

ON THE SPECIES OF *ACARTIIDAE* (COPEPODA : CALANOIDA)
COLLECTED DURING THE INTERNATIONAL INDIAN OCEAN
EXPEDITION

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ABSTRACT

Species of the Calanoid copepod of the family Acartiidae were studied from the samples emanated from the International Indian Ocean Expedition. Seven species of the genus *Acartia* Dana were represented in the collections with one new record. *A. negligens* and *A. danae* were the most abundant and widespread species. *A. amboinensis* was observed to be common in the Australian coastal waters. High densities of the above three species were encountered in the productive up-welling areas. *A. fossae* was reported here for the first time from the Indian Ocean, between 20°S and 30°S latitude near Australia.

Key-words : *Acartia*, Copepods, Indian Ocean.

INTRODUCTION

Acartiidae are planktonic copepods inhabiting estuarine, neritic and oceanic biotopes. This group forms the major zooplankton component in brackish water environments. Earlier studies carried out from Indian Ocean on the systematics and distribution of the group are mainly confined to the coastal regions. Sewell (1932 and 1947) had discussed the distribution of Acartiidae from the Indian Ocean and adjacent waters. The distribution of the dominant *Acartia* species was discussed from the South African coast (De Decker and Mombeck, 1964) and from the neritic waters of Pakistan (Haq, Alikhan and Chutgai, 1973). Haridas and Madhupratap (1978) described a new species from the Laccadive Sea. This paper deals with the species composition and distribution of the species belonging to the family Acartiidae based on the zooplankton collections made during the International Indian Ocean Expedition (IIOE, 1960-65).

MATERIAL

Acartiidae were examined from the 343 standard samples (IOBC, 1969) subsorted at the Indian Ocean Biological Centre. The standard procedure adopted

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for the analysis of the copepods was given by Saraladevi, Stephen and Rao, (1979). In order to facilitate additional information from coastal environments, 97 samples were also analysed from waters around Indian Peninsula, Southwest Australia and Southeast Africa.

RESULTS

In the IIOE collection, species of the genus *Acartia* under the sub-genera *Acanthacartia*, *Odontacartia* and *Acartia* are found. Altogether 7 species were recorded which are listed below, with a brief description of *A. pietschmani*, *A. fossae* and *A. amboinensis* :

Subgenus *Acanthacartia* Steuer
 Acartia (*Acanthacartia*) *pietschmani* Pesta

Acartia pietschmani Steuer, 1923 p. 109 Figs. 92-93.
Acartia pietschmani Farren, 1936 p. 119 Fig. 21
Acartia pietschmani Sewell, 1932 p. 395

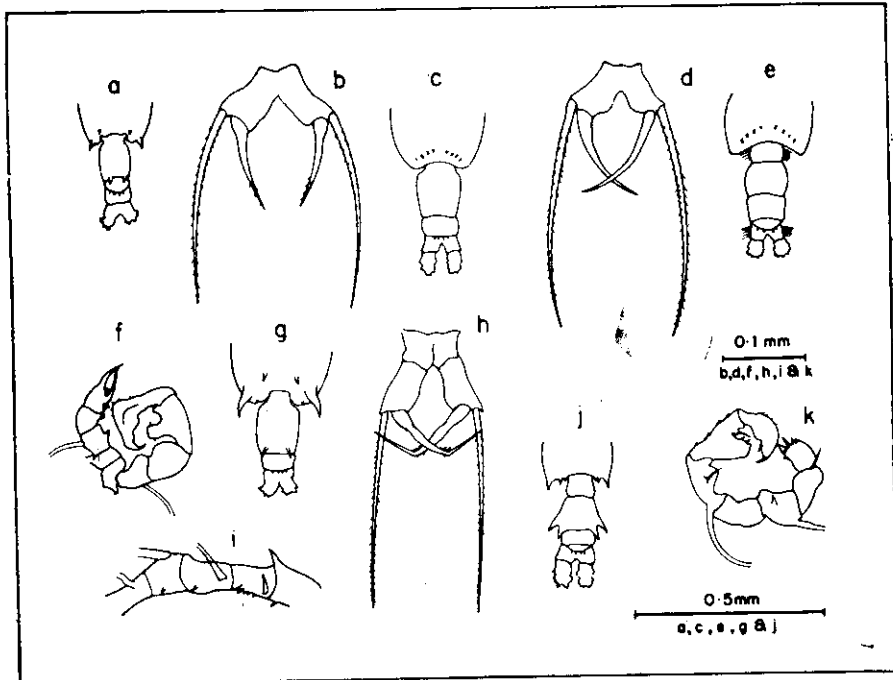


Fig. 1. (a) *Acartia pietschmani* female, posterior metasome (b) fifth leg; (c) *A. fossae* female, posterior metasome (d) fifth leg; (e) male posterior metasome (f) fifth leg; (g) *A. amboinensis* female, posterior metasome (h) fifth leg; (i) Antennule, segment 1 to 5; (j) male posterior metasome (k) fifth leg.

Female : Length 1.0 to 1.25 mm Fig. 1 (a and b). Rostral filaments present posterior metasome with one pair of thick lateral spines and thin dorsal spines. Urosome 3 segmented, Genital segment with 2 dorsal spines, segment 2 with 4 minute spinules. Antennules with anterior distal and posterior ventral spine. Leg 5 claw naked, with a swollen base. Male unknown.

A. (Acanthacartia) fossae Gurney

Acartia (Acanthacartia) fossae Gurney, 1927 p. 156-57 Fig. 22.

Female : Length 1.2 to 1.4 mm Fig. 1 (c & d)

Rostral filaments present posterior metasome round with a row of 4 spinules on each side. Genital segment with lateral hairs, segment 2 with posterior hairs. Leg 5 terminal claw smooth and curved.

Male : Length 1.2 to 1.3 mm Fig. 1 (e & f)

General shape as in female. Urosome segment 1 and furca with lateral hairs. Left leg basipod 2 with inner conical spine, exopod 1 with inner distal hairs, terminal exopod segment with apical spine and an inner curved spine. Inner border with tufts of hairs.

Subgenus *Odontacartia* Steuer

Acartia (Odontacartia) amboinensis Carl

Acartia amboinensis Steuer, 1923 p. 120 Figs. 151-156.

Acartia amboinensis Sewell, 1932 p. 396

Acartia amboinensis Tanaka, 1965 p. 390 Fig. 246.

Female : Length 1.25 to 1.4 mm. Fig. 1 (g—i).

Rostral filaments present. Posterior metasome with thick lateral and delicate dorsal spines. Urosome 3 segmented. Genital segment with 2 pair of spines. Middle segment with 4 spinules. Antennule with 4 minute spines on segment 2. Leg 5 terminal claw with 2 basal swellings.

Male : Length 1.2 to 1.3 mm. Fig. 1 (j & k).

General shape as in female. Leg 5 left basipod with inner spine, exopod 1 smooth, exopod 2 smooth, terminal exopod segment with blunt distal end with 3 spines and an inner spine. Right leg, exopod 1 inner seta across the inner projection, exopod 2 with large inner process bearing lateral spines. Terminal joint curved with spinules and with one apical spine and an inner delicate spine.

A. Odontacartia erythraea Giesbrecht

A. Odontacartia pacifica Steuer

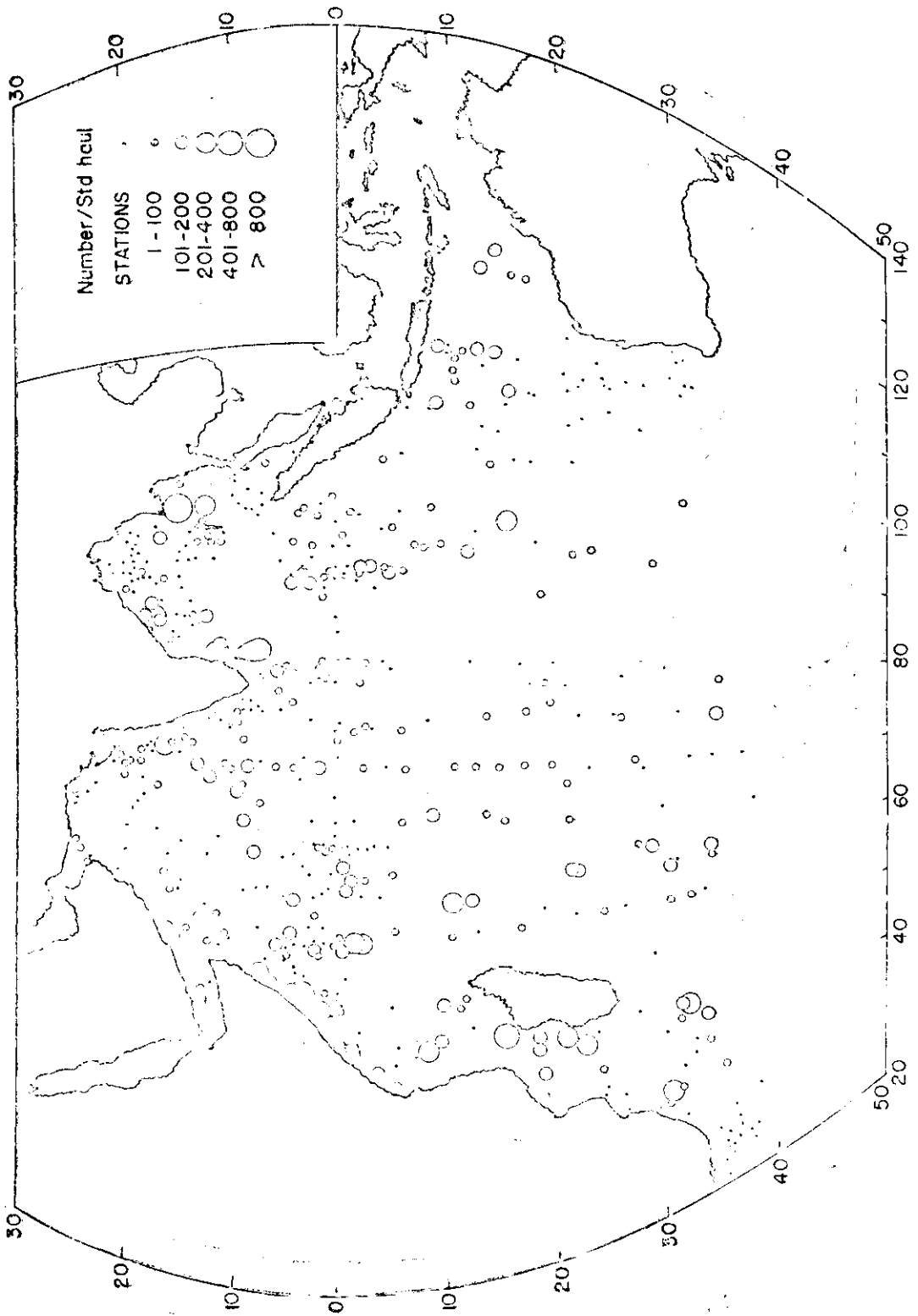
Subgenus *Acartia* Wilson

Acartia (Acartia) danae Giesbrecht

A. Acartia negligens Dana

A. negligens (Fig. 2):

This was the most abundant species and showed wide distribution being recorded from 216 stations. Areas of abundance were mainly located in the

Fig. 2. Distribution of *Acartia negligens* in the Indian Ocean.

African coast. Highest density of > 800 per standard haul was observed at two stations, one in the Somali region and the other near Rangoon.

Acartia danae (Fig. 3):

This species was present at 89 stations. The distribution pattern indicated the affinity of the species to the nearshore waters. Maximum number of > 400 was recorded from the African coast. Compared to the north Indian Ocean the species was more abundant in the southern areas.

Acartia amboinensis (Fig. 4):

The species was present at 47 stations and was abundant in the Arabian coast, Gulf of Cambay and along the west coast of India. In the southern region the species was observed at a few stations near South Africa and Australia.

Acartia pietschmani (Fig. 4):

This was a rare species present at 9 stations in the equatorial region.

Acartia erythraea and *A. pacifica* (Fig. 4):

The former species was very rare in the IIOE being recorded from 8 stations in the Indian neritic waters only. *A. pacifica* showed a scattered distribution in the Indian Ocean, but was well represented in the Indonesian and Australian waters. Its presence was observed from 31 stations.

A. fossue (Fig. 4):

This is the first report of the species from the Indian Ocean. This species was recorded from 17 stations near Australia between latitudes 20°S and 30°S . The species was found along with *A. danae*. It was also observed that *A. negligens* was absent in these stations.

DISCUSSION

The species of the genus *Acartia* is very characteristic in geographical distribution. Many species are restricted to estuarine and coastal habitats. Steuer (1923) gave a general idea of the distribution of Acartiidae in the world oceans. Bradword (1976) described members of the genus *Acartiura* with remarks on distribution. Brylinski (1981) discussed the distribution of *Acartia tonsa* in European waters. From the Indian Ocean a comprehensive account on the distribution of Acartiidae is lacking. Sewell (1932) gave an account of Acartiidae recorded till then from the Indian Ocean and adjacent areas. The

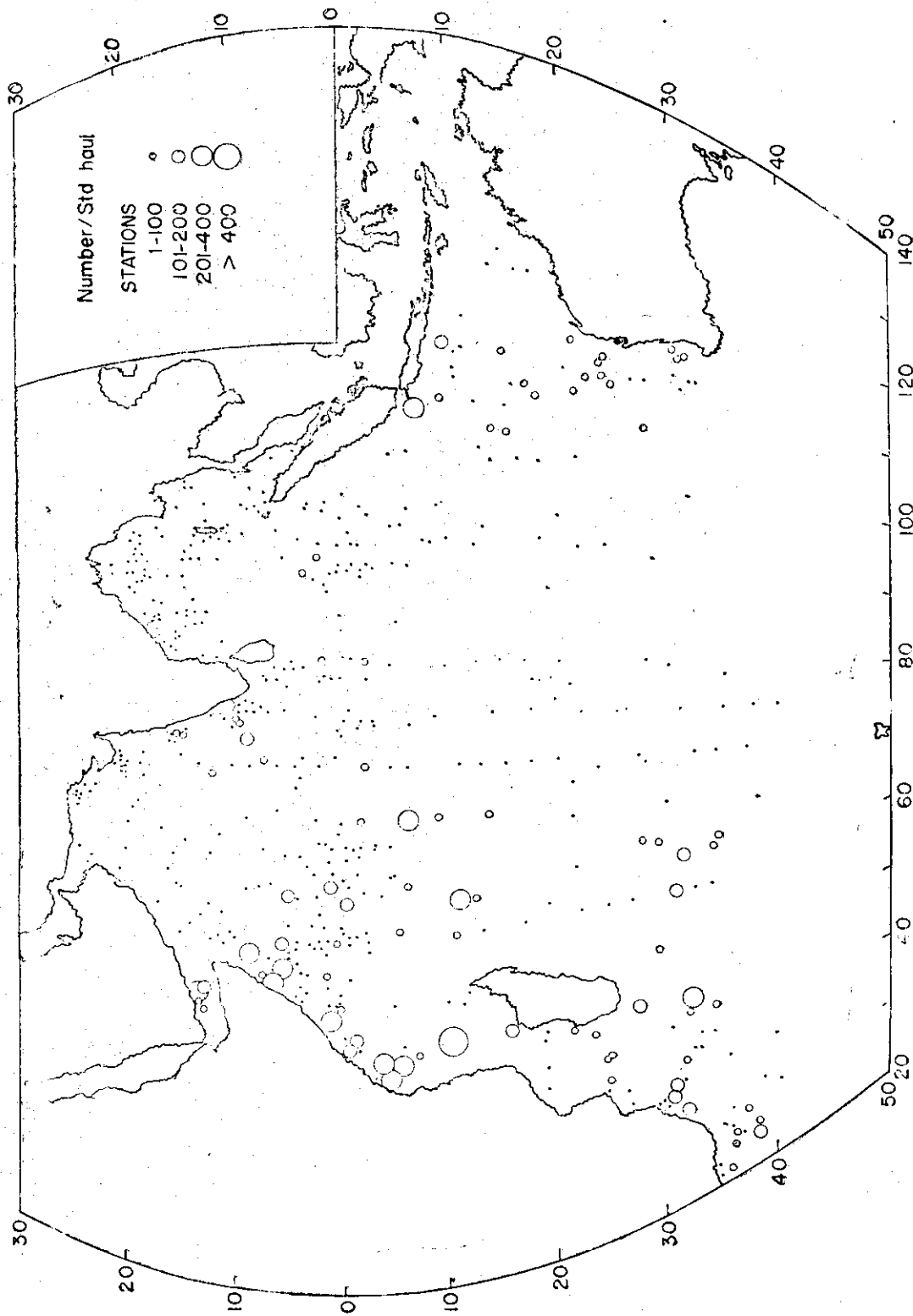


Fig. 3. Distribution of *Acartia danae* in the Indian Ocean.

distribution of some species in the Indian Ocean and contiguous seas was attempted by Sewell (1948). In the present study only oceanic species were encountered since majority of the zooplankton collections of the IIOE were from open ocean. Of the seven species present, *A. negligens* and *A. danae* were the numerically abundant and widely distributed species. Though the two species were found to coexist, the former exceeded the latter in abundance. Both the species had been reported to be common in the warm areas of Atlantic, Pacific and Indian Oceans (Tanaka, 1965). High densities of the two species were noted along the upwelling areas. *A. negligens* though wide spread in the waters near Australia. Tranter (1977) had observed *A. negligens* in the eastern Indian Ocean and included it in the warm water cosmopolitan coenosis. *A. danae* was very rare in the northern Arabian Sea. Sewell (1932) mentioned that the species was far from common in Indian waters. But De Decker and Mombeck (1964) observed the species to be common in South African waters. In the IIOE material also the species was well represented in African and Australian waters.

Acartia amboinensis is a typical Indo-Pacific species which was first described by Carl from the Malay archipelago. Since then it has been reported from the northern Arabian Sea and Bay of Bengal (Sewell, 1947), the coast of Pakistan (Haq, Alikhan and Chutagi, 1973) and from the north-western Pacific (Tanaka, 1965). The only record of *A. amboinensis* from southern part was from the Agulhas region (De Decker and Mombeck, 1964). In the present study also, the species was observed from South-west Australian regions. The species is strictly confined to the Indo-Pacific regions. The study of copepod population in the Atlantic coast of South Africa by De Decker (1973) did not include *A. amboinensis*. Haq, Alikhan and Chutagi, (1973) listed it as the most dominant copepod in the shelf and slope regions of Pakistan. During the present analysis the species was found to be abundant in the Gulf of Aden, Gulf of Oman and the west coast of Indian Peninsula. This study clearly showed that *A. amboinensis* is widespread in the coastal environment of Indo-Pacific area.

A. erythraea is a coastal species and was recorded mostly from the nearshore waters. Though *A. pacifica* had been recorded from the Indian Ocean it was not a common form (Sewell, 1932). In the present study maximum population density of this species was observed around India in the south east Indian Ocean between, Java and Australia.

Under the subgenus *Acanthacartia* only two species namely, *A. pietschmani* and *A. fossae* were encountered in the IIOE material. The former species has been recorded from the north Indian Ocean (Sewell, 1929). In the present study the species was found scattered in the equatorial region. From the scanty representation of the species it is difficult to trace the distribution, but it may be considered as an equatorial species.

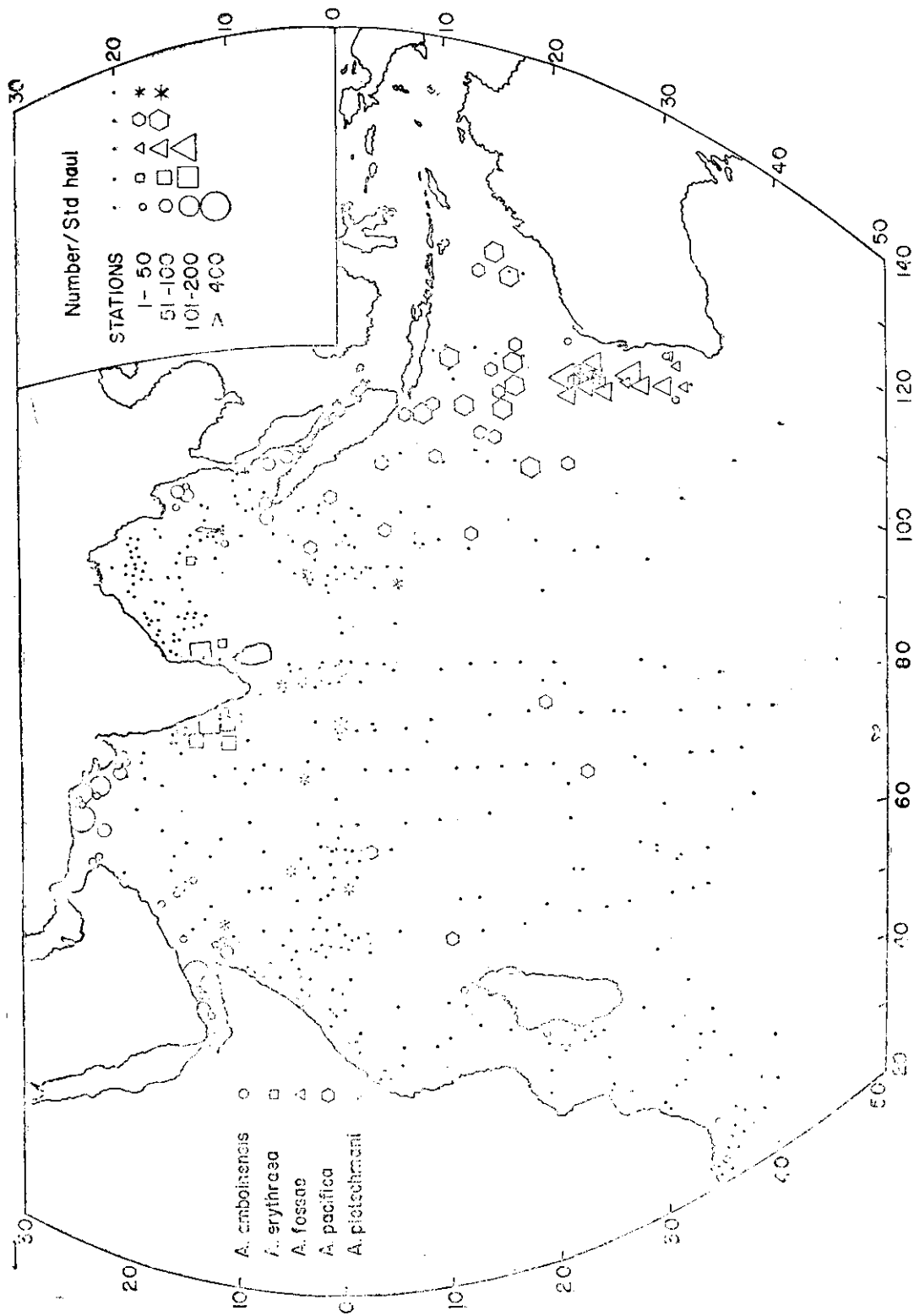


Fig. 4. Distribution of *Acartia amboinensis*, *A. pietschmani*, *A. erythraea*, *A. pacifica* and *A. fossae* in the Indian Ocean.

A. fossae is reported for the first time from the subtropical region of the South Indian Ocean mostly in waters near west Australia. The examination of the samples from South African coast did not show its occurrence in that area. Since the first record of the species from the Suez Canal (Gurney, 1927) very few observations were made on *A. fossae*. Lakkis (1981) recorded the species from the Mediterranean Sea. Examination of a series of plankton samples from the west coast of Australia also showed the presence of the species in that area. Since the species is restricted to this area and the previous records were from Suez Canal and Mediterranean Sea, it can be considered as an inhabitant of subtropical waters. A closely allied species *Acartia dweepi* had been found in the tropical region namely Laccadive Sea (Haridas and Madhupratap, 1978).

Geographic distribution for many copepod groups had been postulated by Copepodologists based on the study of some groups of copepods. Fleminger and Hulsemann (1973) suggested 2 generalities of warm water distribution evident from the study of 5 calanoid genera. In the first category, the species breed regularly up to mid-latitudes and shows circumglobal distribution, whereas in the second group the species breed only in low latitudes and shows provincialism and may have tropical cognates. In the species described in this paper all except *A. fossae* can be grouped in the first category. *A. fossae* is found between 20°S and 30°S latitudes in both hemispheres with a tropical cognate, *A. dweepi*, in the tropical Indian Ocean. The study of the *Acartia* population revealed the highest concentration of the wide spread species namely *A. negligens*, *A. danae* and *A. amboinensis* to be located in the upwelling areas. *A. pacifica* though not widespread, was also associated with the productive environment off Java.

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