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ICHTHYOPLANKTON FROM THE VIZHINJAM COAST

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ABSTRACT

This paper gives the results of ichthyoplankton studies in the nearshore waters of Vizhinjam conducted from April, 1981 to March, 1985. Studies on the composition, quantitative abundance and fluctuations of the fish eggs and larvae of Vizhinjam in relation to hydrography were the objectives of this investigation.

The year 1982-'83 recorded the greatest number of eggs and larvae of commercially important fishes. The relative abundance and quantitative variations of eggs and larvae of 11 families were studied. Eggs and larvae of Carangidae formed the major component of ichthyoplankton community. Eggs and larvae of other groups like anchovies, sardines, mackerel, lizard fishes and ambassids were well represented. It was found that eggs and larval concentration of commercially important pelagic fishes was closely related to their spawning seasons observed by earlier workers. Thus mackerel and sardines recorded two spawning seasons. Anchovies and carangids showed extended breeding seasons; eel too recorded a definite breeding period. Larval forms of ambassids were recorded in different months within this period of study and hence it appears that they breed almost year round. The availability of eggs and larvae of marine fishes around Vizhinjam has shown that it is an ideal breeding and nursery ground.

INTRODUCTION

The nearshore waters of Vizhinjam (76° 55'E; 08°20'N) is an important fishing and mariculture centre on the southwest coast of India. The importance of the study of fish eggs and larvae in the proper assessment and exploitation of fisheries is well known. Being aware of the significance of such studies Bal and Pradhan (1945, 1946, 1947), Gopinath (1946), John (1951), Bapat (1955), Venkataramanujam and Ramamoorthi (1974) and Rengarajan and David Raj (1979) have worked on the ichthyoplankton of the Indian seas. Sudha and Nair (1982) have made a preliminary study of the food fish eggs of the Trivandrum coast. The larval forms of important fishes collected mainly from the shore seines have also been studied by Sudha (1982). Eventhough these investigations emphasised the importance of qualitative studies, very little attention has been paid to the quantitative aspects of the fish eggs and larvae. The paucity of such information from Vizhinjam waters has prompted a study of the composition, abundance and fluctuations of ichthyoplankters over a long period of years and the results are presented in this paper.

MATERIAL AND METHODS

The material used in this study was obtained from the regular plankton samples collected from April, 1981 to March, 1985 from stations of 15 m (Station I), and 30 m (Station II) depths; the first being within the Bay, while the other in the open sea. Samples were collected fortnightly between 0400 and 0600 hrs by 10 min. surface hauls with a net of 50 cm mouth diameter and made of nylobolt (400 μ mesh size) which was towed from a 'catamaran'. The displacement volumes of the samples were estimated and the ichthyoplankters sorted out from these samples were preserved in 4% buffered

formaldehyde solution in sea water. Depending upon the size of the sample, it was sub-sampled with a Folssom splitter and an aliquot of atleast 5 ml was used to determine the numerical abundance of the ichthyoplankters. The values for the whole sample were then computed for 100m³ of water. Though a very large number of eggs and larvae belonging to different species collected from the sea were examined, those which could not be identified with certainty have been excluded from this report. Hydrographic data were recorded by analysis of surface seawater samples following standard methods.

Results

The accompanying figures 1–4 give an idea of the occurrence and seasonal abundance of fish eggs and larvae of different fishes.

Clupeidae

Sardinella spp.

During the four years of the study, the eggs of *Sardinella* spp. reached the highest concentration in March, 1984 at both the stations; the larvae showed the highest intensity during June–July, 1982–'83 at both the stations (Fig. 1).

Dussumieria sp.

Larval forms of *Dussumieria* sp. were encountered only in the year 1983–'84 during June–July period at station I.

Engraulidae

Anchoviella spp.

Eggs of *Anchoviella* spp. recorded greatest concentration in June, 1981–'82 at stations I and II but the highest density of larvae was observed in May, 1983–'84 and 1984–'85 in the open sea and Bay stations respectively. Considering the four years of collection, 1981–'82 showed greater density of *Anchoviella* spp. eggs at both the stations and 1982–'83 and 1983–'84 recorded the highest concentration of larvae in the open sea station (Fig. 1).

Thryssa sp.

Eggs of *Thryssa* sp. were recorded only in November–December, 1982–'83 and May, 1983–'84 in the Bay whereas these were obtained in September and November–December, 1982–'83 in the open sea station.

Scombridae

Rastrelliger kanagurta

Eggs of mackerel were not recorded during this period of study. However, the larval forms of the species were observed either in the Bay or open sea stations in all the years of collection and the year 1982–'83 recorded the greatest number of the larvae (Fig. 1). The highest concentration of mackerel larvae was registered in October, 1982–'83 in the Bay and in May, 1984–'85 in the open sea station. Therefore mackerel larvae showed two peaks of abundance, one in April to July and another during September-December period. However, in the year 1984–'85 the first peak of occurrence of mackerel larvae was encountered in the open sea and the second one recorded in the Bay. It was also seen that in the years 1981–'82 and 1983–'84, eventhough these were not recorded in one station, were obtained in the other station during the two seasons.

Carangidae

Carangid eggs and larvae form the major component of the ichthyoplankton population at Vizhinjam (Fig. 2, 4). The important representatives of this family in this area are *Decapterus* sp., *Selar* sp. and *Caranx* spp. The maximum number of carangid eggs was recorded during November–January, 1982–'83 in the Bay and December–March in 1981–'82 in the open sea station. Larval forms of this group recorded their maxima in November–December, 1982–'83 at both the stations. Further the year 1982–'83 was the most conducive for carangid eggs and larvae.

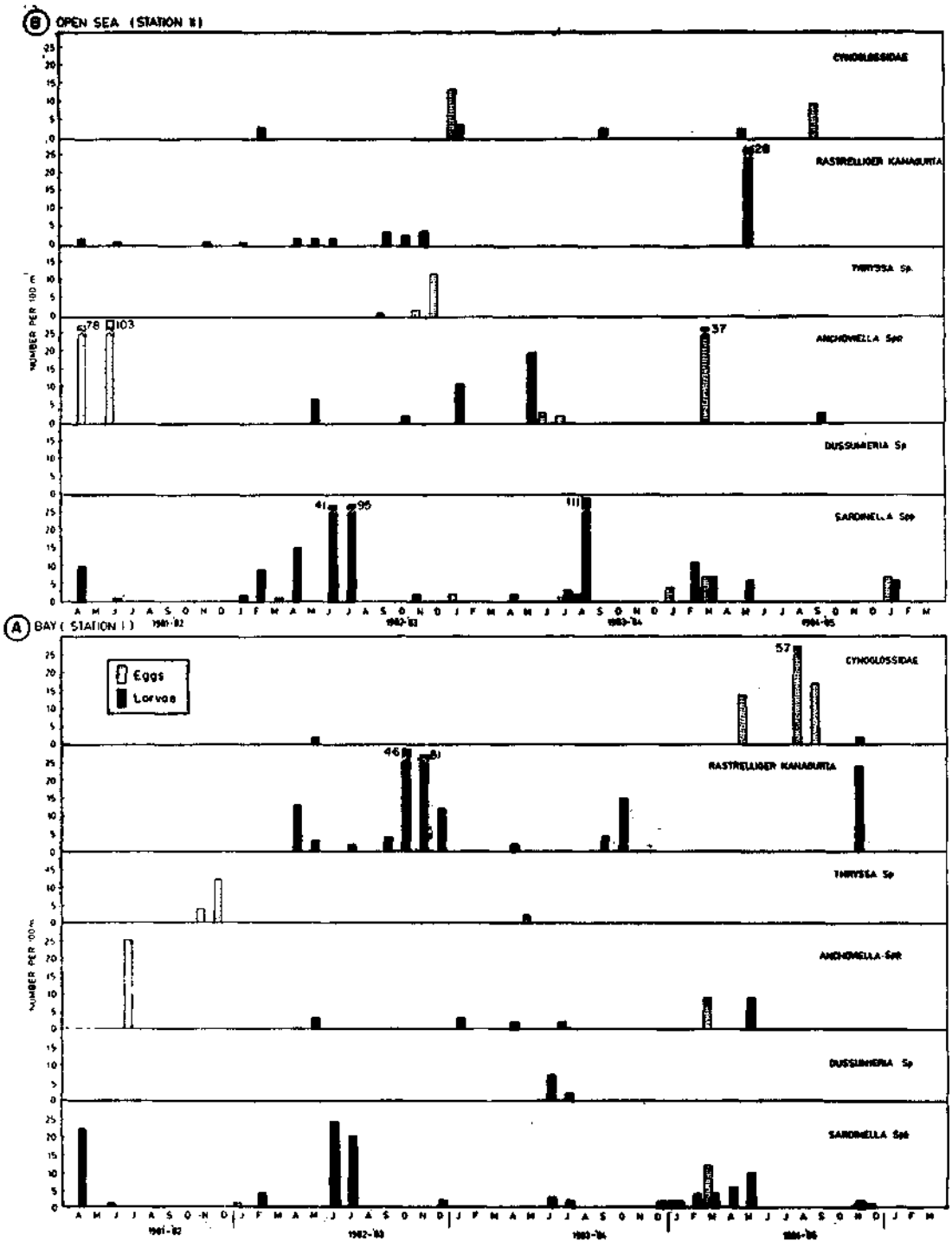

Fig. 1. Mean values of eggs and larvae at Vizhinjam Bay (A) and open sea (B) for the period 1981-'82 to 1984-'85

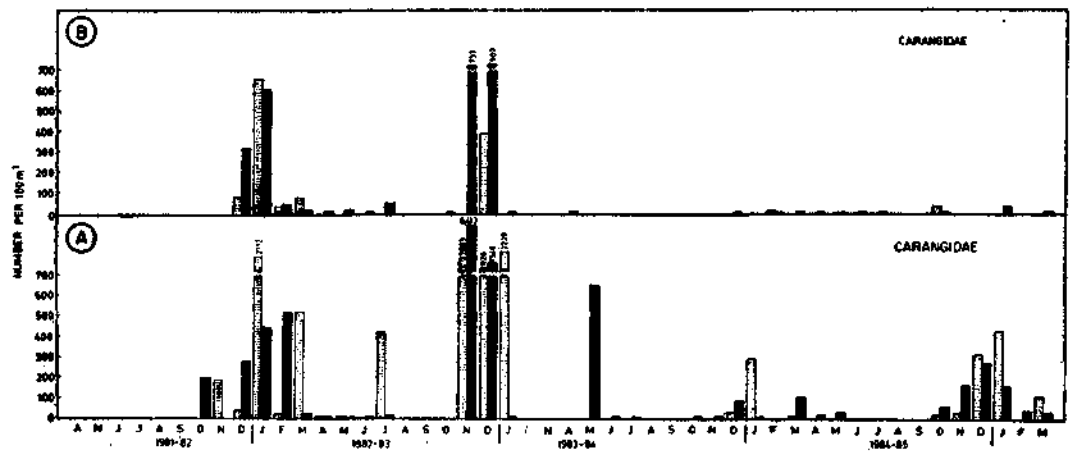

Fig. 2. Mean values of eggs and larvae at Vizhinjam Bay (A) and open sea (B) for the period 1981–'82 to 1984–'85.

Cynoglossidae

Eggs of flat fishes recorded the highest number in August–September, 1984–'85 in the Bay and in January, 1982–'83 in the open sea station. The larval forms were observed only in May, 1982–'83 and November, 1984–'85 in the Bay and in February, 1981–'82, January, 1982–'83 and September, 1983–'84 in the open sea station.

Ophichthyidae

Viewing all the years of investigation, a general finding was that ophichthyid eel eggs were common at both the stations only during December–March period. Larval forms were obtained in June and October, 1982–'83 in the Bay and in December, 1981–'82, March, 1983–'84 and January, 1984–'85.

Muraenidae

Eggs of this family were recorded only in two collections, one in March, 1982 and the other in January, 1985.

Synodontidae

Maximum number of eggs of lizard fishes were encountered in February, 1981–'82 and 1983–'84 at both the stations. The larval concentration was highest in December, 1982–'83 in the Bay and these were poorly represented in the open sea station since they were found only in December, 1981–'82 and June, 1982–'83.

Ambassidae

Post larvae of this family appeared in appreciable numbers in the samples and they were collected in different months in the different years of study, but the highest density was recorded in September, 1984–'85 in the Bay and in June, 1983–'84 in the open sea.

The larval forms of Gobidae, Sciaenidae, Platycephalidae and Leiognathidae were also recorded in isolated months.

Considering the seasonal abundance, the southwest monsoon period (June–August) with a definite lowering in temperature and salinity, recorded the eggs of carangids, *Anchoviella* sp. and flat fishes in high numbers in the Bay and open sea stations respectively (Fig. 4). Larval forms of *Anchoviella* spp., *Sardinella* spp., carangids and ambassids were also observed in fairly good numbers during this period.

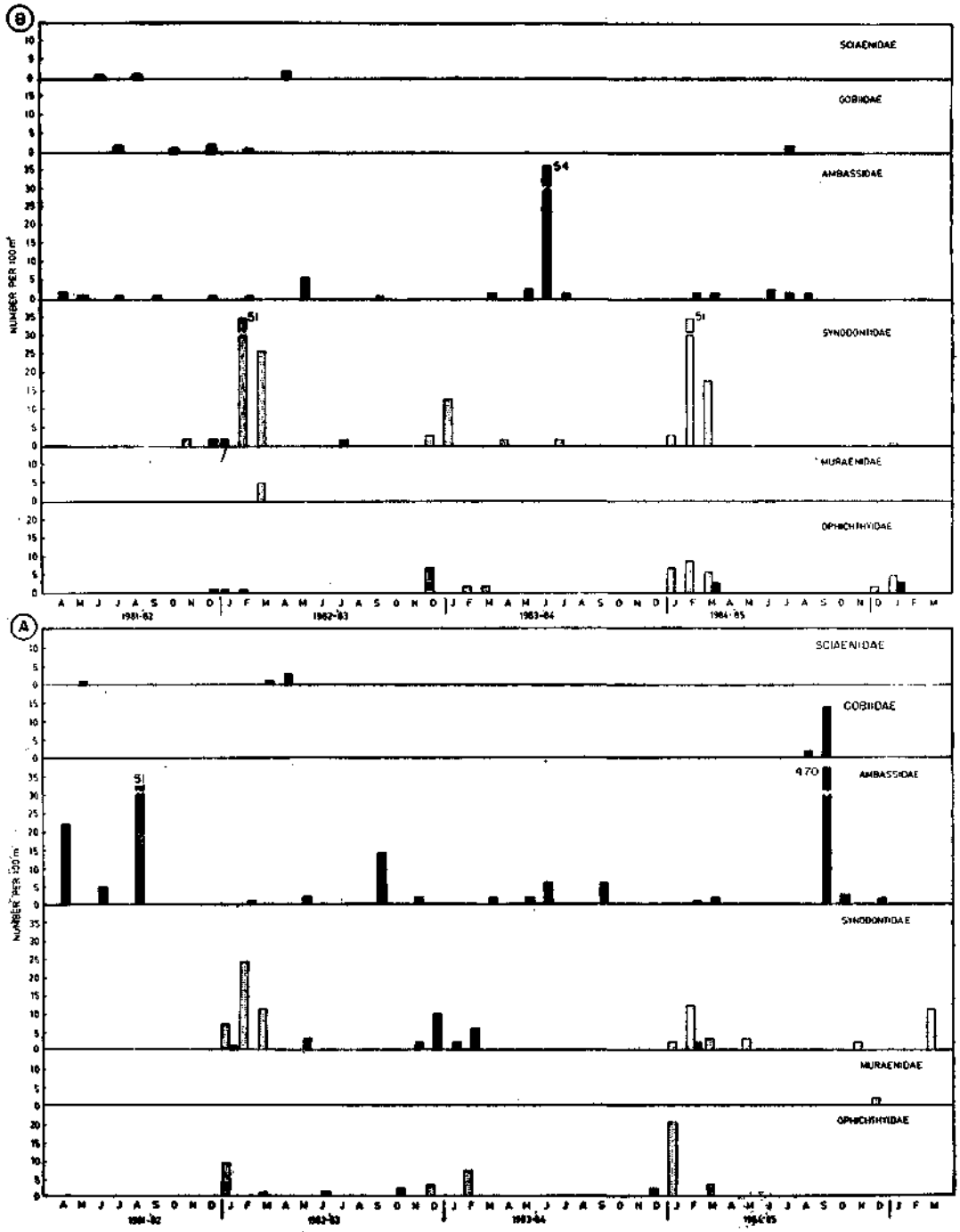

Fig. 3. Mean values of eggs and larvae at Vizhinjam Bay (A) and open sea (B) for the period 1981–'82 to 1984–'85.

During the post-monsoon period (September–January) when there was a gradual increase in temperature and salinity, the eggs and larvae of carangids were the most abundant in both the stations followed by the eggs of flat fishes in the Bay and the larval forms of ambassids and mackerel in the open sea station.

The pre-monsoon period (February–May) was the warmest period of the year with the salinity well above 34‰ (Fig. 4). During this period the eggs and larvae of carangids were again dominant but to a lesser degree. Eggs of *Anchoviella* sp. and larval forms of *Sardinella* spp. occupied the second and the third places. Mackerel larvae were also observed during this period but was less abundant than the post-monsoon period.

Discussion

Vizhinjam supports a rich pelagic fishery consisting primarily of ribbon fishes, carangids, tunas, anchovies, sardines, mackerel and seer fish. During the period of observation, the eggs and larvae of carangids were found to be the major constituent of ichthyoplankton, those of anchovies, sardines, mackerel, lizard fishes and ambassids being the other dominant groups. The absence of eggs and early larval stages of other scombroids and ribbon fishes in these collections may be due to their spawning taking place outside the present collection limits of 5 km from the shore. Sudha and Nair (1982) in their preliminary studies of fish eggs of Trivandrum have also observed most of the eggs recorded in the present study. However, this study was made just for a year and was more on the qualitative aspects of the eggs of food fishes.

From the presence of eggs and larvae of carangids during November–July period it is possible to conclude that this group of fishes have prolonged spawning period with the peaks during November–January months where there was a gradual increase in temperature from 26.7 to 27.4°C and 27.4 to 27.6°C in the Bay and open sea stations respectively. Likewise there was an increase in salinity values during this period. However, in Porto Novo waters, Venkataramanujam and Ramamoorthi (1974) recorded the spawning of *Caranx* sp. when the water temperature was between 28 and 29°C and the salinity values between 31.5 and 34.0‰. It is also reported in the 'Annual Reports' of CMFRI, that partially spent and spent fishes of *Decapterus* sp. and *Selar* sp. were recorded during the November–July period.

It was found that eggs and larval concentration of sardines was closely related to their spawning seasons observed by earlier workers. Lazarus (1984) has observed the spawning seasons of two common lesser sardines namely *Sardinella sirm* and *S. gibbosa* during January–July and July–February respectively. These seasons were found to coincide with the period of abundance of ichthyoplankters of sardines observed in the present investigation.

In the present study mackerel larvae were recorded during two seasons of each year in the plankton of Vizhinjam waters (Fig. 1, 4). Bennet (1967), based on the occurrence of juveniles has also mentioned the possibility of two main spawning seasons for mackerel at Vizhinjam; one from March to May and another from August to September with a subsequent minor spawning from December to January. Further, it is interesting to note that the mackerel larvae were not recorded during the southwest monsoon period when there was a definite lowering of water temperature (Fig. 4).

The presence of only one type of elliptical egg *(Anchoviella devisi)* during November–July has already indicated that this species spawns mainly during November–July period. This is substantiated by the findings presented in the 'Annual Reports' of C.M.F.R.I., of this period.

The occurrence of eel eggs only during the warmest months (January–March) has shown that this group has a definite breeding period (Fig. 4). The period of occurrence of ambassid larvae has, however, not been constant in the different years and hence it appears that they breed all the year round.

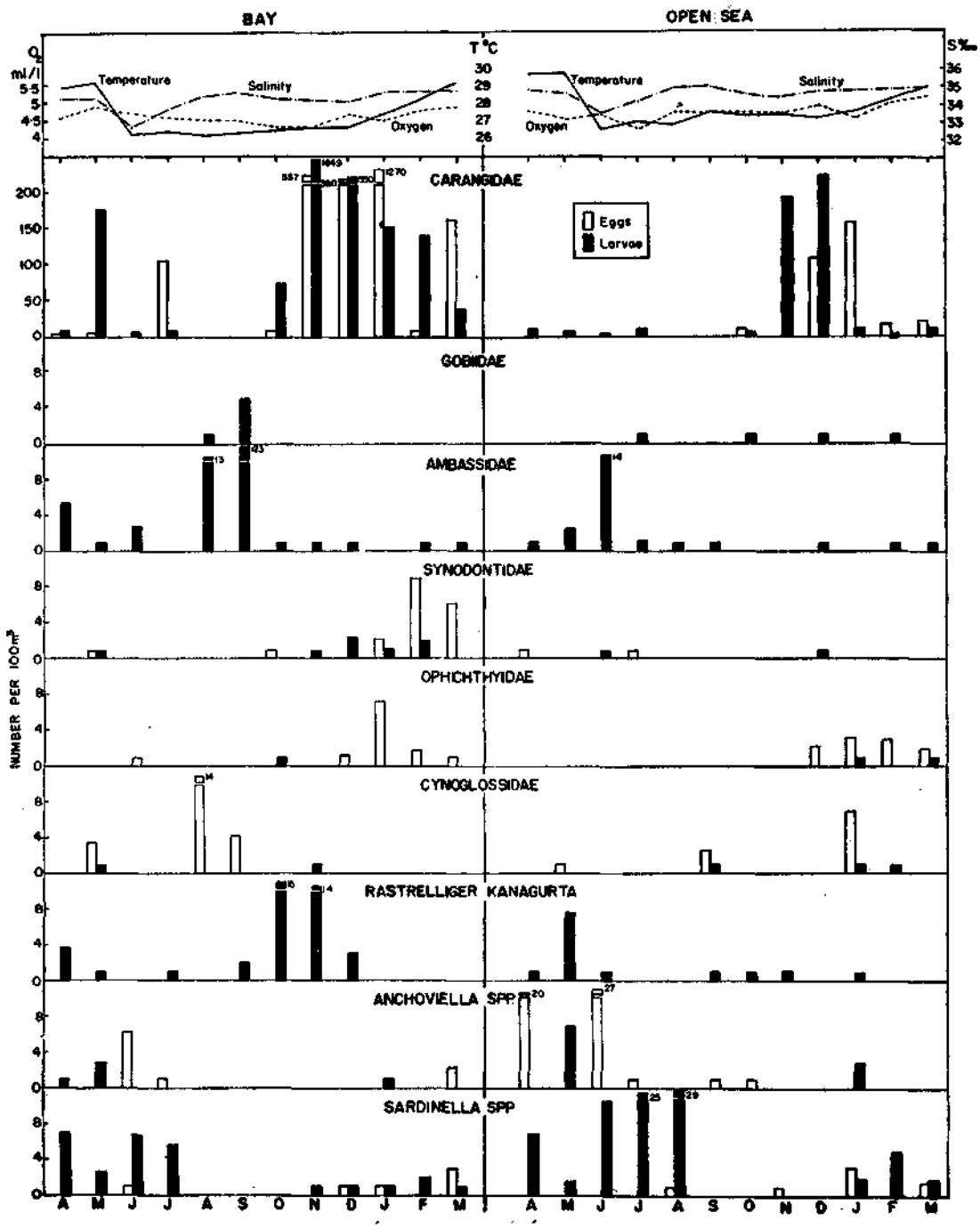

Fig. 4. Seasonal abundance of eggs and larvae in relation to temperature, salinity and dissolved oxygen (average for the period 1981–'82 to 1984–'85) at Vizhinjam Bay and open sea stations.

It was observed that the surface waters of Vizhinjam was well oxygenated as the dissolved oxygen values were well above 4 ml/l in most of the months in all the years of collection. Likewise, salinity values were high (i.e., above 34‰) except for a sharp dip recorded during monsoon months (Fig. 4). So also the productivity in this area was rather high (Rani Mary Jacob and Vasantha Kumar, 1987). Thus the waters around Vizhinjam with their special ecological conditions and high productivity is a favourable breeding and nursery ground for several marine fishes.

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REFERENCES

BAL, D.V. AND L.B. PRADHAN 1945. First progress report on 'Investigation of fish eggs and fish larvae from Bombay waters', 1944–'45. Govt. Central Press, Bombay.

BAL, D.V. AND L.B. PRADHAN 1946. Second progress report on 'Investigation of fish eggs and fish larvae from Bombay waters', 1945–'46, Govt. Central Press, Bombay.

BAL, D.V. AND L.B. PRADHAN 1947. Third progress report on 'Investigation of fish eggs and fish larvae from Bombay waters', 1946–'47, Govt. Central Press, Bombay.

BAPAT, S.V. 1955. A preliminary study of the pelagic fish eggs and larvae of the Gulf of Mannar and the Palk Bay. *Indian J. Fish.*, 2 (1): 231-255.

BENNET, P. SAM 1967. Seasonal abundance of small sized juveniles of *Kastrelliger kanagurta* at Vizhinjam during 1960–'63. *Indian J. Fish.*, 11 (1): 391-406.

GOPINATH, K. 1946. Notes on the larval and postlarval stages of fishes found along the Trivandrum coast. *Proc. Nat. Inst. Sci. India*, 12 (1): 7-21.

JOHN, M.A. 1951. Pelagic fish eggs and larvae of the Madras Coast. *J. Zool. Soc. India*, 3 (1): 41-69.

LAZARUS, S. 1984. Studies on the sardines of the south-west coast of India. *PH. D. Thesis*, Kerala University, Trivandrum.

RANI MARY JACOB AND R. VASANTHA KUMAR 1987. Primary productivity in the nearshore waters of Vizhinjam, Trivandrum. *J. mar. biol. Ass. India*, 26 (1 & 2): 66-70.

RENGARAJAN, K. AND I. DAVID RAJ 1984. On ichthyoplankton of the Cochin Backwaters during spring tides. *J. mar. biol. Ass. India*, 21 (1 & 2): 111-118.

SUDHA, K.C. 1982. Studies on the larval and post larval fisheries of Trivandrum coast. *Ph.D. Thesis*, Kerala Univ., (Unpublished).

SUDHA, K.C. AND R.V. NAIR 1982. An account of the common food fish eggs of Trivandrum coast. *Indian J. Anim. Sci.*, 52 (10) : 916–927.

VENKATARAMANUJAM, K. AND K. RAMAMOORTHI 1974. Studies on the seasonal abundance of the fish eggs and larvae of Porto Novo waters. *Indian J. Fish.*, 21 (2): 254-262.