

CLADOCERANS OF THE PLANKTON COMMUNITY IN ENNORE ESTUARY, MADRAS

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ABSTRACT

The present communication deals with the cladoceran fauna and hydrographic features of Ennore estuary based on the samples collected from November 1976 to December 1978. Seasonal variation in the distribution of cladocerans has been correlated with parameters like temperature, salinity and dissolved oxygen. A comparative study on the distribution of cladocerans from other estuaries of India with that of Ennore estuary has also been made.

INTRODUCTION

The present investigation was made with the idea of studying the species composition of cladocerans in Ennore estuary, their seasonal distribution and succession in relation to hydrographic features. Studies on the plankton community of Ennore estuary are very few and so far no previous study was undertaken on the cladoceran component. Along the east coast of India, the cladocerans of Portonovo waters (Vellar estuary) were studied by Vijayalakshmi and Venugopalan (1972), Santhanam *et al.*, (1975) and Sundaraj and Krishnamurthy (1975). Further the occurrence of cladocerans from Pulicat lake was reported by Kaliyamurthy (1975). Cladocerans of the Cochin backwaters along the west coast are well known (George, 1958 ; Nair *et al.*, 1972 ; Menon *et al.* 1972 ; Pillai and Pillai, 1975).

MATERIAL AND METHODS

The topography of the Ennore estuary

has been dealt with elsewhere (Raghunathan and Srinivasan, 1983). Zooplankton samples were collected from a fixed station at fortnightly intervals for over a period of two years from November 1976 to December 1978. For plankton collections a half M. nylon net (0.3 mm. mesh size) was towed horizontally for ten minutes from the Regional Station's fibreglass boat 'Matsya'. Plankton samples were fixed in 5% formalin and the volume was determined by the displacement method. Then the plankton was diluted to 250 ml. After stirring well a subsample of 2 ml. was quickly pipetted out and examined in a Sedgewick-rafter cell for enumeration. For identification purposes assorted specimens of cladocerans were sorted out and identified. With the help of camera lucida, diagrams were drawn and ocular and stage micrometers were used for measurements.

Water samples collected were analysed for salinity (Mohr's titration method), dissolved oxygen (Winkler method with

Azide modification) and pH (By using a Philips pH meter). A secchi disc was used for water transparency and other parameters like depth, air-temperature, water temperature, tide and weather conditions were noted.

RESULTS

Two species, namely *Evadne tergestina* Claus and *Penilia avirostris* Dana were recorded during the present study. The length of the specimens selected from various samples at random varied from 0.70 to 1.10 mm. (Mean-

0.87 mm) for *P. avirostris* and from 0.45 to 1.00 mm. (Mean-0.86 mm) for *E. tergestina*.

E. tergestina Claus (Fig. 1A)

Specimens of this species occurred in the samples collected during April, 1977 and April, May, June and July 1978. In April and May 1978 this species was abundant from the plankton samples. As the number of specimens obtained during April 1977 was negligible it is not shown in the figure.

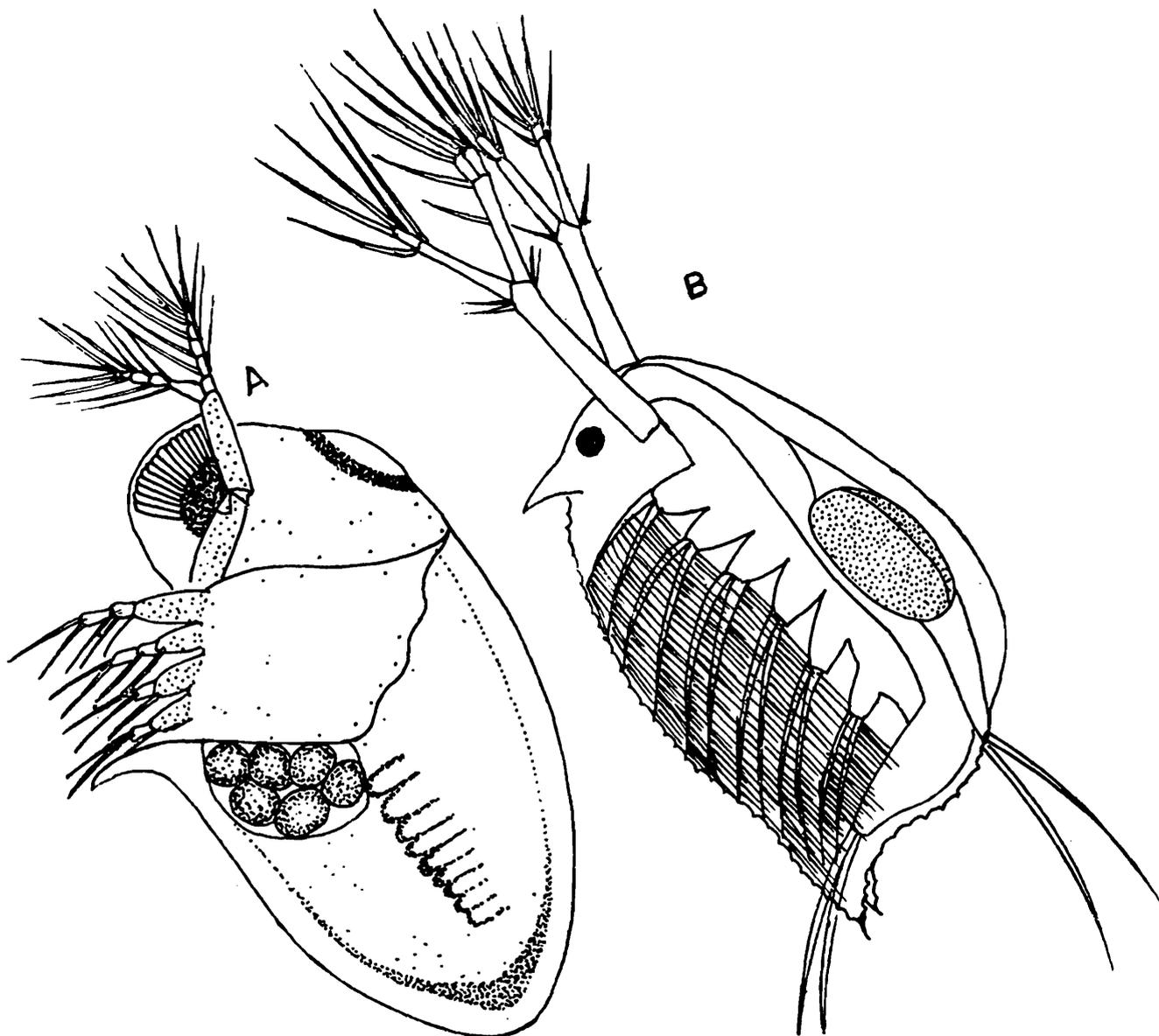


Fig. 1. A. *Evadne tergestina*. B. *Penilia avirostris*.

***P. avirostris* Dana (Fig. 1B)**

This species was recorded from the samples only in April, May and June 1978 with maximum numbers in April. During the rest of the period this species was not found in the samples.

DISCUSSION

Out of the four species of cladocerans recorded from the Indian ocean viz. *Evadne tergestina*, *E. spinifera*, *Podon polyphemoides* and *Penilia avirostris*, the two species found in the present investigation are *E. tergestina* which is generally present in the oceanic and coastal waters, and *P. avirostris* seen mostly in the coastal waters.

One of the important observation made during the present study on the distribution pattern of cladocerans is that the commencement of their swarming is more abrupt than their tapering off. Cladocerans were present only during April, May, June and July 1978, with very few *E. tergestina* during April 1977. The volume of zooplankton collected from Ennore estuary has enormously increased due to the influence of sudden bloom of cladocerans during April, May and June 1978. The cladocerans occupied from 85 to 90% of the plankton volume collected during the above said period. During the same period the salinity was between 22 and 24‰ with temperature ranging from 27 to 29°C. The dissolved oxygen values were between 1.5 to 3.0 mg/l. Maximum transparency value was noted during April 1978 when both these species were seen in large numbers (Fig. 2).

However, in the Gulf of Mannar both these two cladocerans were common during January-April period (Prasad, 1954). In the Madras coast swarms of *Evadne* were observed

during March, April, May and July (Muthu, 1956). From the Madras coastal waters Rajagopal (1962) has recorded *Evadne* during March, April and May and *Penilia* during October. From Portonovo waters, Krishnamurthy (1967) has reported these two cladocerans during November-May. Sundarraj and Krishnamurthy (1975) observed near Portonovo, that *Penilia* was abundant during October and in the backwater both *Penilia* and *Evadne* were found during March and April. Also it has been reported that during the abundance of *Evadne* there was no record of *Penilia*. Santhanam *et al.* (1975) have observed *P. avirostris* in the neritic waters off Portonovo during February, March, May, June, August, September and October with abundance during March. However *Evadne* sp. was recorded during February, March, August, September and October with an abundance during March and August. In the backwaters *P. avirostris* was recorded during September and October with an abundance in October. Kaliyamurthy (1975) has stated that *Evadne* and *Penilia* were encountered sporadically with swarms during March and April in the Pulicat lake. These reports indicate the occurrence of cladocerans in the neritic waters of east coast of India during February, March, May, June, August, September and October with abundance during March and October. The entry of cladocerans from the neighbouring coastal waters to estuaries may either be probably due to their abundance in the inshore waters or due to their active breeding habits. Hence it is probable that cladocerans occur during most seasons of the year in the neritic waters and increase in numbers during March-April period. During this period if the conditions are favourable they are seen in

large numbers in the estuaries. Similarly from west coast Mukundan (1967) has recorded cladocerans in the Calicut coast in almost all the samples except during the peak of the south-west monsoon. Also Dellacroce and Venugopal (1972) have observed *E. tergestina* from the coastal waters of Arabian sea throughout the year.

E. tergestina and *P. avirostris* exhibit a distribution pattern that depends on the hydrographical conditions. Earlier records on the occurrence of cladocerans in relation to salinity show that they are recorded in a wide range of salinity (George, 1958 : 2 to 11‰ ; Rajagopal, 1962 : 33.11 to 34.45‰ ; Menon *et al.* 1972 : 0.6 to 32.8‰). Present

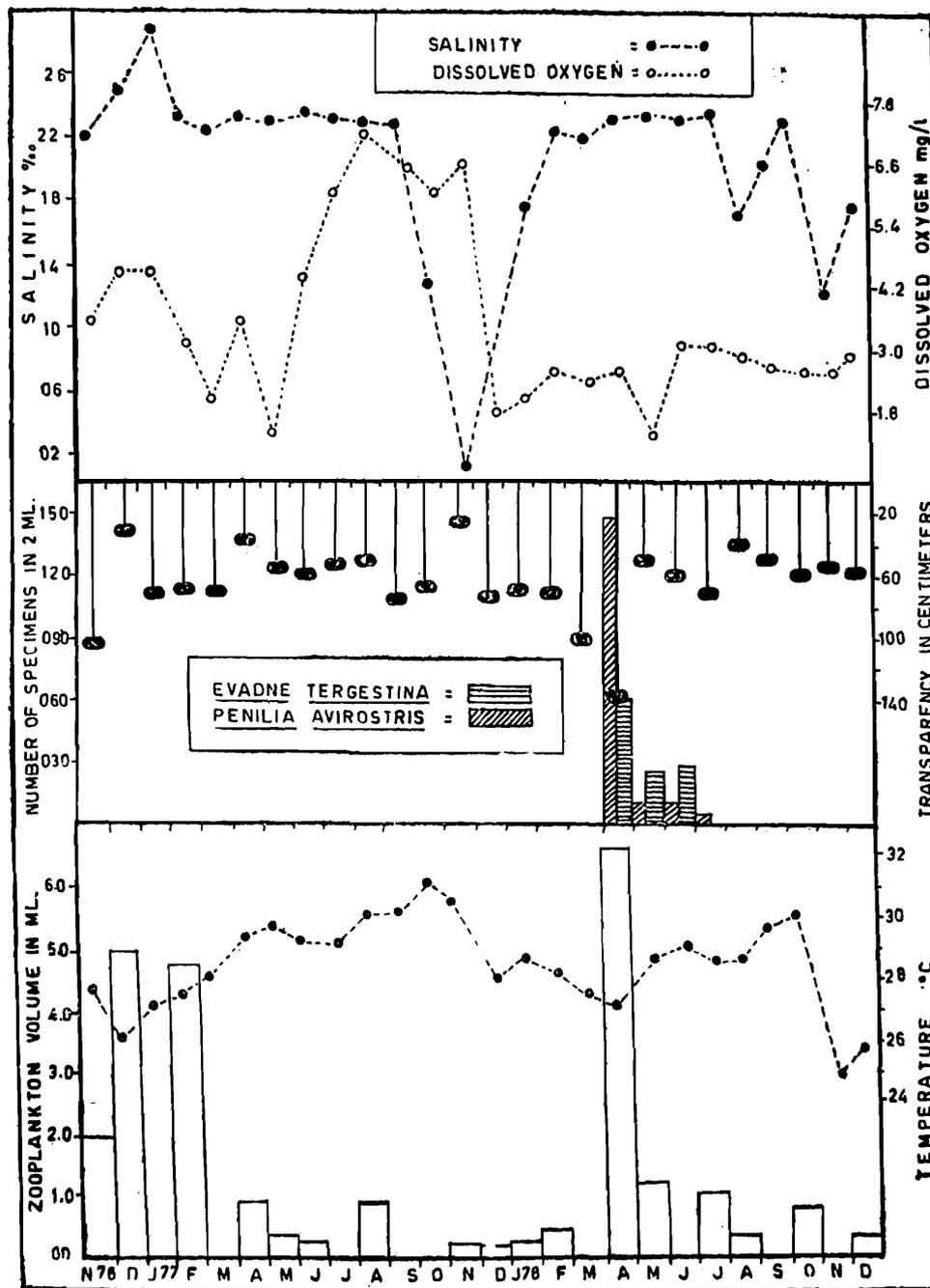


Fig. 2. Fluctuation of zooplankton, *P. avirostris*, *E. tergestina*, salinity, temperature, transparency, and dissolved oxygen during November 1976 to December 1978.

study on the temperature, salinity relationship of the two species of cladocera, shows that they are abundant during the period when salinity and temperature are relatively moderate (salinity 22 to 24‰; temperature 27 to 29°C). The maximum transparency value was recorded during April 1978 when both *Evadne* and *Penilia* were in their maximum (Fig. 2). Low turbidity accompanied with moderate temperature and salinity values are probably favourable for these two cladocerans. According to Dutta *et al.* (1954) for freshwater cladocerans temperature between 21-22°C accompanied with low turbidity in presumably most favourable for occurrence. According to Pillai and Pillai (1975) *P. avirostris* is more restricted in distribution, while *E. tergestina* occurs in a wide range of salinity and both the species showed an abundance during the period when the salinity and temperature values were relatively low (temperature 27.5 to 28.0°C; salinity 10 to 20‰). Also it is interesting to note during the present investigation that cladoceran swarms were noted only during April-May 1978 and not during April-May 1977. During these months in 1977, the volume of plankton itself was very low (Fig. 2) and the main components were decapod larvae, copepodites and few fish eggs. Here again, turbidity might have played a role since salinity and temperature values were almost similar during these months in 1977 and 1978. (Transparency values: April-May 1977—20 to 60 cm. April-May 1978—140 to 60 cm.).

It has been observed by Sundarraj and Krishnamurthy (1975) that during the abundance of *Evadne* there was no record of *Penilia* at Portonovo waters. According to

Mukundan (1967) *Evadne* swarms appear a few weeks before *Penilia* swarms. Contrary to this, in the present investigation, both *Penilia* and *Evadne* were abundant during April 1978.

Considering the reasons for cladocerans blooms, the most important one is the presence of phytoplankton. Rajagopal (1962) recorded that maxima of cladocera followed the diatom abundance. According to Vijayalakshmi and Venugopalan (1972) maximum number of *Penilia* was recorded in the Portonovo waters during April, which coincided with the month of diatom abundance. Subrahmanyam (1959) has stated that the peak in the zooplankton abundance occurs immediately after phytoplankton blooms. Also it has been observed that on certain occasions when the phytoplankton is mainly composed of setoid forms like *Chaetoceros* sp., *Bacteriastrum* sp. and *Rhizosolenia* sp. a fall in the biomass of smaller zooplankton like copepods, cladocerans and tintinnids occurs. However during the present investigation in Ennore estuary no correlation could be noted between phytoplankton and cladocerans.

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