medium high arch in umbilical-extraumbilical position and is bordered by a perforate tegillum.

- Chamber surface is mostly smooth; rare small-sized scattered pustules occur over the earlier chambers on the umbilical side. Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Globotruncanita conica* differs from *G. atlantica* mainly by the chamber shape on the spiral side, which is subrectangular rather than subtriangular.

Recommended revision. *Globotruncanita conica* (White 1928). Robaszynski and others 1984, p. 226, pl. 26, Figures 1-3. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

***Globotruncanita angulata* (Tilev 1951)**



Globotruncanita angulata from the upper Maastrichtian sediments of the North Atlantic Ocean (Orphan Knoll), DSDP Hole 111A.

Original report. *Globotruncana lugeoni angulata* Tilev 1951, p. 46, pl. 2, Figures 13-16, pl. 3, Figure 1, text-Figure 13.

Original work. Tilev, N., 1951. Étude des Rosalines Maastrichtiennes (genre *Globotruncana*) du sud-est de la Turquie (Sondage de Ramandag). *Bulletin de la Laboratoires de Géologie, Minéralogie, Géophysique et Museum Géologique, Université du Lausanne*, 103, 1-101.

Age. Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low, nearly flat trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls subtriangular on the spiral side and with dorso-ventral compression; chambers have a subrectangular shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Sutures on the spiral side are straight to curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel; on the umbilical side the sutures are curved in the direction of coiling and lined

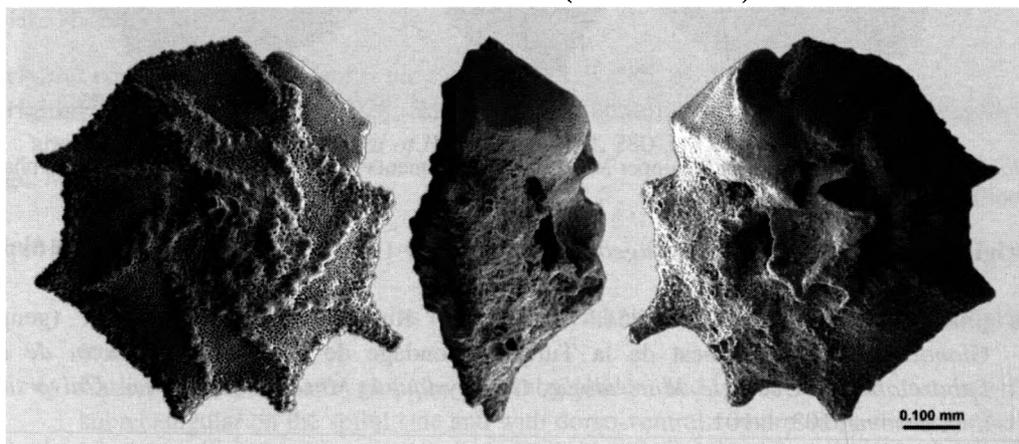
with well-developed ridges that connect the peripheral keel and the periumbilical ridges.

- Test is asymmetrical, plano-convex in edge view, with angular periphery and one peripheral keel developed on all the chambers of the final whorl.
- Umbilicus has a diameter of about one third of the maximum test diameter; periumbilical ridges occur on all the chambers around the umbilicus.
- Aperture is a medium high arch in umbilical position and is bordered by an imperforate tegillum.
- Chamber surface is mostly smooth on the spiral side; on the umbilical side the chambers are ornamented with scattered pustules, which are more prominent over the earlier chambers.
- Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Globotruncana angulata* differs from *G. carpathica* and *G. posthelvetica* mainly by having periumbilical and sutural ridges developed on the umbilical side and more complex wall ultrastructure, which frequently presents a simple-ridged appearance.

Revision. No revision can be recommended for this species.

Radotruncana calcarata (Cushman 1927)



Radotruncana calcarata from the upper Campanian sediments from the central Pacific Ocean (Mid-Pacific Mountains), DSDP Site 463.

Original report. *Globotruncana calcarata* Cushman 1927, p. 115, pl. 23, Figure 10.

Original work. Cushman, J.A., 1927. New and interesting foraminifera from Mexico and Texas. *Contributions from the Cushman Laboratory for Foraminiferal Research*, 3, 111-117.

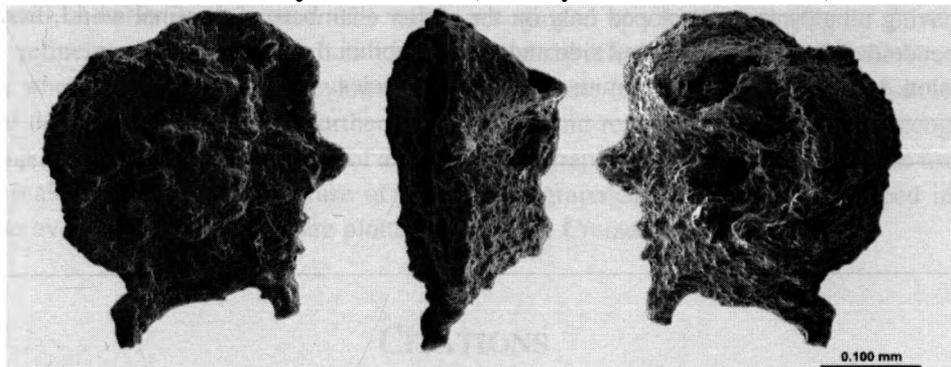
Age. Late Campanian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low, nearly flat trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls subtriangular to subrectangular on the spiral side and with a distinct dorsal compression; chambers have a subrectangular shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Peripheral tubulospines are developed in the chamber posterior peripheral angle in the last one or two whorls resulting in a stellate outline; the last-formed chambers lack such structures occasionally.
- Sutures on the spiral side are straight to slightly curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the peripheral keel and the periumbilical ridges.
- Test is asymmetrical, plano-convex in edge view, with pinched periphery and one peripheral keel developed on all the chambers of the final whorl.
- Umbilicus has a diameter of about one fourth to one third of the maximum test diameter; periumbilical ridges occur on all the chambers around the umbilicus.
- Aperture is a medium high arch in umbilical position and is bordered by a perforate or imperforate tegillum.
- Chamber surface is mostly smooth; rare small-sized scattered pustules occur over the earlier chambers on the umbilical side. Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Recommended revision. *Globotruncanita calcarata* (Cushman 1927). Robaszynski and others 1984, p. 224, pl. 25, Figures 1-3. Robaszynski, F., Caron, M., González Donoso, J. M., Wonders, A. A. H. and The European Working Group on Planktonic Foraminifera, 1984. Atlas of Late Cretaceous globotruncanids. *Revue de Micropaléontologie*, 26, 145-305.

***Radotruncana falsocalcarata* (Kerdany and Abdelsalam 1969)**



Radotruncana falsocalcarata from the uppermost Maastrichtian sediments of the Western Atlantic Ocean (Demerara Rise), ODP Hole 1259C.

Original report. *Globotruncana falsocalcarata* Kerdany and Abdelsalam 1969, p. 261, pl. 1, Figures 1-4, pl. 2, Figures 1-2.

Original work. Kerdany, M.T., Abdelsalam, H., 1969. *Globotruncana falsocalcarata* n. sp. from the Quseir area, Eastern Desert, U.A.R. *Proceedings of the Third African Micropaleontology Colloquium, Cairo, 1968*, 261-267.

Age. Latest Maastrichtian.

Main morphological features.

- Test consists of the proloculus followed by chambers added in a low, nearly flat trochospire.
- Earlier chambers are globular to subglobular and those of the last whorls subtriangular to petaloid on the spiral side and with a distinct dorsal compression; chambers have a subrectangular shape on the umbilical side, overlap at various rates and present a gradual size increase.
- Earlier chambers of the final whorl present an angular subtriangular shape or tubulospines resulting in a stellate outline.
- Sutures on the spiral side are straight to slightly curved, oblique to the previous whorl and lined with well-developed ridges, which are in the continuation of the peripheral keel; on the umbilical side the sutures are curved in the direction of coiling and lined with well-developed ridges that connect the peripheral keel and the periumbilical ridges.
- Test is asymmetrical, plano-convex in edge view, with pinched periphery and one peripheral keel developed on all the chambers of the final whorl.
- Umbilicus has a diameter of about one third to one half of the maximum test diameter; periumbilical ridges occur on all the chambers around the umbilicus.
- Aperture is a medium high arch in umbilical position.
- Chamber surface is mostly smooth; scattered pustules occur over the earlier chambers on the umbilical side. Wall is calcitic, hyaline, simple to simple-ridged and perforate.

Notes on identification. *Radotruncana falsocalcarata* differs from *R. calcarata* mainly by having tubulospines developed only on the earlier chambers of the final whorl, frequent petaloid chambers on the spiral side and wider umbilici.

Revision. No revision can be recommended for this species.

BIOSTRATIGRAPHY

The high rate of evolutionary development, preservation potential and worldwide distribution make the planktic foraminifera one of the most useful fossil groups in the Upper Cretaceous biostratigraphy. The usefulness of the representatives of this group was at its peak in the last fifty years when the planktic foraminifera were frequently considered one of the most useful groups in the correlation of the sedimentary rocks of Late Cretaceous age together with ammonites, inoceramids and coccolithophorids. In addition, planktic foraminifera can be used in paleobathymetry, sequence stratigraphy, paleoceanography and paleoclimate related studies.

Modern biostratigraphical frameworks based on planktic foraminifera for the Upper Cretaceous consist of a succession of taxon range zones (TRZ), interval zones (IZ) and partial taxon range zones (PTRZ). The wide geographical distribution of many index species made that some biostratigraphical frameworks for the Upper Cretaceous to be used at global scale and probably the most successful one from this perspective is that given by Robaszynski and Caron (1995). Notably, such advances happened by using the "Linnaean" classification, in which the species concept used was that of morphospecies.

The development of the evolutionary classification based on high resolution observations with the aid of a SEM or ESEM resulted in significant increase in the number of species especially in the heterohelicid group. The new data acquired at a higher level of resolution led to a reassessment of the stratigraphical ranges of almost all of the known species with serial and coiled chamber arrangement. The newly recognized species ranges (Figure 7) require further refinement in the future. It is to be noted a significant increase of the short-ranged species when compared to the previous distribution charts (e.g., Masters 1977; Caron 1985). Each of these species requires a further investigation and reassessment in order to recognize their importance in the development of a new biostratigraphical framework that can be used at global scale. For this reason the use of any biostratigraphical frameworks developed in the past was avoided and the ranges are plotted only on the Cretaceous stage/age scale.

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- Caron, M., 1985. Cretaceous planktic foraminifera. In: *Plankton Stratigraphy* (H.M. Bolli, J.B. Saunders, K. Perch-Nielsen, Eds). Cambridge: Cambridge University Press, 17-86.

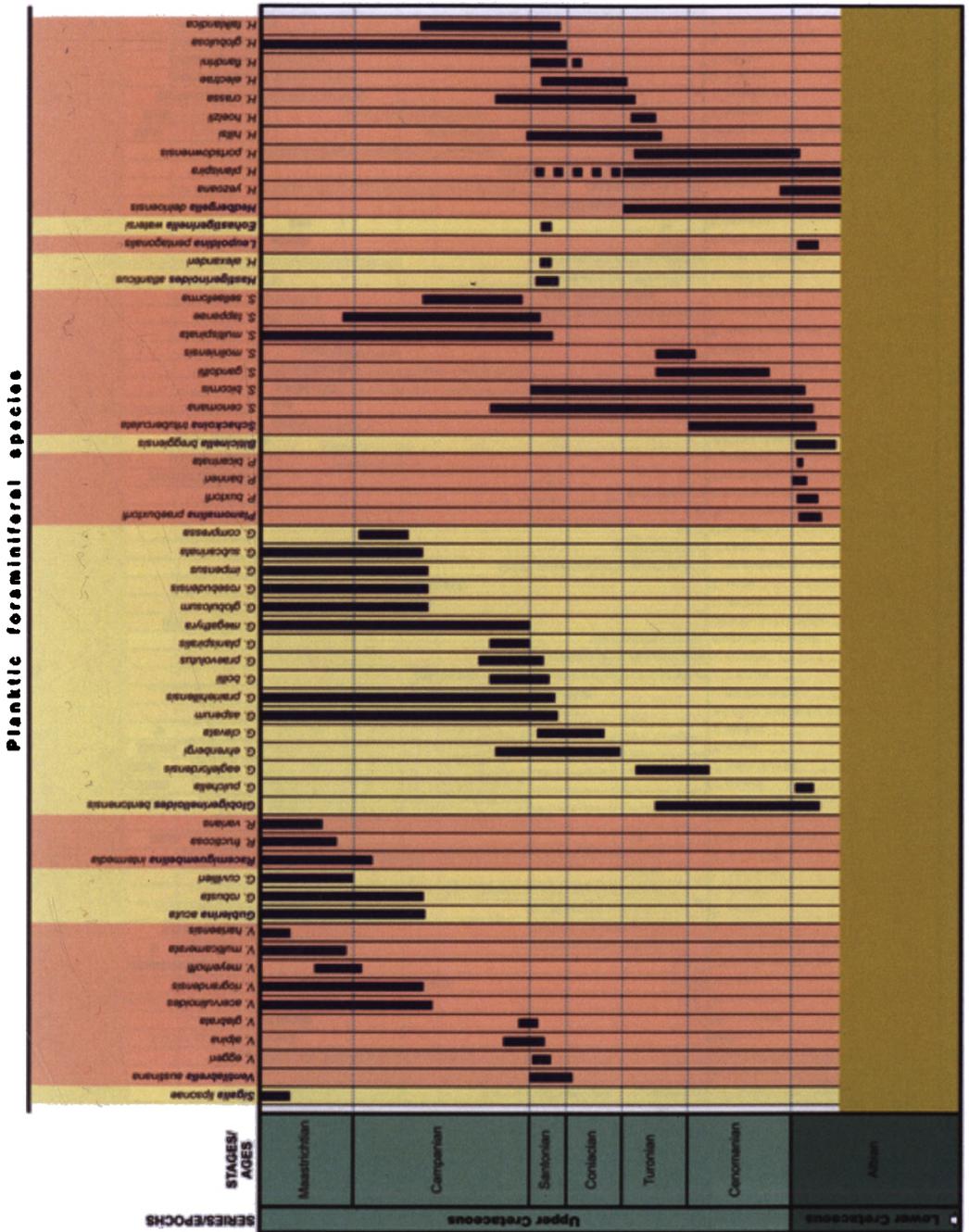


Figure 7. (Continued).

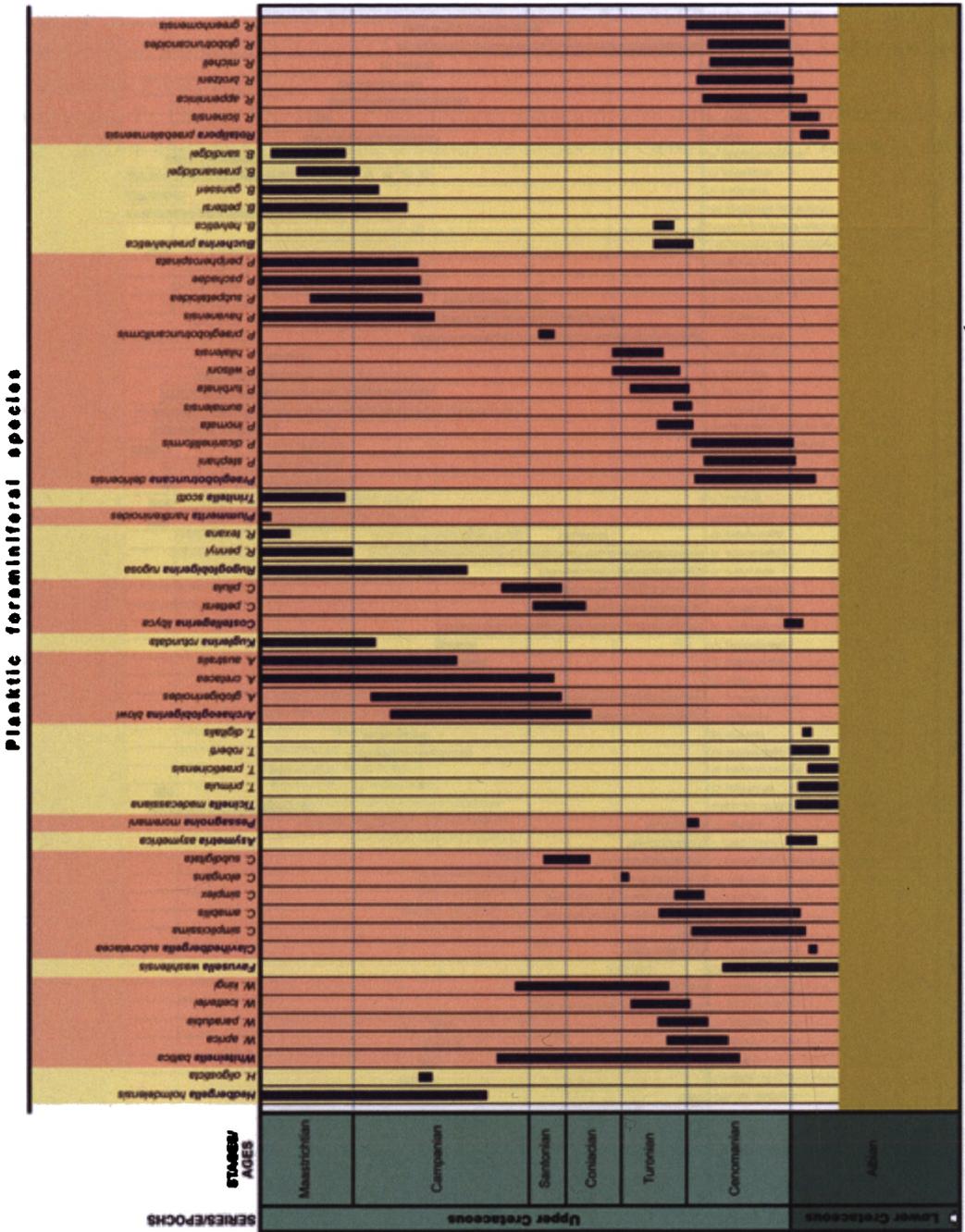


Figure 7. (Continued).

INDEX

A

Abathomphalus, 226, 230, 236, 279, 283
acervulinoides, 20, 121, 122
ackermanni, 34, 297, 298
acuta, 20, 127, 128
aegyptiaca, 33, 277, 278
alexanderi, 12, 23, 168, 169
algeriana, 33, 257, 258, 259, 260
Allothea, 145, 146, 183
alpina, 20, 119, 120
alta, 34, 302, 303
amabilis, 10, 26, 195, 196
americana, 18, 90, 91, 104
Anaticinella, 32, 39, 172, 175, 188, 254, 256, 257
angulata, 35, 317, 318
angusticarinata, 33, 261, 262
Anomalina, 135, 137, 138, 157, 205
appenninica, 32, 246, 248, 249, 251
aprica, 25, 187, 188
arca, 33, 267, 268, 299, 311
Archaeoglobigerina, 28, 39, 207, 208, 209, 210, 211, 212, 276, 290, 292, 293
Archaeoguembelitra, 47, 48
asperum, 10, 21, 140, 141
Asymetria, 9, 26, 39, 199, 200
asymetrica, 27, 33, 199, 200, 201, 285, 288, 289
atlantica, 35, 312, 313, 317
atlanticus, 23, 167, 168, 169
aumalensis, 31, 228, 229
austinana, 20, 117, 118
australis, 28, 210, 211, 212

B

baltica, 25, 186, 187
banneri, 22, 154, 155

Bannerina, 154, 156
bentonensis, 21, 134, 135, 136, 138
Bermudeziana, 229, 230, 232
bicarinata, 22, 155, 156
biconvexa, 33, 264
bicornis, 23, 160, 161
Biticinella, 22, 37, 157, 206
blowi, 28, 207, 208, 209, 210
bollii, 21, 142, 143
Bollitruncana, 306, 307
bouldinensis, 34, 293, 295
Braunella, 81, 83
brauni, 17, 83, 84, 85
breggiensis, 22, 157, 206
Bronnimannella, 64, 79
brotzeni, 32, 249, 250, 251, 252
Bucherina, 31, 39, 238, 239, 240, 241, 242, 243, 244, 245
buxtorfi, 22, 152, 153, 154, 155

C

cachensis, 33, 266, 267
calcarata, 35, 318, 319, 320
canaliculata, 33, 259, 260, 261, 263, 273
carinata, 13, 17, 73, 74, 101, 105
carpathica, 35, 111, 305, 306, 307, 308, 318
carpatica, 19, 110, 111
cenomana, 16, 23, 46, 47, 48, 159, 160, 161
Chiloguembelina, 57
circumnodifer, 11, 34, 275, 304, 305
clarae, 10, 19, 103, 104
clavata, 21, 139, 140
Clavihedbergella, 10, 26, 39, 173, 193, 194, 195, 196, 197, 198, 199
compressa, 21, 151, 152, 238
concvata, 11, 33, 285, 286, 287, 289

Concavototrancana, 11, 33, 44, 283, 284, 285, 286,
287, 288, 289, 290, 291, 292, 293, 300, 302, 310
conica, 35, 316, 317
contusa, 34, 299, 300, 303
Contusotruncana, 33, 44, 293, 294, 295, 296, 297,
298, 299, 300, 301, 302, 303
Costellagerina, 9, 28, 29, 38, 213, 214, 215, 216,
217
costellifera, 18, 97, 98
costulata, 18, 96, 97
crassa, 25, 178, 179, 185
cretacea, 16, 28, 33, 48, 171, 209, 210, 269
Cuneolina, 84
cushmani, 12, 32, 255, 256
cuvillieri, 13, 20, 130, 131

D

decoratissima, 19, 112, 113
deflaensis, 19, 113, 114
delrioensis, 25, 31, 171, 172, 180, 223, 224, 225, 226
dentata, 33, 287, 288, 310
Dicarinella, 258, 260, 287, 289
dicarinelliformis, 31, 225, 226, 227, 230
digitalis, 28, 206, 207
digitata, 17, 88, 89
directa, 17, 57, 58, 88
Dorbignya, 210

E

eaglefordensis, 21, 135, 137, 138
Edgarinella, 277
eggeri, 20, 118, 119, 121
ehrenbergi, 21, 138, 139
Ehrenbergites, 65
electrae, 25, 179, 180
elegans, 17, 84, 85
elevata, 35, 309, 310
elongans, 26, 197, 198, 199
Eohastigerinella, 24, 37, 170, 171, 199
escheri, 139
esnehensis, 35, 311, 312
euryconus, 17, 70, 71
excolata, 18, 98, 99
Exmouthia, 288, 310

F

falklandica, 25, 183, 184
falsocalcarata, 35, 319, 320
falsostuarti, 33, 281, 282

Falsotruncana, 178, 267
Favusella, 10, 25, 38, 191, 192
fayose, 17, 56, 57
Fingeria, 190, 191, 233
flandrini, 25, 181
Fleisherites, 88
fornicata, 34, 295, 296, 297, 300
fructicosa, 21, 132, 133

G

gagnebini, 33, 291, 292, 293
Gandolfia, 208, 209, 276, 290, 292, 293
gandolfii, 23, 38, 161, 162, 163, 168
gansseri, 31, 242, 243
glabrans, 17, 87, 88, 108
glabrata, 20, 120, 121
Globigerina, 171, 173, 174, 177, 188, 190, 192, 198,
209, 217, 228, 268, 304
Globigerinelloides, 10, 11, 12, 21, 37, 134, 135, 136,
137, 138, 139, 140, 141, 142, 143, 144, 145, 146,
147, 148, 149, 150, 151, 152, 238
globigerinoides, 28, 208, 209
globocarinata, 17, 75, 76, 77, 79, 80
Globoheterohelix, 55
Globorotalia, 223, 236, 253, 255, 256
Globotruncana, 27, 32, 44, 208, 224, 226, 229, 230,
233, 235, 239, 241, 242, 247, 248, 254, 257-283,
285, 287, 289, 291, 292, 295, 297, 298, 305, 306,
307, 308, 309, 311, 312, 313, 316, 317, 318, 320
Globotruncanella, 151, 234, 237
Globotruncanita, 34, 44, 305, 306, 307, 308, 309,
310, 311, 312, 313, 314, 315, 316, 317, 318, 319
globotruncanoides, 32, 251, 252
globulosa, 25, 182, 183
globulosum, 12, 21, 146, 147
greenhornensis, 32, 253, 254
Groshenyia, 170
Gublerina, 13, 20, 37, 81, 82, 127, 128, 129, 130,
131
Guembelina, 98
Guembelitra, 13, 15, 36, 46, 47, 48
Gümbelina, 46, 49, 52, 58, 60, 62, 73, 75, 76, 78, 80,
81, 82, 83, 87, 97, 113, 117, 121, 132
Gümbelitra, 15, 47

H

Hantkenina, 22, 23, 158, 163
hantkeninoides, 30, 220, 221
hariaensis, 20, 37, 126, 128, 129, 131, 132, 133, 134
harrisi, 16, 47, 48

Hartella, 107
harti, 19, 107, 108
Hastigerinella, 23, 168, 170, 192, 194, 196, 200
Hastigerinoides, 11, 12, 23, 38, 140, 167, 168, 169
havanensis, 31, 233, 234, 237
Hedbergella, 12, 13, 24, 25, 38, 155, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 188, 193, 195, 202, 208, 213
Hedbergina, 24, 25
helvetica, 31, 239, 240, 242, 306
hendersoni, 17, 72, 74
Hendersonia, 72, 74
Hendersonites, 74
Heterohelix, 11, 12, 13, 16, 36, 49, 50, 51, 52, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 93, 94, 95, 101, 104, 105, 108
hilalensis, 31, 231, 232
Hillsella, 144, 176, 177, 197
hillsi, 12, 25, 176, 177
hoelzli, 25, 177, 178
holmdelensis, 25, 184, 185
hölzli, 177
Huberella, 92, 93
huberi, 18, 93, 94

I

impensus, 21, 149, 150
incipiens, 17, 36, 66, 67, 68, 70, 71, 72
initialis, 17, 36, 67, 68
inornata, 31, 226, 227, 294
insignis, 273
intermedia, 21, 33, 37, 131, 132, 278, 279, 283

K

kempensis, 18, 100, 101
kingi, 25, 190, 191
Kuglerina, 28, 39, 212, 219

L

Laeviheterohelix, 60, 70, 71, 88, 110
lazarusi, 19, 106
Lazarusina, 106
Leptobimodalina, 94
leptobimodalis, 18, 94, 98
Leupoldina, 23, 37, 169
libyca, 29, 213, 214
linnei, 262

linneiana, 33, 262, 263, 277, 281
lipsonae, 19, 115, 116
Lipsonia, 102, 115
loetterlei, 25, 189, 190, 191
lugeoni, 317
Lunatriella, 9, 10, 17, 36, 57, 88, 89, 90

M

madecassiana, 28, 202, 203, 204, 205
magellani, 17, 71
Magellanina, 71
marginata, 33, 265, 266
Marginotruncana, 261, 293
mariei, 270
mayaroensis, 33, 282, 283
megathyra, 21, 145, 146
messinae, 150
meyerhoffi, 20, 124, 126
miceli, 32, 250, 251, 255
Mihaia, 53, 59
mihaii, 17, 53, 54
mississippiica, 33, 276, 277
moliniensis, 23, 38, 162, 163
moremani, 17, 27, 51, 52, 200, 201
multicamerata, 20, 125, 126
multiloculata, 32, 256, 257
multispinata, 23, 163, 164

N

nakhitschevanica, 19, 108, 110, 111, 113, 114
navarroensis, 19, 104, 105
Nederbragtina, 86
Neoschackoina, 165, 166
nothi, 33, 280, 281
nuttalli, 13, 17, 78, 79, 81, 82, 83, 84

O

obscura, 17, 50, 51, 58
oligosticta, 25, 185, 186
orientalis, 33, 270, 271
orphanensis, 34, 300, 301, 302

P

pacificus, 17, 74
palpebra, 18, 101, 102
papula, 17, 62, 63
Paracostellagerina, 214

paradubia, 25, 188, 189
paraglobulosa, 17, 55
Paraspiroplecta, 10, 18, 36, 103, 104, 105, 106, 107, 108
pembergeri, 33, 272
pennyi, 29, 218, 219
pentagonalis, 24, 169, 170
peripherospinata, 31, 237, 238
Pessagnoina, 27, 39, 197, 201
pettersi, 29, 31, 214, 215, 216, 241, 243
Phanerostomum, 140, 141, 147
pilula, 9, 29, 215, 216, 217
planata, 17, 59, 60, 77
planispira, 21, 25, 144, 145, 173, 174, 183
planispiralis, 21, 144, 145
Planoglobulina, 79, 122, 123, 124
Planoheterohelix, 52, 53
Planomalina, 22, 37, 136, 138, 152, 153, 154, 155, 156
Planulina, 138, 153, 185, 276
Planulitella, 66, 69
plummerae, 17, 34, 63, 64, 294, 295, 296
Plummerella, 29, 30, 220
Plummerita, 29, 30, 35, 39, 221
portsdownensis, 25, 174, 175, 180, 188
posthelvetica, 35, 306, 307, 308, 318
postmoremani, 17, 52, 53, 54, 55, 59, 60, 93
praebalernaensis, 32, 246, 247, 248
praebuxtorfi, 22, 37, 152, 153
praecostulata, 18, 95, 97, 98, 100, 101, 102
Praeglobotruncana, 26, 30, 39, 178, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 257, 258, 294
praeglobotruncaniformis, 31, 232, 233
Praegublerina, 77, 128, 129
praehelvetica, 31, 238, 239, 240, 241
praehuberi, 18, 92, 93, 94
praesandidgei, 31, 39, 243, 244, 245
praeticinensis, 28, 204, 205
praevolutus, 21, 143, 144
prairiehillensis, 21, 141
prima, 17, 86, 88, 89, 90, 91, 93, 94, 95
primula, 12, 28, 203, 204
Proliferania, 67, 111, 113
proliferans, 19, 114, 116, 118, 119, 120, 121, 122, 123
Protoheterohelix, 50, 51
pschadae, 31, 236, 237
Pseudoclaviedbergella, 195, 196
Pseudoguembelina, 18, 36, 37, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 104, 105, 126
Pseudohastigerinoides, 162, 163

Pseudoplanoglobulina, 19, 58, 108, 109, 110, 111, 113, 114
pseudotessera, 17, 57, 76, 77
Pseudotextularia, 85, 131, 132, 133, 134, 135
pulchella, 21, 136
Pulvinulina, 267, 299
punctulata, 17, 80, 81, 83

R

Racemiguembelina, 11, 21, 36, 86, 131, 132, 133, 134
Radotruncana, 35, 39, 318, 319, 320
rajagopalani, 17, 81, 82
raynaudi, 206
reicheli, 32, 254, 255
reniformis, 19, 109, 110
renzi, 33, 260, 261, 262
reussi, 17, 58, 59, 65
riograndensis, 20, 122, 123
roberti, 28, 205, 206
robusta, 20, 128, 129
roddai, 33, 258, 259
Rosalina, 259, 262, 265, 314
Rosalinella, 274
rosebudensis, 21, 147, 148
rosetta, 33, 241, 268, 269, 272
Rosita, 296, 299, 300
Rotalia, 182, 286, 309
Rotalipora, 12, 31, 39, 226, 230, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257
rotundata, 28, 211, 212, 219
Rugoglobigerina, 10, 29, 38, 191, 211, 212, 215, 216, 217, 218, 219, 220, 223, 235, 239, 275, 289
rugosa, 10, 29, 33, 211, 217, 218, 274, 275
Rugotruncana, 11, 34, 39, 304, 305

S

sandidgei, 31, 243, 244, 245
Schackoina, 13, 22, 23, 38, 158, 159, 160, 161, 162, 163, 164, 165, 166, 168, 169
scotti, 30, 222, 223
sellaeforma, 23, 166
semicostata, 11, 17, 82, 83
shatskyensis, 18, 102, 104, 105
Siderolina, 159
sigali, 35, 307, 308
Sigalia, 19, 36, 67, 110, 111, 112, 113, 114, 116, 118, 119, 120, 121, 122, 123
simplex, 26, 196, 197, 198
simplicissima, 26, 194, 195, 196, 197

sphaeralis, 17, 79
sphenoides, 17, 65, 66
spinifera, 9, 10, 17, 89, 90
Spinoglobo truncanella, 151, 237
Spiropecta, 16, 17, 36, 91, 104, 107
steinecki, 17, 60, 61, 63, 64, 65, 66, 71
Steineckia, 60
stenopos, 17, 68, 69
stephani, 31, 224, 225, 226, 229, 233
striata, 17, 64, 65
stuarti, 35, 314, 315
stuartiformis, 35, 308, 309
subcarinata, 21, 150, 151, 152
subcircumnodifer, 33, 275, 276
subcretacea, 26, 192, 193
subdigitata, 26, 198, 199
subpennyi, 33, 289, 290, 292
subpetaloidea, 31, 235, 236
subspinosa, 35, 313, 314

T

tappanae, 23, 164, 165
texana, 29, 219, 220
Texasina, 63, 118
Textilaria, 70, 90
Textularia, 64
Ticinella, 12, 27, 38, 187, 202, 203, 204, 205, 206, 207
ticinensis, 32, 247, 248
Trinitella, 30, 38, 222, 223

trituberculata, 23, 158, 159, 160, 161
trocoidea, 173
turbinata, 31, 229, 230, 232, 233

V

Vanhintella, 147, 186
varians, 21, 37, 133, 134, 135
venezuelana, 33, 283, 284, 285, 286, 290
Ventilabrella, 10, 20, 37, 63, 110, 112, 113, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 128, 129, 131, 132, 133, 134
ventricosa, 33, 273, 274, 278
vescicarinata, 288
vridhachalensis, 33, 285, 286, 287

W

walfischensis, 34, 298, 299, 300, 303
washitensis, 10, 12, 17, 26, 49, 50, 191, 192
watersi, 24, 170, 171
Whiteinella, 25, 38, 186, 187, 188, 189, 190, 191, 208
wiedenmayeri, 33, 292, 293
wilsoni, 31, 230

Y

yezoana, 25, 172, 173, 193, 202

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