

BENTHIC FORAMINIFERA FROM SHELF REGION
BETWEEN BOMBAY - RATNAGIRI
DISTRIBUTION ECOLOGY AND ENVIRONMENTAL SIGNIFICANCE

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Benthic foraminifera are one of the chief indicators of temperature, density and bottom conditions and their study is useful in the understanding of various problems of coastal oceanography. A review of the literature indicates that only few reports pertaining to the taxonomy are available from the west coast of India. Therefore, the benthic foraminiferal ecology of a large number of samples from the beach to the shelf along the western coast were studied. Results, chiefly from northern half of the west coast are presented here.

Detailed study of foraminifera from the beaches of the West Coast of India, showed presence of 114 species (including 4 new) and indicated that the west coast fauna is richer than the east coast. The frequency of the fauna on the west coast decreases from north to south whereas it is the reverse on the east coast. Cluster analysis

shows that the fauna of the west and east coasts belong to two different faunal realms. This is due to differences in the oceanographic features of the Arabian Sea and the Bay of Bengal.

Large number of samples collected on board R.V. Gaveshani, ORV Sagar Kanya and also some small boats were utilised for foraminiferal studies. The distribution of shelf fauna was interpreted in terms of depth, temperature, salinity and fresh water influence tides, currents, substrate etc.

Studies on living foraminifera off Bombay-Daman area have indicated a mobile substrate on the Easter bank (Gulf of Kambhat) which does not permit foraminifera to be attached to the bottom sediments. The absence of living and the presence of reworked foraminifera are due to the large discharge by Narmada and Tapti rivers through the narrow southern land Channel and its interaction with the strong tidal current in this area.

Cluster analysis, when applied to quantified data explains the spatial distribution of benthic foraminifera off Ratnagiri and classified the area into two biotopes which are dependent on fresh water influence, rate of sedimentation and organic carbon content. Factor analysis was used to obtain meaningful patterns and interpretation

of anomalous and patchy distribution of foraminifera, a problem very often faced by Micropaleontologists.

Large foraminiferal data from Bombay-Daman and Dabhol-Vengurla gave an opportunity to study the relationship between foraminifera and organic carbon. It was observed that *Ammobaculites* and *Ammonia* are positively and *Florilus* - *Nonion*, *Nonionella* and *Asterorotalia* are negatively proportional to the organic carbon.

A study of ecology and distribution of *Virgulinea* spp. in modern sediments within the study area is a significant contribution for establishing the paleoenvironment of Miocene and Pliocene rocks where fossils of these species occur.

The understanding obtained through studies for ecology for foraminifera has been used to solve some environmental and paleoenvironmental problems. With the help of foraminiferal studies, the long standing marine Archaeological controversy was settled about the Lothal tank -that it was a first ever naval dock - yard of the world and not a fresh water storage tank.

Studies from Thana Creek and other areas concluded that pollution or environmental stress gradient can be

measured by monitoring the relative sensitivity of tolerance of biota, particularly the benthic foraminifera.

The results were also used to develop some models for sediment transport and paleoclimatic studies.

With factor analysis and comparison of tests of living and dead foraminiferal, a novel technique was developed to decipher the direction of long term net sediment transport. Model, was tested on foraminiferal data off Navapur and indicated a NNW-SSE current and an onshore movement of sediment.

It was proposed that dimorphic forms of foraminifera can be used as an additional tool for paleoclimatic studies. By comparing results of a foraminiferal distribution in a core from North sea with O^{16}/O^{18} ratios it was concluded that higher ratios of microspheric/megalospheric forms indicate warmer climate. As differentiation between dimorphic forms is not always possible, therefore this technique was further modified. Study of the mean proloculus size (MPS) of *Cavartalia annectens* in near shore sediments of the west coast of India has established a significant inverse relationship of MPS with temperature and salinity. It is also possible to utilise this new technique to study paleomonsoonal variations along the west coast of India.

In the course of studies on shallow water shelf (Karwar) cores, a cyclicity of 77 years in paleomonsoonal precipitations has been established. This leads to a possible correlation between monsoonal variations with Gleissberg solar cycle of 78 years. Preliminary results of a short core from shelf region off Ratnagiri also indicate the similar results.