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Upper Cretaceous smaller foraminifera from the Gypseous
Clays of the 'Uttattur Beds' of the Uttattur* Group,
Trichinopoly District, Madras State.**

(With Plate I and Fig. 1)

By

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ABSTRACT:

Fortyseven species of smaller foraminifera inclusive of two sub-species are described from the gypseous clays of the Uttattur beds. Seventeen of them are not definitely determined for the time being. Twentyfive species, however, appear to be similar to the Upper Cretaceous Austin-Taylor and Navarro stages of North America. Two of these sub-species, *Globotruncana rosetta rosetta* Carsey and *G. ventricosa ventricosa*. White are reported from the Colon Shale Formation of Columbia, South America. Species like *Globigerina cretacea* d'Orbigny, *Lagena* cf. *globosa* Montagu, *Ramulina globulifera* Brady and *Gyroldina beisseli* White are previously recorded from the Upper Cretaceous of North-West basin of Western Australia and New Mexico. Thus it appears that these species of foraminifera of the Uttattur beds are similar to the species of Senonian age ranging from Coniacian to Maestrichtian. The species are, however, compared (types being unavailable) with the illustrations.

Ootatoor (Uttattur) Beds of Uttattur Group:

Author : Blanford, H. F., p. 23, 1862.

Type area : The group owes its name to the Uttattur village (11.4/78.51) in the District of Trichinopoly, Madras State, where it is developed. The group

* Spelling used in this paper are after the present Survey of India toposhheet No. 58(I/16) (Scale 1 inch to mile).

** Read before the Society on 4. 1. 63.

is made up of two rock-units. A coral-reef limestone is at the base. This basal unit occurs as detached outcrops toward the western border of the group. A more widespread, shale-siltstone-gypseous clay unit intercalated with concretions and nodules of ferruginous, calcareous and phosphatic material occurs at the top. This upper unit is designated as the Uttattur beds of Blanford. Exact relation between these two constituent rock-units of the Uttattur group was neither clear to Blanford, (p. 56) in 1862, nor it could be established by the present authors.

Type section: No measured type-section of the Uttattur Group is available.

Typical sections: Typical sections are known to occur at a number of localities from Blanford's own record. In all instances the measured sections are unavailable.

Lithology: The Uttattur beds present much variety—fine silt, calcareous and argillaceous shales, sandy and gypseous clays, frequently tinted with ochreous matter. They also contain angular fragments of shale from the plant beds (Uttattur plant beds occurring at the base of the marine Uttattur group) and concretions and nodules of ferruginous, calcareous and phosphatic material. Occasionally they are unconsolidated. South of Karai (11.8/78.53) and Garudamangalam (11.5/78.55) the Uttattur beds consist almost exclusively of laminated sands, clays and argillaceous shales with comparatively few fossils.

Lower contact: The Uttattur group rests undisturbed either upon the gneiss (crystalline complex) or upon the Uttattur plant beds. The Uttattur beds which is dealt with as uppermost beds of the Uttattur group behave likewise: they are seen to cap (in addition to the gneiss and the plant beds) the detached outcrops of coral reef limestone toward north-side of the basin.

Upper contact: The Uttattur beds are unconformable to the Upper Cretaceous Trichinopoly Group.

Structure: Least known. Hypothetical statements are various—but without a number of digs into the basin itself, precise information will not be available.

Thickness and areal distribution of the Uttattur beds: The Uttattur beds occupy a strip of country about thirty miles in length and three to four miles in average width. It appears to be widest between Uttattur (11.4/78.51) and Maruvattur (11.12/78.57). These beds contract rapidly to the north and south both along its length and breadth.

Incidentally it may be pointed out in passing that the present work is also confined between Maruvattur to the north and Uttattur to the south. Samples of gypseous clays are drawn by the authors from within a depth of 6 ft. from the surface at the following localities (in a north-south direction): Maruvattur (11.12/78.57), Kalpadi (11.11.30/78.55.30), Panangur (about 1.5 miles south-south-west of Maruvattur), Varagupaddy (11.9.30/78.54), Kudikkadu (about 3 miles north-east of Karai), Sirukanbur (about 3.2 miles north-east of Karai), Nattakkudu (about 4.9 miles east-north-east of Karai), Karai

(11.8/78.53), Kulakkalnattam (about 5 miles east of Karai), Ayinapuram (about 3.5 miles east-south-east of Karai), Ukkalur (about 1.8 miles north-east of Uttattur), Uttattur (11.4/78.51), Nallur (about 3 miles north-east of Uttattur), Nambakkurichchi (about 1.2 miles south-east of Uttattur), Terkumadevi (about 4.2 miles north-east of Karai).

These beds are variable in composition and thickness both along its length and breadth. Gypseous clays predominate over the rest of components. No quantitative estimate of either of the composition or of the thickness of this unit is possible without adequate bore-hole data. Speaking qualitatively they appear to be more sandy toward the north and clayey toward the south. Pelagic ammonites and bottom-dwelling other molluscs are frequent to the north, whereas they are practically absent to the south.

Blanford estimated thicknesses of the Uttattur beds from three localities as 720 ft., 1900 ft. and 400 ft. within a distance of 7 and 8 miles respectively from one another and this calculated thickness was based primarily on the assumption that the beds are horizontal throughout and their dip is even and does not exceed eight degrees.

The bedding is however irregular (p. 89) and they were laid down on an irregular sea floor.

Fossils, Age and Palaeoecology: North of Karai (11.8/78.53) the Uttattur beds are characterised by pelagic cephalopods and bottom-dwelling molluscs and annelids. South of Karai these are practically absent except for probably a few drifted genera from the north. The geological age of the Uttattur beds was derived chiefly from the fossil cephalopods and molluscs occurring in them.

In Blanford's opinion the fossil cephalopods bore greatest resemblance with the fauna of the Gault, Upper Greensand and even Neocomian of Western Europe.

Dr. Stoliczka (1861-1873) was more directly concerned with the systematic descriptions of the fossil collections from the Cretaceous deposits of various parts in South India than with the specific determination of the geological age of the Uttattur beds.

In later years Dr. Kossmat subdivided the Uttattur beds into a three-fold unit—lower, middle and upper on the basis of the ammonites and other molluscs occurring in the Uttattur beds. These fossil shells, in his opinion, were similar to those animals occurring in the Upper Albian, Cenomanian and lower Turoonian beds of Europe. A three-fold subdivision of the Uttattur beds and the consequent geological age of the beds has been maintained almost as an article of faith in our geology. It does not appear to have been checked up in field practice, and the boundary surfaces between the different layers remain obscure.

Prof H. C. Dasgupta (1922) reported on some smaller foraminifera (*Globigerina* sp., *Nodosaria* sp., *Textularia* sp.) from the phosphatic nodules of the Uttattur beds.

... Drs. K. Jacob and M. V. A. Sastri (1951) reported on the occurrence of *Globotruncana appennica* (Renz), *Globo. indica* sp. nov., and ascribed a Cenomanian age to the Uttattur beds.

... Messrs. M. V. A. Sastri and V. V. Sastri (1962) (*Micropalaeontology*, no. 2, p. 276) have reported on their finding of 25 genera and 30 species of smaller foraminifera of Upper Albian age from the Uttattur beds.

The authors regret having overlooked giving synonymy in their proper places.

Stratigraphic status: Smaller foraminifera (from the Gypseous clays of the localities given on a previous page) described by the authors in this paper indicate tentatively that they are of Senonian age. This is an ugly revelation and it contradicts our conceptions of the geological age of the Uttattur beds.

On the other hand the record of the Upper Cretaceous foraminifera in this report brings the authors nearer to the hypothesis of the Upper Cretaceous embayment of Blanford (p. 103-105) and the manner of sedimentation during the Uttattur period.

The foraminifera described here are obtained from random samples collected from only a few localities of the Uttattur beds. The result of our studies indicates that the relative stratigraphic positions of the different layers of the gypseous clays were not definitely known at the time of collection.

It appears to the authors that the Gypseous clays of the Uttattur group which constituted the main bulk of the Uttattur beds of Blanford range up to Senonian of the Upper Cretaceous.

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THE FIGURED SPECIMENS ARE DÉPOSITED IN THE GEOLOGICAL
LABORATORY, CALCUTTA UNIVERSITY

SYSTEMATIC DESCRIPTION OF THE FORAMINIFERA

Family—LAGENIDAE

Sub-Family—Nodosariinae

Genus—**ROBULUS** Montfort, 1808

Robulus munsteri (Romer) Cushman
[U.S.G.S. Prof. paper, 206, Pl. 17, fig. 8]

(PL. 1, FIG. 1)

SPECIMEN No. 4/26 N (12)

Description: Test planispiral, involute; periphery keeled; last volution with 7 distinct chambers; sutures limbate, curved; umbilicus with a boss; wall smooth, perforate; aperture radiate, at the peripheral angle.

Locality: Sirukanbur ridge (25), Nattakkudu ridge (26), Terkumadevi ridge (27), Ukkalur ridge (17) and Nambakkurichi ridge (20).

Remarks: This sp. has got resemblance with *R. munsteri* of Gulf Coast of Navarro, Taylor & Austin age.

Robulus pondi Cushman

[U.S.G.S. Prof. paper 206, Pl. 16, fig. 1 (a), (b)]

(PL. 1, FIG. 4)

SPECIMEN No. 4/27 M (10)

Description: Test planispiral, involute; peripheral margin subangular; last volution with 8 chambers, sutures curved; umbilicus with a boss; wall smooth, perforate; aperture peripheral, terminal and rounded.

Locality: Kulakkalnattam ridge (28), Nattakkudu ridge (26), Terkumadevi ridge (27) and Nallur ridge (30).

Remarks: This form has remarkable similarity with Gulf Coast form *R. pondi* of Navarro and Taylor age.

Robulus pseudo-secans Cushman

[U.S.G.S. Prof. paper 206, Pl. 17, fig. 12]

(PL. 1, FIG. 2)

SPECIMEN No. 4/27 M (18)

Description: Test planispiral, involute, gradually thinning from the umbo to the periphery which is acute and keeled, last volution with 9 distinct chambers; sutures greatly limbate and raised; umbilicus with a boss; wall smooth, perforate; aperture at the peripheral angle, rounded.

Locality: Kudikkadu ridge (12), Terkumadevi ridge (27).

Remarks: This form has a similarity with *R. pseudo-secans* described from Gulf Coast Up. Cretaceous of Navarro and Austin age.

Robulus stephensoni Cushman
[U.S.G.S. Prof. paper 206, Pl. 18, fig. 13 (a, b)]

(PL. 1, FIG. 3)

SPECIMEN NO. 5/28 SW (32)

Description: Test planispiral, involute, periphery with a narrow keel, last whorl with 10 chambers; suture curved, limbate; umbilicus narrow; wall smooth, perforate; aperture at the peripheral angle, rounded.

Locality: Varaguppadi ridge (10), Kulakkalnattam ridge (28).

Remarks: This form has remarkable similarity with Gulf Coast form *R. stephensoni* of Navarro and Taylor age.

Genus—FRONDICULARIA Defrance, 1824

Fronidularia arkadelphia Cushman

[U.S.G.S. Prof. paper 206, Pl. 37, fig. 21]

(PL. 1, FIG. 7)

SPECIMEN NO. 4/26 N (1)

Description: Test elongate, narrow, compressed, with inverted 'V' shaped chambers; initial end with a spine; wall perforate, surface with fine parallel, longitudinal costae; aperture terminal, at the end of the last chamber.

Locality: Nattakkudu ridge (26).

Remarks: This form has resemblance with *F. arkadelphia* described from the Up. Cret. (Navarro age) of Gulf Coast.

Fronidularia archiaciana d'Orbigny

[U.S.G.S. Prof. paper 206, Pl. 37, fig. 20]

(PL. 1, FIG. 15)

SPECIMEN NO. 1/20 N (4)

Description: Test elongate, gently tapering, greatest breadth toward the apertural end, compressed, sides flattened; five chambers distinct, inverted V-shaped, not inflated; suture distinct, limbate; surface smooth, wall perforate; aperture terminal; periphery truncated.

Locality: It has been recorded from Nambakkurichi ridge (20).

Remarks: Rare, It strongly resembles *F. archiaciana* which has been described from the U.S. Gulf Coast of Navarro and Taylor age.

Fronidularia goldfussi Reuss

[U.S.G.S. Prof. paper 206, Pl. 35, fig. 1]

(PL. 1, FIG. 16)

SPECIMEN NO. 29/6 E (6)

Description: Test elongate, thin, compressed with a basal spine; chambers chevron shaped, increasing very slightly in width as added, four chambers distinct; suture distinct, progressively more curved; slightly limbate, not rising

above the smooth, flattened ; periphery distinctly truncate ; surface smooth ; wall perforate.

Locality : It has been found from Ayinapuram ridge (6), Nambakkurichi ridge (20), Sirukanbur ridge (25), Kulakkalanattam ridge (28), Terkumadevi ridge (27).

Remarks : Rare. It is nearly identical with the species that has been described from Taylor and Austin age of U.S. Gulf Coast.

Genus—**DENTALINA** d'Orbigny, 1826

Dentalina gracilis d'Orbigny

[U.S.G.S. Prof. paper 206, Pl. 23, fig. 4]

(PL. 1, FIG. 6)

SPECIMEN No. 30/10 SSE (3)

Description : Test elongate, slightly curved ; 8 chambers, chambers more or less gradually increasing in size ; sutures oblique ; wall smooth, perforate ; aperture terminal, radiate.

Locality : Varaguppadi ridge (10), Sirukanbur ridge (25) and Ayinapuram ridge (6).

Remarks : This form has resemblance with *D. gracilis* described from the Up. Cret. (Navarro, Taylor and Austin age) of Gulf Coast.

Genus—**NODOSARIA** Lamarck, 1812

Nodosaria affinis Reuss

[U.S.G.S. Prof. paper 206, Pl. 25, fig. 11]

(PL. 1, FIG. 11)

SPECIMEN No. 30/10 SSE (6)

Description : Test uniserial, straight, with 5 chambers ; sutures transverse ; wall perforate, surface with numerous parallel, longitudinal costae ; aperture terminal, radiate.

Locality : Varaguppadi ridge (10), Nattakkudu ridge (26), and Karai ridge (4).

Remarks : This form has similarity with *Nodosaria affinis* of Gulf Coast Up. Cret. (Navarro, Taylor and Austin age).

Genus—**MARGINULINA** d'Orbigny, 1826.

Marginulina jarvisi Cushman

[U.S.G.S. Prof. paper 206, Pl. 22, fig. 18(a, b)]

(PL. 1, FIG. 5)

SPECIMEN No. 30/10 SSE (2)

Description : Test elongate, subcylindrical, earliest portion close coiled, later uncoiled, becoming straight ; 9 chambers distinctly seen ; sutures oblique ; wall smooth, perforate ; aperture terminal.

Locality : Varaguppadi ridge (10), Kulakkalanattam ridge (28), Sirukanbur ridge (25), Ukkalur ridge (17) & Nambakkurichi ridge (20).

Remarks : This form has remarkable similarity with *M. jarvisi* of the Up. Cret. (Navarro age) of Gulf Coast.

Marginulina navarroana Cushman
 [U.S.G.S. Prof. paper 206, Pl. 22, fig. 5]
 (PL. 1, FIG. 4)
 SPECIMEN NO. 30/12 NNW (24)

Description: Test elongate, early portion close coiled, later uncoiled with 4 distinct chambers; sutures slightly curved; wall perforate; surface with parallel, longitudinal costae; aperture terminal, at the end of a small neck.

Locality: Kudikkadu ridge (12).

Remarks: This form has resemblance with *M. navarroana* of Gulf Coast Up. Cret. (Navarro age).

Marginulina texasensis Cushman
 [U.S.G.S. Prof. paper 206, Pl. 21, fig. 26]
 (PL. 1, FIG. 45)
 SPECIMEN NO. 1/19 W (9)

Description: Test elongate, slender, early portion coiled, becoming uncoiled; ventral margin convex, lobulated; dorsal margin slightly concave; six chambers distinct, inflated, increasing gradually in height towards the apertural end; sutures distinct depressed, especially in the later portion; surface smooth, wall perforate; aperture radiate, at the peripheral angle.

Locality: It has been recorded from Uttattur ridge (19).

Remarks: It resembles closely with *M. texasensis* Cushman which has been described from Navarro and Taylor age of U.S. Gulf Coast.

Marginulina curvatura Cushman
 [U.S.G.S. Prof. paper 206, Pl. 22, fig. 12]
 (PL. 1, FIG. 38)
 SPECIMEN NO. 1/20 N (16)

Description: Test elongate, early portion coiled and later with uncoiled chambers; five chambers distinct, unequal, becoming gradually inflated more toward the apertural end; sutures distinct, oblique, depressed, surface smooth, wall perforate; aperture at the peripheral angle, circular.

Locality: It has been found from Nambakkurichi ridge (20), Kudikkadu ridge (12) and Kulakkalnattam ridge (28).

Remarks: Rare. Agrees strongly with *M. curvatura* which has been described from Navarro age of U.S. Gulf Coast.

Genus—**SARACENARIA** DeFrance, 1824
Saracenaria triangularis (d'Orbigny) Cushman & Church
 [U.S.G.S. Prof. paper 206, Pl. 28, fig. 3]
 (PL. 1, FIG. 9)
 SPECIMEN NO. 30/12 NNW (26)

Description: Test elongate, triangular, early portion slightly coiled, later uncoiled, becoming straight; 8 distinct chambers seen gradually increasing in

size ; sutures distinct, curved ; wall smooth, perforate ; aperture terminal, at the peripheral angle which is sharp.

Locality : Kuddikkadu ridge (12) and Karai ridge (4).

Remarks : This sp. has remarkable similarity with *S. triangularis* described from Up. Cret. (Navarro, Taylor & Austin age) of Gulf Coast, U.S.A.

Saracenaria saratogana Howe & Wallace
[U.S.G.S. Prof. paper 206, Pl. 28, fig. 5 (a), (b)]
(PL. 1, FIG. 8)

SPECIMEN No. 30/10 SSE (18)

Description : Test elongate, early portion close coiled, later uncoiled, becoming straight ; 8 chambers distinctly seen ; sutures curved ; wall smooth, perforate ; aperture terminal, radiate.

Locality : Varaguppadi ridge (10), Kulakkalnattam ridge (28), Sirukanbur ridge (25), Karai ridge (4), and Nambakkurichi ridge (20).

Remarks : This form has similarity with *S. saratogana* described from the Up. Cret. (Navarro age) of Gulf Coast, U.S.A.

Genus—PSEUDOGLANDULINA Cushman, 1912

Pseudoglandulina sp.

(PL. 1, FIG. 14)

SPECIMEN No. 30/10 SSE (7)

Description : Test uniserial, straight with 3 chambers, the last one making a major portion of the test ; sutures transverse ; wall smooth, perforate ; aperture terminal.

Locality : Varaguppadi ridge (10) and Nallur ridge (30).

Genus—VAGINULINA d'Orbigny, 1826

Vaginulina sp.

(PL. 1, FIG. 44)

SPECIMEN No. 4/27 M (4)

Description : Test elongate, compressed, one margin usually straight, sutures curved downward, surface smooth, wall perforate, aperture terminal, radiate.

Occurrence : Terkumadevi ridge (27), Nattakkudu ridge (26), Kulakkalnattam ridge (28), Kudikkadu ridge (12), Karai ridge (4), Nambakkurichi ridge (20), Ukkalur ridge (17), Ayinapuram ridge (6), Nallur ridge (30), Uttattur ridge (19).

Remarks : Common.

Sub-family—Lageninae

Genus—LAGENA Walker & Jacob, 1798

Lagena cf. *globosa* Montagu

[U.S.G.S. Prof. paper 206, Pl. 39, fig. 26]

(PL. 1, FIG. 22)

SPECIMEN No. 30/10 SSE (5)

Description: Test globose, single chambered, wall perforate, smooth, aperture terminal, radiate.

Locality: Varaguppadi ridge (10), Ukkalur ridge (17), Nambakkurichi ridge (20) and Uttattur ridge (19).

Remarks: This form has similarity with *L. cf. globosa* described from the Up. Cret. of Gulf Coast (Navarro, Taylor & Austin age, U.S.A.) & N.W. basin, Western Australia.

Lagena hispida Reuss

[U.S.G.S. Prof. paper 206, Pl. 39, fig. 13]

(PL. 1, FIG. 13)

SPECIMEN No. 30/10 (4)

Description: Test spherical, single chambered with a neck, wall perforate, surface spinose, aperture terminal at the end of the neck.

Locality: Varaguppadi ridge (10), Kulakkalnattam ridge (28), Sirukanbur ridge (25) and Nallur ridge (30).

Remarks: This form has remarkable similarity with *L. hispida* described from the Up. Cret. (Navarro, Taylor & Austin age) of Gulf Coast.

Family—**ELLIPSOIDINIDAE**

Genus—**PLEUROS TOMELLA** Reuss, 1860

Pleurostomella subnodosa Reuss

[U.S.G.S. Prof. paper 206, Pl. 55, fig. 1 (a), (b)]

(PL. 1, FIG. 46)

SPECIMEN No. 1/20 N (13)

Description: Test elongate, early chambers biserial, later chambers irregularly uniserial; eleven chambers distinct, unequal; sutures distinct, depressed; in uniserial chambers sutures are directed alternately in opposite directions; surface smooth, wall perforate; aperture at the last chamber, arc shaped, in a depressed area.

Locality: Karai ridge (4), Nallur ridge (30), Ayinapuram ridge (6), Nambakkurichi ridge (20), Varaguppadi ridge (10), Sirukanbur ridge (25) and Kudikkadu ridge (12).

Remarks: Common. It agrees closely with *P. subnodosa* that has been described from Taylor age of U.S. Gulf Coast.

Family—**GLOBIGERINIDAE**

Sub-family—**Globigerininae**

Genus—**GLOBIGERINA** d'Orbigny, 1826

Globigerina cretacea d'Orbigny

[Jour. Pal. Vol. 17, Pl. 82, fig. 16]

(PL. 1, FIG. 26)

SPECIMEN No. 4/27 M (5)

Description: Test trochospiral with 3 volutions; chambers globular, inflated; dorsal side with 11 chambers, ventral side with 5 chambers; sutures dis-

tinct, depressed, nearly straight; wall calcareous, perforate, surface very finely spinose; aperture large, arched, in the umbilical region.

Locality: Nallur ridge (30), Ayinapuram ridge (6), Kulakkalnattam ridge (28), Terkumadevi ridge (27).

Remarks: This sp. is particularly abundant during Up. Cret. and has been described from Up. Cret. of Gulf Coast, U.S.A. and Western Australia.

Family—**GLOBOROTALIIDAE**

Genus—**GLOBOTRUNCANA** Cushman, 1927

Globotruncana ventricosa ventricosa White

[Bul. Am. Pal. Vol. 36, no. 155, Pl. 1, fig. 5 a-c] .

(PL. 1, FIG. 47)

SPECIMEN No. 29/6 E (F)

Description: Test trochospiral with three volutions; dorsal side flat with numerous chambers; ventral side convex with six chambers; sutures curved on the dorsal side, radial and depressed on the ventral; wall calcareous, perforate, finely spinose; umbilical area large, grooved; aperture large with a continuous slightly arched, lip-like projection; periphery double-keeled.

Locality: Ayinapuram ridge (6), Nallur ridge (30), Kulakkalnattam ridge (28).

Remarks: This sp. has been described from Senonian of N. Eastern Columbia and Europe.

Globotruncana rosetta rosetta Carsey

[Bull. Am. Pal. Vol. 36, no. 155, Pl. 6, fig. 1 a-c]

(PL. 1, FIG. 30)

SPECIMEN No. 5/28 NE (14)

Description: Test trochospiral, dorsal side with nearly flat chambers, early chambers short with radial suture, later petaloid with curved sutures, ventral side with 5 chambers; sutures radial, periphery with a single keel; wall perforate; surface more or less smooth; aperture large, with arched lip-like projection from the chambers.

Locality: Ayinapuram ridge (6), Kulakkalnattam ridge (28).

Remarks: This sp. has been described from Senonian of North-Eastern Columbia and Europe.

Family—**OPHTHALMIDIIDAE**

Sub-family—**Cornuspirinae**

Genus—**CORNUSPIRA** Schultze, 1854

Cornuspira sp.

(PL. 1, FIG. 12)

SPECIMEN No. 30/10 SSE (1)

Description: Test planispiral, closely coiled, depressed near the centre; tubular chamber gradually increasing in size; wall smooth, coarsely perforate; aperture terminal at the end of the tube.

Locality: Karai ridge (4), Ukkalur ridge (17), Uttattur ridge (19), Nambakkurichi ridge (20), Varaguppadi ridge (10), Sirukanbur ridge (25) and Terkumadevi ridge (27).

Family— **HETEROHELICIDAE**

Sub-family—**Bolivinitinae**

Genus—**BOLIVINITA** Cushman, 1927

Bolivinita eleyi Cushman

[U.S.G.S. Prof. paper 206, Pl. 48, fig. 20 (a), (b)]

(PL. 1, FIG. 19)

SPECIMEN No. 30/12 NNW (3)

Description: Test elongate, 6 times as long as broad; biserial; periphery flattened to slightly rounded; 14 chambers distinctly seen; sutures crescentic in shape; wall smooth, surface finely perforate; aperture not seen.

Locality: Kudikkadu ridge (12).

Remarks: This sp. has been recorded from Up. Cret. (Taylor and Austin age) of Texas Gulf Coast, U.S.

Sub-family—**Eouvigerininae**

Genus—**NODOGENERINA** Cushman, 1927

Nodogenerina sp.

(PL. 1, FIG. 10)

SPECIMEN No. 6/30 N (19)

Description: Test short, uniserial, straight, chambers few, truncated; wall smooth, perforate; aperture terminal, circular.

Locality: Ayinapuram ridge (6), Nallur ridge (30) and Kulakkalnattam ridge (28).

Sub-family—**Gumbelininae**

Genus—**RECTOGUMBELINA** Cushman, 1932

Rectogumbelina sp.

(PL. 1, FIG. 18)

SPECIMEN No. 6/30 N (12)

Description: Test with early portion biserial, later irregularly uniserial; chambers distinct, numerous, to some extent inflated, slightly overlapping; sutures distinct, oblique, slightly depressed; wall perforate, surface smooth; aperture terminal with a very short neck.

Locality: It has been recorded from Nallur ridge (30).

Remarks: Very rare.

Family—**BULIMINIDAE**

Sub-family—**Virgulininae**

Genus—**LOXOSTOMA** Ehrenberg, 1854

Loxostoma sp.

(PL. 1, FIG. 17)

SPECIMEN No. 6/30 N (14)

Description: Test elongate slender, slightly tapering, greatest breadth towards the apertural end, slightly twisted, compressed; early chambers biserial, later tending to become uniserial; six chambers distinct, increasing in height towards the apertural end; later chambers inflated; sutures distinct, slightly depressed, oblique, slightly curved; surface smooth, wall perforate; aperture terminal.

Locality: It has been recorded from Nallur ridge (30).

Remarks: Very rare.

Family—POLYMORPHINIDAE

Sub-family—Polymorphininae

Genus—GUTTULINA d'Orbigny, 1839

Guttulina sp.

(PL. 1, FIG. 23)

SPECIMEN No. 5/28 NE (4)

Description: Test fusiform, broadest in the middle, base somewhat rounded, acute apertural end; chambers arranged as in Quinqueloculina, slightly overlapping; sutures distinct but not depressed; wall smooth, perforate, aperture at the apical angle, indistinct.

Locality: Kulakkalnattam ridge (28).

Sub-family—Ramulininae

Genus—RAMULINA Rupert Jones, 1875

Ramulina globulifera H. B. Brady

[Foraminifera-Cushman, 4th Edition, 1950, Pl. 22, fig. 23]

(PL. 1, FIG. 24)

SPECIMEN No. 1/20 N (11)

Description: Test with a single globular chamber with four radial tubes projected from the surface; wall and tubes spinose, perforate.

Locality: Nambakkurichi ridge (20), Uttattur ridge (19), Ayinapuram ridge (6), Kulakkalnattam ridge (28).

Remarks: Common. It has also been described from the Taylor formation, U.S. and Northwest Basin, Western Australia of Up. Cret. age.

Ramulina arkadelphia Cushman

[U.S.G.S. Prof. paper 206, Pl. 43, fig. 4]

(PL. 1, FIG. 39)

SPECIMEN No. 29/6. E (4)

Description: Test with irregularly elongate portions from which tubular projections extend in various directions, projections have rounded openings; wall thin, finely hispid.

Locality: Ayinapuram ridge (6).

Remarks: Very rare. It agrees closely with the species that has been described from Navarro age of U.S. Gulf Coast.

Family—RHIZAMINNIDAE

Genus—BATHYSIPHON M. Sars, 1872

Bathysiphon alexandri Cushman

[U.S.G.S. Prof. paper 206, Pl. 1, fig. 5]

(PL. 1, FIG. 31)

SPECIMEN No. 30/10, SSE (41)

Description: Test elongate, wall thin, more or less straight; margin smooth; wall coarsely perforate; aperture at the end of the tube, elongate.

Locality: Varaguppadi ridge (10).

Remarks: This sp. has a remarkable similarity with *B. alexandri* described from the Up. Cret. (Austin age) of Gulf Coast, U.S.A.

Bathysiphon taurinensis Sacco

[U.S.G.S. Prof. paper 206, Pl. 1, fig. 3]

(PL. 1, FIG. 32)

SPECIMEN No. 4/25 S (28)

Description: Test elongate, more or less straight, margin very irregular, wall agglutinated, coarsely perforate, aperture at both ends of the tube.

Locality: Sirukanbur ridge (25).

Remarks: This sp. has a close resemblance with *B. taurinensis* of Up. Cret. (Austin age) of Gulf Coast, U.S.A.

Family—ASTRORHIZIDAE

Genus—Rhabdammina M. Sars, 1809

Rhabdammina sp.

(PL. 1, FIG. 34)

SPECIMEN No. 4/25 S (27)

Description: Test elongate, slightly curved, has a branching tendency; wall agglutinated, coarsely perforate; aperture at both ends.

Locality: Sirukanbur ridge (25).

Family—HYPERAMMINIDAE

Sub-family—Hyperammininae

Genus—SACCORHIZA Eimer & Fickert, 1899

Saccorhiza (?) sp.

(PL. 1, FIG. 33)

SPECIMEN No. 4/25 S (29)

Description: Test slightly, curved margin irregular; wall agglutinated coarsely perforate; aperture at both ends.

Locality: Sirukanbur ridge (25).

Family—TEXTULARIIDAE

Sub-family—Textulariinae

Genus—TEXTULARIA Defrance, 1824

Textularia sp.

(Pl. 1, FIG. 20)

SPECIMEN No. 5/28 SSW (31)

Description: Test elongate, biserial with zig-zag line between the chambers on the middle; chambers simple; wall arenaceous, perforate; surface more or less smooth; aperture not seen.

Locality: Kulakkalnattam ridge (28) and Nallur ridge (30).

Family—ANOMALINIDAE

Sub-family—Anomaliniinae

Genus—ANOMALINA d'Orbigny, 1826

Anomalina ammonoides (Reuss) Chapman

[U.S.G.S. Prof. paper 206, Pl. 63, fig. 11 a-c]

(PL. 1, FIG. 27)

SPECIMEN No. 30/10 SSE (21)

Description: Test compressed, slightly trochospiral; dorsal side less involute than the ventral one; chambers numerous; sutures indistinct on the ventral side; wall smooth, perforate; aperture peripheral, a low arched opening.

Occurrence: Sirukanbur ridge (25).

Remarks: Abundant. This sp. is very similar to *A. ammonoides* (Reuss) Chapman described from the Up. Cret (Taylor and Austin) of the Gulf Coast, U.S.A.

Anomalina clementina (d'Orbigny) Franky

[U.S.G.S. Prof. paper 206, Pl. 63, fig. 12 a-c]

(PL. 1, FIG. 21)

SPECIMEN No. 4/25 S (21)

Description: Test almost planispiral, involute in character with numerous chambers; sutures on the dorsal side nearly straight; distinct on the ventral side, slightly curved; wall smooth, perforate; aperture peripheral, slit-like.

Occurrence: Sirukanbur ridge (25), Uttattur ridge (19), Ukkalur ridge (17), Nambakkurichi ridge (20), Karai ridge (4) and Nallur ridge (30).

Remarks: Very common. This form has a close similarity with *A. clementina* (d'Orbigny) Franky described from the Up. Cret. (Navarro and Taylor) of the Gulf Coast, U.S.A.

Anomalina henbesti Plummer

[U.S.G.S. Prof. paper 206, Pl. 64, fig. 2 a-c]

(PL. 1, FIG. 25)

SPECIMEN No. 4/25 S (37)

Description: Test trochospiral, ventral side more involute than the dorsal one; chambers numerous, inflated; wall smooth, perforate; aperture peripheral, not distinctly seen.

Locality: Sirukanbur ridge (25), Kulakkalnattam ridge (28).

Remarks: Common. This form is very similar to *A. henbesti* Plummer described from the Up. Cret. (Navarro, & Taylor) of the Gulf Coast, U.S.A.

Family—**VERNEULINIDAE**

Genus—**CLAVULINOIDES** Cushman, 1936

Clavulinoides sp.

(PL. 1, FIG. 36)

SPECIMEN No. 30/10 SSE (17)

Description: Test more or less elongate, gradually constricted towards the initial end with a median ridge at one side; 5 chambers distinct; sutures crescentic in shape; surface smooth, wall perforate; aperture terminal, rounded.

Occurrence: Varaguppadi ridge (10), Kulakkalnattam ridge (28), Sirukanbur ridge (25).

Remarks: Common.

Genus—**GAUDRYINELLA** Plummer, 1931

Gaudryinella sp.

(PL. 1, FIG. 43)

SPECIMEN No. 4/25 S (6)

Description: Test elongate, narrow; in the early stage triserial, later biserial; chambers numerous; surface rough, wall coarsely perforate.

Occurrence: Sirukanbur ridge (25) and Kudikkadu ridge (12).

Family—**ROTALIIDAE**

Sub-family—**Discorbinæ**

Genus—**GYROIDINA** d'Orbigny, 1826

Gyroidina beisseli White

[U.S.G.S. Prof. paper 206; Pl. 58, fig. 11 a-c]

(PL. 1, FIG. 40)

SPECIMEN No. 5/28 SW (9)

Description: Test trochospiral; dorsal side flat, ventral side slightly conical; chambers numerous; sutures radial, indistinct; wall finely perforate, surface smooth; umbilicus small; aperture an arched opening at the base of the apertural face on the ventral side.

Occurrence: Kulakkalnattam ridge (28) Sirukanbur ridge (25) and Nallur ridge (30).

Remarks: Abundant. This form has a close similarity with *G. beisseli* White described from the Up. Cret of Mexico.

Sub-family—**Rotaliinae**

Genus—**ROTALIA** Lamarck, 1804

Rotalia sp.

(PL. 1, FIG. 42)

SPECIMEN No. 22/43 W (c)

Description: Test trochospiral, dorsal side slightly conical, ventral one nearly flat; chambers numerous; sutures limbate, curved on the dorsal side,

truncated near the umbilicus on the ventral side; surface smooth, wall perforate; aperture not seen.

Occurrence: Panangur ridge (43).

Remarks: Rare.

Family—NONIONIDAE

Genus—NONIONELLA Cushman, 1926

Nonionella sp.

(PL. 1, FIG. 36)

SPECIMEN No. 30/10 SSE (25)

Description: Test slightly trochospiral; chambers numerous; ventral side with an elongate lobe from the periphery to the umbilicus; wall perforate, surface smooth; aperture peripheral, slit-like.

Occurrence: Varaguppadi ridge (10).

Remarks: Rare.

Family—PLANORBULINIDAE

Genus—PLANORBULINA d'Orbigny, 1826

Planorbulina sp.

(PL. 1, FIG. 37)

SPECIMEN No. 30/12 NNW (4)

Description: Test very small, trochospiral, closely coiled; chambers numerous, globular; sutures distinct; ventral side with 5 chambers; wall coarsely perforate, surface smooth.

Occurrence: Kudikkadu ridge (12).

Remarks: Common.

Family—CHILOSTOMELLIDAE

Sub-family—Allomorphinellinae

Genus—PULLENIA Parker & Jones, 1862

Pullenia sp.

(PL. 1, FIG. 28)

SPECIMEN No. 4/25 S (44)

Description: Test planispiral, completely involute; periphery broadly rounded; sutures slightly curved; wall perforate, surface smooth; apertural face peripheral, aperture not distinct.

Occurrence: Sirukanbur ridge (25).

Remarks: Rare.

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Explanation of Plate I

1. *Robulus münsteri* Cushman (a) side view, (b) apertural view
2. *R. pseudo-secans* Cushman (a) side view, (b) apertural view
3. *R. stephensoni* Cushman (a) side view, (b) apertural view
4. *R. pondi* Cushman (a) side view, (b) apertural view
5. *Marginulina jarvisi* Cushman
6. *Dentalina gracilis* d'Orbigny
7. *Frondicularia arkadelphiana* Cushman
8. *Saracenaria saratogana* Howe & Wallace.
9. *Saracenaria triangularis* (d'Orbigny) Cushman & Church
10. *Nodogenerina* sp. (a) side view, (b) apertural view
11. *Nodosaria affinis* Reuss
12. *Cornuspira* sp. (a) side view, (b) apertural view
13. *Lagena hispidi* Reuss
14. *Pseudoglandulina* sp.
15. *Frondicularia archiaciana* d'Orbigny
16. *Frondicularia goldfussi* Reuss
17. *Loxostoma* sp.
18. *Rectogümbelina* sp.
19. *Bolivinita eleyi* Cushman
20. *Textularia* sp.
21. *Anomalina clementina* (d'Orbigny) Franky
(a) dorsal view, (b) ventral view, (c) apertural view
22. *Lagena* cf. *globosa* Montagu
23. *Guttulina* sp.
24. *Ramulina globulifera* H.B. Brady
25. *Anomalina henbesti* Plummer (a) dorsal view, (b) ventral view, (c) apertural view
26. *Globigerina cretacea* d'Orbigny (a) dorsal view, (b) ventral view
27. *Anomalina ammonoides* (Reuss) Cushman
(a) dorsal view, (b) ventral view, (c) apertural view
28. *Pullenia* sp. (a) side view, (b) apertural view
29. *Lenticulina* sp.
30. *Globotruncana rosetta* rosetta Carsey
(a) dorsal view, (b) ventral view, (c) peripheral view
31. *Bathysiphon alexanderi* Cushman
32. *B. taurinensis* Sacco
33. *Saccorhiza* sp.
34. *Rhabdammina* sp.
35. *Nonionella* sp. (a) dorsal view, (b) ventral view, (c) apertural view
36. *Clavulinoides* sp.
37. *Planorbulina* sp.

38. *Marginulina curvatura* Cushman
39. *Ramulina arkadelphia* Cushman
40. *Gyroidina beisseli* White
(a) dorsal view, (b) ventral view, (c) apertural view
41. *Marginulina navarroana* Cushman
42. *Rotalia* sp. (a) dorsal view, (b) ventral view
43. *Gaudryinella* sp.
44. *Vaginulina* sp.
45. *Marginulina texasensis* Cushman
46. *Pleurostomella subnodosa* Reuss
47. *Globotruncana ventricosa ventricosa* White
(a) dorsal view, (b) ventral view, (c) peripheral view.

Explanation of Fig. I

Geological map of the area around Uttattur.

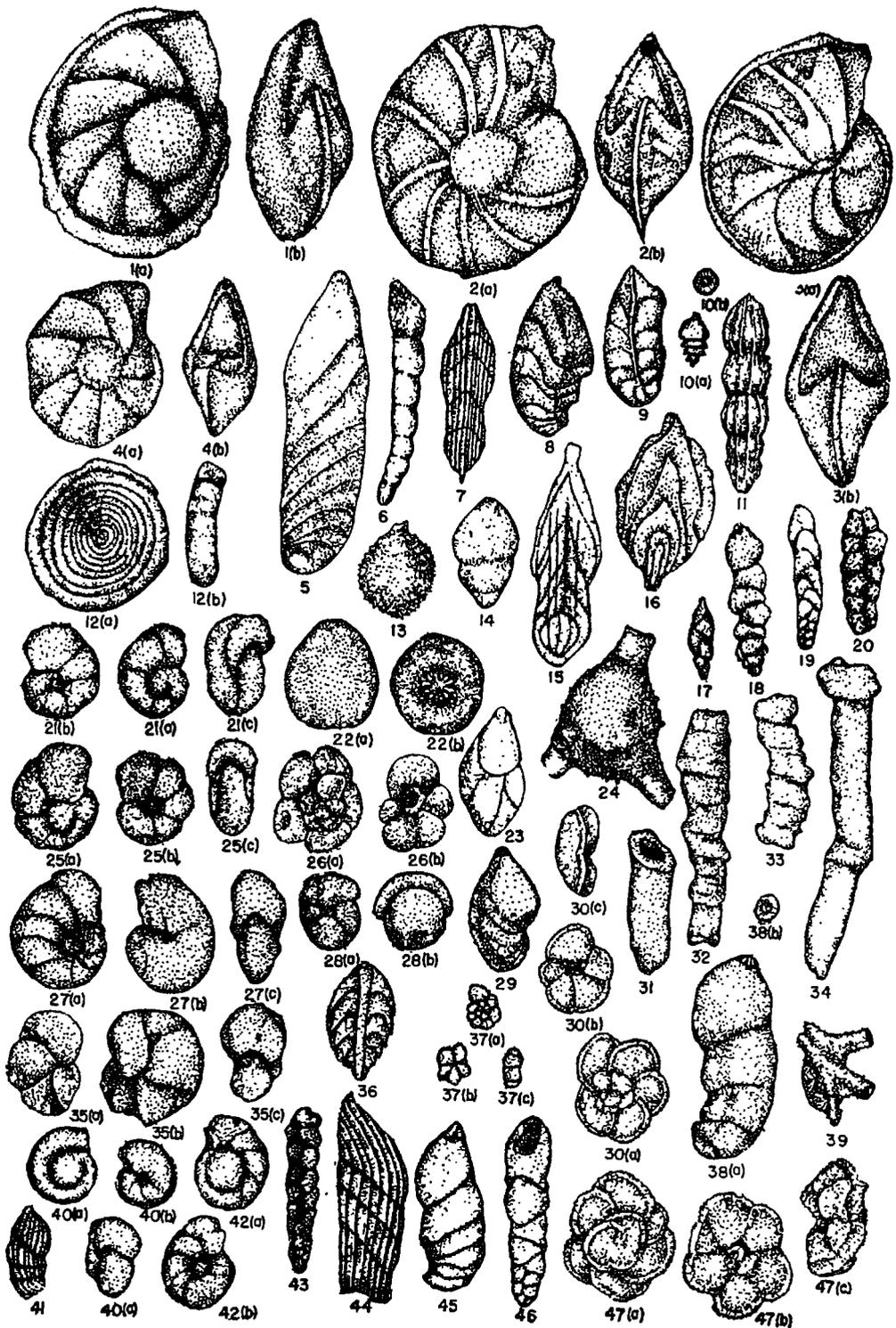


Plate I

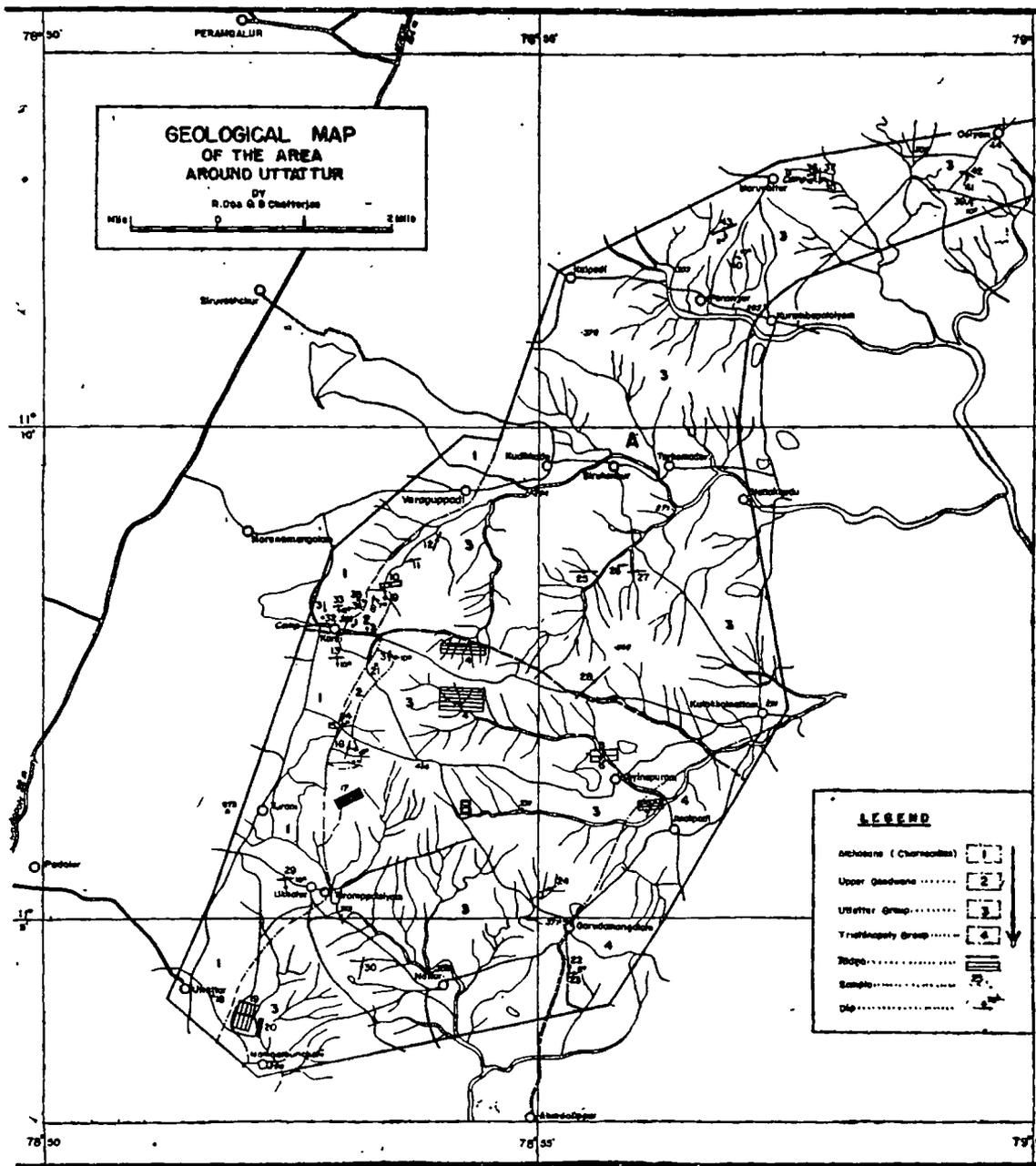


Figure 1