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SEASONAL DISTRIBUTION OF CYCLOPOID COPEPODS OF THE MUD BANKS OFF ALLEPPEY, KERALA COAST

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ABSTRACT

To understand the seasonal distribution and abundance of marine cyclopoid copepods of the mud bank at Purakkad - Thottappally region, Alleppey, regular plankton samples were collected from four fixed stations commencing from June, 1971 to June, 1972. Apart from this, 9 samples collected by *R. V.* VARUNA in the mud bank region was also studied for spatial distribution. A total of 32 species of cyclopoid copepods belonging to 5 genera and 4 families were encountered in the samples. Two peaks were observed for adults as well as copepodites during the period of investigation and this coincides with the rise in temperature and salinity.

INTRODUCTION

CYCLOPOID copepods form an important link in the marine food chain. It is well known that the planktonic cyclopoid copepods form the food of both the larval and some of the commercially important fishes such as sardines and mackerals. Since planktonic cyclopoid copepods form an important element in the marine plankton at the mud banks, a study was undertaken to examine their seasonal fluctuation and abundance in relation to environmental parameters.

Our present knowledge of the systematics of planktonic cyclopoid copepods in Indian Seas is largely due to the work of Sewell (1948). Other studies from inshore waters are those of Kiefer (1928, 1935, 1936), Menon (1945), from Trivandrum coast, Krishnaswamy (1951, 1953) from Madras coast, Ganapathi and Rao (1954) from Visakhapatnam coast, Kasturirangan (1963) from coastal waters of India, Pillai (1968 a, 1968 b) from Bombay waters, Thompson (1971, 1973) from Southwest coast of India and the Laccadive Sea. All the works referred to above are of a qualitative nature. Pillai (1968 b) apart from giving a list of cyclopoid copepods from the fishing grounds off Bombay, studied the seasonal occurrence and abundance of a few species. Thompson and Easterson (1977) studied the dynamics of cyclopoid copepod population of the Cochin backwaters. Goswami (1977) studied the production of some species of cyclopoid copepods along central Westcoast of India. Nair *et al* (1984) studied the standing crop of phytoplankton and Mathew *et al* (1977, 1984) studied the diurnal variation and seasonal distribution of zooplankton of the mud banks off Alleppey.

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MATERIAL AND METHODS

The material for the present study was based on regular plankton collections made in the mudbank at Purakkad - Thottapally region, Alleppey Coast from four fixed stations by using $\frac{1}{2}$ m mouth dia nylon net (No. 21 mesh size 0.069 mm). Horizontal hauls were made

from a canoe during the period June, 1971 to June, 1972. Observations were made at the surface and bottom for temperature, salinity and dissolved oxygen. Observation on temperature was made using a bucket thermometer for surface waters and reversing thermometer for bottom. Sea water samples for chemical analysis were collected by Nansen bottle. Salinity was determined by the titration method and dissolved oxygen by Winkler's method.

culated and the monthly average for the same period plotted.

Results

Hydrography

Ecological parameters of the mudbanks at Alleppey were studied by Rao *et al.* (1984) from the same stations for the same period. The temperature varied between 26°C to 29°C. The salinity was high during premud bank and

Table 1. *Details regarding stations from which plankton samples were collected by* R. V. Varuna *Cruise No.* 144 *on* 21-7-1971

Station No.	Time (hrs.)	Position Lat. (N)	Long. (E)	Depth of haul (m)	Depth at station (m)
1	0800–1005	09°24'	76°21'	2→0	5
2	1020–1040	09°24'	76°19'	5→0	9
3	1050–1110	09°24'	76°18'	5→0	9
4	1120–1155	09°24'	76°17'	5→0	9
5	1205–1225	09°24'	76°16'	5→0	9
6	1300–1330	09°24'	76°13'	10→0	18
7	1340–1410	09°24'	76°12'	10→0	18
8	1420–1450	09°24'	76°11'	10→0	18
9	1500–1530	09°24'	76°10'	10→0	18

Qualitative examination of cyclopoid copepods (adults and copepodites) were based on collections using nylon net which was made upto 250 ml by adding 5% formalin and thoroughly mixing, 10 ml of the sample was taken with a wide mouthed glass pipette. From the count obtained from 10 ml sample the estimate for total sample was calculated. Mean values for the four stations were cal-

postmudbank seasons. During 1972 mudbank season, the average salinity values reached as low as 28.5‰. The dissolved oxygen rose to around 4 ml/l during the premudbank season and was the same during the mudbank season in 1971. However, during the 1972 mudbank season, the dissolved oxygen values were reduced to about 3.2 ml/l.

Cyclopoid Copepods of the Mudbanks off Alleppey

A total of 19 species were encountered in these samples representing 5 genera and 4 amilies. List of species recorded from the mudbanks is given below.

Family: Oncaeidae

Oncaea venusta Philippi, 1843

O. media Giesbrechet, 1891

O. mediterranea Claus, 1863

O. conifera Giesbrecht, 1891

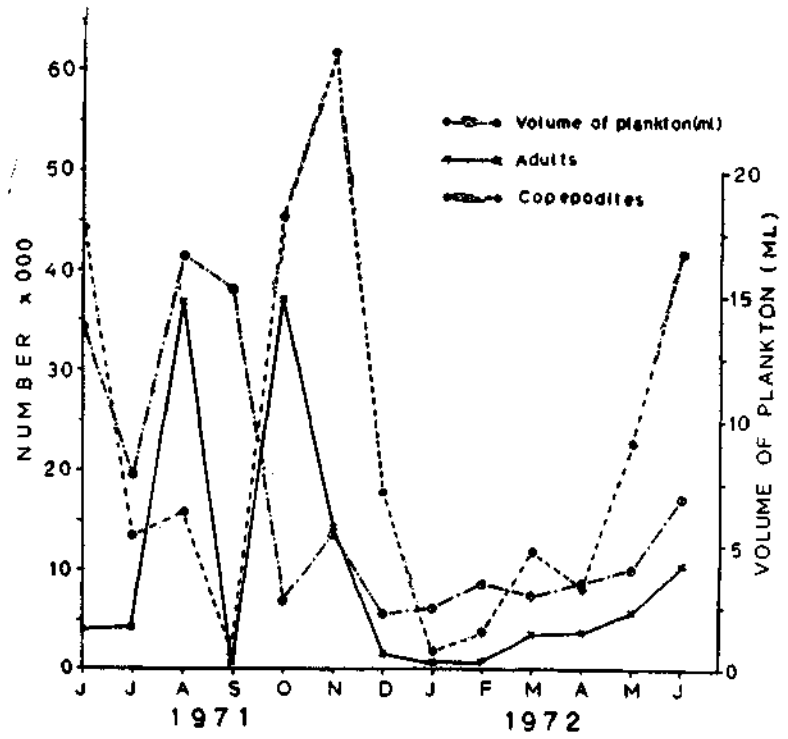

Fig. 1. Volume of plankton and Cyclopoid copepods (adults and copepodites).

Family: Oithonidae

Oithona hebes Giesbrecht, 1891

O. nana Giesbrecht, 1892

O. oculata Farran, 1913

O. brevicornis Giesbrecht, 1891

O. rigida Giesbrecht, 1896

O. simplex Farran, 1913

O. similis Claus, 1863

Family: Corycaeidae

Corycaeus (*Corycaeus*) *crassiusculus* Dana, 1848

C. (*Ditrichocorycaeus*) *asiaticus* F. Dahl, 1894

C. (*D*) *andrewsi* Farran, 1911

C. (*D*) *dubius* Farran, 1911

C (*D.*) *dahli Tanaka,* 1957

FAMILY: SAPPHIRINIDAE

Sapphirina nigromaculata Claus, 1863

S. ovatolanceolata Dana, 1849

Copilia mirabilis Dana, 1849

In addition to these, the following 13 species were also recorded from the samples collected during the Cruise No 144 of *R. V. VARUNA* in July, 1971 from this mudbank region.

C. (*Ditrichocorycaeus*) *affinis* Mc Murruch 1916

C. (*Agetus*) *typicus* kroyer, 1849

Sapphirina opalina Dana, 1849

S. scarlata Giesbrecht, 1891

S. stellata Giecbrecht, 1891

S. metallina Dana, 1849

S. intestinata Giesbrecht, 1891

Copilia quadrata Dana, 1849.

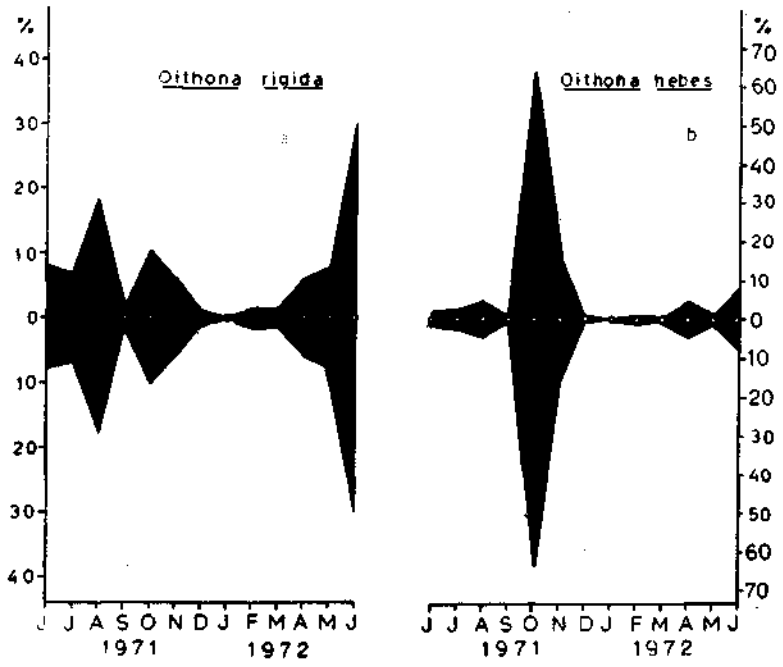

Fig. 2. Relative percentage of : a. *Oithona rigida* and b. *O. hebes*.

Oithona plumifera Baird, 1843

Oncaea venusta var *venella* Farran, 1936

O. cleve[i] Fruchtl, 1923

Corycaeus (*Onychocorycaeus*) *ovalis* Claus, 1863

C. (*O*) *agilis* Dana, 1848

C. (*O*) *giesbrecht* F. Dahl, 1894

SEASONAL DISTRIBUTION AND FLUCTUATION

Studies on the seasonal fluctuations of adults and copepodites were carried out and it was found that they exhibit considerable fluctuation in their occurrence and abundance (Fig. 1). Two peaks were observed in August and October in the case of adults and during

June and November in the case of copepodites. Abundance of copepodites in November follows the adult peak which was observed in October. The observed peaks coincides with the rise in temperature and salinity.

The specieswise analysis dealt with below comprises those species that are numerically abundant.

O. nana Giesbrecht (Fig. 3 a)

Occurred throughout the year except during September. Two peaks - one during August and another during October were observed. The maximum abundance was during October.

O. oculata Farran (Fig. 3 b)

Present throughout the year except in December. Two peaks were observed, one primary during August and another during December.

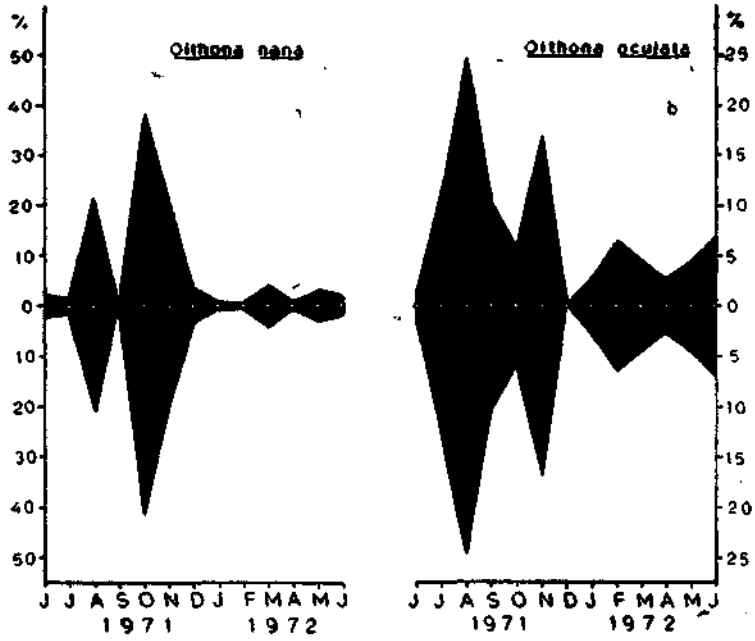

Fig. 3. Relative percentage of : a. *Oithona nana* and b. *O. oculata*.

Oithona rigida Giesbrecht (Fig. 2 a)

Found throughout the year except during January with a peak during August.

Oithona hebes Giesbrecht (Fig. 2 b)

Present throughout the year except during January. The maximum abundance was during October.

O. brevicornis Giesbrecht (Fig. 4 a)

Occurs throughout the year with a peak during August.

O. simplex Farran (Fig. 4 b)

Present during August, November, to

February, May and June in small numbers compared to other species of the genus *Oithona*. Two peaks were observed one during November and another during January.

Other species occurred only sporadically and details about their seasonal cycle and relative abundance are given in Table 2.

Quantitative counts were also made to study the spatial distribution of cyclopoid copepods based on samples collected from 9 stations by *R. V. VARUNA* in the Mudbank region. The results are plotted in relation to temperature, salinity, and oxygen data (Fig. 5). The number of copepodites and adults were numerically abundant in the samples collected nearer to the coast.

Discussion

A general survey of the collections showed that species belonging to the genus *Oithona* were numerically more abundant throughout the year. Some species show periodicity in their appearance in the plankton. For instance *Oithona simplex* and *Oncaea meiad* were observed only during certain months of the year (Table 2). *Corycaeus* (*Ditricho-corycaeus*) *dubius*, *C.* (*D.*) *dahli* occurred only once during August in the entire period of observation. The maximum number of species occurred in August. Abundance of copepod nauplii and the presence of egg bearing females especially those belonging to the genus *Oithona* and the occurrence of young forms of *Corycaeus* suggest that cyclopoid copepods are breeding in the mudbanks. The important causative factor

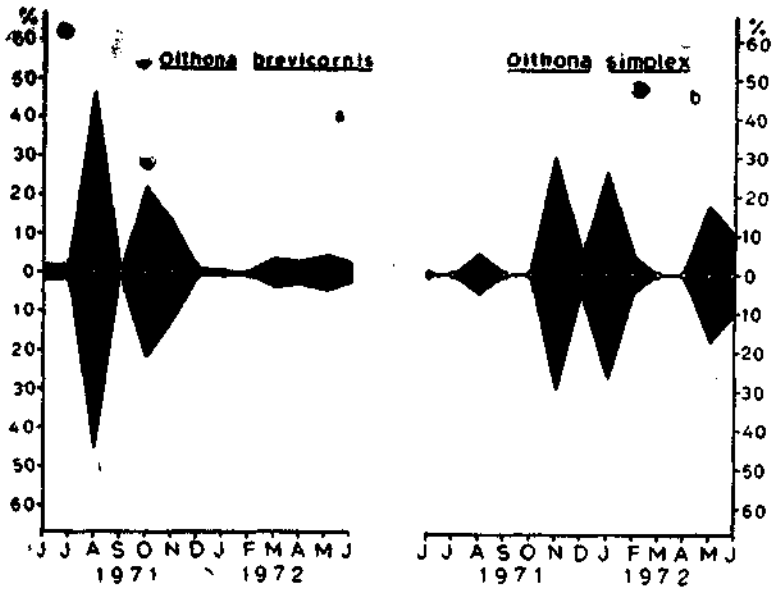

Fig. 4. Relative percentage of: a. *Oithona brevicornis* and b. *O. simplex*.

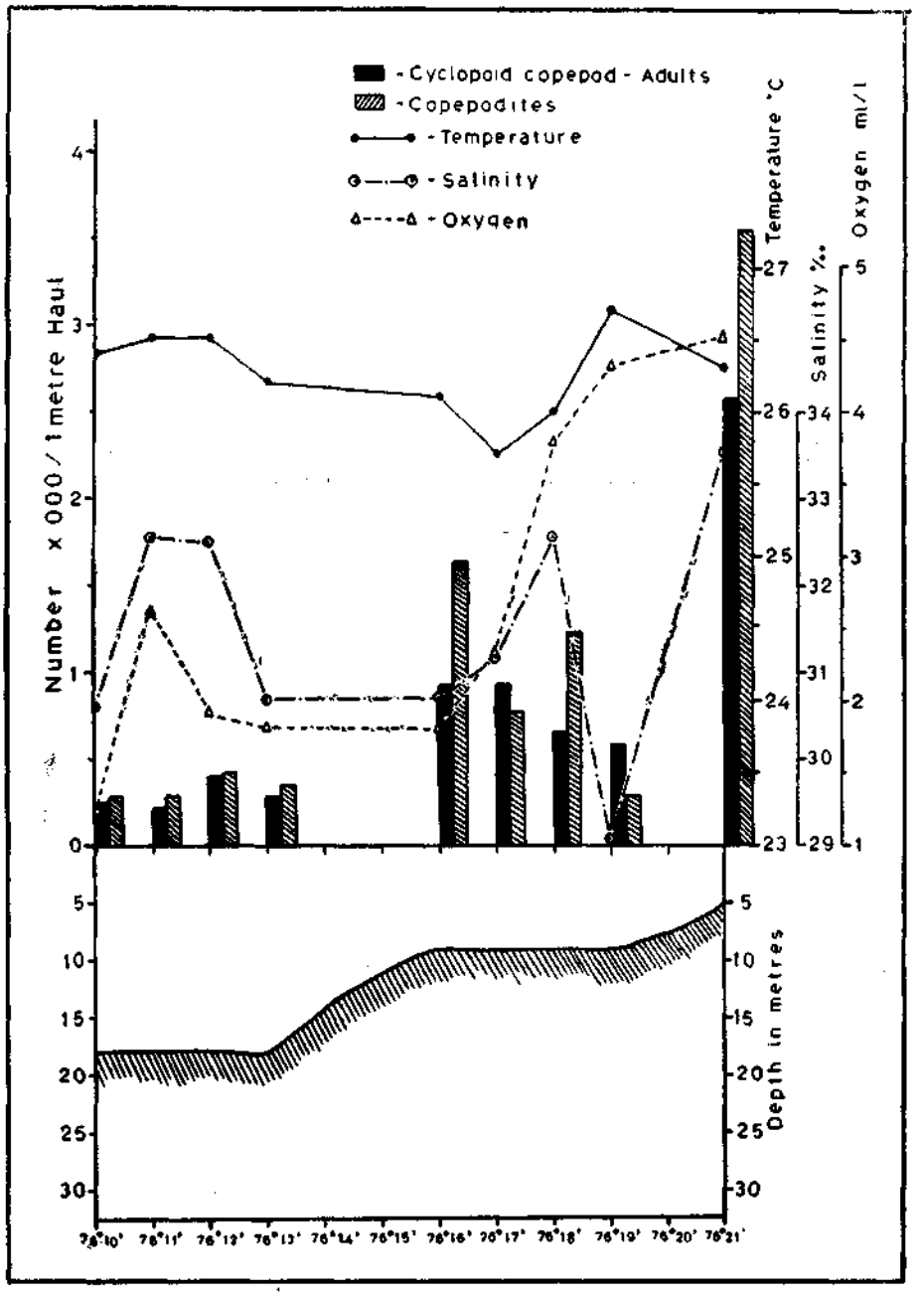

Fig. 5. Spatial distribution of cyclopoid copepods (adults and copepodites) in relation to temperature salinity and oxygen.

appears to be the abundance of phytoplankton which forms the basic food of the herbivorous cyclopoid copepods particularly those belonging to the genus *Oithona*.

TABLE 2. *Seasonal abundance and occurrence numerically less abundant species*

Species	1971							1972					
	J	Ju	A	S	O	N	D	J	F	M	A	M	J
O. simplex	–	–	438	125	–	–	–	50	–	–	–	–	–
oncaea media	–	–	663	50	–	–	–	100	–	–	–	–	–
O. mediterranea	–	–	867	–	–	–	–	–	–	–	–	–	–
O. conifera	–	–	100	–	–	–	–	–	–	–	–	–	–
Corycaeus (Ditrichocorycaeus) andrewsi	–	–	250	–	–	–	–	–	–	–	–	67	–
C. (D) dubius	–	–	100	–	–	–	–	–	–	–	–	–	–
C. (D) dahli	–	–	100	–	–	–	–	–	–	–	–	–	–
C. sp young	–	–	883	–	–	200	438	125	–	–	100	50	–

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