COPEPOD COMPONENTS OF INSHORE ZOOPLANKTON OF THE BAY OF BENGAL OFF SAGAR ISLAND, WEST BENGAL, INDIA

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ABSTRACT

Copepods constitute the most predominant portion of zooplankton biomass in the lower stretch of Hooghly estuary around Sagar Island (21.56° to 21.88°N and 88.08° to 88.16°E) during March 1979–February 1981. Most of the copepod species showed higher diversity and abundance during high saline premonsoon period. The system remains practically virgin and underexploited at secondary level during low saline monsoonal period. Invasion of various species into the estuary begins by postmonsoon.

INTRODUCTION

COPEPODS, by their sheer abundance and diversity, constitute a major group of the zooplankton of the estuary. They occupy an important position in the trophic structure and play a major role in the energy transfer of any aquatic environment. The present investigation outlines the 'shapes' of characteristics, composition, distribution and variation of copepods in the lower stretch of Hooghly estuary.

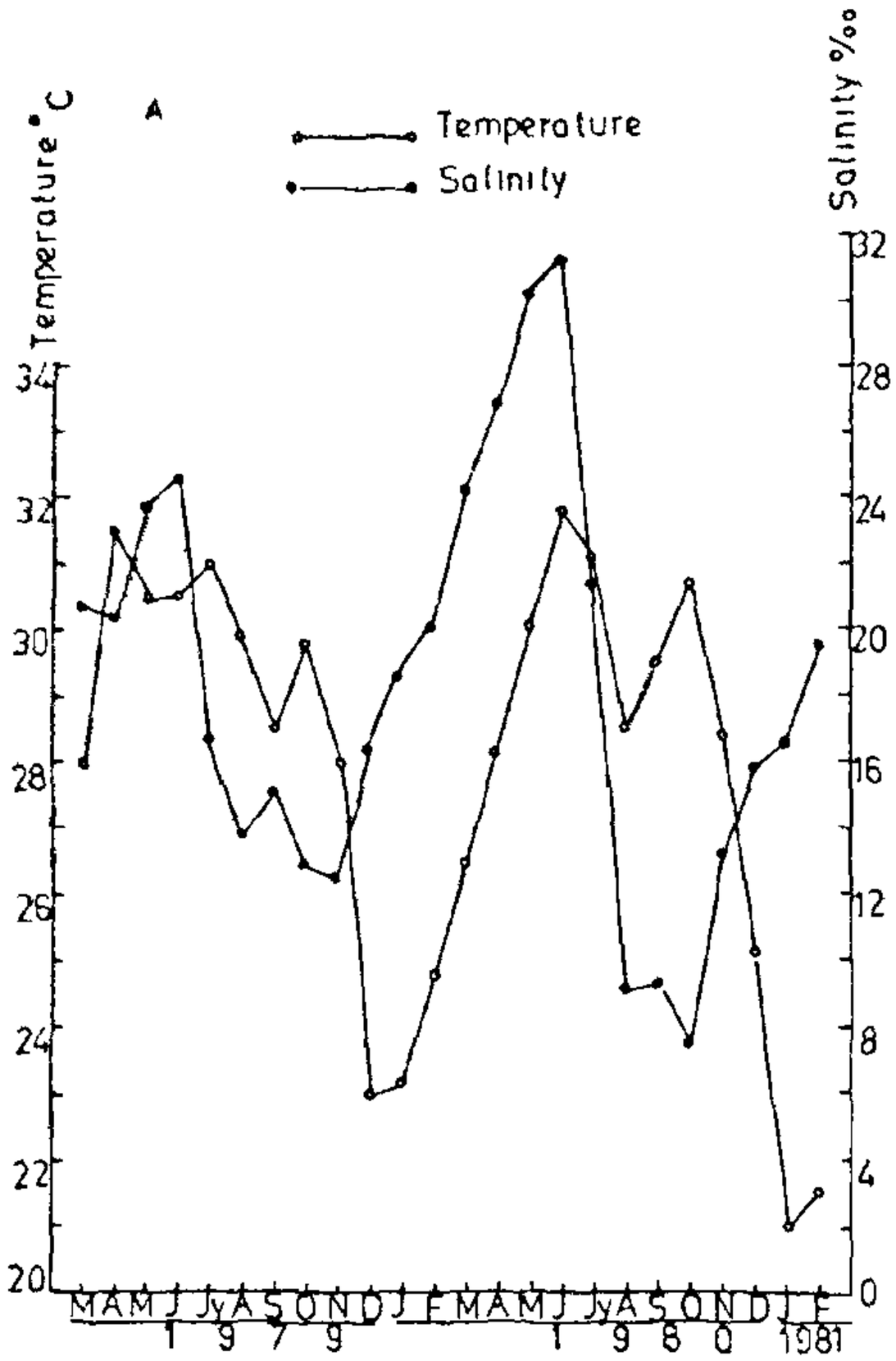
MATERIALS AND METHODS

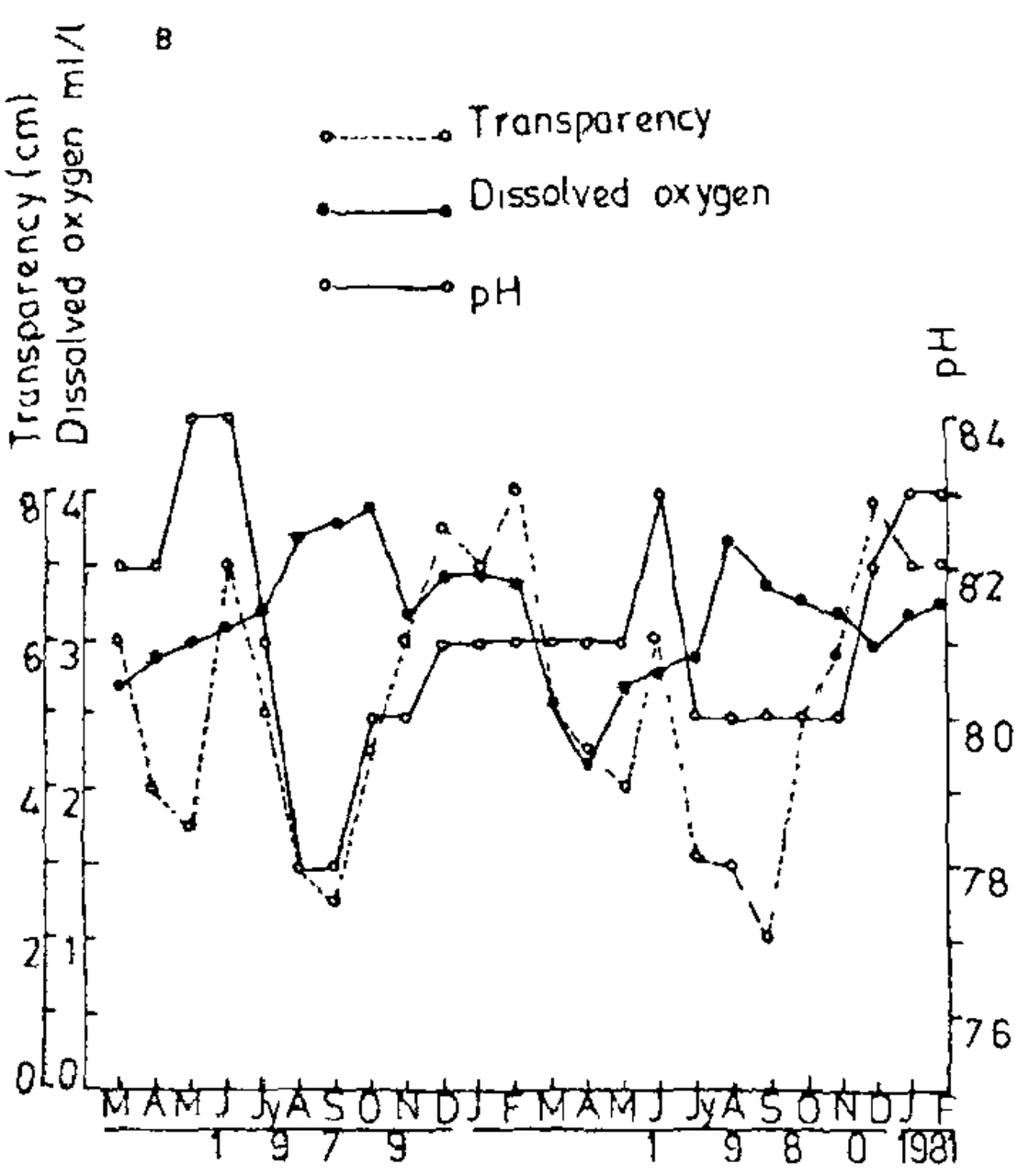
Surface zooplankton samples were collected every fortnight at forenoon during high tide from a selected station situated in the southern sector of the Sagar Island, the largest delta in the Hooghly-Matlah estuarine complex, embracing the western sector of the famous Sunderbans. Measured quantities of surface water were filtered through a plankton net of bolting silk no. 10 (mesh 0.15 mm) and preserved in 4% buffered formaldehyde in sea water. In the laboratory, an aliquot sample was taken in a Sedgwick–Rafter Plankton counting cell under a compound microscope for different numerical analyses. From each plankton collection, three estimations were made and the mean was recorded as no./m^3. Water samples were also collected to determine various hydrological parameters adopting the methods outlined by Strickland and Parsons[1]. Water temperature was recorded on board using a centigrade thermometer with an accuracy of 0.1°C. Water transparency was approximately determined using a Secchi disc and expressed in cm.

RESULTS AND DISCUSSION

The hydrology of Hooghly estuary is highly dynamic and presents a cyclic pattern, characterized by large amount of precipitation and tidal interplay[2,3]. The fluctuation of salinity was large (7.76 to 31.33 ‰) as compared to temperature (21.0 to 31.8°C). High values of salinity (20.81 to 31.33 ‰) were recorded during summer months (March–June) and the low values (7.76 to 16.87 ‰) were observed during the southwest monsoon period (July–October) (figure 1a). The concentration of dissolved oxygen, estimated during the period, varied between 2.2 and 3.9 ml/l. The range of pH values (8.0–8.4) was high from November to June which dropped down to 7.8 during monsoon. Secchi disc readings showed that water was turbid almost all the time with little change in the winter months (December–February) when the transparency reached its maximum (5.8 to 8.0 cm) (figure 1b).

Copepods were the dominant constituents of zooplankton population, both in quality and quantity, throughout the study period, constituting 79.8 to 96.4% of the total zooplankton. Out of 26 genera and 47 species recorded from the study area, calanoid copepods were represented by 15 genera with 34 species, cyclopoid copepods, by 4 genera with 5 species and harpacticoid copepods, by 7 genera with one species. Peak density of copepod population (24, 107 no./m^3) correlated with the diversity of copepod species (21), observed in July 1979. A sharp fall in copepod population associated with lower species diversity was observed during late monsoon months. The presence of only a few copepod species during the





Figures 1a, b. Seasonal variation in the hydrological parameters (1979–1981).

monsoon months has also been reported from other Indian estuaries[4–7].

It is evident from figure 1 that the copepods showed distinct seasonal variations in their abundance with a bimodal type of distribution. The primary major peak was during June/July and the secondary major peak was during January/February. Two peaks of copepod population have also been observed earlier from the Indian region[8–10].

Copepods can be divided into three distinct categories depending on the period of existence in this area.

Category I: Euryhaline species which are present throughout the year. *Paracalanus* sp, *Acrocalanus* sp, *Acartia spinicauda, Labidocera euchaeta, Pontella andersoni, Eucalanus subcrassus, E. elongatus, Pseudodiaptomus annandalei, P. hickmani, Oithona* sp, "*Saphirella*" cf. *indica, Microsetella rosea, Laophonte* sp,

Category II: Species which have a limited period of existence in the area depending on the variable salinity.

Pseudodiaptomus aurivilli, Euchaeta sp, *E. marina, E. wolfendeni, Centropages dorsispinatus, Acartiella sewelli, Corycaeus danae, Euterpina acutifrons, Cladorostrata brevipoda, Harpacticus* sp, *Clytemnestra acutellata, Macrosetella gracilis.*

Category III: Species which are 'casual migrants' seen occasionally in the sample.

Labidocera sp, *L. minuta, Pontellopsis herdmani, Eucalanus* sp, *Pseudodiaptomus* sp, *P. tollingeri, P. masoni, P. daughlishi, Euchaeta tenuis, E. concinna, Centropages furcatus, Temora turbinata, T. discaudata, Tortanus gracilis, T. forcipatus, Candacia bradyi, Canthocalanus pauper, Undinula darwini, Corycaeus catus, C. agilis, Oncaea venusta.*

The correlation matrix between 10 major copepod families is shown in table 2. The positive correlation coefficient between any two pairs among the families Paracalanidae, Acartiidae, Pontellidae, Eucalanidae, Centropagidae, Oithonidae and Ectinosomidae provides evidence that these families combine to form a group by themselves. The family Acartiidae, Pseudodiaptomidae and Clausidiidae gave negative correlations with most of the other families implying that they form a group by themselves and occurred abundantly when the members of the other families were either absent or were poorly represented.

Being a tropical estuary, temperature fluctuations were not significant enough to inhibit the recruitment

Table 1 *Copepod density (no/m³) and relative percentage based on total zooplankton counts* (1979–1981)

Months	Copepod density	Percentage	Months	Copepod density	Percentage
1979			1980		
Mar.	9185	87.8	Mar.	14803	91.5
Apr.	5082	86.8	Apr.	7045	88.2
May	8725	94.1	May	7470	89.4
June	21550	93.3	June	22776	95.6
July	22245	92.2	July	22620	95.4
Aug.	9919	88.0	Aug.	4305	94.5
Sept.	4396	84.5	Sept.	4015	96.4
Oct.	3755	91.2	Oct.	2943	95.5
Nov.	6759	93.7	Nov.	6585	94.2
Dec.	13467	92.8	Dec.	13960	90.6
1980			1981		
Jan.	17045	88.2	Jan.	13938	79.9
Feb.	15985	83.3	Feb.	18085	81.6

Table 2 *Correlation matrix for copepods belonging to 10 major copepod families at South Sagar* (1979–1981)

	Paracalanidae	Acartiidae	Pontellidae	Eucalanidae	Pseudo-diaptomidae	Centropagidae	Oithonidae	Clausidiidae	Ectinosomedae
Paracalanidae	—	—	—	—	—	—	—	—	—
Acartiidae	−0.5300**	—	—	—	—	—	—	—	—
Pontellidae	0.8577**	−0.5866**	—	—	—	—	—	—	—
Eucalanidae	0.8985**	−0.4680*	0.1825	—	—	—	—	—	—
Pseudodiaptomidae	−0.5503**	0.8390**	−0 6117**	−0.4283**	—	—	—	—	—
Centropagidae	0.5133**	−0.5202**	0.5007**	0.5457**	−0.4933**	—	—	—	—
Oithonidae	0 8716**	−0.3976*	0.8985**	0.8351**	−0.4904**	0.5117**	—	—	—
Clausidiidae	−0.1738	−0.1723	0.0110	−0.2048	−0.0287	−0.3657*	−0.2378	—	—
Ectinosomidae	0.8325**	−0.4879**	0.6155**	0.7862**	−0.3788*	0.4771*	0.6443**	−0.3038	—
Laophontidae	0.6493**	−0.4424*	0.8186**	0.6207**	−0.5677**	0.6666**	0.7472**	−0.0207	0.4263*

* significant at 5% level; ** significant at 1% level

of these organisms Food supply seldom acts as a limiting factor in a tropical estuary and does not seem to govern the seasonal abundance[11]. The fluctuation range of dissolved oxygen and pH at the surface waters in the Hooghly estuary are little-to-moderate. Hence salinity, with wide range of fluctuations, appears to be the major hydrographic factor controlling the incidence of these organisms which has been endorsed by other workers[6-8,12]. The other environmental factors such as turbidity, temperature and oxygen saturation also leave their imprints on species diversity[13]. During April and May, due to high pounding wave actions, the offshore waters become too turbid to allow the copepod zooplankton to recruit in this particular station.

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ANNOUNCEMENT

ALUMNI LIAISON CENTRE IN INDIA FOR COLLEGE OF AGRICULTURE AND NATURAL RESOURCES, MICHIGAN STATE UNIVERSITY, USA—AN APPEAL

Dr Robert La Prad, Director of the Michigan State University Agricultural College Alumni Centre, East Lansing, USA, proposes to visit India to contact all the alumni of the Michigan State University College of Agriculture and Natural Resources in India at a very early date for maintaining professional contacts. He can schedule his visit only after the details of the names and current addresses of the alumniare assembled.

I have been requested to act as liaison for this purpose. I would therefore like to appeal to all the alumni of the Michigan State University College to send their names and present official and residence addresses to me at the following address: Prof. S. Krishnamurthi, No. 8 SRP Colony, Cross Road, No. 2, Coimbatore 641 011.

An early response to this appeal would enable me to collect the particulars and inform Dr La Prad so that he can prepare his schedule of visit appropriately. Please state the year of Graduation, Degree and specialisation.