MYSIDACEA FROM THE CENTRAL AND WESTERN PACIFIC IV. GENERA *EUCHAETOMERA*, *EUCHAETOMEROPSIS*, *ARACHNOMYSIS*, *CAESAROMYSIS*, *ECHINOMYSIDES*, *METERYTHROPS* AND *NIPPONERYTHROPS* (TRIBE ERYTHROPINI)

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With Text-figures 1–27, Tables 1–2 and Appendix-tables 1–16

Genus *Euchaetomera* G. O. Sars 1883

Characteristics of the genus

1. Rostrum small, rounded or pointed.
2. Eye large, with cornea divided into two parts, anterior and postero-lateral areas.
3. Antennal scale of the usual type in tribe Erythropini.
4. Telson short triangular, with truncate apex armed with 1 or 2 pairs of spines and a pair of plumose setae; lateral margin smooth or with spines.

Remarks

This genus is easily distinguishable from other genera by the characteristics of the eye and the antennal scale. At present, the genus is consisting of eight species as follows; *E. typica* G. O. Sars, *E. tenuis* G. O. Sars, *E. glyphidophthalmica* Illig, *E. zurstrasseni* Illig, *E. oculata* Hansen, *E. plebeja* Hansen, *E. intermedia* Nouvel and *E. richardi* Nouvel. Among them, some species are readily distinguishable from the other species, but the rest give us considerable difficulties in the identification because the original description is brief or has been made only on the immature specimen. Moreover, there are intermediate form between those species (O. S. Tattersall, 1955). Further studies are needed in order to solve the confusion.

In the genus there are two unnamed species, one from the middle of the Bay of Bengal by Pillai (1973), and the other from the tropical region of the Central Pacific by the present author. The latter is described here in.

Key for the identification of the species in the genus *Euchaetomera*

1. Lateral margin of telson armed with spines; anterior margin of carapace armed with small spines 2

- Lateral margin of telson unarmed with spines; anterior margin of carapace unarmed with small spines 3
2. Antennal scale broad, about 3 times as long as broad.....*E. typica* G.O. Sars
- Antennal scale narrow, about 5 times as long as broad.....*E. zurstrasseni* (Illig)
3. Outer margin of eye parallel to inner one; posterior cornea much smaller than anterior one; distance between anterior and posterior corneas at outer margin nearly equal to outer margin of posterior area.....*E. tenuis* G.O. Sars
- Posterior cornea more or less convex, developing as anterior cornea..... 4
4. Rostral plate with broadly rounded apex 5
- Rostral plate narrow, with acute apex 6
5. Antennal scale with very small tooth at distal end of naked part of outer margin, about 5 times as long as broad; posterior cornea developing as well as anterior one .....*E. plebeja* Hansen
- Antennal scale with well-marked spine at distal end of naked part of outer margin, 4 times as long as broad; posterior cornea much larger than anterior one.....*E.* sp. Pillai
6. Posterior cornea of eye well-developed, extending laterally in an inclination of 45° to the body axis .....*E. glyphidophthalmica* Illig
- Posterior cornea of eye not so developed 7
7. Antennal scale more than 4.5 times as long as broad 8
- Antennal scale equal to or less than 4 times as long as broad; eye not extending to distal margin of second segment of antennular peduncle 9
8. Eye long, extending forward beyond distal margin of second segment of antennular peduncle; posterior cornea developing as well as anterior one.....*E. intermedia* Nouvel
- Eye not extending to proximal margin of second segment of antennular peduncle; posterior cornea smaller than anterior one .....*E.* sp. Murano
9. Eye extending to proximal margin of second segment of antennular peduncle; apex of rostral plate extending to middle of eyestalk.....*E. richardi* Nouvel
- Eye extending forward beyond proximal margin of second segment of antennular peduncle; apex of rostral plate not extending to eyestalk.....*E. oculata* Hansen

Euchaetomera typica G. O. Sars 1883

Euchaetomera typica G.O. Sars, 1883: 41; 1885: 211–241; Ortmann, 1893: 23; 1894: 107; W.M. Tattersall, 1912: 125; Hansen, 1912: 199–201; Zimmer, 1914: 393; W.M. Tattersall, 1923: 283–284; 1926: 10; Illig, 1930: 434–437; W.M. Tattersall, 1939: 243; Nouvel, 1943: 78–79; W.M. Tattersall, 1951: 112; O.S. Tattersall, 1955: 127–128; 1962: 230; Ii, 1964: 361–366; Pillai, 1967: 1710–1711; 1973: 79–82.

Euchaetomera limbata Illig, 1906: 203.

Euchaetomera sennae Colosi, 1919: 7–9; 1920: 239.

Occurrence:

St. 58, 2 females.
St. 117–1, 1 female.
St. 119–1, 1 female.
St. 196–1, 1 female.
St. H10–6, 1 female.
St. H11–5, 1 female.
St. H12–16, 1 female.
St. H53–1, 1 female and 2 males.
St. H56, 4 females and 1 male.
St. 115–1, 1 female.
St. 117–2, 1 female.
St. 120, 1 female.
St. H4–2, 1 female and 1 male.
St. H11–2, 1 female.
St. H12–7, 2 females and 2 males.
St. H13–10, 2 females and 4 males.
St. H54–2, 1 female.
St. H56–4, 2 males and 1 young form.

St. 57, 2 females.
St. H93–6, 11 females and 9 males.
St. H100–3, 1 young form.
St. H103–4, 1 female.
St. H108–8, 1 female.
St. H114, 1 young form.
St. H93–1, 6 females and 3 males.
St. H93–7, 2 males and 9 young forms.
St. H100–6, 2 females.
St. H104–1, 1 female.
St. H113–7, 2 young forms.
St. H131–1, 1 female.

Body length:

Female up to 8.9 mm, male up to 7.0 mm.

Remarks:

The present species is distinguished from other species of the genus by the anterior margin of the carapace armed with small spines, by the eye with the remarkably developed posterior cornea, by the antennal scale being about 3 times as long as broad, and by the telson armed with spines on the lateral margin.

Geographical distribution:

Euchaetomera typica is an oceanic form which is widely distributed in temperate and tropical regions of the Pacific, Atlantic and Indian Oceans.

Vertical distribution:

From the sampling records of collections by an opening-closing net, it is made clear that the species is a mesopelagic species inhabiting in the layer of 100- to 300-m depths (Fig. 1).

Euchaetomera tenuis G. O. Sars 1883

Euchaetomera tenuis G.O. Sars, 1883: 43; 1885: 214–215; Ortmann, 1893: 23; W.M. Tattersall, 1909: 130; Hansen, 1910: 66; W.M. Tattersall, 1911: 29–30; Hansen, 1912: 201–202; Zimmer, 1914: 394; Colosi, 1919: 7; W.M. Tattersall, 1926: 10; Illig, 1930: 448–450; W.M. Tattersall, 1936: 96; 1939: 243; Nouvel, 1943: 79–80; Banner, 1947: 383–385; W.M. Tattersall, 1951: 112; W.M. Tattersall and O.S. Tattersall, 1951: 275–278; Banner, 1954: 580; O.S. Tattersall, 1955: 128–129; Birstein and Tchindonova, 1962: 66; Ii, 1964: 366–372; Pillai, 1967: 1710.

Euchaetomera fowleri Holt and W.M. Tattersall, 1905a: 123–124 and 144; 1905b: 104–105; Hansen, 1905: 7; Holt and W.M. Tattersall, 1906: 25–26; Zimmer, 1909: 84–85.

Brutomysis vogtii Chun, 1896: 179.

Occurrence:

St. 6–1, 1 male.
St. 99, 1 female.
St. 118, 1 female.
St. 130–1, 1 male.
St. 176–5, 1 female.
St. 442, 1 male.
St. H4–3, 1 female.
St. H10–16, 1 female.
St. 84–2, 2 females and 2 males.
St. 110, 1 female and 1 male.
St. 120, 1 male.
St. 146–2, 1 female.
St. 222–11, 1 female.
St. H4–2, 1 male.
St. H10–9, 1 female.
St. H12–11, 1 female and 1 male.

St. H14–12, 5 females and 3 males.
St. H67–1, 1 female.
St. H84–3, 3 males.
St. H86–5, 1 female.
St. H90–2, 1 female and 2 males.
St. H93–1, 1 male.
St. H100–6, 1 female.
St. H48–2, 1 male.
St. H84–2, 9 females and 1 male.
St. H86–4, 1 female.
St. H89–2, 1 male.
St. H90–11, 2 females and 6 males.
St. H93–9, 1 male.
St. H107–1, 1 female.

Remarks:

Euchaetomera tenuis is distinguishable from other allied species by the characteristics of the eye as follows: 1) the outer margin parallel to the inner margin; and 2) the length of the outer margin of posterior cornea nearly equal to the distance between anterior and posterior corneas.

Geographical distribution:

It has been known that the present species is widely distributed in the Atlantic, South Pacific and Indian Oceans. In the North Pacific, however, there were only two records by Banner (1947) from the adjacent waters of Queen Charlotte Islands of Canada and Ii (1964) from Sagami Bay of Japan. The present collections gave us a knowledge of the geographical distribution that the species is also widely found in the tropical and temperate regions south of 40°N in the North Pacific. It is an oceanic form.

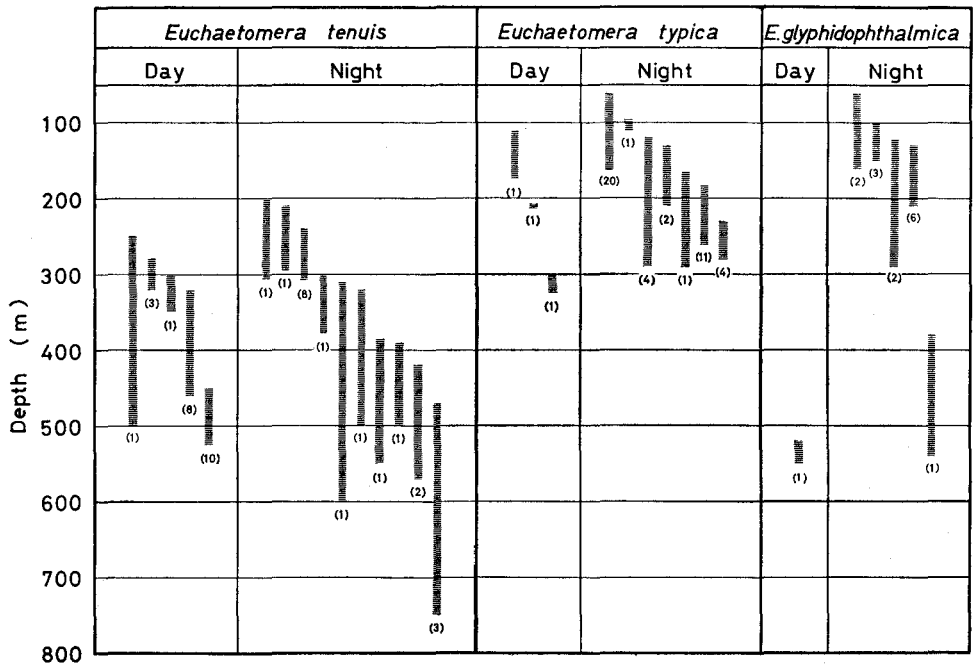

Fig. 1. Vertical distributions of *Euchaetomera tenuis*, *E. typica* and *E. glyphidophthalmica*. The numerals in paretheses indicate the number of specimens collected.

Vertical distribution:

Fig. 1 shows the sampling depths at which the species was collected by the horizontal tows of the ORI-net provided with an opening-closing device. The present species is a mesopelagic form living in the layer of 250- to 550-m depths which is deeper than the inhabiting layer of *E. typica*. It does not appear that there is noticeable vertical migration by day and night.

Euchaetomera plebeja Hansen 1912

(Fig. 2)

Euchaetomera plebeja Hansen, 1912: 202; W.M. Tattersall, 1943: 67; 1951: 112.

Occurrence:

St. H108–8, 1 adult (anterior half of the body) and 3 immature (4.9 mm in 2 specimens out of 3) females, 1 adult (5.8 mm) and 1 immature (posterior half of the body) males.

Remarks:

The present specimens were identified with *Euchaetomera plebeja* from the characters as follows: 1) the anterior margin of carapace broadly rounded (Fig. 2a and b); 2) the antennal scale long and slender, more than 5 times as long as broad; 3) the external margin of scale nearly straight; and 4) the outer margin of eye swollen at the posterior cornea in dorsal view and the distance between the anterior and posterior areas of acting facets at the outer margin less than half as long as the outer margin of posterior area (Fig. 2c).

There are, however, differences between the type specimen in the following respects: 1) Hansen (1912) described that the scale has no external tooth. Out of the present specimens, 2 immature females of 4.9 mm long very well agree with Hansen's description and figure (Fig. 2d), but in other specimens the tooth is clearly present, though it is a very small one (Fig. 2e). Hansen described in "Remarks" of his paper as follows: "*E. plebeja* is instantly separated from *E. tenuis* by the much longer posterior dark area of the eyes and by the at least nearly straight outer margin of the antennal squama", and he took no notice of the lack of the external tooth of the antennal squama. The present author supposes that he could not note conclusively this point because he could not judge whether the absence of the tooth was originated from damage or it was so by nature. It appears that his figure shows that the tooth of antennal scale was broken off, and that the scale had a tooth originally. 2) Judging from Hansen's figure, the eye of the present specimens is broader than that of the type specimen in comparison with the breadth of anterior margin of carapace.

The species closely resembles *E. tenuis*, but is easily distinguishable from the latter by the shapes of eye and antennal scale.

Geographical distribution:

Up to date the species has been only recorded by Hansen (1912) and by W. M.

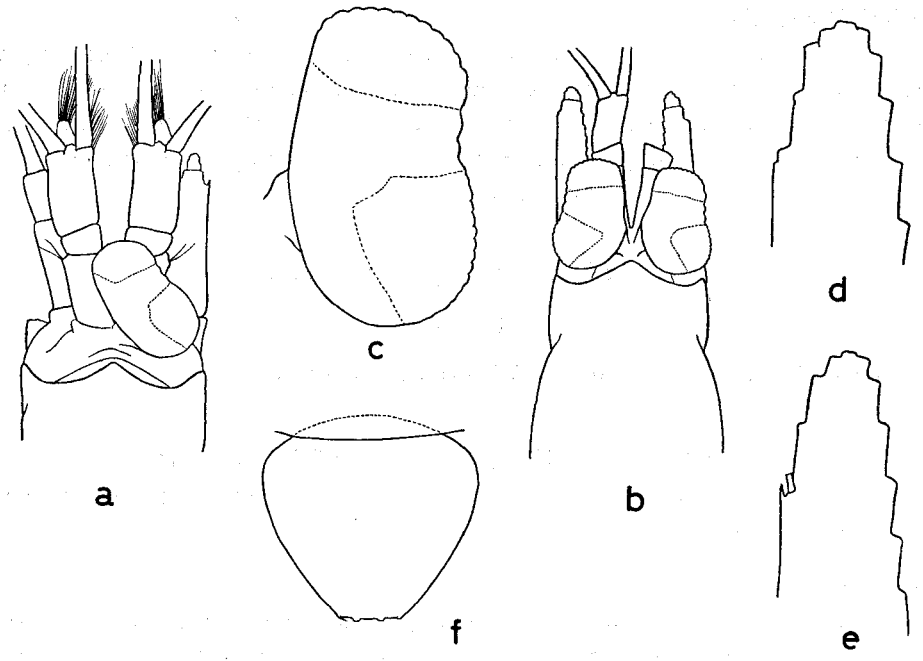

Fig. 2. *Euchaetomera plebeja* Hansen; a, anterior end of adult male, ×25; b, anterior end of immature female, ×25; c, eye in dorsal view, ×62; d, distal part of left antennal scale of immature female, ×124; e, distal part of antennal scale of immature female, ×124; f, telson, ×62.

Tattersall (1943) from the eastern Pacific Ocean east of about 110°E between 27°S and 23°N. The present record from the Central Pacific south of Hawaii Islands, therefore, shows an extension of the western limit of inhabitancy of the species.

Vertical distribution:

The species were taken by the ORI-net provided with an opening-closing device from the depths of 95 to 110 m. It seems to be a mesopelagic form inhabiting in the depths of about 100 m.

Euchaetomera glyphidophthalmica Illig 1906

(Fig. 3)

Euchaetomera glyphidophthalmica Illig, 1906: 201–202; Zimmer, 1914: 394–395; 1915: 318–319; Colosi, 1929: 417; Illig, 1930: 445–446; W.M. Tattersall, 1939: 243–245; 1943: 67; O.S. Tattersall, 1955: 131; Pillai, 1964: 27–28; 1967: 1711.

Occurrence:

St. 53–1, 1 male.
St. 55, 1 male.
St. 65, 2 males.
St. 115–1, 1 young form.
St. 115–2, 2 males.
St. 116, 1 young form.
St. 117–1, 2 females.
St. 117–2, 1 female.
St. 120, 2 males.
St. 121–2, 1 female.

St. 143–3, 1 female.
St. 144–3, 1 female.
St. 146–1, 3 females.
St. 196–1, 1 female.
St. H49, 1 female.
St. H54–8, 3 females.
St. H93–6, 1 female and 1 young form.
St. H113–1, 1 female and 2 young forms.
St. H114, 2 females.
St. H155–3, 1 female and 1 male.
St. 144–1, 1 female.
St. 145–4, 1 female.
St. 176–4, 1 male.
St. H13–10, 1 male and 1 young form.
St. H54–4, 1 male.
St. H57, 2 males.
St. H100–6, 2 young forms.
St. H113–7, 2 females, 1 male and 2 young forms.
St. 117–5, 1 female.

Body length:

Adult female 5.9 to 8.7 mm, adult male 6.0 to 6.6 mm.

Remarks:

The species is rather easily distinguishable from other allied ones of the genus by the characteristics as follows: 1) the rostral plate small and narrow, with acute tip (Fig. 3a); 2) the lateral cornea much larger than anterior one (Fig. 3a); 3) the antennal scale about 4 times as long as broad (Fig. 3b); and 4) the telson with naked lateral margin (Fig. 3c). Illig (1906) described that the telson is armed with 2 pairs of spines on the distal margin, while O. S. Tattersall (1955) and Pillai (1964) noted that it is armed with only one spine at each corner on the distal margin. In most of the present specimens the latter case was observed (Fig. 3c), but in a few

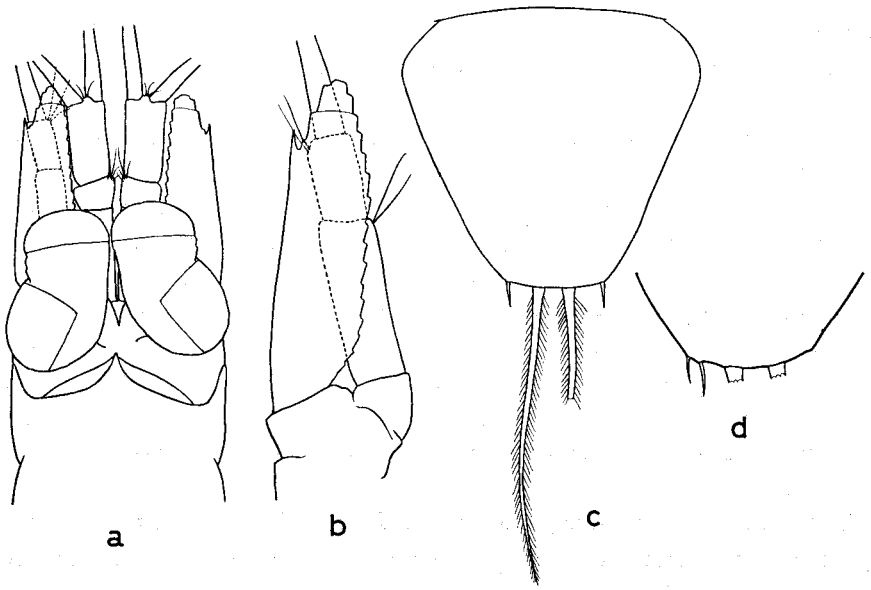

Fig. 3. *Euchaetomera glyphidophthalmica* Illig; a, anterior end of adult female, ×22; b, antenna, ×36; c, telson, ×54; d, distal end of telson, ×80.

specimens the former case was found (Fig. 3d). These spines vertically grow to the distal margin (Fig. 3c and d).

Geographical distribution:

The species has been formerly recorded from the tropical and temperate regions of the Atlantic Ocean (Zimmer, 1914; Illig, 1930; W. M. Tattersall, 1943; and O. S. Tattersall, 1955), from the Mediterranean Sea (Zimmer, 1915; Colosi, 1929), from the tropical region of the Indian Ocean (Pillai, 1964), and from the Gulf of Aden (W. M. Tattersall, 1939). The present collections, therefore, are a new record from the Pacific Ocean. In the Pacific Ocean the species was also found from the tropical and temperate areas as in the Atlantic and Indian Oceans. It is not a rare species in the adjacent waters of Japan.

Vertical distribution:

At night the species was collected by the ORI-net provided with an opening-closing device from 60- to 540-m depths, and a main distribution was found in the layer of 100- to 200-m depths. In the daytime there was only one record from 520- to 550-m depths (Fig. 1).

Euchaetomera sp.

(Fig. 4)

Occurrence:

St. H107–3, 1 immature male (5.4 mm) and 3 immature females (3.5–3.9 mm).

Remarks:

This species has the following characteristics: 1) the frontal margin of the carapace forming a small triangular rostral plate with acute tip which is not far extending to the base of eyestalk (Fig. 4a and b); 2) the eye not extending to the distal margin of the first segment of antennular peduncle (Fig. 4a and b); 3) the outer margin of eye swollen at the region of posterior cornea which is much smaller than the anterior one (Fig. 4c); 4) the antennal scale long and narrow, about 5.5 times as long as broad, extending beyond the distal margin of antennular peduncle by its terminal lobe; the outer margin slightly concave and smooth, terminating into a small tooth (Fig. 4b and d); 5) the telson somewhat longer than width; the lateral margin curved outwardly and unarmed; distal margin less than 1/4 of the maximum width of the telson, armed at each corner with 1 or 2 small spines which obliquely grow in the direction of the lateral margin of the telson; a pair of median plumose setae long and stout (Fig. 4e and f).

The present species is closely related with *E. tenuis* in the small triangular rostral plate, the small posterior cornea of eye, the long and narrow antennal scale, and the shape and armature of telson. However, there is a difference between these two species in the shape of eye. Namely, the outer margin of eye is parallel to inner margin

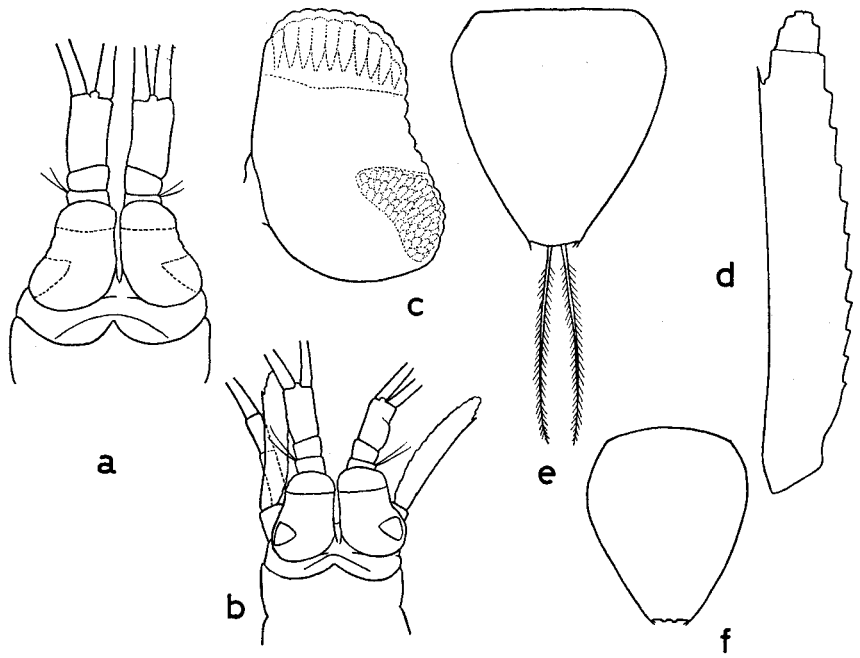

Fig. 4. *Euchaetomera* sp.; a, anterior end of immature male, ×25; b, anterior end of immature female, ×25; c, eye, ×62; d, antennal scale, ×62; e and f, telsons, ×62.

in *E. tenuis*, while it is swollen at the region of the posterior cornea in the present specimens. In such a shape of eye the present species is allied to *E. oculata*, *E. richardi*, *E. intermedia* and *E. plebeja*, but it differs from *E. oculata* in the scale, from *E. intermedia* in the size of eye, from *E. richardi* in the rostral plate, and from *E. plebeja* in the rostral plate and the telson. The present species also differs from *E. typica*, *E. zurstrasseni*, *E. glyphidophthalmica* and *E.* sp. described by Pillai in 1973, in respect to the eye whose posterior cornea smaller than the anterior.

Specimens collected are immature, so that the institution of a new species is reserved.

Genus *Euchaetomeropsis* W. M. Tattersall 1909

Characteristics of the genus

1. Visual element of eye divided into two parts, anterior and postero-lateral areas.

2. Antennal scale lanceolate, setose all round, lacking a spinous process at distal end of outer margin.

3. Telson short, about as long as broad; distal margin truncate, armed with a pair of median plumose setae and with one spine at each corner.

Remarks

The present genus agrees essentially with the genus *Euchaetomera*, except the

difference in the antennal scale. In the genus *Euchaetomera* the antennal scale is of a usual type in the tribe Erythropini, whereas in the present genus there is lacking the spinous process at the distal end of the outer margin of the scale and is setose on its both margins. The genus contains only two species, *E. merolepis* (Illig) and *E. pacifica* Banner. One of the two species, *E. merolepis*, is obtained in the present collections.

Key for the identification of the species in the genus *Euchaetomeropsis*

1. Abdomen long, nearly 1.7 times as long as cephalothorax; posterior emargination of carapace shallow, 1/5 to 1/6 of carapace length; molar part of mandible armed with fine setae ..... *E. merolepis* (Illig)
- Abdomen short, slightly longer than cephalothorax; posterior emargination of carapace deep, 1/4 of carapace length; molar part of mandible rounded, unarmed with fine setae ..... *E. pacifica* Banner

Euchaetomeropsis merolepis (Illig) 1908

(Fig. 5)

Euchaetomera tenuis (pars) Lo Bianco, 1903: 191.
Euchaetomera merolepis Illig, 1908: 550.
Euchaetomeropsis merolepis W.M. Tattersall, 1909: 131–132; Zimmer, 1914: 395; Colosi, 1929: 417; Illig, 1930: 450–452; W.M. Tattersall, 1943: 67; Nouvel, 1943: 82–83; O.S. Tattersall, 1955: 133–134; Casanova, 1968: 153–159.

Occurrence:

St. 117–1, 1 female.
St. 118, 1 female.
St. 145–4, 1 female.
St. 310, 1 female.
St. 345, 1 female.
St. H10–4, 1 male.
St. H10–6, 2 females.
St. H12–2, 1 female.
St. H14–5, 1 female.
St. H48–2, 1 female.
St. H53–1, 1 male.
St. H54–6, 1 male.
St. H57, 1 male.
St. H84–3, 2 females.
St. H84–4, 4 females and 1 male.
St. H84–5, 4 females and 3 males.
St. H86–4, 1 male.
St. H90–2, 1 male.
St. H93–1, 1 female and 1 male.
St. H93–7, 1 female and 1 male.
St. H102–5, 1 male.
St. H131–1, 1 female.

Body length:

Adult female 5.4 to 7.4 mm, adult male 5.7 to 5.9 mm.

Remarks:

The present specimens are identified with *E. merolepis* in the following characteristics: 1) the abdomen long, about 1.7 times as long as the cephalothorax; 2) the posterior emargination of the carapace shallow, about 1/5 of the carapace length; 3) the posterior functional part of eye swollen laterally (Fig. 5a); 4) the molar portion

of mandible armed with fine hairs and small protuberances (Fig. 5c and d). However, there are rather minor differences between the type specimens as follows: 1) the antennal scale 5.5 times as long as broad in the present specimens (Fig. 5b), while 6 times in the type specimens; 2) the portion of the scale proximal to the articulation about 6 times as long as the terminal portion in the type specimens, while 10 to 13 times in the present specimens (Fig. 5b); 3) the maxillule in the present specimens not so long as in the figure shown by Illig (Fig. 5g); 4) the endopod of uropod armed

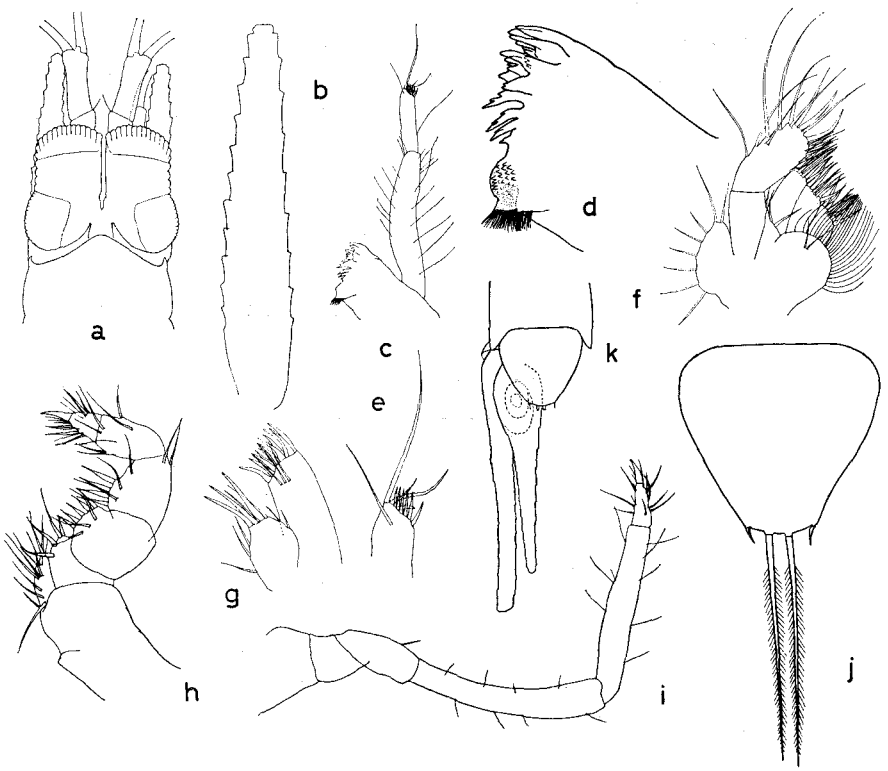

Fig. 5. *Euchaetomeropsis merolepis* (Illig); a, anterior end of adult female, ×19; b, antennal scale, ×53; c, mandible, ×35; d, molar part of mandible, ×114; e, distal part of mandibular palp, ×88; f, maxilla, ×57; g, maxillule, ×75; h, first thoracic endopod, ×56; i, one of third to eighth thoracic endopods, ×45; j, telson, ×45; k, posterior end of adult female, ×20.

with 5 spines at statocyst region in the type specimens, but no spines in the present specimens. With respect to these spines near the statocyst, it is supposed that Illig mistook in his description, since Zimmer (1914), O. S. Tattersall (1955) and Casanova (1968) as well as the present author could not find these spines on their specimens.

Between the present specimens and those of *E. pacifica* recorded from the eastern North Pacific by Banner (1947), noticeable differences are present in the following respects: 1) the abdomen slightly longer than the cephalothorax in *E. pacifica*; 2) the molar part of the mandible rounded and without armature in *E. pacifica*; 3) the

posterior functional part of the eye more swollen laterally in the present specimens than in that of *E. pacifica* by judging from his figure (Banner, 1947, Plate VI, 8a).

Euchaetomera merolepis is very fragile, especially in the eye. Out of 35 specimens taken in the present collections, only 3 specimens were bearing both eyes and a single eye in 6 specimens. None of eyes were possessed by the rest.

Geographical distribution:

The present species has been previously recorded from the Indian Ocean (Illig, 1930), from the Atlantic Ocean (Zimmer, 1914; Illig, 1930; O. S. Tattersall, 1955), from the Mediterranean Sea (W. M. Tattersall, 1909; Nouvel, 1943) and from the Pacific Ocean off California (W. M. Tattersall, 1943). The occurrence of this species, therefore, is a new record in the western and central Pacific. This species is a cosmopolitan in tropical and temperate regions of the world oceans.

Vertical distribution:

The present specimens collected by an opening-closing net were from the layer of 110- to 340-m depths in the daytime and from the layer of 183- to 750-m depths at night. It appears to perform a diel vertical migration, though the data is not so enough (Fig. 6).

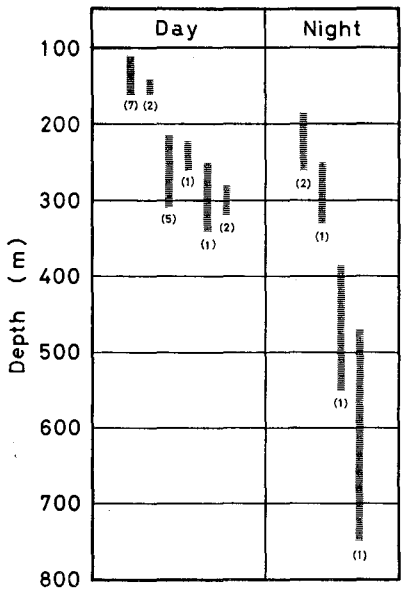

Fig. 6. Vertical distribution of *Euchaetomeropsis merolepis*. The numerals in parentheses indicate the number of specimens collected.

Genus *Arachnomysis* Chun 1887

Characteristics of the genus

1. Carapace very short anteriorly without rostral plate; anterior margin transverse, armed with 3 to 5 acute spines.

2. Abdomen slender; posterior margin of each somite armed with spines.
3. Antenna without scale, armed with a long acute process at outer distal angle of sympod.
4. Eye conical; eyestalk long and slender.
5. First thoracic limb with rudimentary exopod.
6. Telson very small, with smooth lateral margin; apex narrow, armed with a pair of very small spines at each corner.

Remarks

The present genus is easily distinguishable from other genera by so remarkable characteristics as it has ever belonged to the subfamily Arachnomysinae together with *Chunomysis* by Holt and W. M. Tattersall. At present *Arachnomysis* is consisted of two species, *A. leuckartii* Chun and *A. megalops* Zimmer. Both species are comprized in the present collections.

Key for the identification of the species in the genus *Arachnomysis*

1. Number of facets across the largest diameter of eye 10 to 14.....*A. leuckartii* Chun
2. Number of facets across the largest diameter of eye 16 to 25.....*A. megalops* Zimmer

Arachnomysis leuckartii Chun 1887

(Figs. 7a and 8)

Arachnomysis leuckartii Chun, 1887: 33; 1896: 169; Thiele, 1905: 445–447; W.M. Tattersall, 1909: 140; 1911: 56; Zimmer, 1914: 400–401; Illig, 1930: 469; W.M. Tattersall and O.S. Tattersall, 1951: 282–286; O.S. Tattersall, 1955: 139–140; Pillai, 1973: 84–87.
Arachnomysis affinis Hansen, 1910: 71.

Occurrence:

St. 143–3, 1 immature female (4.5 mm).
St. H11–5, 1 immature female (4.5 mm).
St. H13–1, 1 immature female (4.8 mm).
St. H56, 1 immature female (3.9 mm).
St. H93–1, 1 adult female (6.6 mm).
St. H104–1, 1 adult (7.7 mm) and 1 immature (5.3 mm) females, 1 immature male.
St. H107–1, 2 adult females (6.7 and 6.3 mm).
St. H107–2, 1 adult (6.1 mm) and 1 near-adult (5.8 mm) females, 1 adult (6.3 mm) and 1 immature males.
St. H107–3, 1 immature female.
St. H107–8, 1 adult male (6.6 mm).
St. H107–9, 1 adult female (6.3 mm).
St. H108–8, 11 adult (5.3 to 7.6 mm) and 4 immature females, 2 adult (6.7 and 6.6 mm) and 6 immature males.

Remarks:

Hansen instituted *Arachnomysis affinis* for the reception of a immature female collected from the adjacent waters of Molucca Islands, and he pointed out that it differs from *A. leuckartii* in the following three characteristics: 1) the eye scarcely twice as long as broad; 2) the front margin of carapace armed with 5 short denticles; and 3) the sixth segment of abdomen unarmed dorsally with acute processes. Recently, Pillai (1973) identified two specimens collected from the Indian Ocean with *A. leuckartii,* and stated that *A. affinis* is the same with *A. leuckartii* though Hansen described the differences between both of these species, and that *A. leuckartii* obviously shows some intraspecific variation. In the shape of the eye there is a variation in this species. It is more slender in the specimens from the Pacific and Indian Oceans

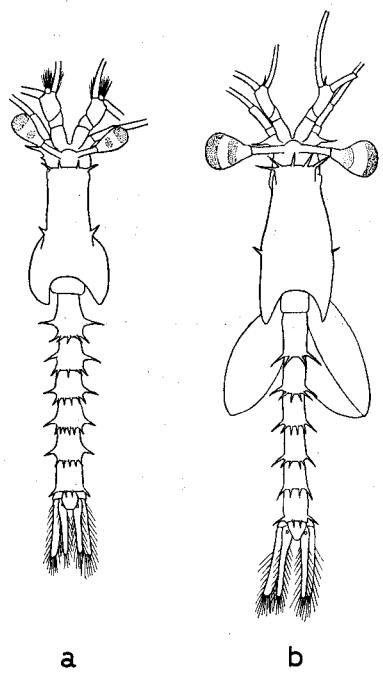

Fig. 7. a, *Arachnomysis leuckartii* Hansen, ×7; b, *A. megalops* Zimmer, ×7.

than in those from the Atlantic Ocean. The ratio of length to width of the eye in the present specimens is from 1.5 to 2.0 with an average of 1.7, while in the Atlantic specimens it is less than 1.5.

Nowadays, the number of facets across the largest diameter is available for the identification. In the present specimens from the Pacific Ocean it is from 8 to 14 with an average of 10, and this is fewer than those of other Oceans which are from 10 to 14 in the Discovery specimens from the Atlantic Ocean and from 14 to 15 in Pillai's ones from the Indian Ocean.

The numbers of spines on the anterior margin of carapace and on the posterior margin of each abdominal somite are shown on Table 1.

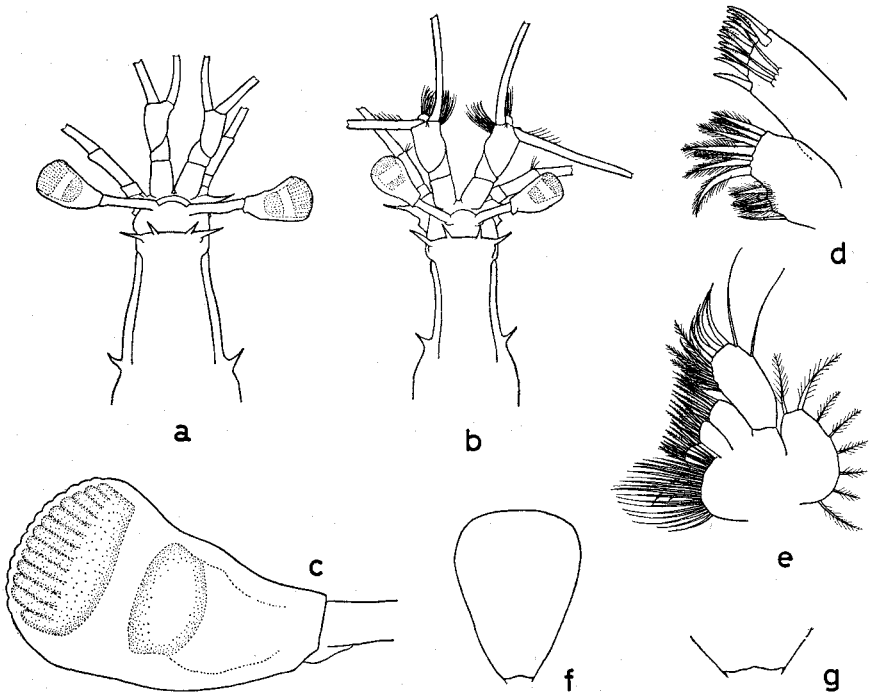

Fig. 8. *Arachnomysis leuckartii* Hansen; a, anterior end of adult female, ×12; b, anterior end of adult male, ×12; c, eye, ×57; d, maxillule, ×114; e, maxilla, ×57; f, telson, ×57; g, distal end of telson, ×114.

Table 1. The number of spines on the anterior margin of carapace and on the posterior margin of abdominal somites in *Arachnomysis leuckartii*.

		Carapace	Abdominal somite					
			I	II	III	IV	V	VI
Number of specimens examined		26	27	27	27	27	27	27
Number of spines	Range	3–5	3–5	4–6	4–6	4–6	3–5	3–4
	Mean	4.0	4.6	5.1	5.1	5.3	4.0	3.8

Geographical distribution:

In the Pacific Ocean a single immature female from the offing of Molucca was a sole record for many years. It seems that the species is widely distributed in the tropical and temperate regions of the Pacific, Atlantic and Indian Oceans. Out of the forty specimens of the present collection, thirty-two specimens were collected in the neighbouring sea areas of 10°E and 155°W. It appears that the species is densely distributed in this area of the Pacific Ocean (Fig. 9).

Vertical distribution:

Twenty-three individuals were obtained in one hauling at St. H108–8 in which a horizontal haul was carried out at a depth of 95 to 110 m. Four individuals at

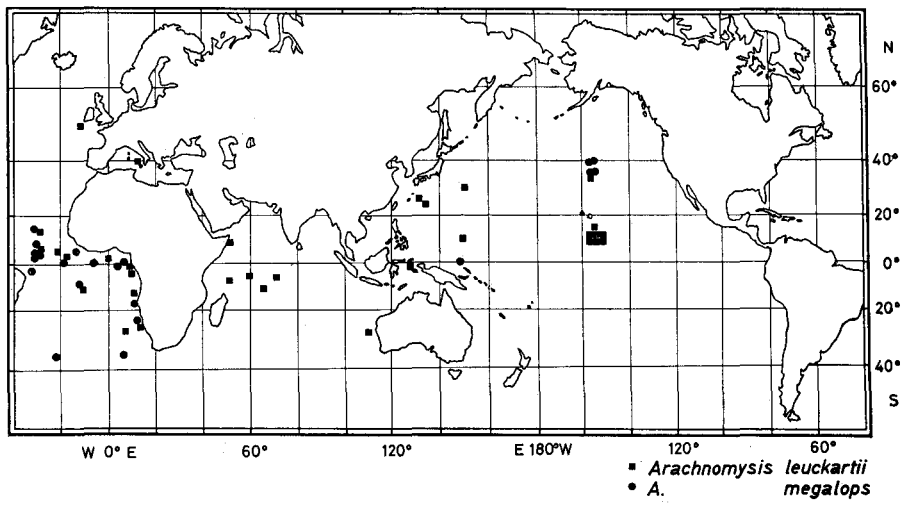

Fig. 9. Geographical distribution of *Arachnomysis leuckartii* and *A. megalops*.

St. H107–2 were taken by an oblique haul from the 58–m depth to the surface. Thus, the species principally lives in a relatively shallow layer. It is suggested, however, that the distribution of this species is vertically extensive, because the species was also collected from two depths, which were respectively of 360 to 600 m and of 480 to 770 m, even though the catch was only a single individual in each hauling (Fig. 11).

Arachnomysis megalops Zimmer 1914

(Figs. 7b and 10)

Arachnomysis megalops Zimmer, 1914: 401; Illig, 1930: 470; O.S. Tattersall, 1955: 140.

Occurrence:

St. H14–11, 1 adult male (7.1 mm).
St. H84–2, 1 near-adult female (7.1 mm) and 1 near-adult male (6.8 mm).
St. H89–2, 1 immature female (5.8 mm).
St. H93–7, 1 adult female (7.5 mm).
St. H93–9, 1 immature female (5.1 mm) and 1 immature male (5.5 mm).

Remarks:

Zimmer pointed out two characteristics of this species as follows: 1) the eye only slightly longer than its width; and 2) the cornea with 20 to 23 facets in the largest diameter. Later, from the examination of the Discovery specimens O. S. Tattersall found that the facets vary from 18 to 25 in number. The present specimens agree in general with the published descriptions by Zimmer and O. S. Tattersall, but some differences are present in the following respects: 1) the eye in the present specimens large and clearly longer than the antennular peduncle (Fig. 10a and b), but somewhat small in comparison with the Zimmer's figure in the type specimen; 2) the ratio

of length to width in the eye varied from 1.2 to 1.5 with the average of 1.3 in the present specimens (Fig. 10c), while the eye only slightly longer than the width (there is no numerical indication) in the type specimen. The present author feels that the eye in the present specimens from the Pacific is somewhat more slender than those in the Zimmer's and Tattersall's specimens from the Atlantic; 3) the eye with 16 to 21 facets (the average of 19) in the present Pacific specimens (Fig. 10c). This is fewer than that of the Atlantic specimens in which the number is 18 to 25; 4) in the present specimens the body length being 7.5 mm in the female and 7.1 mm in the male in well-developed condition. They are comparatively smaller than Zimmer's male

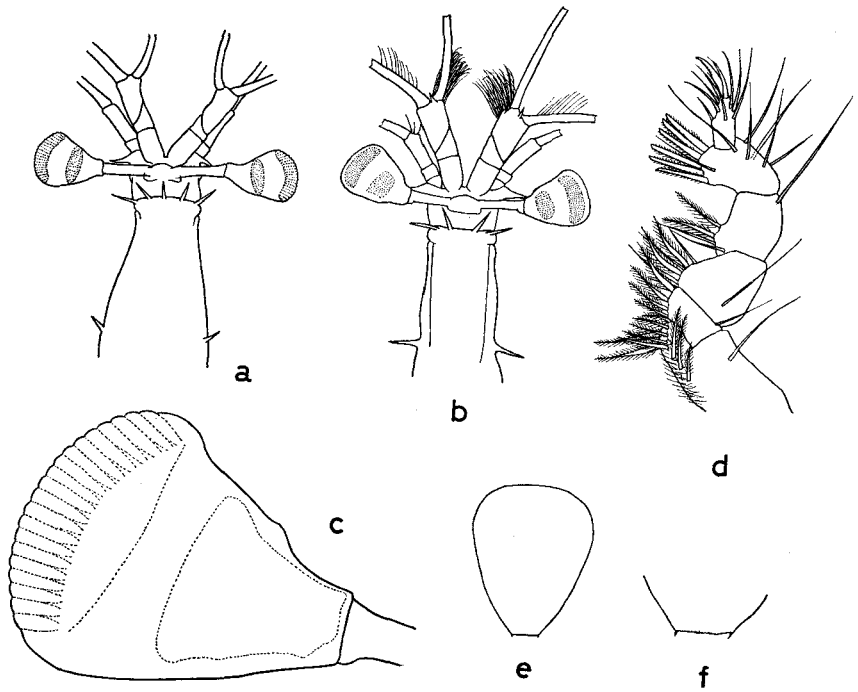

Fig. 10. *Arachnomysis megalops* Zimmer; a, anterior end of adult female, ×11; b, anterior end of adult male, ×12; c, eye, ×57; d, first thoracic endopod, ×57; e, telson, ×57; f, distal end of telson, ×114.

specimen (9 mm) and O. S. Tattersall's specimens (9.5 mm in the female and 8.5 mm in the male).

Although these differences do not appear to be so small, the present specimens are regarded as intraspecific variations and may be identified with this species.

It is already known that there are some variations in the number of spines on the anterior margin of carapace and on the posterior margin of each abdominal somite. The number of spines on the anterior margin of carapace was 4 in five cases out of six specimens, 5 spines was found in only a single specimen shown in Fig. 10a. The number of spines on each abdominal somite is shown in Table 2.

Table 2. The number of spines on the anterior margin of carapace and on the posterior margin of abdominal somites in *Arachnomysis megalops*.

		Carapace	Abdominal somite					
			I	II	III	IV	V	VI
Number of specimens examined		6	7	7	7	7	7	7
Number of spines	Range	4–5	5–6	4–6	5–6	5–6	4–5	4
	Mean	4.2	5.1	5.4	5.4	5.7	4.1	4.0

Geographical distribution:

Hitherto the species has been recorded from the Atlantic Ocean between 20°N and 40°S. It became clearer by the present collections that the species is also widely distributed in the North Pacific Ocean (Fig. 9).

Vertical distribution:

All the present specimens were collected by the horizontal tow using the ORI-net provided with an opening-closing device. They were confined to the vertical range of 100- to 500-m depths. O. S. Tattersall noted that this species carried out upward migrations during hours of darkness and may be found in deeper layer in daytime, because all the specimens were taken at night. In the present collections, there are some specimens of day collection having the vertical range the same as the night

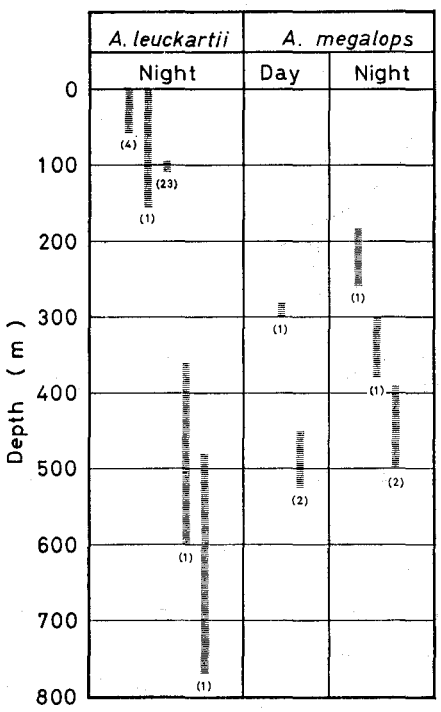

Fig. 11. Vertical distribution of *Arachnomysis leuckartii* and *A. megalops*. The numerals in parentheses indicate the number of specimen collected.

collections have (Fig. 11). Such specimens are not possible to perform a diel vertical migration.

Genus *Caesaromysis* Ortmann 1893

Characteristics of the genus

1. Carapace and abdominal somites armed with many long spines.
2. Visual elements of eye separated into two parts, anterior and postero-lateral areas.
3. Antennal scale in male small, lanceolate, without spinous process at outer distal end; in female, reduced to a short conical process.
4. First thoracic exopod reduced into a small protuberance.

Remarks

The present genus, as well as *Echinomysis*, is easily distinguishable from other genera by the carapace and abdominal somites armed with many long spines. It is possible to distinguish by the reduced first thoracic exopod from *Echinomysis* which the exopod is developed to the swimming foot. The genus is, at present, composed of only one species, *C. hispida*, since *C. vanclevei* Banner was united with the former species by Birstein and Tchindonova (1962).

Caesaromysis hispida Ortmann 1893

(Fig. 12)

Caesaromysis hispida Ortmann, 1893: 24; Zimmer, 1914: 397–399; Illig, 1930: 465–469; O.S. Tattersall, 1955: 136–139; Birstein and Tchindonova, 1962: 66.

Caesaromysides liguriae Colosi, 1916: 136; 1919: 9; W.M. Tattersall, 1951: 137 and 244; Banner, 1954: 581.

Caesaromysis vanclevei Banner, 1947: 389–394; 1954: 31–32; Birstein and Tchindonova, 1958: 329.

Occurrence:

St. 8, 1 immature female (3.5 mm).
St. 13, 1 adult female (7.4 mm).
St. 122, 1 adult female with embryos in marsupium (7.8 mm).
St. 190–7, 1 immature female (3.5 mm) and 1 adult male (8.0 mm).
St. H10–4, 1 adult female (7.6 mm).
St. H10–10, 1 immature female (3.9 mm), 2 immature males (3.0 and 2.8 mm) and 9 young forms.
St. H10–15, 1 adult female (6.3 mm) and 1 near-adult male (6.0 mm).
St. H10–16, 3 immature females (2.8, 2.7 and 2.7 mm), 9 immature males (5.3 to 3.0 mm) and 11 young forms.
St. H13–10, 1 adult female (8.1 mm).
St. H67–1, 2 immature females (4.9 and 4.8 mm), 1 near-adult (6.5 mm) and 2 immature males (3.3 and 3.3 mm).

St. H71–1, 1 immature female (4.3 mm), 1 adult (8.2 mm) and 1 immature (3.7 mm) males and 1 young form (2.9 mm).
St. H73–1, 1 immature female (3.7 mm).
St. H75–6, 1 immature female (4.3 mm).
St. H93–1, 1 immature female (4.3 mm).
St. H93–7, 3 adult females (8.2, 8.2 and 7.2 mm).
St. H93–9, 1 immature female (6.2 mm), 1 immature male (3.0 mm) and 2 young forms.
St. H96–1, 1 male (damaged, about 7 mm).
St. H113–2, 1 immature female (5.9 mm).
St. H114, 1 immature male (4.0 mm).

Remarks:

Banner (1947) established *C. vanclevei* for the reception of specimens collected from the offing of the Pacific coast of the North America from Oregon to Alaska. Although he mentioned many differences between *C. hispida* and the present species

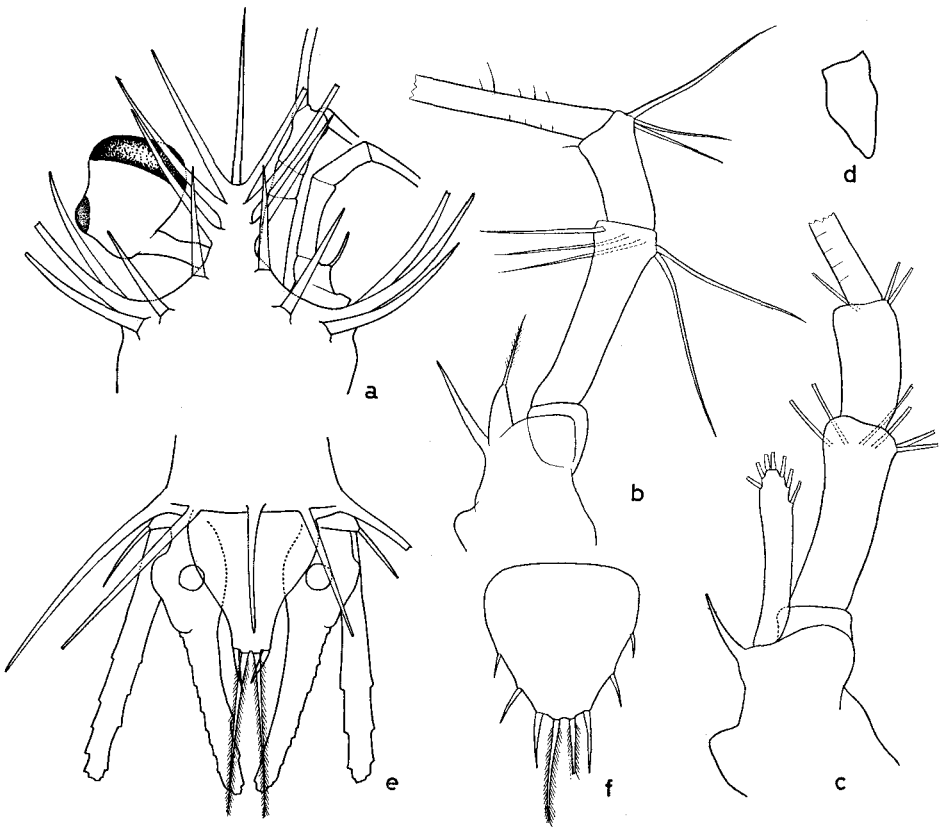

Fig. 12. *Caesaromysis hispida* Ortmann; a, anterior end of adult female, ×15; b, antenna of adult female, ×33; c, antenna of adult male, ×33; d, exopodite of first thoracic leg, ×78; e, posterior end of adult female, ×39; f, telson of adult male, ×33.

at that time, he made clear through the further examination on the Hancock materials that these differences, except the number of spines on the carapace and the abdominal somites, had resulted from the difference in the stage of growth and from the intraspecific variation, and he suspected that *C. vanclevei* may be a synonym of *C. hispida*. In 1962 Birstein and Tchindonova reported in "Mysidacea collected by the Soviet Antarctic Expedition" that *C. vanclevei* is a synonym of *C. hispida*.

The present specimens agree with the description of Banner in the number of spines on the carapace and the abdominal somites, namely, in 4 adult and near-adult males the number is 76 to 97 on the carapace and is 16 to 19, 19 to 21, 18 to 22, 18 to 22, 15 to 19 and 8 to 10 on first to sixth abdominal somites, respectively.

There is a difference in the telson between the Pacific specimens and the Atlantic ones. In the examination of Discovery specimens from the Atlantic Ocean, O. S. Tattersall (1955) noted that the posterior margin of telson is armed with 3 spines. In the present specimens, however, it is armed with one spine at each of both corners and with a pair of median plumose setae (rarely with 1 plumose seta) (Fig. 12e and f).

Geographical distribution:

The species is distributed in the Pacific, Atlantic and Indian Oceans. In the Pacific, hitherto it has been known that the species is widely distributed in the eastern

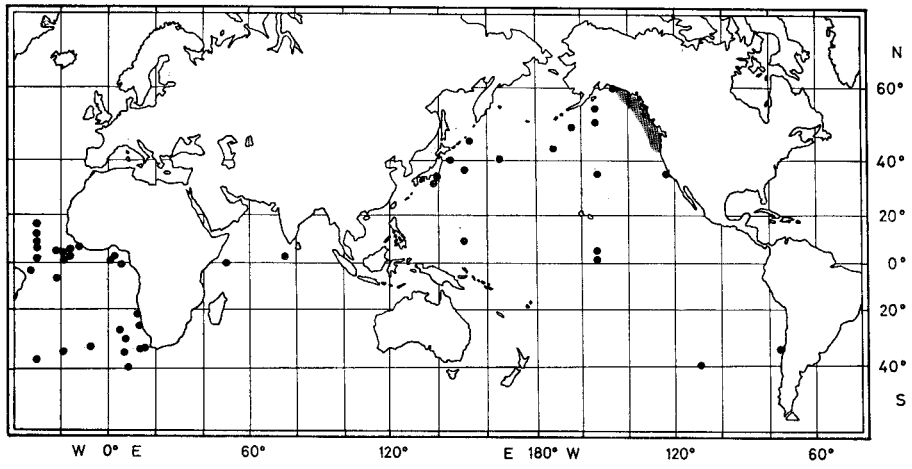

Fig. 13. Geographical distribution of *C. hispida* Ortmann.

Pacific off the North America from Oregon to Alaska, but in the western North Pacific there was only one record from Kurile-Kamchatka Trench by Birstein and Tchindonova. By the present collections it was made clear that the species is also widely distributed in the central and western North Pacific. In the South Pacific there is two records by Colosi and Birstein and Tchindonova from the offing of Valparaiso, Chile (Fig. 13).

Vertical distribution:

As shown in Fig. 14 the species has fairly extensive range in the vertical distribution. But there is a main range from 200 to 500 m deep on the judgement from the number of individuals collected. Banner has recorded this species from 60- to 1200–m depths in the offing of British Columbia and from 50- to 650–m depths in the offing of Alaska.

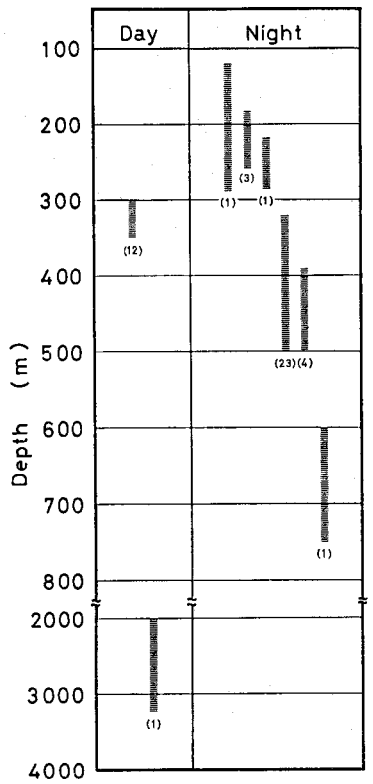

Fig. 14. Vertical distribution of *Caesaromysis hispida* Ortmann. The numerals in parentheses show the number of specimens collected.

Genus *Echinomysides* gen. nov.

Diagnosis

Carapace and adbominal segments armed with many spines. Rostrum produced anteriorly, covering eyestalk and proximal two segments of antennular peduncle, armed with 3 stout spinous processes on frontal margin and with 3 pairs of spines on lateral margin. Eye developed, with visual elements divided into two separated parts, frontal and postero-lateral areas. Antennal scale curved outwardly, becoming progressively narrower from base to apex and terminating into a spinous process; inner margin armed with 2 stout spines at a short distance from apex, and in proximal part of these 2 spines armed with 9 plumose setae; outer margin not smooth,

armed with short spines irregularly arranged. Exopod of first thoracic leg normal and developed as a natatory organ. Each abdominal segment armed with spines on two transverse lines, middle and posterior ones. Telson elongate triangular, terminating into a pair of long and stout spines; lateral margin nearly straight, armed with minute spinules in addition to a prominent spine near distal end. Exopod of uropod armed with about 4 small spines on outer margin near base.

Remarks

The new genus *Echinomysides* very closely resembles *Echinomysis* in general feature. The most important difference is present in the scale. In the former genus it is so peculiar that there are no instance in family Mysidae, while in the latter genus it is normal though there is no terminal spinous process which is generally present at the distal end of smooth part of outer margin in the species of tribe Erythropini. Spines on dorsal surface of carapace are present in the new genus on three longitudinal lines, one median line and two dorso-lateral lines, whereas these are irregularly arranged in the genus *Echinomysis*. The present new genus is also allied to *Caesaromysis* in general form, but differs from the latter in the unique scale and in the developed exopod of the first thoracic leg.

Echinomysides typica sp. nov.

(Figs. 15 and 16)

Occurrence:

St. 440, 1 adult female (3.6 mm) with 8 embryos in marsupium.

Description:

Rostrum produced forward between eyes, and extending to distal margin of second segment of antennular peduncle; frontal margin of carapace armed with 3 long spines, of which the central one is longest and extending forwardly beyond distal margin of antennular peduncle; lateral margin of rostrum armed with 3 pairs of spines which become progressively longer anteriorly (Fig. 15a). Carapace armed with small spines on 3 rows of a median line and 2 dorso-lateral lines; 2 prominent spines present at antero-lateral corner and many spines present on posterior and postero-lateral margins (Fig. 15a and b). Posterior margin of carapace emarginate, exposing last thoracic somite which is armed with 4 spines on dorsal surface near posterior margin of the somite (Fig. 15a). Eye large, divided into two separated visual ocelli, anterior and postero-lateral areas, uncolored part present between two visual ocelli in lateral view (Fig. 15a and b). Eyestalk short, covered by rostrum so that unvisible in dorsal view (Fig. 15a). Antennular peduncle rather small; first segment slightly longer than width; second segment short, twice as wide as long; third segment longest, almost of the same length with the preceding two segments combined (Fig. 15c). Antennal peduncle small, shorter than antennular peduncle; middle segment longest, somewhat longer than width; basal segment long next to the middle and as long as broad;

distal segment shortest, clearly shorter than width; sympod armed at outer distal corner with 2 thick and long spines, of which longer one is of half the length of the scale (Fig. 15c). Antennal scale small, extending beyond antennal peduncle by distal 1/3 of the scale, unique in shape, curved outwardly, tapering anteriorly and terminating into a spinous process, armed on inner margin with 2 long spines at short distance from tip and with 9 plumose setae at proximal parts of these spines; outer margin not smooth, armed with short spines arranged irregularly (Fig. 15e). Mandible with molar part being smooth; mandibular palp rather slender; second segment bearing

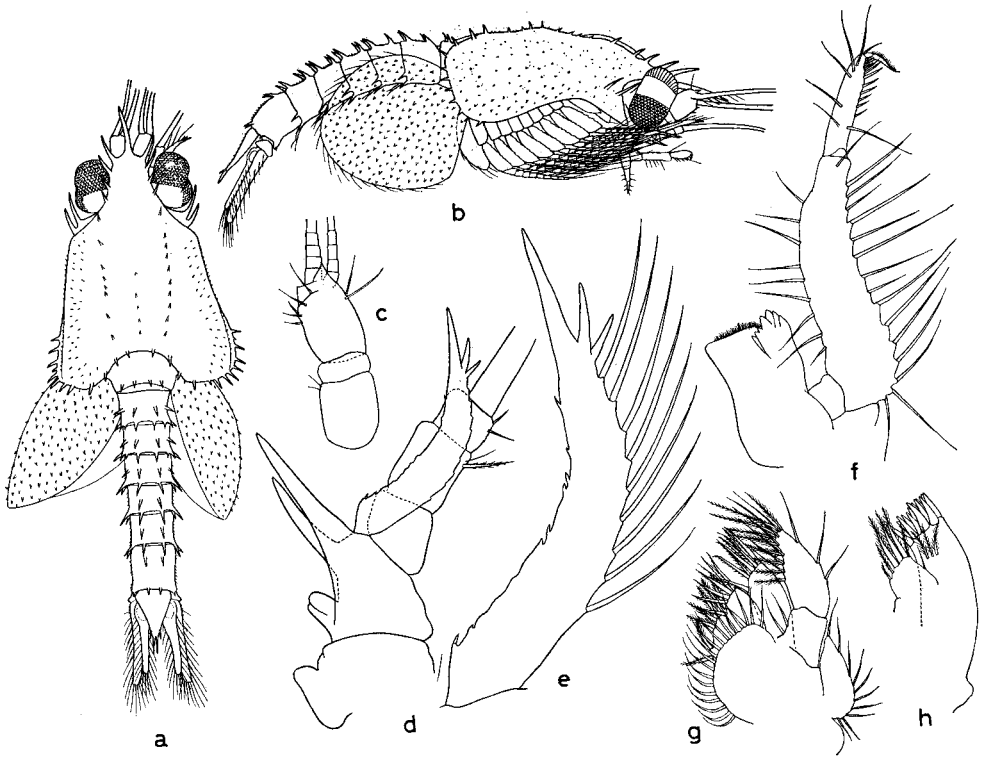

Fig. 15. *Echinomysides typica* gen. nov., sp. nov.; a, adult female in dorsal view, ×18; adult female in lateral view, ×18; c, left antennular peduncle, ×43; d, antenna, ×88; e, antennal scale, ×171; f, mandible, ×88; g, maxilla, ×88; h, maxillule, ×171.

relatively thick and long setae arranged scarcely on both margins; third segment 5 times as long as broad, with comb-like setae scarcely arranged (Fig. 15f). Maxilla and maxillule allied to those of *Echinomysis chuni* (Fig. 15g and h). First thoracic endopod armed on inner margin of merus, carpus and propodus with 3, 5 and 3 stout setae, respectively; exopod developed to natatory organ (Fig. 16a). Second thoracic endopod not hirsute; merus long, almost equal length to carpo-propodus and dactylus together, 4.5 times as long as broad; carpo-propodus 4 times as long as broad (Fig. 16b). Third to eighth thoracic endopods broken off in the type specimen. All thoracic ex-

opods armed with 2 to 4 small spines on outer margin of basal segment (Fig. 16a and b). Adult female furnished with 3 pairs of brood lamellae. First to sixth abdominal segments armed on dorsal surface of middle transverse line with 5, 4, 2, 2, 2 and 2 spines, respectively, and armed on dorsal surface of posterior margin with 4, 4, 2, 2, 2 and 2 spines, respectively, and on ventro-lateral surface of first five abdominal segments with 2 spines, respectively (Fig. 15a). Telson elongate triangular, equal to last abdominal segment in length, 1.5 times as long as broad at maximum width, terminating into a pair of long spines which is slightly longer than telson except these spines, no segmentation at base of spines; lateral margin nearly straight, armed with a spine at short distance from distal end and with about 12 of so minute spinules that these can not be observed by microscope of low power (Fig. 16d). Uropod slender; exopod about twice as long as telson except terminal spines, slightly arched inwardly,

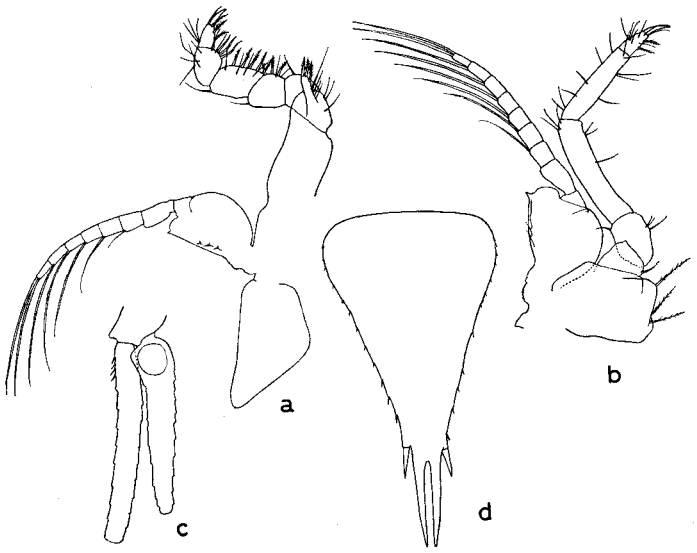

Fig. 16. *Echinomysides typica* gen. nov., sp. nov.; a, first thoracic leg, ×45; b, second thoracic leg, ×45; c, uropod, ×45; d, telson, ×91.

armed with 4 spinules on outer margin near base; endopod shorter than exopod, none of spines at statocyst region on inner margin (Fig. 16c). Male unknown.

Type specimen:

Holotype (NSMT-Cr. 5510), adult female of 3.6 mm. Type specimen is stored in National Science Museum of Tokyo.

Remarks:

A single adult female with 8 embryos in marsupium was only collected. As stated in the paragraph of the genus the present species is distinguishable from all species of mysids by the peculiar antennal scale. Besides the characteristic of the scale the new species differs from two species of *Echinomysis* in the developed rostrum,

the presence of spines on the last thoracic somite, 2 stout spines on the sympod of antenna, the armature of telson and the presence of minute spines on the outer margin of the exopod of uropod.

Distribution:

The present specimen was collected by the bottom-net from the sea-floor at the depth of about 140 m near Amami Island, south-western Japan.

Genus *Meterythrops* Smith 1879

Characteristics of the genus

1. Eye globular, functionally normal.
2. Frontal margin of carapace produced into a triangular rostral plate with broadly rounded tip.
3. Antennal scale large, extending beyond distal margin of antennular peduncle.
4. Telson elongate triangular with narrow apex; apex armed with a pair of median plumose setae and 2 pairs of slender spines in which inner pair is longer than outer; lateral margin smooth.
5. First pleopod of male with uni-articulated endopod and multi-articulated exopod.

Remarks

The genus is most closely related with *Parerythrops,* but the former is distinguishable from the latter of which the first pleopod of male is bearing the unsegmented exopod. In the shape of telson the present genus is also allied to genera *Katerythrops* and *Pleurerythrops*. However, it differs from *Katerythrops* in the armature of telson, namely, in the former the telson is armed with a pair of plumose setae besides 2 pairs of spines, while in the latter it is armed only with 2 pairs of spines. The other genus *Pleurerythrops* has two noticeable characteristics, i.e. the constriction between thorax and abdomen, and the modified setae on the male fourth pleopod. These two characteristics do not exist in the present genus.

The genus is easily distinguishable from other genera by the characteristics of the telson and antennal scale.

Five species inclusive of the present new one are contained in this genus, and in the present collections there are three valid species and an unnamed species.

Key for the identification of the species in the genus *Meterythrops*

1. Antennal scale without a terminal denticle on external margin.....*M. megalops* Ii
– Antennal scale with a strong terminal denticle on external margin..... 2
2. Antennal scale with denticles on outer margin in addition to a terminal one .....*M. picta* Holt and W.M. Tattersall
– Antennal scale with a single denticle at end of smooth part of outer margin..... 3
3. Apex of antennal scale extending to about the same level as the tip of terminal denticle of outer margin of scale .....*M. japonica* sp. nov.

- Apex of antennal scale extending forward far beyond the tip of terminal denticle of outer margin of scale 4
4. Eye considerably small, hardly wider than basal joint of antennular peduncle; terminal lobe of scale occupying about 2/5 of length of scale.....*M. microphthalma* W.M. Tattersall
- Eye large, more than twice as wide as basal joint of antennular peduncle; terminal lobe of scale occupying 1/3 of length of scale.....*M. robusta* Smith

Meterythrops picta Holt and W. M. Tattersall

(Fig. 17)

Meterythrops picta Holt and W.M. Tattersall, 1905: 116–117 and 143; 1906: 23–24; Hansen, 1908: 107; Zimmer, 1909: 87–88; W.M. Tattersall, 1911: 28–29; Zimmer, 1914: 388; Illig, 1930: 428; Stephensen, 1933: 12; W.M. Tattersall, 1951: 113; W.M. Tattersall and O.S. Tattersall, 1951: 209–212; O.S. Tattersall, 1955: 117–118; Birstein and Tchindonova, 1962: 65–66; Ii, 1964: 314–319; Murano, 1970: 138–139.

Meterythrops indica Hansen, 1910: 63–64; Illig, 1930: 428–429; W.M. Tattersall, 1939: 235; Pillai, 1967: 1706.

Meterythrops affinis Coifmann, 1936: 36–38.

Occurrence:

St. 3–3, 1 immature female.
St. 60–2, 1 young form.
St. 76–2, 2 adult females.
St. 77, 1 immature female.
St. 93–2, 2 adult males.
St. 104–6, 1 adult female.
St. 107, 1 immature female.
St. 108, 2 adult females.
St. 111–2, 1 immature male.
St. 113, 1 immature male.
St. 114, 2 adult and 1 immature females.
St. 120, 1 immature female.
St. 121–2, 1 adult male.
St. 122, 1 immature female and 1 immature male.
St. 132, 1 immature female.
St. 139, 1 immature male.
St. 145–3, 1 adult female.
St. 152, 1 adult female and 1 adult male.
St. 154, 1 adult male.
St. 155, 1 adult male.
St. 160, 1 adult male.
St. 161, 3 immature females and 2 immature males.
St. 176–4, 1 immature female.
St. 201, 1 immature female.
St. 206, 2 adult females.
St. 225–10, 1 immature female.
St. 293–2, 1 young form.
St. 293–3, 1 young form.
St. 310, 1 immature female.
St. 344, 1 immature female and 1 immature male.
St. 442, 1 young form.
St. 457, 1 adult female.
St. 526, 1 immature female and 1 adult male.
St. 533, 1 adult female, 2 adult and 1 immature males.
St. H1, 1 female.
St. H45, 1 adult and 3 immature females, 2 immature males.
St. H62, 1 immature female.

Body length:

Female up to 14.4 mm, male up to 14.0 mm.

Remarks:

Hansen instituted *Meterythrops indica* for the reception of a probably adult male, 9.7 mm in the body length, collected from Banda Sea, which was furnished with a denticle on the outer margin of the antennal scale in addition to the terminal one. W. M. Tattersall identified a specimen from the central Arabian Sea during John Murray Expedition as *M. indica,* but he emphasized that *M. indica* is very closely allied to *M. picta,* and the difference between the two species are very slight. Birstein and Tchindonova (1962) and Ii (1964) cancelled a name *M. indica,* as a synonym of *M. picta* through the studies of their specimens from the Indian Ocean and Japan, respectively.

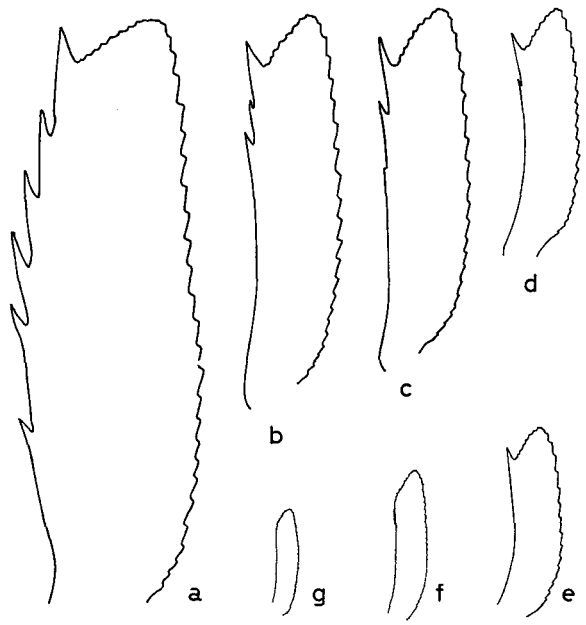

Fig. 17. Developmental change in antennal scale of *Meterythrops picta* Holt and W.M. Tattersall, ×40; a, adult male 13.7 mm; b, adult female 11.6 mm; c, immature female 9.2 mm; d, immature female 6.4 mm; e, young form 5.3 mm; f, young form 4.3 mm; g, young form 2.1 mm.

It has been already known that the number of denticles on the outer margin of antennal scale is increased with the growth of individuals (Illig, 1930; W. M. Tattersall and O. S. Tattersall, 1951). This fact was also observed in the present specimens. Namely, two young specimens of 2.1 mm and 4.3 mm did not have spines at all, nor even any terminal spine, a juvenile of 5.3 mm had only a terminal spine, and an immature of 6.4 mm, an adult female of 11.6 mm and an adult male of 13.7 mm were armed with 1, 2 and 5 spines in addition to the terminal one, respectively (Fig. 17).

Geographical distribution:

The species has been recorded from the Pacific Ocean (Ii, 1964; Murano, 1970), from the Atlantic Ocean (Holt and W. M. Tattersall, 1905, 1906; Hansen, 1908; W. M. Tattersall, 1911, 1951; Zimmer, 1914; Illig, 1930; Stephensen, 1933; O. S. Tattersall, 1955), from the Indian Ocean (Illig, 1930; O. S. Tattersall, 1955; Birstein and Tchindonova, 1962), from the Arabian Sea (W. M. Tattersall, 1939), from the Gulf of Aden (Coifmann, 1936) and from the Banda Sea (Hansen, 1910). In the Pacific Ocean it has been only collected from the Asian side from Formosa to Japan, and there are none of the record from the American side.

Vertical distribution:

The species was presumed to be a bottom-living form when it was instituted by Holt and W. M. Tattersall (1905). In the present work there are three records, 220–330, 370–430 and 570–600 m, collected by the bottom-net. Therefore, it is suggested that the species would come in contact with the sea-floor.

However, most of the present specimens were obtained from the middle layer of the sea. The collection records by the ORI-net with an opening-closing device indicated the layers of 515–585, 520–700 and 670–800 m, and the records by oblique hauls indicated that the species was never obtained when the net did not attain 500–m depth. The species appears to be a mesopelagic or bathypelagic species inhabiting in the layers deeper than 500 m.

Meterythrops japonica sp. nov.

(Fig. 18)

Occurrence:

St. 293–2, 1 adult female with 6 embryos (9.5 mm).

Description:

General form compact. Carapace with anterior margin produced between eyes into a broadly rounded rostrum which reaches middle of first segment of antennular peduncle (Fig. 18a and b); posterior margin emarginate, exposing last thoracic somite in dorsal view (Fig. 18a); cervical sulcus well-marked in lateral view. Eye well developed, globular and functionally normal; diameter of eye about half width of anterior end of carapace (Fig. 18b). Antennular peduncle consisted of 3 segments; first segment armed with a few plumose setae at distal outer corner which is not so projected, second segment very short, twice as broad as long; third segment longest, longer than preceding two segments together, 1 and 2/3 times as long as broad (Fig. 18b). Antennal peduncle short, consisted of 3 segments which are with one another equal in length; each segment as long as broad (Fig. 18c). Antennal scale long, reaching forward beyond distal margin of antennular peduncle by 1/4 of length of scale, twice as long as antennal peduncle, barely 4 times as long as broad; external margin smooth, slightly concave, terminating into a strong spinous process which

is of same level with apex of scale (Fig. 18c). Mouth parts allied to those of congeners of the genus (Fig. 18d and e). Endopod of first thoracic limb short and robust, with well-developed nail; dactylus, propodus and carpus armed with strong barbed setae on inner margin; an elongated triangular endite present on inner side of basis (Fig. 18f). Endopod of second thoracic limb long and rather robust; merus long, longer than carpo-propodus and dactylus combined (Fig. 18g). Abdomen 6-jointed; first five segments subequal; sixth segment longest, somewhat longer than width, 1.5 times as long as preceding one (Fig. 18h). Telson triangular, of about

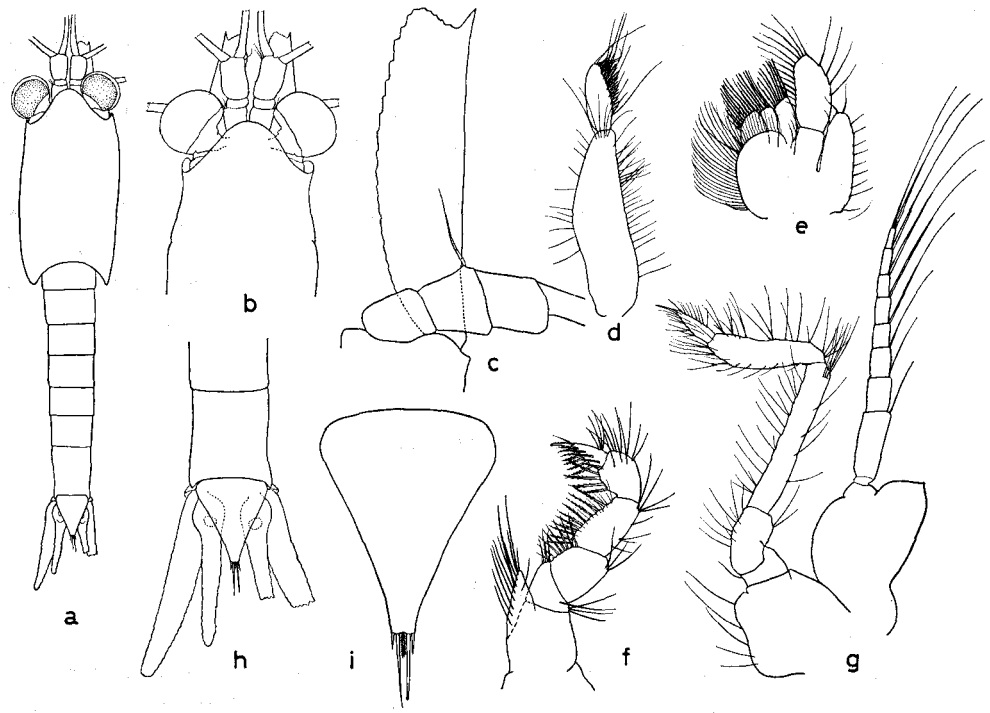

Fig. 18. *Meterythrops japonica* sp. nov.; a, adult female in dorsal view, ×6; b, anterior end of adult female, ×10; c, antenna, ×32; d, mandibular palp, ×25; e, maxilla, ×45; f, first thoracic endopod, ×32; g, second thoracic leg, ×25; h, posterior end of adult female, ×10; i, telson, ×32.

same length with sixth abdominal segment, 1 and 1/4 times as long as broad; apex narrow, armed with a pair of median plumose setae and 2 pairs of spines, of which inner pair of spines long and slender, about 1/3 of telson in length; the other pair short, about 1/4 of length of inner pair; lateral margin naked and slightly concave (Fig. 18i). Uropod moderate; endopod about twice as long as telson, unarmed with spines on inner margin at statocyst region; exopod longer than endopod by 1/5 of length of exopod (Fig. 18h). Male unknown.

Type specimen:

Holotype (NSMT-Cr. 5509), adult female of 9.5 mm. Type specimen is stored in National Science Museum of Tokyo.

Remarks:

It is clear that the present species belongs to either *Meterythrops* or *Parerythrops* from the shape and armature of the telson. Difference between both genera is only present in the character of the first pair of pleopod in the male. It is impossible to judge into which genus of the two the present species is to be contained, because none of adult male was taken in the present collections. It is placed, for the present, in genus *Meterythrops*. The correct identification will be made when the male will be collected in future.

An attention was paid to the comparison with *M. megalops* collected from the same sea area. Although the present species is clearly different from *M. megalops* in the size of eye and the shape of antennal scale, there is a possibility that these differences are originated in the young condition of the latter species as already known on the antennal scale of *M. picta*. Therefore, further examination for identity is needed in future.

The present species differs from the three known species as follows: from *M. picta* in the smooth external margin of antennal scale, from *M. microphthalma* in the shape of antennal scale and the size of eye, and from *M. robusta* in the shape of antennal scale and the armature of the endopod of uropod.

The species is also different from those of genus *Parerythrops* as follows: from *P. affinis* in the shapes of rostral plate, antennal scale and telson, from *P. lobiancoi* in the shapes of antennal scale and telson, and from *P. obesa* in the shape of antennal scale and the armature on endopod of uropod.

Distribution:

The present species was collected by the bottom-net from the sea-floor at the depths of 220–330 m in Tateyama Bay, central Japan. It seems to be a bottom-living form.

Meterythrops microphthalma W. M. Tattersall 1951

Meterythrops microphthalma W. M. Tattersall, 1951: 113–116; Birstein and Tchindonova, 1958: 305; Ii, 1964: 319.
Meterythrops robusta Taniguchi, 1969: 47–48.

Occurrence:

Many specimens of female and male were collected at the following stations: St. 6–6, St. 191–1, St. 191–3, St. 192, St. 193, St. 235, St. 236, St. 243–2, St. 258–1, St. 258–5, St. 258–6, St. 258–9, St. 258–11, St. 259–3, St. 259–5, St. 259–7, St. 259–8, St. H8–2, St. H8–5, St. H8–6, St. H9–1, St. H9–7, St. H9–10, St. H10–10, St. H133–4, St. H133–5, St. H133–6, St. H133–9, St. 133–22, St. H133–23, St. H133–24, St. H133–

25, St. H133–27, St. H134–1, St. H135–3, St. H136–5, St. H136–12, St. H136–15, St. H138–2, St. H139–7, St. H139–8, St. H139–9, St. H139–10, St. H139–11, St. H139–13, St. H139–15, St. H139–21, St. H140–1, TR. 1, TR. 4, TR. 6, TR, 8, TR. 13.

Body length:

Adult female and male up to about 20 mm.

Remarks:

The present species was instituted in 1951 by W. M. Tattersall who indicated the differences from the most related species *M. robusta* in the following characteristics: 1) the eye considerably smaller, on the dorsal surface of the eyestalk there is a prominent tubercle; 2) the antennal scale more slender; 3) the inner uropod without spines on its inner margin. After the examination of *M. robusta* collected from the offing of the Pacific coast from Washington to Alaska, Banner (1954) found that there were small-eyed individuals similar to those described by W. M. Tattersall and intermediate forms between the typical large-eyed individuals. He considered that *M. microphthalma* is a synonym of *M. robusta*. Birstein and Tchindonova (1958) collected many specimens from Kurile-Kamchatka, and identified them with *M. microphthalma* based on W. M. Tattersall's description and figures. In their collection the typical forms of *M. microphthalma* and *M. robusta* were collected together in a hauling, and there were no intermediate forms between the both species. Taniguchi (1969) identified his specimens collected from the offing of the southeast Hokkaido, Japan, with *M. robusta*. Although his specimens have possessed small eyes and slender antennal scale similar to those of *M. microphthalma* described by W. M. Tattersall,

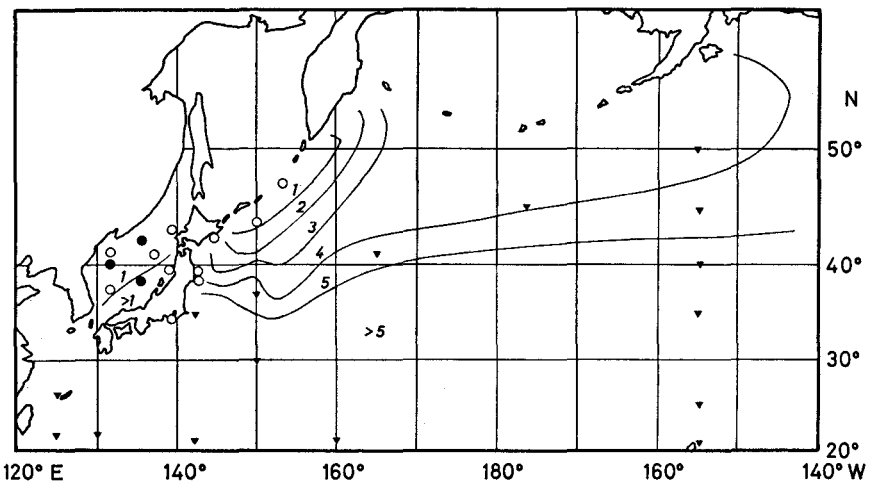

Fig. 19. Occurrence of *Meterythrops microphthalma* W.M. Tattersall in the present work and water temperature at a depth of 400 m (after SVERDRUP et al. 1955).

○: Present ▼: Absent
●: Stations at which horizontal tows were carried out.

there were a series of spines on the inner margin of the endopod of uropod as in *M. robusta*.

The present specimens are identical with *M. microphthalma* described by W. M. Tattersall except the endopod of uropod where there are a long series of spines, about 30 in number, as already noted by Taniguchi. It seems that W. M. Tattersall has overlooked these spines on the endopod of uropod.

Geographical distribution:

M. microphthalma has been only found from the Pacific Ocean off the northeastern part of Honshu Island, off Hokkaido Island and off Kurile Islands, from Japan Sea and Okhotsk Sea. The southernmost catch in the Pacific coast of Japan was recorded from Sagami Bay located at about 35°N, 139°30'E in January 1964 when

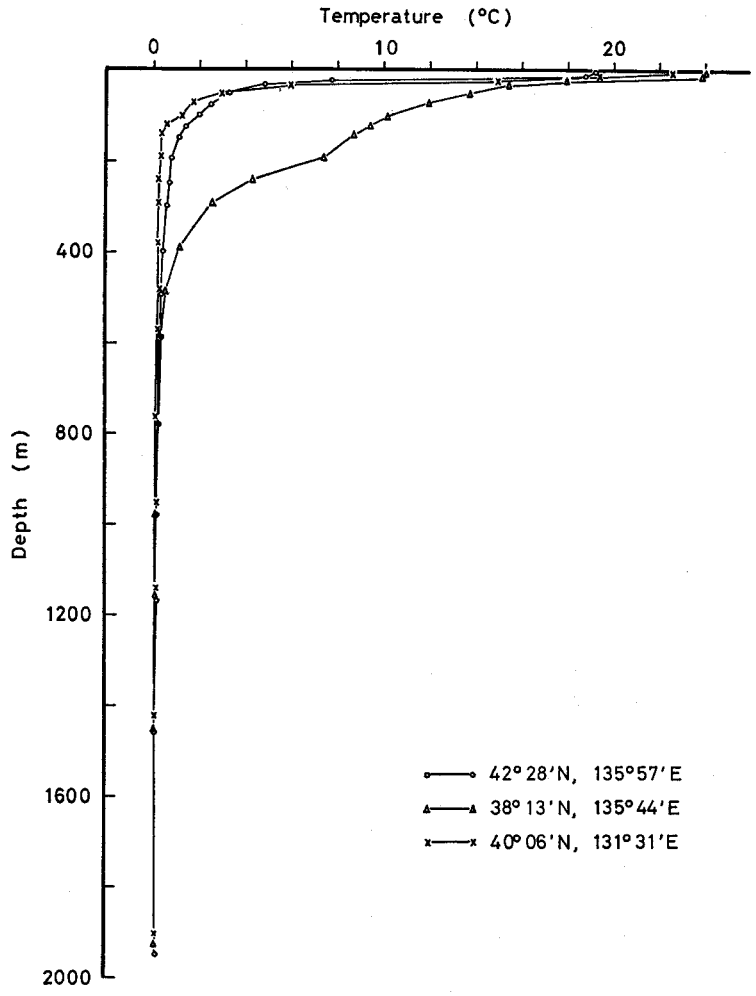

Fig. 20. Vertical distribution of water temperature at 3 stations where horizontal tows were carried out.

abnormal cold water mass came to the Pacific coast of central and western parts of Japan. In normal years, it seems that the southern limit of such distribution is at about 38°N where the front is made between Oyashio, a cold current, and Kuroshio, a warm current. In the Japan Sea the species is very abundant in deep layers and is taken from all stations where the collection was made by R/V Hakuho-Maru in 1970. There are no records from the East China Sea. Although the data are not plenty enough, the northern limit of the distribution may be said to be about 50°N. There are no certain records from the Bering Sea and the eastern Pacific Ocean.

The geographical distribution of the species corresponds to the sea area where is cold water below 3°C at a depth of 400 m (Fig. 19).

Vertical distribution:

An investigation on the vertical distribution of plankton and micronekton was carried out by the ORI-net at 3 stations during R/V Hakuho-Maru Cruise (KH–70–4)

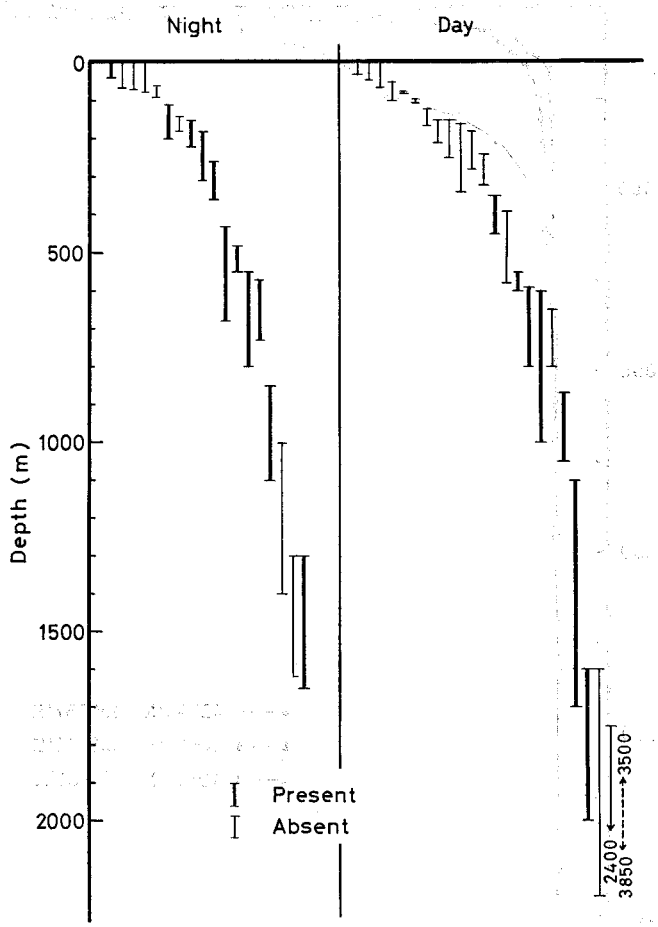

Fig. 21. Depth ranges in 18 tows at night and 24 tows in the daytime by the ORI-net used for the examination of the vertical distribution of *Meterythrops microphthalma* W.M. Tattersall.

in the Japan Sea in August 1970 (Fig. 19). In order to know the distribution pattern of *M. microphthalma* for each of the 3 stations, the results obtained at 3 stations were not sufficiently suitable for making the patterns of 3 stations separately, and so the data from the 3 stations were all together dealt with. In the layers deeper than 100 m where the species is found, the quality of sea water is fairly uniform except the layer from 100 to 300 m (Fig. 20). Accordingly, the error resulting from the unification is not certainly involved in the layer below 300 m. In the layer between 100 and 300 m, it hardly seems that so large errors come into the distribution pattern because there is found the water colder than 10°C in common to 3 stations.

The net was hauled for the purpose 24 times in the daytime and 18 times at night in total at 3 stations in various layers between the surface and 2000-m depth. Among them, *M. microphthalma* was collected in 7 haulings in the daytime and 11 at night (Fig. 21).

The results are given in Fig. 22. In the daytime, *M. microphthalma* was found in the layer of 350 to 2000 m, especially in the layer from 500 to 1100 m with two peaks

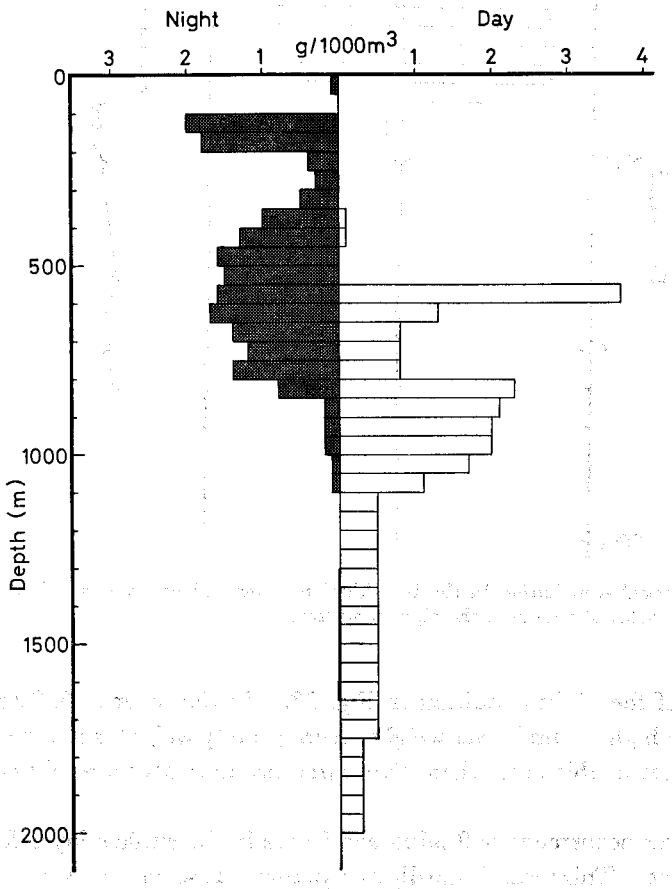

Fig. 22. Vertical distribution of *Meterythrops microphthalma* W.M. Tattersall.

at 550 to 600 m and 800 to 850 m. At night, it was found in the layer from the surface to 1650-m depth, especially in 100 to 850 m with two peaks, as in the daytime, 100 to 150 m and 600 to 650 m. There is a clear difference between day and night periods in the distribution pattern, and this has undoubtedly resulted from their diel vertical migration.

Relation between the individual number and the wet weight is shown in regard

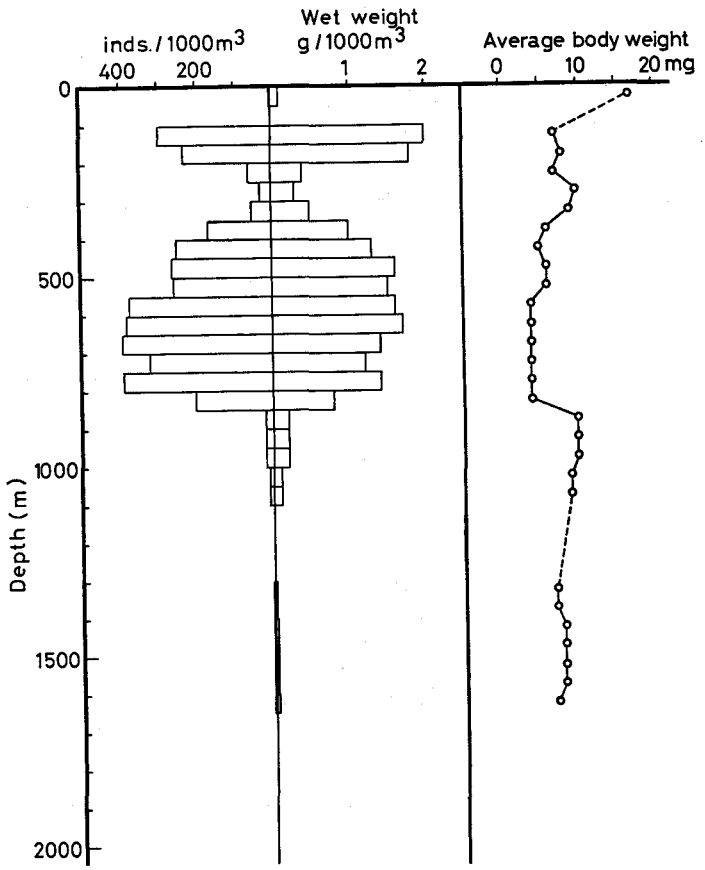

Fig. 23. Vertical distribution in the individual number and wet weight of *Meterythrops microphthalma* W.M. Tattersall in the night condition.

to the case of the night condition in Fig. 23. In the layer of 350 to 850 m which indicated the high values in wet weight, average body weight is relatively light. This fact shows that in this layer there live immature animals more abundantly than in other layers.

There was occurrence of 2 adult specimens in the surface layer from 0- to 50-m depth at night. This result is hardly acceptable. It seems that some error has come into the treatment after the collection.

Meterythrops sp.

(Fig. 24)

Occurrence:

TR. 8, 2 adult females (one of the two about 25 mm, the other fragment).

Remarks:

This specimen was obtained from the stomach contents of a deep-sea fish, *Malacocottus gibber*, collected by a trawl from the sea-floor at 1035-m depth. The specimen has been damaged, but the characteristics of the species have been kept in fairly good condition. The species is closely related to *M. robusta* in the general feature, but it differs from the latter in the following respects: 1) in the present species the antennal scale 4 times as long as broad (Fig. 24b), while in *M. robusta* it slightly longer than 3 times as long as broad; 2) the length: width ratio in the telson almost equal in both species,

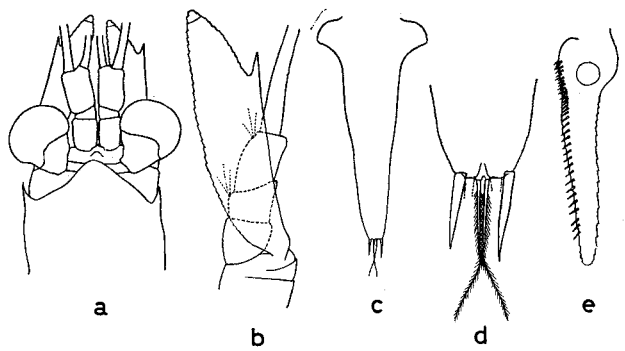

Fig. 24. *Meterythrops* sp.; a, anterior end of adult female, ×6; b, antenna, ×12; c, telson, ×12; d, distal end of telson, ×57; e, endopod of uropod, ×12.

but in the present species the telson more slender than in the latter species, because in the former it becomes abruptly narrower close to the base (Fig. 24c); 3) the lateral margin of telson furnished with fine serrulation on its distal half (Fig. 24d); 4) the endopod of uropod armed with 2 or 3 rows of spines at statocyst region on inner margin (Fig. 24e); 5) the present species was collected from deeper layer than the known depth range, 60 to 270 m, for *M. robusta*.

Genus *Nipponerythrops* gen. nov.

Diagnosis

Carapace short, leaving antennular peduncle and eyestalk uncovered; anterior margin projected into a small triangular rostrum with acutely pointed tip; lateral margin of rostral plate somewhat deeply concave. Antennal scale setose all round. Male pleopods unarmed with any modified setae. Telson elongate triangular, armed with about 14 spines on distal half of lateral margin; apex narrow, armed with a pair of slender spines; no median plumose setae present.

Remarks

The most remarkable characteristic in the present genus is the antennal scale armed with setae on the whole margin. Such an antennal scale is usual type in tribes Mysini and Leptomysini, but is not so in tribe Erythropini. The present genus, however, must be referred to tribe Erythropini in the structures of the third to eighth thoracic limbs and of the fourth pleopod of the male. Among Erythropini, some species such as those of genera *Heteroerythrops* and *Euchaetomeropsis,* and *Hyperamblyops nana* bear such a scale. Of course, the present genus is different from these species in the anterior margin of the carapace, eye and telson. The genus is allied to the species of *Metamblyops* in the normal eye and telson, but the differences in the scale and the rostral plate are too large to identify the present specimens with above genus. The name *Nippon* means Japan in Japanese.

Nipponerythrops typica sp. nov.

(Figs. 25, 26 and 27)

A species of unknown genus; Murano, 1970: 23.

Occurrence:

St. 293–2, 2 adult (9.2 and 9.1 mm) and 2 near-adult (8.7 and 8.6 mm) males, 1 immature female (8.3 mm).

St. 293–3, 4 adult (10.4, 10.3, 9.6 and 9.5 mm) and 1 immature (5.9 mm) males, 2 adult (9.7 and 9.4 mm, the former with embryos in marsupium) and 2 near-adult (9.1 and 7.6 mm) females.

St. 293–4, 1 young form (3.3 mm).

Description:

Body compact. Carapace rather short, barely extending to base of antennular peduncle, emarginate posteriorly, leaving last thoracic segment exposed dorsally; anterior margin forming an acute-angled triangular rostral plate with sharply pointed tip; lateral margin of rostrum somewhat deeply concave; cervical sulcus clearly marked (Fig. 25a and b). Eye well-developed, functionally normal, globular, apartly set with slender eyestalk, without papilla (Fig. 25b). Antennular peduncle relatively slender, first segment 1.3 times as long as broad, armed with a few setae at antero-lateral corner; second segment short, a half length of the breadth; third segment large, almost the same length to preceding two segments together, nearly twice as long as broad, with sexual appendage of male which is 2/3 of length of third segment (Fig. 25b); more robust in male than in female. Antennal peduncle slender, shorter than antennular peduncle; first segment shortest, as long as broad; second segment less than 1.5 times as long as broad; third segment longest, twice as long as broad (Fig. 25c). Antennal scale lanceolate, extending forward beyond distal margin of antennular peduncle by 1/4 of scale, 5 times as long as the maximum width; external margin nearly straight, furnished with setae as in inner margin (Fig. 25c). Mouth parts usual type in Erythropini (Fig. 25d, g and h). First thoracic endopod robust;

inner margin of carpus, ischium and merus armed with stout setae, propodus armed with stout setae on distal half of inner margin (Fig. 25e). Second thoracic endopod slender; carpus inwardly curved, more than 5 times as long as broad, propodus shorter than carpus, 5 times as long as broad (Fig. 25f). Third to eighth thoracic endopods with carpus divided from propodus by an oblique articulation (Fig. 26a). Abdomen slender; first five segments subequal; sixth segment long, longer than the preceding two segments combined, 1.3 times as long as telson, twice as long as broad (Fig. 25a). Pleopods of male well developed, biramous; first pair with exopod 8-segmented and with endopod unsegmented; both rami of second to fifth pairs almost equal in length,

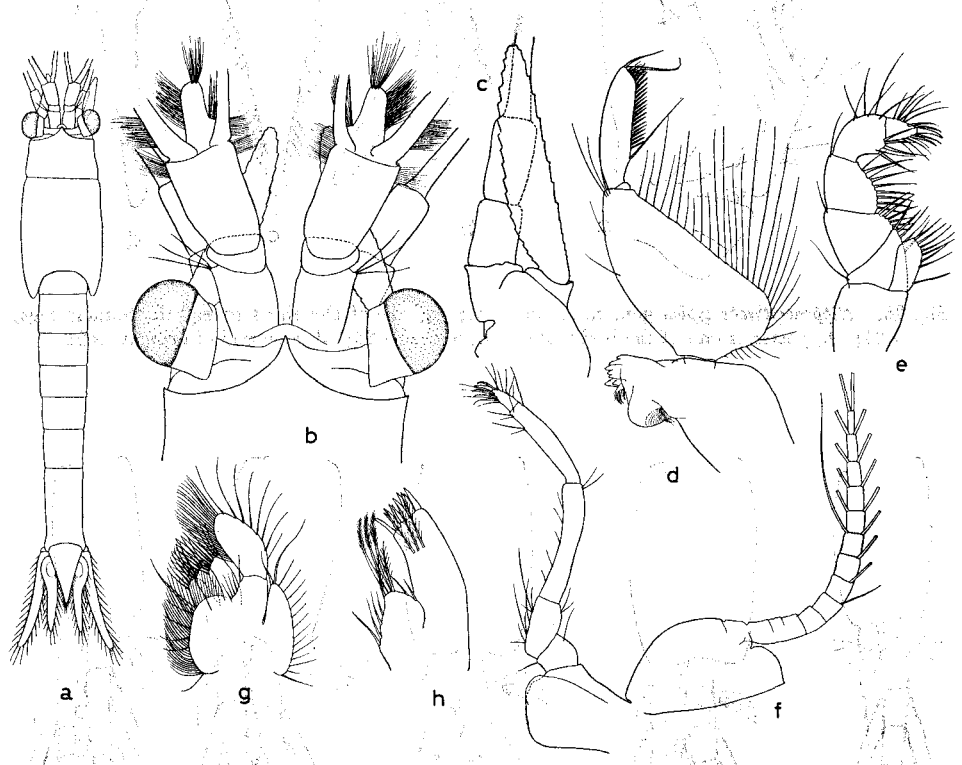

Fig. 25. *Nipponerythrops typica* gen. nov., sp. nov.; a, adult female in dorsal view, ×6; b, anterior end of adult male, ×22; c, antenna, ×28; d, mandible, ×38; e, first thoracic endopod, ×33; f, second thoracic leg, ×25; g, maxilla, ×38; h, maxillule, ×63.

8-segmented, not furnished with any modified setae; pseudobranchial process from endopod slender (Fig. 27). Telson elongate triangular with narrow apex armed with a pair of slender spines which are about 1/6 of length of telson; lateral margin nearly straight, armed on distal half with about 14 spines being a half length of apical ones; no median plumose setae present (Fig. 26c). Uropod long and slender; exopod slightly curved outwardly, 1.7 times as long as telson; endopod shorter than exopod by 1/4 of length of endopod, armed with 2 or 3 spines near region of statocyst on its inner margin (Fig. 25b and d).

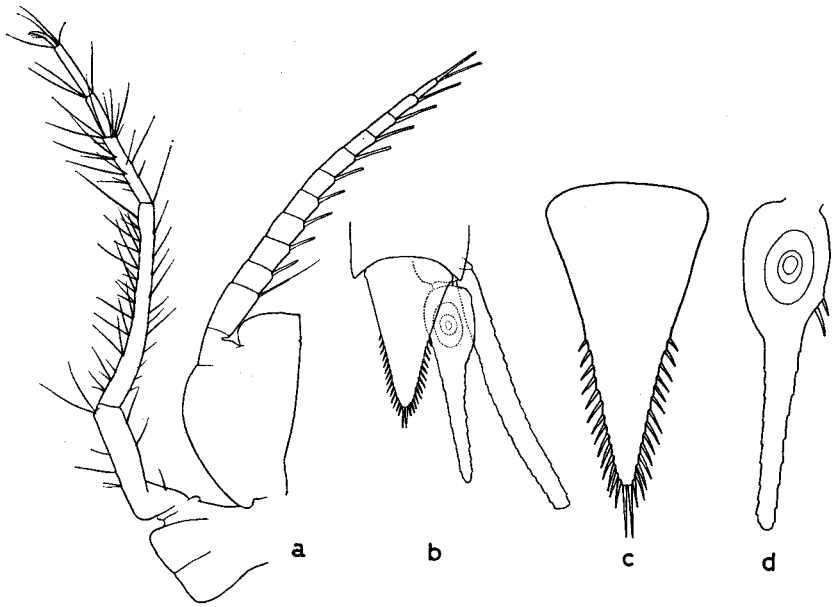

Fig. 26. *Nipponerythrops typica* gen. nov., sp. nov.; a, one of the third to eighth thoracic legs, ×31; b, posterior end of the body, ×19; c, telson, ×35; d, endopod of uropod, ×31.

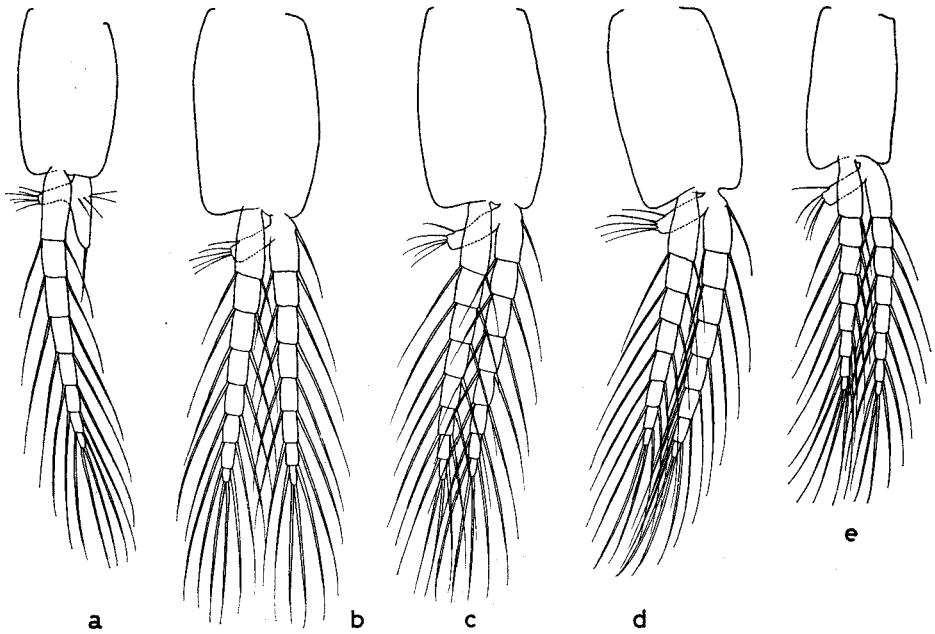

Fig. 27. *Nipponerythrops typica* gen. nov., sp. nov.; pleopods of male, ×30; a, first leg; b, second leg; c, third leg; d, fourth leg; e, fifth leg.

Types:

Holotype (NSMT-Cr. 5511), adult female of 9.4 mm long; allotype (NSMT-Cr. 5512), adult male of 10.4 mm long; and 7 paratypes (NSMT-Cr. 5513); all from St. 293–3. Type specimens are stored in National Science Museum of Tokyo.

Remarks:

As noted in the paragraph of the genus, the species is unique in tribe Erythropini in the shapes of the antennal scale and the frontal margin of the carapace. It is easily distinguishable from other species by these characteristics.

Distribution:

The species is collected by the bottom-net from the sea-floor at the depths of 220 to 330 m, 370 to 430 m and 160 to 250 m. It appears to be a bottom-living form in depths of about 200 to 400 m.

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Appendix-table 1. Tansei-Maru stations from which the collections reported here were taken.

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
3–3	Jan. 21, 1964	14:19–15:33	From 35°13.8′N, 139°15.5′E to 35°11.9′N, 139°15.5′E	0– 500	ORI-net; oblique tow
6–1	» 24, »	10:20–11:43	From 35°06.1′N, 139°20.4′E to 35°06.1′N, 139°16.5′E	0– 470	» »
6–6	» », »	21:26–23:06	From 35°06.0′N, 139°20.4′E to 35°05.8′N, 139°16.0′E	0– 405	» »
8	» 26, »	11:03–11:52	From 34°46.6′N, 139°11.3′E to 34°47.6′N, 139°12.1′E	0– 530	» »
13	» 27, »	11:28–12:16	From 35°13.6′N, 139°22.6′E to 35°11.9′N, 139°22.8′E	0– 420?	» »
53–1	May 21, »	13:55–14:47	From 34°54.6′N, 193°23.2′E to 34°53.8′N, 139°23.3′E	0– 715	» »
55	» 23, »	07:18–08:10	From 34°47.6′N, 139°12.5′E to 34°46.7′N, 139°11.2′E	0– 540	» »
58	» », »	15:28–16:03	From 34°42.1′N, 138°32.1′E to 34°43.4′N, 138°32.9′E	0– 240	» »
60–2	» 24, »	17:10–18:00	From 35°01.4′N, 138°39.2′E to 35°02.5′N, 138°40.2′E	515– 585	» horizontal tow
65	» 26, »	16:40–17:33	From 34°40.6′N, 139°49.5′E to 34°42.9′N, 139°48.7′E	0– 325	» oblique tow
76–2	Aug. 18, »	17:50–20:23	From 34°34.4′N, 138°33.1′E to 34°28.2′N, 128°34.0′E	0–2300	» »
77	» 19, »	00:28–03:10	From 34°00.0′N, 138°19.6′E to 34°05.6′N, 138°18.0′E	0–1800	» »
84–2	Oct. 25, 1964	15:52–16:25	From 35°07.1′N, 139°16.8′E to 35°06.3′N, 139°17.3′E	0– 740	» »
93–2	» 28, »	12:28–13:35	From 34°55.4′N, 138°38.7′E to 34°56.1′N, 138°38.3′E	0–1300	» »
96–1	» 31, »	21:28–21:59	From 33°50.3′N, 138°30.2′E to 33°48.4′N, 138°30.0′E	0– 360	» »
99	Nov. 1, »	11:58–13:09	From 33°20.5′N, 139°00.5′E to 33°22.0′N, 139°04.7′E	0– 860	» »
104–6	Mar. 1, 1965	16:10–17:10	From 35°06.7′N, 139°16.9′E to 35°05.3′N, 139°17.1′E	670– 800	» horizontal tow
107	» 4, »	11:33–14:27	From 34°32.6′N, 138°35.4′E to 34°26.0′N, 138°35.6′E	0–2000	» oblique tow
108	Apr. 23, »	12:12–13:30	From 35°04.9′N, 139°19.6′E to 35°02.1′N, 139°18.9′E	0–1000	» »
110	» », »	19:07–20:24	From 34°49.9′N, 139°31.6′E to 34°49.6′N, 139°28.8′E	0–1440	» »
111–2	» 24, »	16:05–18:59	From 34°31.2′N, 138°33.7′E to 34°23.6′N, 138°34.6′E	0–1430	» »

Appendix-table 1. Cont'd

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
113	Apr. 25, 1965	02:57–04:16	From 33°29.5′N, 138°30.1′E to 33°32.2′N, 138°35.4′E	0– 520	ORI-net; oblique tow
114	" ", "	07:43–09:00	From 33°01.2′N, 138°33.5′E to 33°01.2′N, 138°38.0′E	0– 930	" "
115–1	" ", "	12:25–13:42	From 32°31.3′N, 138°35.6′E to 32°31.1′N, 138°40.2′E	0– 920	" "
115–2	" ", "	13:47–16:39	From 32°31.1′N, 138°40.2′E to 32°26.5′N, 138°36.7′E	0–2500	" "
116	" ", "	21:18–22:35	From 32°19.5′N, 139°30.0′E to 32°19.7′N, 139°33.0′E	0–1200	" "
117–1	" 26, "	04:18–05:39	From 32°29.5′N, 140°30.0′E to 32°13.7′N, 140°33.0′E	0–1100	" "
117–2	" ", "	05:44–08:42	From 32°31.7′N, 140°33.0′E to 32°37.8′N, 140°41.0′E	0–1560	" "
118	" ", "	11:27–12:40	From 33°01.2′N, 140°30.0′E to 33°03.7′N, 140°31.5′E	0–1250	" "
119–1	" ", "	15:46–16:46	From 33°30.8′N, 140°31.0′E to 33°34.0′N, 140°32.5′E	0– 730	" "
120	" ", "	19:30–20:49	From 34°01.0′N, 140°30.0′E to 34°03.3′N, 140°31.1′E	0–1000	" "
121–1	" 26–27, "	23:58–01:15	From 34°31.0′N, 140°30.0′E to 34°33.3′N, 140°35.0′E	0– 850	" "
121–2	" 27, "	01:20–04:20	From 34°33.3′N, 140°35.0′E to 34°35.0′N, 140°47.0′E	0–1100	" "
122	" ", "	10:19–11:35	From 34°40.7′N, 139°59.6′E to 34°40.7′N, 139°57.2′E	0– 900	" "
130–1	July 15, "	10:35–11:59	From 35°05.4′N, 138°40.1′E to 35°06.1′N, 138°45.9′E	0– 439	" "
132	Apr. 11, 1966	21:23–22:25	From 34°32.1′N, 138°43.1′E to 34°32.1′N, 138°39.5′E	0– 520	" "
139	" 20, "	09:25–10:39	From 35°04.9′N, 139°22.2′E to 35°03.5′N, 139°25.1′E	0– 850	" "
143–3	June 11, "	00:23–03:15	From 27°57.5′N, 131°56.4′E to 27°51.2′N, 131°56.8′E	0–1754*	" "
144–1	" ", "	20:10–21:22	From 28°05.4′N, 134°07.2′E to 28°03.8′N, 134°10.6′E	0– 845*	" "
144–3	" 11–12, "	21:29–00:22	From 28°03.8′N, 134°10.6′E to 28°01.7′N, 134°18.7′E	0–1368*	" "
145–3	" 12, "	12:44–15:42	From 28°00.0′N, 135°52.5′E to 28°03.8′N, 135°44.3′E	0–1368*	" "
145–4	" ", "	15:50–18:39	From 28°03.9′N, 135°44.3′E to 28°08.5′N, 135°46.4′E	0–1878*	" "

Appendix-table 1. Cont'd

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
146–1	June 13, 1966	12:14–13:35	From 29°57.3′N, 135°52.7′E to 29°59.5′N, 135°51.8′E	0– 224*	ORI-net; oblique tow
146–2	» », »	13:43–15:30	From 30°01.1′N, 135°51.3′E to 30°03.9′N, 135°51.3′E	423– 574*	» horizontal tow
152	July 14, »	14:35–16:10	From 34°56.7′N, 138°38.6′E to 34°53.0′N, 138°39.8′E	0–1000	» oblique tow
154	» 15, »	00:50–02:39	From 34°53.4′N, 138°38.8′E to 34°57.2′N, 138°40.0′E	0– 950	» »
155	» », »	02:45–04:30	From 34°57.2′N, 138°40.0′E to 34°52.9′N, 138°37.8′E	0– 820	» »
160	» 16, »	01:25–03:05	From 34°24.4′N, 138°32.4′E to 34°27.4′N, 138°32.6′E	0– 930	» »
161	» », »	03:14–05:00	From 34°27.4′N, 138°32.6′E to 34°29.2′N, 138°36.9′E	0– 850	» »
176–4	» 18, »	19:28–20:28	From 34°49.2′N, 139°30.8′E to 34°47.3′N, 139°31.8′E	0– 690	» »
176–5	» 19, »	01:11–02:11	From 34°47.9′N, 139°30.9′E to 34°49.2′N, 139°32.6′E	310– 600	» horizontal tow
190–7	Sep. 22, »	02:04–03:12	From 39°03.5′N, 144°21.4′E to 39°10.5′N, 144°22.5′E	0–1060	» oblique tow
191–1	» », »	18:29–19:35	From 38°49.5′N, 142°32.2′E to 38°46.3′N, 142°32.8′E	0– 750	» »
191–3	» 22–23, »	23:44–00:06	From 38°43.4′N, 142°35.9′E to 38°44.0′N, 142°35.2′E	180	» horizontal tow
192	» 27, »	18:58–19:49	From 39°40.8′N, 142°39.9′E to 39°39.0′N, 142°39.7′E	0– 900	» oblique tow
193	» 28, »	03:11–04:21	From 38°27.6′N, 142°33.4′E to 38°24.3′N, 142°35.0′E	0– 750	» »
196–1	Sep. 30–Oct. 1, »	22:57–00:06	From 36°07.3′N, 142°22.4′E to 36°06.2′N, 142°20.2′E	0–1050	» »
201	Oct. 18, »	09:03–10:13	34°35.8′N, 138°34.4′E	0– 500	» »
206	Jan. 18, 1967	18:42–19:50	From 35°10.2′N, 139°16.3′E to 35°07.9′N, 139°16.8′E	0– 950	» »
222–11	Apr. 24, »	03:39–04:22	From 34°42.2′N, 139°59.8′E to 34°41.4′N, 140°00.0′E	200– 305	» horizontal tow
225–10	» 25, »	15:45–18:20	From 34°41.2′N, 139°59.7′E to 34°44.7′N, 140°01.5′E	520– 700	» »
235	June 3, »	12:03–12:46	42°51.3′N, 139°35.2′E	90– 420	» oblique tow
236	» », »	12:56–13:10	42°52.6′N, 139°35.2′E	0– 70	» »

Appendix-table 1. Cont'd

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
243–2	June 4, 1967	06:50–08:24	43°08.6′N, 139°37.9′E	280– 650	ORI-net; horizontal tow
258–1	July 30, »	20:31–23:37	From 42°21.8′N, 144°58.5′E to 42°23.8′N, 144°57.3′E	1450–1650	» »
258–5	» 31, »	01:26–02:19	From 42°23.2′N, 144°57.0′E to 42°22.4′N, 144°57.5′E	190– 290	» »
258–6	» 31, »	02:27–03:12	From 42°22.3′N, 144°57.1′E to 42°22.5′N, 144°56.0′E	420– 550	» »
258–9	» », »	22:27–00:31	From 42°17.0′N, 144°54.0′E to 42°17.8′N, 144°55.7′E	600–1000	» »
258–11	Aug. 1, »	03:30–05:30	From 42°20.8′N, 144°54.1′E to 42°19.7′N, 144°56.9′E	1550–1750	» »
259–3	July 31, »	06:27–07:17	From 42°21.3′N, 144°52.9′E to 42°21.3′N, 144°54.2′E	235– 265	» »
259–5	» », »	08:38–09:42	From 42°20.8′N, 144°56.0′E to 42°20.6′N, 144°56.8′E	390– 590	» »
259–7	» », »	11:52–13:34	From 42°20.0′N, 145°01.5′E to 42°20.6′N, 145°03.0′E	550– 750	» »
259–8	» », »	16:53–19:52	From 42°20.0′N, 144°55.6′E to 42°18.0′N, 144°55.5′E	?–2000	» »
293–2	Apr. 13, 1968	13:00–13:37	From 35°00.3′N, 139°48.4′E to 35°00.0′N, 139°47.6′E	220– 330	Bottom-net
293–3	» », »	14:05–14:43	From 35°00.3′N, 139°47.2′E to 35°00.3′N, 139°47.3′E	370– 430	»
293–4	» », »	15:01–15:29	From 34°59.9′N, 139°47.5′E to 35°00.0′N, 139°48.2′E	160– 250	»
310	Nov. 3, »	18:10–19:44	From 34°54.1′N, 138°37.4′E to 34°56.9′N, 138°37.5′E	0–1150	ORI-net; oblique tow
344	May 9, 1969	06:44–07:51	From 34°58.7′N, 139°22.5′E to 34°57.0′N, 139°21.9′E	0–1200	» »
345	» », »	14:45–15:58	From 34°20.3′N, 138°34.4′E to 34°23.3′N, 138°35.0′E	0–1000	» »
440	Apr. 22, 1970	20:05–20:38	28°10.5′N, 129°10.0′E	138– 141	Bottom-net
442	» 23, »	00:34–01:49	28°21.2′N, 128°57.8′E	0– 900	ORI-net; oblique tow
457	Oct. 11, »	09:50–11:05	From 35°00.5′N, 139°21.7′E to 34°59.6′N, 139°20.6′E	0– 700	» accidentally touched the sea-floor
526	Jan. 24, 1971	05:22–06:30	From 34°54.3′N, 138°38.5′E to 34°52.5′N, 138°38.4′E	0–1200	» oblique tow
533	» », »	12:27–12:50	From 34°45.3′N, 138°22.8′E to 34°44.6′N, 138°22.7′E	570– 660	Bottom-net

Appendix-table 2. Hakuho-Maru stations from which the collections reported here were taken

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
H 1	Sep. 8, 1967	05:47–07:05	From 34°59.1′N, 142°15.2′E to 35°01.1′N, 142°13.7′E	0–1050	ORI-net; oblique tow
H 4– 2	» 13, »	13:24–14:31	From 22°06.6′N, 142°19.7′E to 22°07.9′N, 142°22.0′E	0– 950	» »
H 4– 3	» », »	19:25–20:20	From 21°13.5′N, 142°05.5′E to 21°11.3′N, 142°04.0′E	0–1200	» »
H 8– 2	Dec. 5, »	20:05–20:44	From 44°06.5′N, 149°55.4′E to 44°06.8′N, 149°55.1′E	(185)?	» horizontal tow
H 8– 5	» », »	22:51–23:22	From 44°08.9′N, 149°52.6′E to 44°10.1′N, 149°51.0′E	200– 260	» »
H 8– 6	» 5–6, »	23:55–01:00	From 44°10.8′N, 149°49.6′E to 44°09.2′N, 149°49.7′E	250– 540	» »
H 9– 1	» 6, »	08:07–10:35	From 43°56.4′N, 149°52.0′E to 43°55.9′N, 149°53.5′E	850–1080	» »
H 9– 5	» », »	14:55–16:08	From 43°48.7′N, 149°58.0′E to 43°48.5′N, 149°58.4′E	460– 500?	» »
H 9– 7	» », »	16:50–17:45	From 43°47.2′N, 149°56.5′E to 43°46.4′N, 149°54.8′E	180– 210	» »
H 9–10	» 7, »	02:48–04:05	From 43°52.8′N, 149°58.2′E to 43°55.8′N, 149°59.8′E	0–1200	oblique tow
H 10– 4	» 9, »	06:53–08:12	From 37°28.2′N, 150°06.1′E to 37°26.2′N, 150°10.0′E	0–1000	» »
H 10– 6	» », »	08:45–09:35	From 37°26.0′N, 150°12.4′E to 37°25.9′N, 150°13.3′E	140– 160	horizontal tow
H 10– 9	» », »	12:04–13:13	From 37°25.4′N, 150°18.6′E to 37°25.2′N, 150°20.0′E	300– 350	» »
H 10–10	» », »	13:20–15:12	From 37°24.5′N, 150°21.7′E to 37°23.6′N, 150°25.0′E	340– 500	» »
H 10–15	» », »	21:30–23:30	From 37°32.2′N, 150°24.9′E to 37°34.0′N, 150°28.1′E	600– 750	» »
H 10–16	» 10, »	00:00–01:50	From 37°34.5′N, 150°31.5′E to 37°35.2′N, 150°34.2′E	320– 500	» »
H 11– 2	» 13, »	02:22–03:17	From 29°52.7′N, 150°07.4′E to 29°58.1′N, 150°06.5′E	(180)	» »
H 11– 5	» », »	07:57–09:14	From 29°41.4′N, 150°02.5′E to 29°39.9′N, 150°05.5′E	0– 850	oblique tow
H 12– 2	» 17, »	12:24–13:08	From 20°04.4′N, 150°09.4′E to 20°04.7′N, 150°09.8′E	250– 340	horizontal tow
H 12– 7	» », »	20:10–21:07	From 20°08.5′N, 150°17.8′E to 20°09.0′N, 150°18.5′E	230– 280	» »
H 12–11	» 17–18, »	23:20–01:15	From 20°12.9′N, 150°21.0′E to 20°13.3′N, 150°21.2′E	420– 570	» »

Appendix-table 2. Cont'd

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
H 12–16	Dec. 18, 1967	06:40–07:45	From 20°22.6′N, 150°26.5′E to 20°20.8′N, 150°24.3′E	0– 900	ORI-net; oblique tow
H 13– 1	» 21, »	17:13–17:23	From 09°56.0′N, 149°51.5′E to 09°56.1′N, 149°51.6′E	0– 155	» »
H 13–10	» 22, »	21:03–21:55	From 09°47.3′N, 149°34.0′E to 09°48.0′N, 149°32.2′E	120– 290	» horizontal tow
H 14– 5	» 26, »	01:00–01:55	From 00°01.3′S, 148°35.0′E to 00°02.2′S, 148°34.4′E	250– 320	» »
H 14–11	» », »	09:37–10:30	From 00°14.5′S, 148°37.4′E to 00°14.7′S, 148°38.0′E	280– 300	» »
H 14–12	» 26, »	10:36–11:35	From 00°15.0′S, 148°38.6′E to 00°16.2′S, 148°40.8′E	320– 460	» »
H 45	May 25, 1968	12:47–13:47	From 26°00.8′N, 125°09.5′E to 26°00.8′N, 125°13.0′E	0– 800	» oblique tow
H 48– 2	» 26, »	21:25–22:46	From 23°00.8′N, 124°15.6′E to 22°57.6′N, 124°14.6′E	0– 850	» »
H 49	» 27, »	05:22–06:28	From 21°59.3′N, 123°29.3′E to 21°58.5′N, 123°33.0′E	0– 500	» »
H 53– 1	» 28, »	21:22–22:41	From 22°08.8′N, 129°41.6′E to 22°09.6′N, 129°44.4′E	0– 880	» »
H 54– 2	» 29, »	18:06–18:51	From 22°01.5′N, 132°10.6′E to 22°02.6′N, 132°11.8′E	210	» horizontal tow
H 54– 4	» », »	21:09–22:51	From 22°04.0′N, 132°16.6′E to 22°01.0′N, 132°16.5′E	380– 540	» »
H 54– 6	» 29–30, »	23:00–00:21	From 22°00.6′N, 132°18.0′E to 22°00.4′N, 132°20.0′E		» »
H 54– 8	» 30, »	01:31–01:40	From 22°00.5′N, 132°19.5′E to 22°00.5′N, 132°19.5′E	0– 100	» oblique tow
H 56	» 31, »	06:02–07:11	From 24°02.8′N, 133°09.0′E to 24°07.3′N, 133°07.0′E	0– 800	» »
H 56– 4	» », »	22:20–23:27	From 26°03.0′N, 131°53.6′E to 26°06.3′N, 131°52.4′E	—	» »
H 57	June 1, »	13:02–14:05	From 27°55.2′N, 131°58.0′E to 27°52.2′N, 131°57.6′E	0– 800	» »
H 62	» 5, »	22:40–23:44	From 31°50.5′N, 132°07.4′E to 31°52.9′N, 132°10.7′E	0– 850	» »
H 67– 1	Aug. 16, 1969	19:36–20:45	From 40°59.9′N, 165°04.0′E to 41°00.3′N, 165°07.1′E	0–1250	» »
H 71– 1	» 18, »	20:38–21:53	From 44°56.3′N, 176°57.6′E to 44°56.9′N, 176°54.1′E	0–1420	» »
H 73– 1	» 20, »	18:16–19:35	From 47°56.2′N, 164°16.6′E to 47°57.2′N, 164°12.2′E	0–1180	» »

Appendix-table 2. Cont'd

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
H 75- 6	Aug. 22, 1969	23:05–23:35	From 50°01.5'N, 155°00.0'W to 50°02.2'N, 155°00.8'W	218- 285	ORI-net; horizontal tow
H 84- 2	» 31, »	08:42–09:27	From 39°56.5'N, 154°50.6'W to 39°55.3'N, 154°49.3'W	450- 525	» »
H 84- 3	» », »	10:00–10:30	From 39°54.5'N, 154°48.3'W to 39°55.2'N, 154°47.5'W	280- 320	» »
H 84- 4	« », »	10:55–11:10	From 39°52.7'N, 154°46.3'W to 39°53.0'N, 154°46.6'W	215- 310	» »
H 84- 5	» », »	11:30–12:01	From 39°51.8'N, 154°45.9'W to 39°51.5'N, 154°45.0'W	110- 160	» »
H 86- 4	Sep. 2, »	01:53–02:27	From 40°05.9'N, 154°39.8'W to 40°06.0'N, 154°41.0'W	208- 295	» »
H 86- 5	» », »	04:13–04:43	From 40°06.3'N, 154°45.5'W to 40°05.5'N, 154°48.5'W	385- 550	» »
H 89- 2	» », »	18:11–18:41	From 39°54.7'N, 154°58.7'W to 39°53.7'N, 154°59.1'W	300- 380	» »
H 90- 2	» », »	20:11–21:06	From 39°51.1'N, 155°00.4'W to 39°49.7'N, 155°00.8'W	470- 750	» »
H 90–11	» 3, »	03:21–03:51	From 39°57.2'N, 155°00.4'W to 39°59.3'N, 155°00.4'W	240- 310	» »
H 93- 1	» 6, »	18:36–19:49	From 34°58.7'N, 154°53.8'W to 34°57.7'N, 154°54.8'W	0- 950	» oblique tow
H 93- 6	» », »	22:29–22:50	From 34°59.2'N, 154°51.1'W to 34°59.7'N, 154°50.1'W	60- 162	» horizontal tow
H 93- 7	Sep. 6, »	23:14–23:34	From 35°00.0'N, 154°49.6'W to 35°00.3'N, 154°48.8'W	183- 260	» »
H 93- 9	» 7, »	00:04–00:34	From 35°00.5'N, 154°48.0'W to 35°00.7'N, 154°47.0'W	390- 500	» »
H 96- 1	» 8, »	17:23–18:40	From 29°57.4'N, 154°56.5'W to 29°58.0'N, 154°58.4'W	2000–3250	» »
H100- 3	» 10, »	14:11–14:41	From 25°01.2'N, 155°02.1'W to 25°01.2'N, 155°01.2'W	300- 320	» »
H100- 6	» 10, »	17:20–18:35	From 25°01.2'N, 154°56.5'W to 24°58.2'N, 154°56.7'W	0–1250	» oblique tow
H102- 5	» 12, »	09:30–09:50	From 21°03.7'N, 154°55.7'W to 21°03.5'N, 154°55.2'W	220- 258	» horizontal tow
H103- 4	» 20, »	00:05–00:35	From 17°05.5'N, 155°05.0'W to 17°06.8'N, 155°05.4'W	165- 290	» »
H104- 1	» », »	21:25–22:31	From 14°07.5'N, 154°59.9'W to 14°05.5'N, 154°59.6'W	0- 900	» oblique tow
H107- 1	» 22, »	18:07–19:15	From 10°00.7'N, 155°06.9'W to 10°00.8'N, 155°05.4'W	0–1550	» »

Appendix-table 2. Cont'd

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
H107– 2	Sep. 22, 1969	19:20–19:26	From 10°00.8′N, 155°05.4′W to 10°00.9′N, 155°05.2′W	0– 58	ORI-net; oblique tow
H107– 3	" ", "	20:35–21:05	From 10°00.7′N, 155°03.9′W to 10°00.7′N, 155°03.1′W	"	horizontal tow
H107– 8	" 23, "	00:36–01:06	From 09°59.7′N, 154°59.3′W to 09°58.7′N, 154°58.5′W	360– 600	" "
H107– 9	" ", "	01:48–02:18	From 09°57.8′N, 154°57.8′W to 09°57.0′N, 154°56.9′W	480– 770	" "
H108– 8	" 24, "	03:25–03:55	From 10°05.2′N, 155°05.9′W to 10°05.7′N, 155°06.4′W	95– 110	" "
H113– 1	" 28, "	19:45–20:15	From 04°57.1′N, 154°57.0′W to 04°57.7′N, 154°56.0′W	100– 150	" "
H113– 2	" ", "	20:35–21:03	From 04°58.3′N, 154°55.2′W to 04°59.4′N, 154°54.0′W	"	" "
H113– 7	" 29, "	01:13–01:33	From 05°06.9′N, 154°44.8′W to 05°05.6′N, 154°44.0′W	130– 210	" "
H114	" 30, "	01:49–02:58	From 02°08.7′N, 155°02.2′W to 02°07.7′N, 155°02.2′W	0–1150	" oblique tow
H117– 5	Oct. 3, "	18:32–18:50	From 04°56.9′S, 155°08.0′W to 04°56.9′S, 155°07.6′W	520– 550	" horizontal tow
H131– 1	Nov. 5, "	21:15–22:25	From 21°30.5′N, 160°10.4′E to 21°28.8′N, 160°07.5′E	0–1100	" oblique tow
H133– 4	Aug. 2, 1970	08:15–09:30	From 42°31.7′N, 136°00.8′E to 42°32.1′N, 136°02.0′E	550– 600	" horizontal tow
H133– 5	" ", "	09:40–11:45	From 42°32.5′N, 136°04.0′E to 42°33.2′N, 136°06.1′E	870–1050	" "
H133– 6	" ", "	11:55–15:26	From 42°32.0′N, 136°05.6′E to 42°29.0′N, 136°03.0′E	1600–2000	" "
H133– 9	" ", "	16:25–17:35	From 42°25.7′N, 135°58.4′E to 42°23.4′N, 135°56.3′E	0–1000	" oblique tow
H133–22	" 3, "	21:20–22:05	From 42°30.2′N, 136°00.8′E to 42°29.5′N, 136°00.7′E	260– 360	" horizontal tow
H133–23	" ", "	22:10–23:25	From 42°28.5′N, 135°59.5′E to 42°27.8′N, 133°58.9′E	570– 730	" "
H133–24	" 3–4, "	23:10–01:35	From 42°27.1′N, 135°56.9′E to 42°25.7′N, 135°55.1′E	850–1100	" "
H133–25	" 4–5, "	21:05–00:30	From 42°27.0′N, 135°48.3′E to 42°25.3′N, 135°52.5′E	1300–1650	" "
H133–27	" 5, "	00:43–01:25	From 42°24.2′N, 135°54.2′E to 42°23.3′N, 135°56.0′E	150– 220	" "
H134– 1	" ", "	12:50–14:00	From 41°08.1′N, 137°21.0′E to 41°10.0′N, 137°18.8′E	0– 950	" oblique tow

Appendix-table 2. Cont'd

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
H135– 3	Aug. 6, 1970	01:52–02:50	From 39°43.4′N, 138°49.9′E to 39°42.3′N, 138°47.5′E	0–1200	ORI-net; oblique tow
H136– 5	" ", "	22:30–23:17	From 38°17.2′N, 135°42.3′E to 38°16.2′N, 135°42.9′E	430– 680	" horizontal tow
H136–12	" 8, "	07:05–08:20	From 38°15.0′N, 135°35.8′E to 38°15.8′N, 135°34.8′E	350– 450	" "
H136–15	" ", "	11:11–13:10	From 38°23.1′N, 135°37.7′E to 38°24.1′N, 135°40.3′E	590– 800	" "
H138– 2	" 17, "	15:50–17:10	From 41°10.1′N, 131°29.6′E to 41°10.0′N, 131°32.4′E	0–1100	" oblique tow
H139– 7	" 19, "	22:31–23:15	From 40°05.7′N, 131°28.1′E to 40°07.0′N, 131°27.0′E	110– 200	" horizontal tow
H139– 8	" 19–20, "	23:20–00:13	From 40°07.0′N, 131°26.8′E to 40°06.5′N, 131°25.0′E	180– 310	" "
H139– 9	" 20, "	00:20–01:31	From 40°05.6′N, 131°24.5′E to 40°04.0′N, 131°25.0′E	480– 550	" "
H139–10	" ", "	01:42–03:35	From 40°02.7′N, 131°24.8′E to 40°00.7′N, 131°24.0′E	550– 800	" "
H139–11	" ", "	03:43–03:47	From 39°58.7′N, 131°23.6′E to 39°58.7′N, 131°23.6′E	0– 40	" oblique tow
H139–13	" ", "	04:48–05:53	From 39°59.7′N, 131°24.4′E to 39°56.7′N, 131°25.4′E	0– 850	" "
H139–15	" ", "	11:24–14:58	From 40°06.0′N, 131°28.0′E to 40°03.7′N, 131°28.3′E	1100–1700	" horizontal tow
H139–21	" 21, "	07:33–09:32	From 40°05.4′N, 131°19.8′E to 40°04.1′N, 131°20.7′E	600–1000	" "
H140– 1	" 22, "	12:25–13:25	From 37°17.5′N, 131°29.3′E to 37°19.6′N, 131°29.3′E	0–1250	" oblique tow
H155– 3	May 13, 1971	22:22–23:29	From 24°03.3′N, 124°48.9′E to 24°03.8′N, 124°49.5′E	0–1200	" "

Appendix-table 3. Trawl stations where mysids fed by fishes were collected.

Station No.	Date	Position	Sampling depth (m)	Feeders
TR. 1	June 5, 1970	40°02.5′N, 134°12.9′E	775	*Malacocottus gibber*
TR. 4	June 6, 1970	39°47.5′N, 133°39.5′E	525	*Theragra chalcogramma*
TR. 6	June 1, 1970	39°23.5′N, 135°32.5′E	760	*Caraproctus* sp.
TR. 8	June 2, 1970	39°29.3′N, 134°44.6′E	1035	*Malacocottus gibber*
TR. 13	June 10, 1970	39°01.8′N, 134°09.5′E	495	*Theragra chalcogramma*