

Planktic Foraminifera from Niniyur Formation, Cauvery Basin, Southern India

N. Malarkodi

¹ Department of Geology, Bangalore University, Bangalore- 560 056, India

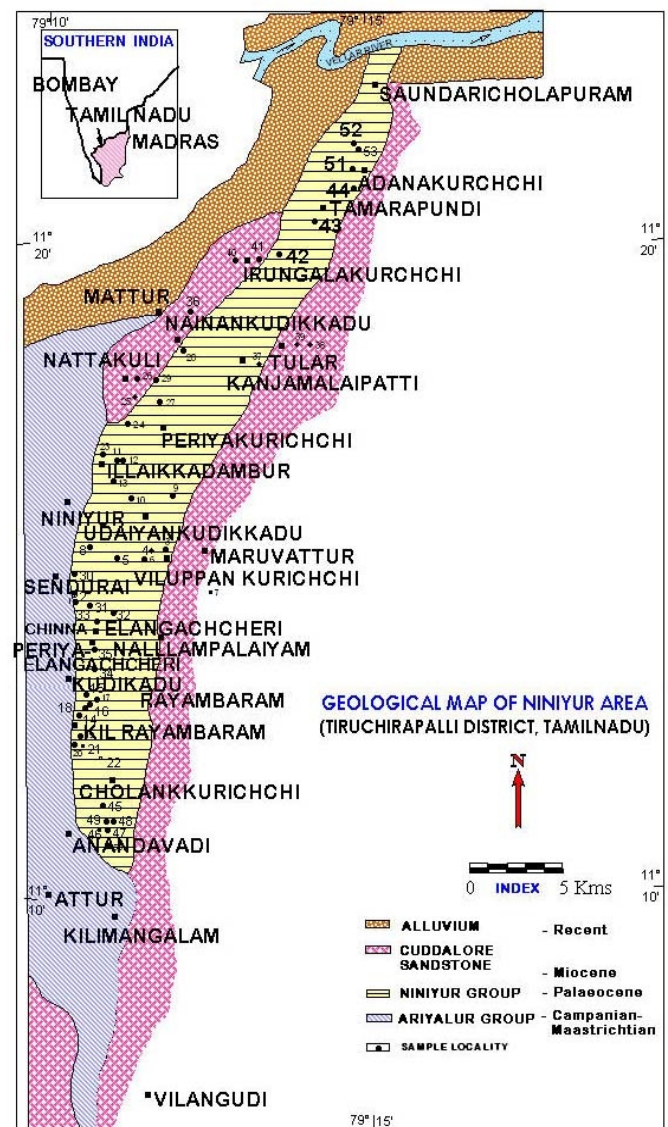
Abstract: The study records the occurrence of sparse but well preserved planktic foraminifera from the Niniyur Formation of the Cauvery Basin, Tamil Nadu, South India. Planktic foraminifera from several outcrops of Niniyur Formation were analyzed to determine their age. Samples of Niniyur Formation have yielded well preserved planktonic foraminifera belonging to the genera *Globanomalina*, *Acarinina* and *Morozovella*. Seven planktic species were recorded viz *Globanomalina pseudomenardii* (Bolli), *G. chapmani* (Parr), *Eoglobigerina spiralis* (Bolli), *Acarinina mckannai* (White), *Morozovella praecursoria* (Morozova), *M. conicotruncata* (Subbotina) and *M. cf. trinidadensis* (Bolli). These forams are important biostratigraphic and paleogeographic indicators. These indicate an Early to Late Paleocene Zones (P2 to P5) age for the Niniyur Formation of Cauvery Basin.

Key words: Planktic Foraminifera, Paleocene, Niniyur, Tiruchirapalli, Cauvery Basin

1. Introduction

The Niniyur Formation overlying the Ariyaur Group is exposed as isolated outcrop along a NNE-SSW trend, between Vellar River in the north and Kavanur in the south, over a strike length of 26 km on the northeastern part of Tiruchirapalli Cretaceous area, exposing highly fossiliferous horizons composed of gritty nodular limestones, marls, shelly limestone and cream coloured limestone (Fig.2 & 3). The section seems to have been deposited in a shallow marine environment during the post KTB transgression. The beds are generally flat lying but occasionally show low dips of 5° to 10°. The area limits within the latitudes 11°08' to 11°22' N; longitudes 79°10' to 79°17' E. The thickness is estimated to be of the order of 66 meters [10]. The succession has been divided into three distinct lithounits of the rank of Member. They are Adanakurchchi Limestone, Subcrystalline shelly Limestone and Argillaceous Gritty Nodular Limestone in the order of stratigraphic succession (Fig.1).

The exposures of Niniyur Formation are very scanty and samples were mainly collected from the unlined open wells, quarry sections and nallas. In the field sediments were examined for vertical lateral lithologic characteristics. In the laboratory samples were processed for foraminifera using standard processing techniques.



Modified after Rao et al., 1963

Figure 1: Geological Map of the Niniyur Area (Tiruchirapalli District), Tamil Nadu.

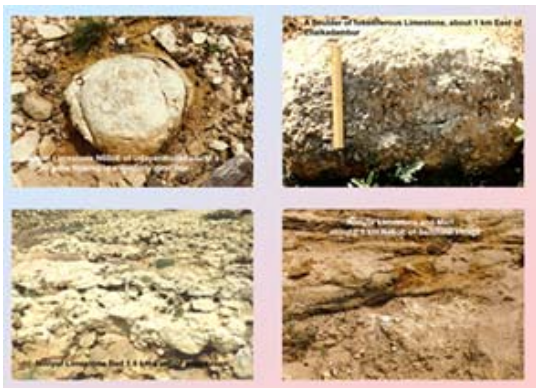


Figure 2 Nodular Limestone from Udayankudikadu, Illaikadampur and Niniyur

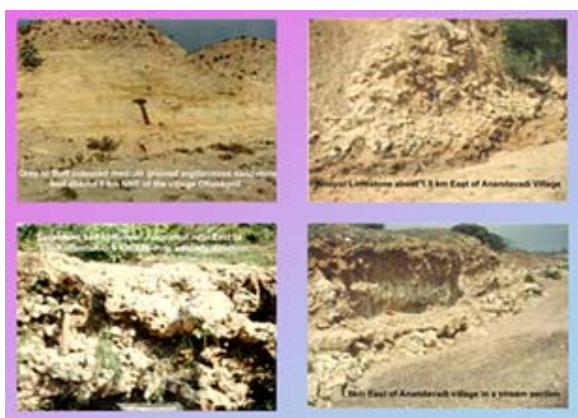


Figure 3: Argillaceous Limestone from NNE of the village Ottakovil, Anandavadi stream section of Niniyur Formation

The samples were disaggregated following the method of Jones (1956). About 300g of each sample was crushed into 0.5 cm fragments and disaggregated by alternating heating with 1:1 sodium sulphate anhydrite (Na₂SO₄) and cooling (freezing) as described by Glaessner [1]. The process was repeated several times to free foraminiferal tests. After disintegration, the samples were washed with tap water to remove clay and the clean residue is dried. The residue was sieved (10, 30, 52, 100, -100 sieves) and each fraction was examined under the light microscope. Microfossils were picked, identified and mounted on faunal slides for a permanent record.

This is the first report on foraminiferal occurrence from the Niniyur Formation. However, some of the earlier reports have dealt with the occurrence of algal remains [5,6,7& 8] Sastry [9] reported the occurrence of *Globorotalia* (*Truncorotalia*) *mossae* Hofker; Mallikarjuna [4], reported ostracodes from Niniyur Formation. Malarkodi [3] reported foraminifera from Niniyur Formation.

2. Planktic Foraminifera

Over sixty samples from critical exposures covering the succession of the Niniyur Formation were examined for their foraminiferal content. A total of seven species belonging to 3 genera were identified. The genus *Globanomalina* is represented by two species *Globanomalina pseudomenardii* (Bolli), *G. chapmani* (Parr), belonging to planktic zone P3 & P4. *Eoglobigerina* and *Acarinina* are presented by a single

species *Eoglobigerina spiralis* (Bolli), *A. mckannai* (White), which are of Paleocene age (P2- Zone). The angulo-conical *Morozovella* is represented by three species, *Morozovella praecursoria* (Morozova), *M. conicotruncata* (Subbotina) and *M. cf. trinidadensis* (Bolli) which are of late Paleocene age. The *Morozovella conicotruncata* is large, highly angulo-conical test, wide open umbilicus with prominent peripheral keel (Plate 1 & 2).

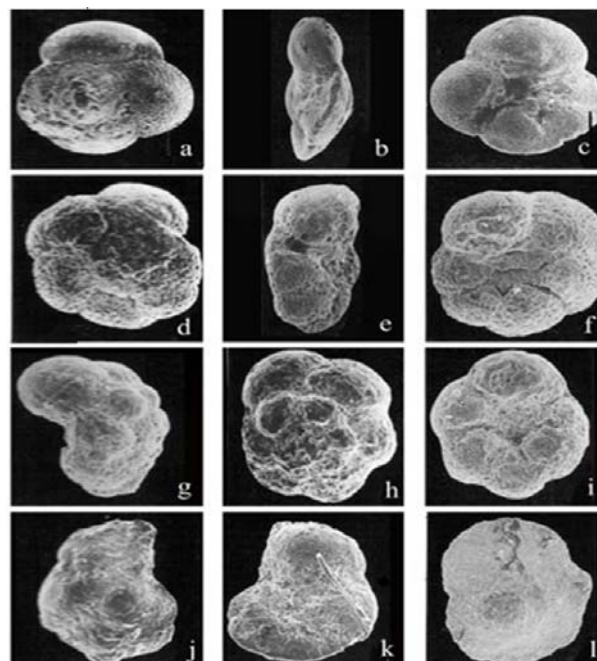


Plate 1: Figs. a-c – *Globanomalina chapmani* (parr), X150; d-i-*Eoglobigerina spiralis* (Bolli), X150, c & g X200; j - l – *Globanomalina pseudomenardii* (Bolli), X150,

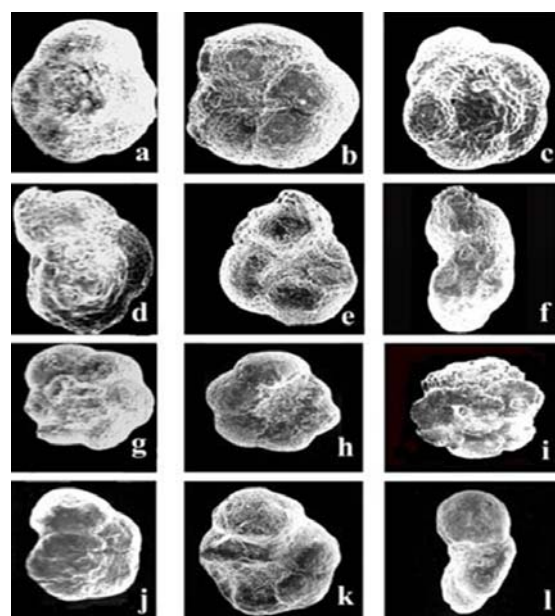


Plate 2: Figs. a-f – *Acarinina mckannai* (white), X150; g-h – *Morozovella praecursoria* (Morozova), X200; i - *Morozovella conicotruncata* (Subbotina), X150; j,k& l – *Morozovella cf. trinidadensis* (Bolli), X200

3. Discussion and Conclusions

The post – Cretaceous transgression during Early Tertiary resulted in the deposition of the Niniyur Formation which is not only lithologically different from the underlying Kallamedu Formation (Upper Maastrichtian) but also paleontologically distinguishable. The Lower Tertiary sediments of Niniyur Formation recorded well preserved Planktic foraminiferal species viz *Globoanomalina pseudomenardii* (Bolli), *G. chapmani* (Parr), *Eoglobigerina spiralis* (Bolli), *A. mckannai* (White), *Morozovella praecursoria* (Morozova), *M. conicotruncata* (Subbotina) and *M. cf. trinidadensis* (Bolli). This assemblage stands out as important from the biostratigraphic and paleogeographic perspective. The occurrence of *Eoglobigerina spiralis* (Bolli), *Morozovella praecursoria* (Morozova), and *M. cf. trinidadensis* (Bolli) indicates Lower Paleocene age for the Adanakurchchi Limestone Member. *A. mckannai* (White), recorded from the Shelly Limestone Member confirms the middle to lower part of Upper Paleocene age (P3-P4) for the Shelly Limestone. *Globoanomalina pseudomenardii* (Bolli), *G. chapmani* (Parr), recorded from the Argillaceous Gritty nodular limestone member are of Upper Paleocene assemblage belonging to (P4 and P5 Zones) age.

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References

- [1] Glaessner, M.F. (1945) Principles of micropalaeontology. Melbourne Univ. Press., pp.296, pls.14, text figs.64, tables 7.
- [2] Jones, J.D. (1956) Introduction to microfossils. Haeper's Geoscience Series, Carey Croneis, Ed., New York, pp.7-18.
- [3] Malarkodi, N. (1997). Geologic studies of Lower Tertiary sediments of Cauvery Basin. Tiruchirapalli District, Tamil Nadu, South India. Unpublished Ph.D thesis. Bangalore University, India
- [4] Mallikarjuna U.B. (1992). The study of ostracodes from the sedimentary sequences of Ariyalur and Niniyur Groups of Tiruchirapalli District, Tamil Nadu, India. Unpublished Ph.D Thesis, Bangalore University, India.
- [5] Rama Rao, L. (1956). Recent contribution to our knowledge of the Cretaceous rocks of south India. Proc. Indian Acad. Sci. B44: 185-245.
- [6] Rama Rao, L. & Prasanna Kumar (1934). On the flint and cherts from the upper most Cretaceous beds (Niniyur Stage) of the Trichinopoly District, South India. Proc. Indian Acad. Sci., 1(10): 10-18.

- [7] Rama Rao, L. & Gowda, S. (1953). Occurrence of Clypeina (Dasycladaceae) of the south Indian Cretaceous. Curr. Sci. 22: 332-333.
- [8] Rama Rao, L. & Gowda, S. (1953). Solonoporaceae from the Cretaceous rocks of south India. Curr. Sci. 22: 177-179.
- [9] Sastry M.V.A., Rao, B.R.J., & Mamgain, V. D. (1963). Note on the occurrence of Globorotalia in Niniyur Stage, south India. Curr. Sci. 34 (4): 199-200.
- [10] Sundaram, R., and Rao, P.S., (1986) Lithostratigraphy of Cretaceous and Paleocene rocks of Trichirapalli District, Tamil Nadu, South India. Rec. Geol. Survey of India. 115(5): pp 9-23.

Author Profile

Dr. Malarkodi received the M.Sc., Ph.D. degrees in Geology from Bangalore University in 1991, 1997 respectively. He is working as faculty in the Department of Geology, Bangalore University, Bangalore-560056, Karnataka, India since 1998