

damaged in the last stages.

FIGURED SPECIMEN: Bh. A., 282¹; P. C. Slide No. 14a.

VARIATIONS

Morphotype A₂

Pl. VIII Fig. 8

DESCRIPTION

This morphotype differs from the typical form in the reduced size of the biserial stage, and the predominance of the proliferating stage, with five or six rows of chambers, which is of greater width than the biserial stage. In the proliferating stage some chevron-shaped chambers are present. The sculpture consists of small spines rather than costellae. This morphotype may turn out to be a different species, but as it is very rare, very little work could be done on it.

FIGURED SPECIMEN: Bh. A., 292¹; P. C. Slide No. 14a₂.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Bandy (1967) gives the overall distribution of P. acervulinoides as Santonian - Lower Maestrichtian.

Genus PSEUDOGUENBELINA Bronniman and Brown 1953

PSEUDOGUENBELINA (GUENBELINA) EXCOLATA (Cushman) 1926

Pl. VIII Fig. 9

DESCRIPTION

The test is small, depressed and flaring. There are seven pairs

of chambers which increase slowly in height and more rapidly in width. The sutures are flush to depressed and from almost straight to strongly arched. The wall is sculptured with very strong costellae that are oblique to the sutures. They do not show any tendency to become fainter until the last pair of chambers. The aperture is typical for the genus and accessory apertures occur near the central sutures in the last two pairs of chambers.

COMPARISON

The Zululand specimens correspond exactly to the definition of this species.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Cushman (1928) reports it from the Upper Mendez, Mexico; and (1946) from the Upper Taylor and Navarro of the Gulf Coast. Le Roy (1953) from the Maestrichtian (Unit A) of the Magfi Section, Egypt. Said and Kenawy (1956) from the Maestrichtian of Sinai; Olsson (1960) from the Campanian - Maestrichtian of Trinidad; and from the Navesink of New Jersey. Bandy (1967) gives its generalised distribution as Upper Campanian - Maestrichtian.

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

PSEUDOGUEMBELINA (GUEMBELINA) COSTULATA (Cushman) 1938

Pl. VIII Fig. 10

DESCRIPTION

The test is small and slender and flares very slightly. There are six pairs of chambers which grow very slowly in size. The last chamber is very high and almost crescent-shaped. The sutures are

thin, flush to depressed and inclined downwards. The wall is sculptured with weak, continuous longitudinal costellae in the early stages, but becomes smooth later. The aperture extends laterally, the accessory apertures are not clearly visible.

COMPARISON

The Zululand specimens are in all similar to the descriptions given by various authors.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Cushman (1946) records P. costulata from the Taylor and Navarro of the Gulf Coast. Hamilton (1953) from the Campanian - Maestrichtian in cores from Mid-Pacific guyots. Pessagno (1962) from the Parguera Limestone and Rio Yauco formation of Puerto Rico. Kavary and Frizzell (1963) Upper Senonian - Upper Maestrichtian of Iran. Bandy (1967), general distribution: basal Campanian - Maestrichtian.

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

Genus PSEUDOTEXTULARIA Rzehak 1891

PSEUDOTEXTULARIA BRONNIMANNI Seiglie 1959

Pl. VIII Fig. 11

DESCRIPTION

The axis of the test is straight. The width and height of the chambers increase very rapidly at first, but the last three to five are of about equal height and width and much bigger than the previous ones. The thickness of the test is by far its largest dimension and it increases regularly to the end. The height of the last chamber is approximately a fourth to a fifth of its

thickness. A coiled stage is sometimes present. The sutures of the early small and rapidly increasing chambers are indistinct but sometimes a total of seven to eight pairs was counted. The sutures are depressed and straight in frontal view and depressed and gently arched in side view. There are continuous longitudinal costellae covering the test and these are sometimes faint on the last pair of chambers.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype is from the Middle to Upper Maastrichtian Stage, Cretaceous System.

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

PSEUDOTEXTULARIA B Plummer 1926

Pl. IX Fig. 1

DESCRIPTION

The axis of the test may be straight or curved. The chambers increase regularly in size. The axis of the test may be straight or gently curved and a coiled stage is sometimes present. There are five to six pairs of chambers, most commonly five. They increase regularly in all their dimensions, the thickness of the last chamber being slightly bigger than its width. The sutures are very clear, inclined downwards at the sides, thin and slightly depressed at first, and later become more depressed in frontal view. In side view they are straight to very gently arched. The wall is strongly costate to smooth.

thickness. A coiled stage is sometimes present. The sutures of the early small and rapidly increasing chambers are indistinct but sometimes a total of seven to eight pairs was counted. The sutures are depressed and straight in frontal view and depressed and gently arched in side view. There are continuous longitudinal costellae covering the test and these are sometimes faint on the last pair of chambers.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype is from the Middle to Upper Maastrichtian Stage, Cretaceous System.

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

PSEUDOTEXTULARIA B Plummer 1926

Pl. IX Fig. 1

DESCRIPTION

The axis of the test may be straight or curved. The chambers increase regularly in size. The axis of the test may be straight or gently curved and a coiled stage is sometimes present. There are five to six pairs of chambers, most commonly five. They increase regularly in all their dimensions, the thickness of the last chamber being slightly bigger than its width. The sutures are very clear, inclined downwards at the sides, thin and slightly depressed at first, and later become more depressed in frontal view. In side view they are straight to very gently arched. The wall is strongly costate to smooth.

COMPARISON

The chambers of this species are more inflated and on the whole higher than in P. bronnimanni. Although in P. bronnimanni the ratio of thickness to breadth is generally small, it is still considered to be more proper of the genus Pseudotextularia than of the genus Heterohelix.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype is from the Upper Cretaceous, Navarro Formation, Gulf Coast.

FIGURED SPECIMEN: Bn. A., 292'; P. C. Slide No. 11Ab.

PSEUDOTEXTULARIA ELEGANS (Rzehak) 1891

Pl. IX Fig. 2

DESCRIPTION

The test is formed of five to seven pairs of slightly inflated chambers disposed on a gently curved axis. The chambers increase regularly in all the three dimensions but the width remains constant, or increases very slowly, in the last three pairs of chambers, while the height continues to increase. The thickness increases regularly and rapidly. A strong amount of lateral compression is present. The sutures are thin and depressed, almost straight in frontal view and strongly arched in side view. The wall is costate.

COMPARISON

This species differs from P. B. in the greater lateral compression and greater thickness; it differs from P. bronnimanni

in the greater height of the chambers in the lesser compression and in the regular growth rate. Gumbelina nuttalli Voorwijk is probably a synonym.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Cushman (1946) reports Guembelina plummerae (synonym of P. elegans) from the Austin - Taylor - Navarro until the Corsicana Marl. Said and Kenawy (1956) (also using the synonym G. plummerae) report it from the Maestrichtian of Egypt. Bandy (1967) gives it a general range from the Uppermost Coniacian to the Maestrichtian.

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

Genus RACEMIGUEMBELINA Montanaro Gallitelli 1957

RACEMIGUEMBELINA cf. FRUCTICOSA Egger 1899

Pl. IX Fig. 3

DESCRIPTION

The chambers show a slow increase in width and height. After the first four pairs a rapid increase in thickness takes place, so that the test has almost parallel sides in frontal view and is very strongly flaring in side view. The chambers are inflated with strongly depressed sutures that are straight at first and later arched in side view; and straight in frontal view. After the sixth pair of chambers, proliferation takes place and three ovoidal-globular chambers occur on one side and one on the other side (probably here the others have broken off). The wall is sculptured with fine, longitudinal continuous costellae. The

aperture is obscured by an infilling of dirt.

The specimens are microsphaeric forms with the early stage coiled. The magalosphaeric forms differ in that they never achieve the same thickness of test.

COMPARISON

Montanaro Gallitelli (1957) puts Pseudotextularia varians of Cushman (1946) in synonymy with the present species.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Cushman (1946) considers this species as Navarro in age in the Gulf Coast.

FIGURED SPECIMEN: Bh. A., 282'; P. C. Slide No. 9a.

Family ROTALIPORIDAE

Subfamily ROTALIPORINAE

Genus HEDBERGELLA Bronniman and Brown 1958

HEDBERGELLA sp. C

Pl. IX Fig. 4

DESCRIPTION

The test is low trochospiral and the periphery is strongly lobate. The test is formed of two whorls. The chambers are inflated in the early whorls, strongly depressed dorsally and inflated ventrally in the last whorl. There are four and a half chambers in the last whorl, increasing very rapidly in size, petaloid and slightly overlapping in spiral view; rounded and non-overlapping

in umbilical view. The sutures are straight, inclined backwards and depressed on the spiral side, straight, radial and depressed on the umbilical side. The umbilicus is broad and shallow. The aperture is umbilical - extra-umbilical with a wide lip (probably forming a flap that has been broken off). The wall is very coarsely nodose.

COMPARISON

Hedbergella sp. C is very similar to Globigerina esnaensis Le Roy 1953 of probable Lower Eocene age.

FIGURED SPECIMEN: Bh. A., 772'; P. C. Slide No. 71c.

Family GLOBOTRUNCANIDAE

Genus GLOBOTRUNCANA Cushman 1927

GLOBOTRUNCANA ARCH (Cushman) 1926

Pl. IX Fig. 5

DESCRIPTION

The test varies from low to quite high trochospiral. It is biconvex to more strongly convex on the spiral side. The equatorial periphery is gently to quite strongly lobate, and the axial periphery truncate, with two clearly separated, but at times very close, keels which are usually strong, but sometimes weak, especially in the smaller specimens. The wall is sculptured by a few nodes only in the early chambers. There are usually six and a half chambers in the last whorl, which increase slowly in size, although the last chamber may often be smaller than the second last. The chambers are petaloid in spiral view and they

slope at low to quite high angles towards the umbilicus, but never protrude strongly on the umbilical side. They are sub-rectangular in umbilical view. The sutures are gently curved backwards on the spiral side and strongly beaded, becoming less so in later stages, but always raised. On the umbilical side they are straight and depressed. The umbilicus is wide.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

This extremely well known species has been recorded by many authors, and its meaning has sometimes been misunderstood, due to Cushman's representing two species under this name. Bolli, Loeblich and Tappan (1957) redrew the holotype. Bandy (1967) gives the general range of G. arca as Turonian - Lower Maestrichtian. Bronnimann and Brown (1956) give it as limited to the Maestrichtian. Takayanagi (1965) reports it from Santonian - Campanian from California. Berggren (1962) found it in the Maestrichtian of Denmark. Klaus (1959) reports it from the Upper Turonian - Coniacian of Switzerland. Barr (1962) records it in the Isle of Wight, England, from the Belemnitella mucronata zone.

FIGURED SPECIMEN: Bh. A., 4381; P. C. Slide No. 19.

GLOBOTRUNCANA BULLOIDES Vogler subsp. NAUSSI Gandolfi 1955

Pl. IX Fig. 7

DESCRIPTION

The test is moderately high trochospiral and biconvex. It is more strongly convex spirally. The equatorial periphery is

subelliptical or subcircular, deeply notched, particularly in later stages. The axial periphery is angular-rounded with two keels, the spiral one is the strongest and the umbilical keel is weak and shows a tendency to disappear in later stages of the test. The imperforate band lays on the ventral surface of the chambers. There are five and a half chambers to the last whorl, which increase quite rapidly in size. In spiral view they are petaloid and overlap very slightly, becoming almost non-overlapping in later stages. In axial view they are slightly inflated both dorsally and ventrally. The sutures are curved backwards, beaded, not strongly thickened nor elevated in spiral view; thin and depressed, radial in umbilical view. The wall is smooth dorsally and slightly nodose ventrally. The umbilicus is wide and deep.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of G. bulloides subsp. naussi is from the Upper Cretaceous System, Upper Senonian, Campanian Stage of North-eastern Colombia.

FIGURED SPECIMEN: Bh. A., 737'; P. C. Slide No. 19bb.

GLOBOTRUNCANA CONTUSA (Cushman) 1926

Pl. X Fig. 1

DESCRIPTION

The test is very high trochospiral, and planoconvex or umbilico-concave. The equatorial periphery is subcircular, slightly lobate. The axial periphery is angularly truncate with two very closely spaced keels, of which the umbilical one is weaker and gets fainter in the later stages. The keels are sculptured with

spines; in the later stages they become smooth. There are four to five chambers in the last whorl. In spiral view they are very strongly elongated, very strongly overlapping, crescent-shaped and crenulated. In axial view they are subrectangular, more or less elongated in the direction of growth, sometimes crenulated, and curved around a deep and narrow umbilicus sloping at very low to quite steep angles inwards towards it. The sutures are very strongly bent backwards, curved, beaded or spinose, and flush in spiral view. In umbilical view they are strongly curved backwards with adumbilical and periumbilical portions of the keel varying from quite strong to almost absent.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

White (1929) reports the presence of this species (under the name G. conica var. plicata) in the Upper Cretaceous, except the Velasco shale of the Tampico Embayment (Mexico). Edgell (1957) reports it from the Maestrichtian of Northwestern Australia. Olsson (1960) reports it from the Maestrichtian of New Jersey. According to Bandy (1967) G. contusa is confined to the Upper Maestrichtian.

FIGURED SPECIMEN: Bh. A., 282'; P. C. Slide No. 191.

GLUBOTRUNCANA CONVEXA Sandidge 1932

Pl. X Fig. 2

DESCRIPTION

The test is low trochospiral, equally biconvex. The equatorial periphery is subelliptical, gently notched and the axial periphery is broadly rounded with two not very widely separated keels

of equal strength. There are six chambers to the last whorl, which are inflated both dorsally and ventrally and increase slowly in size. The chambers are crescent-shaped and strongly overlapping in umbilical view. The sutures are strongly curved backwards, thin and depressed in spiral view; gently curved backwards, thin and depressed in umbilical view. No extensions of the keel are developed. The wall is smooth dorsally and ventrally it is sculptured by a few nodes and becomes smoother in the later stages. The umbilicus is very wide.

COMPARISON

The Zululand specimens only differ from the holotype in their lack of well developed umbilical shoulders.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of G. convexa is from the Upper Cretaceous System, Ripley Formation of Western Alabama.

FIGURED SPECIMEN: Bh. A., 737'; P. C. Slide No. 19ab.

GLOBOTRUNCANA FORNICATA Plummer 1931

Pl. X Fig. 3

DESCRIPTION

The test is low to quite high trochospiral and is planoconvex or unequally biconvex. The equatorial periphery is oval, lobate. The axial periphery is angular-truncate with two quite closely spaced keels, the umbilical one being weakly developed and becoming fainter. The keels are at first moderately beaded, becoming smooth in the last chambers. There are five chambers in the last whorl

which increase rapidly in size. They are crescent-shaped and elongated, strongly overlapping and sometimes gently crenulated. In axial view they are subrectangular, narrow, and slope at low to very low angles towards the umbilicus. The sutures are curved, elevated and beaded, strongly bent backwards on the spiral side; and strongly curved backwards and depressed on the umbilical side, with adumbilical and peri-umbilical portions of the keel quite strongly developed.

COMPARISON

In the higher strata the evolution towards Globotruncana contusa makes itself evident, the coil becoming more high trochospiral and the chambers more elongated and crenulated. Because these specimens cannot yet be placed with Globotruncana contusa, they have not been separated herein from Globotruncana fornicata.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

Sandidge (1932) reports this species from the Ripley Formation of Western Alabama. Cushman and Daederick (1944) report it from the Taylor-Lower Navarro of Arkansas. Sigal (1952) reports it as starting in the Lower Coniacian, perhaps Turonian and reaching the middle Maestrichtian in Algeria. Bronnimann and Brown (1956) regard it as Coniacian - Campanian, possibly Maestrichtian. Edgell (1957) reports it from Santonian - Campanian strata in North-western Australia. Klaus (1959) reports its appearance as approximately coinciding with the beginning of the Coniacian in Switzerland. Olsson (1960) reports it from the Campanian - Lower Maestrichtian of New Jersey and Delaware. Barr (1962) reports it as restricted to the Actinocamax quadratus zone on the Isle of Wight.

GLOBOTRUNCANA FORNICATA Plummer var. ACKERMANI Gandolfi 1955

Pl. X Fig. 4

DESCRIPTION

The test is low trochospiral, plano-convex and umbilico-convex. The equatorial periphery is oval, strongly lobate and the axial periphery is broadly rounded with two closely spaced keels that are quite strongly and heavily beaded in the early stages but later become weaker. There are four to six chambers in the last whorl which generally increase quite rapidly in size. Occasionally they may show an irregular increase rate. The chambers are inflated, petaloid and weakly overlapping or non-overlapping in spiral view; in axial view they are globular at first and then become more and more pointed towards the umbilical side, and slope at quite high angles. In umbilical view they are inflated, sub-rectangular and wedging towards the umbilicus. The sutures are gently curved backwards to almost radial, strongly depressed on the umbilical side, without periumbilical or adumbilical portions of the keel. The wall is poorly nodose and later becomes smooth on both sides. The umbilicus is small and shallow.

COMPARISON

G. fornicata var. ackermani differs from G. globigerinoides in the more decidedly umbilically pointed later chambers of the last whorl, and in the more flattened spiral side.

PREVIOUSLY RECORDED STRATIGRAPHIC DISTRIBUTION

The holotype of G. fornicata ackermani is from the Upper Cretaceous System, Maastrichtian Stage of Colombia.

FIGURED SPECIMEN: Bh. A., TDT 1 P. C. Slide No. 192.

GLOBOTRUNCANA FUNDICONULOSA Subbotina 1953

Pl. X Fig. 5

DESCRIPTION

The test is moderately high trochospiral, and biconvex with a central conical area protruding on the spiral side and a strongly protruding umbilical side. The equatorial periphery is sub-circular and notched. The axial periphery is angular - truncate, with two equally strong well-separated keels that become fainter in the later stages of the test. There are six chambers in the last whorl. The increase rate is not constant, nor is the chamber shape, which varies from crescent-shaped and strongly overlapping, to petaloid with very little overlapping in spiral view. In axial view the chambers are angular truncate: they slope towards the umbilical side at low angles. In the early stages of the last whorl, the angle increases so that the last chamber slopes quite steeply with the development of umbilical shoulders. On the umbilical side the chambers are petaloid and slightly overlapping. The sutures are thickened and elevated, heavily beaded, and variously curved on the spiral side according to the shape of the chambers. On the umbilical side the sutures are thin, bent forwards and depressed.

The adumbilical portion of the keel is not present. The periumbilical portion is weakly developed. On the umbilical side the wall is sculptured with strong nodes which become more numerous and smaller in later stages. On the spiral side the wall is also sculptured with nodes, and becomes smooth later. The umbilicus is narrow and deep.

Author De Gasparis M L

Name of thesis The Microstratigraphy of the cretaceous system of Zululand 1968

PUBLISHER:

University of the Witwatersrand, Johannesburg

©2013

LEGAL NOTICES:

Copyright Notice: All materials on the University of the Witwatersrand, Johannesburg Library website are protected by South African copyright law and may not be distributed, transmitted, displayed, or otherwise published in any format, without the prior written permission of the copyright owner.

Disclaimer and Terms of Use: Provided that you maintain all copyright and other notices contained therein, you may download material (one machine readable copy and one print copy per page) for your personal and/or educational non-commercial use only.

The University of the Witwatersrand, Johannesburg, is not responsible for any errors or omissions and excludes any and all liability for any errors in or omissions from the information on the Library website.