

## TOTAL BIOMASS AND FAUNISTIC COMPOSITION OF THE ZOOPLANKTON IN THE COCHIN BACKWATER

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### ABSTRACT

The results obtained on the biomass and composition of zooplankton from fortnightly collections at two fixed stations, one at Fairway buoy and another at Aroor during the period January to December 1968 are presented in this paper. The results deal with the zooplankton biomass and the quantitative abundance of major zooplankton taxa of the area investigated.

The results show that zooplankton at Aroor is richer in biomass and diversity than that at Fairway buoy. A major peak of zooplankton was observed at Fairway buoy during August-September, while Aroor recorded the highest value during December-January. Three groups viz. copepods, decapod larvae and cladocerans controlled the total zooplankton composition. It was found that no single group continued to dominate the community though copepods were the major component of the community for most part of the year. Cladoceran abundance was noted at Fairway buoy during the low salinity period.

### INTRODUCTION

THE Cochin Backwater is an open estuary. The pioneering studies of plankton conducted by George (1958) in this area have been augmented in recent years by a few other more restricted investigations.

The present investigation of zooplankton of Cochin Backwater was started with a view to study the total zooplankton biomass and distribution of major faunistic groups, and the relationship of the backwater zooplankton with the plankton of the inshore waters.

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### MATERIAL AND METHODS

Zooplankton collections were started by the middle of January 1968 and concluded by the end of December 1968. Two fixed stations were worked out, one situated at the Fairway buoy about 6.5 km away, outside the bar-mouth and another at Aroor nearly 14 km away, within the estuary. Collections were taken every fortnight in the morning. HT net a modified version of WP2 net was used for the collections (IOBC Handbook No. 3 in Press). All collections came from surface hauls of 5 minutes duration filtering on an average 80m<sup>3</sup> of water. The samples were preserved in 5% buffered formalin prepared in Sea water. Temperature and

salinity of the surface water at each station during the time of collection were also recorded (Table 1).

In the laboratory the samples were subsampled into four aliquots, of which one was used for estimating the wet weight with a Mettler electric balance. One of the aliquots was made up to 300 ml and 15 ml of this sample was pipetted out and examined under a stereoscopic microscope to record the various taxa present.

#### HYDROGRAPHY

##### *Temperature :*

By the onset of the monsoon there was a decrease in surface temperature and a certain amount of uniformity was maintained in temperature till the end of the monsoon. An increase in temperature towards the beginning of post-monsoon was well indicated. Temperature was found to be high throughout the latter half of the post-monsoon and pre-monsoon. Temperature at Fairway buoy fluctuated between 25.4°C and 32.6°C and at Aroor 26.2°C and 32.8°C.

##### *Salinity :*

As will be seen from table 1 the surface salinity at Fairway buoy was high during the first half of the year and the downward trend was found during the monsoon period. An early fluctuation from high to low values concurrent with the monsoon and non-monsoon periods has been noticed by previous workers (George, 1958 ; Ramamirtham and Jayaraman, 1963 ; Menon & Nair, 1967).

The Aroor station situated within the estuary showed considerable variations in salinity, the values during the monsoon months being very low. The months of July, August, September and October showed typically oligohaline conditions. Values similar to those at Fairway buoy were obtained only during April and May which evidently indicate the influence of sea-water at this locality during this period.

#### ZOOPLANKTON

##### *Biomass :*

The total zooplankton biomass recorded as wet weight for the two stations are also given in table 1. The results show that Aroor is rich in zooplankton biomass. At the Fairway buoy we can discern the major zooplankton peak during August and September. The high value obtained during September (6123 mg/m<sup>3</sup>) was owing to a cladoceran swarm. Aroor recorded the major peaks during January and December, and the major component was Copepoda. However, a distinct depletion in zooplankton fauna was observed during the monsoon period. During the first half of the year, when the salinity was comparatively high for this locality the plankton was abundant.

##### *Faunistic composition :*

*Hydromedusae :* Appeared at Fairway buoy inconsistently. The highest number recorded at this station was 33/m<sup>3</sup> during February. Aroor collections contained representatives of this group only during the first half of the year, the highest number being 214/m<sup>3</sup> during January. Species of the genera *Blackfordia* and *Eirene* were dominant at these stations.

*Polychaete larvae* : This group did not show any particular pattern in occurrence. Polychaete larvae appeared at Aroor only during high salinity period. The highest number (361/m<sup>3</sup>) was recorded in May.

TABLE 1. Surface hydrographical data and plankton biomass (mg/m<sup>3</sup>) at Fairway Buoy and Aroor

Fairway Buoy				Aroor			
Date	Temp. C°	Salinity ‰	Biomass (mg/m <sup>3</sup> )	Date	Temp. C°	Salinity ‰	Biomass (mg/m <sup>3</sup> )
18-1-'68	29.0	31.6	10	18-1-'68	30.5	27.2	1363
1-2-'68	29.8	31.5	79	1-2-'68	31.0	28.9	260
15-2-'68	28.8	32.3	—	15-2-'68	31.4	29.0	—
29-2-'68	30.8	32.1	69	29-2-'68	32.6	29.0	88
14-3-'68	30.6	31.5	19	14-3-'68	31.4	29.0	481
28-3-'68	30.2	32.0	93	28-3-'68	31.6	29.8	130
11-4-'68	30.8	31.0	—	25-4-'68	31.8	32.8	186
25-4-'68	31.8	32.0	248	9-5-'68	31.9	32.4	803
9-5-'68	29.8	33.0	40	23-5-'68	32.2	30.0	260
23-5-'68	29.9	32.8	59	6-6-'68	31.2	27.2	170
6-6-'68	29.2	21.5	49	20-6-'68	29.5	22.9	5
11-7-'68	25.4	18.0	87	4-7-'68	27.8	0.6	39
9-8-'68	29.0	16.8	1266	18-7-'68	26.2	0.8	10
12-9-'68	25.7	13.4	445	1-8-'68	28.4	0.6	25
26-9-'68	28.4	11.6	6123	14-8-'68	29.8	0.4	2
11-10-'68	30.4	19.9	46	2-9-'68	31.0	5.0	723
24-10-'68	32.6	29.5	7	12-9-'68	28.6	1.0	60
8-11-'68	31.8	29.8	238	26-9-'68	30.3	4.6	2
5-12-'68	29.8	31.0	30	11-10-'68	32.6	3.0	7
19-12-'68	29.4	30.0	32	24-10-'68	32.8	2.8	—
				9-11-'68	31.8	3.0	108
				5-12-'68	31.8	29.2	74
				19-12-'68	30.4	28.2	3324

*Cirripede larvae* : Occurred at Fairway buoy in fair numbers almost every month. On the other hand at Aroor the larvae were absent during the monsoon period. Larvae of *Blanus amphitrite* always dominated in number.

*Copepoda* : This group formed the major component of the plankton community, mainly represented by the members of the genera *Paracalanus*, *Acartia*, *Pseudodiaptomus*, *Labidocera* and *Oithona*. Peak abundance of copepods occurred at Fairway buoy during April, July, August and September. The highest number was 4695/m<sup>3</sup> during April. The peak abundance of this group occurred at Aroor during December, January, February and March. A quantitative comparison of this group at the two stations (Fig. 1) showed inverse relationship.

*Cladocera* : Cladocerans appeared in very high numbers during August and September at Fairway buoy. But for this swarm (20,924/m<sup>3</sup>), their number was not high at both stations throughout the year (Fig. 3). Always members of genera *Evadne* and *Penilia* were the dominant representatives. About 90% of the cladocerans collected from Fairway buoy during August and September was *Evadne tergestina*.

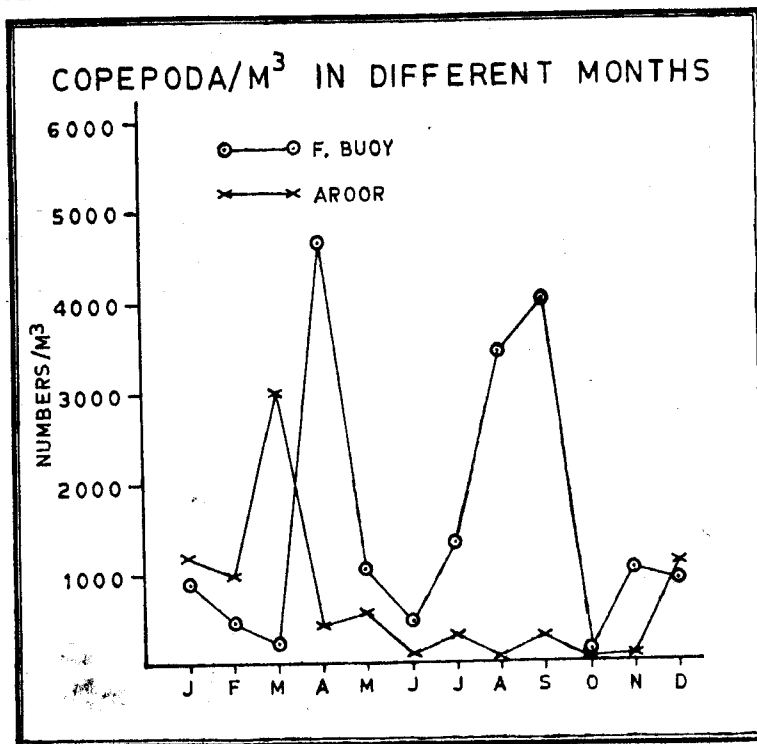


FIG. 1. Abundance of copepods during the different months.

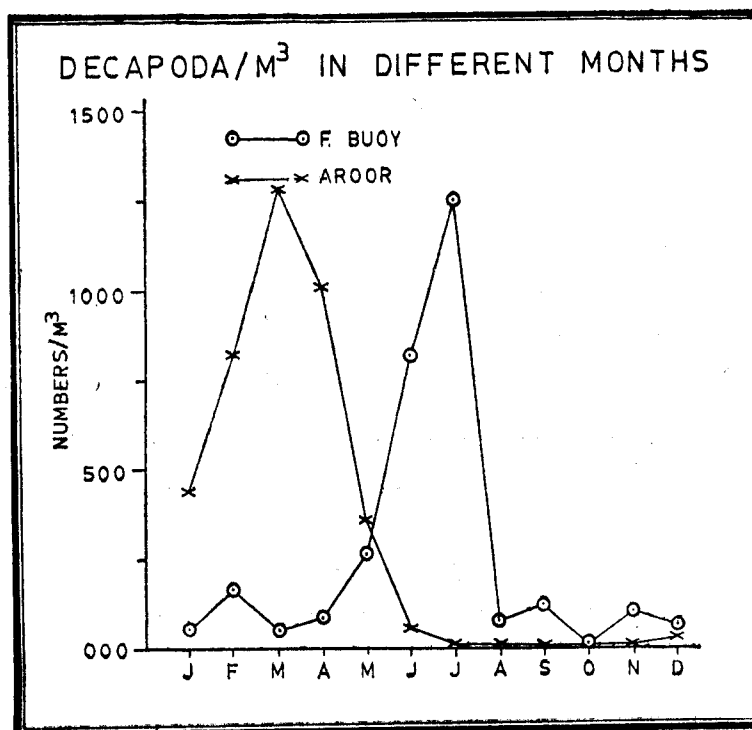


FIG. 2. Abundance of decapod larvae during the different months.

*Decapod larvae* : Occurred at both the stations throughout the year. This group is similar to copepods in their numerical abundance (Fig. 2). The highest number was recorded at Fairway buoy during June and July when their number was comparatively negligible at Aroor. Maximum number occurred at Aroor during February, March and April.

*Chaetognatha* : This group showed a distinct preference to the inshore waters. Aroor recorded comparatively fewer individuals of this group. *Sagitta bedoti* was the most common species. The maximum number of this group at Fairway buoy was recorded during August and September and the highest number during September was 232/m<sup>3</sup>.

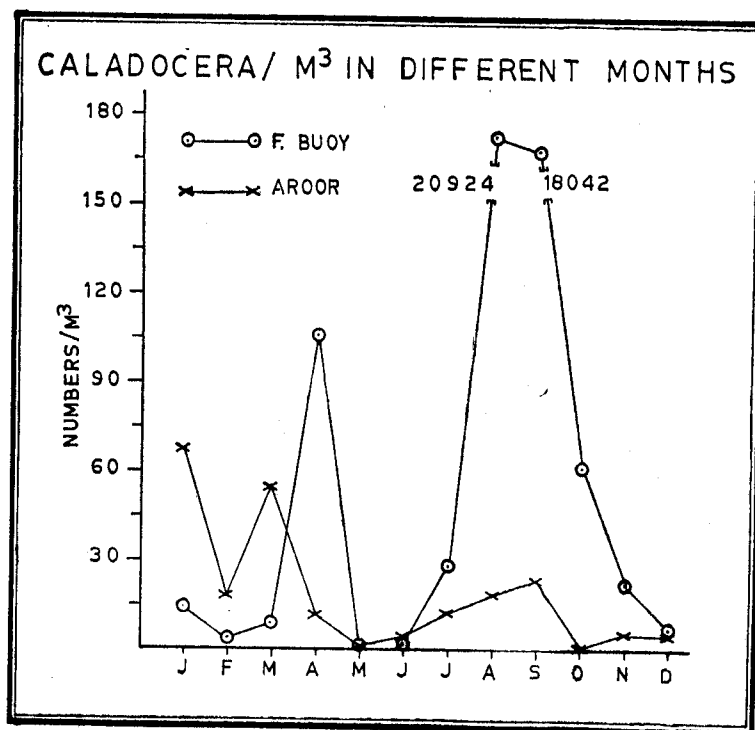


FIG. 3. Abundance of cladocerans during the different months.

*Fish eggs and larvae* : Fish eggs and larvae were present in fair numbers at Fairway buoy during the latter half of the year. The highest number at Aroor was during December.

*Other groups* : Sergestids, bivalve larvae, gastropod larva, ascidians and gammarid amphipods were inconsistently represented in the plankton samples at both the stations.

#### DISCUSSION

We have in our studies taken into consideration only two important parameters namely, temperature and salinity. It is clear that the amplitude of salinity variations

is extremely impressive and this factor plays an important role in the ecology of the Cochin Backwater. An assessment of the species composition of different taxa during the year round in this locality is sure to reveal an interesting ecological picture. The present study at the major taxa level give us a clue as to where one should search for the facts to build up data which are likely to unravel the role of environmental factors on the life of these organisms.

On account of the constant connection with the sea, there is a regular ingress and egress of marine plankton in the estuary (George, 1958). George (1958) found similarity between the plankton of the canals with that of the inshore waters.

A study of the percentage frequency of the planktonic organisms shows that three groups, Copepoda, decapod larvae and Cladocera control the total composition. At Fairway Buoy copepods dominated the fauna during three-fourth of the year. A depletion in the copepoda at this station coincided with an abundance of cladocerans, their occurrence reaching extremely high values. The observation is in conformity with the findings of Menon (1945) who recorded maximum number of *Evadne tergestina*, the most common species during July to October in the coastal waters of Trivandrum. George (1953) also found a similar situation in the coastal waters of Calicut. Presence of cladocerans at Aroor during high salinity periods is in contradiction to the findings of George (1958). Members of the genera *Acartia*, *Oithona* and *Paracalanus* were present throughout the year at the two stations. Copepods as a whole and the species number in general were less during the monsoon months. *Oithona rigids* and *Paracalanus parvus* were present almost throughout the year at the two stations. Species such as *Labidocera pectinata*, *Temora turbinata* and *Centropages furcatus* were present only during high saline periods and totally absent during the monsoon period.

Hydromedusae, polychaete larvae, cirripede larvae, decapod larvae sergestids and gastropod larvae showed distinct maxima and minima at Aroor, although this was not quite clear cut at Fairway buoy.

The present study showed that no single group dominated the community throughout the year, though copepods were the major component in the community during the pre-monsoon and post-monsoon periods. The swarming of cladocerans at Fairway Buoy coincided with the low saline period.

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