Deep-Sea Shrimps and Lobsters from the Flores Sea Collected by the R.V. *Hakuho-Maru* during KH-85-1 Cruise

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Abstract The deep-sea shrimps and lobsters from the Flores Sea collected by the R. V. *Hakuho-Maru* during KH-85-1 cruise are referred to 42 species of 14 families. Based upon this material, some rare species are systematically discussed, and a new species of the family Glyphocrangonidae, *Glyphocrangon hakuhoae*, is described.

Introduction

During KH-85-1 cruise of the R.V. *Hakuho-Maru* of the Ocean Research Institute, University of Tokyo (ORI-UT) to Indonesian waters, which was carried out in 1985 as a joint research with the Lembaga Oseanologi Nasional, Lembaga Ilmu Pengetahuan Indonesia (LON-LIPI) and the Intergovernmental Oceanographic Commission (IOC-UNESCO), the macrobenthos and megalobenthos on deep-sea bottom were collected at four stations (Fig. 1). As mentioned in the preliminary report (HORIKOSHI & OHTA, 1987), the cruise aimed as fundamental researches on biota of deep-sea system in the Flores Sea. As for the systematic studies on the decapod crustaceans, the present report, dealing with shrimps and lobsters, is coupled with the report on the crabs made by TAKEDA & MOOSA (1990).

The exact locations of the stations A–D are recorded in the following lines.

Stn. A–1 (05° 47.3′S, 119° 35.4′E—05° 46.9′S, 119° 34.6′E; 280–280 m); 12–II–1985
Stn. A–2 (05° 47.1′S, 119° 35.5′E—05° 47.9′S, 119° 37.0′E; 250–285 m); 12–II–1985
Stn. B–1 (05° 56.0′S, 119° 28.5′E—05° 56.0′S, 119° 29.5′E; 630–657 m); 12–II–1985
Stn. B–2 (05° 55.4′S, 119° 29.5′E—05° 54.5′S, 119° 29.5′E; 558–593 m); 12–II–1985
Stn. C (06° 19.1′S, 119° 34.9′E—06° 17.7′S, 119° 38.0′E; 935–960 m); 13–II–1985
Stn. D (06° 35.3′S, 119° 51.8′E—06° 36.0′S, 119° 50.9′E; 1790–2010 m); 14–II–1985

The carapace length (cl), from the orbital margin to the posteromedian margin, is used to indicate material size unless mentioned otherwise.

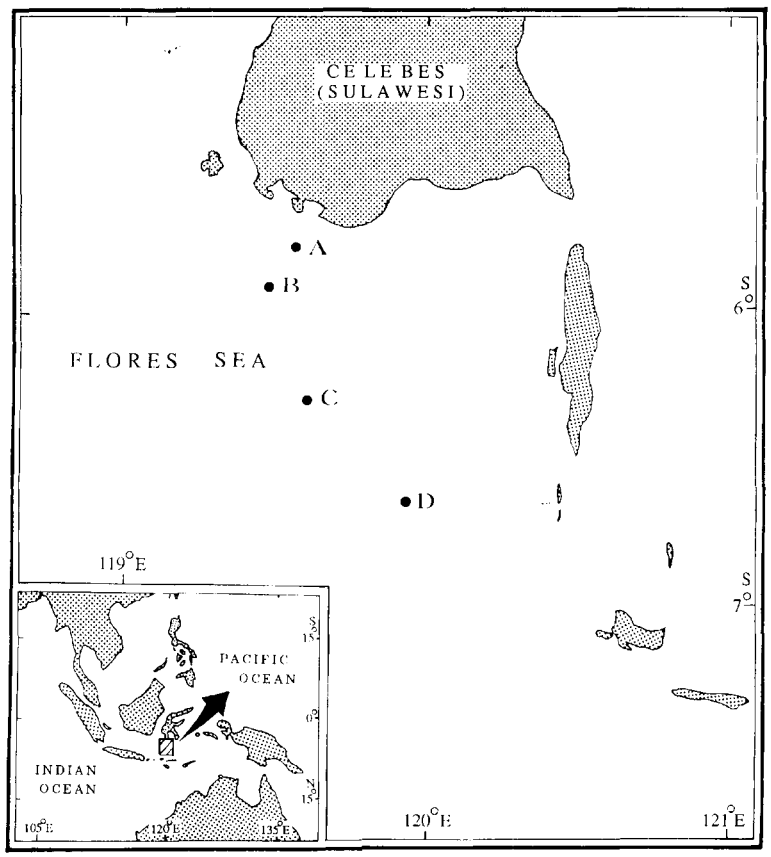

Fig. 1. Map of sampling locations off Sulawesi in the Flores Sea.

The bulk of the specimens is preserved in the National Science Museum, Tokyo (NSMT), and one of the paratypes of *Glyphocrangon hakuhoae* is in the LON-LIPI, Indonesia, which should be called, owing to a change of organization, the Pusat Penelitian dan Pengembangan Oseanologi (PUSLITBANG OSEANOLOGI-LIPI).

DENDROBANCHIATA

Family Benthesicymidae

Genus ***Benthesicymus*** BATE, 1881

Benthesicymus investigatoris ALCOCK et ANDERSON, 1899

Benthesicymus investigatoris ALCOCK & ANDERSON, 1899 a, p. 282; –1899 b, pl. 41 (2); CROSNIER, 1978, p. 21, figs. 7 (c, d), 8 (c, d), 9, 10; –1984, p. 20; –1985 a, p. 857; –1989, p. 41; HAYASHI, 1986, pp. 55, 238, fig. 14; –1992, p. 40, fig. 22; KENSLEY *et al.*, 1987, p. 276; BURUKOVSKY, 1990, p. 189; KIKUCHI, 1991, p. 88, figs. 16, 17.

Material. Stn. A–1, 2 ♀♀ (cl 19.8 and 21.1 mm) (NSMT–Cr 2238).

Distribution. Indo-Pacific Oceans from eastern Africa to Hawaii and Sala-Y-Gomez, 400–1600 m deep.

Family Aristeidae

Genus *Aristeus* DUVERNOY, 1840

Aristeus mabahissae RAMADAN, 1938

Aristeus mabahissae RAMADAN, 1938, p. 43, figs. 2 (b), 3 (b), 4 (a–c); CROSNIER, 1978, p. 65, figs. 25 (c–f), 26 (c–f); –1984, p. 22; HAYASHI, 1986, pp. 53, 237, fig. 12; –1992, p. 18, figs. 9, 11, 13 (a, b).

Material. Stn. B–1, 1 ♀ (cl 24.5 mm) (NSMT–Cr 2239).

Distribution. Indo-West Pacific from Madagascar to New Caledonia and Japan, 350–1100 m deep.

Aristeus virilis (BATE, 1881)

Hemipenaeus virilis BATE, 1881, p. 187; –1888, p. 303, pl. 44 (4).
Aristeus tomentosus BATE, 1881, p. 189.
Hemipenaeus tomentosus: BATE, 1888, p. 307, pls. 49 (2, 3), 50.
Aristeus virilis: CROSNIER, 1978, p. 61, figs. 25 (a, b), 26 (a, b); –1984, p. 21; –1985 a, p. 861; –1989, p. 42; DE FREITAS, 1985, p. 3, fig. II-1; HAYASHI, 1986, pp. 53, 237, fig. 13; 1992, p. 19, figs. 10, 12, 13 (c, d); YU & CHAN, 1986, p. 46, 1 fig.; KENSLEY *et al.*, 1987, p. 281.

Material. Stn. A–1, 1 ♂ (cl 27.0 mm) and 2 ♀♀ (cl 33.6 and 43.4 mm) (NSMT–Cr 2240); Stn. B–1, 4 ♂♂ (cl 27.1–31.3 mm) (NSMT–Cr 2241); Stn. B–2, 2 ♀♀ (cl 26.4 and 51.1 mm) (NSMT–Cr 2242).

Distribution. Indo-West Pacific from eastern Africa to eastern Australia and Japan, 230–900 m deep.

Genus *Pseudaristeus* CROSNIER, 1978

Pseudaristeus sibogae (DE MAN, 1911)

(Fig. 2 a–c)

Hemipenaeus sibogae DE MAN, 1911, p. 25; –1913, pl. 2 (5).
Pseudaristeus sibogae: CROSNIER, 1978, p. 83, figs. 27 (a), 30 (a–c); DE FREITAS, 1985, p. 12, fig. II-5; PEREZ FARFANTE, 1987, p. 332, figs. 4 (e), 9, 18.

Material. Stn. C, 2 ♂♂ (cl 30.4 and 32.0 mm) (NSMT Cr 2243).

Remarks. The known largest specimen is a male from off Natal, South Africa, with 38.1 mm in carapace length (DE FREITAS, 1985). PEREZ FARFANTE (1987) might have overlooked this record during her excellent work on the gamba prawns of the genus *Pseudaristeus*.

Distribution. South Africa, Madagascar and Indonesian waters, 800–1200 m deep.

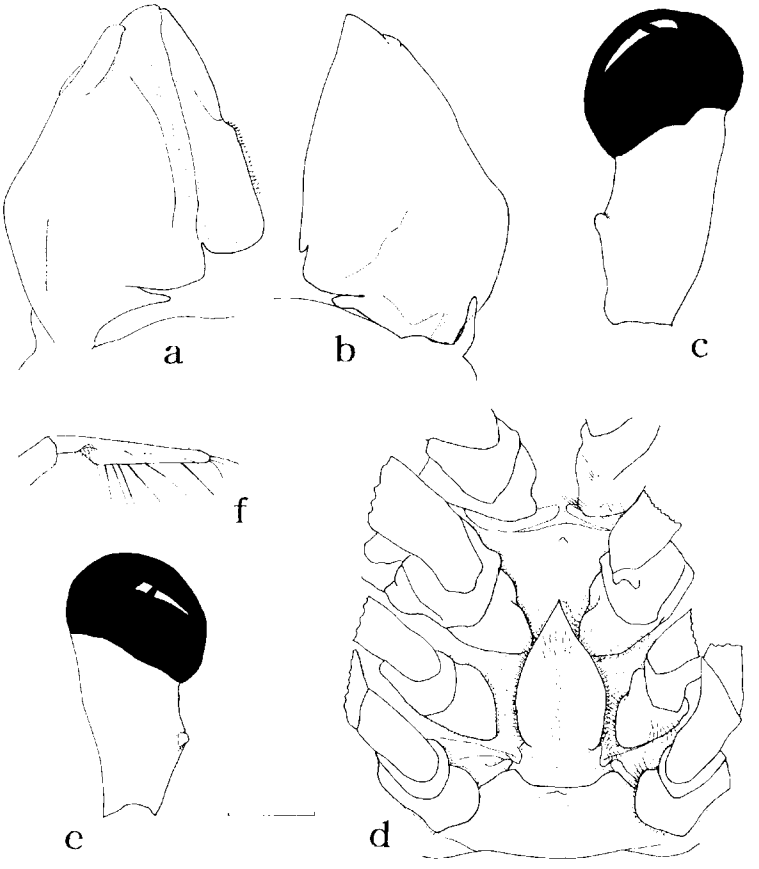

Fig. 2. a–c, *Pseudaristeus sibogae* (DE MAN), ♂ (cl 32.0 mm), and d–f, *P.* aff. *crassipes* (WOOD-MASON), ♀ (cl 26.8 mm). a and b, petasma in anterior and posterior views, respectively; c and e, eyes; d, thelycum; f, distal segment of 3rd maxilliped. Scale bar=2 mm.

Pseudaristeus aff. ***crassipes*** (WOOD-MASON, 1891)

(Fig. 2 d–f)

Pseudaristeus sp.: CROSNIER, 1984, p. 22.
Pseudariseus crassipes: PEREZ FARFANTE, 1987, p. 322 (part), fig. 13.

Material. Stn. C, 1 ♀ (cl 26.8 mm) (NSMT-Cr 2244).

Description. Body and appendages almost smooth, not covered with hairs. Rostrum extremely overreaching beyond end of antennal scale, armed dorsally with 3 spines at proximal portion, including 1 spine placed posterior to orbital margin. Carapace carinate on anterior 2/3; cervical sulcus deep, interrupting dorsal carina; post-cervical sulcus feebly defined. Hepatic, post-antennal and post-orbital spines absent. Antennal spine supported by moderately long carina. Branchiostegal spine supported

by long carina extending backwards to hepatic region. Suprabranchial ridge marked.

Abdomen rounded dorsally on anterior 3 somites, dorsally carinate on posterior 3 somites, ending in posteromedian spine. Sixth somite about twice as long as 5th.

Eye with large cornea, noticeably wider than stalk. Antennular peduncle with stylocerite nearly reaching end of 1st segment. Antennal scale 0.75 times as long as carapace, 2.44 times as long as wide.

Thelycum as in Fig. 2 (d).

Remarks. The present specimen is remarkable among the members of the genus in having a glabrous body even for its appendages, alike in the specimen from Indonesian waters reported by CROSNIER (1984). PEREZ FARFANTE (1987) re-examined the *Corindon* specimen, and suspected that it is distinct from the typical specimens of *Pseudaristeus crassipes* (WOOD-MASON) in having some morphological features including the details of the thelycum. However, she tentatively identified it as *P. crassipes*, because only one specimen has been available and some of body measurements such as the eye size or the relative length of the thelycal median plate are within the range of *P. crassipes*. Although she observed single female specimen having the entirely smooth surface in the latter species, the structure of the thelycum seems to be essentially different. Therefore, we inclined to believe that the *Hakuho-Maru* specimen as well as the *Corindon* material are distinct from *P. crassipes*. In the glabrous form in question, the eighth thoracic sternite is less produced anteriorly at lateral sides instead of the well advanced portions, reaching the level of posterior end of the median plate on the seventh sternite. Furthermore, the median plate seems to be less setose than in *P. crassipes*. Other details can be referred to PEREZ FARFANTE (*op. cit.*). The differences in the ratio of length to width of the median thelycal plate may reflect the difference in size or variation between the *Corindon* and *Hakuho-Maru* specimens. The final decision of the specific identity should be entrusted to the finding of the males.

Distribution. *Pseudaristeus crassipes* is known from India, Sri Lanka, the Gulf of Aden, and Indonesia. The glabrous form is known only from Indonesia, 1710–1730 m deep.

Family Solenoceridae

Genus ***Hadropenaeus*** PEREZ FARFANTE, 1977

Hadropenaeus lucasii (BATE, 1881)

Solenocera lucasii BATE, 1881, p. 185.

Philonicus lucasii: BATE, 1888, p. 277, pl. 42 (4).

Haliporus malhaensis BORRADAILE, 1910, p. 258, pl. 16 (2).

Hadropenaeus lucasii: PEREZ FARFANTE, 1977, p. 327, figs. 9, 16, 44 (c), 53–55; HAYASHI, 1986, pp. 43, 232, fig. 2; –1992, p. 171, figs. 93, 94, 97; BURUKOVSKY, 1990, p. 188.

Hymenopenaeus lucasi: CROSNIER, 1978, p. 115, figs. 37 (f–h), 39 (c), 40 (c), 42 (d), 43 (a), 44, 46 (a); KENSLEY *et al.*, 1987, p. 275.

Hadropenaeus lucasi: CROSNIER, 1984, p. 23; –1989, p. 44.

Material. Stn. A–1, 3 ♂♂ (cl 20.0–ca. 21 mm) and 1 ♀ (cl 24.9 mm) (NSMT–Cr 2245); Stn. A–2, 1 ♀ (damaged) (NSMT–Cr 2246).

Distribution. Indian and Pacific Oceans from Madagascar to Hawaii and Sala-Y-Gomez, 150–630 m deep.

Genus *Hymenopenaeus* SMITH, 1882

Hymenopenaeus equalis (BATE, 1888)

(Fig. 3 a–d)

Haliporus equalis BATE, 1888, p. 285, pl. 41 (1).

Haliporus aequalis: DE MAN, 1911, p. 32; –1913, pl. 2 (8).

Hymenopenaeus aequalis: KUBO, 1949, p. 219, figs. 8 (a′), 20 (r), 27 (o, p), 66 (m, n), 71 (h), 72 (d, j), 80 (i), 92 (d–i); CROSNIER, 1984, p. 25; HAYASHI, 1986, pp. 45, 233, fig. 4; –1992, p. 180, figs. 97–99.

Hymenopenaeus equalis: CROSNIER & FOREST, 1973, figs. 86 (c, d), 87 (h); CROSNIER, 1989, p. 45, figs. 1 (a–d, f, g), 2 (a, b), 3 (a, b).

Material. Stn. B–2, 1 ♂ (cl 18.5 mm) and 1 ♀ (cl 14.1 mm) (NSMT–Cr 2247).

Remarks. In the *Hakuho-Maru* specimens from the Flores Sea, the rostrum is armed with six or seven teeth excluding two situated behind the orbital margin. The first three abdominal somites are rounded dorsally, whereas the posterior three somites are carinate dorsally. The males from Japanese waters (2 males, SUF 530–2–1045, off Kushikino, southwest of Kyushu) have seven (cl 14.8 mm) or eight teeth (cl 16.1 mm) on the rostrum, and the third abdominal somite is only weakly carinate posteriorly. The petasma of the male from the Flores Sea agrees well with that shown by CROSNIER (1989, fig. 2 a), without discernible difference from those of the males from Japan.

CROSNIER (*op. cit.*) observed minor variations in the shape of the thelycum. The present female shows resemblance to the typical form (*e.g.*, CROSNIER & FOREST, 1973, fig. 87 h; CROSNIER, 1989, fig. 3 b) rather than the varietal one (*e.g.*, CROSNIER, 1989, fig. 3 a), since the transverse projection is situated rather posteriorly, though the m-shaped projection placed at posterior portion of the seventh sternite is hard to trace and only noticeable as obscure ridge at lateral portion.

Distribution. Indo-West Pacific from the Bay of Bengal through Indonesia and the Philippines to Japan, 200–600 m deep.

Hymenopenaeus propinquus (DE MAN, 1907)

(Fig. 3 e–g)

Haliporus propinquus DE MAN, 1907, p. 40.

Hymenopenaeus propinquus: CROSNIER, 1978, p. 124, figs. 39 (e), 40 (e), 42 (e), 43 (e), 45 (e–h), 46 (d, e), 47 (a); –1984, p. 25; –1985 a, p. 869; –1989, p. 50, figs. 1 (e), 3 (c); KENSLEY *et al.*, 1987, p. 275.

Material. Stn. B–1, 3 ♂♂ (cl 20.0–21.9 mm) and 2 ♀♀ (cl 21.6 and 24.5 mm) (NSMT–Cr 2248).

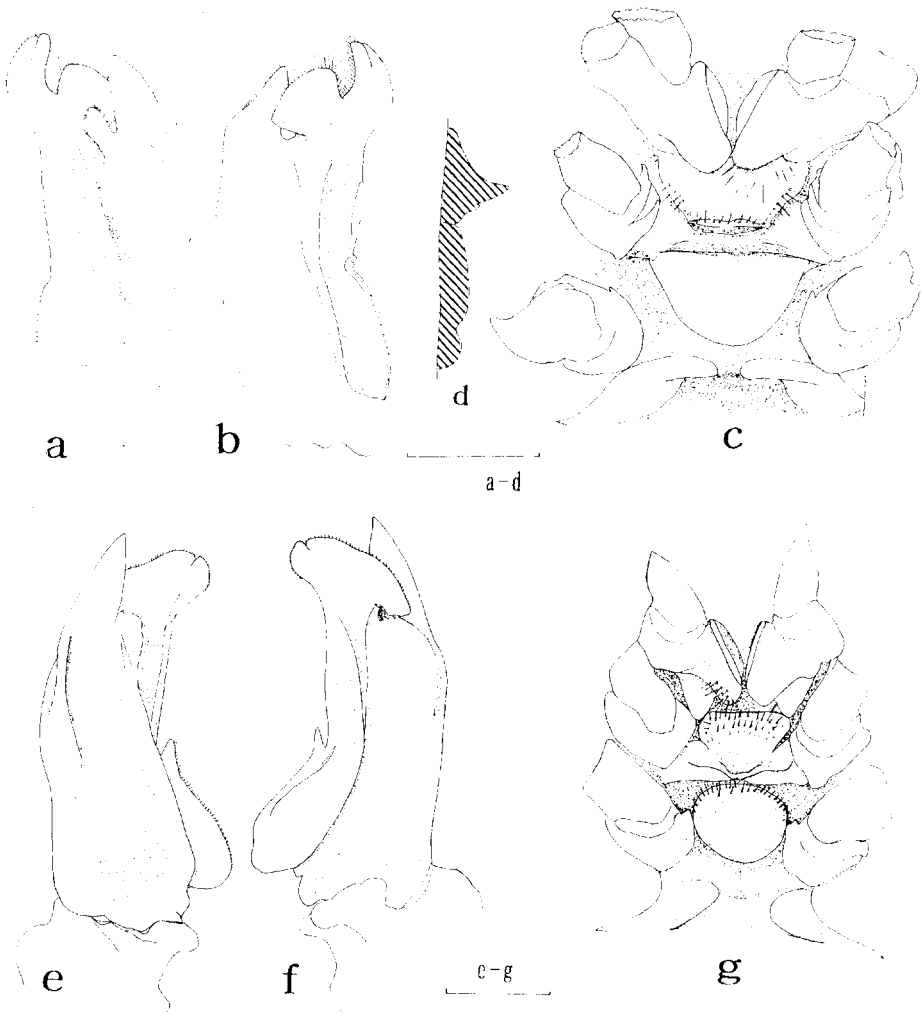

Fig. 3. a–d, *Hymenopenaeus equalis* (BATE), ♂ (a, b: cl 18.5 mm) and ♀ (c, d: cl 14.1 mm), and e–g, *H. propinquus* (DE MAN), ♂ (e, f: cl 21.6 mm) and ♀ (g: cl 24.5 mm). a, b, and e, f, petasmas in anterior and posterior views, respectively; c and g, thelyca; d, lateral profile of thelycum. Scale bars = 2 mm.

Remarks. It was shown that there are some variations in the shape of the thelycum. The present females are similar to that figured by CROSNIER (1989, fig. 3 c) in having the eighth thoracic sternite rather glabular and comparatively higher than the level of the seventh sternite, contrary to the case shown by CROSNIER (1978, fig. 45 e, f). The petasmas of the present males show minor variations in the relative length of the distolateral lobes; in two males (cl 21.6 and 21.9 mm) it is well developed, nearly reaching the level of distal margin of the ventral lobe (Fig. 5), while in another male

end of antennular peduncle in females, falling short of that portion in males, slightly curving dorsad in anterior 1/3 armed dorsally with 5 or 6, commonly 6, spines, ventrally unarmed. Carapace with weak post-rostral carina, dorsally rounded for its posterior portion.

Abdomen rounded dorsally on first 2 somites; 3rd somite with weak dorsal carina on posterior 2/3 and without pair of sharp spines at posteromedian end; 4th to 6th somites carinate dorsally; 4th and 5th with pair of spines at each posteromedian end; 6th somite 2.00–2.21 times as long as 5th. Telson 0.91–0.98 times as long as 6th somite.

Eye large, prosartema reaching end of 1st segment of antennular peduncle. Antennular peduncle barely reaching end of antennal scale, upper flagellum 0.66–0.73 times as long as lower one in females, and 0.61–0.64 times in males. Stylocerite sharp, reaching end of basal segment of antennular peduncle. Antennal scale 0.79–0.84 times as long as carapace and 3.21–3.57 times as long as wide in females, relatively longer in males being 0.83–0.90 and 3.29–3.83 respectively. Third maxilliped with distal segment 0.73–0.85 times as long as penultimate.

Distribution. Known with certitude from the Philippine-Indonesian region, 150–275 m deep.

Genus ***Penaeopsis*** BATE, 1881

Penaeopsis sp.

Material. St. A–1, 1 ♀ (cl ca. 8.5 mm) (NSMT–Cr 2252).

Remarks. The specimen at hand is young and badly damaged. An exact identification is therefore impossible, but it is confirmed that the telson is provided with two pairs of movable lateral spines.

Of five Indo-West Pacific species of the genus *Penaeopsis*, *P. eduardoi* PEREZ FARFANTE and *P. rectaculata* (BATE) are recorded in the Philippine-Indonesian region (PEREZ FARFANTE, 1980). The latter belongs to the species group having three pairs of movable telson spines together with *P. jerryi* PEREZ FARFANTE in the northern part of the Indian Ocean.

Genus ***Parapenaeus*** SMITH, 1885

Parapenaeus investigatoris ALCOCK et ANDERSON, 1899

Parapeneus investigatoris ALCOCK & ANDERSON, 1899 a, p. 279; –1899 b, pl. 41 (1, 1a, 1b); ALCOCK, 1906, p. 32, pl. 6 (17).

Penaeus (Parapenaeus) investigatoris: ALCOCK, 1901, p. 18.

Parapenaeus investigatoris: CROSNIER, 1985 b, p. 343, figs. 12 (c), 13 (c, d), 14 (b).

Non *Parapenaeus investigatoris*: KUBO, 1949, p. 406, figs. 7 (e′), 21 (d), 28 (i–l), 47 (q), 61 (d, d′), 75 (d, j), 78 (j), 143 (d, h), 145; Barnard, 1950, p. 602, fig. 110 (a, b); DE FREITAS, 1987, p. 30, fig. III-14 (*M. murrayi*).

Material. Stn. A–1, 1 ♀ (cl 10.9 mm) (NSMT–Cr 2253).

Remarks. The present female is distinguishable from *P. murrayi* RAMADAN by having the rostrum not curving dorsad but gently convex, with the ventral margin weakly concave. The thelycum agrees well with the figure given by CROSNIER (1985 b, fig. 14 b), except for the presence of a small projection or spine, somewhat alike that of *P. murrayi*, placed at anteromedian margin of the seventh thoracic sternite.

Distribution. From the Gulf of Aden through India and Indonesia to the Philippines, 215–400 m deep.

Family Sicyoniidae

Genus *Sicyonia* H. MILNE EDWARDS, 1830

Sicyonia truncata (KUBO, 1949)

(Fig. 5)

Eusicyonia truncata KUBO, 1949, p. 456, figs. 8 (m), 48 (f), 77 (a, g), 79 (j), 156 (e), 158.
Sicyonia truncata: KENSLEY, 1981 b, p. 20; HAYASHI, 1992, p. 162, figs. 87 (d), 88 (d), 89 (b, c), 90.

Material. Stn. A 1, 1 ♂ (cl 9.1 mm) and 1 ♀ (cl 6.3 mm) (NSMT–Cr 2254); Stn. B–1, 2 ♂♂ (cl 8.7 and 9.1 mm) (NSMT–Cr 2255).

Description. Body covered with fine hairs. Rostrum somewhat quadrate, barely

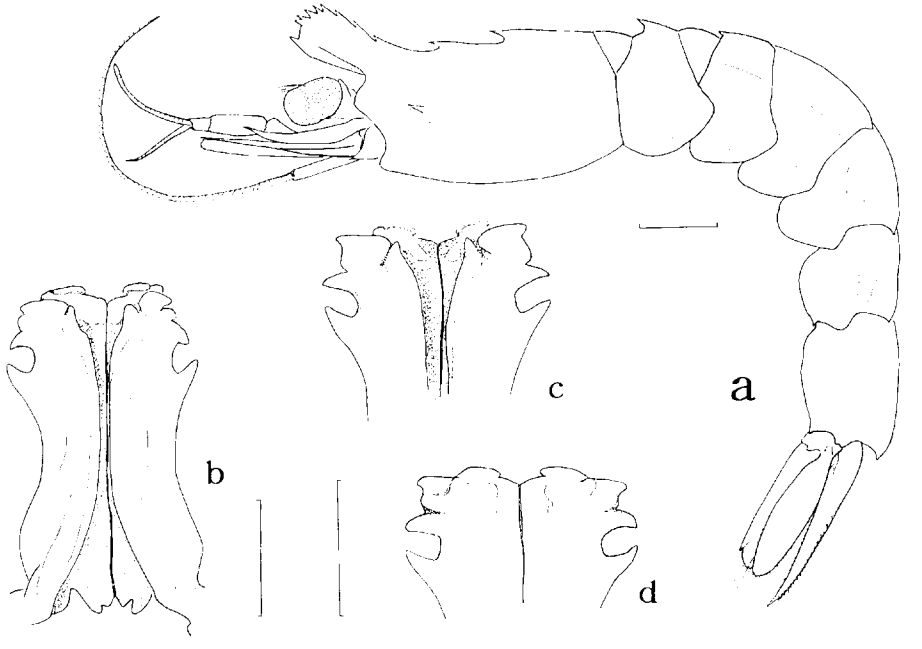

Fig. 5. *Sicyonia truncata* (KUBO), ♂ (cl 9.1 mm). a, entire animal, without appendages; b, petasma in posterior view; c and d, distal part of petasma in posterior and anterior views, respectively. Scale bar for a=3 mm; scale bars for b, and for c and d=1 mm.

reaching end of 1st segment of antennular peduncle, armed dorsally with 7 or 8 spines, distal end nearly truncated, ventral margin slightly convex, without spine. Carapace carinate dorsally, with 2 spines on mesial margin, anterior one placed at anterior 1/3, posterior one situated at posterior 1/3. Hepatic spine present.

Abdomen carinate dorsally, first 2 somites with spine at each anteromedian end. Sixth somite 1.43–1.47 times as long as 5th, ending with posteromedian spine. Pleuron of 5th somite with spine at posteroventral portion. Telson 1.45–1.60 times as long as 6th somite, armed dorsolaterally with 2 rows of movable spines, totalling 14–31 spines on each side.

Eye large. Antennular peduncle with long stylocerite, barely reaching median part of 2nd segment. Antennal scale 0.67–0.69 times as long as carapace, 2.32–2.42 times as long as wide, outer margin concave, distolateral spine overreaching distal margin of lamella.

Remarks. This species was described on the females from Japan, and the male has not yet been recorded. The shape of the petasma of males at hand represents some resemblance to that of *Sicyonia curvirostris* BALSS being provided with a lateral projection on distal third, but the distalmost lobe of *S. truncata* is not divided into two lobules, and the upper lobule of the distolateral lobe is much larger than lower one instead of those subequal in *S. curvirostris*.

Distribution. Japan, 125–350 m deep, and off Natal, South Africa. First to the Indonesian fauna.

Family Sergestidae

Genus *Sergestes* H. MILNE EDWARDS, 1830

Sergestes seminudus HANSEN, 1919

Sergestes seminudus HANSEN, 1919, p. 18, pls. 1 (7), 2 (1); SAKAI & NAKANO, 1985, p. 18, figs. 1–5; KIKUCHI & NEMOTO, 1986, p. 54; HAYASHI, 1992, p. 241, figs. 124 (e), 125 (g), 126 (f, n), 127 (e, l).

Material. Stn. C, 1 ♂ (cl 9.5 mm) and 1 ♀ (8.6 mm) (NSMT-Cr 2256).

Distribution. Indo-West Pacific from the Arabian Sea to eastern Australia and Japan, surface to 4500 m deep.

Genus *Sergia* STIMPSON, 1860

Sergia gardineri (KEMP, 1913)

Sergestes gardineri KEMP, 1913, p. 55, pl. 7 (2–5); HANSEN, 1919, p. 9, pl. 1 (2); NAKANO, 1986, p. 29, figs. 1–5.

Sergia gardineri: KENSLEY, 1981 a, p. 55; 1981 b, p. 20; KIKUCHI & NEMOTO, 1986, p. 54; HAYASHI, 1992, p. 251, figs. 130 (d, k), 131 (c).

Material. Stn. C, 1 ♀ (cl 7.6 mm) (NSMT-Cr 2257).

Distribution. Indo-West Pacific from eastern Africa to the central Pacific, surface to 1600 m deep.

CARIDEA

Family Oplophoridae

Genus *Acanthephyra* A. MILNE EDWARDS, 1881

Acanthephyra curtirostris WOOD-MASON, 1891

Acanthephyra curtirostris WOOD-MASON, in WOOD-MASON & ALCOCK, 1981, p. 195; –1892, p. 364, fig. 5; CROSNIER & FOREST, 1973, p. 39, fig. 8 (a); ZHONG & LAN, 1983, p. 182, fig. 8; HANAMURA, 1983, p. 74, fig. 13; CHACE, 1986, p. 17, figs. 2 (i), 4 (i), 5 (i), 6 (g), 8 (h); KENSLEY *et al.*, 1987, p. 283; CROSNIER, 1987 b, p. 697; KRYGIER & WASMER, 1988, p. 81; CLEVA, 1989, p. 70.

Material. Stn. C, 1 ovig. ♀ (cl 13.4 mm) and 1 juv. (cl 5.6 mm) (NSMT Cr 2258).

Distribution. Tropical and subtropical waters of the world oceans, except for the eastern extremity of the tropical Pacific, 190–5000 m deep.

Acanthephyra eximia SMITH, 1884

Acanthephyra eximia SMITH, 1884, p. 376 (as *eximea*); –1886, p. 667, pl. 14 (1); CROSNIER & FOREST, 1973, p. 34, fig. 7 (c, d); HANAMURA, 1983, p. 73; CHACE, 1986, p. 18, figs. 2 (j), 4 (j), 5 (j), 6 (h), 9 (a); HAYASHI, 1986, pp. 87, 254, fig. 46; KIKUCHI & NEMOTO, 1986, p. 56; CROSNIER, 1987 b, p. 697; CLEVA, 1989, p. 70; BURUKOVSKY, 1990, p. 194.

Acanthephyra angusta BATE, 1888, p. 737, pl. 124 (6).

Acanthephyra edwardsii BATE, 1888, p. 747, pl. 126 (1).

Acanthephyra brachytelsonis BATE, 1888, p. 753, pl. 126 (7).

Acanthephyra pulchra A. MILNE EDWARDS, 1890, p. 163.

Material. Stn. C, 1 ♂ (cl. 32.2 mm) (NSMT–Cr 2259).

Distribution. Indian, Pacific and Atlantic Oceans, 200–4700 m deep.

Acanthephyra quadrispinosa KEMP, 1939

Acanthephyra batei STEBBING, 1905, p. 107, pl. 24 (b).

Acanthephyra quadrispinosa KEMP, 1939, p. 576; CHACE, 1986, p. 26, figs. 3 (h), 4 (t), 5 (t), 7 (g), 10 (c), 14; KIKUCHI & NEMOTO, 1986, p. 56; WASMER, 1986, p. 39, fig. 5 (a–c); CROSNIER, 1987 b, p. 697; KENSLEY *et al.*, 1987, p. 284; IWASAKI & NEMOTO, 1987, p. 18; KRYGIER & WASMER, 1988, p. 82; CLEVA, 1989, p. 70; HANAMURA, 1989, p. 54; WASMER, 1993, p. 66.

Acanthephyra purpurea ZHONG & LAN, 1983, p. 184, fig. 9.

Material. Stn. D, 1 ♂ (cl 12.8 mm) (NSMT–Cr 2260).

Distribution. Indo-Pacific and eastern South Atlantic, surface to 4200 m.

Acanthephyra sanguinea WOOD-MASON et ALCOCK, 1892

Acanthephyra sanguinea WOOD-MASON & ALCOCK, 1892, p. 358, fig. 1; CHACE, 1986, p. 29, figs. 3 (i), 4 (u), 5 (u), 7 (h), 10 (d); CLEVA, 1989, p. 70.

Acanthephyra kempii BALSS, 1914, p. 595; –1925, p. 259, pl. 22.

Material. Stn. C, 1 ♂ (cl 14.4 mm), 1 ♀ (cl 13.5 mm) and 1 ovig. ♀ (cl 14.4 mm)

(NSMT Cr 2284).

Distribution. Tropical waters of the Indo-West Pacific, 350–3500 m deep.

Genus ***Oplophorus*** H. MILNE EDWARDS, 1837

Oplophorus typus H. MILNE EDWARDS, 1837

Oplophorus typus H. MILNE EDWARDS, 1837, p. 424, pl. 25 (6); CHACE, 1947, figs. 8–11; –1986, p. 60, figs. 32 (p–t), 33; ?ZHONG & LAN, 1983, p. 181, fig. 7; CHAN & YU, 1986, p. 97, pl. 1 (d); HANAMURA, 1987, p. 29, fig. 12 (f–h); CLEVA, 1989, p. 71.

Oplophorus brevirostris BATE, 1888, p. 766, pl. 127 (3).

Material. Stn. C, 1 ovig. ♀ (cl 12.6 mm) (NSMT–Cr 2261).

Description. Rostrum falling short of end of antennal scale, armed dorsally with 8 spines and ventrally with 6 spines. Carapace carinate dorsally on anterior 2/3, rounded posteriorly, with sharp posteroventral tooth. Upper rostral carina slightly converging posteriorly.

Abdomen with 1st somite rounded dorsally, 2nd carinate on posterior 1/2, 3rd to 5th somites ending each with long posteromedian spine. Sixth somite as long as 5th. Telson about twice as long as 6th somite, armed with 2 pairs of dorsolateral spines. Pleuron of 1st somite smooth on ventral margin.

Antennal scale dentate on proximal 1/6 of lateral margin, without barb near apex of inner margin.

Distribution. Indo-West Pacific from eastern Africa through northwestern Australia, Indonesia, New Guinea, the Philippines to Taiwan, 250–2400 m deep.

Genus ***Systellaspis*** BATE, 1888

Systellaspis debilis (A. MILNE EDWARDS, 1881)

Acanthephyra debilis A. MILNE EDWARDS, 1881, p. 13.

Miersia gracilis SMITH, 1882, p. 70, pl. 11 (4).

Acanthephyra debilis var. *europea* A. MILNE EDWARDS, 1883, pl. 33 (2).

Systellaspis bouvieri COUTIÈRE, 1905 b, p. 8, fig. 3.

Systellaspis debilis var. *indica* DE MAN, 1916, p. 151; –1920, p. 51, pl. 6 (11).

Systellaspis debilis: CROSNIER & FOREST, 1973, p. 87, figs. 26 (b), 27 (b); ZHONG & LAN, 1983, p. 185, fig. 10; CHACE, 1986, p. 65, figs. 34 (g–i), 35 (e, f); HAYASHI, 1986, pp. 91, 256, fig. 50; KIKUCHI & NEMOTO, 1986, p. 58; CROSNIER, 1987 b, p. 715, figs. 9 (a–h), 10; KENSLEY *et al.*, 1987, p. 290; IWASAKI & NEMOTO, 1987, p. 21; KRYGIER & WASMER, 1988, p. 90; CLEVA, 1989, p. 71.

Material. Stn. C, 1 ♂ (cl 12.7 mm) (NSMT–Cr 2262).

Distribution. Tropical and subtropical waters of the Atlantic and Indo-Pacific Oceans, surface to 4600 m deep.

Family Nematocarcinidae

Genus ***Nematocarcinus*** A. MILNE EDWARDS, 1881

Nematocarcinus undulatipes BATE, 1888

(Figs. 6 and 7 a, b, d–f)

Nematocarcinus undulatipes BATE, 1888, p. 801, pl. 130; DE MAN, 1920, p. 83, pl. 8 (20); CHACE, 1986, p. 76, figs. 41, 42; HAYASHI, 1986, pp. 91, 256, fig. 51; KENSLEY *et al.*, 1987, p. 291; BURUKOVSKY, 1990, p. 195; –1991, p. 41, figs. 1, 5–8; SQUIRES, 1990, p. 95, figs. 46, 47.

Material. Stn. B-1, 1 ♂ (cl 21.5 mm) (NSMT-Cr 2263).

Description. Rostrum nearly horizontal, dorsal margin weakly convex, or rarely concave, armed dorsally with 14 spines, becoming more widely spaced anteriorly, including 7 situated behind orbital margin, and ventrally armed with single subapical spine.

Abdomen with 1st to 6th somites rounded dorsally. Third somite moderately produced posteriorly. Sixth somite 2.06 times as long as 5th somite, ventral margin nearly smooth or very weakly elevated as tuberculated ridges on posterior portion. Pleuron of 5th somite with sharp posteroventral spine. Telson as long as or slightly longer than 6th somite, armed with 8 or 9 dorsolateral spines on each side.

Antennular peduncle with stylocerite falling short of end of basal segment. Antennal scale 0.73 times as long as carapace, distolateral spine slightly overreaching distal end of lamella.

Thoracic sternum in females nearly smooth or faintly setose on ventral surface, especially on posterior 2 plates.

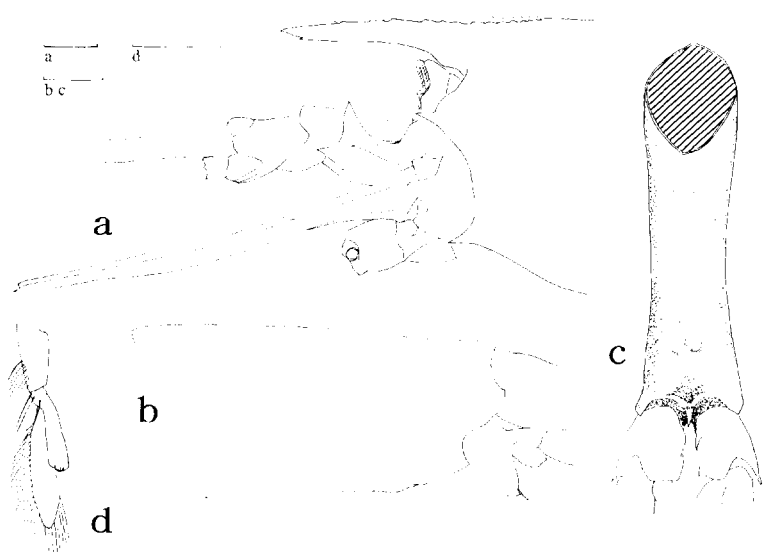

Fig. 6. *Nematocarcinus undulatipes* BATE, ♂ (cl 21.5 mm) from the Flores Sea. a, frontorbital part; b and c, 6th abdominal somite in lateral and ventral views, respectively; d, appendix masculina. Scale bars=2 mm.

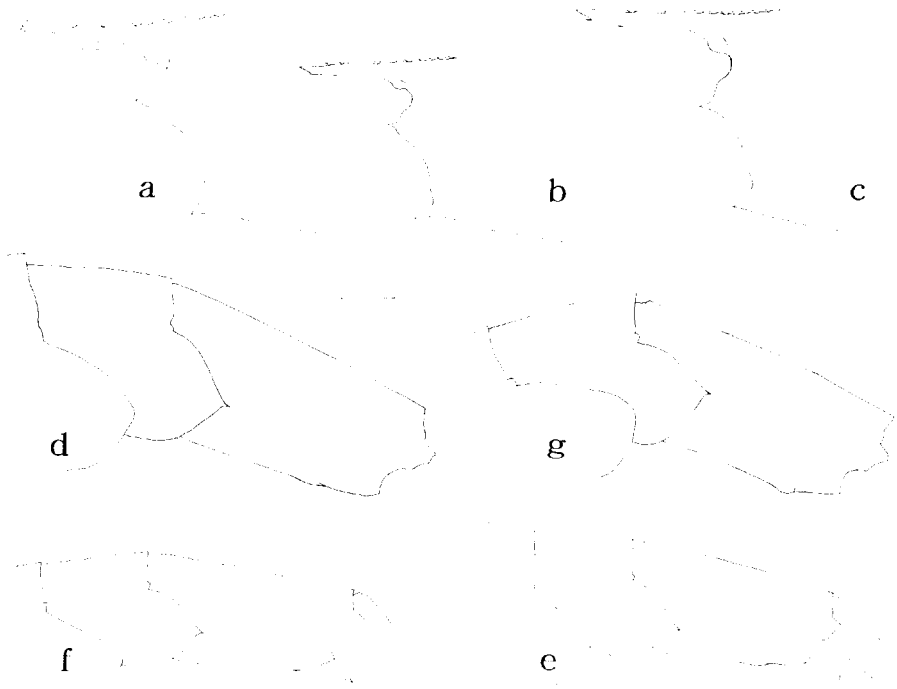

Fig. 7. a, b, d–f, *Nematocarcinus undulatipes* BATE, ♀♀ (SUF 530–2–1141) (a and d; cl 26.5 and 26.1 mm) from Tosa Bay, Japan, ♂ and ovig. ♀ (USNM 221658) (b and f, and e; cl 21.0 and 20.8 mm) from west of Halmahera, Indonesia, *Ablatross* Stn. 5620, and c, g, *N. bituberculatus* CHACE, ovig. ♀, paratype (USNM 211375) (cl 25.4 mm) from west of Halmahera, *Albatross* Stn. 5624. Anterior parts of carapaces (a–c), and 5th and 6th abdominal somites (d–g). Scale bar = 3 mm.

Remarks. CHACE (1983) recognized *Nematocarcinus bituberculatus* CHACE as distinct from *N. undulatipes* due to having a pair of prominent posteromesial tubercules on the ventral margin of the sixth somite. However, weak ridges are usually noticeable in the specimens from Indonesia (present material and 3 males and 3 females from the *Albatross* Stn. 5620, west of Halmahera; USNM 221658) and Japanese waters (2 females from Tosa Bay; ZUF 530–1141). By the kind coutesy of Dr. F. A. CHACE, Jr., we were able to examine an ovigerous female paratype of *N. bituberculatus* from Indonesia (USNM 211376). The tubercles on ventral margin of the sixth somite in the paratypic specimen is noticeably developed and marked (Fig. 7 g) than those of any materials referred to *N. undulatipes* (Fig. 7 d–f). Following morphological differences are also noticed; 1) the antennal scale is slightly shorter in *N. bituberculatus*, being 0.62 times as long as the carapace instead of 0.68–0.69 in females (0.73–0.76 in males), 2) the stylocerite of the antennular peduncle is reaching the end of basal segment of the antennular peduncle instead of falling short of that level, and 3) the thoracic sterna in the females are densely studded with setigerous punctations instead of being

nearly smooth or less setose with minute hairs, especially on the seventh and eighth sternum. Although we could not confirm these characters as specific features for polymorphic *N. undulatipes* due to limited observations, it is best, at this stage, to retain *N. bituberculatus* as the species distinct from *N. undulatipes*.

Distribution. Indo-Pacific from eastern Africa through the Philippine-Indonesian region to Japan and Sala-Y-Gomez in the southeastern Pacific, 350 to 1270 m deep.

Family Stylodactylidae

Genus ***Stylodactylus*** A. MILNE EDWARDS, 1881

Stylodactylus licinus CHACE, 1983

(Fig. 8 a)

Stylodactylus licinus CHACE, 1983, p. 14, fig. 6; ?HAYASHI, 1986, pp. 93, 257, fig. 52; CLEVA, 1990, p. 87, figs. 3 (a–j), 18 (f, g).

Material. Stn. A–1, 1 ovig. ♀ (cl 15.8 mm) (NSMT–Cr 2264).

Description. Rostrum 1.64 times as long as carapace, dorsally concave, armed with 39 teeth on dorsal margin and with 18 teeth on ventral margin. Carapace with small supraorbital spine. Subantennal spine obtuse. Antennal spine developed, slightly larger than branchiostegal spine.

Abdomen rounded dorsally, 6th somite 1.65 times as long as 5th. Telson 1.57 times as long as 6th somite, armed with 5 pairs of dorsolateral spines. Pleura of 4th and 5th somites each with posteroventral spine.

Antennular peduncle with stylocerite barely reaching end of median portion of 2nd segment of antennular peduncle, 2nd segment 2.44 times as long as 3rd. Antennal scale 0.88 times as long as carapace, 5.80 times as long as wide, distolateral spine overreaching distal end of lamella.

First pereopod overreaching antennal scale by slightly more than length of chela. Second pereopod overreaching end of antennal scale by slightly less than length of fingers. Third pereopod overreaching antennal scale by about half length of propodus and dactylus, propodus 4.24 times as long as dactylus, latter armed with 7 ventral spines, ischium and merus fused, armed with 4 lateral spines on distal half. Fifth damaged, ischium with 7 lateral spines.

Remarks. *Stylodactylus licinus* CHACE is distinguishable from *S. stebbingi* HAYASHI et MIYAKE by having no articulation between the ischium and merus of the fourth pereopod, while in *S. stebbingi* the corresponding articulation is present in the fourth pereopod. Our female is damaged and lacking the fourth pereopod. However, the combination of morphological characters mentioned above may prove that the specimen at hand is referable to *S. licinus*.

The egg size of the present specimen preserved in about 70% ethanol is slightly smaller than that reported by the original author, measuring about 0.7–0.8 × 0.5–0.7 mm, and somewhat comparable to the values reported by CLEVA (1990).

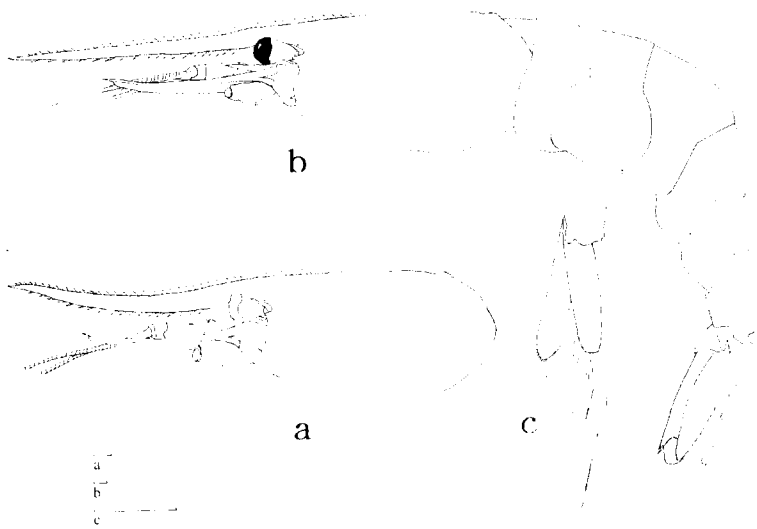

Fig. 8. a, *Stylodactylus licinus* CHACE, ovig. ♀ (cl 15.8 mm), and b, c, *Stylodactylus* sp., ♂ (cl 12.7 mm). a, carapace; b, entire animal, without appendages; c, appendix masculina. Scale bars = 1 mm.

CLEVA (*op. cit.*) suggested that *S. licinus* recorded from Japanese waters by HAYASHI (1986) is different in certain morphological characters as well as the color in fresh condition from typical form of the species obtained from various localities of the Indo-West Pacific.

Distribution. Reliably known from Indonesia, the Philippines, New Caledonia, the Chesterfield Islands and Fiji, 500–1000 m deep.

Stylodactylus sp.

(Fig. 8 b, c)

Material. Stn. B–2, 1 ♂ (cl 12.7 mm) (NSMT–Cr 2265).

Description. Rostrum 1.77 times as long as carapace, nearly straight, armed dorsally with 38 teeth including 6 situated behind orbital margin, ventrally with 20 teeth, posteriormost spine placed just above end of 1st segment of antennular peduncle. Carapace with minute supraorbital spine. Antennal spine moderately long, no secondary spine below branchiostegal.

Abdominal somites rounded dorsally, 6th somite 1.62 times as long as 5th. Telson 1.59 times as long as 6th somite, ending into distal end-piece, armed with 5 pairs of dorsolateral spines, excluding distal 4 spines. Pleura of 4th and 5th somites each with posteroventral spine.

Eye moderately large, distal segment of stalk not so long. Antennular peduncle with 1st segment 1.58 times as long as 2nd, 2nd 2.88 times as long as 3rd, stylocerite

tapering distally, reaching mid portion of 2nd segment. Antennal scale 0.85 times as long as carapace, 6.00 times as long as wide, distolateral spine overreaching far beyond distal end of lamella.

Third pereopod overreaching antennal scale by length of dactylus and 1/3 of propodus, propodus 3.79 times as long as dactylus. Fourth pereopod overreaching antennal scale by length of dactylus and 1/5 of propodus. Fifth pereopod overreaching antennal scale by length of dactylus and 1/6 of propodus.

Appendix masculina slightly shorter than appendix interna.

Remarks. The male specimen from the Flores Sea shows close resemblance to *Stylodactylus stebbingi* HAYASHI et MIYAKE and its allies. The shape of the rostrum is most similar to that of *S. stebbingi*, but the absence of an articulation between the ischium and merus of the fourth pereopod warrants to distinguish the present material from *S. stebbingi*. *S. tokarensis* ZARENKOV has four to 16 teeth on the ventral margin of the rostrum, and the propodus of the third pereopod is proportinately long, being 4.8–6.5 times of the dactylus (CLEVA, 1990), instead of 3.39.

The present material also differs from *S. licinus* CHACE in having the rostrum nearly straight rather than curving dorsad, and the rostrum proper is rather slender; the height of the rostrum measured just behind the posteriormost spine of the ventral series is 0.091 times of the carapace length, while it is 0.106 in the specimen attributed to *S. licinus*. Further the supraorbital spine is conspicuously minute than it is in *S. licinus*.

Thus the present specimen represents unique features compared with any species of the genus, and probably belongs to an undescribed taxon. The final validity would be confirmed when more materials become available.

Family Eugonatonotidae

Genus ***Eugonatonotus*** SCHMITT, 1926

Eugonatonotus chacei CHAN et YU, 1991

Gonatonotus crassus: KUBO, 1937, p. 87, figs. 1–3.

Eugonatonotus crassus: HAYASHI 1986, pp. 99, 260, fig. 59; KENSLEY *et al.*, 1987, p. 304; CHAN & YU, 1988, p. 259, figs. 1, 2, pl. 1.

Eugonatonotus chacei CHAN & YU, 1991, p. 144, fig. 1, pl. 1 (a).

Material. A–1, 1 ♂ (cl 23.8 mm) (NSMT–Cr 2266).

Remarks. According to CHAN & YU (1991), the Indo-West Pacific specimens of *Eugonatonotus* are distinguishable from the Atlantic counterpart, *E. crassus* A. MILNE EDWARDS, by the presence of two pairs of the dorsolateral spines on the fifth abdominal somite instead of only single pair and so on.

Distribution. Eastern Indian Ocean and western Pacific, 100–610 m deep.

Family Pandalidae

Recently CHRISTOFFERSEN (1989) proposed on the basis of the cladistic analysis an

alternative system for the superfamily Pandaloidea. According to him, the genera reported here would be referred as follows: *Chlorotocus* (Thalassocardidae), *Heterocarpus* (Heterocarpoidae), *Plesionika* (Plesionikidae) and *Stylopandalus* (Physetocaridae). However we believe more discussion would be needed to establish an appropriate phylogenetic relationship of the superfamily. This paper follows a current recognition (*e.g.*, CHACE, 1992).

Genus ***Chlorotocus*** A. MILNE EDWARDS, 1882

Chlorotocus crassicornis (COSTA, 1871)

Pandalus crassicornis COSTA, 1871, p. 89, pl. 2 (2).
Chlorotocus gracilipes A. MILNE EDWARDS, 1882, p. 14.
Chlorotocus gracilipes var. *andamanensis* ALCOCK & ANDERSON, 1899 a, p. 284.
Chlorotocus crassicornis: CROSNIER & FOREST, 1973, p. 184, figs. 58–60; CHACE, 1985, p. 12, figs. 7, 8; HAYASHI, 1986, pp. 117, 267, fig. 73; HANAMURA & TAKEDA, 1987, p. 106.

Material. Stn. A–1, 2 ♀♀ (cl 12.2 and 15.7 mm) and 2 ovig. ♀♀ (cl 16.0 and 20.5 mm) (NSMT–Cr 2267); A–2, 1 ♂ (cl ca. 13 mm, damaged badly) (NSMT–Cr 2268).

Remarks. Eggs carried by the females are small and numerous, measuring 0.50–0.60 × 0.40–0.45 mm in non-eyed embryos and 0.60–0.65 × 0.45–0.50 mm in embryos with eyes that are indicated as brownish spots.

Distribution. Eastern Atlantic and Indo-West Pacific, down to 600 m deep.

Genus ***Heterocarpus*** BATE, 1888

Heterocarpus dorsalis BATE, 1888

Heterocarpus dorsalis BATE, 1888, p. 630, pl. 111; DE MAN, 1920, p. 171, pl. 15 (43); CHACE, 1985, p. 22, fig. 13 (d); HAYASHI, 1986, pp. 117, 267, fig. 74; HANAMURA & TAKEDA, 1987, p. 107; CROSNIER, 1988, p. 62, figs. 2, 3.
Heterocarpus alphonsi BATE, 1888, p. 632, pl. 112 (1).
Heterocarpus dorsalis ssp. *alphonsi*: MONOD, 1973, p. 123, figs. 28–31.

Material. Stn. A–1, 1 ovig. ♀ (cl ca. 36 mm) (NSMT–Cr 2269); Stn. B–1, 3 ♂♂ (cl 19.9–36.1 mm) (NSMT–Cr 2270); Stn. B–2, 1 ♂ (cl 34.5 mm), 1 ♀ (cl 21.2 mm) and 2 ovig. ♀♀ (cl 32.1 and 33.1 mm) (NSMT–Cr 2271); Stn. C, 1 ♂ (cl 23.3 mm) (NSMT–Cr 2272).

Remarks. In the Flores Sea specimens, the rostrum varied from 0.96 to 1.38 times as long as the carapace length, armed dorsally with 10 to 13 teeth, including two or three placed behind the orbital margin, and the ventral margin provided with 12 or 13 teeth.

CROSNIER (1988) suggested that there are some variations on the length of the rostrum as well as its spination in the specimens from Madagascar and the Philippine-Indonesian region, indicating a general tendency that the Madagascarian population has proportionately longer rostrum than in the Philippine-Indonesian population,

even though several intermediate forms occur in respective areas. The rostral length of the *Hakuho-Maru* specimens seemed to be typical of the Philippine-Indonesian population.

Distribution. Indo-West Pacific. 180–1400 m deep.

Heterocarpus sibogae DE MAN, 1917

Heterocarpus sibogae DE MAN, 1917, p. 283; –1920, p. 169, pl. 14 (42); CHACE, 1985, p. 36, fig. 13 (m), 18, 19 (not fig. 20 = *H. hayashii*); CHAN & YU, 1986, p. 57. pl. 2 (d) (not pl. 2 (c) = *H. hayashii*); HANAMURA & TAKEDA, 1987, p. 107; CROSNIER, 1988, p. 79, fig. 5 (c), pls. 1 (c), 3 (a, b); BURUKOVSKY, 1990, p. 200.

Heterocarpus sp.: HAYASHI, 1986, pp. 119, 269, fig. 77.

Non *Heterocarpus sibogae*: HAYASHI, 1986, pp. 119, 268, fig. 76 (= *H. hayashii*).

Material. Stn. A–1, 4 ovig. ♀♀ (cl 24.0–29.8 mm) (NSMT–Cr 2273); Stn. B–2, 1 ovig. ♀ (cl 23.7 mm) (NSMT–Cr 2274).

Remarks. The specific recognition of *Heterocarpus sibogae* and its congeners appears to become much clear due to the excellent work made by CROSNIER (1988). The definite identification is most reliably based upon its coloration.

Although the natural coloration could not be available, the materials collected by the R.V. *Hakuho-Maru* were identified to this species due to having 1) the first two abdominal somites with conspicuously high dorsal median carina and 2) the posteromedian spines of the third and fourth abdominal somites being subequal in length.

HANAMURA & TAKEDA (1987) reported under this name seven specimens including one juvenile from northwestern Australia. Six adults of these specimens (NTM Cr 006085, 006086; NSMT–Cr 9396) appeared to agree with *H. sibogae* in having the well developed dorsal carinae on the first two abdominal somites and comparatively long posteromedian spine on the fourth somite. The young specimen with a carapace length of 11.1 mm remains some doubt for its identification, because it lacks the dorsal carina on the first abdominal somite and the dorsal margin of the carapace is dentated on anterior 38% of its length. However, the posteromedian spine of the fourth abdominal somite is not so short compared with that of the third somite, being about 0.9 times as long as the latter, and the median carina of the second abdominal somite is well developed. At present, we think that these discrepancies may come from the smaller body size as usual.

Distribution. Indo-Pacific Oceans, 240–700 m deep.

Genus ***Plesionika*** BATE, 1888

Plesionika martia orientalis CHACE, 1985

(Fig. 9)

Plesionika martia orientalis CHACE, 1985, p. 84, figs. 38, 39, 53, 54; HANAMURA & TAKEDA, 1987, p. 111, fig. 3 (a, b).

Material. Stn. A–1, 1 ♂ (cl 25.5 mm) (NSMT–Cr 2275).

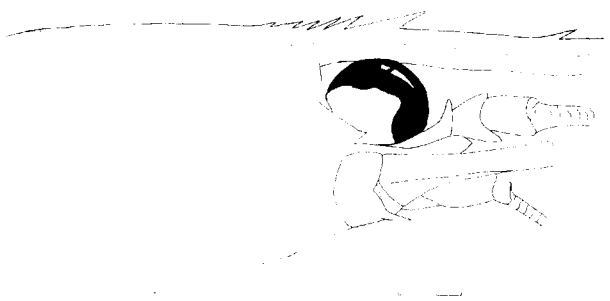

Fig. 9. *Plesionika martia orientalis* CHACE, ♂ (cl 25.5 mm). Scale bar 3 mm.

Description. Rostrum extremely overreaching antennal scale, 1.40 times as long as carapace; dorsal margin armed with 7 moderately spaced teeth, including 4 situated behind orbital margin, distalmost spine placed just anterior to end of antennular peduncle. Carapace weakly carinate on anterior 2/5, but not remarkably high, ending posteriorly with gentle slope. Orbital margin faintly convex posteriorly, lower margin convex.

Sixth abdominal somite 1.82 times as long as 5th. Telson 1.17 times as long as 6th somite, posterior end falling anterior to distal margin of endopod of uropod. Pleuron of 5th somite with minute spine at posteroventral corner, ending into angle of 54°.

Eye with cornea 0.21 times as long as carapace. Antennular peduncle with stylocerite overreaching end of basal segment, inner margin nearly straight on distal half, distal end subacute. Antennal scale 0.91 times as long as carapace, 5.18 times as long as wide. Lateral spine on basicerite sharp and long in right side, but short and robust in left side. Third maxilliped with distal segment 0.79 times as long as penultimate.

Second pereopods subequal in both sides, with 25 carpal articulations.

Exopod of 3rd pleopod 0.82 times as long as carapace.

Branchial filaments of podbranch on 2nd maxilliped leaf-shaped, about 3.3 times as long as wide.

Remarks. In the male at hand the dorsal carina of the carapace is not so developed and the anteriormost tooth of the rostral dorsal margin is placed just anterior to the end of the antennular peduncle as in *Plesionika parvimartia* CHACE, but the other features as well as larger body size may distinguish it from the latter species.

The true relationships among the members of the "*P. martia*" group are not yet entirely clear (*e.g.*, CHACE, 1985; HANAMURA, 1989). In this paper we assigned the Flores Sea specimen to this subspecies due to having the relatively small eye, the longer exopod of the third pleopod and the nearly vertical orbital margin.

Distribution. This subspecies is known from northwestern Australia and the Philippine-Indonesian region, 240–690 m deep.

Plesionika reflexa CHACE, 1985

(Fig. 10)

Plesionika reflexa CHACE, 1985, p. 108, fig. 49; HAYASHI, 1986, pp. 137, 273, fig. 88; KENSLEY *et al.*, 1987, p. 318; HANAMURA & TAKEDA, 1987, p. 116.

Material. Stn. A–1, 5 ♂♂ (cl 11.1–13.1 mm), 6 ♀♀ (cl 10.7–18.3 mm) and 18 juvs. (cl 5.6–8.0 mm), largest female is infected by a bopyrid (NSMT-Cr 2276).

Remarks. In the small specimen with 5.6 mm in carapace length, the posteromedian spine of the third abdominal somite does not curve dorsad, representing the typical form of *Plesionika ensis* (A. MILNE EDWARDS), whereas in the other specimens this spine is more or less recurved upwards, and weakly concave or nearly straight at its basal portion.

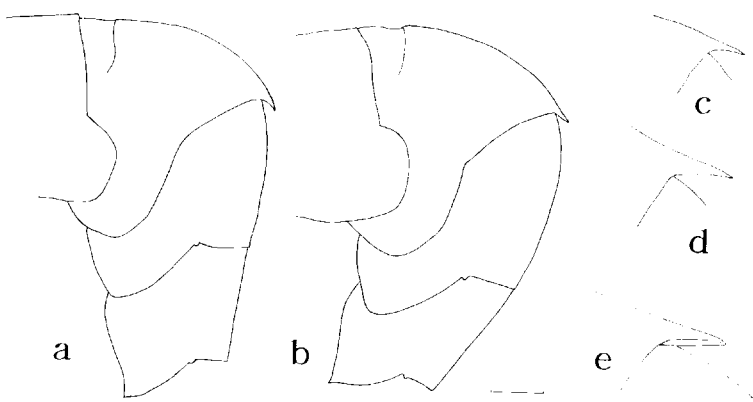

Fig. 10. *Plesionika reflexa* CHACE, youngs (a, b, c; cl 5.6, 5.7, 7.1 mm), ♂ (d; cl 12.1 mm), and ♀ (e; cl 18.3 mm). Third to 5th abdominal somites (a, b), and posteromedian spines of 3rd abdominal somites (c–e). Scale bar = 1 mm.

Distribution. Known with certitude from northwestern and eastern Australia, and the Philippine-Indonesian region including the South China Sea, 190–630 m deep. CROSNIER (1986) suggested that the French Polynesian population has the proportionately short dactyli in the posterior pereopods as in the Hawaiian form.

Plesionika unidens BATE, 1888

Plesionika unidens BATE, 1888, p. 648, pl. 113 (4); DE MAN, 1920, p. 129, pls. 11 (28), 12 (28); CHACE, 1985, p. 134; HAYASHI, 1986, pp. 139, 274, fig. 90; HANAMURA & TAKEDA, 1987, p. 118.

Material. Stn. A–1, 2 ♂♂ (cl 10.4 and 11.6 mm), 1 ♀ (cl 9.3 mm) and 5 ovig. ♀♀ (cl 9.5–11.8 mm) (NSMT-Cr 2277).

Distribution. Whole Indo-West Pacific, 210–400 m deep.

Genus *Stylopandalus* COUTIÈRE, 1905

Stylopandalus richardi (COUTIÈRE, 1905)

Pandalus (Stylopandalus) richardi COUTIÈRE, 1905 a, p. 1113.

Stylopandalus richardi: RICHARD, 1905, p. 11; BURUKOVSKY, 1982, p. 40; CHACE, 1985, p. 136, fig. 62; SQUIRES, 1990, p. 256, figs. 139, 140.

Parapandalus zurstrasseni BALSS, 1914, p. 597; –1925, p. 281, figs. 53–59, pl. 27; DE MAN, 1920, p. 141, pl. 12 (32); ZHONG & LAN, 1983, p. 186, fig. 11.

Pandalus (*Plesionika*) *gracilis* BORRADAILE, 1915, p. 208; –1917, p. 398, pl. 58 (1).

Parapandalus richardi: CROSNIER & FOREST, 1973, p. 224, fig. 69 (b); HANAMURA, 1983, p. 79; KIKUCHI & NEMOTO, 1986, p. 58.

Material. Stn. C, 1 ♂ (cl 7.0 mm) (NSMT-Cr 2278).

Distribution. Tropical and subtropical waters of the world oceans, surface to 3600 m deep.

Family Glyphocrangonidae

Genus ***Glyphocrangon*** A. MILNE EDWARDS, 1881

Glyphocrangon hakuhoae sp. nov.

(Figs. 11–13)

Material. Stn. A–1, 1 ♂ (cl 15.0 mm) (holotype, NSMT-Cr 2279); 2 ovig. ♀♀ (cl 13.6 and 15.8 mm) (paratypes, NSMT-Cr 2280 and LIPI), and 2 juvs. (cl 10.2 and 10.5 mm) (paratypes, NSMT-Cr 2281).

Diagnosis. Integument humpy, not pubescent. Rostrum slightly shorter than carapace, armed with 2 pairs of lateral teeth, without transverse septa on anterior part of dorsal surface; in lateral view, anterior dorsal margin of rostrum convex at its median part and concave for its distal half. Anterior 1st (submedian) carina of carapace weak, composed of 2 large and some smaller tubercles; posterior 1st carina with 2 elongated tubercles; anterior 2nd (intermediate) carina with 2 or 3 depressed tubercles; posterior 2nd carina prominent, truncated, divided into 3 parts; anterior 3rd (antennal) carina almost indistinguishable, only with 2 or 3 obscure tubercles, not continuous with antennal spine; posterior 3rd carina with interruption at its anterior 1/5, weakly inclined anteriorly, obtuse at its anterior end; anterior 4th (lateral) carina not continuous with branchiostegal spine, developed as bilobate lamina, directed anterolaterally only silghtly beyond level of bottom of orbit, but not expanded laterally; posterior 4th carina only with obscure interruption at anterior 1/4; antennal spine directed forwards and obliquely upwards, less than 1/2 as long as branchiostegal spine; abdomen uneven, provided with dorsal carina on 2nd to 4th somites; pair of submedian carinae on 5th somite, carina of 6th somite strongly developed, sharply pointed posteriorly; 3rd to 5th somites each with 2 marginal spines on pleuron; antennal scale with lateral tooth.

Description. Integument hard, glabrous, humpy, without pubescence. Rostrum armed with 2 pairs of lateral teeth, without transverse septa on dorsal surface of its anterior portion; anterior pair of lateral teeth at basal 1/3 of rostral length, sharply pointed, and posterior pair just level of bottom of orbit distinct but obtusely angulated; in lateral view, basal half of anterior portion of rostrum or median 1/3 of rostrum in front of anterior pair of lateral teeth, straight or rather convex dorsally, but distal

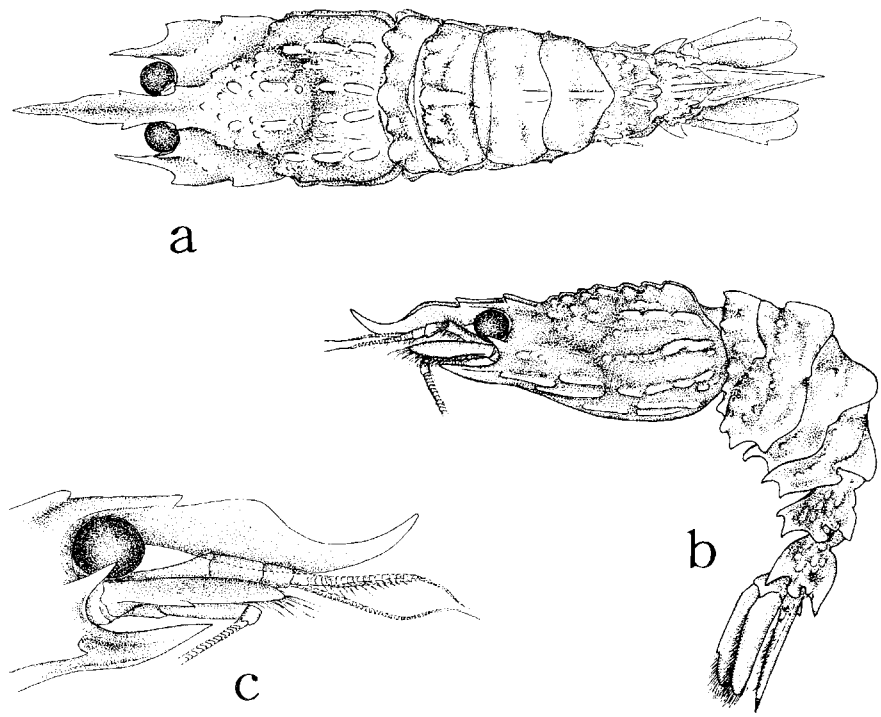

Fig. 11. *Glyphocrangon hakuhoae* sp. nov., ♂, holotype (NSMT-Cr 2270; cl 15.0 mm).

1/3 of rostrum strongly concave and curved upwards as a whole.

First (submedian) carina of carapace weakly convergent posteriorly, composed of 2 main and 3 subsidiary blunt, forwardly directed tubercles anterior to cervical groove, and 2 elongate posterior tubercles posterior to cervical groove. Surface between 1st (submedian) and 2nd (intermediate) carinae ornamented with some indistinct granules of good size. Anterior 2nd carina composed of 2 elongate tubercles and prominent mound in front of and isolated by furrow from them; posterior 2nd carina subdivided into subequal parts, surface subtruncated and microscopically erose. Hepatic region with obscure rounded tubercles; posterior 3rd (antennal) carina with indentation at anterior 1/5; posterior 4/5 shallowly concave for its anterior half, converging posteriorly towards posterior base of 2nd carina: anterior ends of both anterior and posterior parts very obtuse. Anterior 4th (lateral) carina forming bilobate wing-like expansion as usual, but not strongly developed laterally; anterior lobe terminating in sharp point indipendent of branchiostegal spine at about level of bottom of orbit; posterior lobe not in a line with anterior lobe, obtusely but distinctly angulated; posterior 4th carina parallel to 3rd carina, very indistinctly divided into 3 parts. Anterior 5th (sublateral) carina linear, distinct for its whole length; posterior 5th carina distinct, uneven, followed by tubercle at its posterior end. Anterior and posterior 6th

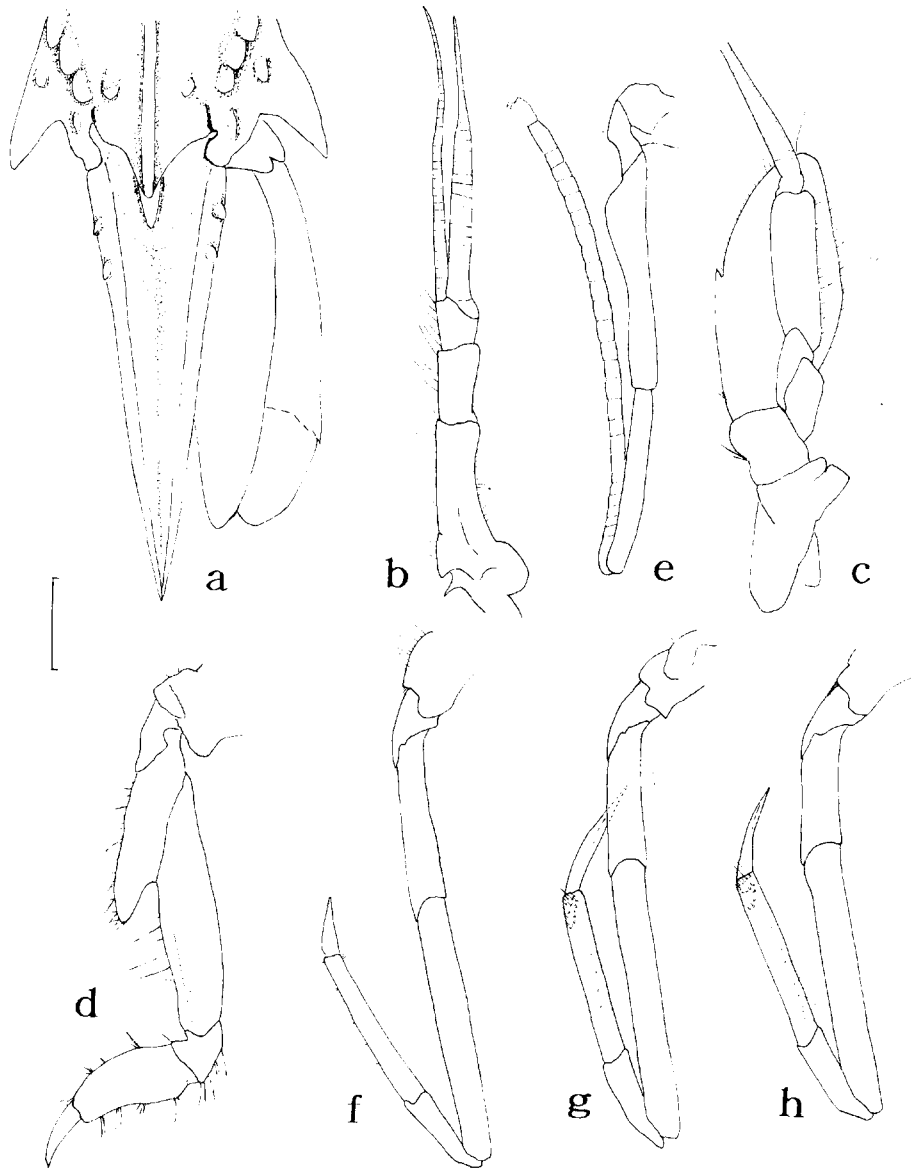

Fig. 12. *Glyphocrangon hakuhoae* sp. nov., ovig. ♀, paratype (NSMT-Cr 2280; cl 13.6 mm). a, telson and right uropod; b and c, 1st and 2nd antennae; d–h, 1st to 5th pereopods. Scale bar 2 mm.

(submarginal) carinae narrow, uneven, but traceable. Antennal spine weakly curving inwards in dorsal view and directed obliquely upwards in lateral view, about 1/3 as long as branchiostegal spine which is prominent and directed forwards.

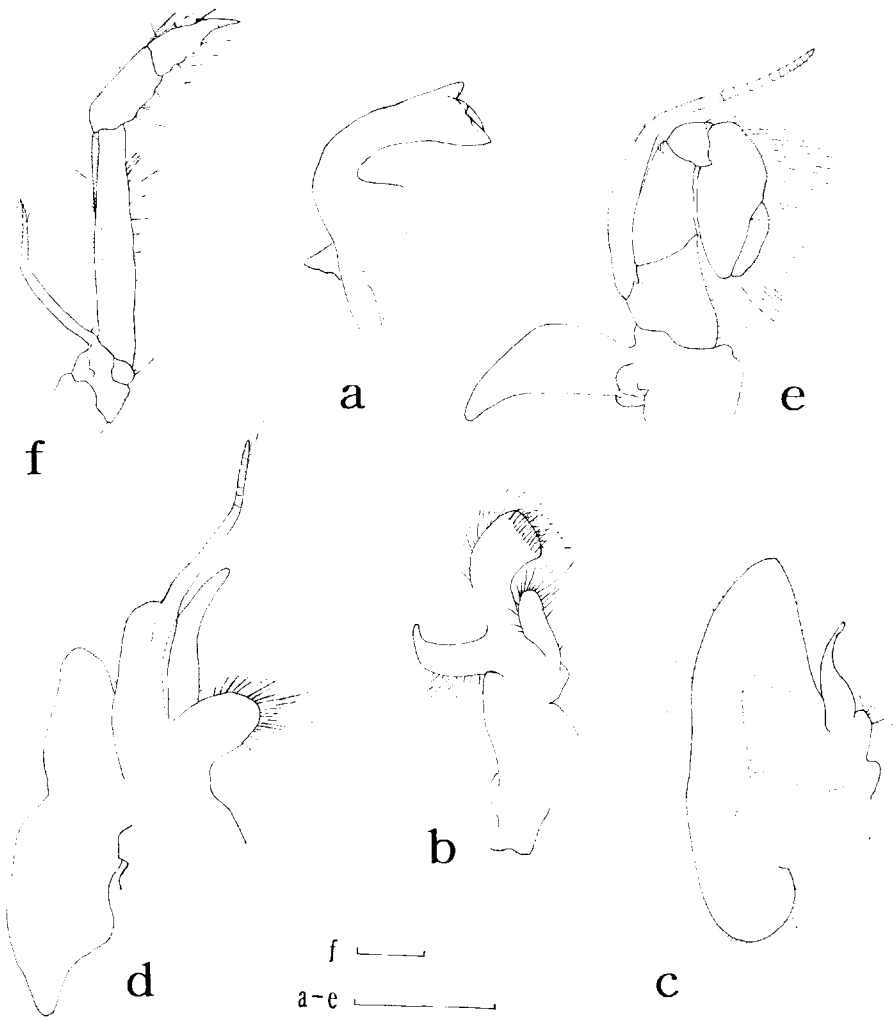

Fig. 13. *Glyphocrangon hakuhoae* sp. nov., ovig. ♀, paratype (NSMT-Cr 2280; cl 13.6 mm). a, mandible; b and c, 1st and 2nd maxillae; d–f, 1st to 3rd maxillipeds. Scale bars = 2 mm.

Abdomen with scattered blunt tubercles on lateral surfaces of somites and dorsal thick carina in midline of each somite. First somite with forwardly directed median carina, 2 elongated tubercles on its lateral upper part, and 2 or 3 smaller ones along its anterior margin. Second somite with several tubercles along its anterior margin, armed with 3 marginal teeth, dorsal carina being rounded posteriorly. Third and 4th somites similar to 2nd, but dorsal carinae sharper posteriorly. Fifth somite with 2 longer marginal teeth; dorsal carina composed of median linear and pair of prominent lateral ridges. Posterolateral tooth of 6th somite strongly developed, directed oblique-

ly outwards in dorsal view; dorsal median carina high and thin, sharply pointed posteriorly. Telson as long as preceding 2 somites combined, with 2 small, blunt tubercles at basal part of lateral margin.

Mouthparts as illustrated (Fig. 13).

Pereopods comparatively stout and short. Right 2nd pereopod slightly longer than left, with more carpal articulations; chela very small. Third pereopod with dactylus oval and about 1/3 as long as propodus. Fourth pereopod with dactylus simple, about 2/3 as long as propodus. Fifth pereopod with dactylus simple, about half as long as propodus.

Remarks. During the recent two decades, the genus *Glyphocrangon* was studied in detail by HOLTHUIS (1971) based on the specimens from the East and West Atlantic collected by the R. Vs. *Gerda* and *John Elliott Pillsbury* of the University of Miami, and also by CHACE (1984) who reported on the specimens collected by the *Albatross* Philippine Expedition, 1907–1910. Due to these two important contributions altogether 38 species, 11 Atlantic, 26 Indo-Pacific, and one Pacific and West Atlantic, are systematically established, with a key for their identification. Since then, three additional species were described by KENSLEY *et al.* (1987) from Australian waters, and one species from the Atlantic by BURUKOVSKY (1990).

Although in the key prepared by CHACE (*op. cit.*) the new species is keyed out to the nearest kin of *G. granulosis* BATE and *G. prionotota* WOOD-MASON, its general appearance is rather close to those of *G. megalophthalma* DE MAN, *G. pugnax* DE MAN and *G. stenolepis* CHACE in having the naked and uneven carapace and the anterior fourth carina divided into two and not expanded laterally. However, the new species is readily distinguished from all the known species by the shape of rostrum which is very thick and rather convex dorsally at its median part and strongly curved downwards at its distal third and upwards distally.

Etymology. The name is derived from the R. V. *Hakuho-Maru.*

Distribution. Only known from the type locality in the Flores Sea, at a depth of 280 m.

Glyphocrangon hastacauda BATE, 1888

Glyphocrangon hastacauda BATE, 1888, p. 519, pl. 93 (5); DE MAN, 1920, p. 224; CHACE, 1984, p. 13; HAYASHI, 1986, pp. 147, 278, fig. 98.

Material. Stn. B-1, 2 ovig. ♀♀ (cl 25.0 and 27.0 mm) (NSMT-Cr 2282).

Remarks. The specimens at hand were compared with the specimens from Suruga Bay on the Pacific coast of central Japan. The basic pattern of sculpture and armature of the carapace and abdomen are not much different from each other, but in the specimens from Japaneses waters the antennal spine is apparently more divergent than the branchiostegal spine, and the dorsal median carinae of the abdominal somites are sharply developed. CHACE (1984) who worked on the Philippine and Indonesian specimens also mentioned some differences. The specimens were referred to this species with hesitation, as they seem to differentiate to some extent at least for the subspe-

cific level.

Distribution. *Glyphocrangon hastacauda* is known from Japan, the Philippines, Indonesia, and the Bay of Bengal off Sri Lanka, 630–1114 m deep.

Glyphocrangon investigatoris WOOD-MASON, 1891

Glyphocrangon investigatoris WOOD-MASON, in WOOD-MASON & ALCOCK, 1891, p. 191; –1894, pl. 6 (3); ALCOCK, 1901, p. 127; CALMAN, 1939, p. 216; CHACE, 1984, p. 14.
Glyphocrangon investigatoris var. *andamanensis* WOOD-MASON & ALCOCK, 1981, p. 356; –1984, pl. 6 (2).

Material. Stn. B–1, 1 ovig. ♀ (cl 30.5 mm) (NSMT–Cr 4245).

Remarks. This species is most characteristic in having the broken lines of sharply defined, truncated tubercles on the intercarinal glabrous spaces of the carapace. The rostrum is as long as the anterior part of the carapace in front of the cervical groove, being armed with two pairs of lateral teeth, the former directed obliquely outwards and the latter obliquely upwards. The main carinae on the carapace are as noted below; submedian (1st) carina broken into six (anterior part) and four (posterior part); intermediate (2nd) carina into three (anterior part) and four (posterior part); antennal (3rd) carina not developed on hepatic region and indistinctly subdivided into two at submedian part of posterior part, anterior end of posterior part being unarmed and posterior end of posterior being followed by a small tubercle; anterior part of lateral (4th) carina expanded into prominent, undivided lamina directed obliquely outwards beyond level of bottom of orbit, being discontinuous with branchiostegal spine; posterior part of lateral (4th) carina subdivided very indistinctly into some lobes followed by three defined at posterior end. The antennal spine is slightly shorter than the branchiostegal spine and subparallel with the longitudinal axis of the carapace as well as with the branchiostegal spine in dorsal view, but directed obliquely upwards against the horizontal branchiostegal spine in lateral view.

KENSLEY *et al.* (1987) compared three new species from Australia with *Glyphocrangon regalis* BATE and this species based on several features such as the presence or absence of pubescence and the nature of tubercles and carinae on the carapace, the shape of the rostrum, and the dorsal profile of the sixth abdominal somite. The details are referred to the Table 7 prepared by them.

Distribution. Arabian Gulf, Bay of Bengal, Andaman Sea, Indonesia and the Philippines, 258–1087 m deep.

Family Crangonidae

Genus *Metacrangon* ZARENKOV, 1965

Metacrangon sp.

Material. Stn. B–2, 1 ♂ (cl 9.0 mm) (NSMT–Cr 2283).

Remarks. The specimen at hand belongs to the typical *Metacrangon* species and is seemingly very close to *M. munita* (DANA) from the northeast Pacific. There may

be some minor, but consistent differences in the armature and shape of the carapace and appendages to warrant it for the sole representative of the new species.

Genus ***Philoceras*** STEBBING, 1900

Philoceras kempii (DE MAN, 1918)

Pontophilus Kempii DE MAN, 1918, p. 165; -1920, p. 283, pl. 23 (68).
Philoceras kempii: CHACE, 1984, p. 40.

Material. Stn. A-1, 1 ovig. ♀ (cl 5.5 mm) (NSMT-Cr 4240).

Remarks. The detailed description of the original author was summarized by CHACE (1984) who resurrected the genus *Philoceras* as distinct from *Pontophilus* based chiefly on the characters such as the absence of lateral teeth on the basal half of the rostrum, the absence of a longitudinal suture extending from the orbital margin to the branchial region, and the absence of an exopod on the first pereopod. This species is at present known as one of six representatives of *Philoceras*.

Distribution. Hitherto known only from the type locality in the Flores Sea, 300–400 m deep.

Genus ***Pontophilus*** LEACH, 1817

Pontophilus gracilis junceus BATE, 1888

Pontophilus junceus BATE, 1888, p. 492, pl. 88 (2–4).
Pontophilus occidentalis var. *indica* DE MAN, 1918, p. 161; - 1920, p. 264, pls. 20 (63 a), 21 (63); KENSLEY, 1968, p. 319, figs. 18, 19.
Pontophilus gracilis junceus: CHACE, 1984, p. 52, figs. 20–22, 23 (d–f).

Material. Stn. B-2, 2 ♀♀ (cl 7.5 and 8.0 mm) (NSMT-Cr 4238); Stn. C, 3 juvs. (cl 3.1–3.5 mm) (NSMT-Cr 4334).

Remarks. Six subspecies including the nominate one are distinguished in *Pontophilus gracilis* SMITH by CHACE (1984) who elaborately figured *P. g. abyssi* and *P. g. junceus* collected from Indonesian and Philippine seas by the *Albatross* in 1909. This subspecies from the Indo-West Pacific and the nominate subspecies from the Atlantic differ from the others in having only two teeth in the dorsal midline of carapace. According to him, this subspecies can usually be distinguished by a proportionately shorter rostrum, the presence of an inconspicuous spine above the orbital cleft, and usually somewhat smaller eyes.

Distribution. Reliably known from Indonesia and the Philippines, 386–1280 m deep, and also from South African waters, 2525–3440 m deep.

Genus ***Sabinea*** ROSS, 1835

Sabinea indica DE MAN, 1918

Sabinea indica DE MAN, 1918, p. 304; 1920, p. 303, pl. 25 (75); CHACE, 1984, p. 59.

Material. Stn. A–1, 1 ♀ (cl 9.5 mm), infested by a bopyrid (NSMT–Cr 4241).

Remarks. The genus *Sabinea* is composed of this Indo-West Pacific and four Atlantic species, being distinguished from the related genera by having the simple and very short second pereopod. The rostrum is not reaching as far as the distal end of the antennular peduncle, with a pair of lateral spines. The carapace is armed with only two teeth on the median dorsal carina and two spines on the lower lateral carina, in addition to the usual antennal and pterygostomial spines.

Distribution. Flores Sea and west of Halmahera, Indonesia, 400–545 m deep; west and southwest of Jolo Island, Sulu Archipelago, the Phillippines, 444–472 m deep.

Genus ***Prionocrangon*** WOOD-MASON et ALCOCK, 1891

Prionocrangon ommatosteres WOOD-MASON et ALCOCK, 1891

Prionocrangon ommatosteres WOOD-MASON & ALCOCK, 1891, p. 362; ALCOCK & ANDERSON, 1895, pl. 9 (4); ALCOCK, 1901, p. 123; DE MAN, 1920, p. 308, pl. 25 (76); CHACE, 1984, p. 58.

Material. Stn. B–2, 1 ex. (damaged) (NSMT–Cr 4242).

Remarks. In the specimen at hand, unfortunately, the abdomen and the posterior half of the carapace are missing. However, the triangular rostrum and eyestalks agree well with the previous description and figures of *Prionocrangon ommatosteres*, one of four species in the genus characterized by having the degenerate eyestalk without cornea.

Distribution. Bay of Bengal and Indonesia, 366–1301 m deep.

PALINULA

Family Polycheridae

Genus ***Stereomastis*** BATE, 1888

Stereomastis andamanensis (ALCOCK, 1894)

Pentacheles andamanensis ALCOCK, 1894, p. 239.
Polycheles andamanensis: ALCOCK, 1901, p. 159; ALCOCK & ANDERSON, 1901, pl. 10 (3).
Stereomastis andamanensis: DE MAN, 1916, p. 16, pl. 1 (2).

Material. Stn. C, 1 ♂ (cl in median line 30.0 mm) (NSMT–Cr 4243).

Remarks. This species is fully described, on comparison with *Stereomastis phosphorus* (ALCOCK), by DE MAN (1916) who indicated the unexpected resemblance to *S. nana* (S. I. SMITH). The dorsal surface of carapace is wholly covered with fine hairs, and the disposition of spines on the dorsal surface and lateral borders of carapace is as figured by DE MAN (*op cit.*). The carinae of the first five abdominal somites are culminate each in an acute antrorse spine in lateral view; the first spine is small and obliquely directed upwards, while the second spine is as large as the first and projected horizontally forwards; the third and fourth spines are of the same size and nearly twice as long as the second; the fifth is similar to, but slightly smaller than the precedings;

the sixth segment is provided with double carinae which are armed each with six to eight denticles and united posteriorly.

This species is readily distinguished, as remarked by DE MAN (*op. cit.*) from *S. nana* by the features that the antero-inner angle of the orbital notch is armed with a sharp spine, and the sublateral ridge on each branchial region is armed usually with seven or eight spines instead of five.

Distribution. Off Travancore coast, about 1900 m deep, and Indonesian waters (Makassar Strait, Flores Sea and Halmahera), 472–2000 m deep.

Stereomastis trispinosa (DE MAN, 1905)

Pentacheles trispinosa DE MAN, 1905, p. 587.
Stereomastis trispinosa: DE MAN, 1916, p. 10, pl. 1 (1).

Material. Stn. B-1, 1 ♂ (cl in median line 37.0 mm) (NSMT-Cr 4244).

Remarks. This species is described in detail by the original author, on the comparison with the close congeners, *Stereomastis phosphorus* (ALCOCK) and *S. andamanensis* (ALCOCK). The disposition of spines on the dorsal surface and lateral borders of carapace is as shown in the figure given by DE MAN (1916). This species is also characteristic in the armature of dorsal median carinae of the abdominal somites, differing from them, as already noted by the original author, by the obtuse and rounded median carina of the fourth somite. The carinae of the first three somites are culminate each in an acute, overhanging antrorse spine: the spine of the third somite is much larger than those of the first and second somites; the carina of the fifth somite is low and not sharp in both ends in lateral view; the carina of the sixth somite is double, both being armed with four denticles and united posteriorly.

Distribution. Previously known only from the Flores Sea, 538–915 m deep.

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