NOTES

ON THE OCCURRENCE OF SIPHONOPHORES IN THE COCHIN BACKWATER

ABSTRACT

No information is available on siphonophores of the estuaries in India. The present investigation was taken up to study their occurrence and seasonal fluctuation in the Cochin Backwater, a tropical estuary. Data on salinity, temperature, zooplankton biomass and siphonophores were collected by analysing the samples obtained from 10 stations in the Cochin Backwater area between Alleppey light house (south of Cochin) and Marthomanagar (north of Cochin) during 1971 and 1972. Data reveal that siphonophores are present in the estuary, in the pre-monsoon and the post-monsoon periods except during January. Analysis of data on rainfall, temperature and salinity shows that salinity has a more important role to play on the occurrence and seasonal fluctuations of the siphonophores.

WHILE considerable amount of work has been carried out on the plankton in general, of the Indian estuaries (George, 1958 ; Dutta *et al.*, 1954 ; Nair and Tranter, 1971 ; Menon *et al.*, 1971) and on specific groups such as Hydromedusae (Vannucci *et al.*, 1970 ; Santhakumari and Vannucci, 1971), Copepoda (Wellershaus, 1969, 1970; Pillai, 1971), and Chaetognatha (Srinivasan, 1971; Nair, 1971), no information is available on siphonophores of Indian estuaries. Hence, the present investigation on Siphonophora of the Cochin Backwater was taken up to study in detail their occurrence and seasonal fluctuations in relation to hydrological conditions.

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Material and Methods :

The present investigation is based on 206 zooplankton samples of which 143 are from the Vembanad Lake and 63 from the Ernakulam channel and the Cochin Bar mouth. The estuary is influenced both by the sea and the influx of fresh water by rivers. The samples were collected from 10 fixed stations (Fig. 1) during 1971 and 1972. The samples from the Vembanad Lake were collected once a month during 1971 and 1972 while those from the Ernakulam channel and the Bar mouth were collected every week during 1971 at dawn by towing horizontally for 10 minutes at surface a half metre diameter ring net with mesh size 0.33 mm. The samples were preserved in 5% formalin buffered with 1% Hexamine and were analysed in the laboratory for qualitative and quantitative studies.

At the stations in the Lake, siphonophores are numerically less abundant and irregular or totally absent. Hence, detailed studies on seasonal fluctuation and other aspects are based on the collections made from the stations in the Ernakulam channel and the Cochin Bar mouth.

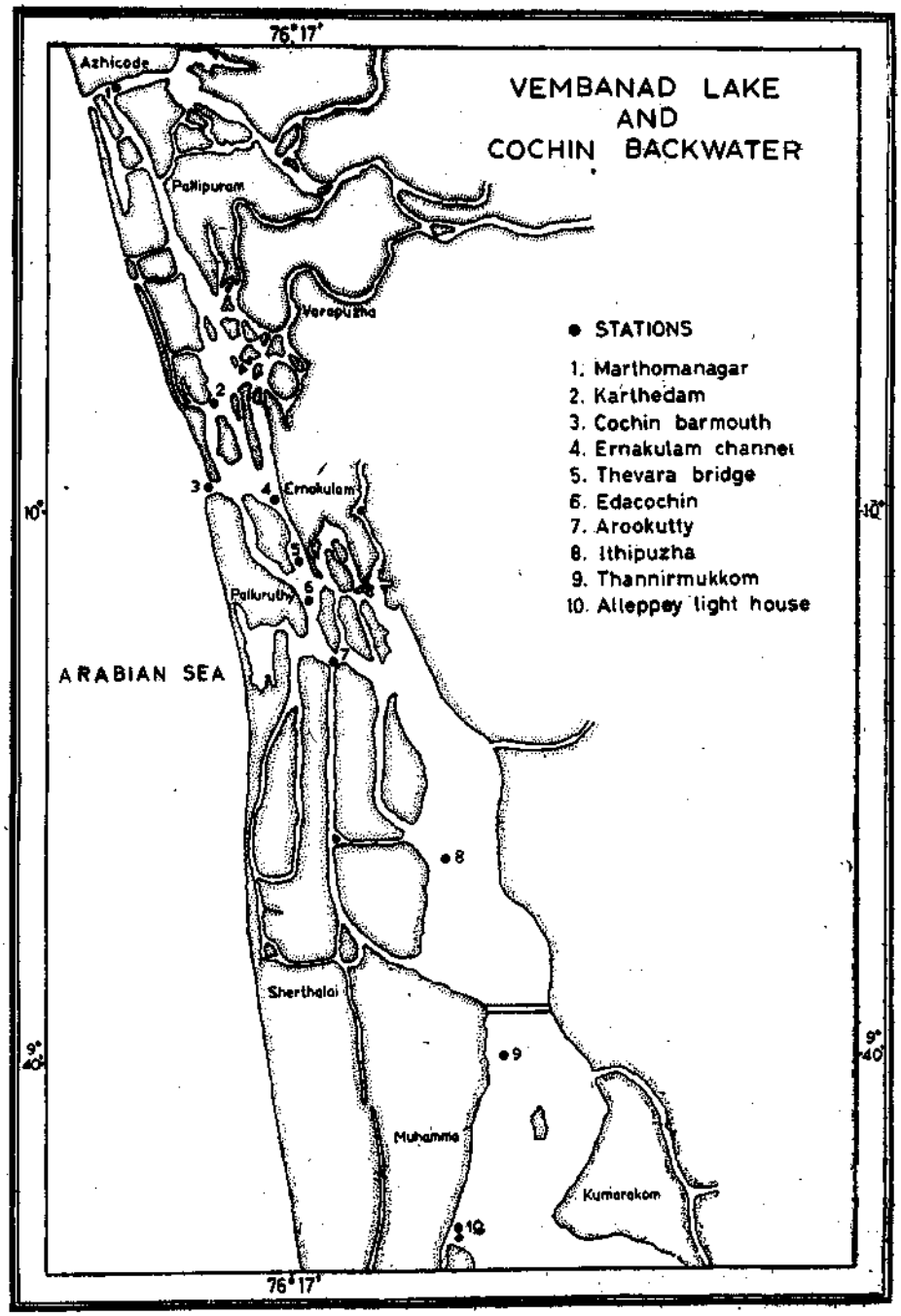

Fig. 1. Map showing stations in the Vembanad Lake and the Cochin Backwater.

The classification of different seasons adopted for the present study is that followed by Qasim and Gopinathan (1969) which is as follows :

Pre-monsoon (February to May)

Monsoon (June to September)

Post-monsoon (October to January)

Species composition:

The following five species of siphonophores belonging to four genera were present in the Cochin Backwater.

Species	Number of samples in which the species occurred	Number of specimens
Lensia subtiloides ..	17	
Polygastric stage ..		3
Anterior nectophore ..		29
Posterior nectophore ..		23
Eudoxid bell ..		1
Bract ..		15
Gonophore ..		46
Lensia hotspur ..	1	
Anterior nectophore ..		1
Muggiaea delsmani ..	2	
Anterior nectophore ..		2
Diphyes chamissonis ..	2	
Anterior nectophore ..		18
Eudoxid stage ...		4
Eudoxid bell		7
Eudoxoides mitra ..	1	
Eudoxid bell ..		1

Lensia subtiloides is a cosmopolitan species. *Muggiaea delsmani* was recorded from a low salinity area (13.92‰). This species was also recorded by Totton (1954) from a low salinity area in the Java Sea.

Fluctuation of siphonophores :

Siphonophores were present at stations between Edacochin and Marthomanagar but were absent south of Edacochin, though regular periodic samples were collected

upto Alleppey light house. Siphonophores were present in more numbers at stations in the Ernakulam channel and at the Cochin Bar mouth and scarce at other stations (1 specimen each at Edacochin, Thevara bridge, Thannirmukkom and Karthedam and 5 specimens at Marthomanagar).

In the Ernakulam channel and at the Cochin Bar mouth stationss,iphonophores occurred from February to May and again from October to December, and their numerical counts were also high. The data presented in Fig. 2 refers to collections from these two stations.

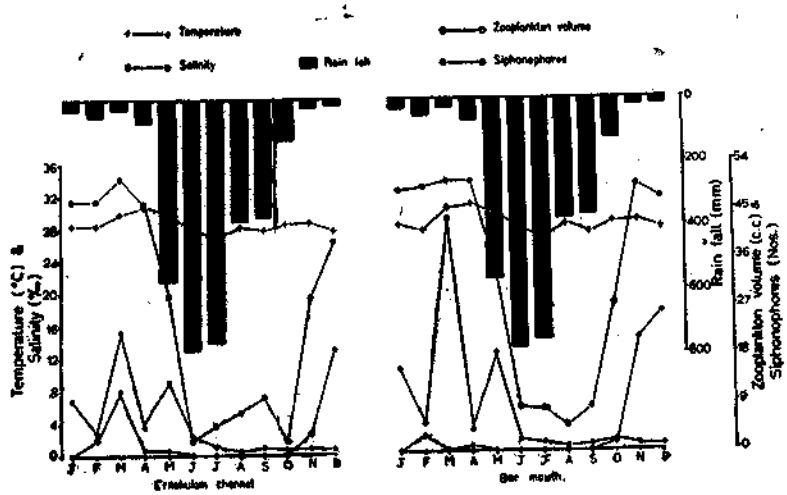

Fig. 2. Occurrence of siphonophores in relation to rainfall, surface temperature, salinity and zooplankton standing crop at the Ernakulam channel and the Cochin Bar mouth stations.

Two distinct peaks of occurrence were observed, one during February/March and the second during December. The numerical counts of siphonophores were high (47 specimens for the Bar mouth station and 36 specimens for the Ernakulam channel) during the post-monsoon months (especially in December). Siphonophores were absent in the collection during January and June to September.

Lensia subtiloides and *Diphyes chamissonis* occurred both in the Ernakulam channel and at the Cochin Bar mouth during February to May and October to December. Whereas, *Eudoxoides mitra* (in April), *Lensia hotspur* and *Muggiaea delsmani* (in November) were present only in collections made at the Cochin Bar mouth.

Fluctuations of siphonophores compared to other planktonic groups in the Cochin Backwater :

The peak periods of siphonophores—the pre-monsoon peak in February/March and the second peak in the post-monsoon month of December— more or less coincide with the peak periods of Copepoda (Pillai, 1971), Chaetognatha (Nair, 1971),

Hydromedusae (Santhakumari and Vannucci, 1971) and Cladocera (Menon *et al.*, 1971) in the Cochin Backwater as shown below :

Group	First peak	Second peak
Siphonophora	Pre-monsoon (February/March)	Post-monsoon (December)
Hydromedusae	,, (February)	
Copepoda	,, (February)	Post-monsoon (November)
Cladocera	,, (April)	Monsoon (August/September)
Chaetognatha	,, (February/March)	Post-monsoon (November)

*Months are shown in parenthesis

The surface salinity, temperature, rainfall and zooplankton standing crop were studied to understand their influence on the occurrence, abundance and seasonal fluctuations of siphonophores in the Cochin Backwater. Their minimum and maximum during the period of study are shown below :

	Bar mouth station		Ernakulam channel station	
	Minimum	Maximum	Minimum	Maximum
Rainfall (mm)	17 (December)	755 (June)	17 (December)	755 (June)
Salinity (‰)	1.74 (July)	35.4 (April)	0.52 (June)	35.24 (March)
Temperature (°C)	26.5 ,,	31.3 ,,	26.7 (July)	31.5 (April)
Zooplankton (cc)	0.8 (August)	75.0 (March)	0.6 (August)	55.5 (March)
Siphonophore (No.)	nil (January, March and May to September)	47 (December)	nil (January, June to October)	36 (December)

*Months are shown in parenthesis

Rainfall :

As regards rainfall, during the monsoon period, the rain water and flood waters entering the estuary considerably reduces the salinity of the waters of the estuary. Influx of inshore saline waters into the estuary except as a ' tongue ' at the bottom of the Ernakulam channel is practically nil and may account for the absence of siphonophores during the monsoon months.

Temperature :

From the present investigation, it is noticeable that temperature fluctuates between 26.5°C and 31.5°C within a range of 5°C and this has apparently no effect on the occurrence of siphonophores in the Cochin Backwater.

Salinity :

Salinity fluctuates considerably between 0.52 ‰ and 35.4 ‰ and it is evident that salinity plays a more direct role controlling the occurrence of siphonophores in the estuary. During monsoon months, when salinity decreases, zooplankton standing crop also declines. But, when there is an increase in the salinity during the immediate post-monsoon months zooplankton standing crop decreases thereby indicating that zooplankton production is higher during the pre-monsoon months. The same trend was also earlier observed by Nair and Tranter (1971) in the Cochin Backwater.

An interesting feature noticed here is that during the pre-monsoon months (February to May) an increase in zooplankton standing crop also showed a corresponding increase in the number of siphonophores. However, during the post-monsoon months (October to January), while salinity increases and zooplankton standing crop was found to show a declining trend, the number of siphonophores showed an increase.

The species composition of siphonophores did not, however, indicate any endemism. The occurrence of siphonophores in relation to salinity distribution indicates that higher salinity plays an important role in the influx of marine species into the Backwater. The occurrence of *Lensia subtiloides* appears to be more regular than *L. hotspur, Muggiaea delsmani, Diphyes chamissonis* and *Eudoxoides mitra* distribution of which in the Backwater may be fortuitous. It is likely that some of these species may be carried into the Backwater, especially to the harbour area by the tides.

Central Marine Fisheries Research Institute, Cochin-682018.

K. RENGARAJAN

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