

Caridean and stenopodidean shrimps from the East China and the Yellow Seas (Crustacea, Decapoda, Natantia)

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Caridean and stenopodidean shrimps from the East China
and the Yellow Seas (Crustacea, Decapoda, Natantia)¹⁾

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The research project of the biological resources of the East China and the Yellow Seas was carried out from 1957 to 1967 by the Seikai Regional Fisheries Research Laboratory, Nagasaki. Nektonic and benthonic invertebrates were fished up there by the research vessels, "Toko Maru" and "Yoko Maru", operating trawl nets and the Yamashita-Deguchi-Type dredge at more than a thousand sampling stations settled throughout the seas. From the animals thus collected a generous quantity of decapod crustaceans including caridean and stenopodidean shrimps was sorted out and presented for study to our laboratory through the courtesy of Mr. Hideo Yamashita. In this collection are included the shrimps of nine families belonging to the section Caridea, Stylodactylidae, Pasiphaeidae, Palaemonidae, Alpheidae, Ogyridae, Hippolytidae, Processidae, Pandalidae and Crangonidae, and the section Stenopodidea, Stenopodidae. Of the above-mentioned families, Stylodactylidae was already treated in Hayashi and Miyake's (1968) report. And also Alpheidae and Hippolytidae are not included herein for the other authors' forthcoming publications.

In this communication the authors intend to clarify the caridean and stenopodidean fauna of the East China and the Yellow Seas, making up a rather meagre knowledge restricted to the continental coastal species. Although the economically important species have so far had the chance to be reported by such authors as Miers (1879), Urita (1926), Yu (1930, 1936), Yoshida (1941) and Liu (1955), the less important or offshore species have hardly been known. Of the twenty-three species here treated *Leptochela aculeocaudata* Paulson, *L. gracilis* Stimpson, *Palaemon (Palaemon) gravieri* (Yu), *Ogyrides orientalis* (Stimpson) and *Crangon (Crangon) affinis* de Haan have already been well known from this region, and also the most ones inclusive of the above species are

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rather common in Japanese waters except the three species, *Chlorotocus crassicornis* (Costa), *Pontophilus incisus* Kemp and *Pontocaris sibogae* (de Man). And there proved to occur two undescribed species of Palaemonidae, *Palaemon* (*Palaemon*) *yamashitai* sp. nov. and *Periclimenes* (*Harpilius*) *macrophthalmus* sp. nov., and one of Crangonidae, *Metacrangon sinensis* sp. nov.

This paper gives the descriptions of the new species and some discussions on the taxonomic interests in each species. In the last of this paper the geographical distributions of twelve species are discussed with the figures indicating their localities.

The specimens examined have been deposited in the collections of the Zoological Laboratory of Kyushu University. The following is the list of the species dealt with in the present paper.

Section Caridea

Family Pasiphaeidae

Leptochela aculeocaudata Paulson, 1875

Leptochela gracilis Stimpson, 1860

Leptochela japonica Hayashi and Miyake, 1969

Family Palaemonidae

Subfamily Palaemoninae

Palaemon (*Palaemon*) *gravieri* (Yu, 1930)

Palaemon (*Palaemon*) *yamashitai* sp. nov.

Subfamily Pontoniinae

Periclimenes (*Periclimenes*) *hertwigi* Balss, 1913

Periclimenes (*Harpilius*) *macrophthalmus* sp. nov.

Family Ogyridae

Ogyrides orientalis (Stimpson, 1860)

Family Processidae

Processa processa (Bate, 1888)

Family Pandalidae

Plesionika binocularis (Bate, 1888)

Plesionika ortmanni Doflein, 1902

Chlorotocus crassicornis (Costa, 1871)

Chlorotocella gracilis Balss, 1914

Family Crangonidae

Crangon (*Crangon*) *affinis* de Haan, 1849

Crangon (*Neocrangon*) *sagamiensis* Balss, 1913

Metacrangon sinensis sp. nov.

Pontophilus bidentatus (de Haan, 1844)

Pontophilus incisus Kemp, 1916

Pontophilus japonicus Doflein, 1902

Pontophilus sp.

Pontocaris habereri Doflein, 1902
Pontocaris sibogae (de Man, 1918)
 Section Stenopodidea
 Family Stenopodidae
Spongicola venusta de Haan, 1844

Description of species

Family Pasiphaeidae

Leptochela aculeocaudata Paulson, 1875

Leptochela aculeocaudata Paulson, 1875, p. 100, pl. 16, fig. 1-1s [1961, p. 106, pl. 16, fig. 1-1s] -Red Sea; Nobili, 1906, p. 28, fig. 4a-c -Red Sea; Kemp, 1915, p. 311, figs. 34, 35, pl. 13, fig. 14 -Chilka Lake, Mergui Arch., Andaman Is. and Gulf of Manaar; Kemp, 1925, p. 254 -Bombay, Madras Pres., Andaman Is., Mergui Arch., Nicobar Is. and Orissa coast; Kubo, 1955, p. 103, fig. 6 -Japan: Tokyo Bay.

Leptochela hainanensis Yu, 1936, p. 87, figs. 1-3 -China: Hainan I.

Leptochela aculeocaudata hainanensis: Armstrong, 1941, p. 1 -Samoa Is.

Material examined.

- 25°58.0' N, 122°32.0' E, 103 m, June 7, 1962, Time uncertain -1 ovig. ♀, ZLKU No. 16545.
 30°01.0' N, 124°04.0' E, 55 m, June 15, 1962, 20: 06 -1 ovig. ♀, ZLKU No. 16546.
 30°00.0' N, 125°29.5' E, 57 m, June 17, 1962, 01: 11 -3 ovig. ♀♀, ZLKU No. 15740.
 Definite locality unknown, July 1, 1962, Time uncertain -1 ovig. ♀ ZLKU No. 15743.
 31°00.0' N, 124°21.5' E, 45 m, July 3, 1962, 03: 17 -1 ♀, ZLKU No. 15744.
 31°12.4' N, 123°37.8' E, 47 m, July 4, 1962, 13: 32 -1 ovig. ♀, ZLKU No. 15745.
 31°30.0' N, 127°13.8' E, 107 m, July 8, 1962, 19: 25 -1 ovig. ♀, ZLKU No. 15746.
 35°47.5' N, 123°51.8' E, 74 m, Mar. 22, 1963, 16: 41 -1 ♂, ZLKU No. 15747.
 35°00.0' N, 121°03.0' E, 45 m, Mar. 23, 1963, 10: 05 -8 ♂♂, 10 ♀♀, ZLKU No. 15748.
 28°45.0' N, 126°14.9' E, 100 m, June 14, 1963, 05: 37 -1 ♂, ZLKU No. 15766.
 31°30.1' N, 124°00.2' E, 39 m, June 24, 1963, 07: 59 -18 ♂♂, 5 ovig. ♀♀, 17 ♀♀, ZLKU No. 15767.
 31°31.0' N, 123°59.5' E, 41 m, July 20, 1963, 12: 53 -1 ♀, ZLKU No. 15807.
 37°30.0' N, 123°46.2' E, 70 m, Mar. 9, 1964, 05: 15 -1 ♂, 3 ♀♀, ZLKU No. 15808.
 36°29.8' N, 122°45.7' E, 28 m, Mar. 10, 1964, 06: 23 -1 ♂, ZLKU No. 15812.
 34°45.0' N, 123°30.0' E, 78 m Mar. 17, 1964, 01: 07 -1 ♂, ZLKU No. 15813.
 31°30.0' N, 127°00.0' E, 106 m, Mar. 18, 1964, 22: 22 -1 ♂, ZLKU No. 15814.
 31°30.0' N, 124°15.8' E, 43 m, June 15, 1964, 09: 28 -1 ♂, 1 ♀, ZLKU No. 15815.
 34°29.5' N, 122°55.5' E, 69 m, Nov. 27, 1964, 13: 27 -14 ♂♂, 17 ♀♀, ZLKU No. 15817.
 35°00.0' N, 121°00.0' E, 35 m, Nov. 28, 1964, 01: 55 -2 ♀♀, ZLKU No. 15848.
 35°02.2' N, 121°30.0' E, 34 m, Nov. 28, 1964, Time uncertain -2 ♂♂, ZLKU No. 15850.
 37°30.0' N, 125°45.0' E, 73 m, Jan. 29, 1965, 12: 50 -5 ♂♂, 5 ♀♀, ZLKU No. 15852.
 37°01.4' N, 123°01.6' E, 29 m, Jan. 30, 1965, 00: 45 -1 ♂, ZLKU No. 15862.
 35°29.7' N, 121°47.0' E, 40 m, Jan. 31, 1965, 14: 20 -1 ♂, 3 ♀♀, ZLKU No. 15863.

- 35°00.0' N, 121°15.0' E, 38 m, Feb. 5, 1965, 00: 19 -1 ♀, ZLKU No. 15867.
 Definite locality unknown (I), 0 m, July 20, 1965, Time uncertain -127 ♂♂, 247 ♀♀, ZLKU No. 15868
 Definite locality unknown (II), 0 m, July 20, 1965, Time uncertain -1 ♂, 6 ♀♀, ZLKU No. 16242.
 Definite locality unknown, 0 m, July 24, 1965, Time uncertain -4 ♀♀, 4 juvs., ZLKU No. 16249.
 Definite locality unknown (I), 0 m, July 25, 1965, Time uncertain -2 ♂♂, 5 ♀♀, ZLKU No. 16257.
 Definite locality unknown (II), 0 m, July 25, 1965, Time uncertain -1 ♀, ZLKU No. 16264.
 37°21.2' N, 123°08.5' E, 66 m, Feb. 2, 1966, 07: 34 -3 ♂♂, 7 ♀♀, ZLKU No. 16265.
 37°30.0' N, 124°00.0' E, 70 m, Feb. 2, 1966, 02: 30 -1 ♀, ZLKU No. 16275.
 37°33.7' N, 123°34.7' E, 70 m, Feb. 2, 1966, 04: 57 -1 ♂, 2 ♀♀, ZLKU No. 16276.
 Definite locality unknown, 0-50 m, Mar. 7, 1966, Time uncertain -8 ♂♂, 7 ♀♀, ZLKU No. 16279.
 37°27.7' N, 124°27.6' E, 75 m, Nov. 7, 1966, 18: 40 -1 ♂, 1 ♀, ZLKU No. 16294.
 37°30.0' N, 124°00.0' E, 70 m, Nov. 7, 1966, 22: 16 -2 ♂♂, 1 ♀, ZLKU No. 16296.
 37°30.0' N, 124°15.0' E, 72 m, Nov. 7, 1966, 20: 25 -1 ♂, 1 ♀, ZLKU No. 16299.
 37°44.7' N, 123°59.8' E, 67 m, Nov. 7, 1966, 13: 30 -1 ♂, 2 ♀♀, ZLKU No. 16301.
 37°45.0' N, 123°30.0' E, 68 m, Nov. 7, 1966, 10: 16 -1 ♂, 9 ♀♀, ZLKU No. 16304.
 37°45.0' N, 123°45.0' E, 67 m, Nov. 7, 1966, 12: 06 -1 ♂, 7 ♀♀, ZLKU No. 16314.
 37°14.5' N, 123°15.0' E, 70 m, Nov. 8, 1966, 06: 50 -1 ♂, 1 ♀, ZLKU No. 16316.
 37°15.0' N, 124°30.8' E, 70 m, Nov. 8, 1966, 15: 00 -1 ♂, ZLKU No. 16318.
 37°15.3' N, 125°00.0' E, 65 m, Nov. 8, 1966, 18: 31 -1 ♂, 7 ♀♀, ZLKU No. 16319.
 37°15.8' N, 124°15.9' E, 73 m, Nov. 8, 1966, 13: 36 -2 ♀♀, ZLKU No. 16327.
 36°58.8' N, 123°15.0' E, 67 m, Nov. 9, 1966, 12: 05 -1 ♀, ZLKU No. 16329.
 37°00.0' N, 125°00.0' E, 59 m, Nov. 9, 1966, 00: 43 -1 ♂, 1 ♀, ZLKU No. 16330.
 36°29.6' N, 124°59.4' E, 64 m, Nov. 10, 1966, 00: 08 -7 ♀♀, No. 16332.
 36°00.7' N, 125°29.9' E, 60 m, Nov. 12, 1966, 00: 08 -1 ♂, 3 ♀♀, ZLKU No. 16339.
 26°05.0' N, 122°55.0' E, 110-111 m, Dec. 9, 1967, Time uncertain -18 ♀♀, 12 ovig. ♀♀, 35 ♀♀, ZLKU No. 16343.

Remarks. A good deal of specimens of this species has been amassed in the present collection. The present specimens are in close agreement with Paulson's (1875) and Kemp's (1915, 1925) extensive descriptions. Yu in 1936 published the report on the macrurous crustaceans taken from Hainan Island, southwestern China, and made there an erection of the closely allied species, *Leptochela hainanensis*, to the present species. And Yu gave three points by which *L. hainanensis* is distinguished from *L. aculeocaudata*, namely, the shape of the antennal scale, the feature of the fifth pereopod, and the length of the spines on the telson. Subsequently Armstrong (1941) placed *L. hainanensis* under the subspecific level of *L. aculeocaudata*, recognizing the presence of a considerable variation in all the distinguishing characters, and making a comparison among *L. aculeocaudata* s. s., *L. aculeocaudata hainanensis* and *L. pugnax* de Man. The last species, *L. pugnax*, seems to

be easily separated from the former two by having the antennal spine. These regards pointed out by Armstrong, however, appear to be rather tenuous for separating the former two from each other because that these characters are too variable, and that the two forms are to a not inconsiderable extent overlapped each other as to these characters. The shorter exopod of the fifth pereopod than in Kemp's (1915) figure, which was given by Yu (1936) as one of the diagnostic characters, was not recognized by Armstrong as being serviceable for the distinguishing character by the reason that, "the obliquity of the basoischium is such that the exopod may appear to be near the middle of the ischium when seen from one angle and scarcely to exceed the articulation when viewed from another."

The present specimens, as mentioned above, show a not negligible morphological fluctuation as follows:

1. The rostrum almost reaches the end of the cornea or extends beyond it.
2. The carapace is distinctly tri-carinated only in the ovigerous female, but entire in both the male and the non-ovigerous female.
3. The antennal scale is from about three to four times as long as its maximum breadth. None of the specimens such as the typical form of *L. hainanensis* are present, in which the outer lateral margin of the antennal scale is almost straight without concavity behind the middle.
4. The antennular peduncle is from reaching a little beyond the middle of the antennal scale to distinctly surpassing the end.
5. In the second pereopods the fingers are measured 1.4 to 1.7 times the length of the palm but never known more than twice.
6. Of five pairs of the terminal spines of the telson the outermost pair falls short of the end of the third pair, ranging from extending to the middle of the third pair to reaching as far as more than the distal third.

These facts seem exceed the possible range of variations in the external features of each form defined by Yu and Armstrong, resulting in the obscurity of the taxonomic categories of these species. In fact, only the character by which the two might be separated from each other consists in the proportional length of the fingers of the second pereopod to the palm: in *L. aculeocaudata* the fingers are decidedly less than twice, while 2.2 to 2.3 times in *L. hainanensis*. Should be taken fully this difference into consideration, the overlapped range of the variations in the other characters appeared in the present specimens as well as in the previous authors' examination is enough to lead the authors to regard the closely allied form, *L. hainanensis* as a synonym of *L. aculeocaudata*.

Distribution. This species is widely distributed in the shallow waters of the Indo-West Pacific region from the Red Sea, Indian coast, and the Andaman Islands eastwards to Japan, China and the Samoa Islands.

Leptochela gracilis Stimpson, 1860

Leptochela gracilis Stimpson, 1860, p. 111 -Japan: Kagoshima; Bate, 1888, p. 860, pl. 139, fig. 2 -Japan: Osaka Bay; Balss, 1914, p. 19 -Korea: Tschemulpho; Kemp, 1929, p. 251 -China: Amoy and Fukien, and Japan: Misaki; Urita, 1926, p. 424 -China: Tsingtao; Yokoya, 1933, p. 13 -Japan: Pacific coast from Todo-saki to Inubosaki, and Japan Sea coast from Toyama Bay to Goto Is.; Yu, 1936, p. 86 -China: Hainan I.; Yokoya, 1939, p. 263 -Japan: Miyagi Pref.; Yoshida, 1941, p. 21, pl. 4, fig. 4 -several localities of Korea; Kubo, 1955, p. 99, figs. 1-3 -Japan: Pacific coast from Fukushima Pref. to Lake Hamana, Inland Sea of Japan, and Japan Sea coast from Wakasa Bay to Fukuoka Pref., and China: Shanghai; Liu, 1955, p. 23, pl. 8, figs. 6-14 -several localities of Chinese coast.

Material examined.

31°30.5' N, 124°44.0' E, 43 m, Oct. 11, 1962, Time, 01: 23 -1 ♀, ZLKU No. 16408.
32°16.5' N, 122°31.0' E, 32 m, Oct. 11, 1962, 21: 52 -3 ovig. ♀♀, ZLKU No. 16409.
32°14.4' N, 123°54.0' E, 35 m, Oct. 13, 1962, 19: 14 -1 ♂, 1 ♀, ZLKU No. 16412.
34°58.5' N, 121°04.0' E, 42 m, Oct. 16, 1962, 15: 05 -1 ♂, ZLKU No. 16414.
32°30.2' N, 123°02.0' E, 34 m, Mar. 16, 1963, 17: 04 -1 ♂, 1 ♀, ZLKU No. 16415.
31°59.1' N, 123°55.1' E, 39 m, Mar. 16, 1963, 11: 10 -1 ♂, ZLKU No. 16417.
34°29.5' N, 122°55.5' E, 69 m, Nov. 27, 1964, Time uncertain -13 ♂♂, 7 ♀♀, ZLKU No. 16418.
35°00.0' N, 121°00.0' E, 35 m, Nov. 28, 1964, 01: 55 -2 ♂♂, ZLKU No. 16438.
35°00.0' N, 121°15.0' E, 35 m, Nov. 28, 1964 -1 ♂, ZLKU No. 16439.
35°02.2' N, 121°30.0' E, 34 m, Nov. 28, 1964, 05: 40 -4 ♂♂, ZLKU No. 16443.
Definite locality unknown, 0-50 m, Mar. 7, 1966, Time uncertain -1 ♀, ZLKU No. 16447.
37°15.3' N, 125°00.0' E, 65 m, Sept. 8, 1966, 18: 31 -1 ♀, ZLKU No. 16448.
37°00.0' N, 125°00.0' E, 59 m, Sept. 9, 1966, 00: 43 -1 ♂, ZLKU No. 16449.
36°00.7' N, 125°29.9' E, 60 m, Sept. 12, 1966, 00: 08 -2 ♂♂, 2 ♀♀, ZLKU No. 16450.

Distribution. Commonly known in Japan, Korea and Chinese coast, and bathymetrically down to the depth of 194 m.

Leptochela japonica Hayashi and Miyake, 1969

Leptochela japonica Hayashi and Miyake, 1969, p. 1, figs. 1-3 -Japan: Chijiwa Bay and Genkai-nada, western Kyusu.

Material examined.

26°05.0' N, 122°55.0' E, 100 -111 m, Dec. 9, 1967, Time uncertain -1 ♀ (9.5 mm in body length), ZLKU No. 16543.

Remarks. This species may readily be distinguished from the two preceding ones by bearing three triangular, carinal processes of diagnostic form on the dorsal surface of the fifth abdominal somite. A single specimen was picked out from the collection of *Leptochela aculeocaudata*.

Distribution. Only recorded from western Kyushu, Japan, vertically ranging from the surface to the depth of 66 m.

Family Palaemonidae

Subfamily Palaemoninae

Palaemon (Palaemon) gravieri (Yu, 1930)

Leander gravieri Yu, 1930, p. 564, fig. 3 -China: Tientsin and Tangku; Kubo, 1942, p. 48, figs. 19 E, P, 20 E, 21 E, 22 E, 23 E, L, 24 E, P, 25 E, E', 26 E, R, 27 E, O, 28 D, M, 29 E, 30 -western coast of Korea.

Leander macrodactylus: Yoshida, 1941, p. 26, pl. 6, fig. 4 (non *Palaemon macrodactylus* Rathbun) -Korea.

Palaemon (Palaemon) gravieri: Holthuis, 1950, p. 82 -no new locality; Liu, 1955, p. 52, pl. 18, fig. 2 -several localities of China.

Material examined.

31°30.5' N, 124°44.0' E, 43 m, Oct. 11, 1962, Time, 01: 23 -1♂ (8.5 mm in carapace length), ZLKU No. 14227.

32°14.4' N, 123°54.0' E, 35 m, Oct. 13, 1962, 19: 14 -3♀♀ (4.7-5.1 mm), ZLKU No. 14228.

33°14.3' N, 122°16.9' E, 26 m, July 21, 1963, Time uncertain -1♀ (6.0 mm), ZLKU No. 14231.

Remarks. Holthuis (1950) noted that, "It is possible that *P. ortmanni* and *P. gravieri* only form two extremes of a variable species; this, however, only can be proved by more material.", paying only attention to the rostral form and the number of its teeth in both the species. Really the general body form of the both is well similar to each other. However, it seems not uneasy to distinguish them from each other in the following rather marked points:

1. *P. ortmanni* in general is larger than *P. gravieri*.
2. The rostrum in *P. gravieri* is nearly straight and comparatively high in the middle, whereas that in *P. ortmanni* is more curved upwards and much narrower.
3. The dactyli of the last three pereopods in *P. gravieri* are distinctly larger and much more slender in the proportional length than those in *P. ortmanni*.

This species appears to be more allied to *P. macrodactylus* Rathbun

rather than to *P. ortmanni*, but is separable from the former by the much longer rostrum, and by the more slender last three pereopods as well as by the possession of equidistant setae on the posterior margin of each propodus of the last three pereopods as already mentioned by Kubo (1942).

The present material runs in the original description given by Yu (1930). The movable finger of the second pereopod in the present material, however, is perceptibly longer than the palm instead of that in the original description being shorter than the palm. The dactylus of the fifth pereopod in the original description seems more stouter and shorter than in the present material.

Distribution. Only known from Korea and China.

Palaemon (Palaemon) yamashitai sp. nov.

(Figs. 1, 2)

Material examined.

33°14.3' N, 122°16.9' E, 26 m, July 21, 1963, Time, 07: 09 -1 ♀ (holotype) ZLKU No. 14232; 1 ♀ (paratype), 1 sp., ZLKU No. 14233.
31°30.1' N, 124°00.2' E, 39 m, June 24, 1963, 07: 59 -1 ♂, 1 ♀, (paratypes) ZLKU No. 16454.

Description of holotype. The body is of small size. The rostrum is directed slightly downward, the tip broken off reaching beyond the end of the antennular peduncle. Both the upper and the lower borders are convex. Fourteen and four teeth are present on the upper and on the lower borders, respectively, except for the ones would probably be placed on the final broken part. All of the upper teeth are of equal size and situated equidistantly but the first tooth which is more separated from the second than the second is from the third; the first two teeth are on the carapace. The lower teeth are also equal in size and much more spaced than the upper teeth, the first tooth being in the middle of the rostrum. There are fine setae between the teeth on both the borders. A lateral carina is obscurely visible.

The carapace is entirely smooth but an ill-defined branchiostegal groove which looks a fine streak. The inferior orbital margin is broadly produced forward to form an obtuse, triangular projection. The antennal spine is much stronger than the branchiostegal one.

The abdominal somites are all smooth without grooves and carinae. The pleura of the first four somites are broadly rounded, while that of the fifth assumes a form of the bluntly protruded angle in the posteroventral corner. The sixth somite is elongated, one and a half the length of the fifth somite, and a trifle shorter than the telson.

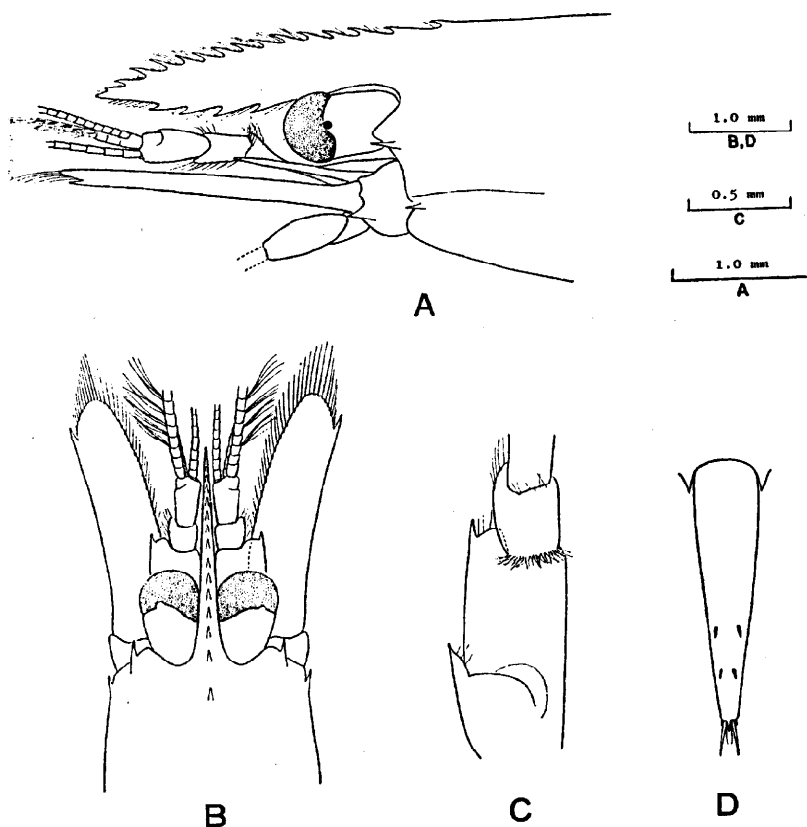


Fig. 1. *Palaemon (Palaemon) yamashitai* sp. nov., paratype, female. A, anterior part of body in lateral view; B, anterior part of body in dorsal view; C, antennular peduncle; D, telson.

The telson is elongate and slender with the strongly projected, stout process terminally, more than four times as long as the maximum breadth. The dorsal surface is convex with two pairs of small spines; the anterior pair is somewhat behind the middle and the posterior pair halfway between the anterior pair and the posterior end of the telson. On the posterior margin there situated are two pairs of spines and medially a pair of long plumose setae; the outer pair of the spines is very small, while the inner much longer and stouter than the outer.

The eye is short and broad. The cornea is globular and fused with the small ocellus. The stalk is somewhat longer than the cornea, gradually narrowing proximally.

The basal segment of the antennular peduncle is broad, the outer

lateral margin being nearly straight and ending in a stout spine extending to the level of the middle of the second segment; the anterolateral corner is expanded forward into a short, round lobe which fails to reach the end of the lateral spine. The stylocerite is rather short and falls short of the middle of the basal segment; sharply pointed terminally and broad proximally. The length of the distal two segments together is somewhat less than the basal segment alone; the second segment is distinctly broader and shorter than the third of subcylindrical form. The upper flagellum is fused for four basal joints, each articulation of which is very obscure; the inner free portion is short, more than twice as long as the basal fused portion.

The basicerite of the antennal peduncle is laterally provided with a small, but distinct spine. The carpocerite is depressed and broad, not reaching the middle point of the antennal scale. The antennal scale is elongated and four and a half as long as broad, far overreaching the end of the rostrum; the outer lateral margin is slightly concave, terminating in a stout tooth which is exceeded by the lamella, the anterior margin of which is greatly expanded forward.

The oral parts are typical of the genus. The incisor process of the mandible is broad, with four and three teeth on the left and on the right sides, respectively; the palps on both the sides are slender and three jointed; the molar process is strong with some knobs and two small groups of brush-like arranged setae. The endite of the first maxilliped is bilobed, the upper broader and the lower smaller; the palp is well developed and slender; the exopod is large and with the elongated caridean lobe; the epipod is divided by the deep notch into the upper larger and the lower smaller parts. The third maxilliped is slender, reaching the end of the second segment of the antennular peduncle; the ultimate segment is two-thirds the length of the penultimate; the antepenultimate segment is stouter than the distal segments, one and a half the length of the penultimate.

The first pereopod is slender, exceeding the end of the antennular peduncle by the length of the chela when expanded. The fingers are narrow with the tips slightly curved, a little longer than the palmar portion; some tufts of setae are grown on the surface. The palmar portion is about twice as long as broad. The carpus is subcylindrical and slightly longer than the chela. The merus is more or less longer than the carpus.

The second right pereopod is missing. The left pereopod reaches the end of the antennal scale by the length of the chela and half the length of the carpus together. The fingers are uniformly slender and straight with the tips crooked and pointed; the cutting edges are entire and straight without teeth or serration; several tufts of setae

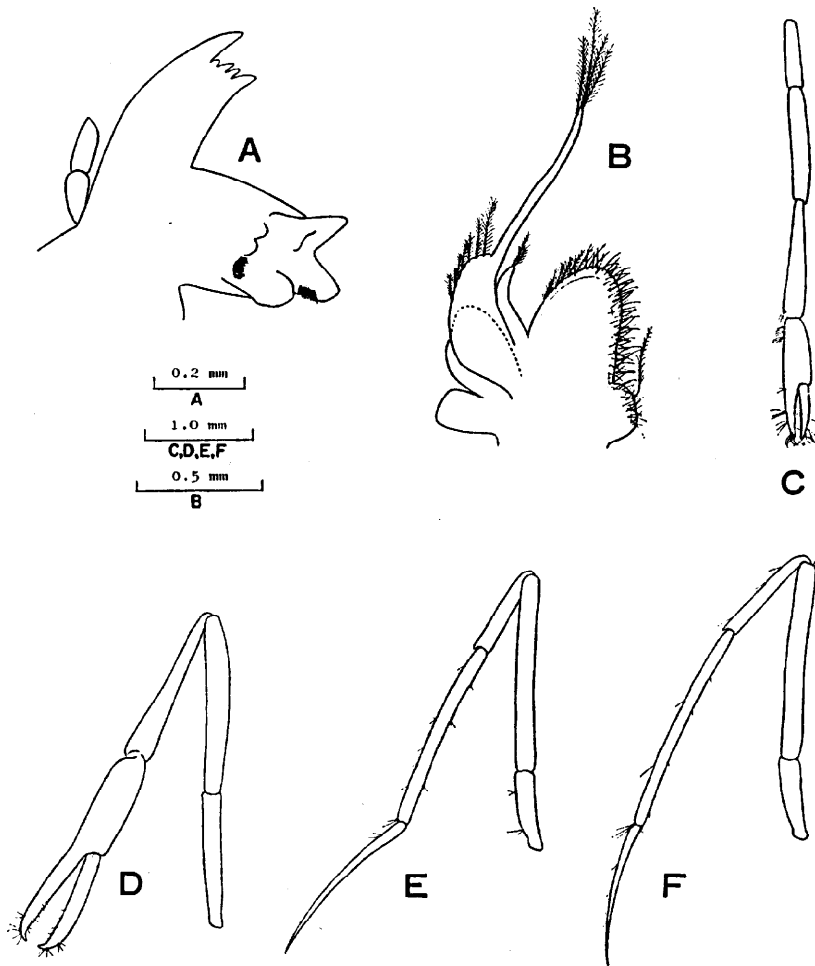


Fig. 2. *Palaemon (Palaemon) yamashitai* sp. nov., paratype, female. A, mandible; B, first maxilliped; C, first pereopod; D, second pereopod; E, third pereopod; F, fifth pereopod.

lie on the distal part. The palm is slender, about three times as long as the maximum breadth and a little shorter than the fingers. The carpus is cylindrical and becomes thicker distally, two-thirds the length of the chela, the distal margin being entire. The merus is stouter and a trifle longer than the carpus. The ischium is subequal to the carpus in length.

The third pereopod is detached and missing. The last two pereopods

are slender and similar. The fourth pereopod is thin and long. The dactylus is excessively narrow and curved with the tip sharply pointed; on the anterior margin several fine setae are present. The propodus is cylindrical and one and a half as long as the dactylus, the posterior margin lacking either spines or setae. The carpus is about half the length of the propodus. The merus is as long as and stouter than the carpus. The dactylus of the fifth pereopod resembles that of the fourth, but the setae on the anterior margin are thicker; near the distal portion of the propodus is placed a row of spinules posteriorly which when greatly enlarged proves to be armed throughout the length with many small, strong and spinular processes; along the posterior border some minute spinules are visible. The merus is subequal to the propodus in length.

The uropods are distinctly longer than the telson.

Description of paratypes. The tip of the rostrum is pointed and directed forward, being somewhat beyond the end of the antennular peduncle; both of the upper and the lower borders are to some extent convex with fourteen to sixteen and four or five teeth, respectively; the interval between the first two teeth on the upper border is longer than each space between the other neighbouring teeth; the lower teeth are rather equidistantly spaced as in the holotype.

The dorsal surface of the telson bears two pairs of small spines; the anterior pair is situated a little before the distal third and the posterior halfway between the anterior pair and the posterior end of the telson.

One of the paratypes has the two-jointed mandibular palp, though usually three-jointed.

The third pereopod is slender and closely similar to the last two pereopods. The dactylus is excessively slender and curved with the sharply pointed tip; on the anterior margin fine hairs are present. The propodus is narrow and linear with on the posterior border some minute spinules, a trifle longer than the dactylus.

Measurements. (mm).

	♀ (holotype)	♀	♀	♂	sp.
Body length	13.8	11.3	10.5	13.8	10.0
Carapace length	3.6	2.8	3.0	4.0	2.5
Rostrum length	2.3+	2.3	2.3	3.0	1.8
Telson length	2.4	1.9	2.0	2.5	1.8
Length of second chela	2.8	2.0	2.2	2.9	1.8

Remarks. The new species is mainly characterized by the excessively slender ambulatory pereopods, especially in the dactyli. Each dactylus,

as mentioned above, is long, curved and filiform; in the third pereopod the dactylus is a little shorter than the propodus, with on the anterior border thin hairs.

The new species bears a good resemblance to *Palaemon* (*Palaemon*) *sewelli* (Kemp) and *P. (P.) gravieri* (Yu), but it is readily distinguishable from them in the shape of the rostrum; the rostrum in the two allied species is more slender and longer, reaching far beyond the end of the antennal scale; the upper border is nearly straight with a few very small, subterminal teeth. On the other hand, in the new species the rostrum does not exceed the antennal scale and both the upper and the lower borders are distinctly curved with the equally distanced teeth. The branchiostegal spine in *P. sewelli* is set well back from the anterior margin of the carapace, whereas in the new species it rises from just the margin. In addition, the dactyli of the last three pereopods in *P. sewelli* are much stouter than in the new species. The much broader and shorter antennal scale in *P. sewelli* stands at variance with that in the new species.

In one of the paratypes two-jointed mandibular palp instead of three-jointed occurs. Such a case was already reported in the Japanese *Palaemon* by the present authors (Fujino and Miyake, 1968), hence it should be possible to consider it as not so rare case.

Subfamily Pontoniinae

Periclimenes (*Periclimenes*) *hertwigi* Balss, 1913

Periclimenes hertwigi Balss, 1913, p. 235 -Japan: Sagami Bay; Balss, 1914, p. 49, figs. 28-30 -no new locality.

Periclimenes (*Ancyllocaris*) *gracillirostris* Kubo, 1940, p. 41, figs. 8-10 -Japan: Kumano-nada, off Mie Pref.

Periclimenes (*Periclimenes*) *hertwigi*: Holthuis, 1952, p. 43, figs. 11, 12 -Kai Is.

Material examined.

31°29.2' N, 130°01.5' E, 196 m, June 13, 1964, Time, 19:13 -1 ovig. ♀ (17.0 mm in body length), ZLKU No. 14225.

Remarks. In the present material the rostrum bears six teeth on the upper border, the first tooth being just over the orbit. On the lower border only one tooth lies below the upper distal tooth which is in some distance from the pointed apex. The telson is at the terminal margin with three pairs of spines of normal form. The outer pair is very small as seen in Kubo's (1940) figure, but in Holthuis's (1952) illustration this pair is comparatively longer. The fused portion of the outer antennular flagellum consists of six basal segments. The

antennal scale reaches as far forward as the level of the end of the antennular peduncle just as in Holthuis's description. The outer lateral tooth is distinct and barely extends to the anterior margin of the lamella. The dactyli of the last three pereopods are particular in shape within this genus, and which character was described in detail by Holthuis.

Balss's (1913) specimen from Sagami Bay, Japan was found between the spines of an echinoderm, *Phormosoma* sp., but in the present specimen the host animal commensally living with is not certain.

Distribution. Recorded from Japan and the Kai Islands, and vertically distributed from 120 m to 305 m deep.

Periclimenes (Harpilius) macrophthalmus sp. nov.
(Figs. 3-5)

Material examined.

32°36.7' N, 127°42.8' E, 145 m, June 17, 1964, Time, 19:13 -1♀ (holotype), ZLKU No. 14226.

Description of holotype. The rather slender body form. The rostrum is long and very shallow, tapering towards the apex. The acuminate end slightly overreaches the second segment of the antennular peduncle but fails to reach the anterior margin of the antennal scale. On the upper border there are six and three teeth in advance of and at the back of the orbit, respectively; the first tooth, which is the strongest of all the teeth, is placed in about the middle of the carapace and much more separated from the second than the second is from the third; the distal tooth is very small and is in short distance behind the apex, and the other teeth are placed equidistantly. A minute tooth on the lower border is visible just below the first tooth on the upper border. The teeth on both the borders are directed forward and not erected. No distinct lateral carina is present.

Apart from the slight depression in the hepatic region the carapace is entire. The inferior orbital angle is produced forward to form a distinct and triangular projection, just below which is present the sharply pointed and defined antennal spine close to the anterior margin of the carapace. The anteroventral margin is broadly rounded. The hepatic spine is fairly behind the antennal spine and a little below it.

The pleura of all the abdominal somites are broadly rounded. The sixth somite is long and narrow, twice as long as the sixth abdominal somite. The lateral margin is a trifle concave. The dorsal surface

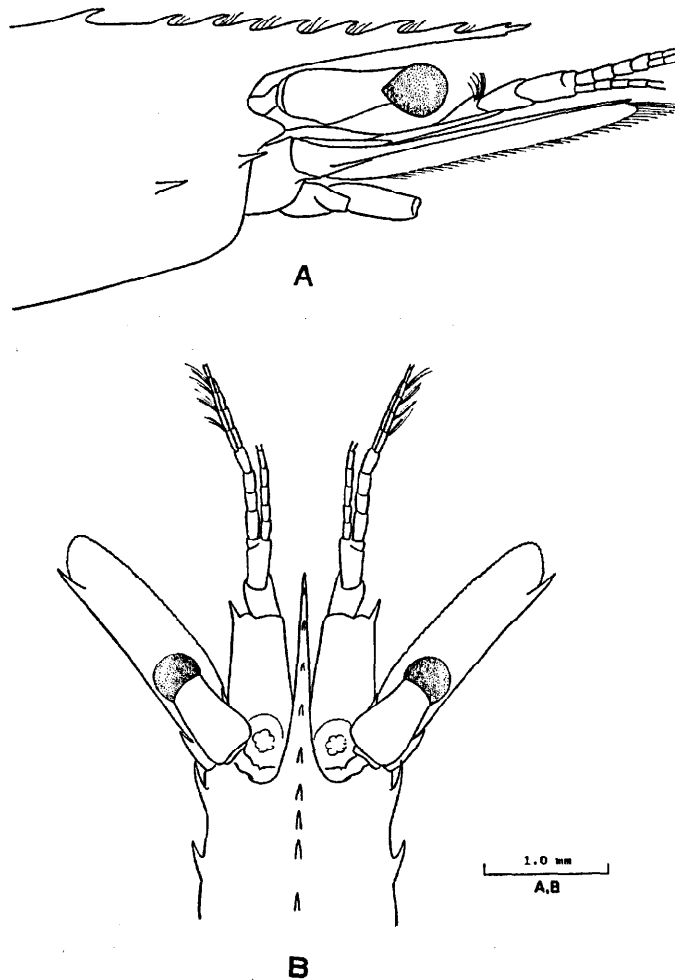


Fig. 3. *Periclimenes (Harpilius) macrophthalmus* sp. nov., holotype, female. A, anterior part of body in lateral view; B, anterior part of body in dorsal view.

bears two pairs of spines; the anterior pair is a little before the middle and lies more inside than the posterior; the posterior pair is midway between the anterior pair and the posterior end of the telson. The posterior end is bluntly projected and provided with three pairs of spines; the outer pair is minute, and the intermediate pair is stout and long and about twice as long as the median thin pair.

The basal segment of the antennular peduncle is broad; the outer

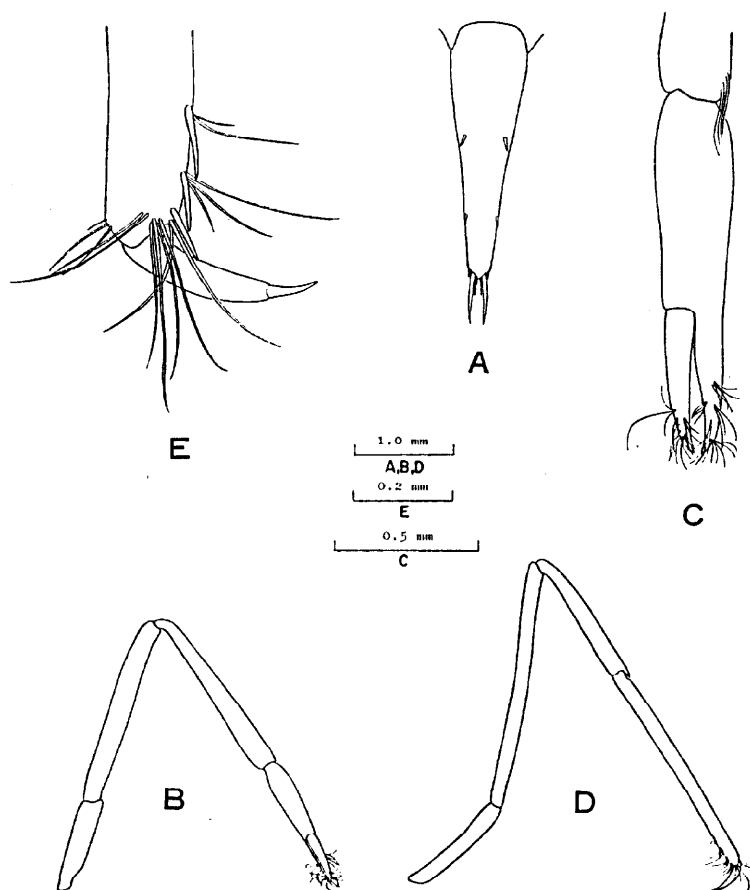


Fig. 4. *Periclimenes (Harpilius) macrophthalmus* sp. nov., holotype, female. A, telson; B, first pereopod; C, chela of first pereopod; D, fifth pereopod; E, dactylus of fifth pereopod.

lateral margin is slightly convex with terminally a long and slender spine directed a little outwards and reaching the middle of the second segment; the anterior margin is to some extent projected forward. The stylocerite is slender and sharply pointed, barely reaching the middle of the basal segment. The distal two segments are narrow and short; the third segment of cylindrical form is longer and more slender than the second which is with an expanded lobe outside. The upper flagellum is fused for four basal segments which together are longer than the distal two segments of the antennular peduncle combined. The shorter free ramus is as long as the fused portion.

The basicerite of the antennal peduncle has laterally a stout spine. The carpocerite is cylindrical and rather stout, failing to reach the middle of the antennal scale. The elongated antennal scale far exceeds the apex of the rostrum; the almost straight lateral margin is armed terminally with a long tooth scarcely reaching the anterior margin of the lamella which is strongly expanded forwards. The breadth of the lamella is subequal both anteriorly and posteriorly.

The eyepeduncle is long, and depressed and heavy proximally. The cornea is globular and reaches as far forward as the level of the base of the second tooth on the upper border of the rostrum. The fused portion of the cornea and the peduncle is constricted.

The incisor process of the mandible is slightly curved with distally two larger teeth separated by a smaller tooth; the posterior margin makes a thin edge being furnished distally with some very small spines; the strong and heavy molar process is divided terminally by the moderately deep notches into some round or square knobs where two tufts of short bristles are present. The palp of the maxillula is bifid with distally a small spine; the upper and the lower laciniae are normally developed and with short spines and medially long setae near the margins. The endite of the maxilla is separated to form an upper broader, longer and a lower narrower, shorter lobes; both the parts are provided with dense setae; the well-developed palp is present; the scaphognathite is normally developed. The exopod of the first maxilliped bears the well-developed caridean lobe; the palp is narrow and its tip bluntly pointed; the broad and shallowly bi-lobed epipod is present; there is a feeble separation between the basal and the coxal endites. The second maxilliped is of a normal form; the developed and oblong epipod is present. The third maxilliped is slender and pediform; the ultimate segment is two-thirds the length of the penultimate; the antepenultimate segment is about twice as long as the ultimate; the narrow exopod fails to reach the end of the antepenultimate segment; a rigid, small and round epipod is present; along the inner borders of the penultimate and the antepenultimate segments long hairs are dispersed.

Only the right first pereopod is preserved. It is very slender. The fingers are thin and with the slightly curved, pointed tips, three-quarters the length of the palmar portion which is somewhat depressed; some tufts of setae are grown near the tips; the cutting edges are a trifle gapped and smooth. The carpus is cylindrical, one and a half as long as the chela. The merus is nearly equal to the carpus in length.

The second pereopods are missing.

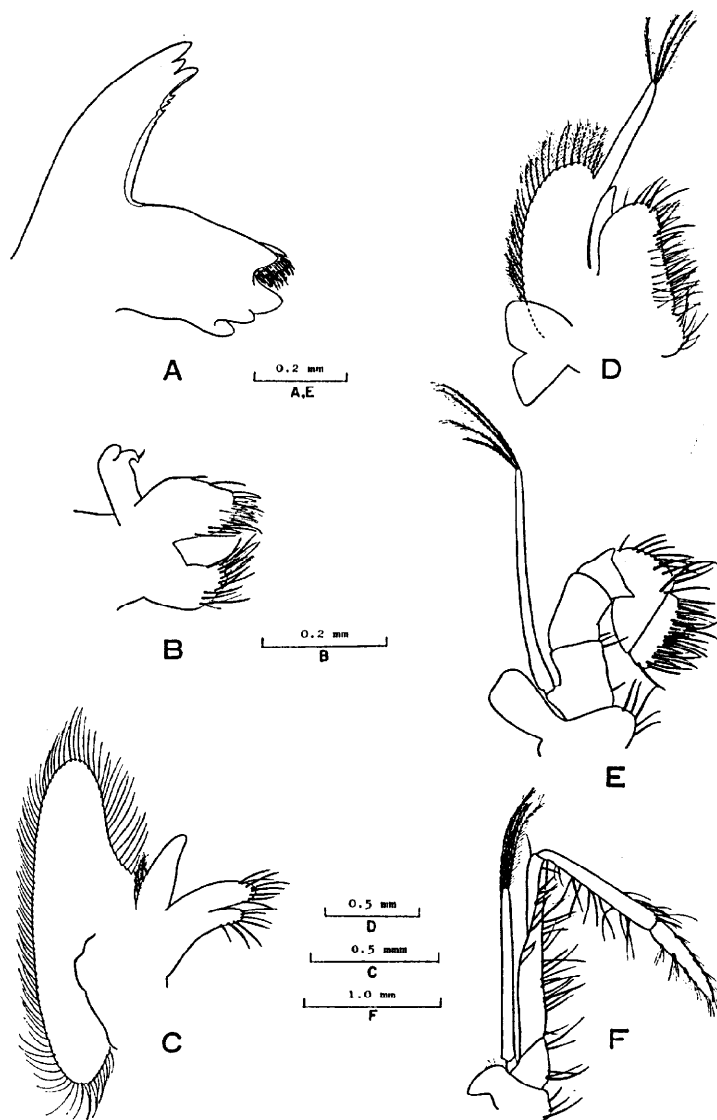


Fig. 5. *Periclimenes (Harpilius) macrophthalmus* sp. nov., holotype, female. A, mandible; B, maxillula; C, maxilla; D, first maxilliped; E, second maxilliped; F, third maxilliped.

Of the following posterior pereiopods only the fifth is preserved. The gently curved and simple dactylus has the pointed end. The propodus is almost straight and slender, measuring more than six

times as long as the dactylus; the posterior margin bears three pairs of spinules and long hairs distally situated. The carpus is more than half the length of the propodus. The merus and the carpus are subequal in length.

Measurements (mm)

Body length	15.4
Carapace length	3.6
Telson length	2.5
Rostrum length	1.0

Remarks. The new species shows the characteristic features in the shape of the rostrum and in the eye form. Such a very slender and long rostrum type is likewise seen in *Periclimenes agag* Kemp, *P. galene* Holthuis, *P. platycheles* Holthuis and *P. tenuipes* Borradaile, which are all assigned to the subgenus *Harpilius*. In *P. agag*, *P. platycheles* and *P. tenuipes* the rostrum is longer than the carapace and with the more teeth on the lower border than in the new species, while the rostrum in the new species is distinctly shorter than the carapace. *P. galene* possesses the rostrum much longer than that in the new species, and having the crest-like elevation above the eye. In the subgenus *Periclimenes* s. s., *P. latipollex* Kemp and *P. laccadivensis* (Alcock and Anderson) have the very slender and long rostrum.

The new species is most closely related to *P. galene* in the general features, especially in the shape of the rostrum and of the antennal scale, and in the considerably elongate eyepeduncle. However, the new species is easily distinguished from it in the structure of the fingers of the first pereiopod, in the proportional length of each dactylus of the last three pereiopods, in the presence or absence of the lower rostral tooth, and in the number of the dorsal teeth on the carapace.

Such a series of small denticles on the posterior edge of the incisor process of the mandible as observed in the new species is also found in a few pontoniids, e. g., *Periclimenes indicus* Kemp and *Pontonia okai* Kemp.

Family Ogyridae

Ogyrides orientalis (Stimpson, 1860)

(Fig. 6)

- Ogyris orientalis* Stimpson, 1860, p. 105 -China, and Japan: Kagoshima; Yokoya, 1927, p. 171, pl. 7, figs. 1-16 -Japan: Bay of Onahama; Liu, 1955, p. 34, pl. 12, figs. 8-16 -several localities of China.
- Ogyris sibogae*: de Man, 1911 (text), 1915 (pls.), p. 135, pl. 1, fig. 1-1h -Sulu Sea and Sumbawa.
- Ogyrides sibogae*: de Man, 1922, p. 14, pl. 2, fig. 8-8g -Ambon.

Material examined.

31°30.1' N, 124°00.2' E, 39 m, June 24, 1963, Time, 07: 59 -3 ♂♂ (5.0-5.7 mm in carapace length), ZLKU No. 16456.

Description. The endopod of the first pleopod of the male nearly reaches the level of the middle of the exopod. It is rather broad, somewhat elliptical with long, marginal and plumose setae as well as with short simple ones. The top is produced to a narrow, long lobe, furnished distally with coupling hooks. The appendix masculina is very short with long, coarse setae. The appendix interna is long and slender.

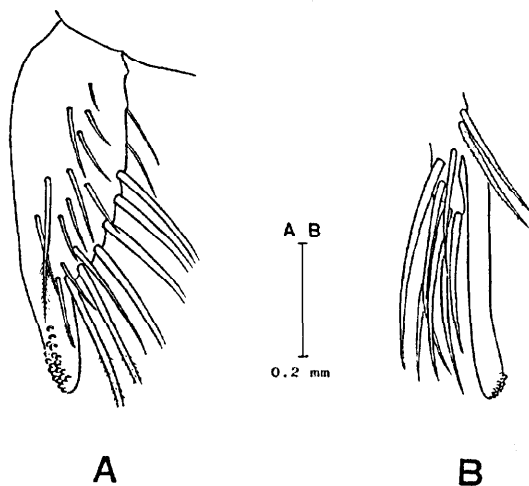


Fig. 6. *Ogyrides orientalis* (Stimpson), male. A, endopod of first pleopod; B, appendix masculina and interna.

Remarks. The present specimens exactly fall in with de Man's (1911, 1922) descriptions of *Ogyrides sibogae*. Yokoya (1927) set forth that de Man's species should be synonymized with *Ogyrides orientalis* (Stimpson)" by the reason of little differences between them. As to the term "triarticulatus" of the carpus of the second pereiopod Yokoya commented that the possible consideration of it as the articulations instead of the articles would help us understand its having four-segmented carpus such as in *O. orientalis*. Stimpson's (1860) description is short and too meagre to make an exact identification for *Ogyrides*, but, as Yokoya mentioned, it is possible that both of the species

1) Described under the genus *Ogyris*.

are probably to be identified with each other.

The sternal process called Yokoya (1927) as a "thelycum", which commences in anteriorly fused and posteriorly separated form from the respective bases of the last two pereopods. Although Yokoya noted the presence of a pear-shaped elevation on the posterior part, in the present specimens the posterior portion is longitudinally concave or furrowed instead of having such an elevation. It seems that the presence of the "thelycum" in the male definitely comes of standing at variance with that of the small but rather distinct appendix masculina, if the word means what is the sexual apparatus of the female.

Only difference of the present specimens from Yokoya's illustration is in the location of two pairs of the dorsal spines on the telson. Of the two pairs in the present specimens the anterior pair is in about the middle and the posterior twice as far from the posterior end of the telson as from the anterior pair. While, in Yokoya's figure the anterior pair is far from the posterior one, which is in the same position as in the present specimens, and at the anterior fourth.

Distribution. Ranged from Japan and China southwards to Sulu Sea and Sumbawa, and between the depth of about 9 and 535 m.

Family Processidae

Processa processa (Bate, 1888)

Nika processa Bate, 1888, p. 527, pl. 95 (pl. non *Processa processa*).

Processa processa: Rathbun, 1906, p. 912, pl. 22, fig. 6 -Honolulu; Johnson, 1961, p. 54 - Singapore.

Material examined.

30°01.0' N, 124°04.0' E, 55 m, June 15, 1962, Time, 20:06 -1 ovig. ♀ (6.6 mm in carapace length), ZLKU No. 16547.

29°30.0' N, 125°31.5' E, 102 m, June 29, 1962, 06:47 -1 ♂ (5.0 mm), ZLKU No. 16548.

28°45.0' N, 125°31.0' E, 99m, June 13, 1963, Time uncertain -1 ovig. ♀ (6.0 mm), 1 ♀ (5.3 mm), ZLKU No. 16459.

31°19.5' N, 127°32.0' E, 126 m, June 17, 1964, Time, 03:45 -1 ♂ (5.5 mm), ZLKU No. 16461.

33°34.9' N, 128°25.2' E, 120 m, June 18, 1964, 19:18 -1 ♀ (7.2 mm), ZLKU No. 16462.

Remarks. The present species is characterized by the posterior round margin of the fifth abdominal pleuron, by the rather broad oblong stylocerite with terminally a distinct tooth, and by the unequal second pereopods. In these respects it appears to be most closely related to the South Australian species, *Processa gracilis* Baker and the South African species, *P. austroafricana* Barnard. From the both the present

species is only discernible in the much less articulated joints of the carpus of the second pereopods, but the definite difference seems rather obscure.

Distribution. Known from the Indo-West Pacific region, Hawaii, Japan and Indonesia.

Family Pandalidae

Plesionika binocularis (Bate, 1888)

(Fig. 7)

Notocaris binocularis Bate, 1888, p. 656, pl. 114, fig. 2-Arafra Sea.

? *Plesionika binocularis*: de Man, 1920, p. 134, pl. 12, fig. 30-between Rotti I. and Timor I., and between Flores I. and Solor I.

Plesionika binocularis: Yokoya, 1933, p. 19-Japan: Shimane Pref.

Material examined.

30°01.0' N, 124°04.0' E, 55 m, June 15, 1962, Time, 20: 06-2 ♂♂ (5.6 and 6.2 mm in carapace length), 1 ovig. ♀ (6.9 mm), ZLKU No. 16549.

30°34.0' N, 123°30.7' E, 52 m, July 3, 1962, 21: 36-3 ovig. ♀♀ (8.1-9.4 mm), ZLKU No. 16552.

28°45.0' N, 125°31.0' E, 99 m, June 13, 1963, 12: 21-1 ovig. ♀ (7.0 mm), ZLKU No. 16475.

33°59.4' N, 128°48.0' E, 102 m, June 19, 1964, 06: 17-2 ♂♂ (6.5 and 6.8 mm), ZLKU No. 16489.

31°38.5' N, 126°10.7' E, 74 m, Mar. 14, 1963, 10: 23-1 ♀ (6.0 mm), ZLKU No. 16467.

28°44.7' N, 124°51.7' E, 92 m, June 13, 1963, 23: 45-1 ♂ (7.0 mm), 1 ovig. ♀ (8.0 mm), ZLKU No. 16474.

30°15.0' N, 125°15.7' E, 63 m, June 12, 1963, 20: 40-1 ♂ (6.0 mm), ZLKU No. 16468.

30°15.0' N, 126°00.6' E, 80 m, June 12, 1963, 01: 10-1 ♂ (5.0 mm), 2 ♀♀ (3.7 and 5.7 mm), ZLKU No. 16469.

30°29.2' N, 124°46.3' E, 53 m, July 2, 1962, 10: 38-2 ovig. ♀♀ (6.6 and 7.3 mm), 2 ♀♀ (6.4 and 7.2 mm), ZLKU No. 16463.

29°30.0' N, 124°51.5' E, 80 m, June 13, 1963, 18: 32-7 ♂♂ (4.6-7.7 mm), 5 ovig. ♀♀ (6.0-7.6 mm), 2 ♀♀ (5.6 and 6.0 mm), ZLKU No. 16472.

Remarks. All of the present specimens (the largest ovigerous female measures 26.7 mm in the body length with the carapace 8.0 mm) are of much smaller size than those in de Man's (1920) collection (the largest ovigerous female is 54.5 mm and 20.0 mm in the body and the carapace length respectively). Bate's (1888) ovigerous female (39.0 mm in the body and 12.0 mm in the carapace length) is somewhat larger than the present specimens. The non-ovigerous female and the male in the present specimens are nearly equal in size, somewhat smaller than the ovigerous female.

The frontal crest rising in about the middle of the carapace was

clearly illustrated and described as much more higher than in the original description by de Man. In the present specimens only an obscure elevation is visible there and this appearance looks to be just the case with Bate's specimens. The rostrum in the present specimens appears to be longer and less curved upwards than in de Man's figure, the curvature being like the specimen figured by Bate.

The rostral teeth in the present specimens in number are:

Number of upper teeth	11	12	13	14	
Number of specimens/Total	1	5	7	6/19	
Number of upper teeth on carapace	3	4			
Number of specimens/Total	8	20/28			
Number of upper movable teeth	6	7			
Number of specimens/Total	15	12/27			
Number of lower teeth	10	11	12	13	14
Number of specimens/Total	1	3	6	8	1/19

In Bate's (1888) illustration the sixth and the seventh immovable teeth on the upper border of the rostrum are apparently much larger than in the present specimens in which these teeth are slender and more sharply pointed.

The carapace in the present specimens is somewhat swollen posterodorsally where a small, obsolete, and tubercle-like spine directed anteriorly is present. Such a spine was entirely omitted by both of the previous authors, and which might have been overlooked because of its small size. According to Bate (1888), the carpus on the right side of the first pereopod is longer than that on the left one. While, in the present specimens the pereopods on both the sides are equal as already noted by de Man. And the left side one of the second pereopods was also described to be longer than the right. As to this point, de Man made the opposite observation as in the present specimens. Examination of the present material proves that only one of the twenty-four specimens has the smaller pereopod on the left side. Therefore, it is possible that Bate's specimens are of rather rare case in this regard.

The specimens of this species collected by "Soyo Maru" and reported by Yokoya (1933) were re-examined for comparison with the present specimens. These are of three specimens, one ovigerous female (8.5 mm in the carapace length) and two males (7.2 and 8.2 mm in the

1) Partly preserved in the Zoological Laboratory of Kyushu University.

Table I Variations and ratios in length of carpus and merus of second pereopods of *Plesionika binocularis*

No.	Sex	Carapace length (mm)	Left		Carpus/Merus	Right		Carpus/Merus
			Carpus (mm)	Merus (mm)		Carpus (mm)	Merus (mm)	
1	♂	4.6	7.0	3.9	1.80	2.9	1.8	1.61
2	♂	5.4	9.1	4.4	2.07	—	—	—
3	♂	5.5	8.8	4.6	1.91	3.8	2.1	1.81
4	♂	5.7	—	—	—	3.6	2.2	1.64
5	♂	6.0	12.3	6.7	1.84	4.6	2.9	1.50
6	♂	6.4	10.2	5.3	1.92	3.8	2.5	1.52
7	♂	6.5	9.0	4.6	1.96	3.9	2.1	1.86
8	♂	6.8	7.5	4.0	1.88	4.0	2.1	1.90
9	♂	7.2	11.4	5.5	2.07	4.5	2.5	1.80
10	♂	7.7	13.6	7.0	1.94	5.0	3.0	1.67
11	ovig. ♀	6.0	—	—	—	10.0	5.2	1.92
12	ovig. ♀	6.6	12.0	6.5	1.85	4.6	2.5	1.84
13	ovig. ♀	6.8	—	—	—	4.3	2.5	1.72
14	ovig. ♀	7.0	—	—	—	4.2	2.6	1.62
15	ovig. ♀	7.0	11.3	6.0	1.88	4.3	2.6	1.77
16	ovig. ♀	7.0	11.6	6.5	1.78	4.6	2.8	1.64
17	ovig. ♀	7.3	—	—	—	5.0	3.0	1.67
18	ovig. ♀	7.6	13.7	7.5	1.83	—	—	—
19	ovig. ♀	8.0	—	—	—	5.0	2.9	1.72
20	♀	5.6	9.0	4.4	2.00	3.5	2.1	1.67
21	♀	5.7	8.0	4.3	1.86	—	—	—
22	♀	6.0	—	—	—	3.6	2.2	1.64
23	♀	6.4	—	—	—	4.0	2.6	1.54
24	♀	7.2	13.2	7.2	1.83	—	—	—

carapace length), which were taken from Shimane Prefecture in Japan. They proved to resemble in all of the detailed characters including the body size the present specimens, though one of the males has the somewhat more curved rostrum than in the present specimens. And such a tubercle-like spine on the carapace as observed in the present material is less defined. The frontal crest is only obliquely elevated as in the case with the present material.

As mentioned above, de Man's specimens appear to be different from the original description, as well as from the present and Yokoya's specimens, especially in the body size and in the frontal crest, hence there remains a doubt in referring de Man's specimens to this species.

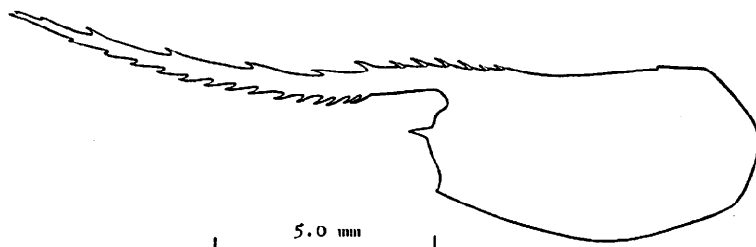


Fig. 7. *Plesionika binoculus* (Bate), male, carapace and rostrum.

In the present specimens the carpus and the merus of the second pereopods, which are multi-articulated, are observed to a great extent variable in length, especially in the left side which is usually longer than the right except only in one specimen. It is observed that the ratio of the length of the carpus against the merus is somewhat larger on the left side than on the right regardless of sex and size. The table I indicates the variation in the length of the carpus and the merus of the second pereopods among individuals. Such a variation was not mentioned by either of the authors.

Distribution. Recorded from Japan and Arafra Sea. Yokoya (1933) reported down to the depth of 238 m.

Plesionika ortmanni Doflein, 1902

(Fig. 8)

Plesionika ortmanni Doflein, 1902, p. 616, pl. 3, fig. 2 -Japan: Sagami Bay; Balss, 1914, p. 30, fig. 14 -Japan: Sagami Bay and Kagoshima; de Man, 1920, p. 124, pl. 11, fig. 26 -Bali Sea.

Material examined.

28°47.7' N, 124°48.0' E, 83-95 m, June 30, 1962, Time, 08: 06 -1 ♂ (14.0 mm in carapace length), ZLKU No. 16491.

28°44.7' N, 124°51.7' E, 92 m, June 13, 1963, 18: 32 -2 ♂♂ (11.5 and 14.0 mm), ZLKU No. 16492.

28°45.0' N, 125°31.0' E, 99 m, June 13, 1963, 23: 45 -1 ♂ (15 mm), ZLKU No. 16494.

33°59.4' N, 128°48.0' E, 102 m, June 19, 1964, 06: 17 -4 ♂♂ (11.0-14.3 mm), 2 ovig. ♀♀ (14.0, 17.0 mm), 2 ♀♀ (10.0, 12.0 mm), ZLKU No. 16495.

34°25.3' N, 129°05.4' E, 150 m, June 19, 1964, 10: 00 -1 ♀ (12.8 mm), ZLKU No. 16503.

Description. The first pereopod as well as the following ones are extremely slender. The first pereopod overreaches the apex of the rostrum by the whole length of the dactylus and the propodus together. The minute terminal chela is almost concealed by thickly settled

setae; the movable part (dactylus) is longer and stouter than the immovable; both of the tips are rigid and pointed. The propodus is subcylindrical, long, and most slender in about the middle, becoming a little thicker towards both of the ends. A row of short setae is longitudinally grown in the proximal third. The carpus measures twice

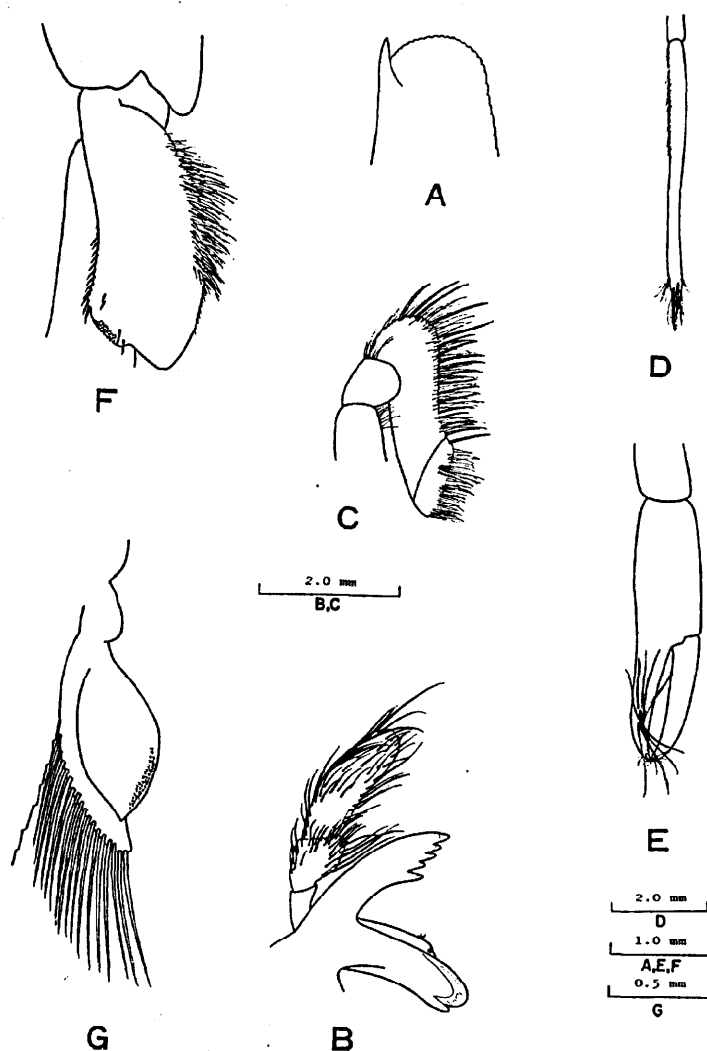


Fig. 8. *Plesionika ortmanni* Doflein, male. A, tip of antennal scale; B, mandible; C, tip of second maxilliped; D, chela of first pereiopod; E, chela of second pereiopod; F, endopod of first pleopod; G, appendix masculina and interna.

the length of the propodus; it is uniformly slender and naked. The merus is distinctly longer and stouter than the carpus, being provided only with fine setae proximally.

The second pereopods are symmetrical; it reaches beyond the rostrum by the length of the chela and some joints of the carpus combined. Both of the movable and the immovable fingers are rather equally curved to make a distinct gap when closed. The tips are both crooked and bluntly pointed. Some tufts of short and long setae are present distally and also near the middle. The palmar portion is more than twice as long as broad.

The mouthparts are typical of the genus. The well-developed three-segmented palp of the mandible is much longer than the incisor process; the distal joint is the longest, and the two proximal joints are subequal in length but the basal one is much more slender; the incisor process is curved and armed terminally with several teeth. The distal article of the second maxilliped is very short and obliquely coalesced with the second distal segment which is elongated, and whose anterior and posterior borders are nearly parallel to each other. Coarse setae and fine hairs are thickly lie on the surface, especially marginally.

The endopod of the first pleopod in the male is broad and oblong. The distal border is truncated. Small spines and thin setae are present marginally. The setose appendix masculina is rather slender and longer than the appendix interna which is broad and foliaceous with the pointed tip, and which is also with a sheet of small crooked spines along the outer lateral margin.

Remarks. The present specimens but one female (ZLKU No. 16503) agree with Doflein's (1902) and de Man's (1920) descriptions and figures. This female specimen has the rostrum almost broken off, and only the second left and the third right pereopods are preserved. Judging from the general body form and the still preserved pereopods, it may be referable to this species. But, the dorsal surface of the telson of this specimen is provided unusually with four pairs of somewhat longer spines than in the others in which they consist of three pairs. In addition, the antennal scale appears to be somewhat longer and more slender than in the others.

Distribution. Known from Japan and Bali Sea, bathymetrically from the depth between 50 and 300 m.

Chlorotocus crassicornis (Costa, 1871)

Chlorotocus gracilipes: Bate, 1888, p. 674, 681 -no new locality; Balss, 1914, p. 33 (list) -no new locality.

Chlorotocus gracilipes var. *andamanensis* Alcock and Anderson, 1899, p. 284 -Bay of Bengal.

Chlorotocus crassicornis: Stebbing, 1914, p. 42, pl. 11 -South African coast: Cape Point and Cape Natal; de Man, 1920, p. 183 (comments on certain features) -no new locality; Calman, 1925, p. 16 -South African coast: Cape and Natal; Calman, 1939, p. 207 -Zanzibar; Barnard, 1950, p. 685, fig. 127e, f -South African coast: Agulhas Bank, Cape Point, Durban and Algoa Bay.

Material examined.

29°58.5' N, 126°59.5' E, 100 m, June 17, 1962, Time uncertain -1 ovig. ♀ (12.4 mm in carapace length), ZLKU No. 16555.

29°30.0' N, 125°31.5' E, 102 m, June 29, 1962, Time, 06: 47 -1 ♀ (10.7 mm), ZLKU No. 16504.

28°47.0' N, 124°50.0' E, 102 m, June 30, 1962, 06: 33 -1 ♂ (10.8 mm), ZLKU No. 16505.

34°25.3' N, 129°05.3' E, 150 m, June 19, 1964, 10: 30 -1 ♀ (5.0 mm), ZLKU No. 16506.

Remarks. In the present specimens the upper and the lower borders of the rostrum possess the respective number of ten or fourteen and four or six teeth, counting the very small apical teeth. Included the spine flanking on the terminal long spine, the dorsolateral spines on the telson are six pairs, or six on either side but not paired, or five or six in an irregular arrangement. Thus, the number and the arrangement of the rostral teeth as well as the spines on the telson as observed in the present specimens and recorded in the previous authors' publications, prove to be not constant but considerably variable.

Distribution. This species is considered to have a wide geographical distribution from the Mediterranean, South African coast, Zanzibar, Andaman Sea and as far northwards as the East China Sea as represented by the present specimens. It is vertically distributed down to the depth of 597 m.

Chlorotocella gracilis Balss, 1914

Chlorotocella gracilis Balss, 1914, p. 33, figs. 16-22 -Japan: Sagami Bay; de Man, 1920, p. 180, pl. 15, fig. 45, 45a -Java, and between Misool I. and Salawatti I.; Kemp, 1925, p. 278 -Andaman Is. and Nicobar Is.; Holthuis, 1955, fig. 90 (After Balss, 1914); Johnson, 1961, p. 47 -Singapore; Hayashi and Miyake, 1968, p. 12, fig. 1 -Japan: Tanabe Bay.

Material examined.

26°05.0' N, 122°55.0' E, 110-111 m, Dec. 9, 1967, Time uncertain -1 ♂ (2.9 mm in carapace length), 1 ovig. ♀ (3.8 mm), ZLKU No. 16507.

Remarks. The present specimens may readily be identified with this species by the characteristic form of the body and the rostrum. The

specimens show a good accordance with Balss's (1914) original description and figures except for the points emended and amplified by de Man (1920).

According to Hayashi and Miyake (1968), this species was found in association with rhizostomian medusae, together with two hippolytid shrimps. As regards the present specimens any data about such association were not available.

Distribution. Distributed in Japan, southwards to the Molucca Islands, Singapore, Java, and the Andaman and Nicobar Islands.

Family Crangonidae

Crangon (Crangon) affinis de Haan, 1849

(Fig. 9)

Crangon affinis de Haan, 1849, p. 183 -Japan; Bate, 1888, p. 484, pl. 86, figs. 1-3 -Japan; Ortmann, 1890, p. 531 -Japan: Maizuru; Doflein, 1902, p. 642 -Japan: Nemuro; Balss, 1914, p. 63 -Petropavlovsk, Kamchatka, Vladivostok, and Japan: from Nemuro, Izu-oshima I. to Kagoshima; Yokoya, 1930, p. 541 -Japan: Mutsu Bay; Yokoya, 1933, p. 32 -Japan: from Tsugaru Straits southward to Kinkazan in Pacific coast and from Kyoga-saki to Tsushima I. in Japan Sea coast; Yokoya, 1939, p. 274, fig. 8 -Japan: Miyagi Pref.; Urita, 1942, p. 30 -Sakhalin; Liu, 1955, p. 60, pl. 22, figs. 5-8 -China.

Crangon propinquus Stimpson, 1860, p. 94 -Japan; Rathbun, 1902, p. 42 -Japan: Aomori.

?*Crangon hakodatei* Rathbun, 1902, p. 42 -Japan: Hakodate; Urita, 1926, p. 429 -China: Tsingtao.

Crangon cassiope de Man, 1906, p. 402 -Inland Sea of Japan; de Man, 1907, p. 406 -no new locality; Liu, 1955, p. 59, pl. 22, figs. 1-4 -several localities of China.

Crangon consobrinus de Man, 1906, p. 401 -Inland Sea of Japan; de Man, 1907, p. 405, pl. 31, figs. 16-19 -no new locality.

Material examined.

Definite locality unknown, Feb. 24, 1962, Time uncertain -1 ovig. ♀ (11.0 mm in carapace length), ZLKU No. 16509.

34°29.5' N, 122°55.5' E, 69 m, Nov. 27, 1964, Time, 13: 27 -1 ♀ (4.6 mm), ZLKU No. 14263.

39°30.0' N, 123°45.0' E, 73 m, Jan. 29, 1965, 12: 50 -2 ♀♀ (4.0 and 4.1 mm), ZLKU No. 14264.

37°44.7' N, 123°59.8' E, 67 m, Nov. 7, 1966, 13: 30 -1 juv. (2.6 mm), ZLKU No. 14266.

37°45.0' N, 123°30.0' E, 68 m, Nov. 7, 1966, 10: 16 -1 ♂ (6.0 mm), ZLKU No. 14267.

37°45.0' N, 123°45.0' E, 67 m, Nov. 7, 1966, 12: 06 -2 ♀♀ (5.5 and 6.3 mm), ZLKU No. 14268.

37°45.0' N, 124°15.0' E, 76 m, Nov. 7, 1966, 15: 31 -1 ♂ (5.1 mm), 3 ♀♀ (3.6-4.0 mm), 10 juvs. (2.2-2.8 mm), ZLKU No. 16510.

37°14.5' N, 123°15.0' E, 70 m, Nov. 8, 1966, 06: 50 -1 ♂ (4.0 mm), ZLKU No. 14270.

- 37°15.0' N, 123°30.0' E, 73 m, Nov. 8, 1966, 08: 42-3 ♀♀ (3.0-3.6 mm), ZLKU No. 14271.
 37°15.8' N, 124°15.9' E, 73 m, Nov. 8, 1966, 13: 36-5 ♂♂ (4.0-6.0 mm), 13 ♀♀ (2.7-5.0 mm), ZLKU No. 14275.
 37°30.0' N, 123°45.0' E, 70 m, Nov. 8, 1966, 00: 05 -4 ♀♀ (2.5-3.5 mm), ZLKU No. 14293.
 36°57.2' N, 123°41.7' E, 71 m, Nov. 8, 1966, 08: 54 -2 ♀♀ (3.2 and 3.6 mm), ZLKU No. 14297.
 37°00.0' N, 124°45.0' E, 69 m, Nov. 9, 1966, Time uncertain -2 juvs. (2.0 and 2.9 mm), ZLKU No. 14299.
 36°29.6' N, 124°59.4' E, 64 m, Nov. 10, 1966, 06: 43 -2 juvs. (2.4 and 2.7 mm), ZLKU No. 14301.
 36°-37° N, 123°-125° E, 66-73 m, Nov. 11, 1966, Time uncertain -1 ♂ (3.1 mm). ZLKU No. 14303.
 36°00.7' N, 125°29.9' E, 60 m, Nov. 12, 1966, Time uncertain -1 ♀ (4.5 mm), ZLKU No. 14304.

Remarks. All the specimens examined appear to be young or sub-adult, except only one ovigerous female. To make an exact identification of *C. affinis* group seems rather uneasy because, as has been disputed, that the distinctive characters have not yet been confirmed among the closely allied forms, *C. affinis* de Haan, *C. cassiope* de Man, *C. consobrinus* de Man, *C. hakodatei* Rathbun and *C. propinquus* Stimpson. Additionally, considerable variations are observed among individuals in relation to the regards that have been pointed out by many authors as the distinguishing characters. Balss (1914) considered the above five species to be identified under the name of *C. affinis*, and afterwards Yokoya (1930) followed him, with the note that, "Examining numerous specimens, I noticed that the species is quite variable and many intermediate forms between the so-called species *C. propinquus*, *C. hakodatei*, *C. consobrinus*, and *C. cassiope* are found."

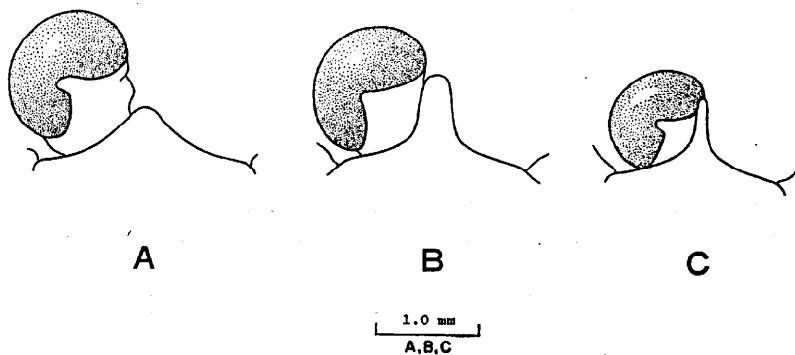


Fig. 9. *Crangon (Crangon) affinis* de Haan, variation of rostrum.

The rostrum in most of the present specimens is long and narrow, and becomes more or less slender distally, the narrowly round tip reaching the border between the cornea and the eyepeduncle or somewhat beyond it. But there are a few specimens having the distinctly shorter and broader rostrum than usual, which may be of *C. cassiope* type as defined by de Man (1906). And also in a few other specimens the rostrum is very short so as to form a broad round protrusion, apparently failing to reach the corneal border. In the present specimens the first four abdominal somites are almost entire without any carinae or grooves. The dorsal carina is observed as a thin line on the fifth abdominal somite, but is rather obscure. The juxtaposed carinae dorsally visible on the sixth somite are not sharp in almost all the specimens, the median part being slightly channelled. The sixth abdominal sternum is shallowly sulcated longitudinally with or without series of hairs on both the sides. In the rather larger individuals the sulcation is more distinct than in the young. de Man (1906) adopted the fact that the sixth abdominal somite which is convex and not sulcate beneath as one of the distinctive point of *C. cassiope* from the typical species of this genus, *C. vulgaris* Linnaeus. This character was also used for the distinction of *C. affinis* from *C. cassiope* by Liu (1955). However, as mentioned above, the sulcation of the sixth somite is relatively ill-defined and would be variable.

In all of the specimens are invisible such pubescence or short hairs rather thickly grown on the integument as seen in *C. hakodatei*, though thin hairs are present on the carapace. And *C. affinis* appears to be discriminated from *C. hakodatei* by lacking the distinct, naked, median dorsal carinae on the third to the fifth abdominal somites.

In the original description of *C. propinquus* given by Stimpson (1860) only the existence of the carination on the fourth, sometimes on the third abdominal somite, was estimated as the distinct feature from the allied species. And also from *C. consobrinus*, *C. affinis* was separated in the difference of the proportional length of the third maxilliped. In consideration of the variation in both the rostrum and the sixth abdominal somite as well as of the less important taxonomic differences appeared in other features it may be desirable to regard *C. cassiope*, *C. consobrinus* and *C. propinquus* as the synonym of *C. affinis*.

Distribution. Recorded from Kamchatka southwards to Japan and northern coast of China, down to the depth of 219 m, taken from the bottom of sandy mud and also among sea-weeds.

Crangon (Neocrangon) sagamiensis Balss, 1913

Crangon (Crangon) sagamiense Balss, 1913, p. 237 -Japan: Sagami Bay; Balss, 1914, p. 63, figs. 38, 39 -no new locality.

Crangon sagamiense: Yokoya, 1933, p. 33 -Japan: from Kinkazan, Miyagi Pref., to Goto Is.

Crangon (Neocrangon) sagamiense: Zarenkov, 1965, p. 1762 (list) -no new locality; Zarenkov, 1965a, p. 147 -no new locality.

Material examined.

33°09.2' N, 128°01.4' E, 158 m, June 18, 1964, Time, 14: 38 -2 ♀♀ (3.8 and 4.1 mm in carapace length), ZLKU No. 14261.

Description. Judging from the body size the present specimens are probably subadult. The carapace is armed with antennal, hepatic, branchiostegal and median dorsal spines. There also is a very small spine a little below the branchiostegal spine.

The basal segment of the antennular peduncle is slender, far exceeding the end of the rostrum; it increases in breadth distally. The stylocerite is broad, rather oblong and obliquely produced forwards with the terminal, pointed end which reaches beyond the level of the middle of the basal segment. The second segment is distinctly longer than the third, though the breadth being subequal to each other. The outer flagellum is stout and segmented for seven joints, scarcely extending to the end of the antennal scale. The inner flagellum is slender and long but fails to reach the end of the endopod of the third maxilliped.

The ultimate segment of the third maxilliped surpasses the end of the antennal scale by its half length. The penultimate segment is a trifle shorter than the ultimate. The antepenultimate segment is about twice as long as the ultimate; the posterior subterminal portion has two spines originated from the same portion, the outer of which is usually much shorter than the inner. The arthrobranch is absent.

The outer distal margin of the carpus of the first pereopod bears a small and a very strong spine at the median and at the posterior angles, respectively; also a strongly protruded and a small spine are situated at the respective corners of the anterior and the outer margins of the merus.

On the thoracic sternum in the median line, four similar, crest-like processes are present, each angle being sharply acute.

Remarks. This species, as indicated by Balss (1914), constitutes a characteristic feature in the rostrum; it is curved upwards and somewhat deep distally and shallowest in the middle in lateral view; the

tip is truncate or oblique and has a small spinose projection produced forwards at the upper distal margin.

A small spine a short distance below the branchiostegal spine is, as described above, visible on either side in all of the specimens examined. This spine was not illustrated in Balss's figure. The outer flagellum of the antennular peduncle in Balss's figure is much slender, and smaller in the number of the joints than in the present specimens.

Zarenkov's (1965) revision of the genus *Crangon* Fabricius resulted in the necessity of separating it into two subgenera, *Crangon* s. s. and *Neocrangon*. The definite factor to cause to decide such a separation is attributable to the presence or absence of the arthrobranch from the third maxilliped. The absence of the arthrobranch in this species may place its systematic position in the *Neocrangon* Zarenkov.

Distribution. Recorded only from the Pacific coast of Japan. Yokoya (1933) reported from the depth of 141 to 329 m.

Metacrangon sinensis sp. nov.

(Figs. 10-15)

Material examined.

- 37°01.5' N, 123°57.9' E, 74 m, Nov. 9, 1966, Time, 07: 20 -1 ovig. ♀ (holotype), ZLKU No. 14533.
- 37°30.0' N, 123°30.0' E, 71 m, Oct. 20, 1962, Time uncertain -1 ♂ (5.0 mm in carapace length), 2 ovig. ♀♀ (7.0 and 10.0 mm), ZLKU No. 14307.
- 37°30.7' N, 123°30.0' E, 71 m, Oct. 20, 1962, Time uncertain -1 ovig. ♀ (7.6 mm), ZLKU No. 14310.
- 36°15.0' N, 123°29.5' E, 74 m, Mar. 19, 1963, 22: 40 -1 ♂ (4.5 mm), ZLKU No. 14305.
- 37°30.5' N, 123°46.2' E, 70 m, Mar. 9, 1964, 05: 15 -1 ♀ (8.0 mm), ZLKU No. 14311.
- 34°25.3' N, 129°05.4' E, 150 m, June 19, 1964, 10: 00 -1 ovig. ♀ (7.0 mm), ZLKU No. 14306.
- 30°00.0' N, 122°45.0' E, 63 m, Dec. 3, 1964, 00: 05 -2 ♂♂ (3.7 and 5.0 mm), 2 ♀♀ (3.0 and 7.0 mm), ZLKU No. 14308.
- 37°00.0' N, 123°15.0' E, 70 m, Jan. 29, 1965, 22: 45 -1 ♀ (7.2 mm), ZLKU No. 14336.
- 37°26.5' N, 124°00.0' E, 70 m, Jan. 29, 1965, 14: 32 -1 ♂ (4.2 mm), 2 ovig. ♀♀ (7.0 and 8.5 mm), 3 ♀♀ (3.5-7.0 mm), ZLKU No. 16522.
- 37°30.0' N, 123°14.3' E, 68 m, Jan. 29, 1965, 08: 53 -11 ♂♂ (4.0-5.6 mm), 2 ovig. ♀♀ (7.0 and 7.2 mm), 11 ♀♀ (4.0-7.8 mm), 1 juv. (3.0 mm), ZLKU No. 14312.
- 37°30.0' N, 123°30.0' E, 70 m, Jan. 29, 1965, 10: 53 -1 ♂ (5.6 mm), 2 ♀♀ (3.1 and 6.6 mm), ZLKU No. 14337.
- 37°30.0' N, 123°45.0' E, 73 m, Jan. 29, 1965, 12: 50 -2 ♂♂ (4.0 and 4.4 mm), 2 ♀♀ (4.9-7.7 mm), ZLKU No. 14400.
- 35°30.0' N, 123°29.5' E, 76 m, Feb. 3, 1965, 14: 21 -1 ♂ (4.8 mm), ZLKU No. 14345.
- 37°30.0' N, 123°14.3' E, 68 m, Feb. 29, 1965, 08: 53 -1 ♀ (6.3 mm), ZLKU No. 14344.
- 37°14.5' N, 123°14.3' E, 68 m, Feb. 2, 1966, 09: 52 -2 juvs. (2.5 and 2.5 mm), ZLKU No. 14346.

- 37°21.2' N, 123°08.5' E, 66 m, Feb. 2, 1966, 07: 34 -8 ♂♂ (4.0-6.0 mm), 2 ovig. ♀♀ (8.5 and 8.5 mm), 12 ♀♀ (3.2-8.0 mm), 2 juvs. (2.4 and 2.5 mm), ZLKU No. 14348.
- 37°30.0' N, 124°00.0' E, 70 m, Feb. 2, 1966, 02: 30 -12 ♂♂ (4.0-5.0 mm), 8 ovig. ♀♀ (7.5-9.0 mm), 22 ♀♀ (4.8-7.8 mm), ZLKU No. 14372.
- 37°33.7' N, 123°34.7' E, 70 m, Feb. 2, 1966, 04: 57 -3 ♂♂ (4.6-6.0 mm), 3 ♀♀ (5.0-5.4 mm), ZLKU No. 14402.
- 37°27.7' N, 124°27.6' E, 75 m, Nov. 7, 1966, 18: 40 -5 ♂♂ (4.0-5.7 mm), 6 ovig. ♀♀ (7.7-9.5 mm), ZLKU No. 14408.
- 37°30.3' N, 124°15.0' E, 72 m, Nov. 7, 1966, 20: 25 -1 ♂ (5.0 mm), 2 ♀♀ (4.3-5.0 mm), ZLKU No. 14528.
- 37°44.7' N, 123°59.8' E, 67 m, Nov. 17, 1966, 13: 30 -1 ♂ (5.7 mm), 1 ♀ (4.5 mm), ZLKU No. 14418.
- 37°45.0' N, 123°30.0' E, 68 m, Nov. 7, 1966, 10: 16 -2 ♂♂ (4.6 and 5.0 mm), 2 ovig. ♀♀ (7.8 and 8.0 mm), 3 ♀♀ (5.0-7.8 mm), ZLKU No. 14420.
- 37°45.0' N, 124°15.0' E, 76 m, Nov. 7, 1966, 15: 33 -1 ♀ (3.6 mm), ZLKU No. 14433.
- 37°45.0' N, 123°45.0' E, 67 m, Nov. 7, 1966, 12: 06 -4 ♂♂ (3.5-4.5 mm), 1 ovig. ♀ (8.0 mm), 1 ♀ (5.0 mm), ZLKU No. 14427.
- 36°57.2' N, 123°41.7' E, 71 m, Nov. 8, 1966, 08: 54 -1 ♀ (4.0 mm), ZLKU No. 14434.
- 37°14.5' N, 123°15.0' E, 70 m, Nov. 8, 1966, 06: 50 -7 ♂♂ (4.0-5.3 mm), 3 ovig. ♀♀ (7.5-8.5 mm), 9 ♀♀ (3.0-8.0 mm), ZLKU No. 14444.
- 37°15.0' N, 123°30.0' E, 73 m, Nov. 8, 1966, 08: 42 -5 ♂♂ (3.7-4.0 mm), 2 ovig. ♀♀ (8.0 and 8.2 mm), 3 ♀♀ (4.1-5.0 mm), ZLKU No. 14502.
- 37°15.5' N, 124°30.8' E, 70 m, Nov. 8, 1966, 15: 00 -2 ♀♀ (3.7 and 5.3 mm), ZLKU No. 14459.
- 37°23.7' N, 123°16.9' E, 67 m, Nov. 8, 1966, 04: 30 -5 ovig. ♀♀ (8.0-8.8 mm), 7 ♀♀ (5.5-9.5 mm), ZLKU No. 14461.
- 37°30.0' N, 123°30.0' E, 70 m, Nov. 8, 1966, 02: 15 -6 ♂♂ (3.3-6.5 mm), 2 ovig. ♀♀ (7.0 and 9.3 mm), 18 ♀♀ (3.4-7.5 mm), 3 juvs. (2.7-3.0 mm), ZLKU No. 14473.
- 37°30.0' N, 123°45.0' E, 70 m, Nov. 8, 1966, 00: 05 1 ♂ (4.5 mm), 2 ovig. ♀♀ (7.5 and 8.4 mm), 6 ♀♀ (3.2-4.4 mm), ZLKU No. 14435.
- 36°58.5' N, 123°15.0' E, 67 m, Nov. 9, 1966, 12: 05 -2 ♂♂ (3.8 and 5.6 mm), 5 ovig. ♀♀ (6.8-9.0 mm), 2 ♀♀ (5.0 and 5.3 mm), ZLKU No. 14509.
- 37°00.0' N, 124°15.0' E, 76 m, Nov. 9, 1966, 05: 29 -4 ♂♂ (4.4-6.4 mm), 4 ovig. ♀♀ (7.6-9.7 mm), 4 ♀♀ (4.0-6.7 mm), ZLKU No. 14513 (paratypes).
- 37°00.0' N, 125°00.0' E, 59 m, Nov. 9, 1966, 00: 43 -5 ♂♂ (4.0-6.5 mm), 1 ♀ (5.0 mm), ZLKU No. 14527.
- 37°01.5' N, 123°57.9' E, 74 m, Nov. 9, 1966, 07: 20 -2 ♂♂ (4.0 and 5.1 mm), 6 ovig. ♀♀ (6.5-7.5 mm), 11 ♀♀ (5.0-8.3 mm), ZLKU No. 14534.
- 36°29.6' N, 124°59.4' E, 64 m, Nov. 10, 1966, 06: 43 -1 ♂ (3.6 mm), ZLKU No. 14558.
- 36°00.0' N, 125°15.0' E, 66 m, Nov. 11, 1966, 22: 09 -2 ovig. ♀♀ (7.6 and 9.0 mm), 1 ♀ (4.0 mm), ZLKU No. 14553.
- 36°-37° N, 123°-125° E, 66-73 m, Nov. 11, 1966, Time uncertain -1 ♂ (5.0 mm), 1 ♀ (4.0 mm), ZLKU No. 14556.

Description of holotype. The body is depressed and thickset. The rostrum is short and broad, reaching a trifle beyond the border of the

cornea and the eyepeduncle. It is depressed and slightly sulcated dorsally, the tip being truncate and entire without any spines or teeth. In lateral view the rostrum is directed a little upwards and somewhat deep. In frontal view it forms T-shaped. The lateral margin is a bit concave and slightly convergent distally.

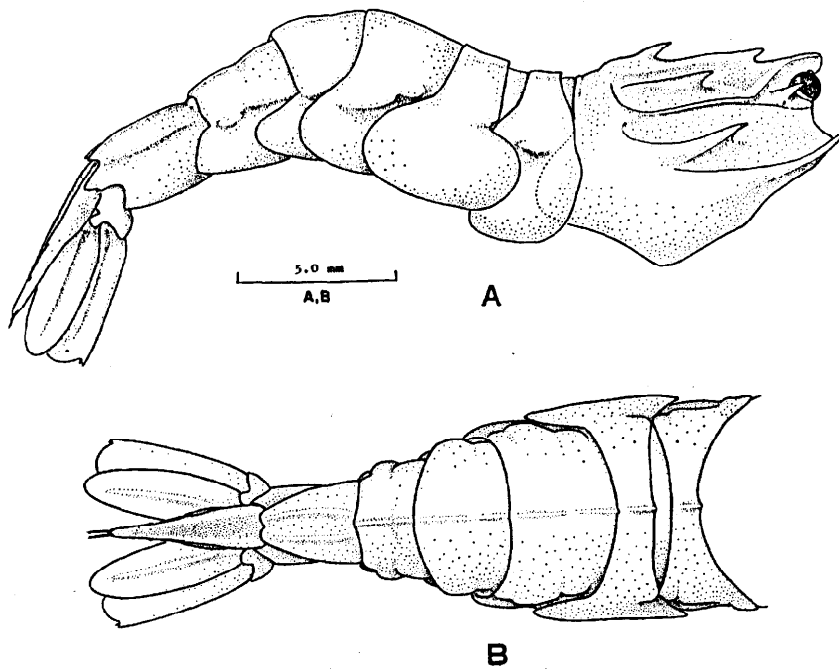


Fig. 10. *Metacrangon sinensis* sp. nov., paratype, ovigerous female. A, carapace and abdomen in lateral view; B, abdomen in dorsal view.

The carapace is on the surface pubescent and sculptured, being as long as or slightly shorter than half the length of the abdomen. The middorsal carina, which is rather high and slightly undulated, is armed with two prominent spines; the anterior spine is somewhat smaller than the posterior, situated a short distance behind the orbit, and the posterior spine is at the posterior third. Dorsolaterally a strong gastric spine is placed, which is at the level with the orbit and mid-point between both of the dorsal spines. A rather short carina, which runs backwards from the gastric spine is nearly in juxtaposition with the dorsal carina. Ventral and somewhat anterior to the gastric spine there is a distinct hepatic spine. Between the gastric and the hepatic spines a weak ridge runs from the suborbital margin backwards to

the point posterior to the middorsal posterior spine and is merged with the another carina extending ventrally. The part enclosed by these carinae is distinctly sunken. A rather marked stria is visible, originating from the anterior margin of the carapace and extending backwards along the longitudinally running carina above mentioned to almost its end. The anterior margin of the carapace is with the strong suborbital spine which is bluntly pointed and broad at the base, failing to reach the end of the rostrum. The branchiostegal spine of large size is produced forwards somewhat beyond the end of the rostrum. A well-defined carina commenced at the branchiostegal spine extends backwards to merge with the lower carina of the hepatic spine.

The abdominal somites are almost glabrous. The obsolete dorsal carinae are visible on the first four abdominal somites. A somewhat marked dorsal carina is visible on the fifth somite. On the sixth somite there are two obscure, apposed carinae. Laterally on each of the first five somites an incomplete carina is present. The lateral carina on the sixth somite is almost complete throughout its length and ends posteriorly in a round protrusion.

The telson is deeply fluted dorsally, much longer than the sixth somite. Two pairs of small dorsal spines are situated on the edges; the anterior pair is at about the middle and the posterior halfway between the anterior pair and the posterior end of the telson. Along the lateral margin there are many long setae grown thickly. The median process of the posterior margin is flanked on both the sides with an outer minute spine, being provided with several long plumose setae.

The cornea is globular and extends beyond the end of the rostrum.

The basal segment of the antennular peduncle is broad with the well-developed stylocerite, the lateral margin of which is nearly straight and terminates anteriorly in an obtuse projection reaching almost the end of the basal segment. The second segment is much longer than the third. The outer flagellum consists of nine stout segments. The inner flagellum is more slender and much longer than the outer, with many tufts of hairs.

The antennal scale is broad, more than one and a half the maximum breadth, a little exceeding the tip of the outer antennular flagellum. The outer lateral margin is slightly convex and tipped with a triangular tooth, the base of which is considerably broad and which scarcely reaches the end of the lamella. The anterior margin of the lamella is broadly convex roundly.

The mouthparts are of normal form of this genus. The mandible terminally possesses the two strong, pointed teeth, each with subterminally

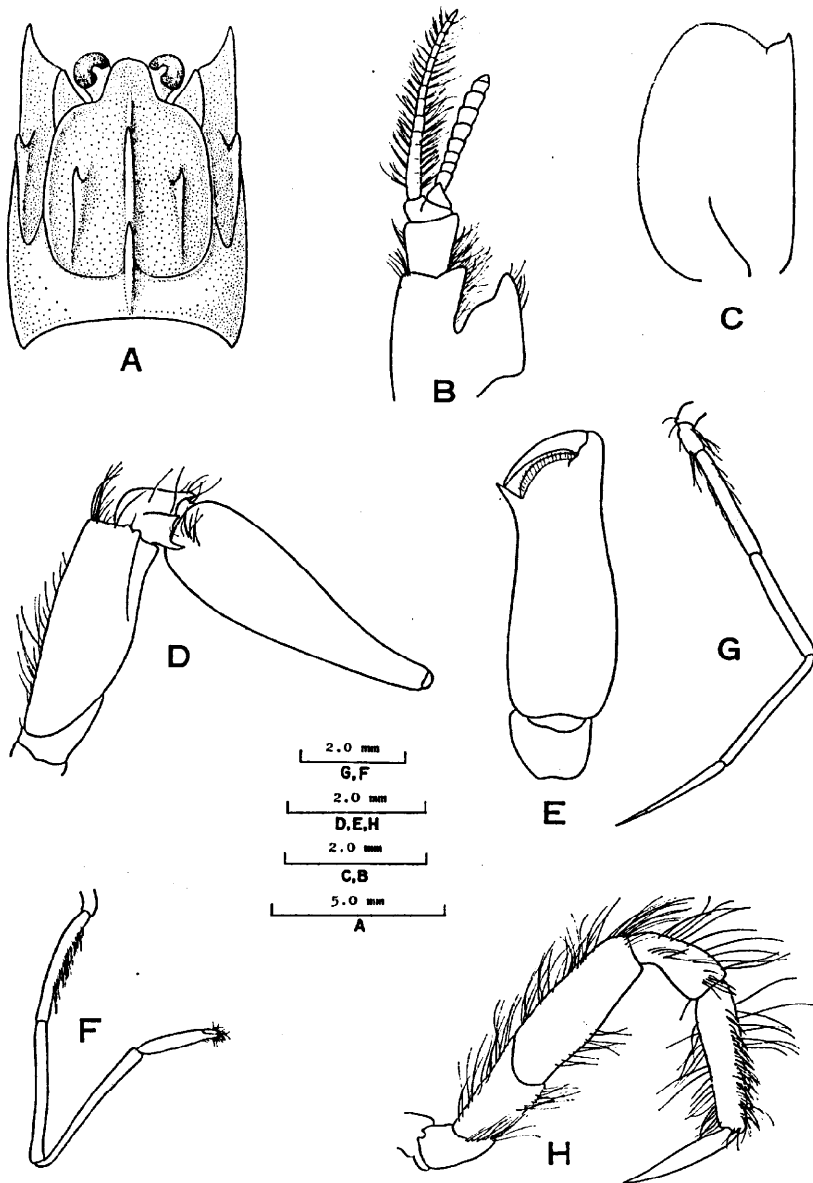


Fig. 11. *Metacrangon sinensis* sp. nov., paratype, ovigerous female. A, carapace in dorsal view; B, antennula; C, antennal scale; D, first pereopod in outer view; E, chela of first pereopod; F, second pereopod; G, third pereopod; H, fourth pereopod.

a small obtuse tooth. The proximal endite of the maxillula is shorter and much narrower than the distal endite and close to each other; the distal endite is strongly curved with many fine setae and stout bristles; the endopod is rather slender and slightly emarginated, with a stout bristle distally. The endite of the maxilla is reduced to form a small convexity; the endopod is slender and long; the broad scaphognathite is a little constricted in the middle. The first maxilliped consists of the slender endopod, the broad-based exopod and the triangularly elongated epipod, the proximal corner of which becomes into a narrow projection. The second maxilliped is with the well-developed, round epipod, the tip of which is pointed; the distal segment of the exopod is very short. The ultimate segment of the third maxilliped is about twice as long as the penultimate and subequal to the antepenultimate; a reduced epipodial process of quadrateform is present.

The first pereopod overreaches the end of the antennal scale when expanded. The chela is rather broad, about three times as long as broad; the proximal portion is a trifle broader than the distal part, the portion anterior to the middle being somewhat narrower. The subchelar spine is rather slender and simple. The carpus is short with a small and a strong spine distolaterally and distoventrally, respectively. The merus is stout, the distal margin being without spine or tooth.

The second pereopod is slender; the movable finger is short, with a crooked tip, about one-third the length of the palmar portion which is narrow and subcylindrical; the carpus is slender, less than twice as long as the chela, and distinctly longer than the merus; the ischium is about one and a half the length of the chela.

The third pereopod is slender and long; the propodus is somewhat longer than the dactylus; the merus is subequal to the ischium in length and much shorter than the carpus; the epipod is slender, slightly curved; the dactylus is flattened, acutely pointed and measures one and a half the length of the propodus; the carpus is slightly shorter than the merus. All of the segments are provided with thickly settled hairs.

The first pleopod is rather short and becomes slender distally. The second pleopod is well developed with the distinct appendix masculina bearing several strong and a series of slender setae marginally. The second to the fifth thoracic sternites in the male and the non-ovigerous female bear strongly protruded and compressed processes; the anterior process is acutely produced forwards. In the male and the non-ovigerous female the abdominal sternites at the base of each pleopod are provided with strong, spine-like projections, of which the last one is rather small and recurved. The ovigerous female is devoid

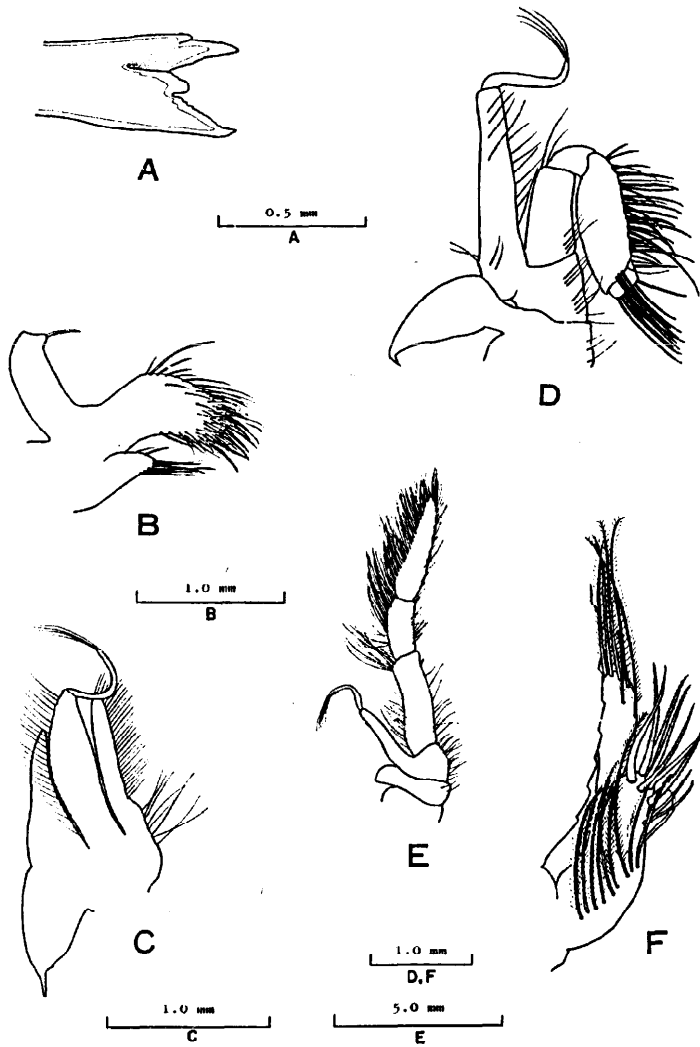


Fig. 12. *Metacrangon sinensis* sp. nov., paratype, A-E: ovigerous female, F: male. A, tip of mandible; B, maxillula; C, first maxilliped; D, second maxilliped; E, third maxilliped; F, endopod of second pleopod.

of all the sternal processes and spines on the thoracic and abdominal sternites.

Variation. The rostrum of the ovigerous female is observed somewhat broader and shorter than in the male and the non-ovigerous

female; the anterior end is usually truncated but in some specimens slightly convex or round. There is a variation in the size of the two median dorsal spines on the carapace; in some specimens the anterior spine is weaker and less erected than the posterior; in the others both the spines are subequal in size and erection or the anterior is larger and more erected than the posterior; the ridge between both the spines is smooth and mostly a little concave or straight; some specimens have an obscure convexity or a minute tubercle-like projection in the middle. The carinae on the carapace of the ovigerous female are relatively lower than in the male and the non-ovigerous female. And also it is observed that the median dorsal carina on the abdominal somites in the male and the non-ovigerous female is more marked than in the ovigerous female. The stria running from the anterior margin of the carapace along the longitudinal carina is subject to some variation in distinctness among individuals. The sculpture on the pleura of the abdomen is in some degree fluctuated in depth and length. The antennal scale of the male is in general rather narrower than that of the female.

There is no noticeable difference between the male and the non-ovigerous female.

Measurements (mm).

	Holotype (ovig. ♀)
Body length	36.1
Carapace length	9.2
Telson length	6.6
Antennal scale length	4.6
Length of chela of first pereopod	5.3

Notes on life history. Ovigerous females were fished throughout the year. The largest ovigerous female is 10.0 mm and the smallest 7.0 mm in the length of the carapace. Juveniles were mainly taken in February. The eggs, after preservation, measure $1.40-1.50 \times 1.10-1.25$ mm in diameter, and the eyed eggs $1.75-1.90 \times 1.25-1.40$ mm.

Description of larvae. The larvae just after hatching (? first larval stage), which are holded under the abdomen of the adult female, measure about 4.1 mm. The yolk is still in rich amount preserved in the body. The eye is fused with the carapace and the cornea is already pigmented. The carapace is smooth and the rostrum is not yet formed. The separation of each abdominal somite is distinct. The articulation between the telson and the sixth abdominal somite appears to be present. The telson and the uropods are not separated from each other, enclosed within the thin integument; through the integument these segments are visible; there are more than ten

small weak spines on the posterior margin. Each segment of the antennular peduncle is not yet separated; the distal part is divided into two lami. The antennal scale is of only a small and narrow lobe, the outer lateral tooth is absent; the anterior margin is provided

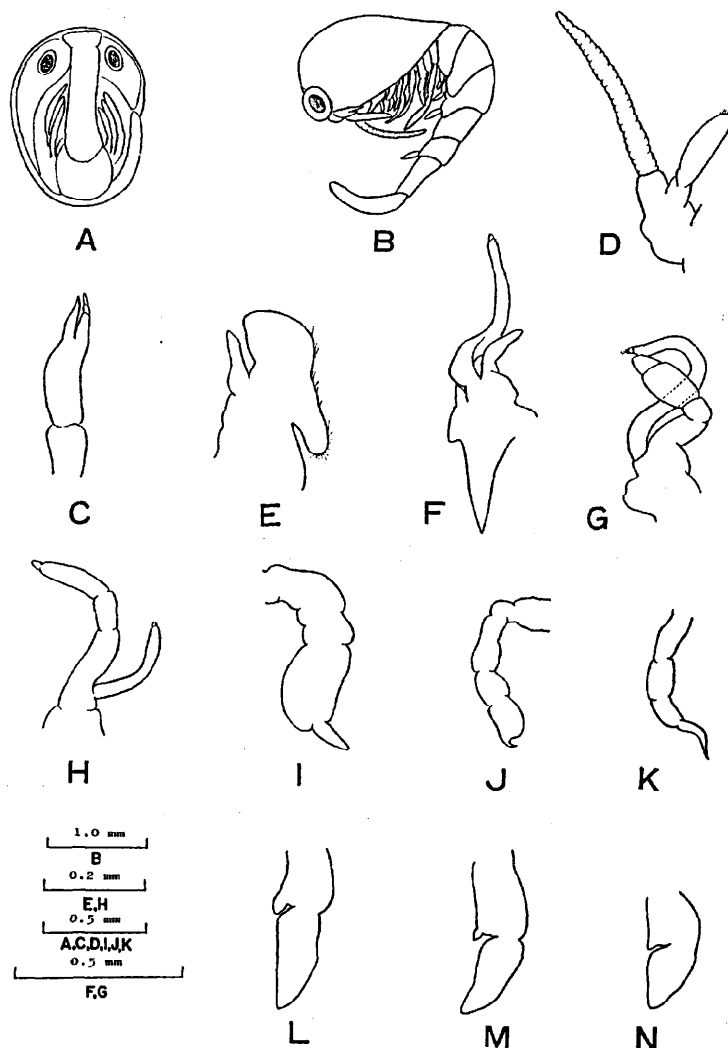


Fig. 13. *Metacrangon sinensis* sp. nov., A: eyed egg; B-N: first larval stage. B, entire animal; C, antennula; D, antenna; E, maxilla; F, first maxilliped; G, second maxilliped; H, third maxilliped; I, first pereopod; J, second pereopod; K, third pereopod; L, first pleopod; M, second pleopod; N, fifth pleopod.

with thin hairs; the flagellum is developed but its segment is not distinct. The oral parts remain undeveloped but seem not so different from the adult form. The palp of the maxilla is well developed; the endite is absent; the scaphognathite is broad and its proximal part becomes narrow with marginally thin hairs. The epipod of the first maxilliped is rather large and triangular in form; the exopod and the endite are well developed. In the second and the third maxillipeds the articulation of each segment is ill-defined. The epipod of the third maxilliped remains undeveloped. The exopods are absent from all the pereopods. The first pereopod is incompletely subchelate, though each segment being not completed. The second pereopod is a rod-shaped appendage with distally a hook-like projection, the chela being not yet formed. The dactyli of the last three pereopods are slender and bluntly pointed. Each of the first four pleopods has a small undeveloped endopod though the exopod is developed. The marginal hairs or setae are invisible. Only in the fifth pleopod the endopod is absent.

The larvae next to the previous stage (? second larval stage) are still attached to the adult. The body is slender and subcylindrical, measuring 5.0 to 5.5 mm. The rostrum is triangular in dorsal view with the rounded tip and the broad basal portion. The carapace is glabrous without any carinae or spines. The anterior ventral portion is somewhat produced forward broadly. The abdomen is slender and cylindrical, the pleura are broad and smooth without carinae, both the anterior and the posterior margins being round; the sixth somite is long and depressed, about one and a half as long as the fifth somite. The telson and the uropod are not yet separated from each other. The eye is movable and well developed; the peduncle is robust and cylindrical. The antennular peduncle is divided into three segments; the basal segment is as broad as the distal two; the third segment is a trifle longer and slender than the second; the stylocerite is broad and truncated distally; the outer flagellum consists of three stout joints with terminally several setae; the inner flagellum is of one joint. The antennal scale is slender; the outer lateral margin is a little concave and ends terminally in a well developed, crooked tooth; the anterior margin of the lamella is strongly produced forwards, far exceeding the lateral tooth; on the anterior and the inner margins plumose hairs are present; the flagellum is stout and rather short, each segment being clearly separated. The mandible is only of a somewhat curved, slender molar process with terminally several strong, triangular or truncated teeth. The maxillula is like the adult form; the palp is curved and the tip truncated; both the upper and the lower laciniae are well developed, each with strong spines distally. The maxilla consists of the reduced endite, the slender endopod and

the broad scaphognathite, the proximal portion of which is constricted to form a narrow expansion with terminally a very long seta. The

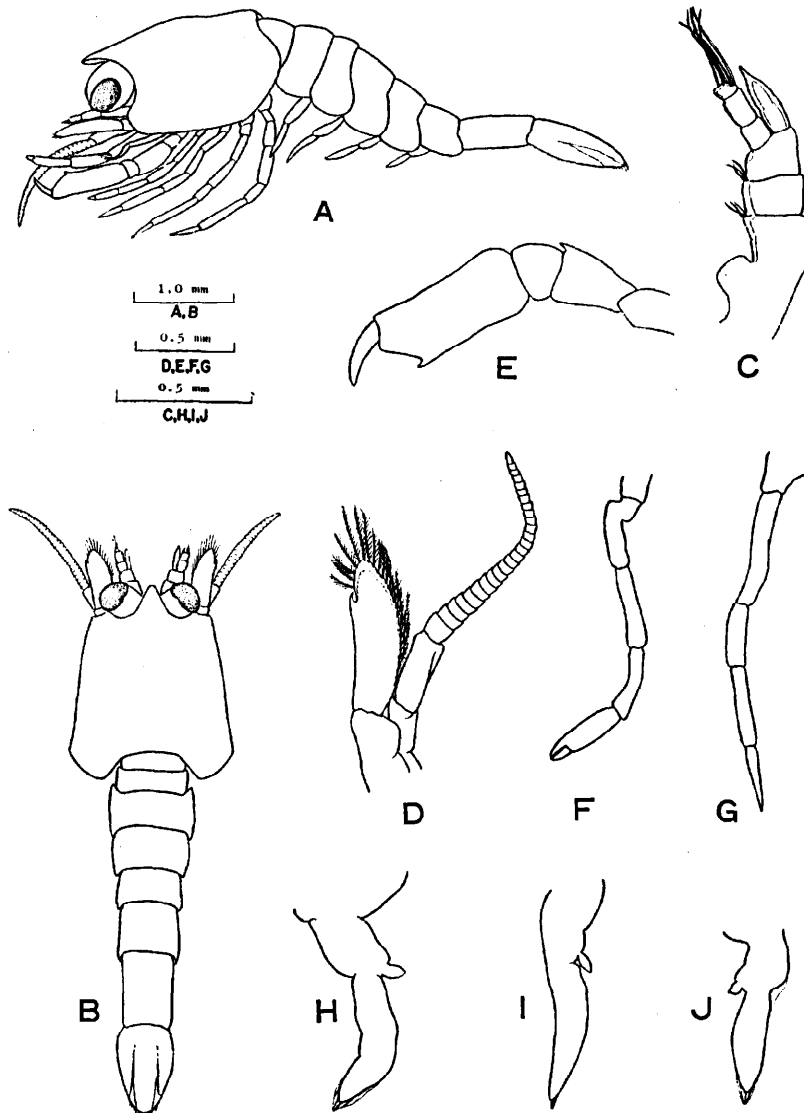


Fig. 14. *Metacrangon sinensis* sp. nov., second larval stage. A, entire animal in lateral view; B, entire animal in dorsal view; C, antennula; D, antenna; E, first pereopod; F, second pereopod; G, third pereopod; H, first pleopod; I, second pleopod; J, fifth pleopod.

endopod of the first maxilliped is slender and long, the basal portion being rather broad; the exopod is well developed and the broader proximal portion is articulated with the slender distal part having terminally long plumose hairs; the triangular epipod is not so developed as in the adult. The epipod of the second maxilliped is distinct and round; the well-developed, three-segmented exopod is much longer than the endopod; the distal segment of the endopod is armed with several spines and setae; in the other parts are present no such setae and hairs as observed in the adult. The endopod of the third maxilliped is naked without setae or hairs; the ultimate segment is subequal to the antepenultimate in length and twice as long as the penultimate; the small, round epipod is present; the two-jointed exopod is long and overreaches the end of the penultimate segment. All of the pereopods are well developed and the exopods are absent. The first pereopod is subchelate and similar to the adult form; the subchela is stout and a trifle curved but not sharply pointed; the anterodistal corner of the merus is provided with a distinct terminal spine which is entirely reduced in the adult. The second pereopod is chelate. The following three pereopods are nearly equal to one another in form and length; the tip of the dactylus is bluntly pointed. The pleopods are developed and jointed; the endopods are of very small lobes; the marginal setae are enclosed by the thin integument.

Remarks. Zarenkov (1965) revised the genus *Sclerocrangon* Sars and separated it into *Sclerocrangon* s. s. and three new genera, *Mesocrangon*, *Rhynocrangon* and *Metacrangon*, on the basis of the structure of the carapace and the abdominal somites, of the appendages of the second pleopod and of the branchial formula. Additionally the biological and ecological facts with comparative anatomic data were detailed in these genera by Zarenkov (1965, 1965a).

The present new species proves to fall in *Metacrangon* defined by Zarenkov (1965) by the presence of two dorso-median and a pair of lateral gastric spines on the carapace, by the rather broad endopod of the second pleopod, which bears terminally coarse plumose setae, by the sixth abdominal somite dorsally carved with the parallel carinae not reaching as far backwards as the posterior margin and with the laterally protruded flap-like expansion, and by the suborbital spine produced forward from the narrow orbit-antennal region. *Metacrangon sinensis* sp. nov. is closely related to the members of the "*Metacrangon munita* group" which was proposed by Yaldwyn (1960). The new species like the North Pacific species, *Met. variabilis* Rathbun, is characterized by the first five abdominal somites more or less carinated, and which is the most important distinct character from the *Met. munita* group having the entirely smooth somites. In this connection

the new species may be in harmony with *Met. spinosissima* Rathbun and also with *Met. spirostris* Rathbun, but from the former it can be discerned by lacking the ventral spines of the pleura, and from the latter by the less erected and much broader rostrum and by the much stouter middorsal spines on the carapace.

The new species bears the closest resemblance to *Met. variabilis* but differs from it in the following regards.

1. The rostrum in the new species is more depressed and much broader than in *Met. variabilis*, and nearly reaches the level of the end of the eyepeduncle. The rostrum in *Met. variabilis* exceeds the end of the cornea.

2. The median-dorsal spines in the new species are very strong, subequal to each other and broad at the base, being obliquely directed upwards. In *Met. variabilis* the anterior one of the median-dorsal spines is more stouter, erected and longer than the posterior.

3. The sculpture on the carapace in the new species is much more distinct and the depression of the gastric region is more than in *Met. variabilis*.

4. The dorsal carinae of the abdominal somites in the new species are clearer than in *Met. variabilis*.

5. Each anterolateral corner of the basal and the second antennular segments in *Met. variabilis* is strongly protruded to form a well-marked projection, while in the new species the corner is rather obtuse in a short lobe.

6. The antennal scale in the new species is broad and round with the outer lateral margin slightly convex and the anterior margin of the lamella broadly round. The lateral final tooth is very broad at the base and reaches as far forwards as the level of the anterior margin of the lamella. On the contrary, the antennal scale in *Met. variabilis* is rather slender with the strongly curved lateral margin. And the lateral tooth in *Met. variabilis* is much more produced forward and more slender than in the new species, the anterior margin of the lamella being strongly expanded forwards.

In general feature the new species is also similar to *Met. richardsoni* (Yaldwyn) recently recorded from New Zealand waters, but distinguished from it in the rostrum which is much broader with the truncate and glabrous tip instead of the trifid, in the antennal scale which is distinctly broader and with the broad-based lateral tooth, and in the presence of the dorsal carinae on the abdominal somites.

According to Gurney (1941), there is no free larvae in *Sclerocrangon* and the young hatch in the adult form. Gurney also noted that, "As

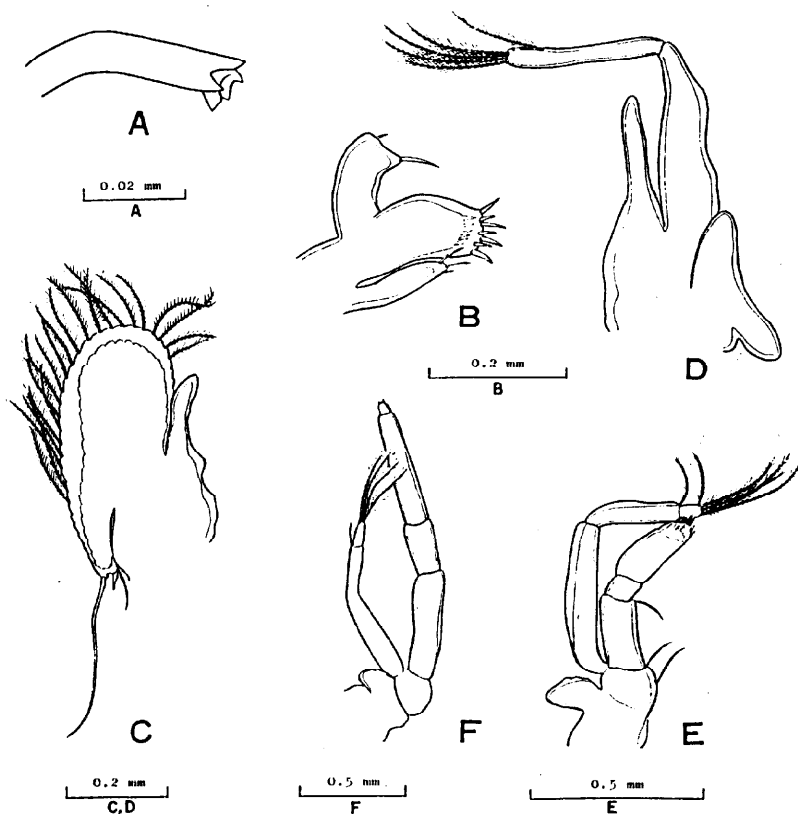


Fig. 15. *Metacrangon sinensis* sp. nov., second larval stage. A, mandible; B, maxillula; C, maxilla; D, first maxilliped; E, second maxilliped; F, third maxilliped.

in the case in *Astacus*, this first stage has no uropod." The ecological and morphological characters observed in the present new species appear to be in good accordance with the above note. The larva of the Arctic species, *Sclerocrangon ferox* (C. O. Sars) is generally similar to that in the present species (Woolebaek, 1906). In the present new species the antennular peduncle in the second stage is considerably developed and the flagellum is separated into two parts, the outer one of which is provided with long setae. On the other hand, in *S. ferox* the segment is rather obscure and the distal portion is not divided. The stylocerite in the present species appears to be somewhat produced laterally, while in *S. ferox* it is not yet visible.

Distribution. Only known from the East China Sea, at a depth of 59 to 150 m,

Pontophilus bidentatus (de Haan, 1844)

(Figs. 16, 17)

Crangon bidentatus de Haan, 1844, pl. 45, fig. 14; de Haan, 1849, p. 183 -Japan.*Pontophilus bidentatus*: Balss, 1914, p. 68, fig. 41 -Japan: Nagasaki; Holthuis, 1955, fig. 100 (after Balss, 1914).*Material examined.*

37°30.0' N, 124°00.0' E, 70 m, Feb. 2, 1966, Time, 02:20 - 1♀ (2.5 mm in carapace length), ZLKU No. 14244.

37°45.0' N, 124°15.0' E, 76 m, Nov. 7, 1966, 15:33 -1♀ (3.3 mm), ZLKU No. 14245.

37°15.3' N, 125°00.0' E, 65 m, Nov. 8, 1966, 18:31 -4 ♂♂ (2.0-2.9 mm), 3♀♀ (2.5-2.8 mm), ZLKU No. 14246.

36°-37° N, 123°-125° E, 66-73 m, Nov. 8-11, 1966, Time uncertain -1♂ (2.8 mm), 1♀ (3.3 mm), ZLKU No. 14253.

36°00.7' N, 125°29.9' E, 60 m, Nov. 12, 1966, 00:08 -5 ♂♂ (2.8-3.3 mm), 1♀ (2.7 mm), 1♀ (2.7 mm), ZLKU No. 14255.

Description. The body is relatively small. The rostrum is short and entirely depressed, reaching slightly beyond the border between the cornea and the eyepeduncle. The frontal margin is truncate or a little convex. Both the lateral borders are anteriorly parallel to each other. The dorsal surface is distinctly sulcated.

The carapace is strongly depressed and sunken dorsally. A rather marked transverse groove runs behind the base of the rostrum. The surface bears a well-defined median carina, with three lateral ones on each side, which are nearly juxtaposed one another. The median dorsal carina is the most distinct of all, ending anteriorly in a stout and a little downcurved tooth which reaches the portion at the back of the transverse groove; viewed laterally, it is about the middle becomes abruptly high and ill-defined posteriorly. The first lateral carina is somewhat convergent anteriorly; it is rather even in lateral view and separated into the anterior shorter and the posterior longer parts by a slight gap; the anterior end of the anterior carina makes a pointed tooth which stands at almost the equal position with the tooth of the median carina; the anterior end of the posterior carina forms rounded. The second lateral carina which rises from the base of the antennal spine runs as far backward as almost the posterior margin of the carapace; it is in about the middle shallow and obscure. The third lateral carina is originated from the strong lateral spine extending to the level of the end of the cornea; this carina disappears posteriorly somewhat in front of the posterior margin. The interspace between each carina becomes smaller from the median laterally.

The thoracic sternite bears a strong frontal projection and four

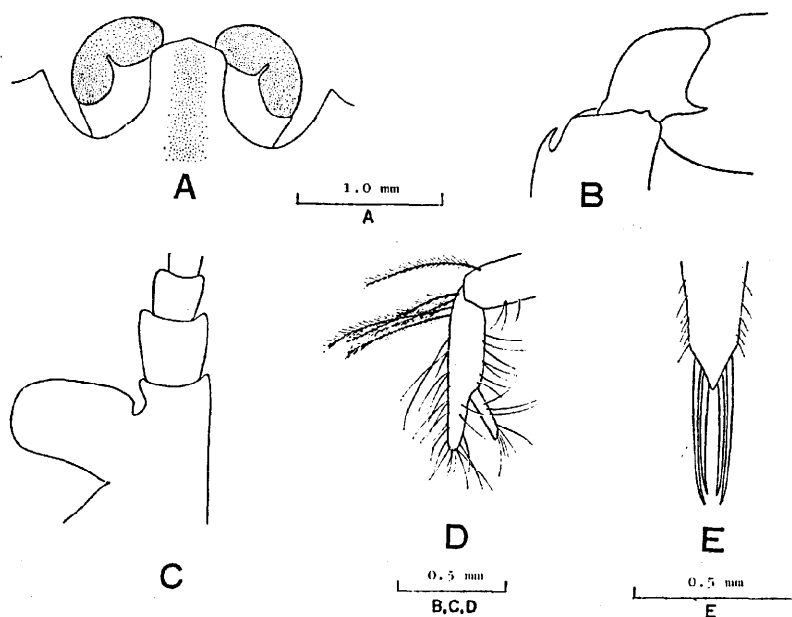


Fig. 16. *Pontophilus bidentatus* (de Haan), male. A, rostrum in dorsal view; B, distal part of merus, and carpus of first pereopod in inner view; C, antennula; D, chela of second pereopod; E, tip of telson.

median, successive and crest-like processes arranged in line; the frontal projection is very long, narrow and flat, produced from the equal level with the base of the second pereopod, reaching as far forward as the base of the first pereopod; the following processes are close to one another and similar in shape, but the last of which is rather vestigial with the round margin.

On the first five abdominal somites there are conspicuous carinae or crests; the crest on the second somite in lateral view is high and anteriorly angled; those on the next three somites are longer than in the second, being highest in the middle and becoming shallower toward both the anterior and the posterior ends which are round or gently slanted. The obscure transverse carinae or convexities are visible, especially on the fourth and the fifth segments. The pleura of the first two somites are bluntly pointed ventrally, and those of the following three somites are truncate and nearly straight, each with posteriorly an obtuse angle. The sixth somite lacks the carina and groove, measuring one and a half times as long as the fifth; the ventral side is longitudinally sulcated with a distinct spine at the posterior

end. The abdominal sternites are armed in the median line with a strong, spinular projection at the same position with the base of each pleopod.

The telson is slender, somewhat longer than the sixth abdominal somite. It is fluted and ends terminally in a pointed process which is flanked on both the sides with two pairs of long setae. The dorsal surface bears no spines.

The basal segment of the antennular peduncle is broad, reaching the end of the cornea. The stylocerite is broadly expanded roundly and directed outwards. The outer flagellum is rather stout and jointed for about eleven segments, extending to the level of the end of the antennal scale. The inner flagellum is slender and short, distinctly failing to reach the end of the outer flagellum.

The antennal scale is broad, more than twice as long as its maximum breadth; the outer lateral margin is almost straight and tipped in a strong tooth; the anterior margin of the lamella is truncated and makes an acute angle with the inner lateral margin, overreaching the lateral tooth.

The branchial formula is as follows.

	I	II	III	IV	V	VI	VII	VIII
Pleurobranchs	—	—	—	1	1	1	1	1
Arthrobranchs	—	—	1	—	—	—	—	—
Podobranchs	—	—	—	—	—	—	—	—
Epipods	1	1	r	—	—	—	—	—
Exopods	1	1	1	—	—	—	—	—

r: rudimental.

The first pereopod when expanded exceeds by the joint of the subchela the end of the antennal scale. The subchela is strong and considerably curved with the tip sharply pointed. The palmar portion is broad and stout, about twice as long as broad; it becomes slightly broader distally with a strong immovable 'thumb', the basal portion of which is somewhat broad and thin. The carpus is very short and cup-shaped; the ventral side is armed with a small tooth; at the upper inner side is also present a distinct tubercular protrusion. The merus is stout, about two and a half as long as its maximum breadth; it is armed anteriorly with a stout, crooked subterminal tooth.

The second pereopod is short, touching the level of the end of the carpus of the first pereopod. The movable finger is short, straight and narrow. The immovable finger is much stouter and a trifle longer than the dactylus. Both the fingers are with the tips straight and not crooked. The palmar portion is also slender, one and a half the length of the dactylus; it is clothed with many long setae. The carpus is much longer and broader than the chela. The merus is as long

as the carpus, and along the inner border setae are grown.

The third pereopod is very slender, not reaching the end of the antennal scale. The dactylus is almost straight, articulated with the distal part. The propodus is distinctly longer than the dactylus. The carpus is as long as the merus. The next two pereopods are similar to each other in shape, but the fourth is shorter than the fifth. The dactylus of the fourth pereopod is slender, sharply pointed and more or less curved; the propodus is one and a half the length of the dactylus; the carpus is somewhat shorter than the propodus; the merus is longer than the propodus. Each segment of the fifth pereopod is longer than in the fourth pereopod.

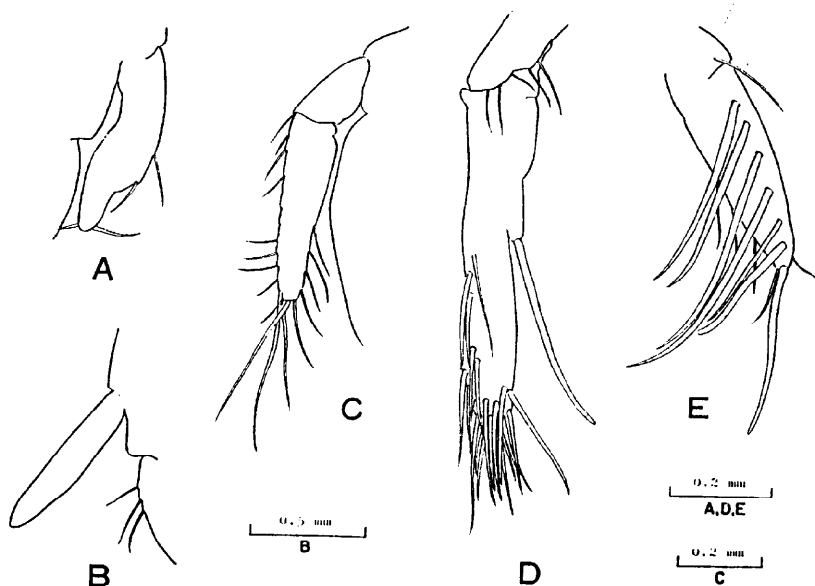


Fig. 17. *Pontophilus bidentatus* (de Haan), A, D, E: male, B, C: female. A, endopod of first pleopod; B, endopod of first pleopod; C, endopod of second pleopod; D, endopod of second pleopod; E, endopod of third pleopod.

The endopod of the first pleopod of the male is of a short and narrow lobe marginally setose. The endopod of the second pleopod is elongated, slender, and rather cylindrical, the tip being covered with thickly settled coarse setae; the very short appendix interna bearing at the tip a long seta is produced at about the middle of the endopod. The following pleopods are provided with considerably developed endopods. In the female the endopod of the first pleopod is a narrow,

naked lobe. The endopod of the second pleopod slightly tapers distally and marginally setose. The following pleopods bear the rather developed endopods, lacking the appendix interna.

Remarks. The antennal scale, the anterior margin of which makes an acute angle with the inner lateral margin, and the processes of oblong form on the thoracic sternum represent the diagnostic features of this species.

The present specimens closely agree with Balss's (1914) description and the excellent figures except the rostrum illustrated very short and so falling short of the border between the cornea and eyepeduncle. In the present specimens the rostrum is much longer and extends to the border. Most of the individuals have a prominent, crest-like projection on the median dorsal side of the first abdominal somite as well as the next four somites, which in Balss's specimens is obscure or entirely absent. However, it may be observed that the crests on the abdominal somites are subject to a certain variation among individuals in distinctness. Also in de Haan's (1844) illustration the abdominal carinae are almost invisible.

Distribution. Recorded only from Japan.

Pontophilus incisus Kemp, 1916
(Fig. 18)

Pontophilus incisus Kemp, 1916, p. 357, pl. 8, fig. 1-Andaman Is.; de Man, 1920, p. 278, pl. 22, fig. 66, 66a-Malay Arch.; Calman, 1939, p. 220-Gulf of Oman.

Material examined.

30°01.0' N, 124°04.0' E, 55 m, June 15, 1962, Time, 20:06-3 ♂♂ (3.8-4.0 mm) in carapace length, ZLKU No. 16556.

33°23.4' N, 129°03.9' E, 100 m, June 18, 1964, 23:40-1 ♂ (3.8 mm), ZLKU No. 16531.

34°00.7' N, 129°19.4' E, 110 m, June 20, 1964, Time uncertain-1 ♂ (3.5 mm), ZLKU No. 14242.

26°05.0' N, 122°55.0' E, 110-111 m, Dec. 9, 1967, Time uncertain-1 ♀ (3.0 mm), ZLKU No. 16532.

Port Blair, Andaman Is. British Museum (Natural History), No. 1924.1.25.sl-55, Zoological Survey of India-1 ♂ (2.7 mm) (syntype).

Description. The rostrum is slender and almost straight, the truncate apex reaching the end of the cornea. In lateral view it is somewhat deep distally, becoming a little more shallower proximally. Viewed dorsally, the lateral borders are nearly juxtaposed and each with terminally a distinct spinular projection directed obliquely forward. The rostrum is markedly fluted. Along the lateral borders long, rather stout setae are grown to cover the greater part of the eye.

The thoracic sternum is armed in front with a strongly protruded, long spine which rises from the level of the basal portion of the stout setae are grown to cover the greater part of the eye.

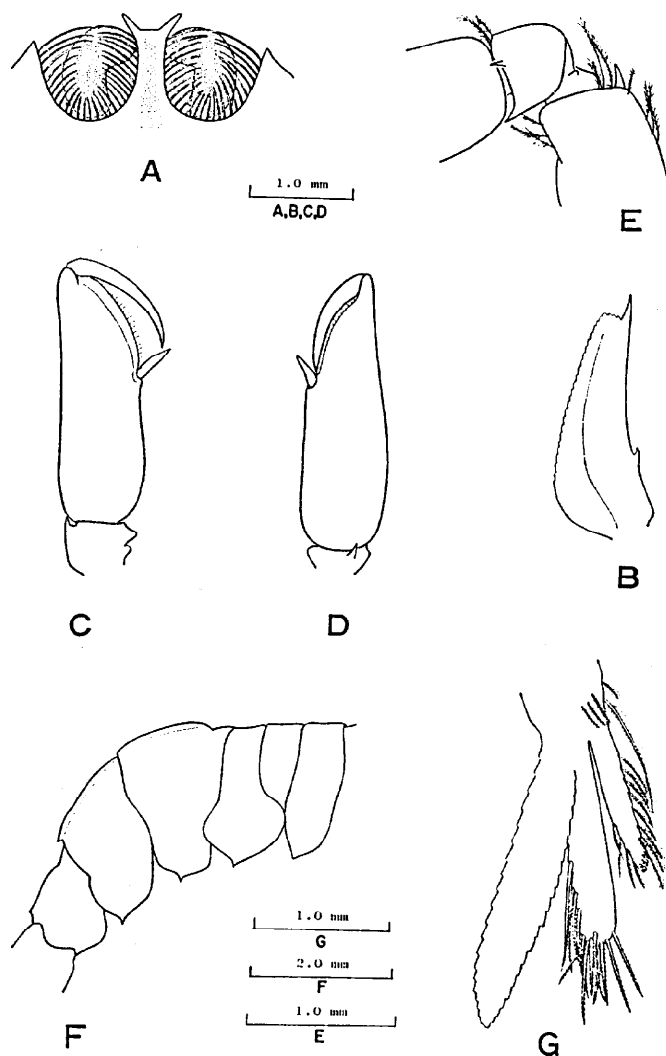


Fig. 18. *Pontophilus incisus* Kemp, male. A, rostrum in dorsal view; B, antennal scale; C, first pereiopod of specimen from East China Sea; D, first pereiopod of syntype from Andaman Is.; E, distal part of merus, and carpus of first pereiopod in inner view; F, abdomen of syntype from Andaman Is. in lateral view; G, second pleopod.

second pereopod, and which extends far beyond the base of the first pereopod. This spine is followed by three much smaller spines; the first spine is placed at the same position with the base of the third pereopod and produced forwards from the broad base; the second spine is much more erected than the first and a little curved; the third spine is in front of the base of the fifth pereopod and crooked, as long as the second.

The antennal scale is broad and more than two and a half the maximum breadth, reaching as far forward as the midpoint of the upper antennular flagellum. The outer lateral border is slightly concave with at about the proximal third a stout spine, terminating in a distinct and sharply pointed tooth which far exceeds the end of the lamella. The anterior margin of the lamella is rather truncated. An obscure carina runs longitudinally throughout the length somewhat outside the middle.

The third maxilliped is provided with a pleurobranch but not an arthrobranch. A rather developed podobranch is present on the epipod of the second maxilliped.

The branchial formula is tabulated below.

	I	II	III	IV	V	VI	VII	VIII
Pleurobranchs	—	—	1	1	1	1	1	1
Arthrobranchs	—	—	—	—	—	—	—	—
Podobranchs	—	1	—	—	—	—	—	—
Epipods	1	1	r	—	—	—	—	—
Exopods	1	1	1	—	—	—	—	—

r: rudimental.

The first pereopod surpasses the end of the carpocerite of the antennal peduncle by the whole length of the chela. The palmar portion is broad and slightly narrows distally, about three times as long as broad. The 'thumb' is strong, pointed and articulated to be movable. The carpus is very short; the inner lower margin and the inner middle portion bear a stout and a much smaller spine, respectively. The merus is about twice as long as broad; a well-developed terminal spine is produced from the anterodistal corner; there are many plumose setae along both the borders.

The appendix masculina is long and well developed, extending to the middle of the endopod; it is armed distally with many coarse setae. The appendix interna is much slender and narrower than the appendix masculina with marginal setae. The following pleopods have the developed appendix interna.

Remarks. In Kemp's (1916) figure of the first pereopod the 'thumb'

of the subchela was not drawn to be articulated, and nothing was mentioned about it. Such an articulation seems an important character to identify the species of this genus. In the present specimens the 'thumb' is without doubt articulated. And one male specimen of the syntype, which is preserved in the British Museum, proves that the thumb is infallibly articulated, too. Therefore there might probably be no room to infer that Kemp did not overlook this fact in his material.

The ventral margins of all the abdominal pleura in the present specimens are broadly round and smooth. On the other hand, the margin of each pleuron in the syntype makes a small spinose projection in the middle. The median dorsal carinae on both the third and the fourth abdominal somites in the syntype are much more distinct than in the present specimens. Kemp (1916) in reference to this point described that, "the pleura of the first four somites are pointed below, bluntly in the female, rather more sharply in the male." In both of the syntype and the illustration given by Kemp the lateral spine of the antennal scale is situated at almost proximal fourth, while in the present specimens it is at about the proximal third. The terminal tooth of the present specimens is somewhat longer than in the syntype. Apart from the above-mentioned differences which should be considered as but a variation the present specimens are in good accordance with Kemp's description and figures.

Distribution. Known from the Gulf of Oman eastwards to the Malay Archipelago.

Pontophilus japonicus Doflein, 1902
(Fig. 19)

Pontophilus japonicus Doflein, 1902, p. 621, fig. B, pl. 3, fig. 6 - Japan: Sagami Bay; de Man, 1920, p. 286, pls. 23, 24, fig. 69-69j - Sulu Sea.

Material examined.

33°09.2' N, 128°01.4' E, 158 m, June 18, 1964, Time, 14:38-1♀ (3.5 mm in carapace length), ZLKU No. 14243.

Description. The basal segment of the antennular peduncle is broad and short, not reaching the end of the rostrum. The stylocerite is a broad and round lobe directed obliquely forward. The distal two segments are very short; the second segment is broader than the third, the outer distal corner being narrowly produced. The outer flagellum distinctly overreaches the end of the antennal scale; it is segmented for eight joints, the basal two of which are much longer than the other segments. The inner flagellum is a little longer and

much more slender than the outer.

The antennal scale is two and a half as long as its maximum breadth. The outer lateral margin is perceptibly concave and proves under a considerable magnification to be finely serrated almost throughout its length. The terminal spine is strong and far exceeds the end of the lamella. The anterior margin of the lamella is rather truncated.

The third maxilliped exceeds with the distal half of the ultimate segment the end of the antennal scale. The ultimate segment narrows distally and somewhat longer than the penultimate. The antepenultimate segment is about one and a half the length of the ultimate segment. Neither the pleurobranch nor the arthrobranch is present. The branchial formula is as follows.

	I	II	III	IV	V	VI	VII	VIII
Pleurobranchs	—	—	—	1	1	1	1	1
Arthrobranchs	—	—	—	—	—	—	—	—
Podobranchs	—	1	—	—	—	—	—	—
Epipods	1	1	1	—	—	—	—	—
Exopods	1	1	1	—	—	—	—	—

The first pereopod overreaches the end of the antennal scale by half the length of the palmar portion, more than two and a half as long as the maximum breadth. It becomes narrower distally with a strong and immovable 'thumb'. The subchela is strong and somewhat curved. The carpus is very short and cup-shaped with at the outer side a strong marginal, spinular projection; a stout process is also present at the inner distal side. The merus is broader distally; on the distal margin there are one large and three other smaller spines.

The second pereopod overreaches the carpus by the length of the chela. The dactylus is very narrow and straight with the sharply pointed tip. The immovable finger in the distal half is broken off, but the basal portion is much broader than in the dactylus. The palmar portion is short, about half the length of the dactylus. The carpus is subcylindrical, subequal in length to the chela. The merus is long, a bit less than three times as long as the carpus; there are many long setae on each segment.

The third pereopod is long and filiform. The dactylus is excessively slender with the tip sharply pointed; the distal third is articulated with the rest. The propodus is somewhat longer than the dactylus. The carpus is much shorter than the dactylus, and a little longer than the merus. The dactylus of the fourth pereopod is very slender and a trifle curved with the tip sharply pointed. The propodus is somewhat longer than the dactylus. The carpus is short, more than a quarter the length of the propodus. The merus is distinctly shorter

than the propodus.

Remarks. The present specimen, though it is considerably damaged, may be referable to this species, especially by the characters of the fine denticulation of the outer margin of the antennal scale, by the shape of the rostrum and by the spinulation on the carapace. The

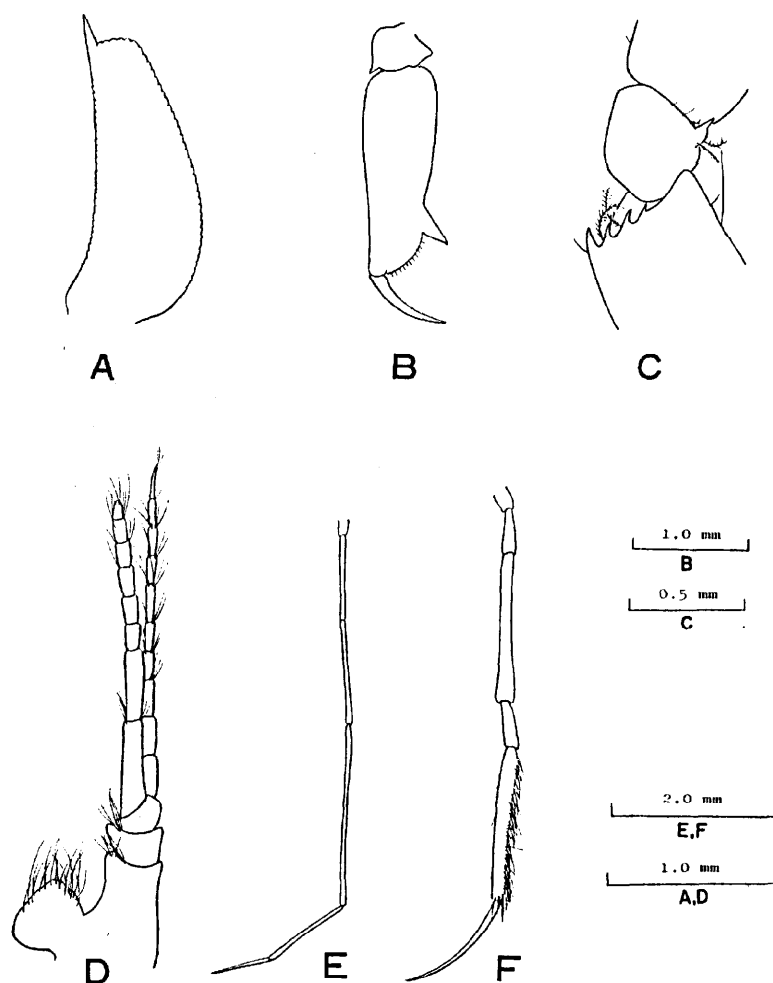


Fig. 19. *Pontophilus japonicus* Doflein, female. A, antennal scale; B, chela of first pereiopod; C, distal part of merus, and carpus of first pereiopod in outer view; D, antennula; E, third pereiopod; F, fourth pereiopod.

numerous denticles of the antennal scale in this specimen are so fine that they would probably be overlooked without considerable magnification. On the other hand, de Man's (1920) figure showed small but rather distinct denticles which are much less in number than in the present specimen. According to de Man, the denticles are in the middle well developed but diminish in size both anteriorly and posteriorly. Such denticles in question were not mentioned in Doflein's (1902) original description as already pointed out by de Man.

The present species appears to fall within the group II in the grouping of the species of *Pontophilus*, made by Kemp (1916), on the basis of the degree of the development of the pleopods, because that the pleopods of this species are comparatively well developed and provided with the appendix interna except in the first and the last pleopods.

This species is characterized by the very slender and long dactyli of the last two pereopods and such a form of pereopods may suggest its inhabiting the muddy bottom.

A minute spine just below the lateral process of the carapace seems to have been overlooked by the previous authors.

Distribution. This species has hitherto been recorded only from Japan and Sulu Sea. de Man's specimens from Sulu Sea were reported to be obtained at the depths of 275 and 522 m where are stony or coral in bottom condition.

Pontophilus sp.

(Figs. 20, 21)

Material examined.

26°05.0' N, 122°55.0' E, 110-111 m, Dec. 9, 1967, Time uncertain-1 sp., ZLKU No. 16533.

Description. A considerably mutilated specimen, lacking all of the pereopods. The rostrum is short and slender, the truncated but rather round apex not reaching the end of the cornea; it is slightly narrow in about the middle and longitudinally channelled.

The carapace is smooth and strongly depressed, slightly less than a third of the body in length; an epigastric spine directed anteriorly is situated in contact with the shallow transverse concavity behind the rostrum. The hepatic spine followed by an ill-defined, short carina is a little behind the epigastric spine. On the ridge which is slightly overhung forward and extended outwards from the orbital margin are present three pairs of small frontal spines closely settled one another

dorsolaterally; the outermost is the stoutest and the inner is minute. A small antennal spine lies just on the orbital margin. There are three distinct anterolateral spines directed anteriorly and sharply pointed; the foremost is the strongest and its tip exceeds the cornea, the following two becoming less stouter and somewhat separated from the foremost; an obscure carina runs a little backwards from the bases of these spines. A fine stria originating from the middle point between the antennal and the anteroventral spines on the anterior margin runs in a straight line as far backwards as about the middle of the carapace.

The abdominal somites are smooth except only for the fifth having dorsally a pair of obscure and a trifle curved carina which is converged anteriorly, and which becomes very obscure posteriorly; the postero-ventral corners of the fourth and the fifth somites are rather square. The sixth somite is long, cylindrical, measuring about twice as long as the fifth. The pleura of all the abdominal somites are broad, not narrowed nor pointed.

The telson is elongated and slender, attenuating posteriorly into a triangular process. The dorsal surface is convex with two pairs of minute spines somewhat inside the lateral margins; the anterior pair is a little in advance of the middle, and the posterior in front of the middle between the anterior pair and the posterior end of the telson. Terminally three pairs of spines are present; the outermost pair is very small and the inner two are slender, long and subequal in length.

The eye is stoutly constructed; the cornea is reniform and exceeds the apex of the rostrum.

The basal segment of the antennular peduncle is broad, and becomes expanded anteriorly with the anterolateral projection which is terminally pointed. A broad and round stylocerite extends outwards, the strongly curved outer margin terminating in a small spinular process which fails to reach the articulation between the basal and the second segments. The second and the third segments are subequal to each other in length, but the former being much broader than the latter, both together as long as the basal segment. The outer flagellum is stout and long, overreaching the end of the lamella of the antennal scale. The inner flagellum is more or less thicker than the outer, being broken off distally on either side.

The basicerite of the antennal peduncle is provided laterally with a small spine. The antennal scale is broad, about twice as long as its maximum breadth; the outer lateral margin is nearly straight with terminally a distinct lateral tooth which is exceeded by the end of the lamella; the anterior margin is broad and produced at the inner corner,

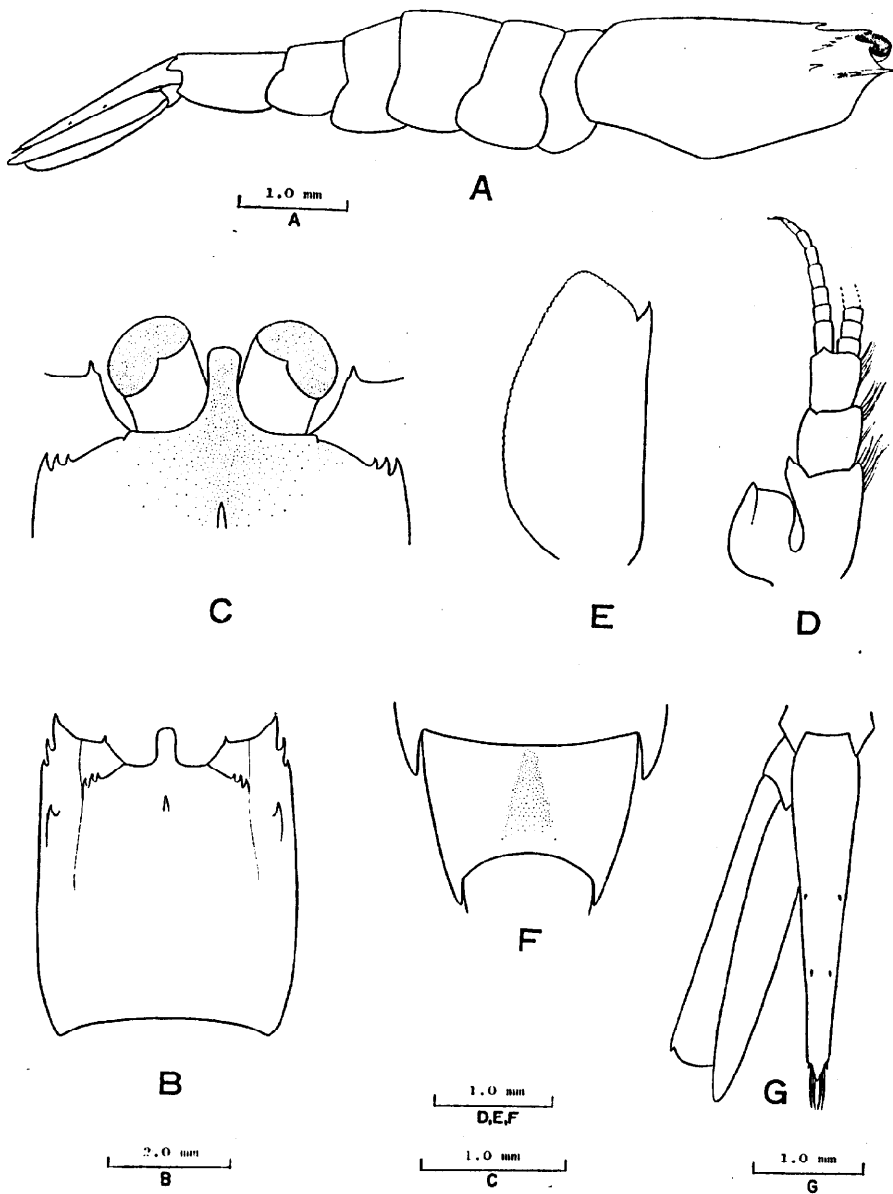


Fig. 20. *Pontophilus* sp. A, entire animal in lateral view; B, carapace in dorsal view; C, anterior part of body in dorsal view; D, antennula; E, antennal scale; F, fifth abdominal somite in dorsal view; G, telson and uropod,

The mouthparts are typical of the genus. The mandible is of a molar process distally separated into three strong, bluntly pointed teeth. The distal endite of the maxillula is expanded roundly with several strong, marginal spines and many coarse setae; the proximal endite is narrow, short and distally setose; the palp is also slender with the curved tip possessing a long spine distally. The maxilla has only a reduced endite; the palp is well developed and slender; the scaphognathite is rather broad. The first maxilliped is made up of the well-developed triangular epipod, the moderately developed exopod with the narrow caridean lobe, and the slender endite. The ultimate joint of the endopod of the second maxilliped is very short and obliquely coalesced with the penultimate segment; a well-developed epipod is with a distinct podobranch. The third maxilliped has the ultimate segment distally damaged; the penultimate segment is about two-thirds the length of the antepenultimate; a small truncated epipod is present; a large and a rudimental arthrobranch is present.

The branchial formula is tabulated below.

	I	II	III	IV	V	VI	VII	VIII
Pleurobranchs	—	—	—	1	1	1	1	1
Arthrobranchs	—	—	1+r	—	—	—	—	—
Podobranchs	—	1	—	—	—	—	—	—
Epipods	1	1	r	—	—	—	—	—
Exopods	1	1	1	—	—	—	—	—

r: rudimental.

All the pereopods are detached and missing.

The thoracic sternum is entire without any spines or processes. The abdominal sternum has some vestigial median processes.

All the pleopods have the endopods well developed; the endopod of the first pleopod is slender, and the tip is rounded with several long setae marginally; the endopod of the second pleopod is also narrow and shorter than in the first, being marginally setose; the endopods of the following pleopods become shorter and broader posteriorly; the appendix interna and masculina are entirely absent from all the endopods.

The uropod is narrow; the endopod is longer and more slender than the exopod, the former longer than the telson but not the latter.

Measurements (mm)

Body length	15.9
Carapace length	4.8
Telson length	2.8

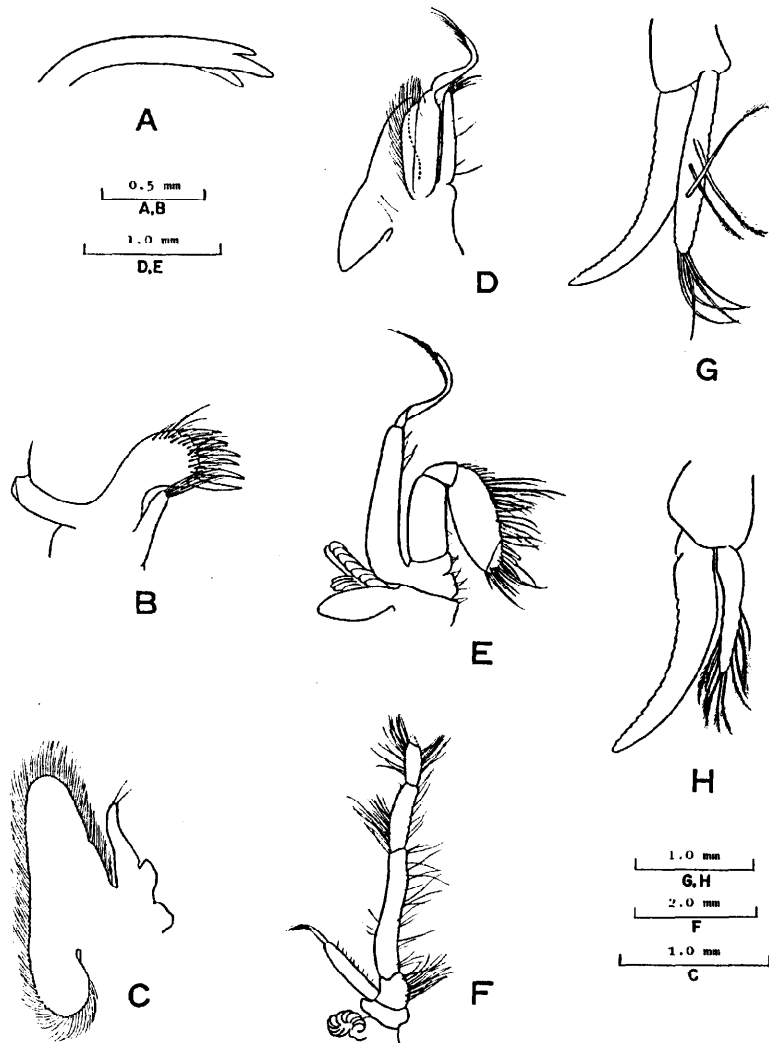


Fig. 21. *Pontophilus* sp. A, mandible; B, maxillula; C, maxilla; D, first maxilliped; E, second maxilliped; F, third maxilliped; G, first pleopod; H, second pleopod.

Remarks. The present single specimen is rather heavily damaged, missing all of the pereopods. However, with the feature of the carapace as well as with the shape of the antennular peduncle and of the antennal scale this specimen appears to be generally allied to *Pontophilus plebs* Kemp, 1916, but some distinct regards are checked up as follows:

1. Such three pairs of frontal spines on the ridge extending out-

wards from the orbit as observed in the present specimen are entirely absent in Kemp's description and illustration. Balss (1921) also pointed out the presence of a pair of frontal spines in his Australian specimen and considered that it might be a variation of *P. plebs*, but Balss did not give the special name for it because of his hesitation that Kemp's specimens seem to be young or immature ones. Balss's figure showed the presence of the ridge or carina going backwards from the frontal spine to nearly the posterior margin of the carapace. While, in the present specimen the ridge is short and fails to reach as far backwards as the middle of the carapace.

2. Kemp (1916) described that the abdominal somites are smooth without sculpture or pubescence, whereas in the present specimen the fifth abdominal somite is obscurely carinated dorsally as noted in the description.

3. The outer flagellum of the antennula in Kemp's figure was illustrated much stouter than the inner, whereas in the present specimen the outer flagellum is more slender at the base than the inner.

4. In Kemp's figure of the antennal scale the anterior margin of the lamella is much more strongly expanded forward than in the present specimen.

5. Two rows of excessively minute spines between the lateral spines on the telson, which were plainly shown in Kemp's description can not be observed in the present specimen.

Although this specimen may be separated from *P. plebs* by the above-mentioned differences, especially by the fact of having the three pairs of the frontal spines, it should be advisable not to give the specific name for it because of the unwarranted preservation of the heavily damaged specimen now examined.

Judging from the well-developed endopod of all the pleopods being devoid of both the appendix masculina and the appendix interna, the present specimen is to fall in either the group VI or V in the grouping of the species of *Pontophilus* by Kemp (1916).

Pontocaris habereri Doflein, 1902

(Fig. 22)

Pontocaris habereri Doflein, 1902, p. 620, fig. A, pl. 1, figs. 4, 5 - Japan: Sagami Bay.

Egeon habereri: Rathbun, 1906, p. 911 - Hawaii Is.

Aegeon (*Pontocaris*) *habereri*: Balss, 1914, p. 71 - Japan: Sagami Bay.

Material examined.

28°32.0' N, 126°18.8' E, 115 m, June 13, 1962, Time, 15:13 - 1♂ (5.6 mm in carapace

length), ZLKU No. 16559, 1 ♀ (7.6 mm), ZLKU No. 16534.
 29°58.5' N, 126°59.5' E, 100 m, June 17, 1962, 10: 28 -1 ♂ (6.3 mm), ZLKU No. 16560.
 29°59.5' N, 126°14.5' E, 85 m, June 17, 1962, 05: 48 -1 ♂ (6.9 mm), ZLKU No. 16561.
 29°00.1' N, 124°48.1' E, 82 m, June 29, 1962, 21: 54 -1 ♂ (6.8 mm), ZLKU No. 14239.
 30°01.0' N, 124°50.0' E, 58 m, July 1, 1962, 07: 04 -1 ♂ (7.0 mm), ZLKU No. 14240; 1 ♂ (6.5 mm), ZLKU No. 16562.
 Definite locality unknown, July 1, 1962, Time uncertain -3 ovig. ♀♀ (7.8-8.5 mm), 2 ♀♀ (8.0 and 8.3 mm), ZLKU No. 16535.
 30°29.2' N, 124°46.3' E, 53 m, July 2, 1962, 10: 38 -1 ovig. ♀ (7.5 mm), ZLKU No. 14241.
 28°44.7' N, 124°51.7' E, 92 m, June 13, 1963, 18: 32 -1 ♂ (6.6 mm), ZLKU No. 14235.
 28°45.0' N, 125°31.0' E, 99 m, June 13, 1963, 23: 45 -1 ♂ (6.7 mm), 1 ovig. ♀ (8.5 mm), ZLKU No. 14236.
 28°45.0' N, 126°14.14.5' E, 100 m, July 14, 1963, 05: 36 -1 ovig. ♀ (8.2 mm), ZLKU No. 14238.

Description. The carapace is furnished with one median and three lateral carinae. The median carina has four teeth; the first tooth is much erected than the others; the third tooth is the largest. The first lateral carinae are convergent anteriorly, each with six strong teeth which increase their size anteriorly; the interval between the anterior two teeth is much larger than that between the other neighbouring teeth; the carina reaches as far forward as a small tooth which is at a short distance from the orbital margin. The second lateral carina is nearly parallel to the first, being separated into the anterior shorter and the posterior longer parts by the shallow slant depression; the former part bears two strong teeth, the anterior of which is placed behind the lateral process of the carapace and is of also the foremost one of the row of the teeth on the third lateral carina; the latter part is provided with a series made up of seven,

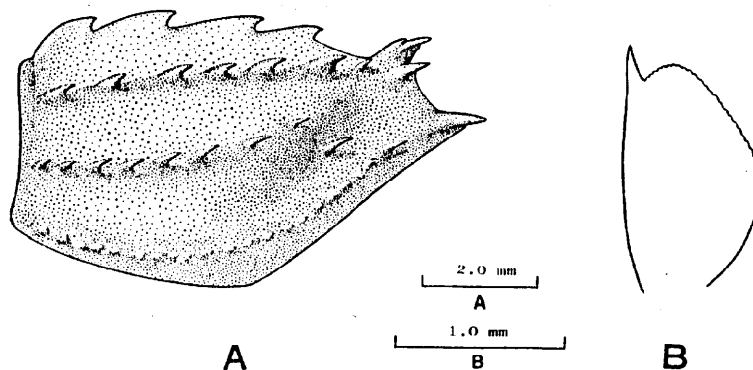


Fig. 22. *Pontocaris habereri* Doflein, male. A, carapace in lateral view; B, antennal scale.

much less developed teeth than those on the first carina, but the foremost tooth is stout and faced on the depression. A small, but distinct spine, which is somewhat above the others on the second carina, lies at the upper verge of the depression, between the second and the third teeth. The teeth on the third lateral carina are too obscure to calculate the exact number of them; it is succeeded as far nearly backwards as the posterior margin of the carapace.

The antennal scale is broad, somewhat less than twice as long as broad; the broadest portion lies in about the middle; it reaches far beyond the end of the antennular peduncle; the outer lateral margin varies from a trifle concave to a bit convex. The lateral final tooth is strong, greatly exceeding the end of the lamella. The anterior margin is round. The fifth abdominal somite bears three carinae; a median longitudinal carina is almost straight and bilaterally has a sinuous carina which is convergent anteriorly. Many tubercles and convexities are clearly ornamented in the adult while obscure or undeveloped in the young individuals.

Remarks. The present material is in good accordance with Doflein's (1902) original description and illustration. The text figure of the second pereopod given by Doflein showed the chela somewhat longer than the carpus, and afterwards de Man (1920) adopted this feature as one of the key characters. On the other hand, the chela in the present specimens is equal to or a little shorter than the carpus. This slight difference between the present specimens and the previous authors' descriptions seem to be rather less important for separating from each other. The spinulation on the carapace of the present material differs from Doflein's figure in possessing two more spines; a small spine, which is situated a short distance behind the orbit and forms the foremost tooth of the row of the teeth on the first lateral carina; another small spine, which is nearly placed between the second and the third teeth on the second lateral carina, and a little above the level. These two spines now in question are rather small but distinct and their presence may be constant because of the specimens at hand being armed with them without exception. So far no authors have noted the presence of these two spines.

The present species shows a good resemblance to *Pontocaris lacazei* Gourret except the shape of the antennal scale. The antennal scale in *P. lacazei*, according to Kemp (1910), is with the definitely concave outer margin, and this character is mentioned as rather constant, but slight variation is observed in the present specimens in this connection. The lamella of the antennal scale in the present material is much broader than the illustration made by Kemp (1910). The sculpture on the abdominal somites in the both are closely similar to

each other. In *P. lacazei* the two outer ones of the three dorsal carinae on each of the third and the fourth somites are posteriorly divergent in almost straight line. In *P. habereri*, however, these carinae in the ovigerous female and the large individuals are anteriorly curved and expanded outwards in the middle, and then somewhat converged posteriorly, forming a triangular symmetrical convexity. In the young or the male its posterior part is slightly divergent and merged terminally with the posterior transverse ridge on each somite. The irregularly arranged carving on the lateral sides of the somites is much less developed in the young and the male rather than in the ovigerous female and the larger individuals.

Rathbun (1906) noted that, "the median carina of the male is four-toothed, of the female five-toothed." However, among the present material no female bearing five teeth is found.

Distribution. Known from Japan and the Hawaii Islands, at a depth of 130 to 253 m.

Pontocaris sibogae (de Man, 1918)

Aegeon sibogae: de Man, 1920, p. 298, pl. 24, fig. 72-72f -Bali Sea.

Material examined.

28°32.0' N, 126°18.8' E, June 13, 1962, Time, 15: 13 -1 ♀ (10.1 mm in carapace length), ZLKU No. 16540.

Remarks. A single female at the authors' disposal agrees precisely with de Man's (1920) description and excellent figures. Only the different point is found in the rostrum, which in the present specimen is more slender and longer, and the tip of which is pointed and simple instead of that of de Man's (1920) specimen being minutely bifid. In addition to the above difference the teeth on the median dorsal and the supra-marginal carinae in the present specimen are less prominent than in de Man's figure. And in the supra-marginal carina the exact number of the teeth is not certain on account of their obscurity.

There is at about the base of the fourth pereopod a rather large, somewhat erected sternal process with the sharply pointed tip, the basal portion of which is very strongly compressed. This process is succeeded by a low, sharp carina and a carinal process, the former being situated in the median line between the base of the fourth and the fifth pereopods, the latter standing at the same portion with the base of the fifth pereopod. The form of these processes is markedly different from in the ovigerous female described by de Man (1920).

On the basis of the differences in the last thoracic sternum of the

adult female, in the sculpture on the third abdominal somite, and in the huge spine at the anterior extremity of the lateral crest of the carapace, the subspecies, *Pontocaris sibogae intermedia* was separated from this species by de Man in 1918. According to de Man (1920), the last thoracic sternal process in the female of this species is not carinated, whereas sharply done in the subspecies. In this respect the present specimen is rather in accordance with the characteristic of the subspecies. While, in the latter two distinguishing points the present specimen appears to belong to this species. By the above reason, as far as the present specimen is concerned, there seems to be present a doubt to separate *P. sibogae intermedia* from *P. sibogae*.

Distribution. Known from Bali Sea.

Section Stenopodidea

Family Stenopodidae

Spongicola venusta de Haan, 1844

Spongicola venusta de Haan, 1844, pl. 46, fig. 9; de Haan, 1849, p. 194 -Japan; Miers, 1878, p. 507, pl. 24, figs. 1, 2 -Philippines: Cebu; Bate, 1888, p. 213, figs. 41, 42, pl. 29 -Philippines: Cebu; Ortmann, 1890, p. 539 -Philippines; Ijima, 1901, pp. 87, 201, 205 -Japan: Sagami Bay; Doflein, 1902, p. 642 -Sagami Bay; Parisi, 1919, pp. 91, 92 -Japan: Sagami Bay; Balss, 1914, p. 74 -Japan: Sagami Bay; Yokoya, 1933, p. 44 -Japan: Miyazaki Pref.; Estampador, 1937, p. 497 (list) -Philippines: Cebu; Holthuis, 1946, p. 62, pl. 3, fig. j- Japan, and Philippines: Cebu; Holthuis, 1955, fig. 105a (after Bate, 1888).
 "a crab" Gray, 1866, p. 489 -Philippines: Cebu; Gray, 1867, p. 44 -no new locality.
 "a Palaemonid" Semper, 1868, p. 28 -Philippines: Cebu.

Material examined.

32°00.6' N, 127°12.0' E, 120 m, June 17, 1964, Time, 09: 25 -1 ovig. ♀ (7.5 mm in carapace length), ZLKU No. 16541.
 33°34.9' N, 128°25.2' E, 120 m, June 18, 1964, 19: 18 -1 sp. (3.0 mm), ZLKU No. 16542.

Remarks. The third pereopod in the ovigerous female is to some extent unequal in size, but almost equal in shape. In the smaller pereopod the breadth of the chela is proportionately less than in the larger, and the gap made by the fingers when closed is more conspicuous than in the larger. In the smaller pereopod the spines on the merus are entirely absent, while in the larger there are two spines, a smaller and a larger one on the anterior subterminal and on the posterior subterminal margins, respectively. Such spines are present on both the sides in another sex undeterminable specimen and much stronger than in the ovigerous female. The absence of the

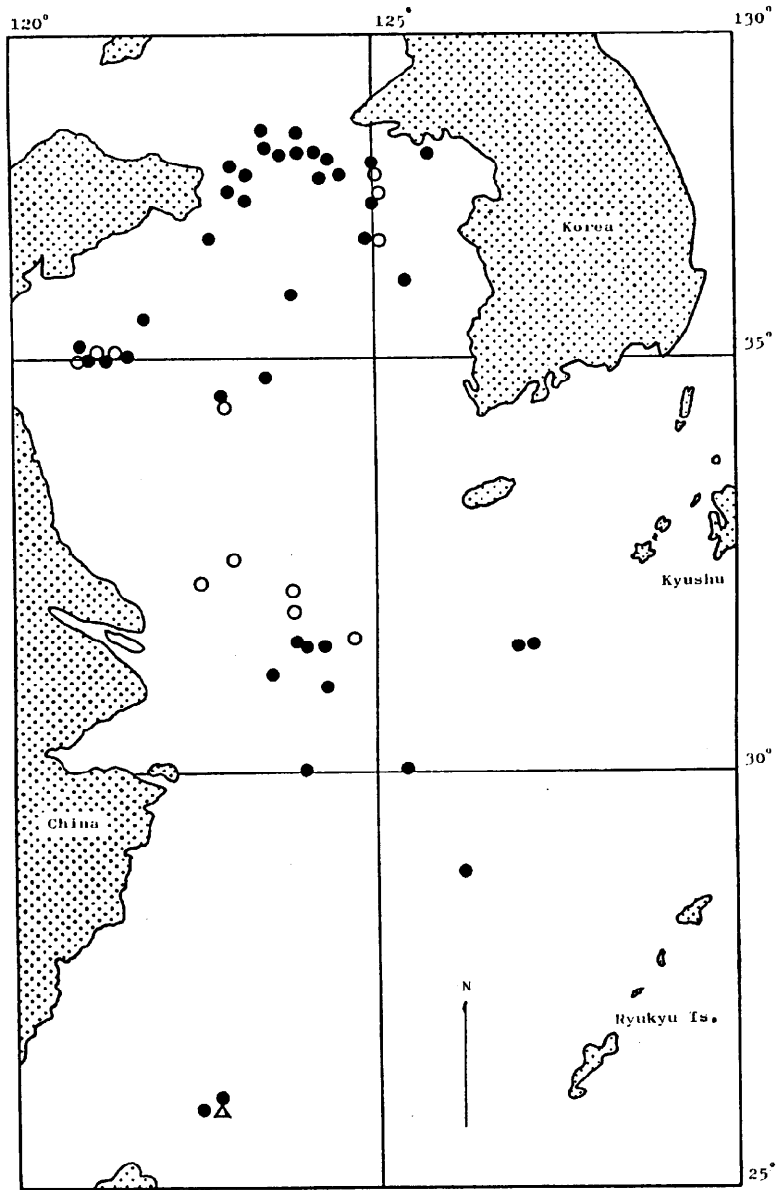


Fig. 23. Distribution of *Leptochela aculeocaudata* Paulson (●), *Leptochela gracilis* Stimpson (○) and *Leptochela japonica* Hayashi and Miyake (Δ).

spines from the merus of the larger pereopod in the ovigerous female seems presumably to be nothing but a malformation. The pleura of all the somites in the ovigerous female are round, broad and smooth, while in the other specimen they are narrow and distinctly pointed in the middle as in Bate's figure. To this character Holthuis (1946) already paid an attention as the sexual difference.

Only two species of this genus were recorded from Japan, namely, *Spongiicola venusta* de Haan and *S. japonica* Kubo. Latter species may easily be discriminated from the former by the chela of the third pereopod which is much narrower than in the former, and whose anterior margin is smooth without any serration.

The present species is known usually living in pair in certain species of hexactinellid sponges of the genus, *Euplectella* and *Hyalonema*. Unfortunately, the association of the present specimens with such host animals was not labelled.

Distribution. Recorded to be restricted to southern Japan and the Philippines, vertically ranging between 74 and 315 m.

Discussion on distribution

More than one thousand sampling stations are rather uniformly settled throughout the East China and the Yellow Seas except the Chinese and Korean coastal regions including Cheju Do. These seas are comparatively shallow and neritical, mostly less than 200 m in depth. The contour line of 50 m deep lies somewhat toward west from the center line of the East China Sea, being nearly parallel to the Chinese coastal line. And the contour line of 100 m deep lies from south to north and more or less curved, near to the median line. It is said that this area is considerably affected by both of the currents, the branch of the Tsushima Warm Current flowing northward along the continental slope and the Yellow Sea cold water mass occurring on the west of the slope. The difference of the bottom sedimentary components in size in this region was recently investigated by Hamada and Hamada (1962); the silt and fine particles are accumulated in the central portion of the East China Sea and also widely expanded in the southwestern continental slope of China. In the Yellow Sea the bed of fine-sized sediments cover about 80 % of the whole area. Medium to coarse sands, constituting the granules of more than 0.25 mm, are found in the northeastern area of the East China Sea.

It may be judged that both of *Leptochela aculeocaudata* and *L. gracilis* are distributed in a considerable density all over the seas. *L. aculeocaudata*

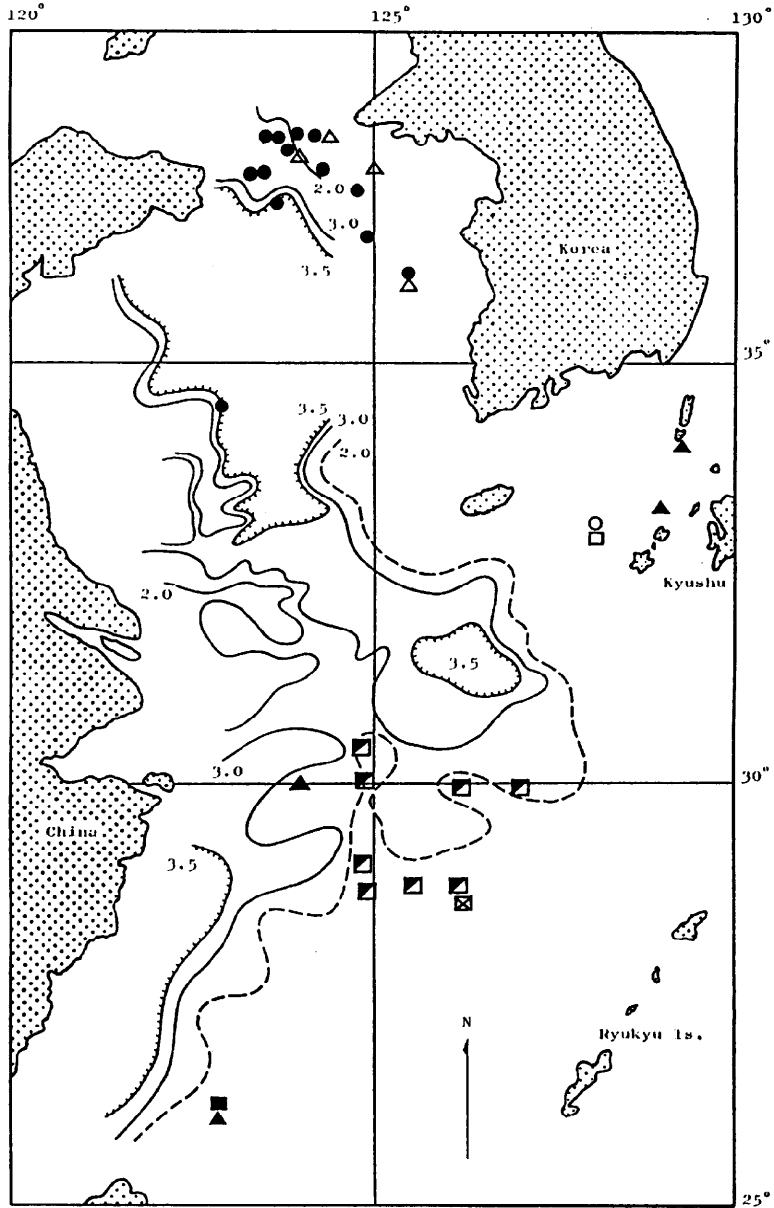


Fig. 24. Distribution of *Crangon* (*Crangon*) *affinis* de Haan (●), *Crangon* (*Neocrangon*) *sagamiensis* Balss (○), *Pontophilus bidentatus* (de Haan) (△), *Pontophilus incisus* Kemp (▲), *Pontophilus japonicus* Doflein (□), *Pontophilus* sp. (■), *Pontocaris habereri* Doflein (◐) and *Pontocaris sibogae* (de Man) (⊗). Numerals represent median diameter of bottom sediments in units.

was mainly taken in about the entrance to the Liaotung Bay and the western region of the East China Sea. *L. gracilis* seems to be mainly ranged in the northern part of the Yellow Sea and western part of the East China Sea. Both the species are swimming in community and mixed each other in several localities, but the latter species has hitherto been hardly fished up more southwards than the latitude of 30° N. Although is present only a record of *L. aculeocaudata* from Tokyo Bay in Japan, its much occurrence in the East China Sea is enough to deduce the wide distribution of this species around the Japanese coastal areas except the northern parts. *L. japocica*, recently reported from the western Kyushu, probably has the common distributional range with *L. aculeocaudata*.

The caridean shrimps, *Plesionika binocularis*, *P. ortmanni* trend to show a tendency of inhabiting the main flow of the Tsushima Current. On the contrary, *Palaemon gravieri* is distributed along the continental slope. Palaemonid shrimps, *Palaemon serrifer* (Stimpson), *P. macrodactylus* Rathbun, *P. ortmanni* Rathbun, *P. annandalei* (Kemp), *P. carinicauda* Holthuis, *P. macrogenitus* (Yu) and *P. orientis* Holthuis have so far been recorded to be restricted to the coasts.

Crangon affinis, *Metacrangon sinensis* sp. nov. and *Pontophilus bidentatus* appear to have the rather narrow geographical distribution save for some exceptional stations, namely the entrance to the Liaotung Bay where the sedimental components change from silts to fine sands. The concentricity of these species to this area seems to be influenced by the bottom condition as well as by the water temperature. A reason that a good number of the specimens of *Met. sinensis* sp. nov. come for the first time to our knowledge may be ascribed to its narrow distribution. *Pontophilus habereri* has the main distributional area in about the center of the East China Sea where the sands are rather coarse and the median diameter in units is 0.25 mm. Liu (1955) first reported *Crangon crangon* (Linné) from the western coast of the Yellow and the East China Seas.

According to Yoshida (1941), it may be considered that the eastern and the western coasts of Korea are conspicuously opposed to each other both geographically and oceanographically. The east coast receives excellence of the cold water current in almost the year and therefore is likewise restricted to the occurrence of the northern water-type shrimps, e. g., *Pandalus hypsinotus* Brandt, *P. borealis* Kröyer, *P. kessleri* Czerniavski and *Argis lar* (Owen). The southern coast shows the intermediate condition between the eastern and the western coasts, and the warm current prevails. The aspect of the western coast is generally characterized by having climatically striking wide range between summer and winter. From this coast *Palaemon macrodactylus*

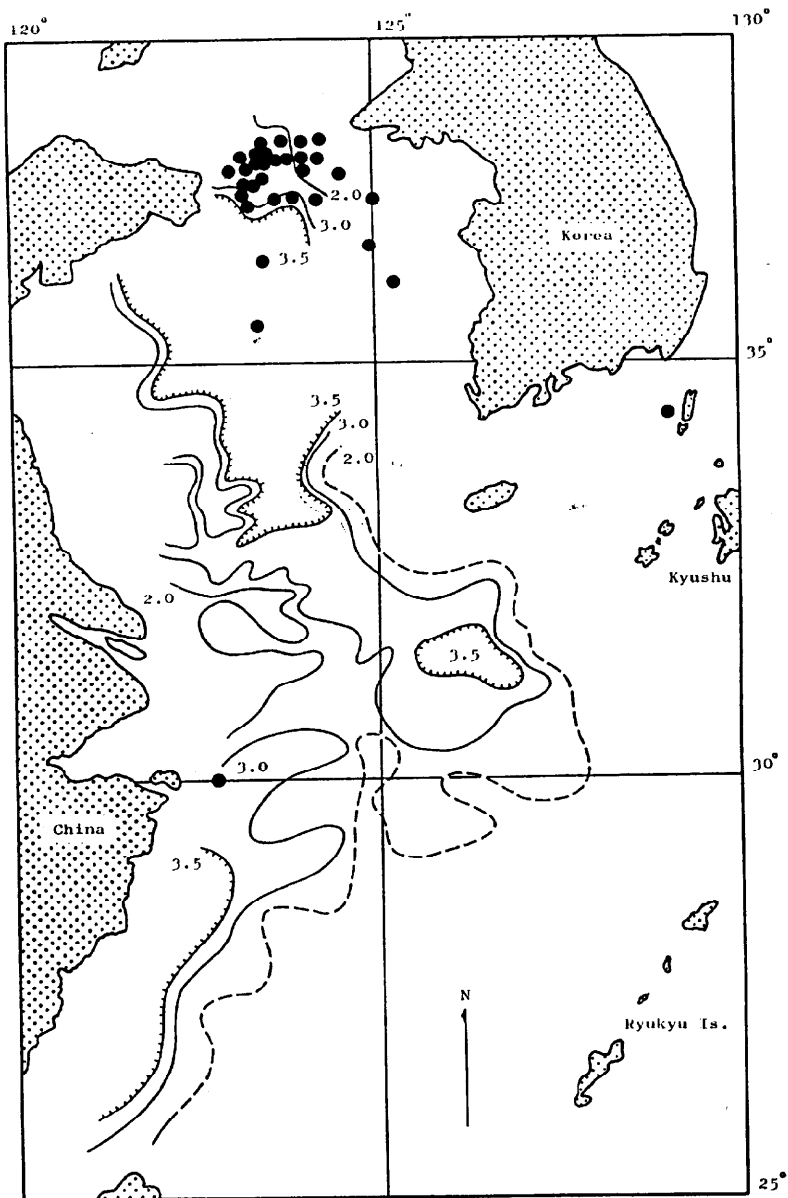


Fig. 25. Distribution of *Metacrangon sinensis* sp. nov. Numerals represent median diameter of bottom sediments in units,

Rathbun and *Palaemon carinicauda* Holthuis were known.

Of the species now examined *Leptochela aculeocaudata*, *L. gracilis*, and *Crangon affinis* were already recorded from this region. And most species have so far been known somewhere in Japan except only three species, *Chlorotocus crassicornis*, *Pontophilus incisus* and *Pontocaris sibogae*. These facts appear to suggest the rather close similarity of the geographical and hydrographical aspects of this region to the Japanese waters.

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