

Genus GUTTULINA d'Orbigny in de la Sagra 1839

GUTTULINA sp. B

Pl. VII Fig. 6

DESCRIPTION

The test is big, elongated, and subcircular in cross-section. The chambers show quinqueloculine arrangement, and move further apart from the base as they are added, and strongly overlapping. They are semilunate in aboral view. The apertures of the last three chambers are visible. The sutures are flush.

FIGURED SPECIMEN: Bh. A., 385'; P. C. Slide No. 28Ad.

Genus PARADENTALINA Uchio 1960

PARADENTALINA? sp.

Pl. VII Fig. 7

DESCRIPTION

The generic identification of this specimen is dubious. The test is rather small and stout. The biserial stage is formed of two inflated chambers of which the second is higher and tapers towards the aperture. The biserial suture is perpendicular to the horizontal suture of the uniserial stage. The proloculum is not visible, which could be due to strong overlapping or enrolling. A section is necessary to correctly determine the species, but since only one specimen has been found, this was not attempted. The sutures are thin and slightly depressed. The aperture of the

first chamber of the biserial stage and the aperture of the first chamber of the uniserial stage are visible at the dorsal edge; the aperture of the last chamber is terminal, centrally positioned, with a phialine lip.

COMPARISON

The specimens are similar to Uvigerina sagrinoides Rzehak 1891 from the Paleocene.

N.B. The generic name "Uvigerina" nowadays is not used in its original meaning.

FIGURED SPECIMEN: Bh. A., 310'; P. C. Slide No. 57a.

Genus PYRULINOIDES Marie 1941

PYRULINOIDES (PYRULINA) ACUMINATA (d'Orbigny) var. CRASSA Marie
1941

Pl. VII Fig. 8

DESCRIPTION

The test is fusiform, irregular with the axis probably twisted. It is biserial throughout, with a tendency to uniseriality. The chambers increase rapidly in size, are strongly overlapping and higher than they are wide. The sutures are flush and thin. The aperture is radiate and terminal.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of P. acuminata crassa is from the Upper Cretaceous System, Campanian Stage, France.

FIGURED SPECIMEN: Bh. A., 462'; P. C. Slide No. 32Aa.

Family TURRILINIDAE

Subfamily TURRILININAE

Genus PYRAMIDINA Brotzen 1948

PYRAMIDINA (UVIGERINA) CRISTATA (Marsson) 1878

Pl. VII Fig. 9

DESCRIPTION

The test is small, triserial and thick, gently flaring. The cross-section is truncate with two keels at each edge. The keels are well developed, indented in the early stages and often discontinuous. The chambers are low and broad. The sutures are depressed, rather thick, strongly inclined downwards and gently arched. The wall is transparent, relatively thick and rough. The aperture is terminal, small and round with phialine lip and shows a connection with the basis of the apertural face.

COMPARISON

These specimens have been attributed to the genus Pyramidina on account of their aperture being connected with the basis of the apertural face.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of P. cristata is from the Cretaceous System, Weiss schreibkreide, Baltic region.

FIGURED SPECIMEN: Bh. A., 292'; P. C. Slide No. 24a.

Genus TOSAIA Takayanagi 1953

TOSAIA? sp.

Pl. VII Fig. 10

DESCRIPTION

The test is small, flaring and inflated. The test is triserial throughout, except in the very early stage which is obscure and might be coiled. In a later stage it shows a tendency to biseriality. In the last triplet the earliest chamber is considerably smaller and built in a lower plane, so that looking at the test from the apertural view only the last two inflated chambers are visible. The sutures are flush at first, only the last triplet has depressed sutures. The wall is smooth. The aperture is a low interio-marginal slit with a lip.

COMPARISON

This identification is not certain. The test is similar to the one represented by Loeblich and Tappan (1963). The aperture is of the same type. If this is in fact a Tosaia, its range must now be considerably extended (from Pliocene down to the Upper Cretaceous).

It differs from the only previously described species of this genus, Tosaia hanzawai, Takayanagi 1953 from the Pliocene, in having indistinct sutures and in being more strongly flaring. It is almost certainly a new species.

FIGURED SPECIMEN: Bh. A., 282¹; P. C. Slide No. 32a.

Family BOLIVINITIDAE

Genus BOLIVINOIDES Cushman 1927

BOLIVINOIDES (BOLIVINA) DRACO DRACO (Marsson) 1878

Pl. VII Fig. 11

DESCRIPTION

The test is quite big, gently flaring and strongly sculptured with longitudinal ridges that may be straight or slightly undulating, crossing in the middle of the test or joining into two parallel ridges. In some specimens the ridges are continuous, in others they are not. There are five or six ridges in the last chamber. The tests bear a small keel of transparent material and their axis may be slightly twisted.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

This subspecies is a guide fossil for the Maestrichtian in Israel. In the higher part of the Maestrichtian it occurs there together with B. draco dorreeni (Reiss, 1954). In Zululand it is accompanied by B. sp. in the higher Maestrichtian.

FIGURED SPECIMEN: Rh. A., 310¹; P. C. Slide No. 30a.

BOLIVINOIDES sp.

Pl. VII Fig. 12

DESCRIPTION

The test may be more or less flaring, from strongly so to quite slender. The sculpture is not strongly pronounced. The ridges are always discontinuous and may cross in the middle of the test

or show a tendency to form two parallel ridges. The early portion of the test is smooth or sparingly nodose, the nodes are not arranged in lines. In the last chamber there are five to six ridges. A keel is never present. The axis of the test can be slightly twisted.

COMPARISON

These specimens differ from B. draco miliaris in the absence of a keel, in the early portion being smooth or nearly so, and in the ridges being discontinuous.

These specimens are very similar in type of sculpture to Bolivinoidea regularis Reiss 1954 or to B. curta Reiss 1954. Their apertural view is the same as that of B. curta, but the size and mode of growth are more similar to B. regularis. Moreover, they differ in their smooth initial third or quarter of the tests. Therefore, this could be a new species that has characters of both B. curta and B. regularis and one differing character, i.e. the smooth initial stage.

FIGURED SPECIMEN: Bh. A., 316¹; P. C. Slide No. 30b.

Genus BRIZALINA Costa 1856

BRIZALINA (BOLIVINA) INCRASSATA (Reuss) var. LIMONENSIS (Cushman)
1926

Pl. VII Fig. 13

DESCRIPTION

The test is rather big, long and slender and not very strongly depressed. The chambers are numerous, low, and increase very slowly in size. The sutures are limbate, strongly inclined and

arched downwards. The aperture is narrow and high, loop-shaped, and interio-marginal, with an internal tooth. The axis of the test is slightly twisted and may be curved.

FIGURED SPECIMEN: Bh. A., 292¹; P. C. Slide No. 22a.

VARIATIONS

Morphotype A₂

Pl. VII Fig. 14

This morphotype is shorter than the typical B. incrassata limonensis and its sutures are thinner and less curved downwards.

FIGURED SPECIMEN: Bh. A., 292¹; P. C. Slide No. 22a₂.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of B. incrassata limonensis is from the Upper Cretaceous System, upper portion of the Pappagallos Shales (Mendez Shale), Mexico.

BRIZALINA (BOLIVINA) INCRASSATA (Reuss) 1851

Pl. VII Fig. 15

DESCRIPTION

The test is rather short and broad, not strongly depressed. The chambers are not very numerous, low and very broad. The sutures are not strongly thickened, inclined downwards and

straight. The aperture is a high interiomarginal arch. The axis of the test may be twisted.

COMPARISON

Of the B. incrassata group these specimens present the greatest similarity with B. incrassata var. crassa Vasilenko and Myatliuk 1947, from the Upper Maestrichtian of the Kazakh, U.S.S.R. However, they differ from this form in the presence of very faint striations on the test wall and in the less evident central formation of zig-zagging shell material. These specimens probably belong to a new subspecies.

FIGURED SPECIMEN: Bh. A., 282'; P. C. Slide No. 22c.

BRIZALINA (BOLIVINA) cf. HILTERMANNI (Hofker) 1956

Pl. VII Fig. 16

DESCRIPTION

The test is extremely delicate, long and slender and the sutures are very strongly inclined downwards, straight and thin. The chambers are rectangular, low and broad.

COMPARISON

The Zululand specimens probably correspond with the stratigraphic distribution of B. hiltermanni. The identification is not certain, as the original description is not very clear.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of B. hiltermanni is from the Upper Cretaceous System, Upper Maestrichtian Stage.

FIGURED SPECIMEN: Bh. A., 292'; P. C. Slide No. 22f.

straight. The aperture is a high interiomarginal arch. The axis of the test may be twisted.

COMPARISON

Of the B. incrassata group these specimens present the greatest similarity with B. incrassata var. crassa Vasilenko and Myatliuk 1947, from the Upper Maestrichtian of the Kazakh, U.S.S.R. However, they differ from this form in the presence of very faint striations on the test wall and in the less evident central formation of zig-zagging shell material. These specimens probably belong to a new subspecies.

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PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of B. hiltermanni is from the Upper Cretaceous System, Upper Maestrichtian Stage.

Family SPIRILLINIDAE

Subfamily SPIRILLININAE

Genus SPIRILLINA Ehrenberg 1843

SPIRILLINA cf. SIMPLEX Le Calvez 1949

Pl. VII Fig. 17

DESCRIPTION

The test is rather big, planispiral, circular in outline and with a broadly rounded periphery. The section of the chamber is circular. The diameter increases regularly in size. The wall is finely perforated, smooth. The aperture is damaged in the type specimen.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of S. simplex is from the Middle Eocene, France.

FIGURED SPECIMEN: Bh. A., 1814'; P. C. Slide No. 46a.

Family HETEROHELICIDAE

Subfamily HETEROHELICINAE

Genus HETEROHELIX Ehrenberg 1843

HETEROHELIX (GUMBELINA) GLOBULOSA (Ehrenberg) 1840

Pl. VII Fig. 18

DESCRIPTION

The axis of the test is gently curved. There are five or six pairs of chambers which increase rapidly in size. The chambers are low and broad with flush sutures at first, becoming more inflated and with more constricted sutures at a later stage; the

last pair of chambers is sphaerical. The aperture is a broad interiomarginal arch with a lip. The wall is smooth.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Cushman (1946) reports it from the Taylor and Navarro formations of the Gulf Coast; Weiss (1955) from the Damian and Lower Eocene of Peru; Trujillo (1960) from the Coniacian of California; Takayanagi (1960) from the Turonian to the Maestrichtian of Japan; Tappan (1962) from the Seabee formation of Alaska; Giannelli, Lazzaretto and Mazzanti (1965) from the Santonian to the Maestrichtian of Northern Italy; Takayanagi (1965) from the Forbes formation of California; Eicher (1965) from the Graneros Shale of Colorado; Barr (1966) from the Senonian of Ireland; Bandy (1967) gives its general range as Middle Turonian - Maestrichtian and into the Tertiary.

FIGURED SPECIMEN: Bh. A., 282'; P. C. Slide No. 11a.

HETEROHELIX (GÜMBELINA) cf. PAPULA (Belford) 1960

Pl. VIII Fig. 1

DESCRIPTION

The axis of the test is straight. There are seven to eight pairs of chambers which are very closely appressed. The chambers are rather low and their thickness is the largest dimension. They increase very slowly in width so that the test is very gently flaring. The sutures are straight and slightly inclined downwards on the sides. The sutures become more depressed as the chambers become more inflated, especially the median suture. The test wall

is granulated, and the aperture is an interiomarginal arch with a lip.

COMPARISON

The Zululand specimens are very similar to Belford's species, but they are slightly thicker, and they seem to exceed the range given by Belford, therefore this identification is left doubtful.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Belford described H. papula from the Santonian Toolonga Calcilitite of Western Australia.

FIGURED SPECIMEN: Bh. A., 462'; P. C. Slide No. 11b.

HETEROHELIX ULTIMATUMIDA (White) 1929

Pl. VIII Fig. 2

DESCRIPTION

The test is small and rather depressed until the last pair of chambers. The axis of the test is straight. There are five to seven pairs of chambers and a coiled stage is sometimes present. The chambers are low, broad, closely appressed and they become more inflated as they are added. The characteristic of this species is the last pair of chambers which is much bigger than the second last and globular in shape. The sutures are thin, depressed, and straight, and slightly inclined downwards at the sides. The wall may be sculptured with barely discernible costellae or it may be completely smooth. The aperture is an interiomarginal arch with a lip. In one specimen the last chamber is proliferating.

COMPARISON

The Zululand specimens compare best with Kavary and Frizzell's (1963) description and figures.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Cushman (1946) records this species in the Mendez and Velasco Shale of Mexico. Said and Kenawy (1956) in the Maestrichtian, Sinai. Kavary and Frizzell (loc. cit.) in the Upper Cretaceous of Iran. It was found in samples from Mid-Pacific Sea-Mounts by Hamilton (1953).

FIGURED SPECIMEN: Bh. A., 316'; P. C. Slide No. 11f.

HETERONHELIX LATA (Egger) 1900

Pl. VIII Fig. 3

DESCRIPTION

The test is rather thick and has a straight axis. There are five pairs of ovoid chambers which increase very rapidly, but continuously, in size. The sutures are not strongly constricted and are straight and inclined downwards at the sides. The wall bears very fine, continuous, longitudinal costellae. The aperture is a low interiomarginal arch with a lip.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype is from the Cretaceous System, Senonian, Bavaria.

FIGURED SPECIMEN: Bh. A., 292'; P. C. Slide No. 11h.

HETEROHELIX sp. aff. MOREMANI (Cushman) 1938

Pl. VIII Fig. 4

DESCRIPTION

The axis of the test may be strongly or gently curved. There are seven or eight pairs of chambers. The rate of increase of their width is discontinuous, so that at first the sides are gently flaring and later they become parallel, until the last pair of chambers which is inflated. The coiled stage has not been observed. The sutures are inclined downwards and flush in the early stage, they later become strongly constricted, especially the median suture. The wall is smooth.

COMPARISON

The Zululand form is very close to H. moremani in the long, slender test, slightly irregular chambers and curved axis. It differs in the presence, on the early stage of its test, of very fine longitudinal striae. It also occurs stratigraphically higher.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Cushman (1946) places it in the lower Austin of Texas. Bandy (1967) gives it a general range from Cenomanian to Coniacian or later.

FIGURED SPECIMEN: Bh. A., 292'; P. C. Slide No. 111.

Genus GUBLERINA Kikoin 1948

GUBLERINA sp. B

Pl. VIII Fig. 5

DESCRIPTION

The test is small and consists of five pairs of chambers prior to the development of the non-septate area. The non-septate area is strongly developed, and extends for $\frac{1}{4}$ to $\frac{1}{3}$ of the total height beyond the limit of the last pair of chambers. The rate of increase of chamber width is approximately equal to that of the previous stage of the test, so that the test is uniformly flaring. Near the margin of the non-septate area, proliferation occurs. The biserial stage is formed of small, inflated, regularly increasing chambers with thin depressed sutures. The wall is smooth and thin throughout. The non-septate stage shows slightly inflated areas separated by shallow grooves.

FIGURED SPECIMEN: Bh. A., 292' P. C. Slide No. 11Bb.

GUBLERINA sp. A

Pl. VIII Fig. 6

DESCRIPTION

The test is depressed and not very strongly flaring. The initial, coiled stage is not always present. The characteristic of this species is that the non-septate area is reduced and enclosed between the last few pairs of chambers, or occasionally poorly developed beyond the last pair of chambers. Proliferation does not take place.

The biserial chambers are inflated, the sutures are thick and depressed. The early stages of the test bear a delicate keel. The non-septate area starts after the third pair of chambers and extends between the last four or five pairs. The wall is variously sculptured with nodes and strong costellae. The aperture is indistinct.

The megalosphaeric form is the most abundant. It differs from the microsphaeric form by its lack of a coiled stage and by the non-septate area starting after the sixth - eighth pair of chambers and extending between the last two or three pairs of chambers.

FIGURED SPECIMEN: Bh. A., 523'; P. C. Slide No. 11Ba.

Genus PLANOGLOBULINA Cushman 1927

PLANOGLOBULINA ACERVULINOIDES Cushman 1927

Pl. VIII Fig. 7

DESCRIPTION

The test is small. The axis of the biserial stage may be slightly curved or straight. The coiled stage has not been observed. There are three to seven pairs of chambers in the biserial stage, the specimens with four pairs being the most common. The proliferating stage can be of various sizes, with four rows of chambers or rarely with two. It can be of various widths, from twice to four times the width of the last pair of chambers. The chambers are subglobular and costate. The sutures in the biserial stage are thin and depressed, inclined downwards at the periphery. The aperture is not clearly visible as the tests are slightly

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