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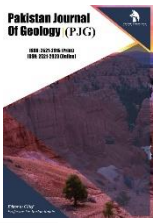

RESEARCH ARTICLE

FORAMINIFERAL CHARACTERISATION AND TAXONOMY OF THE ROTALIID BENTHIC FORAMINIFERA *UVIGERINA* IN NIGER DELTA NIGERIA AND OTHER RELATED GENERA

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ABSTRACT

The present study deals with the modern taxonomical consideration of the Neogene smaller Rotaliid benthic foraminiferal species of *Uvigerina* from Eastern Niger Delta Nigeria, west Africa, central Atlantic Ocean which represent good example of the Southern Tethyan assemblage. This assemblage indicates an open marine environment, which represents outer neritic-Bathyal environment(~200-2000m). The wide paleogeographic distribution of this assemblage in different localities in the Northern and Southern Tethys: USA, Mexico, Caribbean, Peru, Venezuela, Brazil, Spain, France, Germany, Sweden, Austria, Hungaria, Italy, Ivorian Basin, Angola, Libya, Egypt, United Arab Emirates (UAE), Pakistan, New Zealand. indicate that the ancestral Tethys is connected with the ancestral Atlantic with Indian-Pacific, via Mediterranean Sea.

KEYWORDS

Foraminifera, Neogene, West Africa, Middle East, Southern Tethys.

1. INTRODUCTION

The present study deals with the taxonomic consideration of Neogene Rotaliid benthic foraminiferal species of the genus *Uvigerina* from NEP-1 Niger Delta Nigeria west Africa, central Atlantic Ocean (figure 1).

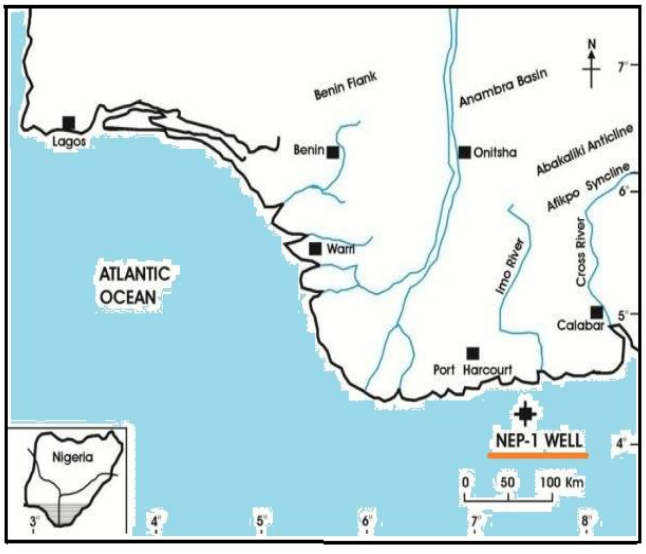

Figure 1: Map showing the location of NEP-1 offshore Niger Delta Nigeria (after Aturamu, 2016)

These recorded fauna are correlated with the synchronous foraminiferal species from other Tethyan localities, e.g. are shown in Figure 2.

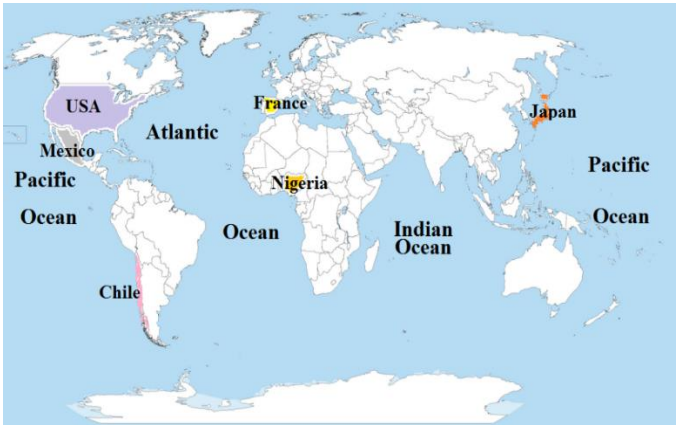

Figure 2: Location maps of the six countries yield the identified recorded genera and its species: *Uvigerina, Uvigerinita* and *Uvigerinatella.*

2. MATERIAL AND METHODS

According to Aturamu in 2016, the NEP-1 well offshore Niger Delta Nigeria contains fairly diverse foraminifera; a total of 1213 foraminiferal specimens were recovered from the sampled interval; 140 specimens from the genus *Uvigerina* were identified, which comprise of 140 specimens; this makes up 11.5 % of the total foraminifera assemblage encountered at the NEP-1 Well (Aturamu, 2016). The diversity and abundance of the foraminiferal assemblages varied greatly throughout this interval. All the *Uvigerina* species are cosmopolitan, and are known mainly from the Atlantic, the Pacific Ocean and its environs. The taxonomic classification of Loeblich and Tappan in 1988 of the Rotaliid benthic foraminiferal genus *Uvigerina* Cushman in 1926 and its members are followed in this study, as well as the holotypes of the related genera, e.g.

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Euuvigerina Thalmann (1952), *Uvigerinella* Cushman (1926), *Uvigerinelloides* Anan (2024), and the other two new genera *Uvigerinita* and *Uvigerinatella* of Anan. These fauna have been shown in Plate 1.

Plate 1: (Scale bars =100µm, except 5b=50 µm)

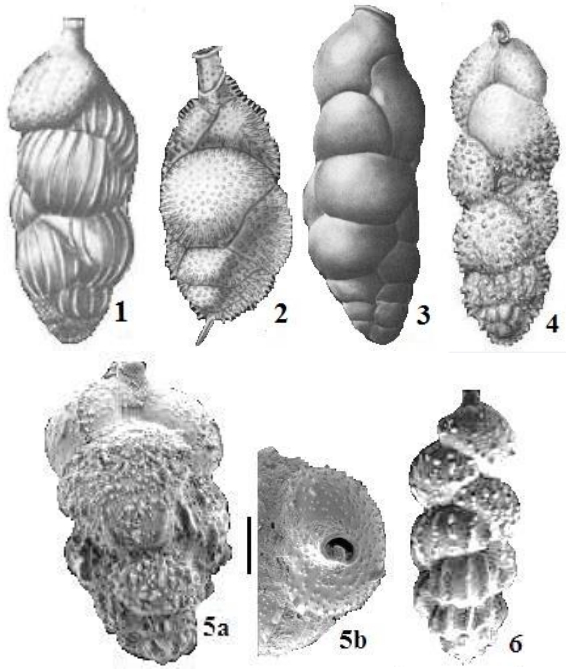

Figure 3: Uvigerina (Cushman, 1926), 2. Euuvigerina (Thalmann, 1952), 3. Uvigerinella (Cushman, 1926), 4. Uvigerinelloides (Anan, 2024), 5. Uvigerinita (Anan, n. gen.), 6. Uvigerinatella (Anan, n. gen).

3. Systematic Paleontology

The modern taxonomical consideration of members of the Rotaliid benthic foraminiferal genus *Uvigerina* from NEP-1, Eastern Niger Delta Nigeria, west Africa, central Atlantic Ocean is treated in this study. The stratigraphic range of these species shown in (figure 3).

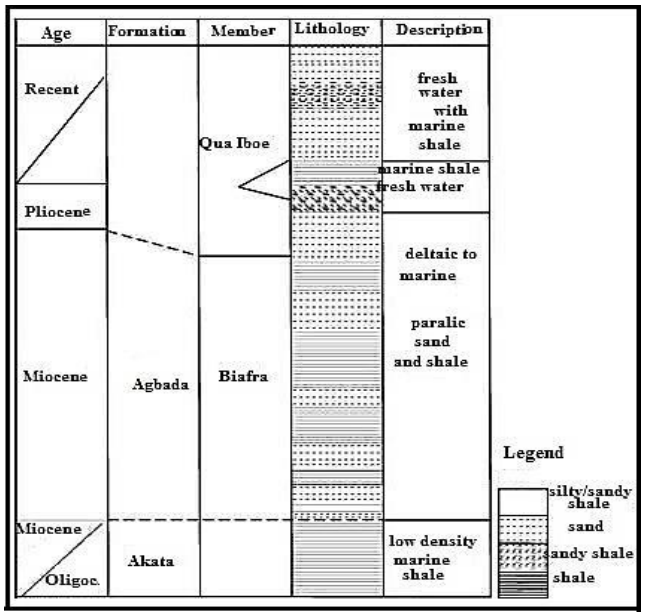

Figure 4: Generalized Stratigraphy of NEP-1, Eastern Niger Delta (after Aturamu, 2016)

The taxonomy of Loeblich and Tappan in 1988 is followed here for 5 Rotaliid benthic foraminiferal species of the *Uvigerina* and other related new genera were recorded from the Neogene stratigraphic succession of NEP-1, from Eastern Niger Delta Nigeria (Loeblich and Tappan, 1988). These identified fauna are illustrated in Plate (2). The transitional fauna in this study, the author may choose to affiliate with either two species, designated as transitional or arbitrarily split among both, then the present author prefer the latter choice.

Plate 2: (Scale bars =100µm)

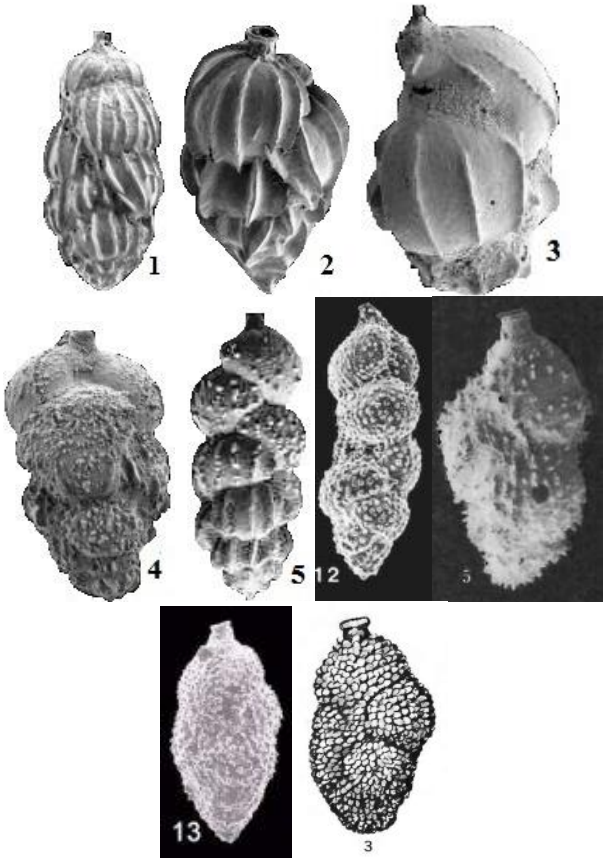

Figure 5: Uvigerina bifurcata d'Orbigny, 1839; 2. Uvigerina conica Anan, n. sp.; 3. Uvigerina globosa Anan, n. sp.; 4. Uvigerinita hispida (Schwager, 1866); 5. Uvigerinatella peregrina (Cushman, 1923).

U. hispida (LeRoy, 1964)

Order Foraminiferida (Eichwald, 1830)

Suborder Rotaliina Delage and (Hérouard, 1896)

Superfamily Buliminacea (Jones, 1875)

Family Uvigerinidae (Haeckel, 1894)

Subfamily Uvigerininae (Haeckel, 1894)

Genus *Uvigerina* (d'Orbigny, 1826)

Type species *Uvigerina pigmea* (d'Orbigny, 1826)

Uvigerina bifurcata (d'Orbigny, 1839). Miocene to Recent. France, Mexico, Niger Delta Nigeria.

Uvigerina conica Anan, n. sp. (=*Uvigerina bifurcata*- Aturamu, 2016, p. 4, plate 2, figure 2, *non* figure 1; Kender et al, 2019, p. 81, plate 13, figure 17). Nigeria, Bering Sea

Holotype: Plate 2, figure 2.

Etymology: after the conical shape of the test.

Stratigraphic level: Miocene (see figure 3).

Diagnosis: Test triserial conical-shape, initial part of the first chamber is pointed, proloculus pointed, chambers mostly inflated particularly the later chambers, surface has heavy regular costae varies from 4-6, sutures depressed, aperture terminal with well-developed neck.

Remarks: This species *Uvigerina conica* differs from *U. bifurcata* by its conical-shape test, less number of heavy regular costae, and pointed initial chambers.

Uvigerina globosa Anan, n. sp. (=*Uvigerina bifurcata*- Aturamu, 2016, p. 4, plate 1, figure 5, *non* figures.1-4, 6-8, 11-13, 15; Kender et al, 2019, p. 81, plate 14, figure 4). Miocene. Nigeria, Bering Sea.

Holotype: Plate 2, figure 3.

Etymology: after the relatively globular-shape of the test.

Stratigraphic level: Miocene (see figure 3).

Diagnosis: Test triserial relatively globular-shape test rounded initial part of the first chamber, chambers increased rapidly as added, and tends to change from triserial to biserial in later stage of the test, surface ornamented by 4-5 longitudinal ribs, sutures depressed, aperture terminal with well-developed neck.

Remarks: This species *Uvigerina globosa* differs from *U. bifurcata* by its relatively globular test, less number of regular longitudinal ribs.

Genus *Uvigerinita* Anan, n. gen.

Type species *Uvigerinita senticosa* (Cushman, 1927)

Uvigerinita senticosa (Cushman, 1927) (=*Uvigerina senticosa* - Aturamu, 2016, p. 6, plate. 1, figures. 10, 14; Finger, 1992, p. 82, plate. 22, figure 23). USA, Mexico, Nigeria.

Holotype: Plate 2, figure 4.

Stratigraphic level: Miocene (see figure 3).

Diagnosis: This genus is characterized by triserial robust elongate test, sub-cylindrical in shape, circular cross-section, two and a half times as long as broad, surface ornamented with low density and evenly distributed hispidity over the chambers, sutures depressed; aperture terminal with well-developed neck,

Remarks: This genus *Uvigerinita* Anan is characterized by heavy hispidity surface than longitudinal costae or ribs in the other genus *Uvigerina*, and chambers of this genus and species are more inflated than most other *Uvigerina* species and are evenly graduated in size from the almost rounded initial end to the broadest towards the apertural end. This genus has density and evenly distributed hispidity than numerous fine spines, shorter tubular neck without initial spine, regular added chambers than twisted chambers the genus *Euuvigerina*. This genus differs from the other genus *Uvigerinelloides* Anan by less shorter test, more heavily hispidity all over the chambers of the test than the entirely smooth last-formed chambers.

Genus *Uvigerinatella* Anan, n. gen.

Type species *Uvigerina peregrina* Cushman, 1923

Uvigerinatella peregrina (Cushman, 1923) (=*Uvigerina peregrina* - Aturamu, 2016, p. 7, plate 2, figures. 3, 4, 9, 14-16; *Uvigerina hollicki* - Schönfeld and Spiegler, 1995, p. 819, plate 1, figure 2; *Angulogerina occidentalis* – Keller, 1980, p. 862, plate 5, figures. 9, 10, *Uvigerina* cf. *U. hispidocostata* - Finger, 1992, p. 144, plate 22, figures. 10, 11). USA, Mexico, Chile, Nigeria, Japan.

Holotype: Plate 2, figure 5.

Stratigraphic level: Miocene (see figure 3).

Diagnosis: Test triserial elongate and stout, about 2 times as long as broad, chambers inflated with ornamented lower part by longitudinal ribs, but with spines towards the younger chambers, sutures depressed, Aperture terminal, produced on a spinose neck.

Remarks: The new genus *Uvigerinatella* differs from the other Uvigeriniid genera (i.e. *Uvigerina, Euuvigerina, Uvigerinella, Uvigerinelloides*) by its mixed ornamented test, longitudinal ribs in the lower part but spinose toward the upper part of the test.

4. PALEOGEOGRAPHY

The noted three benthic foraminiferal genera and its species: *Uvigerina bifurcata* d'Orbigny (1839), *Uvigerina conica* Anan, n. sp., *Uvigerina globosa* Anan, n. sp., *Uvigerinita hispida* (Schwager, 1866), *Uvigerinatella peregrina* (Cushman, 1923), were originally erected from different localities in the Southern Tethyan, which were recorded also from some localities in the Northern Tethys. *Uvigerina conica* Anan, n. sp. and *Uvigerina globosa* Anan, n. sp. were recorded from Nigeria and Bering Sea; *U. bifurcata* (d'Orbigny, 1839) from France, Mexico, Niger Delta Nigeria; *Uvigerinita senticosa* (Cushman, 1927) from USA, Mexico, Nigeria; and *Uvigerinatella peregrina* (Cushman, 1923) from USA, Mexico, Chile, France, Nigeria and Japan.

5. PALEOENVIRONMENT

Major environmental parameters affecting the geometry and sedimentary geology include water depth, type of substrate, temperature, oxygenation, current patterns, and upwelling (Figure 4). Many biserial and triserial shallow-infaunal taxa, belonging to the genera *Bolivina, Bulimina* and *Uvigerina*, are often systematically considered as opportunistic taxa, and these taxa are less restricted to the sediment surface than many trochospiral taxa, suggests that they are more dependent on a rather continuous abundance of organic matter, eventually of a lower quality (Abu-Zied et al., 2008).

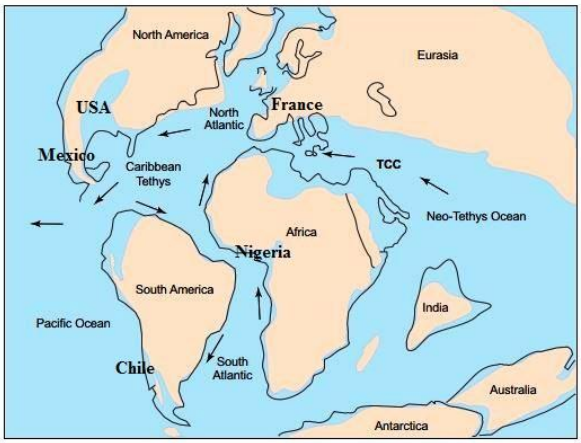

Figure 6: Paleogeography of the Neo-Tethys Ocean during the Neogene showing the flow direction of the Tethyan Circumglobal Current (TCC) from east to west (after Abed, 2013).

On the other hand, *Uvigerinatella peregrina* Cushman in 1923 was originally described from a continental slope sample (~2100 m), off the northeastern United States (Cushman, 1923). This interval is characterized by changes in seabed oxygen and nutrient levels that might have influenced subtle morphological changes in the test. This species is replaced progressively by another *Uvigerina* morphotype with spines between the costae and an entirely spinose last chamber (*Uvigerina hollicki* Thalmann) at 2000 m depth, and below 3000 m. *Uvigerinatella peregrina* is replaced by the spinose morphotype *Uvigerina hispida* which became increasingly dominant (Lutze, 1986). And Its water depth range varies from 300 m in the Atlantic, having its shallowest reliable occurrences in the Gulf of Mexico, to 2496 m in the deep Guinea Basin (figure 5).

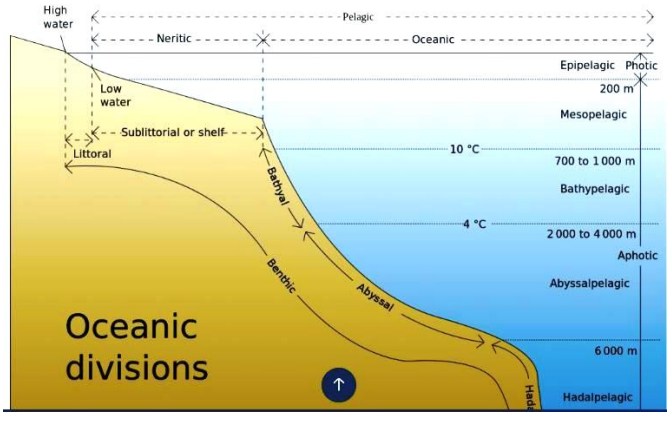

Figure 7: The Oceanic subdivisions (after http://www.gnu.org/copyleft/fdl.html).

6. CONCLUSIONS

Three Neogene-Quaternary Rotaliid foraminiferal genera and its species from six countries in North America (USA, Mexico) and South America

(Chile), Europe (France), West Africa (Nigeria) and East Asia (Japan) made it possible to elucidate them with its modern taxonomical consideration The paleodepth of the recorded benthic foraminifera is inferred from the bathymetric distributions of the individual genera or species reported for the Neogene-Quaternary stratigraphy is a product of many environmental parameters, e. g. water depth, eustasy, temperature, oxygenation, nutrient and pattern of sedimentation, which causes the morphological changes in the test.

REFERENCES

Abed, A.M., 2013. The eastern Mediterranean phosphorite giants: An interplay between tectonics and upwelling. GeoArabia. 18 (2), Pp. 67-94.

Abu-Zied, R.H., Rohling, E.J., Jorissen, F.J., Fontanier, Ch., Casford, J.S.L., Cooke, S., 2008. Benthic foraminiferal response to changes in bottom-water oxygenation and organic carbon flux in the eastern Mediterranean during LGM to Recent times. Marine Micropaleontology 67, Pp. 46–68.

Aturamu, A.O., 2016. Taxonomic notes on some members of genus Uvigerina from the Deep Offshore Eastern Niger Delta Nigeria. British Journal of Earth Sciences Research, 4 (4), Pp. 1-16.

Cushman, J.A., 1923. The foraminifera of the Vicksburg group. U.S. Geological Survey, Professional paper, Washington, D.C, U.S.A., 133, Pp. 11-71.

Cushman, J.A, 1927. Recent foraminifera off the west coast of America. Scripps Institute Oceanography, Bulletin Technical Series, 1, Pp. 119-188.

Finger, K.L., 1992. Biostratigraphic Atlas of Miocene Foraminifera from the Monterey and Modelo Formations, Central and Southern California. Cushman Foundation for Foraminiferal Research, Special Publication No. 29, Pp.179.

Keller, G., 1980. Benthic foraminifers and paleobathymetry of the Japan Trench area, Leg 57, Deep Sea Drilling Project. Initial Reports of the Deep Sea Drilling Project, 56-57(2), Pp. 835-865.

Kender, S., Aturamu, A.O., Zalasiewicz, J., Kaminski, M., Williams, M., 2019. Benthic foraminifera indicate Glacial North Pacific Intermediate Water and reduced primary productivity over Bowers Ridge, Bering Sea, since the Mid-Brunhes Transition. Supplement of J. Micropalaeontology, 38, Pp. 177–187.

Orbigny, A., d'. 1839, Foraminifères (*in* Ramon de la Sagra, Histoire physique, politique et naturelle de l'ile de Cuba). Paris, Arthus Bertrand, Pp. 224.

Repetto, G., Bicchi, E., 2013. Fossil starfishes (Echinodermata Asteriidae) and paleontological analysis of the Pliocene of Cherasco, Piedmont region (NW Italy). Biodiversity Journal, 4 (2), Pp. 365-378.

Schönfeld, J., Spiegler, D., 1995. Benthic foraminiferal biostratigraphy of Site 861, Chile Triple Junction, Southeastern Pacific. Proceedings of the Ocean Drilling Program, Scientific Results, 141, Pp. 213-221.

Schwager, C., 1866. Fossile Foraminiferen von Kar Nicobar: Novara Expeditions. Geologischer. Theil, 2, Pp. 187-268.