# EUPHAUSIIDS OF THE WEST COAST OF INDIA

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# EUPHAUSIACEA (CRUSTACEA : ZOOPLANKTON) OF THE EXCLUSIVE ECONOMIC ZONE OF THE WEST COAST OF INDIA

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## ABSTRACT

The euphausiids (Class Crustacea: Order Euphausiacea) one of the major components of the marine zooplankton occurring in the EEZ of the west coast of India (eastern Arabian Sea) and collected during the cruises of FORV *Sagar Sampada* during 1985-1992 period from the epipelagic zone were subjected to specieswise study for their distribution in space and time and for their ecology and biology. Seventeen species were encountered of which *Pseudeuphasia latifrons* (at an average density of 258/1000m$^3$ of water), *Euphausiia diomedeae* (1,256), *E. sibogae* (1,437), *Nematoscelis gracilis* (309), *Stylocheiron armatum* (230) and *S. affine* (216) were the most abundant and cosmopolitan in occurrence. The other 17 species namely *Thysanopoda monacantha, T. tricuspidata, T. astylata, E. tenera, E. pseudogibba, Nematobrachion flexipes, S. suhmii, S. microphthalma, S. longicorne, S. abbreviatum* and *S. maximum* were rather sparsely distributed and their average number per 1000m$^3$ of water ranged between 10 and 151 only. The major species exhibited marked variations in population during different months and seasons mainly depending on the changes in the environment. All the major species had a southwest monsoon and post monsoon abundance. The euphausiids had the maximum density of 3,942 per 1000m$^3$ in the continental shelf waters where the depth to the bottom ranged from 51 to 100 m. The southern latitudes of the study area always supported more euphausiids, the

reason being environmental. The populations gradually tapered to the north. A pronounced variation in the day/night abundance was observed for majority of the species indicating diurnal vertical migration. *E. diomedeae* was found to perform strong vertical migration against *S. affine* which migrated the least. The different life stages such as adults, juveniles and larvae exhibited varying degrees of vertical migration, always the larvae being the least migrating. Notable variations in the different latitudinal sectors during the major seasons and months were shown by the major species, a phenomenon attributed to changes in the environment. The pattern of movement of euphausiids between shelf and oceanic waters during different seasons showed that from an equilibrium level during the premonsoon season the population increased in the shelf region during the monsoon and reached the maximum during the postmonsoon season. However, marked variations were found among individual species. The monthly variations among species in the shelf and oceanic waters were also worked out. A study of latitudinal and seasonal variations in the shelf and oceanic areas for the various species threw some light on their north-south movement during different seasons in the different environments. In this tropical environment all the species showed almost continuous breeding with varying intensities. However, a study of the monthly abundance of the adults, the juveniles and the larvae and also the spermatophore and egg bearing animals in the population gave indications on the breeding periods of the major species; the peak periods being April, May and November for *P. latifrons*, April, May, July and November for *E. diomedeae*, August, September and October for *E. sibogae*, July and November for *N. gracilis*, March, April and May for *S. armatum* and April, August, September and November for *S. affine*. A study of the spermatophore bearing males and females indicated that the copulation success was minimum among the various species.

The numerical abundance of each species and total euphausiids estimated for space and time and in their different combinations were statistically tested for significance. The biodiversity analyses were performed to calculate richness, diversity and evenness of species in each station using univariate techniques. Multivariate techniques were used to evaluate both among the stations and among the sites patterns in overall biodiversity.

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# SPATIAL DISTRIBUTION OF EUPHAUSIIDS

Gopalakrishnan and Brinton (1969) highlighted the significance of looking into the distribution of Euphausiacea as a whole in space. According to them as majority of the euphausiid material consists of larvae and immature specimens, as all the species pass through similar developmental stages and as the younger stages of most species are restricted to the near surface strata, it is to be expected that the euphausiid community as a whole is representatively sampled. Their further reasoning towards this point is concerned with the appendages that function in feeding, based on which the genera are distinguished. Whether the food is gathered selectively or by filtering, those species whose feeding habits have been studied are generally recognised as omnivorous and, hence, play similar role in the food chain. This may be particularly true in the epipelagic part of the tropical zone. Therefore, they concluded that euphausiids constitute an ecological entity in a broad sense. Keeping in view of the above reasons, the euphausiids as a whole are considered in the present studies apart from a specieswise treatment given for all the parameters.

**Euphausiids in general**

The euphausiids as a group were found widely and abundantly distributed in the present study area comprising the Arabian Sea part of the EEZ (Fig. 11). Their average numerical density in the epipelagic zone (0 to 150 m) was estimated at 3,170 per 1000$m^3$ of water filtered. (All the numerical values mentioned hereafter will be number per 1000 m3 of water filtered by the sampling net). In a preliminary study made by Mathew *et al.* (1990) the average density of euphausiids in the same area was estimated as 3,680 which is higher than the present value . (This higher value might have crept in by error on the mistaken identity of the earlier larval stages of euphausiids with that of sergestids and decapod larvae while sorting the zooplankton taxa). However, the present value is highly comparable with the average values obtained for any other sea areas. Gopalakrishnan and Brinton (1969) estimated the euphausiid abundance in the range of 2,500 to 4,000 for the area north of the equator in the Indian Ocean and more than 1,000 for the major part of the Indian Ocean. Ponomareva (1966) estimated the euphausiid density for the entire Pacific Ocean and found that majority of the areas comprising the tropics and the subtropics contained euphausiids at the rate of 100-500. However,