



Research Paper

BENTHIC FORAMINIFERA FROM PALAEOCENE SEDIMENT OF PONDICHERRY AREA, CAUVERY BASIN

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The paper present the characteristic benthic foraminiferal fauna robust Anomalinids (*Gavelinella danica*, *G. velascoensis*), *Nuttallides truempyi*, *Osangularia velascoensis*, *Gyroidinoides globosus*, *Bulimina trinitatensis*. Suggesting upper-middle bathyal depths (200-1000 m) depositional environment to *Palaeocene* sediments of Pondicherry area.

Keywords: Benthic foraminifera, Cauvery basin, Bathyal depths, Paleocene sediments, Pondicherry

INTRODUCTION

Benthic foraminifera are one of the most important protist groups, due to the preservation of a hard fossilized test and the vast diversity of species, benthic foraminifera can be used for paleoenvironmental investigations. The benthic foraminifera, in the fossil record traced all the way back to the early Cambrian period onwards. Depending on species composition and dominance in the foraminiferal assemblage, it is used to draw the paleoclimatic interpretation (Culver, 1993). It is well-known and most widely used in biostratigraphy and paleoenvironmental reconstructions. The foraminifera have a great capacity of tolerating to variety of environments and adverse conditions. Many species still exist in small numbers, even though the conditions are unfavourable and are beyond foraminifera's

optimum tolerance zone. The opportunist species rapidly increase in abundance and the conditions change to foraminifera's advantage. Species that do not respond to rapidly changing conditions in this way are known as generalists (Murray, 2006).

Benthic foraminifera can be roughly divided into two groups, based on the texture of the test. It can either be agglutinated (built by cementing sediment particles together) or calcareous (built out of calcium carbonate, secreted by the organism). The particles making up the agglutinated walls can be mineral grains either specifically chosen on the basis of size, composition or gravity, or simply reflecting the composition of the sea floor. Out of the calcareous made up tests, three major types are recognized; microgranular, porcelaneous and hyaline. These

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types are an important foundation in classifying the foraminifera (Culver, 1993). Agglutinated tests are more susceptible for test destruction, but some species are more durable than others, depending on the morphology of the test structure (Schröder, 1988). Based on their habitat, benthic foraminifera can be infaunal (live within the sediment) or epifaunal (adapted to a life on the sediment surface or other substrates). There are also various feeding strategies of the benthic foraminifera (parasitism, carnivory, herbivory, suspension and deposit feeding, omnivory), though the vast majority of them are herbivore (Pawlowski, 2012). Several species show a positive correlation to high food availability and since algal blooms (measured as content of chlorophyll a) are patchy in occurrence, food is likely to be a controlling factor for spatial patchiness in foraminiferal distribution (Murray, 2006).

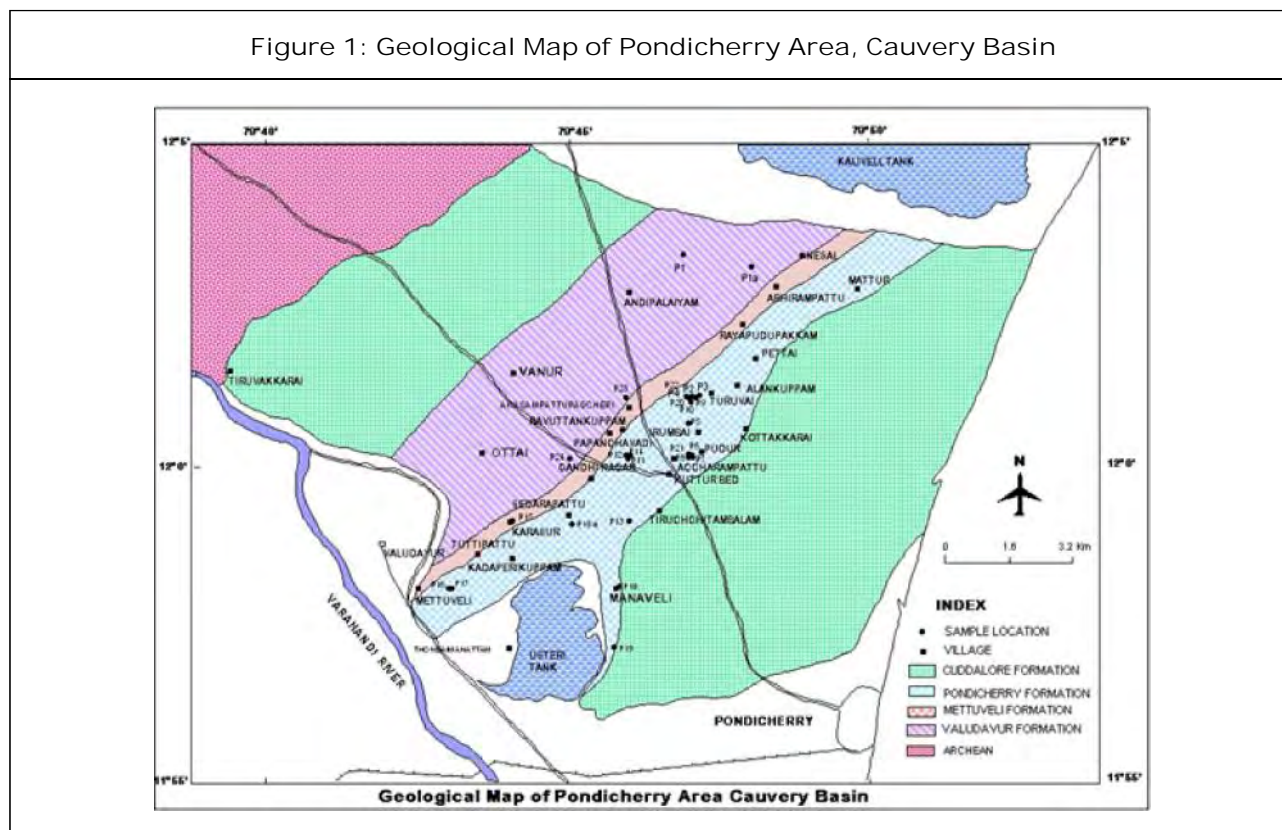
Location

In the Cauvery basin, Cretaceous-Tertiary outcrops occur discontinuously at four places viz., Tiruchirapalli in the south, Ariyalur, Vridhachalam and Pondicherry in the north along the western margin (Figure 1). The Cretaceous – Tertiary rocks of Pondicherry occupy an area of nearly 30 sq. miles NW of Pondicherry and the study area is situated to the NE of Pondicherry town where Palaeocene rocks are well exposed.

Geological Settings

The Cauvery basin represent passive margin sedimentary systems developed in response to the separation of the Indian subcontinent from Australia and Antarctica in the early Cretaceous time, contemporaneous with the first phase of seafloor spreading responsible for the formation of the Indian Ocean. The basin forming a half graben morphology trending NE-SW with a

Figure 1: Geological Map of Pondicherry Area, Cauvery Basin



regional dip 5°-10° to the east and southeast due to the result of continental rifting between India, Australia and Antarctica plates (Veevers *et al.*, 1991). Blanford (1865) was the first to study and describe these rocks and gave the earliest geological account of the Pondicherry area. The presence of marine Lower Tertiary sediments was first reported by Furon and Lemoine (1939) who noted the occurrence of larger foraminiferal genera *Assilina* and *Discocyclina*. Rajagopalan (1964 and 1965) on the basis of detailed mapping classified the Cretaceous and Lower Tertiary sequence into three distinct lithological units which are in ascending order, the Valudavur, the Mettuveli and the Pondicherry Formations. The upper Cretaceous of this area comprises the Valudavur and the Mettuveli Formations. The Pondicherry Formation is of early Tertiary age (Palaeocene - early Eocene). The three formations which are having total thickness of less than 1000 ft extend over a strip of almost eleven to sixteen km long and about four miles wide in NE-SW direction. The three units are apparently conformable to each other. It is overlain by the Cuddalore Sandstone of Miocene age. Sundaram *et al.* (2001) gave a detailed work on the lithostratigraphy of Pondicherry area and the succession comprise the Valudavur and Mettuveli Formations (Maastrichtian) and Karasur and Manaveli Formations (Palaeocene).

RESULTS AND CONCLUSION

The dominant benthic assemblages present in the study area Pondicherry area, Cauvery Basin (Figure 1) is characterised by robust Anomalinids (*Gavelinella danica*, *G. velascoensis*), *Nuttallides truempyi*, *Osangularia velascoensis*, *Gyroidinoides globosus*, *Bulimina trinitatensis* are common in the study area suggesting upper-

middle bathyal depths (200-1000 m) depositional environment (Berggren, 1972; Berggren and Aubert, 1975; Schnitker, 1979; Murray, 1991; and Bignot, 1998).

The benthic foraminiferal assemblages recorded from the Pondicherry area were more commonly present and interpreted as upper-middle bathyal depths (200-1000 m) depositional environment.

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