

**Mysids (Crustacea) from the shallow waters off Maharashtra and south Gujarat, India,
with description of a new species**

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Abstract

Taxonomy, ecology and distribution of mysids collected from the coastal waters of Maharashtra and South Gujarat, India, are presented. Fourteen species belonging to seven genera are represented of which one species, *Acanthomysis microps*, is described as new to science. The new species is distinguished from all the known species of the genus by the combination of broadly rounded rostrum, narrower eyes and the spination of the uropodal endopod and telson. Other species recorded are *Siriella dubia*, *S. jonesi*, *Rhopalophthalmus mumbayensis*, *R. anishi*, *R. murudana*, *R. vijayai*, *Gastrosaccus dunckeri*, *Eurobowmaniella muticus*, *Afromysis dentisinus*, *Acanthomysis pelagica*, *A. platycauda*, *A. macrops*, and *Mesopodopsis orientalis* and the differences shown by the present specimens from the published description are fully discussed with figures.

Key words; *Crustacea, mysids, new species, shallow waters, India*

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Introduction

In the nearshore waters of India, several species of mysids form an important component of zooplankton, feeding mainly on detritus and diatoms and play an important role in the nutrient regeneration. The mysids in turn are eaten by estuarine fishes like *Megalops cyprinoides*, *Polynemus tetradactylus*, *Etroplus suratensis* and the prawn *Parapenaeopsis styliifera* (Rao 1970; Varghese 1981; Jhingran 1975). The shallow water mysids of the Indian region are rich and diverse and our knowledge on them is limited to the works of W. Tattersall and Pillai. In a series of papers, W. Tattersall (1906, 1908, 1914, 1915, 1922) described the mysids collected mainly from the brackish waters of the east coast of India. Pillai (1957, 1961, 1964a-c) studied the littoral mysids of the Kerala coast. The real basis of our knowledge on the Indian Mysidacea was for the first time laid by Pillai (1973) when he published the Mysidacea of the Indian Ocean based on materials collected during the International Indian Ocean Expedition (IIOE) that sampled the epipelagic waters down to 200 m. To date no information is available on the Mysidacea of the brackish and coastal waters of Maharashtra and South Gujarat. During 1984 -1996, many biological and environmental investigations in and around coastal waters of Maharashtra and south Gujarath were carried out for the environmental impact assessment of marine ecosystem. The present materials were collected during such investigations. A total of seven genera and fourteen species were represented, of which one species is described as new. By the present study, much information is provided on the species composition, distribution and ecology of the Mysidacea of this area.

Materials and methods

Zooplankton samples collected from twenty locations between 18°-23°N and 69°-73°E were studied (Figures 1 and 2). Samples were collected with a Heron-Tranter net (Tranter et al. 1972) having a mouth area of 0.25 m² and a mesh size of 0.33 µm. Oblique hauls of 6 minutes duration were taken. The plankton samples were preserved in 5% formaldehyde solution.

Mysids were sorted out from the samples and were divided on the degree of development of the secondary sexual characteristics into juveniles, immature or young male and female, adult male and female. Total length of the specimens was measured from the tip of the rostral plate along the dorsal surface to the tip of the telson.

Location and sampling frequency

The number of stations sampled at each locality, and the details are given in table 1. In all locations depths was in between 5-20 m.

Results

Of the 20 localities sampled, mysids occurred at 15 areas. Samples taken at Mumbai harbour, Bhavnagar, Porbander, Veraval and Sutrapada yielded no mysids. Maximum density (7424 no.of inds./m³) was found at Thal and was constituted by a single species *Mesopodopsis orientalis*. Fourteen species representing seven genera were identified, of which one species is described as new. List of the species and the localities where they occurred are given below.

<i>Siriella dubia</i>	Dharamtar, Bassein, Daman, Diu
<i>Siriella jonesi</i>	Dahej, Jafarabad, Okha, Vadinar, Kandla
<i>Rhopalophthalmus mumbayensis</i>	Dharamtar, Thane, Bassein, Daman
<i>Rhopalophthalmus anishi</i>	Kasheli (Bassein)
<i>Rhopalophthalmus murudana</i>	Murud
<i>Rhopalophthalmus vijayai</i>	Dahej
<i>Gastrosaccus dunckeri</i>	Daman, Hazira, Dahej, Jafarabad, Diu, Okha, Vadinar, Kandla
<i>Eurobowmaniella muticus</i>	Bassein, Daman
<i>Acanthomysis pelagica</i>	Jafarabad
<i>Acanthomysis platycauda</i>	Dharamtar
<i>Acanthomysis macrops</i>	Dharamtar
<i>Acanthomysis microps</i> sp. nov.	Jafarabad
<i>Afromysis dentisinus</i>	Murud, Okha, Vadinar
<i>Mesopodopsis orientalis</i>	Dharamtar, Thal, Mahim, Versova, Bassein, Daman, Hazira, Jafarabad, Diu, Vadinar, Kandla

Description of species

SUBFAMILY: SIRIELLINAE

Genus *Siriella* Dana

Siriella dubia Hansen, 1910

(Figure 3A, B)

Siriella dubia Hansen, 1910: 44, plate 5, Figure 4a-e; W. Tattersall, 1922: 455, Figure 5a-b; 1936: 146, Figure 1; 1951: 79; Illig, 1930: 560; Ii, 1964: 131, Figure 35; Pillai, 1964c: 7, Figure 2; 1973: 42, Figures 13, 14.

Occurrence

Dharamtar	October and November 1984 12 adult males, 10 adult females, and 8 juveniles.
Bassein	April 1989 1 immature male, 1 immature female, and 28 juveniles.
Daman	March 1989 15 juveniles.
Diu	March 1989 1 immature male.

Length: adult male 6.5-7.4 mm, adult female 7.1-8.5 mm.

Remarks

The present specimens agree with the published description and figures but show some variations from the previous records. According to the description published by Hansen (1910) and Ii (1964) the apex of the telson is armed with four pairs of long spines successively increasing in length. In the present material, the apex is armed with only three pairs of spines (Figure 3A, B). Pillai (1973) found the inner pair of spines slightly shorter than the middle pair in female and just the reverse in male. In the present specimens, the inner pair of spines is the longest in both sexes (Figure 3A, B).

This species is unique in having the outer border of the proximal segment of the exopod of the uropod setose and also in having four equidistant spines spread along the entire border.

Hansen's specimen measured 6.6 mm, Li's 6.5 mm, Tattersall's 8 mm, and Pillai's 7.2 mm. The present material is 8.5 mm and the largest hitherto recorded.

Distribution

Hitherto this species has been recorded from Indonesia (Hansen 1910), Andaman Island, the Great Barrier Reef, Philippines (W. Tattersall 1922, 1936, 1951), and the Arabian Sea (Pillai 1964c, 1973)

Ecological note

This species is a shallow water form and was collected from 11- 0 m depth, where the bottom sediment was sandy or silty clay and occurred in temperature 26-29°C and salinity 29-36‰. The brood sizes varied between 10 (7.2 mm) and 22 (8.2 mm).

Siriella jonesi Pillai, 1964

(Figure 3C-K)

Siriella jonesi Pillai, 1964c: 11, Figures 5-6; 1973: 47, Figures 17-18.

Occurrence

Dhahej	November 1996 1 adult female and 1 immature male
Jafarabad	November 1996 1 adult male, 51 adult females, 2 young male, 1 young female, and 427 juveniles.
Okha	January 1990 6 juveniles
Vadinar	October -November 1995 1 immature male and 3 juveniles
Kandla	October 1996 6 adult males, 9 adult females, 3 immature females, and 16 juveniles.

Length: adult male 6-7 mm; adult female 5.8-6.5 mm.

Remarks

There are only two previous records of this species (Pillai 1964c, 1973). The original description was based on an immature male (5.6 mm) collected from the Arabian Sea (20°20'N 72°00'E). A second report on an adult male (8.8 mm) collected during International Indian Ocean Expedition (20°19'N 72°28'E) was made in 1973 and a detailed illustrated description was given. In the present collection, many adult and young males, females and juveniles were well represented.

The present specimens differ from those described by Pillai (1964c, 1973) in the following points. (1) The rostrum is more produced reaching the base of the antennular peduncle (Figure 3C). In Pillai's specimens the carapace is produced into a low rostrum. (2) The first segment of the antennular peduncle is shorter than the third segment (Figure 3D). In the Pillai's specimen, first segment is longer than the third segment. (3) Basal part of the telson carries two to three pair of spines as against two pair on the Pilla's specimen.

The adult female is recorded here for the first time and shows distinct sexual dimorphism as follows: In female, the rostrum is low and the carapace has a distinct dorsal nodule in front of the cervical sulcus (Figure 3E, F). The antennular peduncle of female is slender and the first segment is longer than the rest of the peduncle (Figure 3G). There are only 18-26 spines on the lateral margin of the telson (Figure H) as against 28-32 spines in male (Figure 3I). The inner margin of the endopod of the uropod has only 15-18 spines as against 19-23 in male (Figure 3J).

A prominent character of this species which has not been noticed by Pillai (1964c, 1973) is the short frontal spine of the labrum (Figure 3K). In all the species of *Siriella* except *S. lingvura* Li, 1964 and *S. spinula* Panampunnayil, 1995, the labrum is anteriorly produced into a very long spine, usually as long as or longer than the lip proper. In the present specimen the frontal spine is only 1/8 length of the lip proper.

Distribution

The two earlier records of this species are from the Arabian Sea (Pillai 1964c, 1973) and the present record is also from the same area. From the available information, it appears that this species has a restricted distribution and is confined to the Arabian Sea.

Ecological note

This is a littoral form living close to the coast in shallow waters. It has been found to occur in temperature and salinity ranging from 25-31°C and 26-41‰ respectively.

SUB FAMILY: RHOPALOPHTHALMINAE

Genus *Rhopalophthalmus* Illig

Four new species of *Rhopalophthalmus* - *Rhopalophthalmus mumbayensis*, *Rhopalophthalmus anishi*, *Rhopalophthalmus murudana* and *Rhopalophthalmus vijayai* were recorded during the present study and the details have already been published (Panampunnayil and Biju 2006) and hence are not dealt with here.

SUBFAMILY: GASTROSACCINAE

Genus *Gastrosaccus* Norman

Gastrosaccus dunckeri Zimmer, 1915

(Figure 4A, B)

Gastrosaccus dunckeri Zimmer, 1915: 165, Figures 13-18; W. Tattersall, 1922: 459; Pillai, 1957, 7, Figure 3, 1-7; O. Tattersall, 1960: 170, Figure 2 A-N; Pillai 1961: 25, plate 3, Figures K-N; 1964c: 17, Figure 9; 1973: 61, Figures 28, 29; Ii, 1964: 235, 580, Figure 59.

Occurrence

Daman	February 1990 28 adult males, 18 immature males, 24 adult females, 19 immature females, and 39 juveniles.
Hazira	April 1995 5 adult males, 2 adult females, and 1 juvenile.
Dahej	November 1996 2 adult males, 3 adult females, 1 immature female, and 8 juveniles.
Jafarabad	November 1996 4 adult females, 3 young males, 1 young female, and 10 juveniles.
Diu	February 1990 1 immature male, 4 adult females, and 1 immature female.
Okha	January 1990 21 juveniles

Vadinar	March 1996 4 adult males, 17 adult females, 7 young males, 4 young females, and 60 juveniles.
Kandla	October 1996 1 adult male, 6 adult females, 1 young female, and 5 juveniles.

Length: adult male 7.5-8.3 mm, adult female 5.7-8.6 mm.

Remarks

The present specimens closely resemble the published description and figures of *G. dunckeri* by Pillai (1973) except for some minor variations. The third segment of the antennular peduncle has one dorsal spine, which has not been observed by Pillai (1973). The inner lobe of the maxillule has three stout barbed spines as against two in Pillai's specimens. Both the rami of the second pleopod of the male are nine-segmented, while in the Pillai's specimens, the exopod is eight-segmented and the endopod is nine-segmented. The nine-segmented endopod of the third pleopod is much shorter than the first segment of the exopod (Figure 4A), while in the Pillai's specimen, the endopod is as long as the first segment of the exopod. The exopod of the fourth pleopod is nine-segmented and that of fifth pleopod is seven segmented. But in Pillai's specimens the exopod of the fourth and fifth pleopods is eight segmented. The number of spines on the lateral margin of the telson varied from 13 to 22 in both sexes, and both sides of the same telson have the same number of spines (Figure 4B). In Pillai's specimens the lateral margin of the telson has only 15 spines.

Zimmer's, (1915) and Pillai's (1973) specimens measured 9 mm and specimen collected from Waltair coast (Shyamasundari 1973) and Kerala coast (Pillai 1957) measured 12 mm. The largest specimen in the present collection is an ovigerous female of 8.6 mm.

Pillai (1973) stated that *G. dunckeri* collected from the inshore waters of Kerala have a different type of telson. The spines arming the telsonic sinus are very long and the distal ones are bent inwards, and this peculiarity has never been observed in offshore specimens. The present materials are collected from the shallow coastal waters and in all the specimens, the spines in the telsonic sinus are straight and not bent inwards. It is likely that Pillai's specimens from the Kerala inshore waters represent a different variety.

O.Tattersall (1960) and Pillai (1973) recorded slight sexual dimorphism in the telson. According to O.Tattersall (1960), the male telson is broader, while in the Pillai's specimen,

the female telson is broader. No such sexual dimorphism could be made out in the present specimens.

Distribution

Gastrosaccus dunckeri has been recorded from several localities in the Indian and Pacific Oceans namely Ceylon to New Guinea (Zimmer 1915), Orissa, India (W. Tattersall 1922) Kerala, India (Pillai 1957, 1961), East Africa (O. Tattersall 1952), Singapore (O. Tattersall 1960), the South China Sea (Ii 1964), the Arabian Sea (Pillai 1973), the East China Sea (Wang and Liu 1997), and the Andaman Sea (Shyamasundari 1973, Fukuoka and Murano 2002).

Ecological note

This is a coastal form but is occasionally captured in offshore waters. It occurred in temperature and salinity ranging from 22.6 -29.3°C and 24-31‰ respectively.

Genus *Eurobowmaniella* Murano

Eurobowmaniella muticus (W.Tattersall, 1915)

(Figure 4C-H)

Gastrosaccus muticus W.Tattersall, 1915: 512, Figure 1b,d; 1922: 459; Pillai 1957: 4, Plate 2, Figures 1-5; 1961: 24, plate 3, Figures C-H; Shyamasundari, 1973: 392, Figures 12-16.

Eurobowmaniella muticus, Murano 1996: 65.

Occurrence

Bassein	April 1989 49 adult males, 32 adult females, 1 young male, and 8 young females.
Daman	February 1990 2 adult males, 5 adult females, 6 young males, and 2 juveniles.

Length: adult male 6.5 mm, adult female, 8-8.4 mm

Remarks

The genus *Eurobowmaniella* comprises only two species, *E. simulans* (W.Tattersall, 1915) and *E. muticus*. These two species had been included in the genus *Gastrosaccus* by previous workers (W. Tattersall 1915, Pillai 1957) and later Murano (1996) transferred them to the genus *Eurobowmaniella* for the complicated copulatory organs of the third male

pleopod and for the presence of two subsidiary spines on either side of the median spine of the labrum.

Based on specimens collected from the inshore waters of Kerala, Pillai (1957, 1961) published two brief descriptions of this species. Compared to the Pillai's description the following variations were observed.

In Pillai's specimens, the anterior margin of the carapace is produced into a small acute spine. In all the present specimens, the anterior end is bluntly rounded (Figure 4C). There is a pseudorostral process which lie anterior to the true rostrum and it is possible that Pillai mistook this for the true rostrum. The labrum is longer than broad, its anterior margin is transverse and armed with one stout media spine flanked by one short spine on either side (Figure 4D). Earlier workers did not made any reference to this structure. In Pillai's specimens, there are 15 spines on the lateral margin of the telson.

W. Tattersall (1915) differentiated this species into two types, A and B based on the structure of the exopod of the third pleopod of the male. In the type A, the ultimate segment of the exopod is flattened and carries bifid spines. In type B, the ultimate segment has two long simple spines, one flattened grooved process and two terminal barbed spines. Pillai (1961) referred his specimens to the type B. The present material is also referable to the type B but with minor differences. The exopod of our specimens is five segmented and, on detailed examination, it was found that the last three segments carry modified spines. The antepenultimate segment has one stout spine and one flattened process with grooves on the distal border. The penultimate segment carries one stout distal spine and the ultimate segment terminates in two stout spines, the inner one short and the barbed outer one is longer and stouter than inner one (Figure 4E, F). Obviously, the earlier workers had failed to see the basal joints of these modified spines and concluded that the spines are carried by the distal segment of the exopod. The female pleopods were not studied by the previous workers (W.Tattersall 1915, Pillai 1957,1961, Shamasundari 1973). In female the first pleopod is biramous, the sympod is long with two pectinate proximal setae and group of distal setae; exopod is small and ovate with single distal seta; the endopod is single segmented and is armed with many plumose setae. In the present specimens, the number of spines on the lateral margin of the telson appears to be variable between 10 and 13 and seldom has the same number on both sides of the same telson (Figure 4G,H). In female the telson narrows more strongly towards the apex (Figure 4H).

Pillai's mature male and female are 10 and 13 mm in length, while the present specimens are only 7.6 and 8.4 mm respectively.

Distribution

This is a shallow water form and has been recorded from the Chilka Lake, Orissa, Gangetic delta (W. Tattersall 1915, 1922), Kerala coast (Pillai 1957, 1961), and Waltair coast (Shyamasundari 1973).

Ecological note

Pillai (1957) stated that this species was fairly common along the Kerala coast during March to October, appearing in swarms in June and July. In the present collection, it occurred in moderate numbers at Bassein creek. Part of the broods were lost in all the ovigerous females collected and the maximum number counted in a ruptured marsupium was 26 eggs. The specimens were collected from sandy and silty clayey bottom at depths of 5-8 m and the range of temperature and salinity recorded at the time of collection were 24-26°C and 32-35.5‰ respectively.

SUBFAMILY: MYSINAE

Tribe Leptomysini

Genus *Afromysis* Zimmer

Afromysis dentisinus Pillai, 1957

(Figure 5 A, B)

Afromysis dentisinus Pillai, 1957: 11, plate 4, Figures 1-7; 1964c: 28, Figure 17; 1965: 1716, Figure 75; 1973: 100, Figure 54.

Occurrence

Murud	March 1989 1 adult male, 4 young male, and 2 juveniles.
Okha	January 1990 4 juveniles.
Vadinar	October 1995 2 adult males and 1 adult female.

Length: adult male 7.1 mm, adult female 6.5 mm.

peduncle (Figure 5C), while in male, it stops short of the tip of the antennular peduncle. In female the basal part of telson carries five spines (Figure 5D) while in male there are only four spines. The female has only 16 or 17 spines on the distal lateral margin of the telson (Figure 5D) as against 21 in male. The endopod of the uropod is armed with only two spines (Figure 5E) while there are four spines in the male. Adult female is only 5.8 mm long while adult male is 7 mm long.

This species closely resembles *A. indica* (Tattersall, 1922) but the latter differs from it in having a pointed rostral plate and the spines on the lateral margin of the telson are arranged into groups of short spines alternating with long ones.

Distribution

So far, this species has been recorded from the inshore waters of Kerala (Pillai 1957) and Lawson's Bay, Waltair (Shyamasundari 1973). The present occurrence considerably extends the distribution of this species to northwards. This is a typical shallow water form confined to the coastal waters of India.

Ecological note

Pillai (1957) recorded this species as occurring in small numbers along with *A. indica*, especially during June to August. The present material consisted of only two specimens and they were collected along with *Siriella jonesi* and *Gastrosaccus dunckeri*. The material was collected from depth of 18-0 m where the bottom was clayey silt and the temperature and salinity recorded were 25.4°C and 31.9‰ respectively.

Acanthomysis platycauda (Pillai, 1964)

(Figure 5F, G)

Lycomysis platycauda Pillai, 1964c: 32, Figures 19-20.

Acanthomysis platycauda Pillai, 1973: 109, Figure 60; Liu and Wang, 1986:1194, figure 19.

Occurrence

Dharamtar October and November 1984

 Many adult, young males, and females.

Length: adult male 6-6.7 mm, adult female 5.1-6 mm.

Remarks

Pillai (1964c) reported the male specimens of this species collected from the Arabian Sea under the name *Lycomysis platycauda*. In 1973, he transferred these specimens to the genus *Acanthomysis* based on the character of the mandibular palp. The present material closely resembles those described by Pillai (1964c) except for the following minor variations. In the present specimen, the first segment of the antennular peduncle in male is distinctly shorter than the third segment (Figure 5F) while in the type form it is as long as the third segment. In the present specimen third to eighth thoracic endopods have a long, slender, spiniform claw (Figure 5G), while in the type form the claw is present only in the third endopod. In the present material the basal bulged part of the telson has only one or two spines as against three in the type.

Body of the adult female is similar to that of male as it is covered with spines. The antennal scale is relatively longer and all pleopods are rudimentary and unsegmented.

Distribution

The original description was based on immature female collected from the Kerala (Pillai 1961) and the subsequent record was from Arabian Sea (Pillai 1964c), coast of Sumatra (04°00'N, 99°49'E) (Pillai 1973) and from South China Sea (Liu and Wang 1986). The present record is from near the type locality in the Arabian Sea.

Ecological note

This species was collected in moderate numbers represented by all age groups. An ovigerous female measuring 6.3 mm was carrying 18 eggs, while another female measuring 6 mm was carrying 28 eggs. The temperature and salinity recorded at the time of collection were 28.6°C and 33.5‰ respectively. It was collected from 7 to 0 m depth. Judging from the present collection, this is a coastal form, though it is also encountered in offshore waters.

Acanthomysis macrops Pillai, 1973

(Figure 5H-J)

Acanthomysis macrops Pillai, 1973: 110, Figure 61.

Occurrence

Dharamtar November 1984

1 adult female

Length, adult female 5.6 mm

Remarks

This species was created by Pillai (1973) based on the material collected from the Arabian Sea during the IIOE. Since then, this species has not been recorded from anywhere else. The present material consists of a single adult female with empty marsupium and very well agrees with the description and figures published by Pillai (1973). The minor differences between the present specimen and the type form lie in the following points. In the type form, the labrum is anteriorly produced into a short stumpy prolongation, while in the present specimen, it is a long blunt spiniform process (Figure 5H). In the type form, the telson is nearly twice as long as broad and the distal border carries five pairs of large spines of which the middle pair is very small and the other four pairs are long and regularly increase in length towards the middle. In the present specimen the telson is only 1.6 times as long as broad at base and the apex proper carries only four pairs of spines and the outer two pairs are long and subequal and the inner most pair is the shortest (Figure 5I). In the type form, there are only 11 spines on the endopod of the uropod, while in the present specimen there are 16 spines (Figure 5J). These differences do not seem to be specific. The shape of the rostral plate, the enormous eyes and the short, broad linguiform telson show close similarity with this species.

Distribution

The type form was collected at 09°00'N, 76°22'E (Pillai 1973). The present record considerably extends the distribution of this species northwardly in the Arabian Sea. This species seems to be very rare and endemic in the Arabian Sea.

Ecological Note

This species was collected from 8 to 0 m depth along with *Acanthomysis platycauda*, *Mesopodopsis orientalis* and *Rhopalophthalmus mumbayensis*, where the bottom was clayey silt. It occurred in temperature 28.6°C and salinity 33.5‰.

Acanthomysis microps sp. nov.

(Figures 6A-I, 7A-E)

Occurrence

Jafarabad

November 1996

1 immature male, 3 adult females and 3 juveniles.

Types

Holotype, adult female (IOBC - Kochi, India 0507-10-50-1999). Allotype, immature male (IOBC-0507 A-10-50-1999).

Description

Body short and stout. Anterior dorsal margin of carapace broadly rounded, covering basal part of eyestalks (Figure 6A); anteriolateral corner rounded, posterior border moderately emarginate. Eyes globular, cornea much narrower than stalk (Figure 6A).

Basal segment of antennule peduncle shorter than distal segment, outer distal corner with a few plumose setae and one long dorsal seta; second segment short and with a few plumose setae; distal segment with mid dorsal lobe and a few distal setae (Figure 6B). Antennal scale far over reaching antennular peduncle, setose all round, six times as long as broad, with distal segment, apex rounded; antennal peduncle stout, second segment slightly longer than third, second and third segments with a few setae on outer distal corner, outer distal corner of sympod sharply produced.

Labrum anteriorly produced into long spiniform process (Figure 6C). Mandibles with well developed incisor process, *lacinia mobilis*, spine row and molar processes (Figure 6D). Second segment of mandibular palp stout, third segment slender and half length of second segment (Figure 6E). Maxillule with broad inner lobe armed distally with three strong barbed spines and eight pectinate setae; outer lobe with five denticles on inner margin, distal margin with 10 strong spines, inner most spine stouter than rest; outer margin with prominent hump (Figure 6F). Second segment of maxilla expanded, carrying one stout spinous seta and row of plumose setae; endite of third segment deeply bifid; second segment of endopod twice as long as broad; exopod comparatively small (Figure 6G).

Basis of first thoracic endopod produced into large gnathobasic lobe, next two segments moderately produced inwards, dactylus with distinct claw and many pectinate setae (Figure 6H). Carpopropodus of endopod of second thoracic limb much shorter than merus, dactylus with several pectinate setae and slender claw (Figure 6I). Third to eight thoracic endopods subsimilar, ischium twice as long as merus, carpopropodus with three subequal segments, dactylus with distinct long slender claw (Figure 7A). Outer distal corner of basal plate of exopod produced into two small denticles (Figure 7A). In present holotype specimen, oostegites are fully developed.

Pleopods in female rudimentary, unsegmented and rod shaped (Figure 7B).

Telson linguiform, longer than sixth abdominal segment, widened basal part with 3 or 4 spines followed by unarmed waist, distal two-thirds with 25-27 long and short spines, long spines alternating with 1 or 2 short spines, distal border rounded and armed with 6-8 large flattened similar spines (Figure 7C).

Uropods over reaching telson, setose all round, endopod with 3 spines below statocyst; exopod longer than endopod (Figure 7D, E).

Length: adult female 6 mm.

Etymology

The specific name refers to the narrow cornea.

Remarks

So far five species of *Acanthomysis* have been recorded from Indian waters, *Acanthomysis indica* (Tattersall, 1922), *A. pelagica* (Pillai, 1957), *A. anomala* Pillai, 1961, *A. platycauda* (Pillai, 1964c) and *A. macrops* Pillai, 1973. The new species closely resembles *A. platycauda*, but differs from it in the following points.

In *A. platycauda* the rostrum is triangular whereas in the present species it is broadly rounded. In *A. platycauda* the eyes are cylindrical and the cornea is wider than the stalk. In the present species the eyes are globular and the cornea is narrower than the stalk. In *A. Platycauda* there are five spines on the endopod of the uropod, while in the present species there are only three spines. The new species differ from the other Indian species in the number of spines on the endopod of uropod and telson.

Ecological note

This species was collected from a depth of 6-0 m and occurred along with *Mesopodopsis orientalis*. The temperature and salinity recorded at the time of collection were 25.9°C and 32.3‰ respectively.

Genus *Mesopodopsis* Czerniavsky

Mesopodopsis orientalis (W.Tattersall, 1908)

(Figure 8A-E)

Macropsis orientalis W. Tattersall 1908: 236, Plate 22, Figures 1-9.

Mesopodopsis orientalis W. Tattersall, 1922: 482; Nair, 1939: 175; Nouvel, 1957: 323; O. Tattersall, 1960: 180; 1965: 91-92; Pillai, 1968: 6; Murano, 1988: 298.

Occurrence

Swarms/ aggregations of this species were encountered at Thal, Mahim, Versova and Daman. It occurred in moderate numbers at Kandla, Jafarabad, Hazira, Vadinar, Bassein, and Dharamtar.

Length: adult male 5 - 8.4 mm, adult female 5.2 - 9.6 mm

Remarks

This species was created by W.Tattersall (1908) for specimens collected from the brackish waters of Bengal. Though this species has been recorded from several localities, only two brief descriptions have since been published (Pillai 1968, Kaliamurthy 1973). The descriptions given by W.Tattersall (1908), Pillai (1968) and Kaliamurthy (1972) generally apply to the present specimens. According to W. Tattersall, the third to eighth thoracic endopods have 6-9 tarsal segments in the female and the eighth endopod of males have only five tarsal segments. In specimens collected from the inshore waters of the Strait of Malacca, Pillai (1968) has observed only four tarsal segments in the eighth thoracic endopod and five in the other endopods. Kaliamurthy's specimens collected from Pulicat Lake have 6-9 tarsal segments in the thoracic endopods of both sexes. In the present material there are seven tarsal segments in the third thoracic endopod, eight segments in fourth to seventh endopods and five or six in eighth endopod in both sexes (Figure 8A-C). There is thus wide variation in the number of tarsal segments of the thoracic endopods.

The setation of the thoracic endopods is quite interesting. The sickle shaped setae are found on the tarsal segments of third and eighth endopods only. The inner margin of the ischium of fourth and fifth endopods are profusely setose; in the sixth endopod only the distal half is setose, in the seventh endopod there are only two setae, and in the eighth endopod the ischium is without any setae.

The partition of the exopod of the third pleopod of the male is very indistinct in the present specimens. The short terminal spine on the exopod of the fourth pleopod of male has 16-20 pairs of barbs (Figure 8D), while in Pillai's specimens there are only eight or nine pairs, the long terminal spine is indistinctly segmented, while, according to Pillai, it is

smooth. The distal lobe of the telson has 30-36 pairs of spines as against 24-25 pairs in Pillai's specimens (Figure 8E). Pillai's largest male and female measured 6.7 mm and 7.2 mm, while in the present collection the largest male and female measured 8.4 mm and 9.6 mm respectively.

Distribution

This common mysid is widely distributed throughout the shallow coastal waters of India. It has been recorded from the brackish waters and estuaries throughout the year (W.Tattersall 1914; Panikkar and Aiyar 1937; George 1958; Gupta and Gupta 1984; Chandramohan 1983; Sarkar and Chowdhury 1986) and also from the fresh waters of Orissa, Midnapur, Calcutta and Adayar (W.Tattersall 1915) and from the fish and prawn culture ponds in Java (Nouvel, 1957), Singapore (O.Tattersall 1960), Malaysia (O. Tattersall 1965), and Thailand (Murano 1988)

Ecological note

This is probably the most abundant species of Mysidacea living around Indian coasts. This species has got great adaptability to varying degrees of salinity as instanced by its occurrence in the highly fluctuating saline conditions of the salt pan and this ability ensures its wide distribution from seawater to almost up to fresh water. It usually lives in swarms/ shoals/ aggregations and the number of individuals in a swarm varies from few hundreds to several thousands.

Nair (1939) recorded 8-10 embryo in *Mesopodopsis orientalis* from coastal waters and those from estuarine waters bears eight embryos (Hanamura 2008). Observations made during the study period on the brood sizes of *M. orientalis* at different localities showed that the number of eggs ranged from 10-21 at Bassein, 12-19 at Mahim and Dharamtar, 9-21 at Thal, 12-29 at Hazira, 10-15 at Daman, and 14-22 at Jafarabad. These observations indicate that there is wide variation in the number of broods carried by *M. orientalis* of different populations.

Discussion

The present study extends our knowledge on the Mysidacea much farther into the northern coastal waters of the Arabian Sea. Mysids were encountered at all localities except at Mumbai harbour, Bhavnagar, Sutrapada, Veraval and Porbander. Absence of mysids in these areas may be due to the high industrial and domestic pollution. A total of seven genera and 14 species were represented in the collection. *Mesopodopsis orientalis* was the most

common and dominant mysid and occurred at 11 localities with relatively high concentration at Thal, Daman, Versova and Mahim. Maximum density (7424 no.of inds./m³) was observed at Thal. *Rhopalophthalmus mumbayensis* was the abundant mysid at Bassein and occurred in small aggregations. All the other species were either moderately or sparsely represented.

The genus *Siriella* is represented by two species, *S. dubia* and *S. jonesi*. Pillai (1973) had stated that this is a rare species and has a restricted distribution and is confined to the area north of 10° N in the Indian Ocean and western part of the Pacific Ocean. In the present reports of this species seems to be confined to the west coast of India, as it is so far not recorded from the east coast. Occurrence of *S. jonesi* from Kandla and Jafarabad extending its distribution northwards and judging from the available information it is a coastal form and is confined to the Arabian Sea.

The genus *Rhopalophthalmus* is represented by nine species in the Indian waters, but only four species were collected from the study area. In general, species of *Rhopalophthalmus* are neretic in habitat and when present occur in swarms (Pillai 1973). *Rhopalophthalmus mumbayensis* occurred in small aggregation of adult males and breeding females and is definitely a gregarious form; the other three species were only sparsely represented. While *R. mumbayensis* occurred at Daman, Bassein, Mahim, Thane and Dharamtar, the other three species were confined to a particular locality - Kasheli, Murud and Dahej respectively characterised by slight variations in temperature and salinity, each area containing a single species.

The genus *Gastrosaccus* is represented by only one species, *G. dunckeri*. These species are common along the coasts of India and in the present collection this species occurred at eight localities.

In the present study, the genus *Eurobowmaniella* is represented by *Eurobowmaniella muticus*. This species is a shallow water littoral form and in the present collection these species occurred at Bassein and Daman.

Pillai (1957) reported that *Afromysis dentisinus* usually occur in the nearshore waters of India. The present records at Murud, Okha and Vadinar, extends its distribution northwardly and it as an endemic species in the Arabian Sea.

Of the 14 species, which have up to the present been referred to genus *Acanthomysis* (Fukuoka and Murano 2005), only six species, including the new species, are known from

Indian waters. The present materials contain 4 species, *Acanthomysis pelagica*, *A. platycauda*, *A. macrops* and *A. microps* sp. nov.

Mesopodopsis orientalis, which occur in large numbers, are capable of completing life cycle in a few days (Nair 1939) and are suitable for bioassay tests to determine the potential impacts of various pollutants on all life stages and also to form a nourishing source of food in fish culture ponds.

Based on the distribution range of the species, segregation of mysids in shallow waters can be shown in table 2.

Highest number of species was recorded from Bassein and Daman while lowest was observed at Ratnagiri, Thal, Mahim and Versova. *Mesopodopsis orientalis* and *Acanthomysis platycauda* were previously known from around Mumbai and all the other species are first records from the respective areas of their collection.

Acknowledgements

The authors are grateful to the Director, National Institute of Oceanography, Goa and to the Scientist-in-Charge, Regional Centre, NIO, Kochi for the encouragement and facilities provided. Thanks are due to the Scientist-in-Charge, NIO, Bombay for providing the study material. This is NIO contribution No. 4443.

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Legend to Figures

Fig. 1, Location of stations in shallow coastal waters off Gujarat

Fig. 2, Location of stations in shallow coastal waters off Maharashtra

***Siriella dubia* Hansen**

(Figure 3A, B)

Fig. A, Distal part of telson, male

Fig. B, Distal part of telson, female

***Siriella jonesi* Pillai**

(Figure 3C-K)

Fig. C, Anterior part of body, male

Fig. D, Antennule of male

Fig. E, Anterior part of body, female

Fig. F, Carapace, lateral view, female

Fig. G, Antennule of female

Fig. H, Telson of female

Fig. I, Telson of male

Fig. J, Endopod of uropod of female

Fig. K, Labrum

***Gastrosaccus dunckeri* Zimmer**

(Figure 4A, B)

Fig. A, Third pleopod of male

Fig. B, Telson

***Eurobowmaniella muticus* (W.M. Tattersall)**

(Figure 4C-H)

Fig. C, Anterior part of body, male

Fig. D, Labrum

Fig. E, Third pleopod of male

Fig. F, Same, tip of exopod enlarged

Fig. G, Telson of male

Fig. H, Telson of female

***Afromysis dentisinus* Pillai**

(Figure 5A,B)

Fig. A, Fourth pleopod of male

Fig. B, Same, tip of exopod enlarged

***Acanthomysis pelagica* (Pillai)**

(Figure 5 C-E)

Fig. C, Anterior part of body, female

Fig. D, Telson

Fig. E, Inner uropod

***Acanthomysis platycauda* Pillai**

(Figure 5 F,G)

Fig. F, Antennule of male

Fig. G, Tip of eighth thoracic endopod

***Acanthomysis macropsis* Pillai**

(Figure 5H-J)

Fig. H, Labrum

Fig. I, Telson

Fig. J, Basal part of endopod of uropod

***Acanthomysis micropsis* sp. nov. (female)**

(Figure 6A-I)

Fig. A, Anterior part of body

Fig. B, Antennule

Fig. C, Labrum

Fig. D, Mandible

Fig. E, Mandibular palp

Fig. F, Maxillule

Fig. G, Maxilla

Fig. H, First thoracic limb

Fig. I, Second thoracic endopod

***Acanthomysis micropsis* sp. nov. (female)**

(Figure 7A-E)

Fig. A, Sixth thoracic endopod

Fig. B, Fifth pleopod

Fig. C, Telson

Fig. D, Posterior part

Fig. E, Basal part of endopod of uropod

***Mesopodopsis orientalis* (W.M. Tattersall)**

(Figure 8A-E)

Fig. A, Third thoracic endopod

Fig. B, Seventh thoracic endopod

Fig. C, Eighth thoracic endopod

Fig. D, Distal part of fourth pleopod of male

Fig. E, Distal part of telson

Table 1. Location and sampling frequency in shallow waters off south Gujarat and Maharashtra

	Location	Bottom substrate	Tidal range (m)	No.of stations	Year
Gujarat	Kandla	S	1.4	7	October 1996
	Vadinar	S	1	7	October and November 1995, March 1996
	Okha	S	1.9	5	January 1990
	Porbander	S	1.2	5	February 1989, 1990, and March 1995
	Veraval	S	1	3	February 1989
	Sutrapada	S	1	9	February 1996
	Diu	S	2.4	5	March 1989, February 1990, and April 1995
	Jafarabad	CS	3.2	11	November 1996
	Bhavnagar	CS	5.7	10	January 1996
	Dahej	S /SC	5.3	10	November 1996
	Hazira	S /SC	5.6	3	April 1995
	Daman	S /SC	3.2	5	March 1989 and February 1990
	Bassein	S /SC	3.4	4	April 1989, January and February 1990
	Maharashtra				10
Thane		SC	3.3	1	April 1989 and March 1990
Versova		SC	3	1	April 1989 and March 1990
Mahim		SC	3.1	1	April 1989 and March 1990
Mumbai H.		S /SC	3.7	5	April 1989
Dharamtar		CS	3.7	2	October and November 1984
Thal		CS	3.2	16	January 1994 and December 1995
Murud	CS	1.6	5	March 1989 and 1990	

S-sandy, CS- clayey silt, SC- silty clay

Table 2. Origin of occurrence of mysids in shallow water off Gujarat and Maharashtra based on distribution

Arabian Sea only	Indian Ocean	Indian and Pacific Oceans
<i>Siriella jonesi</i>	<i>Eurobowmaniella muticus</i>	<i>Siriella dubia</i>
<i>Rhopalophthalmus mumbayensis</i>	<i>Acanthomysis pelagica</i>	<i>Gastrosaccus dunckeri</i>
<i>Rhopalophthalmus anishi</i>	<i>Mesopodopsis orientalis</i>	<i>Acanthomysis platycauda</i>
<i>Rhopalophthalmus murudana</i>		
<i>Rhopalophthalmus vijayai</i>		
<i>Acanthomysis macrops</i>		
<i>Acanthomysis microps</i>		
<i>Afromysis dentisinus</i>		

Figure 1

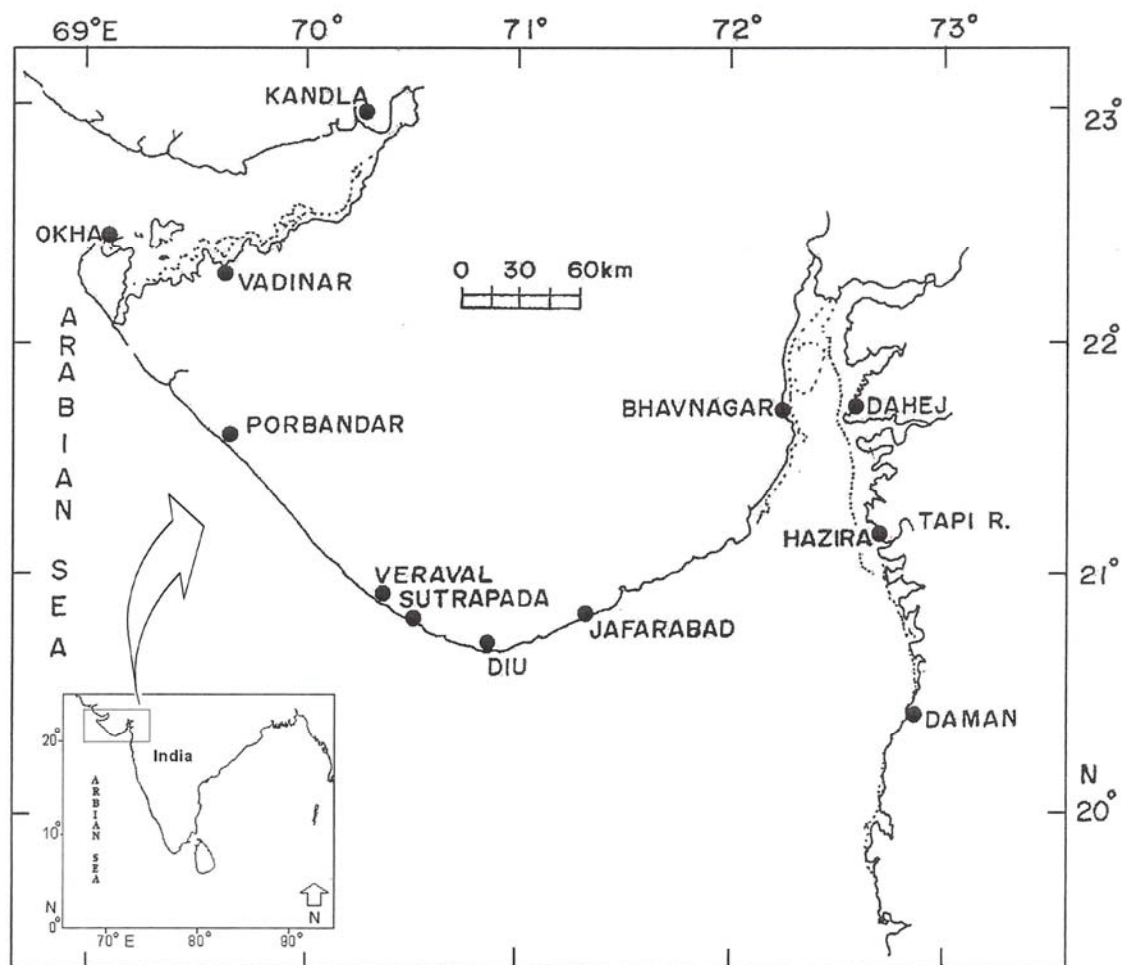


Figure 2

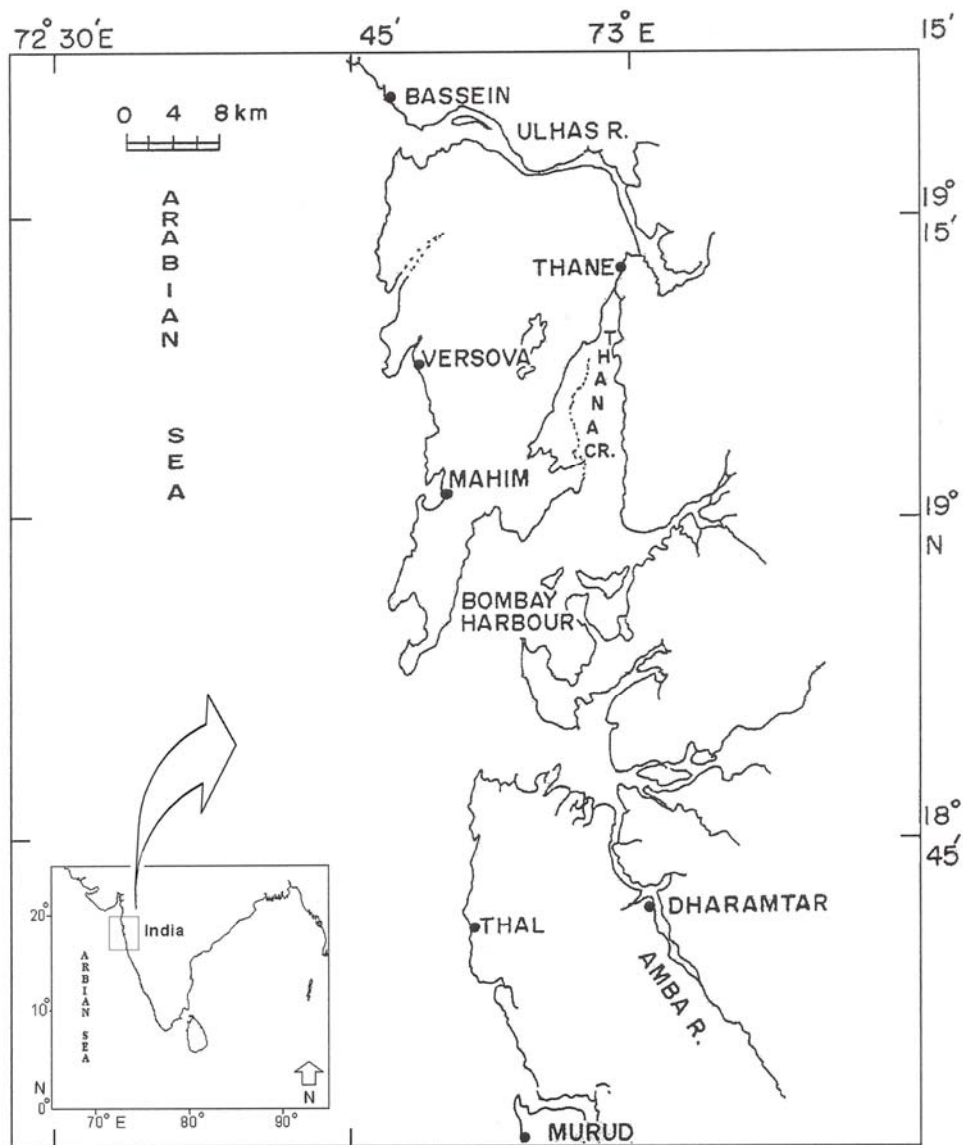


Figure 3

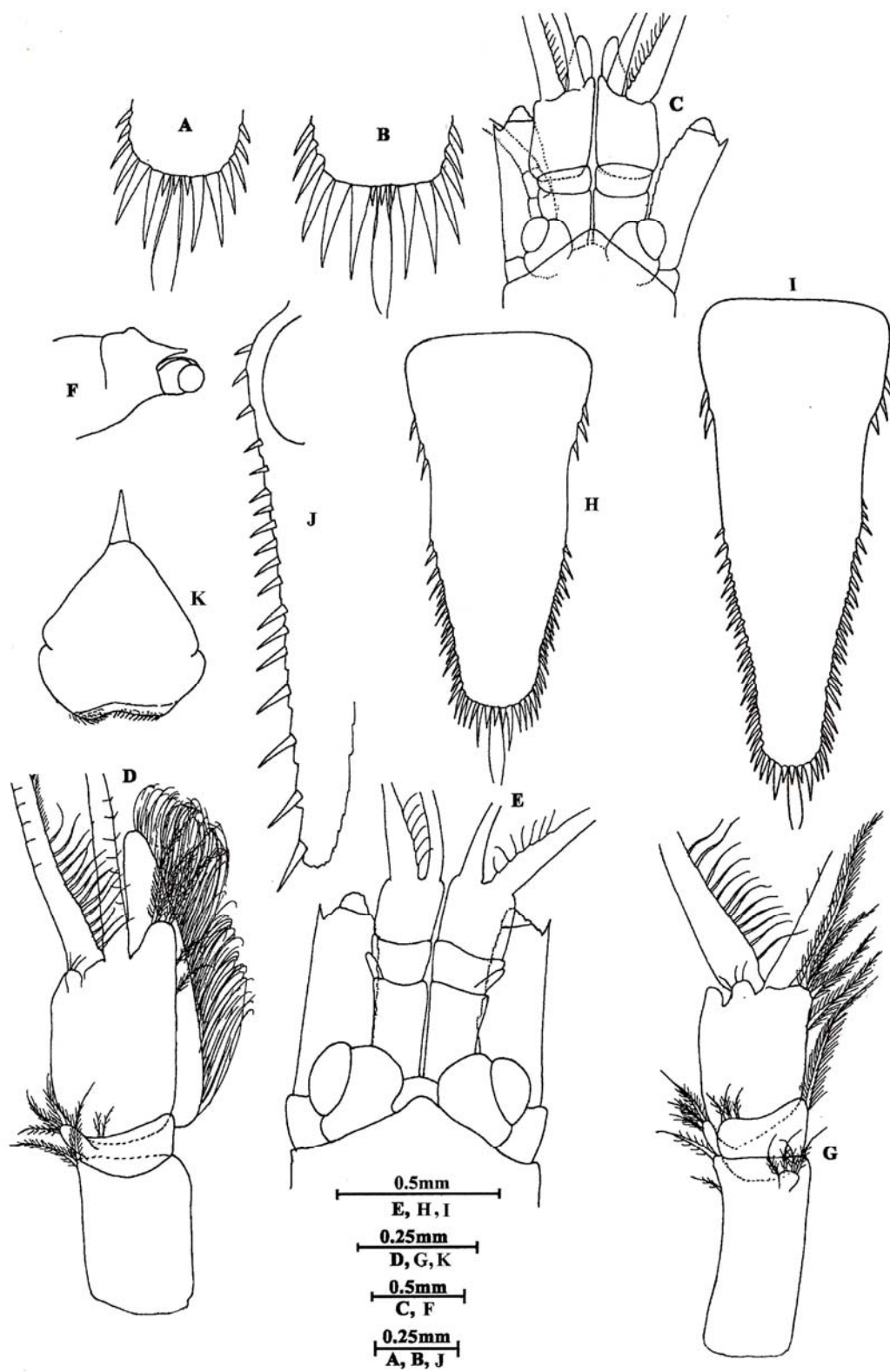


Figure 4

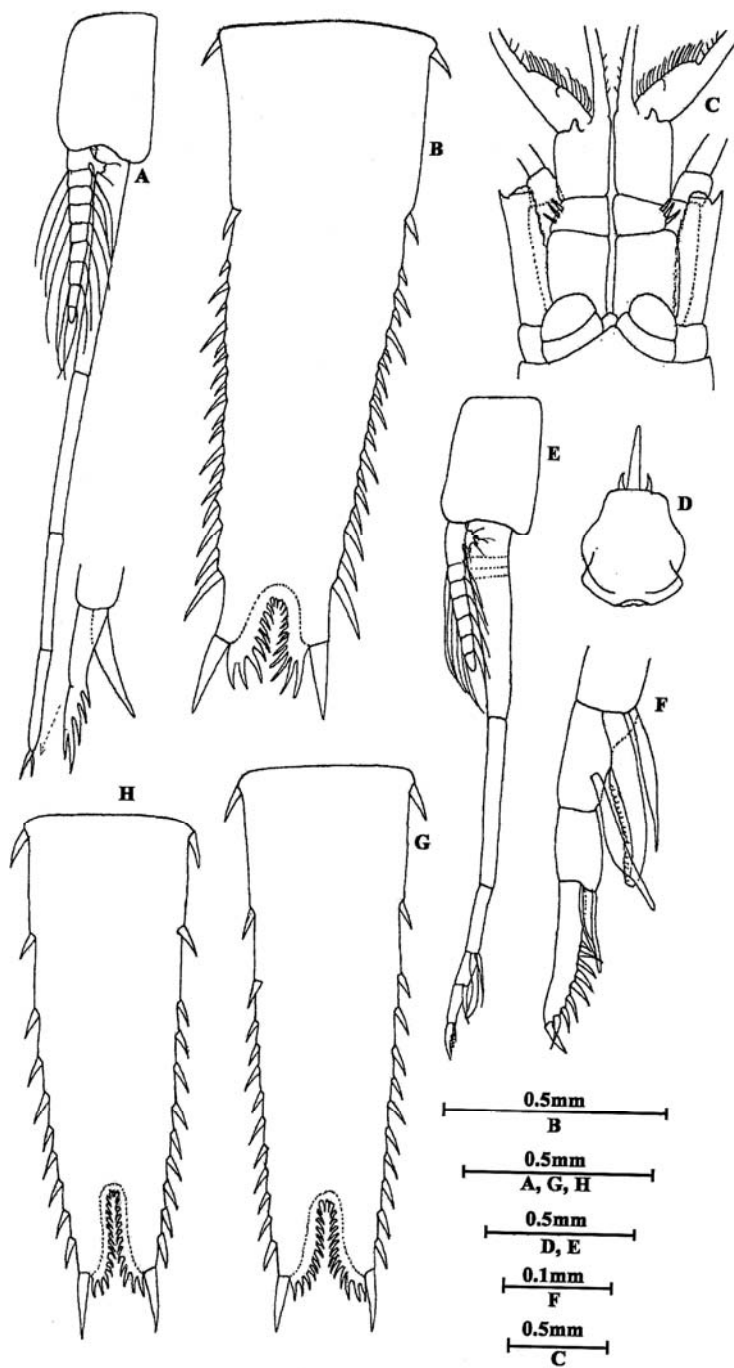


Figure 5

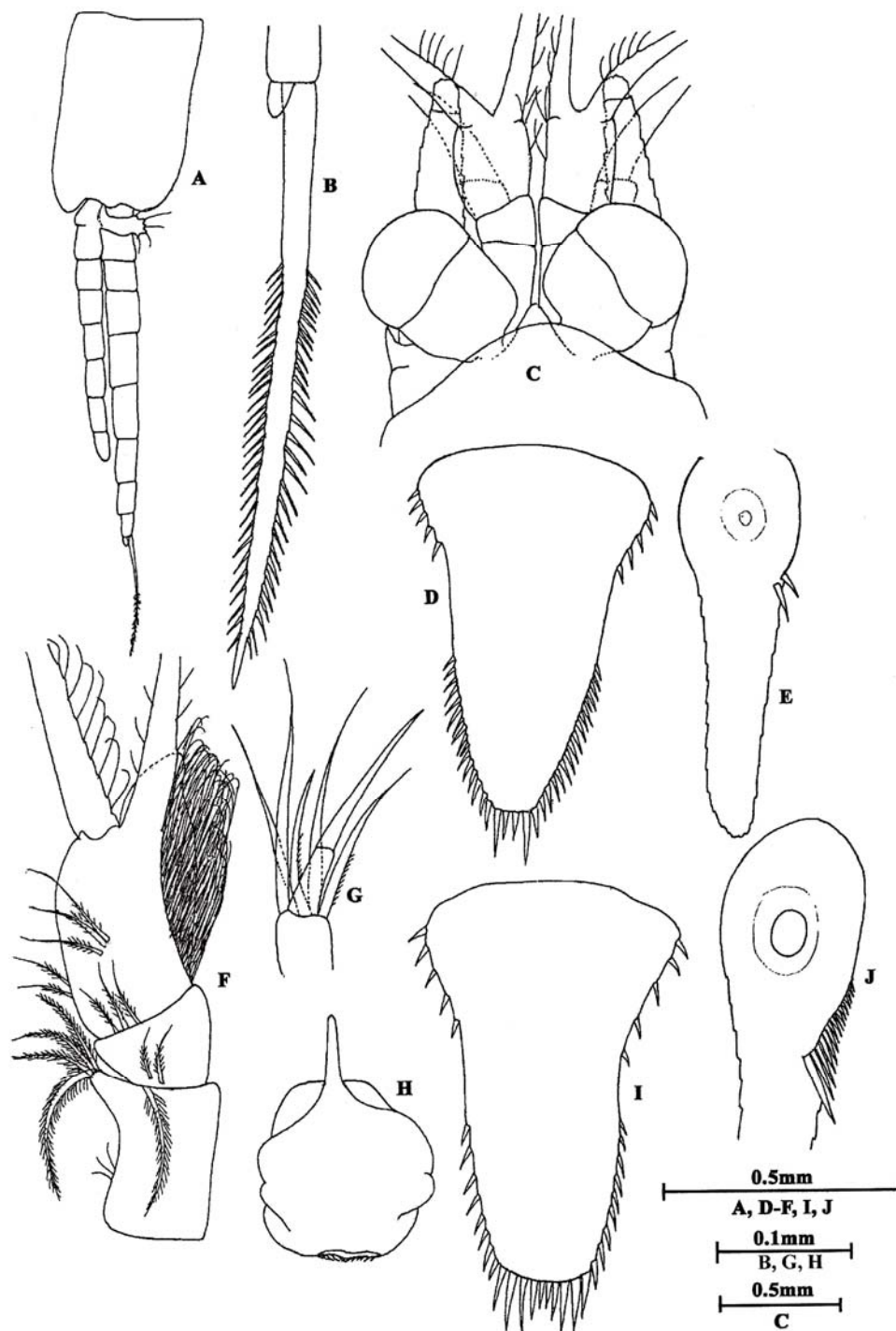


Figure 6

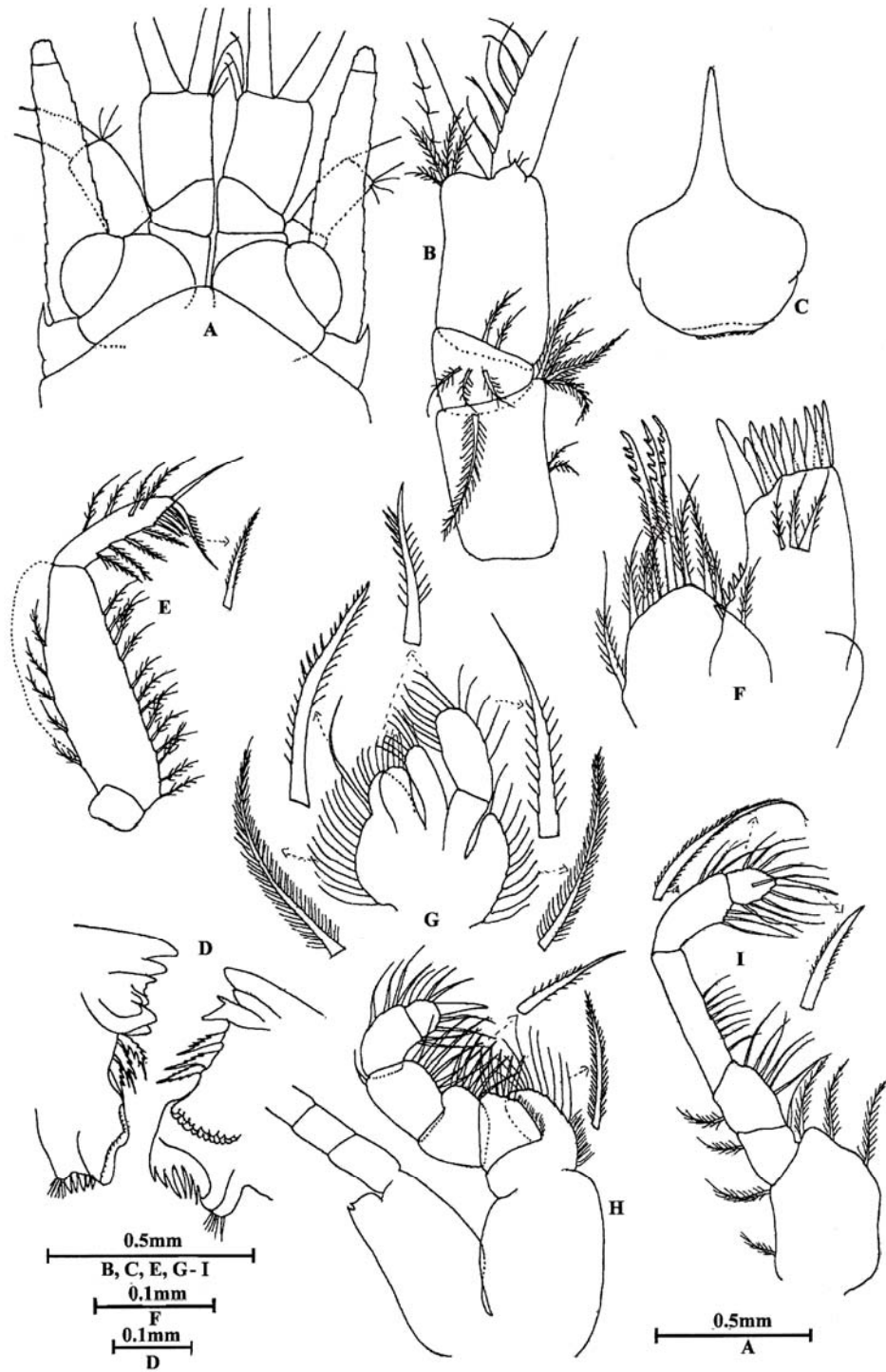


Figure 7

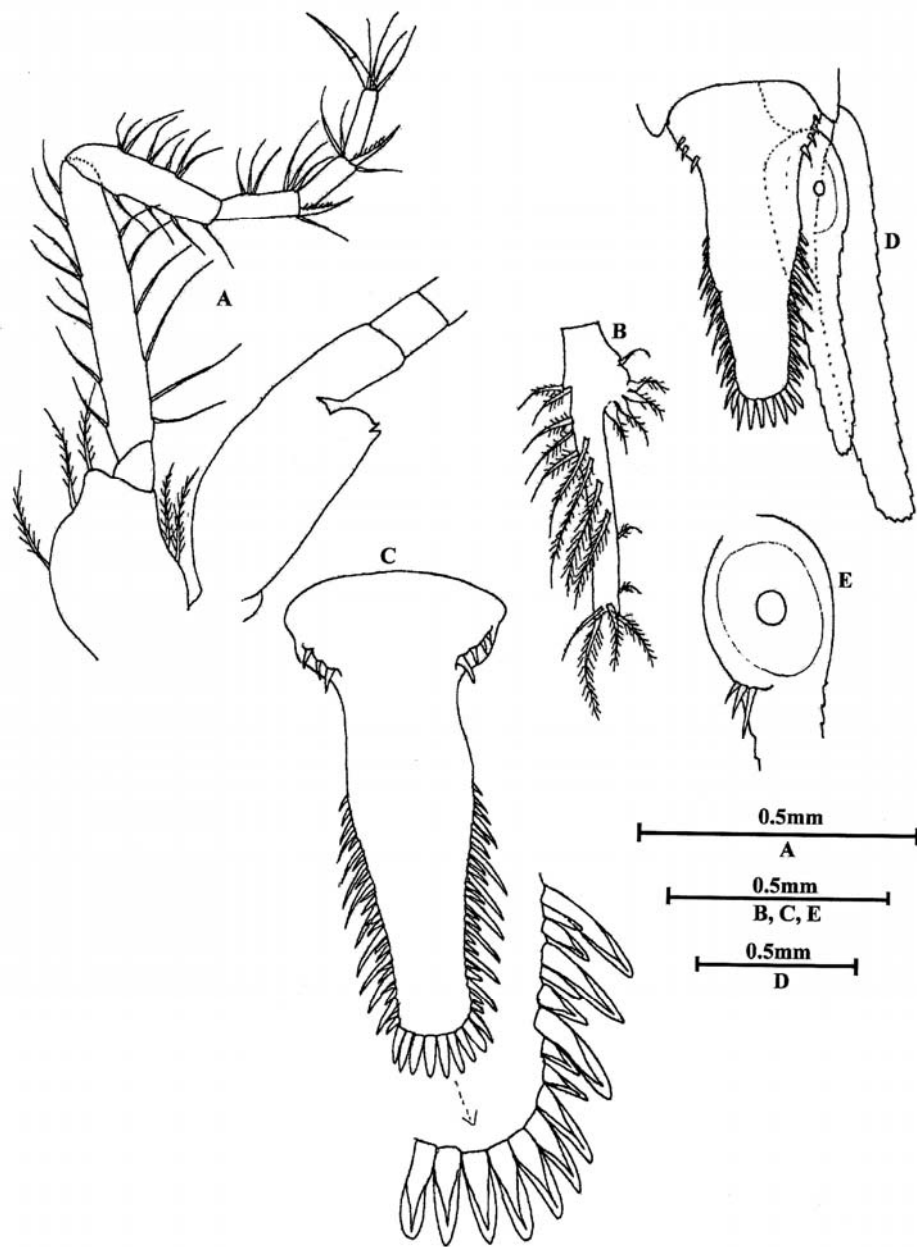


Figure 8

