

## Major Crustacean Groups & Zooplankton Diversity around Andaman-Nicobar Islands

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Crustacea formed the bulk of the zooplankton collected from the Andaman Sea. Species composition and distribution of major crustacean groups, viz. Copepoda, Ostracoda, Euphausiacea and Decapoda in general showed a mixture of oceanic and neritic species with euryhaline species dominating the composition. Their distribution is compared with other studies. Species diversity and evenness in the distribution of species was quite high.

Species composition of the zooplankton from Andaman Nicobar area is little known. In this paper species composition of major groups of Crustacea, viz. Copepoda, Ostracoda, Euphausiacea and Decapoda and diversity of zooplankton are presented.

### Materials and Methods

Zooplankton samples were collected from 34 stations in Andaman Sea<sup>1</sup> during the 51 and 52 cruises of *R V Gangesani* (29 Jan. to 27 Feb. 1979). Samples were collected in vertical hauls (200-0 m) using a HT net (500  $\mu$ m mesh). Zooplankters were identified to species level as far as possible and counted from aliquots of samples. Distribution of common species of major groups from selected stations are presented in Figs 1 to 4. Diversity was calculated using the indices given by Margalef<sup>2</sup> and Heip<sup>3</sup> for species of zooplankton encountered from all groups and converting their numerical abundance to number per cubic metre.

### Results and Discussion

**Copepoda**- Copepods dominated the zooplankton and were the main contributors to the bulk of the biomass. Of the 48 species belonging to 33 genera 43 belonged to the suborder Calanoida and the rest to Cyclopoida. No harpacticoides were encountered in the samples. Fifteen species, viz. *Undinula vulgaris* (21%), *Euchaeta marina* (11.5%), *Pleuromamma indica* (9.3%), *Eucalanus monachus* (7.4%), *Aetideus giesbrechti* (5.8%), *Oncea* sp. (5%), *Corycaeus* sp. (3.9%), *Oithona* sp. (3.7%), *Candacia pachydactyla* (3.7%), *Eucalanus attenuatus* (3.3%), *E. mucronatus* (3.1%), *Sapphirina* sp. (2.9%), *Rhincalanus cornutus* (2%), *Copilia* sp. (2%), and *Temora stylifera* (1.9%) contributed to about 86.5% of the total copepod

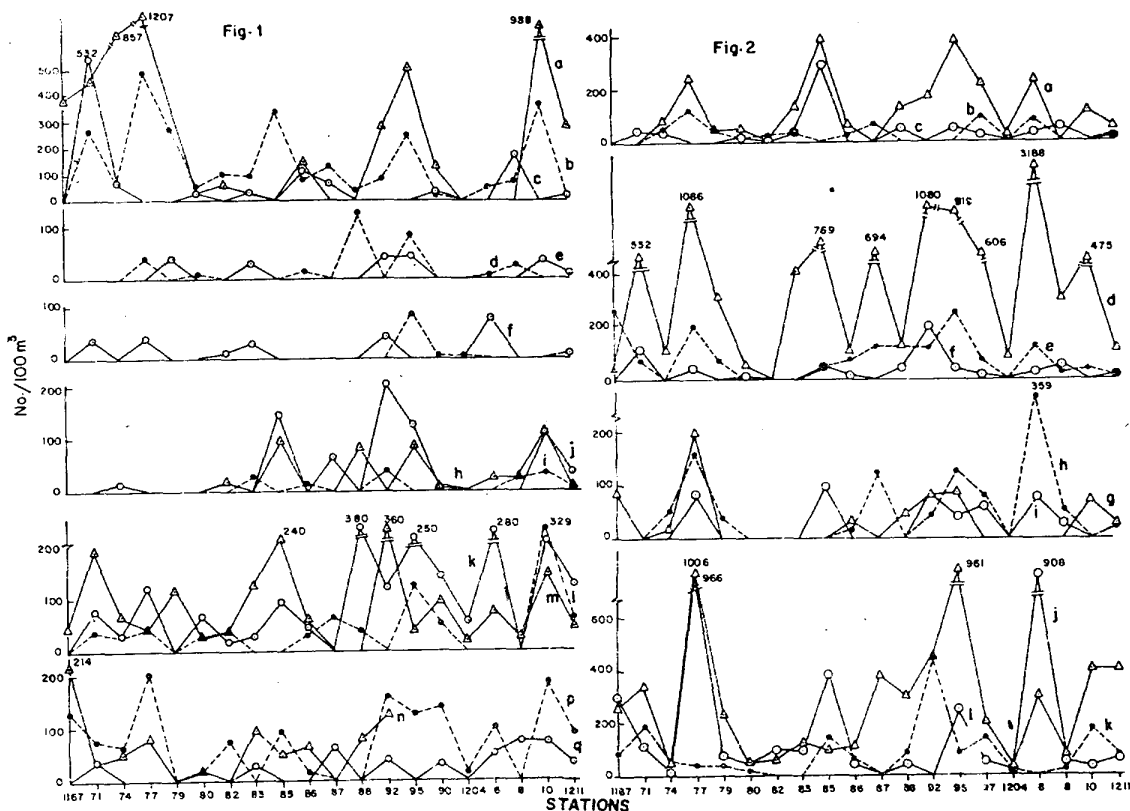
counts. These species were generally present in most of the stations although there were variations in their counts (Figs 1 and 2).

Some species like *Canthocalanus pouper*, *Calocalanus pavo*, *Euchaeta concinna*, *Rhincalanus nasutus*, *Eucalanus crassus*, *Centropages tenuiremis*, *C. gracilis*, *Temora turbinata*, *Calanopia* sp., *Tortanus forcipatus*, *Acartia erythraea*, *Candacia discaudata* and *Labidocera acuta* which are common in the coastal waters of the Indian peninsula<sup>4,5</sup> were represented only at a few stations. Some of the oceanic forms like *Euchaeta longicornis*, *Scolecithricella nicobarica*, *Scaphocalanus* sp., *Scottocalanus* sp., *Pleuromamma xiphias*, *Gaetanus armiger* and *Euchirella amoena* also occurred sparsely. Other species which exhibited a fair but discontinuous distribution were *Undinula darwini*, *Eucalanus elongatus*, *Euchaeta wolfendeni*, *Centropages furcatus*, *C. calaninus*, *Paracalanus* sp., *Acrocalanus* sp., *Scolecithrix dana*, *Temora discaudata*, *Lucicutia* sp., *Haloptilus longicornis*, *Pontellina plumata* and *Acartia ambonyensis*.

In general, the composition of copepods was constituted by a mixture of neritic and oceanic species with euryhaline marine forms dominating the counts. In the coastal waters although species like *Undinula vulgaris* and *Euchaeta marina* occur fairly commonly, the copepod counts are usually dominated by smaller forms like *Acrocalanus* spp, *Paracalanus* spp and *Acartia* spp. Species like *Pleuromamma indica*, *Aetideus giesbrechti*, *Scolecithrix dana*, *Lucicutia* sp. and *Haloptilus longicornis* which were usually common in the present collections rarely occur in neritic waters. Some of the species like *Eucalanus elongatus*, *Euchaeta wolfendeni*, *Centropages calaninus*, *Temora discaudata*, *Pontellina plumata* and *Haloptilus longicornis* were better represented on the western side of the Andaman islands.

Zoogeography of Indian Ocean plankton has been recently reviewed by Rao<sup>6</sup>. Although there is a vast

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Figs 1 and 2— Distribution of copepod species in the Andaman Sea [1: (a) *Pleuromamma indica*, (b) *Acteocina giesbrechti*, (c) *Eucalanus mucronatus*, (d) *Acartia amboynensis*, (e) *Pontellina plumata*, (f) *Centropages furcatus*, (g) *C. calaninus*, (h) *Euchaeta wolffeni*, (i) *Eucalanus elongatus*, (j) *Urdinula darwini*, (k) *Copilia* sp., (l) *Oithona* sp., (m) *Corycaeus* sp., (n) *Rhincalanus cornutus*, (p) *Sapphirina* sp. and (q) *Haloptilus longicornis*. 2: (a) *Onca* sp., (b) *Scolecithrix dana*, (c) *Acrocalanus* sp., (d) *Urdinula vulgaris*, (e) *Eucalanus attenuatus*, (f) *Paracalanus* sp., (g) *Lucicutia* sp., (h) *Temora stylifera*, (i) *T. discoidata*, (j) *Euchaeta marina*, (k) *Candacia pachydactyla* and (l) *Eucalanus monachus*.]

literature on various groups of zooplankton, comprehensive accounts of distribution of many species, especially of Copepoda are few. Tanaka<sup>7</sup> discussing the distribution of the genus *Euchaeta* reported that *E. marina* which was very common in the present study is widely and densely distributed in the Indian Ocean during SW monsoon but is absent in the Bay of Bengal during the same season. But an earlier study<sup>8</sup> indicated that this species is common in the Bay during SW monsoon also. *E. concinna* which is considered to be most abundant in the Bay of Bengal during NE monsoon<sup>7</sup> was represented only at 2 stations in this study. Among Candaciids, *C. pachydactyla* reported to be widely distributed north of 10°N in the Indian Ocean<sup>9</sup> was the most common form. *C. discaudata*, another common species of the Bay of Bengal was also recorded. *Pleuromamma indica* was common in the Arabian Sea and Bay of Bengal<sup>6</sup> while *Haloptilus longicornis* was the most common species of the genus in the Indian Ocean<sup>10</sup>.

*Ostracoda*—Ostracods were fairly abundant in the

area and represented in 97% of the samples. Of the 17 species identified from the collections 16 belonged to the family Halocyprididae and 1 to Cypridinidae. *Halocypris brevirostris* (39.5%), *Spinoecia porrecta* (15.9%), *Metaconchoecia rotundata* (14.4%), *Conchoecia giesbrechti* (9.7%), *Orthoconchoecia striola* (5%), *O. atlantica* (4.7%) and *Euconchoecia aculeata* (4.7%) were the common species (Fig. 3).

*Cypridina dentata* which is very common in the Arabian Sea<sup>11</sup> was represented in low numbers at 2 stations on the eastern side of the Little Andaman Island. *Paraconchoecia elegans*, *P. discophora*, *P. procera*, *P. decipiens*, *Conchoecetta acuminata*, *Orthoconchoecia bispinosa*, *Spinoecia parthenoda*, *Conchoecia magna* and *Conchoecilla daphnoides* were the other species albeit sparsely occurring in the collections.

Of the 16 species of ostracods recorded earlier from the Andaman Sea<sup>11</sup>, *Microconchoecia curia* and *Platyconchoecia prosadena* were not represented in the present collections. All the 7 common species observed

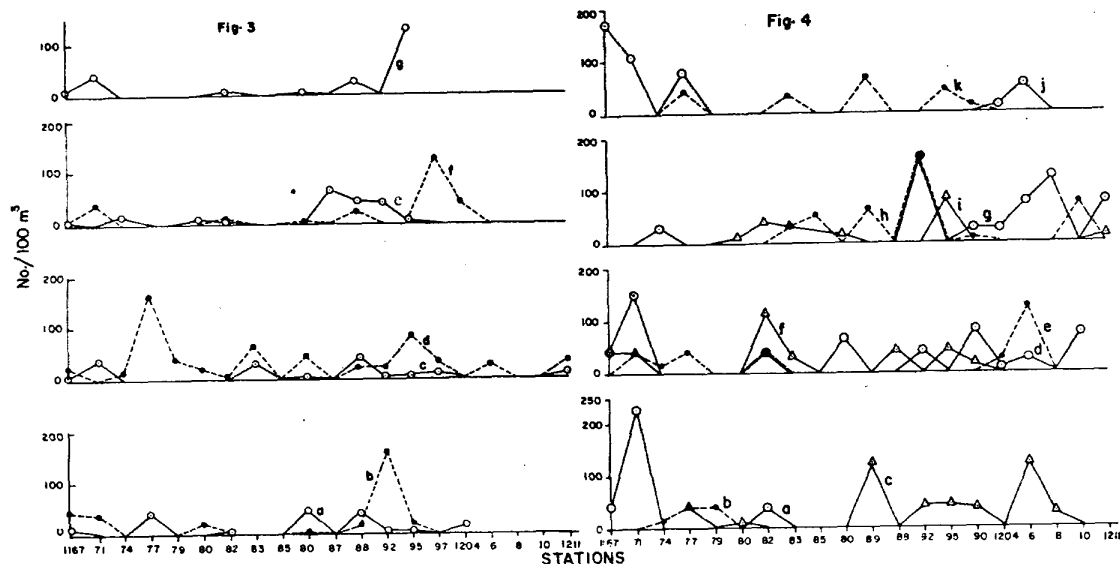


Fig. 3—Distribution of Ostracod species in the Andaman Sea [(a) *Orthoconchoecia atlantica*, (b) *Metaconchoecia rotundata*, (c) *O. striola*, (d) *Spinocella porrecta*, (e) *Euchonchoecia aculeata*, (f) *Conchoecetta giesbrechti* and (g) *Halocypris brevirostris*.]

Fig. 4—Distribution of Decapod and Euphausiid species in the Andaman Sea [(a) *Thalassocaris* spp., (b) *Hippolyte* spp., (c) *Brachyuran* zoea, (d) *Lucifer typus*, (e) *L. hanseni*, (f) *Sergestes* spp., (g) *Euphausia sibogae*, (h) *E. diomedea*, (i) *Thysanopoda* sp., (j) *Nematoscelis gracilis* and (k) *Stylocheiron carinatum*.]

in the present study showed a wide distribution in the Indian Ocean. *Conchoecilla daphnoides*, an equatorial species occurred at 2 stations on the eastern side of the Car-Nicobar and Little Andaman Islands. *Conchoecetta acuminata*, reported to be a rare species in the Indian Ocean, also occurred only at 2 stations east of North and Little Andaman Islands. *Orthoconchoecia bispinosa* and *Paraconchoecia discophora* having rare distribution in the Indian Ocean are new records for the Andaman Sea. All the reported species from the Andaman Sea are widely distributed in the Atlantic, Pacific and Indian Oceans<sup>11,12</sup> except *P. decipiens* and *O. striola* which are Indo-Pacific.

**Euphausiacea**—Euphausiids occurred in all stations although generally in low numbers. Juveniles of euphausiids formed about 25% of their total numbers. *Euphausia sibogae* (22.2%), *E. diomedea* (8.2%), *Thysanopoda aequalis* (7.7%) and *Nematoscelis gracilis* (7.6%) dominated the counts (Fig. 4). *Pseudeuphausia latifrons*, *N. microps*, *Stylocheiron affine*, *S. carinatum*, *S. elongatum*, *S. indicum*, *S. longicorne* and *Thysanopoda monacantha* were the other species that occurred in the collections. Distribution of euphausiids was in general similar to earlier studies from the Indian Ocean<sup>13,14</sup> except that *Pseudeuphausia latifrons* reported to be abundant in the coastal waters of India and Andaman Sea was only occasionally represented in the present collections.

**Decapoda**—Members of the family Sergestidae

contributed to the majority of decapods (41.5%) followed by carideans (31.3%), brachyurans (15.6%), penaeids (8.7%) and other decapod larvae (Fig. 4). A similar trend had been observed in the general composition of decapoda in the IIOE samples also<sup>15</sup>.

Among sergestids, the oceanic form, *Lucifer typus* dominated (18.3%) followed by *L. hanseni* (8.5%) and larvae of *Sergestes* spp (7.9%). Both the species of *Lucifer* were distributed around Andaman and Nicobar islands. On the other hand, *L. pencillifer* which abundantly occurs in the Bay of Bengal<sup>8</sup> was collected from a few stations in small numbers. *L. faxoni* which also is fairly common along the east coast of India<sup>8</sup> was not collected in this region at this time. Of the larvae of other species of *Sergestes* recorded, viz. *S. orientalis*, *S. crassus*, *S. cornutus* and *S. atlanticus*, *S. orientalis* has been reported from the plankton of southeast and southwest coasts and *S. crassus* from southwest coast of India<sup>16,17</sup>. The other 2 species of *Sergestes* larvae appear to be new records from the Andaman Sea as well as Indian waters. *S. cornutus* was collected at sts 1164 and 1197 whereas *S. crassus* and *S. atlanticus* were recorded from a single station each (1197 and 1195 respectively), in small numbers.

Larvae of *Metapenaeus* spp, *Parapenaeopsis* spp, *Penaeopsis rectacuta*, *Solenocera indica* and *Gennadas* spp were collected around the Andaman Island in small numbers. Among the penaeid larvae *Solenocera indica* (4.5%) and *Penaeopsis rectacuta* (2.8%) were the

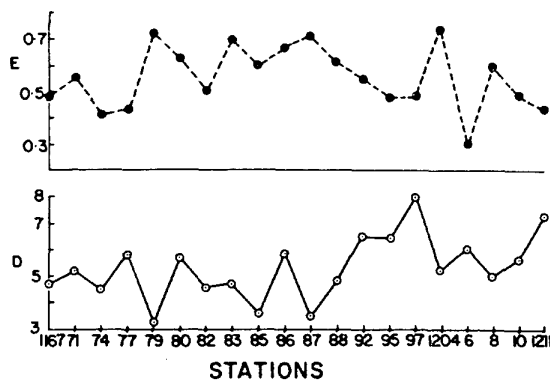


Fig. 5—Species diversity indices from selected stations

$$\left[ D = \frac{S-1}{\log_e N} \text{ and } E = \frac{e^H - 1}{S-1} \right]$$

main forms, the latter had been reported to be a major constituent of penaeids of the Andaman Sea<sup>18</sup>.

Larvae of *Thalassocaris* spp (10.8%), *Alpheus* spp (7.9%) and *Hippolyte* spp (3.3%) were the main carideans that contributed to the decapod composition. Other caridean larvae such as *Leptochela aculeocaudata*, *Processa* spp and *Periclimenes* spp occurred in small numbers at 1 or 2 stations.

Non caridean larval forms such as *Axiu* spp, *Calocaris* spp, *Callianassa laticauda* and *Callianassa* sp. were collected from mostly a single station each.

Brachyuran zoeae were fairly abundant and were present at all stations. Their maximum density 127/100 m<sup>3</sup> was observed at st 1206. Larvae of Anomura were rare and confined to a few stations on the western side of Andaman Island.

**Species diversity**—Species diversity index (D) varied between 3.2 at st 1179 and 8.1 at st 1197 (Fig. 5). The diversity was fairly uniformly high around the islands except for a low patch on the eastern side of the Andaman island (sts 1185 and 1187). Evenness in distribution of species (E) was usually high as typical of the oceanic waters. It was generally high on the eastern side of the islands and showed an inverse relationship

with biomass. Evenness was quite high compared to values generally obtained in coastal waters<sup>5</sup> and quite comparable to data available<sup>8</sup> from oceanic regions along the east coast of India.

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