

Recent Foraminifera from the Gosthani River Estuary back water along the East Coast of India Andhra Pradesh

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ABSTRACT

The present study has led to recognition of a total of 92 foraminifera species from the gosthani estuary. They are grouped in 47 genera and 28 families. Eight families account for 64% of the species: *Miliolidae* (22), *Rotaliidae* (8), *Elphidiidae* (8), *Lituolidae* (6), *Bolivinitidae* (6), *Textularia* (5), *Nodosariidae* (5), and *Nonionidae* (4) of the 92 species identified, so are scarce and the remaining 20 are abundant in occurrence. The scarce species are grouped into stenohaline marine, slightly to moderately euryhaline, and truly euryhaline forms. Among the abundant foraminifers, *Ammonia beccarii*, *A. beccarii tepida*, *Elphidium simplex*, *Quinqueloculina seminulum* and *Textularia agguinans* are ubiquitous in the estuary.

Key words: Foraminifera, euryhaline, stenohaline, back water, estuary

1. INTRODUCTION

Gosthani River originates in Ananthagiri hills of Eastern Ghats and flows down to North East to a distance of 120 km, and debouches into the Bay of Bengal near Bhimunipatnam (18°-17° 51'N 83°24'-83°30'E) forming an estuary [fig.1].

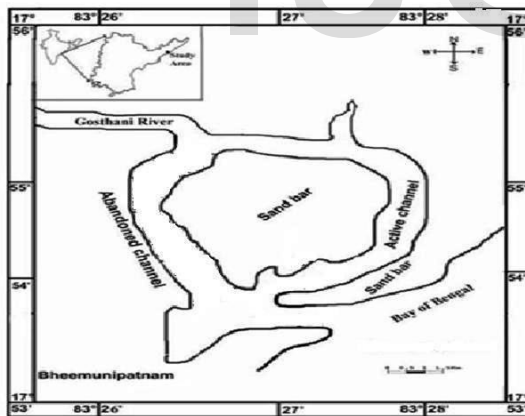


Fig. 1. General location map

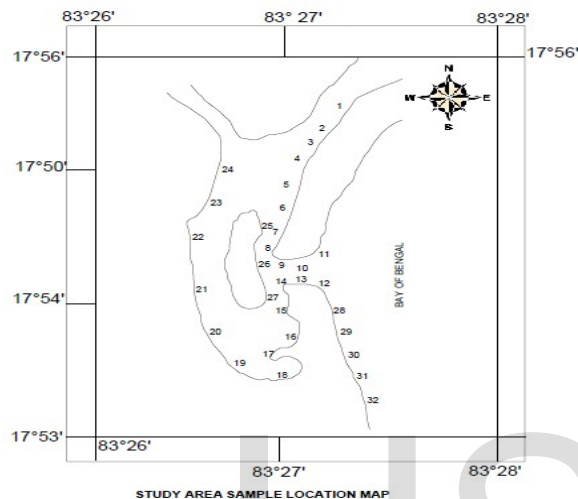
Gosthani River is medium sized east flowing river in Andhra Pradesh, India. Many foraminifer's forms are abundant in the deep ocean, some forms survive only in brackish estuaries or salt marshes and they are more peculiar to certain temperature and depth ranges. Estuaries are transition zone between river in and oceanic environments and is influenced by tides, waves, and the influx of saline

water by oceans and flows of water by oceans and flows of freshwater and sediment by rivers.

1.2 Geology: The catchment area of the Gosthani river forms a part of the Eastern Ghats province comprising the granulite facies rocks with local charnockites patches and pegmatite and quartz veins belonging to Precambrian age (2600-2000 M.Y) litho units mapped around borra include calc granulite. Pyroxenite, syenite and carbonate rock besides thick cappings of laterite enriched in bauxite [9]. Dominating garnetiferous sillimanite gneisses, hypersthene granulites and apatite-magnetite deposits characterizes the terrain near Kasipatnam [10]. Between Thatipudi where the river enters the plains and its mouth near Bhimunipatnam the country rock is constituted by sillimanite gneisses. Thick red sediments of recent origin [11] are conspicuous to the south and north of the estuary. Red soils occur over the entire plain area, especially on the slopes of the hills that dot the plains but they are not as imposing as those along the coast. Neither the rock types nor the red sediments and soil are fossiliferous. Thus the foraminifera fauna of Gosthani estuary of recent nature and there is no contamination of the fauna with that from the drainage basin of the river.

2. MATERIALS AND METHODS:

Sediment samples for foraminifera studies, sediment texture analysis [6] and determination of organic matter content and water samples for the determination of salinity and dissolved oxygen content [5] were collected from 50 stations (Fig. 2) during May and December 2011 (pre-monsoon and post-monsoon seasons) [3] from the lake.



Temperature and hydrogen-ion concentration were measured at all the 50 stations. The sediment sample preserved in neutralized formaldehyde was washed free of silt and clay over an ASTM-230 mesh sieve having openings of 0.063mm. The sieve with the residue was kept immersed in an aqueous solution of rose Bengal (which has prepared by dissolving 1 gm of rose Bengal dye in one litre of water) for an hour. Then the material on the sieve was gently washed to free it of the excess stain and dried. The foraminifera tests were separated from the residue that is mostly of terrigenous sand by floatation in carbon tetrachloride. The residue was examined and if foraminifera tests were left in the residue they were picked and added to the floated crop. The foraminiferal crop was examined under a binocular microscope [7].

RESULTS AND DISCUSSION

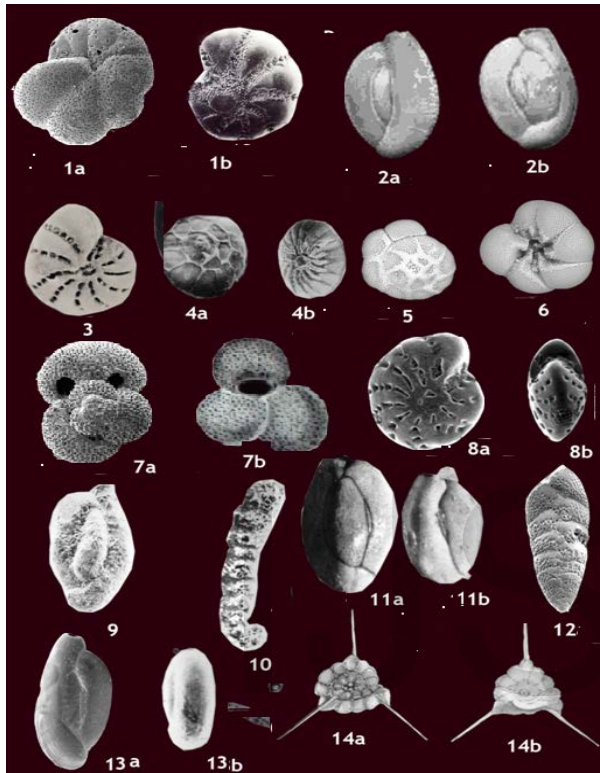
The Gosthani river estuary, situated 30km north of Visakhapatnam on the east coast of India has been selected for a study of its foraminifera in relation to ecology. Salinity in the Gosthani estuary varies with seasons, bottom water salinity from estuary 35.23‰ in May and 31.54‰ in December. The bottom

water temperatures show a range of 21.5°-37°C. They lowest (21.5°) in December, and highest (37°C) in May. Dissolved oxygen of the bottom waters is variable from 3.5ml/l to 9.86 ml/l. It is relatively low in May and high in December. P^H of the waters ranges from 7.9 to 9. It is relatively high at the mouth and also the at the head of the estuary. Sand admixed with 0.20% of silt and clay is the predominant sediment type at the mouth as well as at the head portion of the estuary while clayey sand is most dominant in the middle section [2]. Sandy clay and clayey sand are common in the backwaters. The organic matter content in the Gosthani estuary sediments has range of 0.16-2.49% by weight of the dry sediment. The estuary sediments contain larger organic matter concentrations in May and December than in other months. These higher concentrations are attributed to the phytoplankton bloom in the overlying waters during the corresponding periods. There are 20 species of abundant occurrence (populations more than 5% of the standing crop at least at one station), of them, *Ammonia beccarii*, *A. tepida*, *Elphidium simplex*, *quinqueloculina seminulum*, and *Textularia agglutinans* are ubiquitous in the estuary while *discorbis australis*, *Hanzawaia concentrica*, *quinqueloculina subcuneata* [1] and *Triloculina Oblonga* are restricted to the lower section, *Bigenerina sp.* to the middle section *quinqueloculina gualtieriana* to the upper section *elphidium incertum* and *milliammina fusca* to the lower and middle sections, and *Ammobaculites dilatatus*, *A. exiguus*, *Haplophragmoides wilberti*, *Miliammina fusca var.*, *quinqueloculina lata* and *elphidium advenum* to the upper and middle parts [13] [4].

CONCLUSION

The Gosthani estuary, situated 30 km north of Visakhapatnam on the east coast of India has been selected for a study of its foraminifera in relation to ecology. Among the abundant foraminifers, *ammonia beccarii*, *A. beccarii tepida*, *Elphidium simplex*, *Quinqueloculina seminulum* and *Textularia agglutinans* are ubiquitous in the estuary, while *Discorbis australis*, *Hanzawaia concentrica*, *Quinqueloculina subcuneata* and *Triloculina oblonga* are restricted to the lower parts, *Bigenerina sp.* to the middle part, *Quinqueloculina gualtieriana* to the upper part, *Elphidium incertum* and *Miliammina fusca* to the lower and middle sections, and

Ammobaculites dilatatus, *A. exiguus*, *Haplophragmoide s wilberti*, *miliammina fusca var.*, *Quinqueloculina lata* and *Elphidium advenum* to the upper and middle part of river estuary [8] [12]. However some broken foraminiferal tests are also present due to high energy conditions prevailed at the mouth of the River.



1. *Cibicides lobatulus* (general view) 2. *Elphidium simplex* 3. *Miliammina fusca* 4. *Ammonia beccarii* 5. *Ammonia tepida* 6. *Globigerina ruber* 7. *Elphidium advenum* 8. *Elphidium incertum* 9. *Miliammina fusca var.* 10. *Ammobaculites exiguus* 11. *Quinqueloculina seminulum* 12. *Bolivina spatulata* 13. *Quinqueloculina lata* 14. *Asterorotalia trispinosa*. (a) Dorsal view, (b) Ventral view.

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