

Biomass and biochemical composition of zooplankton from northwest Bay of Bengal during January 1990

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Biomass, proximate composition, organic carbon and caloric content of assorted zooplankton from the surface waters were studied. Day and night stations revealed significant difference in biomass (displacement volume, dry wt and organic carbon) whereas at coastal and oceanic stations irrespective of day and night the difference was significant only in dry wt values. Protein and organic carbon content peaked at 14°-16°N. Average caloric content was 4.05 kcal g⁻¹ dry wt. High lipid content at 12°-14°N correlated with maximum chl-*a*

Information on biochemical fractions of zooplankton is of great importance in tracing physiological state, nutritive value and energy pathway in pelagic food web. Reports on the nutritive value of mixed zooplankton from the Bay of Bengal are meagre¹. This paper presents information on biomass and major biochemical fractions of assorted zooplankton from the coastal and oceanic surface waters of northwest Bay of Bengal.

Zooplankton samples were collected from 65 stations (Fig. 1) by surface hauls (10 min) using Heron-Tranter net (mouth area 0.25 m², mesh size 300 µm) during January 1990 on board *R V Nanda Rathi*. Biomass (displacement volume) determined on board was converted² to dry wt. Separate samples were taken from 47 out of 65 stations for biochemical estimation. Immediately after collection, the samples were cleaned of debris, washed with distilled water and dried at 60°C till constant weight. Protein³, carbohydrate⁴, lipid⁵ and organic carbon⁶ were estimated in triplicate. Caloric content was determined from major biochemical fractions⁷. The stations were grouped into (i) day and night samples were taken during 0600 to 1800 hrs and 1800 to 0600 hrs respectively for diel variability study; (ii) coastal and oceanic stations within and beyond 200 m depth contour respectively and (iii) latitude-wise (at 2° interval) to evaluate the difference if any in biomass and biochemical composition of assorted zooplankton.

Biomass in terms of displacement volume and dry wt ranged from 0.05 to 0.96 ml.m⁻³; and 6.58-65.95 mg.m⁻³ respectively. In terms of carbon it varied from 1.16 to 18.69 mgC.m⁻³. High value of

2.48 ml.m⁻³ observed at st. 9 due to swarming of ostracods has not been considered for averaging. Night station supported high biomass (Fig. 2) in terms of dry wt (35.39 mg.m⁻³) and organic carbon (20.11 mgC.m⁻³). Significant difference ($P < 0.001$) was observed in biomass between day and night stations in terms of displacement volume, dry weight and carbon content. The coastal and oceanic stations showed significant difference ($P < 0.001$) in dry wt alone.

Protein ranged from 18.58 (st. 63) to 60.66% (st. 46) with a mean value of 44.87 ± 8.32% while lipid and

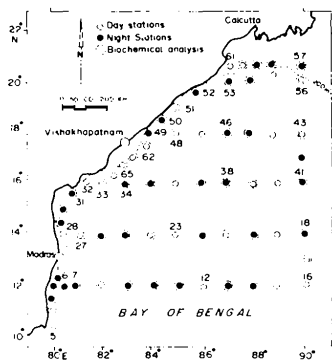


Fig. 1. Station locations.

carbohydrate varied from 4.1 (st. 63) to 23.28% (st. 11) and 1.49 (st. 50) to 12.26% (st. 38) respectively. Organic carbon and caloric content ranged from 16.21 (st. 50) to 39.27% (st. 51) and 1.75 (st. 63) to 5.31 kcal.g⁻¹ dry wt (st. 24) respectively whereas on ash free dry wt basis the caloric content accounted to 6.42 kcal.g⁻¹ dry wt. Mean caloric content was 4.05 kcal.g⁻¹ dry wt. However mean caloric content based on percentage of organic carbon was 4.08 kcal.g⁻¹ dry wt. Significant correlation was noticed between protein and caloric content ($r = 0.78, P < 0.001$).

Biomass, protein and organic carbon values (Fig. 3) were maximum at 14°-16°N while lipid was maximum at 12°-14°N followed by a sharp decrease resulting in very low levels at 18°-20°N. Lipid showed

significant correlation with caloric content ($r = 0.77, P < 0.001$). In the present study L:P ratio varied from 0.15 to 0.65 (av. 0.33).

In general, copepods contributed maximum (79.57%) followed by ostracods (3.93%), decapod larvae (3.82%), chaetognaths (3.06%), amphipods (1.92%), appendicularians (1.89%), polychaete larvae (0.82%), fish eggs and larvae (0.72%), pteropods (0.6%), cladocerans (0.59%) and gastropod larvae (0.53%). However gelatinous organisms like hydromedusae and siphonophores were in good numbers at sts 48 and 50. Though the average value of protein in the present study is comparable with Andaman Sea¹⁻⁹ and Arabian Sea⁹, the value was slightly higher than from Arabian Sea off central west coast of India¹⁰⁻¹¹. This may be due to the analytical technique adopted, time of collection, general composition of zooplankton and its physiological condition. Reciprocal relationship¹² between protein and lipid at 14°-16°N and very low values at sts. 48, 50, 57 and 63 suggest that such a relationship is not applicable for the entire study area. Compared to carbohydrate and lipid, protein formed the major fraction, indicating its usefulness as energy reserve. Zooplankton utilize the protein as an additional source of energy at times of stress¹³. The lipid values recorded in the present study are slightly higher than those from west coast^{7-9, 11}. The low lipid

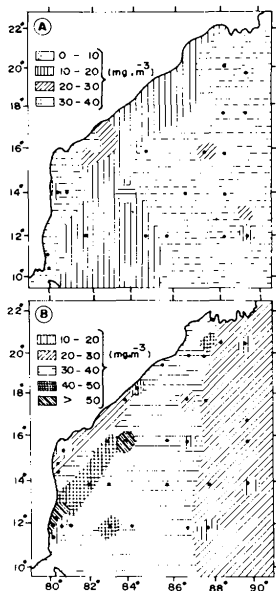


Fig. 2 Day (A) and night (B) variations in biomass (dry wt in mg.m⁻³)

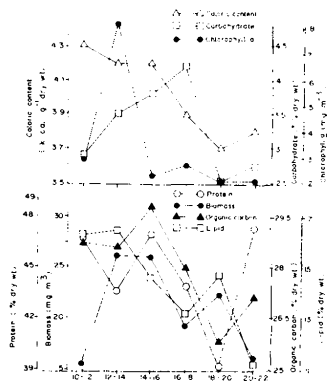


Fig. 3 Latitude-wise variations in biochemical composition, biomass, organic carbon, and chlorophyll a

in tropical zooplankton may be attributed to the availability of food throughout the year¹⁴ and also to the inhibition of lipid accumulation at high temperature¹⁵. High lipid content at 12°-14°N can be due to the grazing of herbivorous zooplankton as indicated by maximum chlorophyll *a* at that region. Lipid protein ratio has been considered as an indicator of calories and L:P ratio > 0.7 represents high caloric content¹⁶.

Though carbohydrate is the principal metabolic substrate in many marine organisms, very low levels in zooplankton due to oxidation of carbohydrate directly from food¹⁷ indicates its poor contribution as energy reserve as compared to lipid and protein. The amount of food available and the energy stored have been reported to influence carbon content of zooplankton¹⁸. Very low levels of protein and lipid, at 16°-20°N (Fig. 3) resulted in low carbon content. Caloric content in general is higher than reported earlier for Andaman Sea¹, west coast of India⁸⁻¹⁰ from lat. 11°-15°N. However difference is not observed in caloric content when calculated from the biochemical component and percentage of carbon. Though protein forms the major fraction of biochemical component in tropical zooplankton, to what extent protein is used as a metabolic substrate is still uncertain.

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