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The microstratigraphy of the cretaceous system of Zululand

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COMPARISON

This species differs from M. hamuloides in the incomplete enrolment of its early stages and in its apertural characters. It differs from M. elongata in its dorsal side being convex instead of concave, in its test being stout instead of slender, and in its sutural and apertural characters.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of M. modesta is from the Upper Cretaceous System, Lower Senonian Stage, Quadratenklide (Lower Campanian Stage).

FIGURED SPECIMEN: Bh. A., 532¹; P. C. Slide No. 61d.

Genus MARGINULINOPSIS Silvestri 1904

MARGINULINOPSIS (MARGINULINA) TAYLORANA (Cushman) 1937

Pl. V Fig. 14 & Pl. VIII Fig. 1

DESCRIPTION

The test is rather big with a coiled portion formed of five to six chambers and a uniserial portion of three chambers disposed on a gently curved axis.

The chambers in the coiled stage increase regularly in size. The first two uniserial chambers are of nearly equal dimensions, whereas the last is considerably bigger. The sutures are curved backwards, thin and flush throughout, up to the last one which is depressed and straight. The aperture is at the dorsal angle and it is protruding, and is visible between the chambers. The wall is smooth.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Cushman (1946) reports the presence of this species from the Upper

Taylor and the Lower Navarro in the Gulf Coast; Frizzell (1954) from the Upper Taylor, Gulf Coast.

FIGURED SPECIMEN: Bh. A, 310'; P. C. Slide No. 12Aa.

Genus NEOFLABELLINA Bartenstein 1948

NEOFLABELLINA RUGOSA d'Orbigny 1840

Pl. V Fig. 15

DESCRIPTION

The basal periphery is notched. The coiled stage is formed by the proloculum followed by two or four chambers that are not decidedly coiled. (All the chambers that precede the first equitant chamber are regarded here as belonging to the planispiral stage). The uniserial stage is formed by five or nine chambers, which are arquate and increase regularly in size. The sutures are marked by sharp ridges or, near the base of the late chambers, by series of nodes. The wall is very strongly sculptured with nodes and spines and the periphery is double-keeled. At the base of the equitant chambers and at the levelo of the coiled stage the keels change into sharp spines. The aperture is on a neck.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

N. rugosa is represented in the Navarro-Taylor-Austin of the Gulf Coast (Cushman, 1946); in strata of similar age in Egypt (Said and Kenawy, 1956); its upper limit in Ireland is given by McGugan (1957) as the Belemnitella mucronata subzone, and (McGugan, 1964) is known in the Campanian of Vancouver Island, British Columbia.

FIGURED SPECIMEN: Bh. A., 1173'; P. C. Slide NO. 10a.

NEOFLABELLINA BUTICULA Hilltermann 1952

Pl. VI Fig. 1

DESCRIPTION

The test is very wide. The basal periphery is uninterrupted. The planispiral stage is decidedly coiled, and formed of a proloculum followed by six chambers. There are ten equitant chambers in all, of slightly irregular shape and they extend down near the base of the test. The sutures are thick, more or less elevated and curved, and arched or bluntly angled in the centre. The wall is smooth and the aperture terminal. (The above description is based on a whole specimen although the drawing shows but a fragmentary specimen).

COMPARISON

The specimens correspond exactly with the description given by Pozaryska, except for having six instead of seven chambers in the coiled section.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Pozaryska (1957) reports the presence of this species in the Campanian-Lower Maestrichtian of Poland, and states that in Germany the species is only known in the Campanian. Hofker (1936) represents a specimen from the contact zone Campanian - Maestrichtian of Belgium.

FIGURED SPECIMEN: Bh. A., 1920'; P. C. Slide No. 10b.

Genus NODOSARIA Lamarck 1812

NODOSARIA INTERCOSTATA Reuss 1860

Pl. VI Fig. 2

DESCRIPTION

The specimen is fragmentary but probably only the aboral end of the first chamber is broken off. The four globular chambers increase very slowly in size and have slightly constricted sutures, except for the last suture which is strongly constricted. The test is sculptured with strong, sharp, continuous costellae, very closely spaced and parallel. The aperture is strongly protruding on a distinct neck.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

As given by Reuss it occurs in the Cretaceous System, Upper Senonian Stage, Germany.

FIGURED SPECIMEN: Bh. A., 590'; P. C. Slide No. 3b.

NODOSARIA CORTA Smitter 1957

Pl. VI Fig. 3

DESCRIPTION

This is a small species and is characterized by sutures that are almost, or completely, flush, and by strong ribs that are not necessarily continuous. The aperture is completely flush.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

As given by Smitter the species occurs in the Upper Cretaceous System, Upper Campanian Stage in Zululand.

FIGURED SPECIMEN: Bh. A., 310'; P.C. Slide No. $3b_3$.

NODOSARIA VERTEBRALIS Batsch var. AUSTINENSIS Carsey 1926

Pl. VI Fig. 4

DESCRIPTION

Only one very big fragment of this morphotype has been found. There are thirteen chambers which increase slowly in height and rapidly in width and have the sutures perfectly flush, so that the test has a high conical shape and the chambers appear rectangular. The wall is sculptured with very strong, continuous, longitudinal ribs. The aperture is probably non-protruding.

COMPARISON

Although N. vertebralis has very strong ribs, similar to N. intermostata, it is not related to it. It is differentiated by the mode of growth of its chambers.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype is from the Cretaceous System, Gulf Series, Austin Formation, Gulf Coast.

FIGURED SPECIMEN: Bh. A., 1717'; P. C. Slide No. 3d.

NODOSARIA TENUIS Olszewski 1875

Pl. VI Fig. 5

DESCRIPTION

The test is very small and slender and extremely delicate. It is formed of eight chambers with constricted sutures which increase slowly in size. The wall is smooth except for a short, blunt spine of clear calcite at the aboral end. The aperture is on a broad, short neck.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype is from the Belemnitella mucronata faunizone of the Senonian Stage, Poland.

FIGURED SPECIMEN: Bh. A., 292'; P. C. Slide No. 3e.

NODOSARIA ASPERA Reuss 1845

Pl. VI Fig. 6

DESCRIPTION

The test is small and delicate and it is formed of three globular chambers which increase rapidly in size. The sutures are constricted. The sculpture consists of short, blunt spines which are closely packed. The last chamber has a smooth and slender apertural neck. The Zululand type is not very well preserved and, being fragile, the specimens are often badly damaged.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Pozaryska (1951) reports this species from the Turonian-Danian of Poland; Cushman (1946) from the Taylor of Texas; and Cushman and Jarvis (1932) from the Upper Cretaceous of Trinidad.

FIGURED SPECIMEN: Bh. A., 310'; P.C. Slide No. 3f.

NODOSARIA LIMBATA d'Orbigny 1840

Pl. VI Fig. 7

DESCRIPTION

The test is uniserial and formed of only two to three chambers which are pyriform in shape and increase slowly in size. The

sutures are strongly constricted. The first chamber bears a spine of clear calcite at the aboral end. The wall is smooth.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

N. limbata is known from the Upper Cretaceous of Trinidad and Mexico (Cushman and Jarvis, 1932), and from the Maestrichtian of Egypt (Said and Kenawy, 1956).

FIGURED SPECIMEN: Bh. A., 292'; P.C. Slide No. 3a.

Genus PSEUDONODOSARIA Boomgaart 1949

PSEUDONODOSARIA (GLANDULINE) LAEVIGATA (d'Orbigny) 1826

Pl. VI Fig. 8

DESCRIPTION

The test is small, fusiform, with a pointed base, and more or less elongated. The chambers are very strongly overlapping throughout the test. The last chamber is almost conical in shape, with the maximum width a little above its base and very big relatively to the test size. The sutures are thin and flush. The wall is smooth. In well preserved specimens a small spine of clear calcite is present at the aboral end. The aperture is radiate, terminal.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Not known.

FIGURED SPECIMEN: Bh. A., 336'; P.C. Slide No. 29a.

PSEUDONODOSARIA (NODOSARIA) LARVA (Carsey) 1926

Pl. VI Fig. 9

DESCRIPTION

The test is elongated and slender. The base is rounded. The chambers overlap more strongly at the beginning and less so in later stages. The last chamber is not very big. The early sutures are flush and the last but one is often gently constricted. The wall is smooth. The aperture is terminal and radiate.

COMPARISON

P. larva differs from P. laevigata in its test being elongated and not fusiform, in its rounded base, and in the smaller size of the last chamber.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of P. larva is from the Upper Cretaceous System, Gulf Series, Navarro Formation, Central Texas.

FIGURED SPECIMEN: Bh. A., 282[1]; P. C. Slide No. 29b.

Genus SARACENARIA Defrance in de Blainville 1824

SARACENARIA SARATOGANA Howe and Wallace 1932

Pl. VI Fig. 10

DESCRIPTION

In the early stage this species is completely enrolled. The uniserial stage has a straight axis and is formed of seven low and broad chambers which increase rapidly in thickness. The thickness of the last chamber is approximately the same magnitude as the width. The ventral margins are broadly rounded. The

dorsal margin is bluntly angled. The sutures are flush and not strongly inclined on the sides, and they are flush to depressed, gently curved in ventral view.

COMPARISON

This type has been attributed to the species saratogana because of the blunt periphery and slightly coiled initial stage.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

It is known from the Navarro stage of the Gulf Coast (Cushman, 1946); from the Danian of Egypt (Said and Kenawy, 1956); from the Lower Campanian of Hokkaido, Japan (Takayanagi, 1960).

FIGURED SPECIMEN: Bh. A., 292'; P. C. Slide No. 15e.

SARACENARIA TRIANGULARIS d'Orbigny 1840

Pl. VI Fig. 11

DESCRIPTION

There are five chambers visible in the coiled stage which is completely enrolled; and three chambers in the uniserial stage. The chambers in the coiled stage increase slowly in thickness, and in the uniserial stage, very rapidly. Thus when seen in dorsal view the test is strongly flaring. The chambers in the uniserial stage are low and broad. The sutures are thin and flush, and slightly inclined downwards ventrally. The ventral margin is sharply angled but no keel is developed. The aperture is at the dorsal angle. The wall is smooth.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Reported from the Upper Austin to the Navarro in the Gulf Coast

(Cushman, 1946); from strata of similar age in Egypt (Said and Kenawy, 1956); from the Coniacian and Santonian of California (Trujillo, 1960).

FIGURED SPECIMEN: Bh. A., 310'; P. C. Slide No. 15a.

Genus VAGINULINA d'Orbigny 1826

VAGINULINA GRACILIS Plummer var. CRETACEA Plummer 1926

Pl. VI Fig. 12

DESCRIPTION

The test is long and slender, gently arcuate, the dorsal side is concave. It is formed of eight chambers which increase slowly and regularly in size. The sutures are thick, flush at first and later depressed, inclined downwards towards the ventral side at first and then become straight. The wall is smooth. The aperture is at dorsal angle, radiate and strongly produced.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of V. gracilis cretacea is from the Upper Cretaceous System, Navarro Formation, Texas.

FIGURED SPECIMEN: Bh. A., 292'; P. C. Slide No. 67a.

Genus VAGINULINOPSIS Silvestri 1904

VAGINULINOPSIS (HEMICRISTELLARIA) SILICULA (Plummer) 1931

Pl. VI Fig. 13

DESCRIPTION

These specimens only occur as fragments but it is clear that the

whole specimens were very big; only the last few chambers being missing on the type. It is slightly flaring. The coiled portion has the same width as the uniserial portion and is formed of four chambers, not completely enrolled, and a big round proloculum. After the coiled stage, twelve low, broad chambers with horizontal sutures follow. The sutures in the coiled stage are thin and flush. Looking at the flattened sides of the test, the sutures of the uniserial stage are thick and slightly elevated in the middle, and they become thin and flush towards the periphery of the test. The cross-section of the test is elliptical. The wall is flush and at the aboral end there is a strong spine of clear calcite.

FIGURED SPECIMEN: Bh. A., 831[1]; P. C. Slide No. 4a.

VARIATIONS

Morphotype A_2

Pl. VI Fig. 14

In this variation the coiled stage is more strongly enrolled and is more involute, so that the proloculum is not clearly visible as in V. silicula s.s. The sides of the test are parallel instead of slightly flaring. The sutures have the same thickness throughout, but are elevated in the middle, and the aperture is at the dorsal angle.

FIGURED SPECIMEN: Bh. A., 982[1]; P. C. Slide No. $4a_2$.

COMPARISON

The Zululand type differs from the holotype by having a straight axis and a more pronouncedly coiled initial stage, but are very

similar to the specimens represented by Cushman (1946). The Zululand specimens also show some similarity with Marginulina plummerae Cushman 1937 (from the Navarro Formation, Corsicana Mari), in their sutural characteristics, gently flaring sides, and character of the coiled stage; but they differ from that species in the presence of a strong spine at the aboral end.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of M. silicula is from the Upper Cretaceous System, Navarro Formation of Texas.

VAGINULINOPSIS (MARGINULINA) AUSTINANA (Cushman) 1937

Pl. VI Fig. 15

DESCRIPTION

The test is strongly depressed. The coiled stage forms almost a complete whorl and it is wider than the uniserial stage. It is formed of seven chambers around a circular, protruding proloculum. The sutures in the coiled stage are thin and flush. There are five chambers in the uniserial stage, tapering towards the apertural end. The sutures are straight to oblique. They are indistinct at first and later become thickened and elevated, being particularly thick near the dorsal periphery, where they are irregularly curved. The aperture is located at the dorsal angle. The wall is smooth.

COMPARISON

The Zululand specimens are very similar to the ones represented by Cushman (1946) but they have a more regular mode of growth.

This species differs from V. silicula in the width of the coiled stage; in the sides of the test tapering towards the aperture instead of being flared or parallel, and in the oblique sutures.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype is from the Cretaceous System, Austin Chalk, in the middle part of Gober Tongue, Gulf Coast.

FIGURED SPECIMEN: Bh. A., 425'; P.C. Slide No. 4b.

Subfamily LINGULININAE

Genus LINGULINA d'Orbigny 1826

LINGULINA sp.

Pl. VII Fig. 2

DESCRIPTION

The test is rather big and rounded rather than elongated in sagittal section. It is compressed in cross-section. There are three strongly overlapping chambers following a rounded proloculum. The aperture is a slit in the plane of compression with strong lips which only surround the central, wider part of the aperture, half closing it. The wall is smooth.

FIGURED SPECIMEN: Bh. A., 438'; P. C. Slide No.

Family POLYMORPHINIDAE

Subfamily POLYMORPHININAE

Genus GLOBULINA d'Orbigny in de la Sagra 1839

GLOBULINA FISTULOSA Bullard 1953

Pl. VII Fig. 3

DESCRIPTION

The test is rather big, oval in sagittal section, in axial section four chambers strongly overlapping are visible. The size increase rate is quite high. The radiate aperture of the second last chamber is visible near the periphery. The apertures of the first two chambers are not visible. The aperture of the last chamber is obscured by a fistulose growth, rather large and bearing five tubular projections which are the actual openings of the test.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of G. fistulosa is from the Upper Cretaceous System, Cenomanian Stage of Texas.

FIGURED SPECIMEN: Bh. A., 310'; P. C. Slide No. 28b.

GLOBULINA (POLYMORPHINA) GIBBA (d'Orbigny) 1826

Pl. VII Fig. 4

DESCRIPTION

The test is big and ovoid in shape. Four chambers are visible from the front and are strongly overlapping and only three chambers

from each side are visible. In aboral view all the chambers are visible. The sutures are flush; the wall is smooth. The aperture is terminal and radiate.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

According to Cushman and Ozawa, (1930) G. gibba is often recorded from Jurassic and Cretaceous formations, but they did not find it in their material.

FIGURED SPECIMEN: Bh. A., 430'; P. C. Slide No. 28d.

GLOBULINA sp. A

Pl. VII Fig. 5

DESCRIPTION

The test is small, pyriform, and with the last chamber more inflated than the others. Three chambers are visible, of which the oldest is almost completely covered by the other two. Judging from the difference in size between the second last and the last chamber the size increase rate is high. The aperture is at the dirsal angle, radiate and the aperture of the second last chamber is also visible, but the aperture of the oldest chamber is not. The sutures are flush and thin.

FIGURED SPECIMEN: Bh. A., 292'; P. C. Slide No. 28a.

Author De Gasparis M L
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