

Seasonal variation of protozoans in Palk Bay and Gulf of Mannar along the south east coast of India

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Abstract

Regular fortnightly zooplankton sample collection was made for two years from November 1993 to October 1995 in the Palk Bay (Station I) and Gulf of Mannar (Station II & III) along the south east coast of India. Among the zooplankton sample particularly protozoa diversity were identified. Their primary peak was observed at the middle of summer (Station I) and premonsoon (Station II and III) months. The temperature and salinity and monsoonal factors mostly influenced the occurrence of protozoans, the results are interpreted and probable reasons discussed.

Introduction

The regular and periodic changes in the climate synchronised with season are ultimately reflected in the environmental parameters also, which in turn have a direct or indirect influence over the planktonic population. A preliminary account of the plankton of the inshore waters of Madras has been given by Jayaraman (1951) and detailed investigations in the same area was reported by Ramamurthy (1953). Prasad (1954) described the characteristics of marine plankton at an inshore station in the Gulf of Mannar based on regular plankton samples. The zooplankton studies in the Indian waters have been reviewed by Panikar and Rao (1973) and a bibliography of plankton of the Indian Ocean was prepared by Prasad (1964).

The present investigation furnishes a comparative account of the changes in the protozoan population within three

stations and general inter relationships between their distribution and monsoonal effects, temperature and salinity for the period of two years from November 1993 to October 1995.

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Material and methods

The survey of zooplankton was carried out in the Palk Bay near Mandapam (Station I), Gulf of Mannar near Manadapam (Station II), Gulf of Mannar near Kudankulam (Station III) along the south-east coast of India. The sampling station I Palk Bay, and Station II Mandapam (Gulf of Mannar) are situated at a distance of about 2 km on either side (5 km between the stations) within the vicinity of Mandapam region, whereas Kudankulam

(176 km away from Station II and on the other end of Gulf of Mannar) is located near Kanyakumari (Fig. 1). Regular fortnightly water and plankton sample collections were made at the three stations for two years from November 1993 to October 1995. The mean depth of water at the above stations were 10 - 12 meters. The plankton collections were made for fifteen minutes sub-surface hauls using a 50 cm mouth diameter net made of bolting silk cloth (No. 14 net, mesh size 60 μ) by a slow moving mechanised trawling boat. The volume of filtered water was calculated with the help of flowmeter.

Results

Among the zooplankton the protozoan population was very small, but from ecological point of view very important because many planktonic forms utilize them as feed materials. The distribution and abundance of protozoans varied with station to station and season to season. Generally the protozoan primary peak was

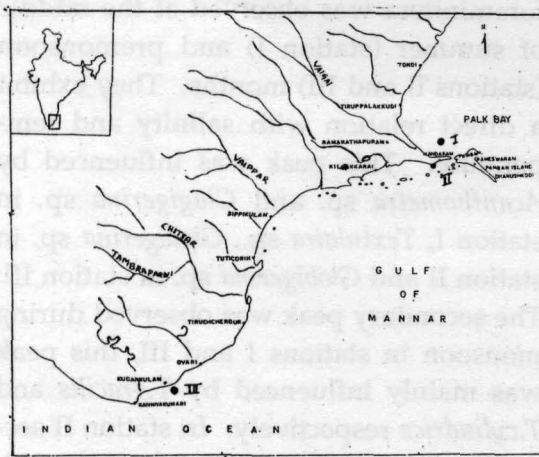


Fig. 1. Map showing the sampling stations

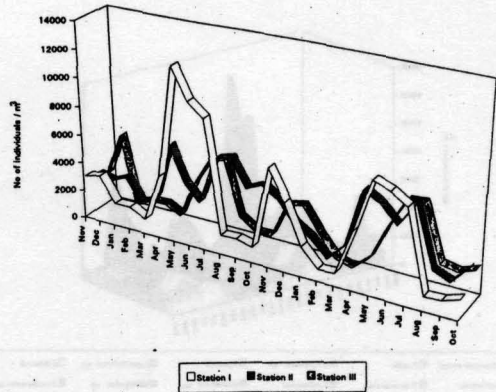


Fig. 2. Total number of protozoans in stations I, II & III during the study period Nov'93 to Oct '95

observed in the middle summer in station I and premonsoon in station II and III. The secondary peak was observed during monsoon in station I and III and during summer in station II (Fig. 2).

Design of minimum quantity of Tintinoidea and Foraminifera were present in the plankton almost throughout the year in all the stations. The foraminifera were represented by *Globigerina* sp., *Textularia* sp. and *Acanthometra* sp. They were common during summer and premonsoon months. In station I *Acanthometra* sp. occurred in August and September but *Globigerina* sp. exhibited a perennial occurrence. *Tintinnopsis dadayi*, *T. nordquisti*, *T. butschlii*, *T. mortensenii*, *T. radix*, *T. tocaninensis*, *Eutintinnus* sp. and *Cyrtarocyliis* sp. were recorded mostly in summer season. (Fig. 3). In station II, the *Acanthometra* sp. was not recorded for the entire two years of study. The other foraminiferans, *Textularia* sp. and *Globigerina* sp. population were high in premonsoon months. The *Tintinnopsis*

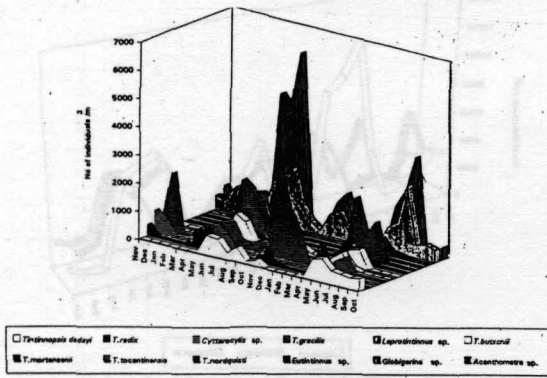


Fig. 3. Protozoan population in station I during the study period of Nov '93 to Oct '95

dadayi, *T.butschlii*, *T. tocaninensis*, *T. radix*, *T.cylindrica*, *T.nordquisti*, *Leprotintinnus* sp. and *Eutintinnus* sp. showed their abundance in summer months (Fig. 4) but one species. *T.gracilis* was abundant during monsoon months in both I and II stations.

In station III the maximum population of *Textularia* sp. and *Globigerina* sp. *Tintinnopsis dadayi*, *T.radix* were recorded during summer months. *Leprotintinnus* sp. and *T.tocantinnensis* during premonsoon and *T.butchlii*, *T.cylindrica*, *Eutintinnus* sp. population during monsoon months (Fig. 5).

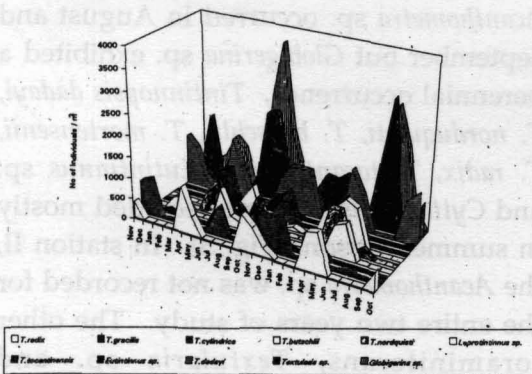


Fig. 4. Protozoan population in station II during the study period of Nov '93 to Oct '95

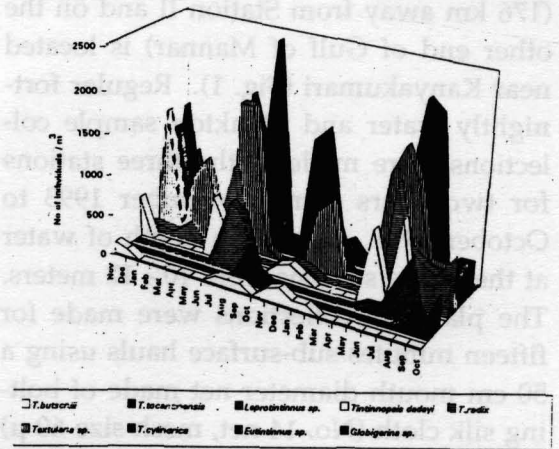


Fig. 5. Protozoan population in station III during the study period of Nov '93 to Oct '95

Discussion

Monsoon played a major role in the distribution and abundance of zooplankton population in tropical waters. Stations I and II are much influenced by the northeast monsoon whereas the station III is more prone to the southwest monsoon.

The primary peak of tintinnid and foraminifera was observed at the middle of summer (station I) and premonsoon (stations II and III) months. They exhibit a direct relation with salinity and temperature. This peak was influenced by *Acanthometra* sp. and *Glogigerina* sp. in station I, *Textulaira* sp., *Globigerina* sp. in station II and *Globigerina* sp. in station III. The secondary peak was observed during monsoon in stations I and III, this peak was mainly influenced by *T.gracills* and *T.cylindrica* respectively. In station II secondary peak was noted in summer with an influence of *T.dadayi*

Tintinnids occurred throughout the year and the maximum numerical abundance was found in April (summer) in stations, I, II and in June-July (premonsoon) at station III. Foraminifera showed an irregular distribution with a peak occurrence in May-July in all the stations. According to Habib Mohamed and Abdul Rahaman (1987) the tintinnids showed maximum population in summer season, whereas foraminifera recorded only in summer season and they were completely absent during monsoon period, showing its inclination towards higher salinity. In the present study, the poor appearance of these species during monsoon season in all the stations, coincided with the above observation and indicated its preference in higher salinity and temperature. Jijung (1985) stated "provinces or zonation" occur in the eastern Arabian Sea and the latitudinal variations can be a major factor in controlling the distribution of planktonic foraminifera apart from the other important factors such as temperature and salinity. Be and Tolderlund (1971) remarked that the latitudinal distribution and abundance of planktonic foraminifera were temperature dependent. Parsons and Kessler (1986) and Mangesh Gauns *et al* (1996) reported the higher population of microzooplankton (protozoan) in coastal waters of eastern Arabian Sea during summer seasons. Naomi *et al.* (1990 a,

1990 b) noted the high foraminiferan population during premonsoon months in the Arabian Sea and Bay of Bengal regions. According to Rao *et al.* (1989) the high standing stock of planktonic foraminifera is related to upwelling (premonsoon) linked nutrient enrichment.

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