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Deep-Sea Decapod Crustaceans from the Pacific Coast of Eastern Hokkaido, Northern Japan (Crustacea, Decapoda, Penaeidea and Caridea)

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ABSTRACT A taxonomic report on 21 species of deepwater shrimps and prawns from the Pacific coast of eastern Hokkaido is presented. Of these, *Pandalus tridens* Rathbun, 1902 and *Neocrangon abyssorum* (Rathbun, 1902) are recorded from the Japanese waters with certainty for the first time. Zoogeographically, the collection is made up of three major components: those species having a wide distribution in northern North Pacific, those which are northwestern North Pacific in distribution, and those which are widely distributed in the tropical region of Indo-West Pacific.

The decapod crustaceans of the Pacific coast of eastern Hokkaido have been reported fragmentarily by several Japanese carcinologists (e. g., Miyake, 1957; Kubo, 1965; Igarashi, 1969; 1970a; 1970b; Miyake, 1982). However, there was no comprehensive work until recently Takeda & Hayashi (1990) enumerated 19 anomuran species and 19 brachyuran species from this area.

The present paper is a report on the deepwater penaeidean and caridean crustaceans collected between 1986 and 1991. Most of the specimens treated here were collected during the following three research projects: an ecological research of the benthic organisms around northern Japan, which was conducted by Fishery Agency of Japan in 1989-1990; a survey of the deep-sea unexploited fisheries resources around Kushiro, which was carried out by Kushiro Fisheries Cooperative Association in 1989-1990; and a biological processing of trawl catch, which was conducted from TS *Oshoro-Maru* of Hokkaido University in 1986, 1989, and 1991. Further I added some specimens collected by a commercial shrimp trawler from Kushiro. Four penaeidean and 17 caridean species including 2 representing the first record from Japanese waters are treated here. The pandalids belonging to *Pandalopsis* have not been dealt with, as these will be treated in a separate study.

The material on which this paper is based is deposited at the Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University (HUMZ). Each species account includes a

list of the material examined, notes on coloration of the fresh specimens, a remarks section where necessary, and note on the geographic and bathymetric distribution based on citation: synonymy lists the original reference to the species, literature presenting significant taxonomic or ditributional information, and synonym. Postorbital carpace length (CL) is used as the standard measurement. Within each family, genus and species are arranged alphabetically.

SYSTEMATIC ACCOUNT
Suborder DENDROBRANCHIATA

Family BENTHESICYMIDAE

Genus *Bentheogennema* Burkenroad, 1936

Remarks.—This genus is readily distinguishable from the closely related genus *Gennadas* in having well-developed podobranch gills on the 3rd maxilliped and anterior 3 pairs of pereopods. From the Japanese waters, the following 2 species are recorded by Hayashi (1984b): *B. borealis* (Rathbun, 1902); *B. intermedia* (Bate, 1888). Hayashi (1984b) gave a key to the world species of the genus. All species are bathypelagic.

Benteogennema borearis (Rathbun, 1902)

(Fig. 1)

Gennadas borealis Rathbun,1902: 887.—Rathbun, 1904: 147, figs. 88, 89.—Schmitt, 1921: 24, fig. 11.—Kobjakova, 1937: 141, fig. 9.—Vinogradov, 1950: 191, pl. 4, fig. 11.

Bentheogennema borealis, Aizawa, 1974: 19, fig. 10.—Butler, 1980: 41.—Hayashi, 1984b: 214, figs. 69, 70a, b, 71a, b.

Gennadas calmanni Kemp, 1909: 724, pl. 74, figs. 5-11.

Material.—HUMZ-C 1313, off Akkeshi, 42°22′71N, 145°22′5E, 0-400m, OBT 9169, midwater beam trawl (*TS Oshoro-Maru*), 17 August 1991, 1 male (12.5mm CL), 3 females (12.9-16.1mm CL), 1 intersexual (12.9mm CL), coll. M. Yabe.

Coloration.—Body and most appendages crimson; anterior branchial region darker than other parts. Mouthparts and pereopods dark red. Cornea of eye dark brown.

Remarks.—The thelyca of the present three female specimens are very consistent with the figure of Aizawa (1974), but differ from the description and figure of Hayashi (1984b) in the absence of a prominent process on the anterolateral corner of the intermediate plate.

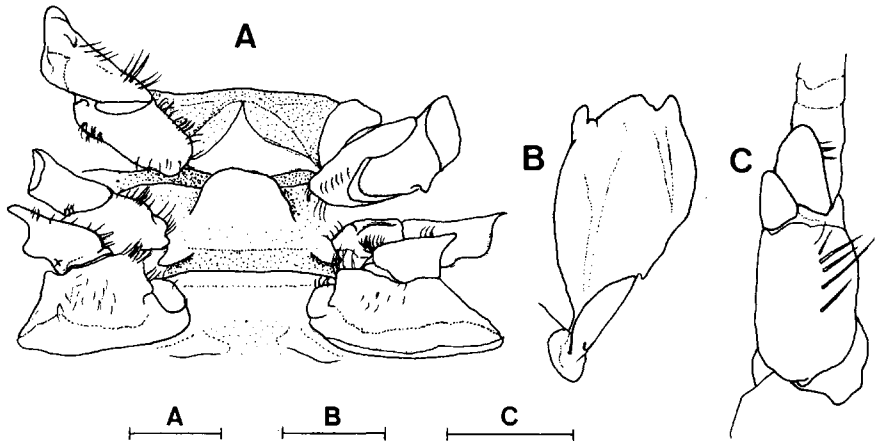

Fig. 1. *Bentheogennema borealis* (Rathbun, 1902). Sexually abnormal specimen (HUMZ-C 1313). A, thelycum; B, left petasma in dorsal aspect; C, left appendix masculina in mesial aspect. (Scales: 1mm in A; 0.5mm in B, C)

A description of the reproductive organs of a specimen, which has the external characteristics of both sexes (Fig. 1), is given below.

Petasma (Fig. 1B) poorly developed, with 3 small lobes on anterior margin; outer lobe broadly rounded, not curved. Inner scale of appendix masculina (Fig. 1C) roughly triangular, much shorther than outer scale; outer scale elliptical, bearing some stout setae. Thelycum (Fig. 1A) with anterior plate broadly triangular; anterior margin of intermediate plate broadly rounded, lateral margin diverging posteriorly, posterior margin not abruptly delimited; anterior margin of 8th thoracic sternite abruptly delimited over entire length between bases of 5th pereopod, posterior margin not delimited. Coxa of 5th pereopod with obscure gonopore.

In Benthesicymidae, similar sexual abnormalities were reported recently in 3 species of *Gennadas* by Kikuchi & Nemoto (1987). This is the second example of the occurrence of hermaphroditism in the penaeoid prawns.

Distribution.——Bering Sea east of Kamchatka and north of Rat Islands, Aleutian Islands (Rathbun, 1904); Baja California (Schmitt, 1921); Sea of Okhotsk (Kobjakova, 1937); Pacific coast of Japan southward to 28° N (Aizawa, 1974); 200-2500m.

Genus *Gennadas* Bate, 1881

Remarks.—Seven Japanese species of the genus were enumerated by Hayashi (1984a). Of these, following 3 species extend its geographical range to northern Japan (Aizawa, 1974; Hayashi, 1984a): *G. incertus* (Balss, 1927); *G. parvus* Bate, 1881; *G. propinquus* Rathbun, 1906. Hayashi (1984a) gave a key to the world species of the genus. All known species are pelagic.

Gennadas propinquus Rathbun, 1906

(Fig. 2)

Gennadas propinquus Rathbun, 1906: 907, fig. 61.——Burkenroad, 1936: 66, 83.——Kensley, 1969: 167, fig. 9.——Hanamura, 1983: 59, fig. 5.——Hayashi, 1984a: 142, fig. 63, 64a-c, 66h, 67d, 68k, 1.

Gennadas clavicarpus De Man, 1907: 144.——De man, 1911: 19, pl. 2 figs. 3h, j.——Tirmizi, 1959: 353, figs. 40c, 48c, 56-66.——Kensley, 1971: 278, fig. 4.

Gennadas alcocki Kemp, 1910: 174, pl. 13 fig. 8.——1913: 62, pl. 7, fig. 8.

Gennadas scutatus, Kemp, 1910: 178, pl. 13, figs. 9, 10.

Gennadas scutatus indicus Kemp, 1913: 62.

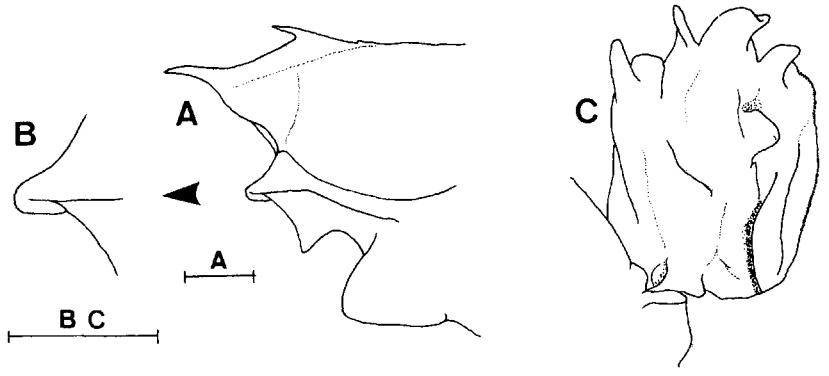

Fig. 2. *Gennadas propinquus* Rathbun, 1906. Female (A, B) and male (C) specimens (HUMZ-C 1314). A, anterior part of carapace from left aspect; B, same, antennal angle; C, left petasma in dorsal aspect. (Scales=1mm)

Material.—HUMZ-C 1314, off Akkeshi, 42°44.71'N, 145°22.5'E, 0-400m, OBT 9169, midwater beam trawl (TS *Oshoro-Maru*), 17 August 1991, 1 male (5.9mm CL), 1 female (7.1mm CL), coll. M. Yabe.

Coloration.——Carapace and abdomen crimson except dorsal margin of rostrum and telson being translucent. Eye with cornea darkly pigmented; eyestalk with red chromatophores on pale red background. Proximal 2 segments of antennular peduncle red, distal segment and flagella scattered with red chromatophores; scaphocerite colorless. Mouthparts dark red; distal portion of carpus of 3rd maxilliped black. Pereopods generally red, black spots present on chela and carpus of anterior 3 pairs of pereopods merus of posterior 2 pairs and coxa of 5th; distal 3 segments of last 2 pairs of pereopods translucent, scattered with red chromatophores. Pleopods pale red.

Remarks.—The present specimens differ from the descriptions and figures of the Indian Ocean specimens of *Gennadas propinquus* given by Kensley (1971) (as *G. clavicarpus*) and by Hayashi (1984a) in the following minor particulars: the antennal angle is rounded (fig. 2A, B), rather than sharply pointed; the inner lobule of median lobe of petasma has convex outer margin as against to having broadly concave or straight outer margin (Fig. 2G). Hanamura (1983), who considered *G. clavicarpus* to be identical with *G. propinquus*, also noticed similar differences in the petasma between the Pacific and Indian Ocean populations. According to him, the differences in petasma seem to be constant. More detailed comparison on other characters, not only on the reproductive organs, is needed to reveal the relation of both populations.

Distribution.——Widely distributed in the Indian Ocean and tropical and warm temperate region of the Pacific Ocean (Kensley, 1971; Hanamura, 1983).

Family ARISTEIDAE

Genus *Aristeus* Duvernoy, 1840

Remarks.—Two species belonging to this genus have been recorded from the Japanese waters: *A. mabahissae* Ramadan, 1938; *A. virilis* (Bate, 1881). Hayashi (1983) presented a key to Indo-West Pacific species of the genus.

Aristeus mabahissae Ramadan, 1938

Aristeus semidentatus, Balss, 1925: 224 (in part).
Aristeus mabahissae Ramadan, 1938: 43, textfigs 2b, 3b,4a-c.—Crosnier, 1978: 65, fig. 25c-f, 26c-f.—Hayashi, 1983: 190, figs. 49, 50a, b).—Hayashi, 1986a: 52, 53, 237.
Hemipenaeus crassipes, Monod, 1973: 118, figs. 7-11 (in part).

Material.—HUMZ-C 1308, off Daikoku-jima, 42°40.1′N, 145°01.9′E, 1080-1096m, RST 9011 (*Rissyo-Maru* No. 51), 29 July 1990, otter trawl, 1 male (30.0mm CL), coll. T. Komai.

Coloration.—Whole animal red, branchial region whitish. Cornea of eye dark brown. Photophores on pereopods appearing as dark red spots. Hayashi (1986a) presented a color photograph of a fresh specimen of this species.

Remarks.—Although the present specimen is considerably damaged, it agrees well with the descriptions and figure of *Aristeus mabahissae* given by Ramadan (1938), Crosnier (1978), and Hayashi (1983). According to Hayashi (1983), this species is distinguished from another Japanese congener *A. virilis* Bate, 1881 by the glabrous integument of body, the absence of subdistal spine of merus of the 3rd pereopod, and few photophores on the pereopods.

Dstribution.—Widely distributed in tropical region of Indo-West Pacific (Hayashi, 1983); benthic, 510-795m (Ramadan, 1938). In Japanese waters, this species was recorded from the East China Sea and Kyushu-Palau Ridge (Hayashi, 1983). The present record extended considerably the known geographic range of this species to the north.

Family SERGESTIDAE

Genus *Sergestes* H. Milne Edwards, 1830

Remarks.—This genus is readily distinguished from closely related genus *Sergia* by the presence of the pesta organ, and the absence of the photophore on the integument. In northern Japan, only S. similis Hansen, 1903 has been recorded. Recently Hayashi (1986b) enumerated 7 species of the genus from the Japanese waters, and gave a key to these species. Most species are pelagic.

Sergestes similis Hansen, 1903

Sergestes atlanticus, Bate, 1888: 390 (in part).—Rathbun, 1904: 145 (in part).

Sergestes similis Hansen, 1903: 60, pl. 11, 6a-d.—Schmitt, 1921: 19, fig. 8, pl. 12, fig. 7.—Milne, 1968: 22, figs. 1-4.—Butler, 1980: 47.—Hayashi, 1986b: 287, figs. 112g, 113f, m, 114k.

Material.—HUMZ-C 1315, off Akkeshi, 42°44.71'N, 145°22.5'E, 0-400m, OBT 9169, midwater beam trawl (TS *Oshoro-Maru*), 17 August 1991, 1 male (10.3mm CL), 1 female (11.5mm CL), coll. M. Yabe.

Coloration.—Body including most appendages scattered with red spots on translucent background; gut and hepatopancrea visible as black and red mass respectively; pesta organ red. Cornea of eye black.

Distribution.—Western Pacific Ocean off Japan, eastern Pacific Ocean from Gulf of California to Bering Sea, South Pacific Ocean off Chile, eastern South Atlantic Ocean in Benguela Current (Milne, 1968); 0-1200m.

Suborder PLEOCYEMATA

Infraorder CARIDEA

Family OPLOPHORIDAE

Genus *Acanthephyra* A. Milne Edwards, 1881

Remarks.—This genus differ from the other related genera in the absence of the distinct lateral carina on the carapace, and having well-developed eyes. Hayashi (1988b) recorded 9 species of the genus from the Japanese waters. Only *A. quadrispinosa* Kemp, 1939 has been known in northern Japan. Hayashi (1988b) presented a key to Japanese species of the genus.

Acanthephyra eximia Smith, 1884

Acanthephra eximia Smith, 1884: 376, pl. 14, fig. 1.—Wood-Mason & Alcock, 1892: 361, fig. 3.—Balss, 1925: 258, textfig. 27.—Chace, 1940: 147, text-fig. 24.—Holthuis, 1955: 277, fig. 1.—Crosnier & Forest, 1973: 34, fig. 7c, d.—Aizawa, 1974: 29.—Chace, 1986: 18, figs. 2j, 4j, 5j, 6h, 9a.—Hayashi, 1986a: 86, 254, fig. 46.—Hayashi, 1988b: 122, fig. 144e, 145c.

Acanthephyra angusta Bate, 1888: 737, pl. 124, fig. 6, 6a.
Acanthephra edwardsii Bate, 1888: 747, pl. 126, fig. 1, 1z.
Acanthephyra brachytelsonis Bate, 1888: 747, pl. 126,fig. 1.
Acanthephyra pulchra A. Milne Edwards, 1890: 163.

Material.—HUMZ-C 1318: off Daikoku-Jima, 42°37.4'N, 144°57.3'E, 1055-1065m, RST 9007 (*Rissyo-Maru* No. 51), 27 July 1990, otter trawl, 1 female (19.6mm cl), coll. T. Komai.

Coloration.—In life, whole animal crimson; cornea of eye dark grown. Hayashi (1986a) presented a color photograph of this species.

Remarks.—The present material is referable to *A. eximia* in having the carapace strongly carinate dorsally throughout length and the absence of median carina on the 1st abdominal somite (Chace, 1986). As previously pointed out by several authors, the armature and proportionate length of the rostrum widely vary in this species (e. g., Chace, 1940; Crosnier & Forest, 1973).

A. eximia has been considered to be a bathypelagic inhabitant (Crosnier and Forest, 1973; Aizawa, 1974). The present material, however, which was captured by bottom trawl, supports Chace's (1986) opinion that the adults of the species probably live on or near the bottom.

Distribution.—Most tropical and temperate coasts of the world (Crosnier and Forest, 1973; Chace, 1986); 200-4700m (Chace, 1986). In Japanese waters, *A. eximia* has been known from the coasts of the southern part. The present material may extend slightly the northern limit of its range in the western Pacific Ocean.

Acanthephyra quadrispinosa Kemp, 1939

Acanthephyra batei Stebbing, 1905: 107, pl. 24B.
Acanthephyra quadrispinosa Kemp, 1939: 571, 572, 576, 578.—Kensley, 1968: 311.—Aizawa, 1974: 31.—Chace, 1986: 26, fig. 3h, 4t, 5t, 7g, 10c, 14.—Hayashi, 1988b: 47, fig. 142.
Acanthephyra purpurea, Kubo, 1965: 605.—Miyake, 1982: 20, pl. 7, fig. 4.

Material.—HUMZ-C 1316, off Akkeshi, 42°44.71'N, 145°22.5'E, 0-400m, OBT 9169, midwater beam trawl (TS Oshoro-Maru), 17 August 1991, 1 male (12.0mm CL), 1 female (13.6mm CL), coll. M. Yabe.

Coloration.—Whole animal red, but scaphocerite pale; cornea of eye dark brown. Miyake (1982) presented a color photograph of this species under the name of *A. purpurea*.

Remarks.—The present material, comprising of 1 male and 1 female, shows a veriation in carination of the 2nd abdominal somite: in the male specimen the 2nd abdominal somite is sharply carinate over entire length, but in the female specimen it is carinate only in the posterior 1/3.

Distribution.—Widespread in the Indo-West Pacific region from the eastern Africa to the mid-Pacific at 163°W longitude, between 44°N latitude and 42°S latitude (Chace, 1986); off Oregon (Krygier & Pearcy, 1981); bathypelagic at the depths of 400-1000m in daytimes, 100-700m at night (Aizawa, 1974).

Genus *Hymenodora* Sars, 1877

Remarks.—The members of the genus apparently differ from the other oplophorid genera in having dorsally rounded abdomen and lightly pigmented eye. All of 4 species were listed from the western North Pacific by Kikuchi & Nemoto (1986). Hayashi (1988C) presented a key to species of the genus.

Hymenodora frontalis Rathbun, 1902

Hymenodora frontalis Rathbun, 1902: 904.—Rathbun, 1904: 28, fig. 8.—Schmitt, 1921: 34, fig. 20.—Kobjakova, 1937: 98, fig. 2.—Vinogradov, 1950: 192, pl. 5, fig. 16—Aizawa, 1974: 34.—Butler, 1980: 70.—Hayashi, 1988c: 208, fig. 147b.

Material.—HUMZ-C 1317, off Akkeshi, 42°44.71′N, 145°22.50′E, 0-400m, OBT 9169, midwater beam trawl (TS *Oshoro-Maru*), 17 August 1991, 4 females (6.2-8.4mm CL), coll. M. Yabe.

Coloration.—In life, entire animal reddish orange, gut visible as deep red mass; pereopods dark red; cornea of eye lacking dark pigment, yellow to orange.

Distribution.—Widely distributed in northern North Pacific, bathypelagic: From Bering Sea and Kamchatka, to off Monterey Bay, California (Rathbun, 1902); Sea of Okhotsk (Kobjakova, 1937); western North Pacific including Japanese coasts (Aizawa, 1974; Kikuchi and Nemoto, 1986); bathypelagic, 0-4432m (Kikuchi and Nemoto, 1986).

Family PASIPHAEIDAE

Genus *Pasiphaea* Savigny, 1816

Remarks.—The taxonomic infomation on the Japanese species of the genus is rather poor. From northern Japan including Okhotsk Sea, *P. pacifica* Rathbun, 1902 and *P. tarda* Kroyer, 1842 were recorded by Kobjakova (1937) and Hayashi (1986) respectively.

Pasiphaea tarda Krøyer, 1842

Pasiphae tarda Krøyer, 1845: 453.

Pasiphaea tarda, Sivertsen & Holthuis, 1956: 23, figs. 17, 18.—Butler, 1980: 56.—Hayashi, 1986: 98, 99, 260.

Pasiphaea cf. *tarda*, Crosnier & Forest, 1973: 133, fig. 37.

Pasiphaeia princeps, Faxon, 1895: 175.

Pasiphaea princeps, Rathbun, 1904: 23.—Kemp, 1910: 42, pl. 4, figs. 1-7.

Pasiphaea principalis Sund, 1913: 6, figs. 5-7, 9a-f.

Material.—HUMZ-C 1337, off Daikoku-Jima, 42°38.4′N, 143°00.4′E, 1055-1130m, RST 9001 (*Rissyo-Maru* No. 51), 24 July 1990, otter trawl, 1 male (61.5mm CL), 7 females (45.6-56.0mm CL), coll. T. Komai; HUMZ-C 1338, off Kiritappu, 42°46.6′N, 145°22.3′E, 1060-1105m, RST 9002 (*Rissyo-Maru No. 51*), 24 July 1990, otter trawl, 3 males (46.0-64.8mm CL), 4 females (49.2-57.7mm CL), coll. T. Komai; HUMZ-C 1339, off Daikoku-Jima, 42°38.0′N, 144°57.6′E, 1020-1080m, TST 9001 (*Taisei-Maru* No. 108), 24 July 1990, otter trawl, 6 males (53.6-60.3mm CL), 6 females (46.7-56.7mm CL), coll. H. Endo.

Coloration.—Entire animal crimson, except anterolateral margin of carapace and great part of antenna, which are translucent. Hayashi (1986a) presented a color photograph of this species collected from the Sea of Okhotsk.

Remarks.—The present material agrees well with the description of Butler (1980) and Hayashi (1986a). The condition of dorsal surface of the first abdominal somite shows slight variation: in most specimens, the dorsal surface is carinated in the posterior half of the somite, in some specimens it is bluntly carinated throughout its length. Hayashi (1986a) noticed that the Japanese specimens bear more basis spines of the 2nd pereoped compared with the Atlantic specimens reported by Sivertsen and Holthuis (1956) (6-11 vs. 2-5). In the present material, the number of basis spines varies from 3 to 9 (usually more than 5). Futher the present material

suggests that the maximum size in the Japanese population is considerably larger than in the Atlantic population: the recorded maximum size in the Atlantic specimens is 41.5mm CL (Matthews & Pinnoi, 1973). These differences may be due to geographical factors.

Pasiphaea tarda may be characterized by the following characters: rostrum directed forward, distinctly overreaching anterior margin of carapace; carapace sharply carinate over entire length, with regularly convex dorsal profile; branchiostergel spine marginal; abdomen sharply carinate in 2nd to 6th somites; telson deeply cleft distally; basis of 2nd pereopd armed with spines.

Recently Iwasaki (1990) resurrected *P. princeps* Smith, 1884, which was synonimized with *P. tarda* by Sivertsen & Holthuis (1956).

Distribution.—Unalaska to Oregon (Rathbun, 1904), off Ecuador (Faxon, 1895), North Atlantic Ocean from Greenland to Bay of Biscay (Sivertsen and Holthuis, 1956), south of Canary Islands (Maurin, 1968), American coast south to South Carolina (Sivertsen and Holthuis, 1956), off Angola (Crosnier and Forest, 1973), Okhotsk Sea and Pacific coast of northeastern Japan (Hayashi, 1986a); 250-2500m (Sivertsen and Holthuis, 1956).

Family HIPPOLYTIDAE

Genus *Eualus* Thallwitz, 1892

Remarks.—This genus is distinguished from the other related genera in having an exopod on the 3rd maxilliped and the absence of the supraorbital spine. Ten species of the genus are reported from the Japanese waters by Miyake & Hayashi (1967; 1968), Hayashi & Miyake (1968), Igarashi (1969). In addition, Miyake (1982) listed *E. suckleyi* (Stimpson, 1864). These all species occur in northern Japan. I presented a key to these Japanese species, since there is no available key including these 11 species.

Key to Japanese species of *Eualus*

1. No epipod on any pereopod 2
— Epipods on 1st, sometimes on 2nd or 3rd pereopods 4
2. Epipod on 3rd maxilliped; eye large, without ocellus ..... *E. biungius* (Rathbun, 1902)
— No epipod on 3rd maxilliped; eye moderately large, with distinct ocellus 3
3. Fourth and 5th abdominal somites armed with posteromedian tooth
..... *E. middendorffi* Brashnikov, 1907
— Fourth and 5th abdominal somites without posteromedian tooth

……*E. kuratai* Miyake & Hayashi, 1967

4. Epipods on 1st, sometimes on 2nd pereopod …… 5

— Epipods on 1st to 3rd pereopods …… 7

5. Normal size, hooked epipod on 2nd pereopod; rostrum distinctly shorter than carapace ……*E. sinensis* (Yu, 1931)

— Reduced size, non-hooked epipod sometimes on 2nd pereopod;rostrum equal to or longer than carapace …… 6

6. Distal half of rostrum usually lacking dorsal tooth;scaphocerite almost equal to carapace length ……*E. fabricii* (Krøyer, 1841)

— Distal half of rostrum bearing dorsal teeth; scaphocerite 0.7-0.8 times as long as carapace ……*E. suckleyi* (Stimpson, 1864)

7. Dactyli of last 3 pairs of pereopods slender, more than half of propodus, almost lacking accessory spinules …… 8

— Dactyli of last 3 pairs of perepods moderately deep, less than half of propodus, bearing accessory spinules ditributed over entire length of flexor margin …… 9

8. Postrostral median carina highly crested, serrate; rostrum styliform, lacking dorsal tooth in distal half ……*E. spathulirostris* (Yokoya, 1933)

— Postrostral median carina low, not crested; rostrum semicircular in lateral aspect, with dorsal teeth distributed over entire length……*E. macilentus* (Kroyer, 1841)

9. Pleuron of 5th abdominal somite rounded posteriorly; rostrum far overreaching distal end of antennular peduncle, without dorsal tooth in distal 2/3 ……*E. leptognathus* (Stimpson, 1860)

— Pleuron of 5th abdominal somite with posteroventral tooth; rostrum not reaching distal end of antennular peduncle, with dorsal teeth distributed over entire length ……10

10. Rostrum short, not reaching distal end of eye, ventral margin with 0 or 1 tooth ……*E. bulychevae* Kobjakova, 1955

— Rostrum overreching distal end of eye, ventral margin with 1-3 teeth …… *E. gracilirostris* (Stimpson, 1860)

Eualus biungius (Rathbun, 1902)

Spirontocaris biungius Rathbun, 1902: 899.—Rathbun, 1904: 97, fig. 44.—Yokoya, 1933: 27, fig. 9A-C.

Eualus biungius, Kobjakova, 1937: 120.—Vinogradov, 1950: 206, pl. 15, fig. 60.—Miyake & Hayashi, 1967: 248, fig. 1.—Igarashi, 1969: 6, pl. 4, fig. 18, pl. 15, fig. 45.—Butler, 1980: 192,

pl. 6C.

Material.—HUMZ-C 938, off Erimo, 42°02.3'N, 144°07.9'E, 915-970m, OST 8903 (*TV Oshoro-Maru*), 6 Sept. 1989, otter trawl, 1 female (14.0mm CL), coll. T. Komai.

Coloration.—Background pale orange. Midaxis of rostrum red; lateral side of carapace deep red, with white patches on branchial region; abdomen with white patches on pleura of anterior 3 somites, 6th abdominal somite entirely red. Third maxilliped and pereopods red.

Remarks.—The present specimen agrees well with the descriptions given by Rathbun (1904), Miyake & Hayashi (1967), and Butler (1980). But it apparently differs from the descriptions given by American authors in the angulate pterygostmial angle of the carapace instead of having a spine.

Eualus biungius belongs to a species group without epipod on pereopods, and it is readily distinguishable from other members of the group by the long rostrum distinctly overreaching the scaphocerite, dorsally smooth abdomen, and the large eye without ocellus.

Distribution.—Known range suggests that *E. biungius* is widely distributed in the northern North Pacific: Bering Sea to Oregon (Rathbun, 1904); Sea of Okhtsk (Kobjakova, 1937); Sea of Japan (Yokoya, 1933; Miyake & Hayashi, 1967); 90-2090m (Vinogradov, 1950).

Eualus fabricii (Krøyer, 1841)

(Fig. 3)

Hippolyte Eabricii Krøyer, 1841: 571.

Spirontocaris fabricii, Rathbun, 1904: 85.—Leim, 1921: 138, pl. 4, fig. 10—Urita, 1942: 24.

Eualus fabricii, Brashnikov, 1907: 168, textfig. 24a, b.—Kobjakova, 1937: 117.—Vinogradov, 1950: 209, pl. 14, fig. 28.—Kobjakova, 1958: 226.—Couture & Trudel, 1968: 873, fig. 13.—Igarashi, 1969: 6, pl. 7, fig. 19, pl. 15, fig. 46.—Butler, 1980: 203.

Material.—HUMZ-C 1066, off Ohzu, 42°31.15'N, 144°19.75'E, 225m, DIIA-2 (TV *Tanshu-Raru*), 31 May 1990, dredge, 1 male (4.2mm CL), 3 females (4.4-7.6mm CL), coll. T. Komai.

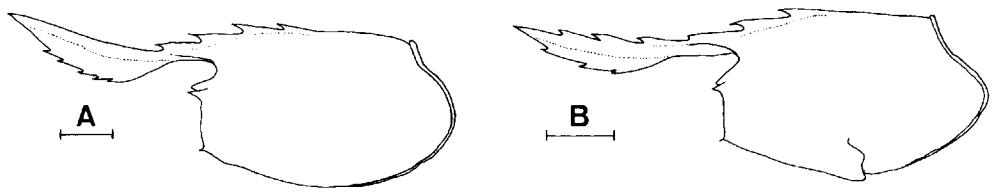

Fig. 3. *Eualus fabricii* Krøyer, 1841. Carapace and rostrum in left aspect. A, normal specimen (HUMZ-C 1069); B, aberrant specimen (same lot). (Scales=2mm)

Coloration.—Carapace and abdomen with patches of red chromatophores on translucent background, patches forming faint bands in abdomen: telson and uropods having 2 red diagonal bands. Cornea of eye gray. Antennal flagellum banded with reddish brown. Third maxilliped and posterior 3 pairs of pereopods with 5 and 4 red bands respectively; distal spines of 3rd maxilliped black, also terminal spines of first pereopod, and distal spinules of last 3 pairs of pereopods; protopodites of pleopods with 1 reddish band.

Remarks.—The 4 specimens examined here are consistent generally with the description of *Eualus fabricii* given by Butler (1980), but 2 small female specimens (5.4mm and 4.4mm CL) differ from that, as well as the other previous descriptions of this species (e. g., Leim, 1921; Urita, 1942), in the armature of dorsal margin of the rostrum. Typically, the rostrum is devoid of dorsal tooth in distal 2/3 (Fig. 3A), while in these 2 specimens it bears the dorsal teeth over entire length (Fig. 3B)). Since no other significant difference could be found between these 2 specimens and the typical ones, I regard them as an aberrant from of *E. fabricii*. Male specimen apparently differs from females in having a stouter outer antennular flagellum.

Although *Eualus fabricii* belongs to a species group with epipod on the 1st pereopod, some authors (e. g., Vinogradov, 1950; Butler, 1980) noted that a rudimentary epipod is sometimes present on the 2nd pereopod. The present 4 specimens also bear a small epipod on the 2nd pereopod. Similar variation of the epipodal character is known in a closely related congener *E. suckleyi* (Stimson, 1864) (Vinogradov, 1950; Butler, 1980), which may differ from *E. fabricii* in proportionately shorter scaphocerite (Butler, 1980).

Spirontocaris fabricii var. *minuta* created by Urita (1942) is very possibly identical with *E. leptognathus* (Stimpson, 1860), which has similar styliform rostrum, because of its small size, shallow bathymetric range, as well as coloration, though unfortunately he did not mention the epipodal character of his variety.

Distribution.—Northwest Atlantic Ocean, from Foxe Basin and west Greenland to Massachusetts Bay (Butler, 1980); Chukchi Sea (Vinogradov, 1950); Sea of Japan and Sea of Okhotsk (Kobjakova, 1937); 4-255m (Butler, 1980).

Eualus middendorffi Brashnikov, 1907

Eualus middendorffi Brashnikov, 1907: 165, fig. 23a, b.—Kobjakova, 1937: 117. —Vinogradov, 1950: 208, pl. 15, fig. 66.—Miyake & Hayashi, 1967: 250, fig. 2a-c.—Igarashi, 1969: 7, pl. 8, fig. 22, pl. 16, fig. 49.

Spirontocaris middendorffi, Balss, 1914: 45.—Urita, 1942: 21, fig. 5.

Material. —HUMZ-C 1052, east of Erimo, 41°37.29'N, 143°21.89'E, 251m, BIIE-2 (*TV Tanshu-Maru*), 29 May 1990, otter trawl, 1 female (14.0mm CL), coll. T. Komai.

Coloration.—Fine reddish dots over entire animal, with translucent background. Cornea of eye grayish brown.

Remarks.—The examination of the other series of specimens belonging to this species shows that the proportionate length of rostrum greatly varies, ranging from 1.3 to 2.2 times as long as carapace; the ratio tends to increase with growth.

The presence of posteromedian tooth on the 3rd to 5th abdominal somites distinguishes this species from all but 1 of the members of the genus. *Eualus barbatus* (Rathbun, 1899) known from the eastern Pacific differs from the former in the rostrum armed with dorsal teeth over entire length and the presence of posteromedian tooth on 6th abdominal somite (Butler, 1980). From the view point of epipodal character, *E. middendorffi* is comparable to a species group without epipod on the pereopods.

Distribution.—This species seems to be confined to the western Pacific: Saghalien (Brashnikov, 1907; Urita, 1942); Sea of Japan southward to Tottori Prefecture (Derjugin & Kobjakova, 1935; Miyake & Hayashi, 1967); Sea of Okhotsk (Kobjakova, 1937); Volcano Bay (Igarashi, 1969); 27-300m.

Genus *Spirontocaris* Bate, 1888

Remarks.—This genus is readily distinguished from the other related genera in having 2 or 3 supraorbital spines on the carapace and well developed exopod on the 3rd maxilliped. All the known species of the genus may be distinguished by Hayashi's (1977) key.

Spirontocaris murdochi Rathbun, 1902

(Fig. 4)

Spirontocaris murdochi Rathbun, 1902: 893.—Rathbun, 1904: 66, fig. 21, pl. 3 fig. 6.—Brashnikov, 1907: 140, fig. 14a, b.—Kobjakova, 1937: 128.—Urita, 1942: 13.—Vinogradov, 1950: 200, pl. 11, fig. 37.—Igarashi, 1969: 5, pl. 5, fig. 13.—Hayashi, 1977: 163, fig. 3.

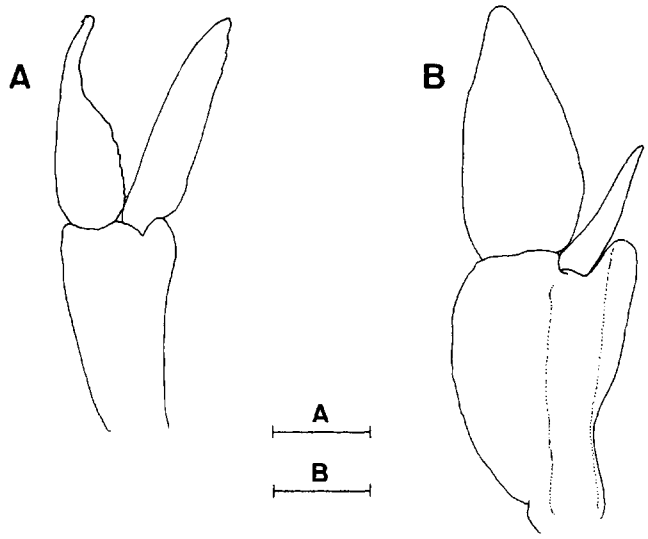

Fig. 4. *Spirontocaris murdochi* Rathbun, 1902. First pleopod in ventral aspect. A, male; B, female. (Scale: 1mm in B; 0.5mm in A)

Material.—HUMZ-C 1063, off Ohzu, 42°32.86′N, 143°52.91′E, 121m, DIIA-1 (*TV Tanshu-Maru*), 31 May 1990, dredge, 4 females (6.9-10.1mm CL), coll. T. Komai; HUMZ-C 1067, off Ohzu, 42°31.15′N, 143°49.75′E, 225m, DIIA-2 (*TV Tanshu-Maru*), 31 May 1990, dredge, 14 males (3.6-5.0mm CL), 34 females (4.8-10.1mm CL), coll. T. Komai; HUMZ-C 1080, off Hamanaka, 42°50.98′N,145°18.75′E, 216m, DIIC-2 (*TV Tanshu-Maru*), 31 May 1990, dredge, 1 male (3.4mm CL), 8 females (5.2-7.4mm CL), coll. T. Komai.

Coloration.—Rostrum translucent, scattered with red chromatophores. Carapace varying from nearly colorless to pale red, often having red spots. Abdomen reddish brown except posterior margin of 6th somite being translucent; uropods and telson transparent with obscure brownish

band. Eye with cornea grayish brown. Third maxilliped and 1st perepod reddish brown except distal half of ultimate segment of 3rd maxilliped being colorless. Second pereopod pale red. Last three pairs of pereopods translucent, with red band on near basal part of carpus; coxa deep red.

Remarks.—The present specimens agree well with the desciption and figures of *Spirontocaris murdochi* given by Hayashi (1977) except for the distinct pterygostomial spine of the male specimens. Therefore, the rounded pterygostomial angle in Hayashi's male specimen may be aberrant.

Rathbun (1904) described the differences between females and males of this species as follows: the male "is smaller and slender than female, rostrum and antennules longer, dorsal teeth much reduced". These sexual dimorphisms are also observed in the present material. In addition to these characters, the 1st pleopod differs sexually: in male endopod subequal to exopod, abruptly tapering at distal 2/5, with adhesive hooks distomesially (Fig. 4A); in female endopod broad, gradually tapering, exopod strongly reduced (Fig. 4B). Although the strong sexual difference of size is apparent, there is no indication of protandry in the present series.

Distribution.—Sea of Okhotsk, Arctic coast of Alaska, Kamchatka (Rathbun, 1904); Taraika Bay (Brashnikov, 1907); Chukchi Sea, Bering Sea, Tatar Strait (Kobjakova, 1937); Volcano Bay (Igarashi, 1969); off Niigata Pref. (Hayashi, 1976): 12-244m.

Spirontocaris spinus (Sowerby, 1805)

Cancer Spinus Sowerby, 1805: 47, pl. 23.

Hippolyte Sowerbei Leach, 1817: pl. 39, fig. 1-10.

Spirontocaris spinus, Rathbun, 1904: 63.—Brashnikov, 1907: 138, fig. 14c. —Greve, 1963: 30, figs. 1A, C.—Couture & Trudel, 1968: 868, fig. 9.—Hayashi, 1977: 177, fig. 8, 9.

Spirontocaris spina, Urita, 1942: 14.—Miyake, 1982: 50, pl. 17 fig. 3.

Spirontocaris spina laevidens Kobjakova, 1936: 221 (Key).—Kobjakova, 1937: 127.—Vinogradov, 1950: 201.

Spirontocaris brevidigitata Kobjakova, 1935: 88, fig. 3.— Kobjakova, 1937: 128.—Vinogradov, 1950: 200, pl. 11, fig. 38.—Igarashi, 1969: 5, pl. 4 fig. 12.

Material.—HUMZ-C 1057, off Hiroo, 42°11.45′N, 143°41.6′E, 325m, DIID-5 (*TV Tanshu-Maru*), 30 May 1990, otter trawl, 1 female (15.4mm CL), coll. T. Komai.

Coloration.—Unavailable. Miyake (1982) presented a color photograph of a fresh specimen from the Sea of Japan.

Remarks.—The present specimen is referable to *S. spinus* revised by Hayashi (1977). This species has close resemblance to the sympatric *S. murdochi* Rathbun, but it is distinguishable from the latter by the larger body, and the proportionately shorter dactylus of the last three pairs of pereopods (about 0.3 vs. 0.4-0.5) (Hayashi, 1977).

Distribution.—Circum polar: southward to northern North Sea, East coast of America, Massachusetts Bay (Holthuis, 1947); Bering Sea (Stimpson, 1860; Rathbun, 1904); Sea of Okhotsk (Kobjakova, 1937); Saghalien (Urita, 1942); Sea of Japan southward to Wakasa Bay, Fukui Prefecture (Miyake, 1982).

Genus *Lebbeus* White, 1847

Remarks.—This genus is easily distinguished from the other related genera by the presence of 1 supraorbital spine on the carapace and the absence of exopod on the 3rd maxilliped. Many species were descibed by Russian authors from the Asian waters. Comprehensive revisionary study of the genus is needed.

Lebbeus groenlandicus (Fabricius, 1775)

Astacus Groenlandicus Fabricius, 1775: 416.
Hippolyte armata Owen, 1839: 88.
Hippolyte cornuta Owen, 1839: 89.
Hetairus groenlandica, Brashnikov, 1907: 155, text-figs. 19a-b.—Kobjakova, 1937: 108.
Spirontocaris groenlandica, Rathbun, 1904: 61.—Leim, 1921: 140, pl. 4, fig. 11.—Yokoya, 1933: 24.—Urita, 1942: 16.
Lebbeus groenlandica, Vinogradov, 1950: 203, pl. 14, fig. 53.—Igarashi, 1969: 5, pl. 5, fig. 15.
Lebbeus groenlandicus, Couture & Trudel, 1968: 870, fig. 10.—Miyake, 1982: 53, pl. 18 fig. 3.

Material.—HUMZ-C 933, off Kushiro, 42°28.0′N, 144°01.0′E, 560m, 28 June 1989, otter trawl, 1 female (30.6mm CL), coll. M. Yabe; HUMZ-C 1058, off Hiroo, 42°11.45′N, 143°41.6′E, 325m, BIID-5 (*TV Tanshu-Maru*), 30 May 1990, otter trawl, 1 male (21.5mm), 1 female (26.1mm), coll. T.

Komai.

Coloration.—Entire animal brownish white, with irregular red bands on abdomen. Cornea of eye dark gray. Antennal flagella alternated with reddish grown and white bands. Thoracic appendages reddish, often banded. Distal portion of spines or teeth of body parts black. Miyake (1982) gave a color photograph of this species collected from off Wakasa, Fukui Prefecture.

Remarks.—*Lebbeus groenlandicus* is readily distinguished from all other members of the genus by the pleura of abdomen armed with 1 or 2 strong ventral spines.

Distribution.—Circum polar: Greenland to Cape Cod (Squires, 1962); Arctic coast of Canada (Rathbun, 1919); Chukchi Sea (Vinogradov, 1950); Bering Sea to Puget Sound (Rathbun, 1904); Sea of Okhotsk (Kobjakova, 1937); Sea of Japan southward to off Wakasa, Fukui Prefecture (Miyake, 1982); 2-518m.

Family PANDALIDAE

Genus *Pandalus* Leach, 1814

Remarks.—The members of the genus *Pandalus* is distinguishable from the other shrimps of northern Japan by the reduced chela of the 1st pereopod, strongly unequal 2nd pereopods, weak ischiual expansion of the 1st pereopod, and the presence of the ischiual spine on the last 3 pairs of perepods. The following 6 species have been known from northern Japan: *P. borealis* Krøyer, 1838; *P. hypsinotus* Brandt, 1851; *P. goniurus* Stimpson, 1860; *P. gracilis* Stimpson, 1860; *P. prensor* Stimpson, 1860; *P. kessleri* Czerniavski, 1878. I added *P. tridens* Rathbun, 1902 to the Japanese fauna herein for the first time.

Pandalus borealis Krøyer, 1838

(Fig. 5)

Pandalus borealis Krøyer, 1838: 254.—Yoshida, 1914: 23, pl. 5, fig. 2.—Yokoya, 1933: 15.—Yokoya, 1939: 263.—Urita, 1942: 3.—Igarashi, 1969: 2, pl. I, fig. 2, pl. 13, fig. 36.—Miyake, 1982: 59, pl. fig. 1.

Pandalus borealis var. *eous* Makarov, 1935, 321, fig. 2-3.

Pandalus borealis eous, Kobjakova, 1937: 104, pl. 1, fig. 2.—Vinogradov, 1950: 193, pl. 4, fig. 20.—Kobjakova, 1958: 223.—Zarenkov, 1960: 343, fig. 2.

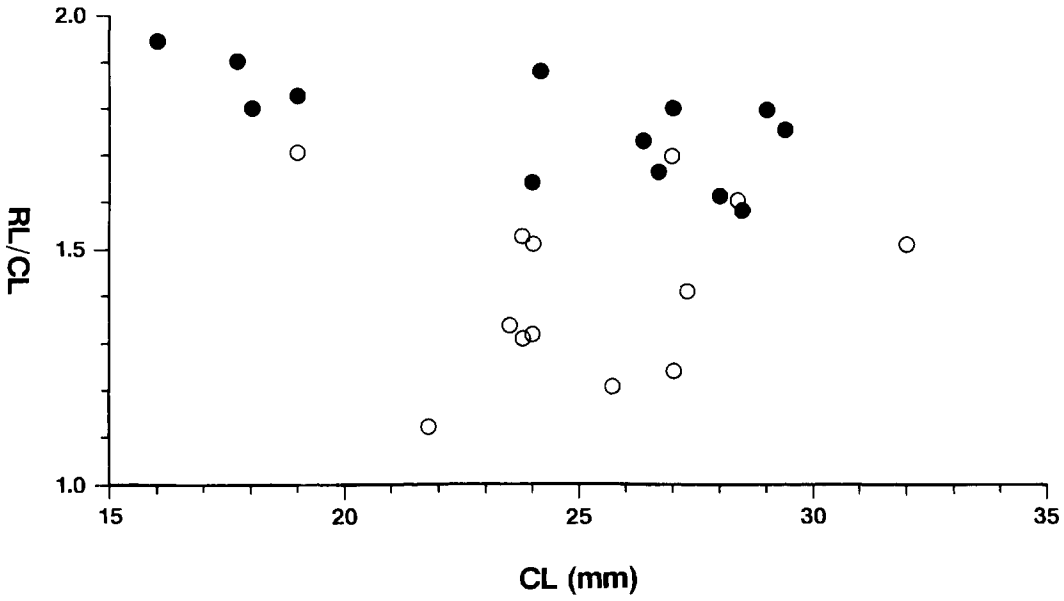

Fig. 5. *Pandalus borealis* Krøyer, 1838. Comparson of proportionate length of rostrum to carapace between eastern Hokkaido specimens and Greenland specimens. ● = eastern Hokkaido specimens; ○ = Greenland specimens. RL = rostrum length.

Material.—HUMZ-1048: east of Cape Erimo, 41°42.34′N, 143°39.45′E, 265m, BIIF-2, (*TV Tanshu-Maru*), 29 May 1990, otter trawl, 6 males (16.1-23.3mm CL), 4 females (24.6-29.7mm CL), coll. T. Komai; HUMZ-C 1074: off Hamanaka, 42°49.43′N, 145°19.31′E, 429m, BIIC-2, (*TV Tanshu-Maru*), 4 June 1990, otter trawl, 3 females (26.7-28.0mm CL), coll. T. Komai.

Coloration.—Fine red dots over entire animal, with translucent back ground; posterior 3 pairs of pereopods often banded. Cornea of eye dark gray. Miyake (1982) presented a color photograph of this species.

Remarks.—Makarov (1935) separated the Bering population from the Atlantic population under the name *Pandalus borealis* var. *eous*, and subsequent Russian authors (e. g., Kobjakova, 1936; 1937; 1958; Vinogradov, 1950; Zarenkov, 1960) regarded it as a distinct subspecies, and referred the western Pacific population to the subspecies. On the other hand, Japanese authors have not accepted the subspecific division, though there was no comparative study based on materials from both area. According to Makarov (1935), his variation is distinguishable from the typical form by the following features: the rostrum is proportionately longer than that of Atlantic form, 1.61-1.70 times as long as the carapace as against 1.43-1.48 times as long; the blade of scaphocerite is shorter with rounded distal margin compared with that of the typical

form. As previously mentioned by Zarenkov (1960), however, the latter feature is very variable among Asian specimens, and seems to have no significant value. Fortunately, I could examine 13 specimens of *P. borealis* from Greenland deposited at HUMZ (HUMZ-C 1162; 1252; 19.2-32. 0mmCL). As to the proportionate length of the rostrum, the present examination confirms Makarov's observation (Fig. 5): in the Japanese material the ratio ranges from 1.60 to 1.95, while in Greenland material it ranges from 1.13 to 1.70. The shape of distal part of the scaphocerite is variable as in the reports of Zarenkov (1960). On the other hand, Japanese specimens bear many dorsolateral spines of the telson compared with the Atlantic specimens (9-13, usually 11 or 12 vs. 6-9, usually 8 or 9). These differences between the two populations may be significant.

Although I do not apply Makarov's name to the present material, future study eventually may prove that the Asian population is distinct from the Atlantic population.

Distribution.—Circum polar: Barents Sea to North Sea (Makarov, 1935; Allen, 1959), western Greenland to Gulf Maine (Haynes and Wigley, 1969), St. Matthew Island to Columbia River mouth (Rathbun, 1904); Bering Sea (Makarov, 1935; Saghalien (Urita, 1942), Sea of Japan (Kobjakova, 1937); 42-1450m (Kobjakova, 1937). In Japanese waters, *P. borealis* has been reported from the following areas: Sea of Japan southward to Fukui Prefecture (Yokoya, 1933), Pacific coast from Hokkaido to off Ozaki, Miyagi Pref. (Yokoya, 1939; Igarashi, 1969).

Pandalus hypsinotus Brandt, 1851

Pandalus hypsinotus Brandt, 1851: 125.—Rathbun, 1902a, 46.—Rathbun, 1904: 46, pl. 2 fig. 5.—Brashnikov, 1907: 114, texfig. 13a-k, pl. 2 fig. 9.—Kobjakova, 1937: 102.—Kobjakova, 1958: 222.—Yokoya, 1933: 16.—Yokoya, 1939: 263.—Nishimura, 1939: 382.—Yoshida, 1941: 22, pl. 5 fig. 1.—Vinogradov, 1950: 194, pl. 9, fig. 27.—Kubo, 1965: 609, fig. 951.—Igarashi, 1969: 2, pl. 2, fig. 4, pl. 13, fig. 38.—Butler, 1980: 143.

not *Pandalus hypsinotus*, Doflein, 1902: 635, pl. 4 figs. 1,2 (=*Pandalus prensor* Stimpson, 1860).—Holthuis, 1976: 50, fig. 1 (=*Pandalus gracilis* Stimpson, 1860).——Miyake, 1982: 60, pl. 20, fig. 2.

Material.—HUMZ-C 72, off Hiroo, 42°16.2′N, 143°41.6′E, 217m, OST 8612 (*TV Oshoro-Maru*), 7 Sept. 1986, otter trawl, 1 female (46.2mm CL), coll. T. Komai.

Coloration.—Unavailable. Butler (1980) gave a detailed description on the coloration of this species.

Remarks.—*Pandalus hypsinotus* is distinguished from the other closely related western Pac-

ific congeners, *P. prensor* Stimpson, 1860, *P. gracilis* Stimpson, 1860, which were resurrected recently by Hayashi (1988a), and *P. nipponensis* Yokoya, 1933 by its large size, the proportionately longer rostrum, and the posteriormost median spine situated posterior to the level of midlength of the carapace. The present specimen is considerably larger than the recorded maximum size presented by Butler (1980).

The specimens identified as *P. hypsinotus* by Doflein (1902) probably belongs to *P. prensor* Stimpson, 1860 judging from the figure (Plate 4, Fig. 1,2). Further, Miyake's *P. hypsinotus* probably belong to other species judging from the color photograph (Plate 20, Fig. 2). The photographed specimen apparently resembles *P. borealis*, but it differs in the absence of dorsal teeth on the abdomen. The author cannot comment on the specific status of Miyake's specimen.

P. hypsinotus is one of the commercially important shrimps in eastern Hokkaido.

Distribution.—Widely distributed in northern North Pacific Ocean; 5-460m (Butler, 1980). From the Japanese waters, this species occurs in the Pacific coast of northern Japan and the Sea of Japan southward to Fukui Prefecture (Miyake, 1982).

Pandalus tridens Rathbun, 1902

(Fig. 6)

Pandalus montagui, Rathbun, 1899: 557.

Pandalus montagui tridens Rathbun, 1902: 901.—Rathbun, 1904: 41, pl. 2, fig. 2.—Schmitt, 1921: 42, pl. 13, fig. 2.—Vinogradov, 1950: 194.—Kobjakova, 1958: 223.

Pandalus tridens, Ivanov, 1971: 657.—Butler, 1980: 136.

Material.—HUMZ-C 1176: off Hiroo, 42°10.4′N, 143°31.9′E, 115m, DIID-1 (*TV Tanshu-Maru*), 6 June 1990, beam trawl, 2 males (10.6, 13.5mm CL), 1 intersexual (13.8mm CL), 7 females (15.6-21.2mm CL), coll. T. Komai.

Diagnosis.—Integument relatively thin, surface naked. Rostrum (Fig. 6A) directed slightly to rather noticeably upward, far overreaching scaphocerite, 1.49-1.68 times as long as carapace; dorsal margin armed with 10-12 spines including 4-6 on posterior to level of orbital margin, posteriormost spine situated at midlength of carapace, leaving distal 3/5 unarmed; ventral margin armed with 4-7 acute tooth, posteriomost tooth distinctly stronger than preceding one; apex bifid or trifid. Postrostral median carina low, reaching middlength of carapace, dorsal profile of carapace faintly concave or straight. Abdomen (Fig. 6B) unarmed dorsally. Telson usually falling short of uropod, 0.7-0.8 times as long as carapace, armed with 6 (rarely 7) pairs of dorsolateral spines. Eye broadly subpyliform, with distinct ocellus. Antennule with short,

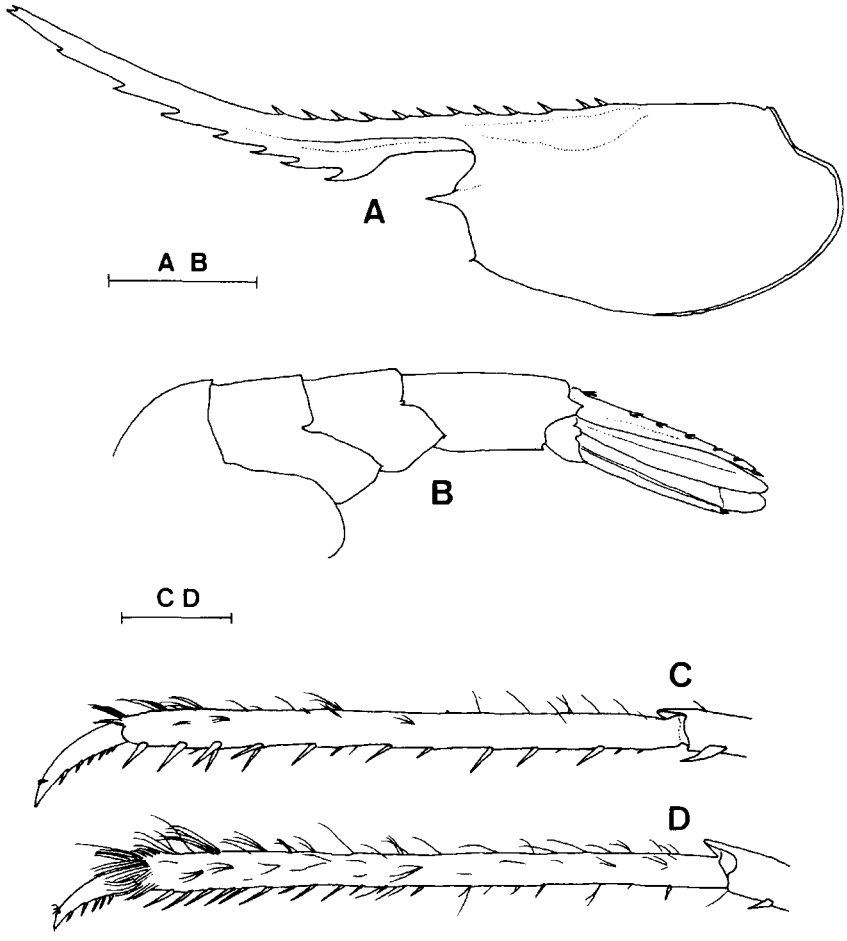

Fig. 6. *Pandalus tridens* Rathbun, 1902. Female (A, B) and male (C, D) specimens (HUMZ-C 1176). A, carapace and rostrum in left aspect; B, posterior part of abdomen in left aspect; C, dactylus and propodus of left 3rd pereopod in lateral aspect; D, same of left 5th pereopod. (Scales: 5mm in A, B; 2mm in C, D)

rounded stylocerite. First pereopod with weak ischiual expansion. Second pereopods strongly unequal. Posterior three pairs of pereopods simple, almost similar in length; dactyli (Fig. 6C, D) armed with accessory spinules distributed over entire length, about 0.2 times as long as propodus; meri with 2 rows of spines.

Color in life.—Fine red dots covering over whole body, with translucent background; darker red on cardiac region to lateral side, orbital region of carapace, ventral part along margin of rostrum and most of 6th abdominal somite; darker region on carapace often reticulated. Abdomen with prominent red spots on lateral side of second to fifth somites; first somite bearing 4 small blue spots along dorsoanterior margin. Antennular flagella having red and

white bands; antennal flagellum colored by alternate red and tranparent bands. Third maxilliped and posterior 3 pairs of pereopods having red bands, ischiua of latter with yellowish chromatophores.

Remarks.—*Pandalus tridens* Rathbun have been given full specific rank by recent authors based on larval morphology (Ivanov, 1971; Haynes, 1979) and on adult morphology (Butler, 1980), though it was treated as a subspecies of the Atlantic species *P. montagui* Leach, 1814 in early works (see synonymy). Butler (1980) presented a detailed description and comparison of *P. montagui* from two Atlantic localities (Quebec and England) and *P. tridens* from British Columbia. The present material agree well with his description of *P. tridens* except for few minor differences. The shape of rostral tip, which was used as an significant feature separating the eastern Pacific form from Atlantic *P. montagui* (trifid vs. bifid), is variously bifid or trifid in the present material. The color pattern of the Hokkaido specimens slightly differ from the description and colored figure given by Butler (1980) in having the ventrally colored rostrum, 4 blue spots along the dorsoanterior margin of the first abdominal somite, and fine red spots on the lateral side of the second to fifth abdominal somites. These discrepancies between the two populations may be due to geographical differences.

In the Western Pacific, Kobjakova (1958) listed *P. tridens* from southern Kurile Islands. The present material confirms Kobjakova's (1958) finding, and I add this species to the Japanese fauna herein.

Distribution.—Widely distributed in northern North Pacific: Pribilof Islands (Rathbun, 1902; 1904), Bering Sea to San Nicolas Island (Schmitt, 1921), British Columbia (Butler, 1980), Cape Oyutorsky (Makarov, 1941), southern Kurile Islands (Kobjakova, 1958), 5-1984m (Schmitt, 1921).

Genus *Pandalopsis* Bate, 1888

Remarks.—Five species including *P. coccinata* Urita, 1942 and *P. japonica* Balss, 1914 were identified during the course of the study. These will be dealt with in a separete paper.

Family CRANGONIDAE

Remarks.—Recently Christoffersen (1988) revised this family based on the cladistic method, and ranked a monophyletic group comprising *Crangon, Neocrangon*, Notocrangon, Metacrangon, Argis, Sclerocrangon, and *Rhynocrangon* as subfamily Crangoninae. He demonstrated that *Neocrangon*, which was created as a subgenus of *Crangon* by Zarenkov (1965), is distinct from the latter phylogenetically. According to him, *Neocrangon* is in sister-relation with a clade

of *Notocrangon* + *Metacrangon* + *Argis* + *Sclerocrangon* + *Rhynocrangon*. On the other hand he could not infer the certain systematic position of *Mesocrangon*, which was created by Zarenkov (1965), though he placed the genus within Crangoninae. In this report I followed Christoffersen's (1988) classification. Practically *Neocrangon* is distinguished from *Crangon* s. s. by 2 median spines on the carapace, and the merus of 1st pereopod bearing 2 or 3 anterior spines. Other genera can be identified using Butler's (1980) key.

Genus *Argis* Krøyer, 1842

Remarks.—This genus is readily distinguished from the other genera of Crangoninae in having the specialized orbit and the spatulate dactyli of the last 2 pairs of pereopods. The taxonomy of the genus is somewhat confused. Conprehensive revisionary study are now needed.

Argis lar (Owen, 1839)

(Fig. 7)

Crangon lar Owen, 1839: 88, pl. 28 fig. 1.

Nectocrangon lar, Rathbun, 1904: 137, figs. 74, 75.—Brashnikov, 1907: 92.—Yokoya, 1933: 38.—Kobjakova, 1937: 140, fig. 12.—Yoshida, 1941: 29, pl. 7, fig. 3, 3'—Zarenkov, 1960: 349 (in part).

Nectocrangon lar lar, Vinogradov, 1950: 221, pl. 21, fig. 90.—Kobjakova, 1958: 229.

Argis lar, Urita, 1942: 37.—Kubo, 1965: 624, fig. 1008.—Squires, 1964: 462, fig. 1A.—Igarashi, 1969: 11, pl. 12, fig. 33, pl. 17, fig. 56, pl. 19, fig. 62.—Miyake, 1982: 68, pl. 23, fig. 3.

Material.—HUMZ-C 1036, off Kushiro, 42°28.0'N, 144°01.0'E, 560m, EST 9003 (*Eisho-Maru*), 28 June 1989, otter trawl, 5 females (19.0-21.8mm CL), coll. M. Yabe; HUMZ-C 1055, off Hiroo, 42°16.31'N, 143°21.89'E, 512m, BIID-3 (*TV Tanshu-Maru*), 30 May 1990, otter trawl, 3 females (11.0-21.4mm CL), coll. T. Komai; HUMZ-C 1071, off Erimo, 41°37.29'N, 143°21.89'E, 251m, BIIE-2 (*TV Tanshu-Maru*), 29 May 1990, otter trawl, 6 males (8.8-11.2mm), 11 females (10.9-23.1mm CL), coll. T. Komai; HUMZ-C 1072, off Hamanaka, 42°52.88'N, 145°21.84'E, 145m, BIIC-5 (*TV Tanshu-Maru*), 4 June 1990, beam trawl, 10 males (8.1-10.1mm), 22 females (16.3-19.4mm CL), coll. T. Komai.

Coloration.—Background bright tan over most of body and appendages; on carapace, brown to buff spots forming diagonal bars and bands, and bordering anterior margin including rostral spine; gastric region often whitish. Abdomen with brown to buff patches on dorsal and lateral

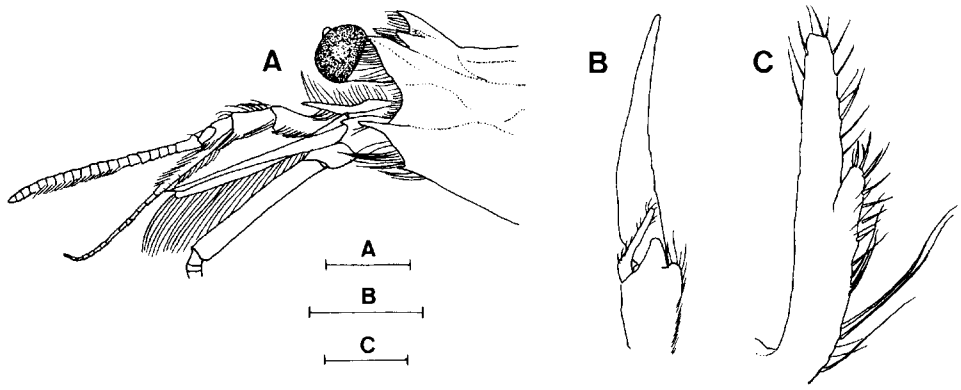

Fig. 7. *Argis lar* (Owen, 1839). Male specimen (HUMZ-C 1072). A, anterior part of carapace and cephalic appendages in left aspect; B, right 1st pleopod in ventral aspect; C, endopod and appendix masculina of left 2nd pleopod. (Scales: 1mm in A, B; 0.5mm in C)

sides, pleura of each somite often bearing large white spot, ventral margin sometimes reddish; on 3rd and 4th somites patches forming dark diagonal bars, on sixth somite these forming complex patterns; middorsal carinae on abdomen dark brown. Cornea of eye dark gray. Eggs grayish green in early stage.

Remarks.—*A. lar* is distinguishable from the closely related congeners by 2 median spines on the carapace and the rounded posterior end of the paired dorsal carinae on the 6th abdominal somite (Squires, 1964; Butler, 1980). The present material differs from the figure given by Squires (1964) and Butler (1980) only in the paired dorsal carinae on the 6th abdominal somite slightly converging posteriorly, rather than parallelly running.

The males are much smaller than the females. They apparently differ from the females of about same size in having more slender body, more prominent dorsal carinae on the abdomen, somewhat longer outer antennular flagellum usually longer than the inner flagellum (Fig. 7A), and very small endopod of the 1st pleopod (Fig. 7B). The appendix masculina (Fig. 7C) is much shorter than the endopod, and bears some spines as well as setae. I could not find certain evidence of protandry in the present series, though closely related congener *A. dentata* (Rathbun, 1902) was demonstated to be a protandrous hermaphrodite (Frechette & Corrivault, 1970). Several ovigerous females were found in the material collected from May to June.

A. lar may rank as the most common shrimp in eastern Hokkaido. It occurs on mud bottoms from the shallow sublittoral to the upper bathyal zone.

Distribution.—Restricted to waters adjacent to western North America and eastern Asia (Squires, 1964). In the Japanese waters, *A. lar* was recorded from the following area: Pacific coast of northern Japan southward to Iwate Prefecture (Miyake, 1982); Sea of Japan southward to off Noto, Ishikawa Prefecture (Yokoya, 1933); 10-375 m, Miyake, 1982). The present material may extend slightly the bathymetric range to a depth of 560 m.

Genus *Neocrangon* Zarenkov, 1965

Remarks.—Although 6 species were assigned to the genus by Chistoffersen (1988), the taxonomy of the genus seems to be insufficient.

Neocrangon abyssorum (Rathbun, 1902)

(Fig. 8)

Crangon abyssorum Rathbun, 1902b: 890.—Rathbun, 1904: 125, fig. 66.—Butler, 1980: 112.

Crago abyssorum, Schmitt, 1921: 97.

Sclerocrangon abyssorum, Birshtein & Vinogradov, 1951: 359.—Birshtein & Vinogradov, 1953: 216.

Crangon (Neocrangon) abyssorum, Zarenkov, 1965: 1762 (list).—Birshtein & Zarenkov, 1970: 422.

Neocrangon abyssorum, Kuris & Carlton, 1977: 554 (list).

not *Crangon abyssorum*, Yokoya, 1933: 34, fig. 14.

Material. —HUMZ-C 937: east of Cape Erimo, 42°04.9′N, 143°51.2′E, 887m, OST 8904 (*TV. Oshoro-Maru*), 6 Sept. 1989, otter trawl, 1 female (3.9mm CL), coll. T. Komai.

Diagnosis.—Integument thin, almost naked. Rostrum (Fig. 8A-C) reaching anterior end of cornea of eye, spiniform, not sulcate dorsally, bearing tuft of setae subdistally. Carapace (Fig. 8A, B) lacking submedian spine; postrostral median carina reaching midlength of carapace, armed with 2 small spines; antennal and branchiostegal spine almost equal, latter slightly overreaching level of rostral apex; pterygostomial spine absent; hepatic spine situated at level of anterior median spine; gastric region slightly depressed below. Abdomen (Fig. 8A, D) with pleura of anterior 5 somites ventrally rounded; median carina absent from 1st to 5th

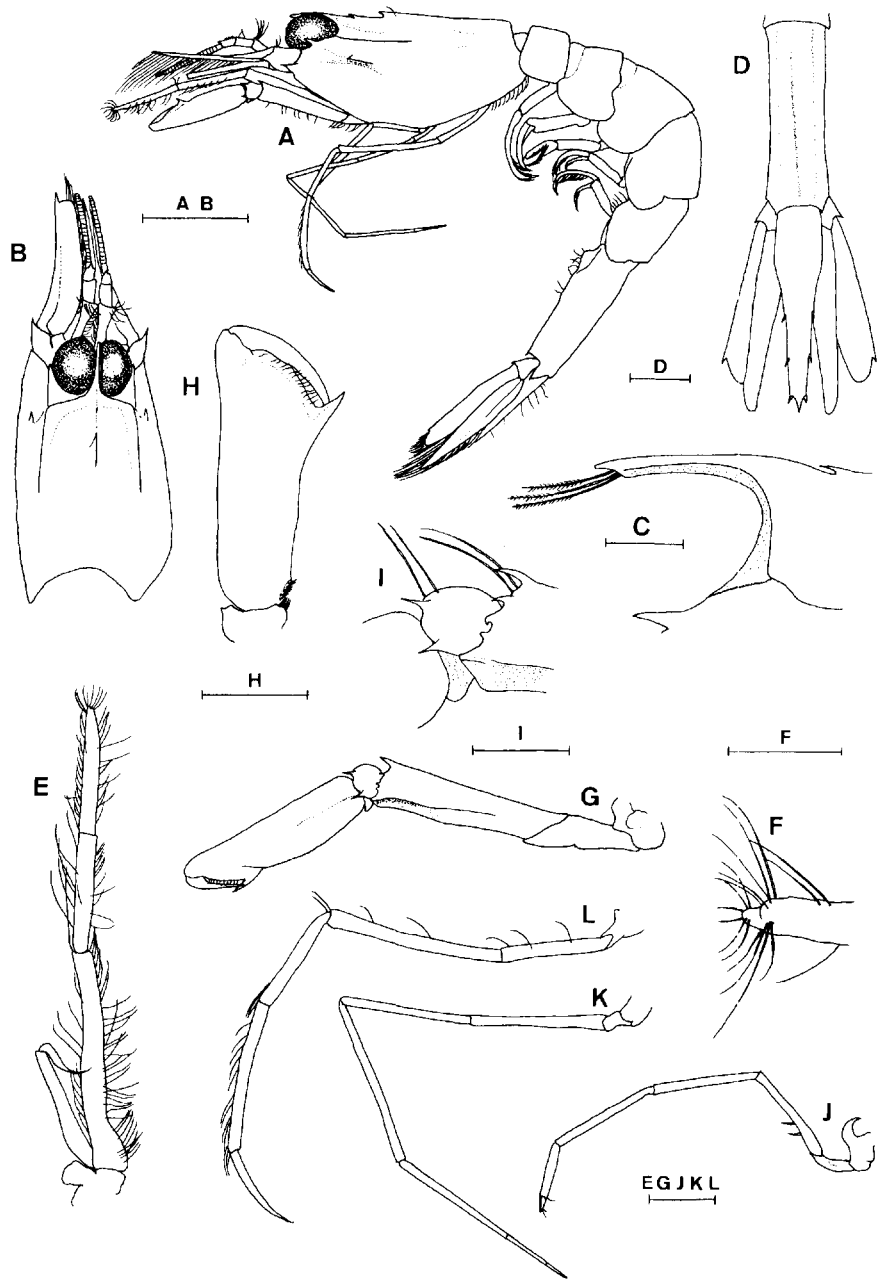

Fig. 8. *Neocrangon abyssorum* (Rathbun, 1902). Female specimen (HUMZ-C 937). A, entire animal in left aspcet; B, carapace and cephalic appendages in dorsal aspect; C, rostrum in left aspect; D, 6th abdominal somite and telson in dorsal aspect; E, left 3rd maxilliped in dorsal aspect; F, same, distal part of ultimate segment; G, left 1st pereopod in lateral aspect; H, same, chela in dorsal aspect; I, same, carpus and distal part of merus in lateral aspect; J, left 2nd pereopod in lateral aspect; K, left 3rd pereopod in lateral aspect; L, left 4th pereopod in lateral aspect; (Scales: 2mm in A, B; 1mm in D, E, G, H, J-L; 0.5mm in C, F, I)

somites, 6th somite slender, 3.8 times as long as proximal height, having 2 obscure dorsal carinae, not extending beyond dorsoposterior margin. Telson (Fig. 8D) acute distally, with 3 pairs of dorsolateral spines. Eyes (Fig. 8A, B) very large, contiguous, eyestalk not visible from dorsal aspect. Scaphocerite 0.7 times (Fig. 8B) as long as carapace, with concave lateral margin. Third maxilliped (Fig. 8E, F) rather slender, with articulated exopod; distal part of ultimate segment with characteristic setae radiately arranged. First pereopod (Fig. 8G, H, I) subchelate, cutting edge of palm obliquely transverse; carpus bearing 2 lateral spines; merus with anterodorsal spine and a lateral spine but without flexor spine. Second (Fig. 8J) and 3rd pereopods (Fig. 8K) thin, former chelate. Posterior 2 pairs of pereopods (Fig. 8L) slender, with simple dactylus about 0.6 times as long as propodus. Pleopods bearing rudimental appendix interna.

Coloration.—Unavailable.

Remarks.—Although the only one specimen examined is obviously young, it agrees with the previous descriptions of *N. abyssorum* given by Rathbun (1904) and Butler (1980) in many aspects. However, several differences are apparent: the postrostral and postorbital carinae only reach the midlength of the carapace, but near dorsoposterior mergin of the carapace; the 5th abdominal somite is devoid of median carina; paired dorsal carinae on the sixth abdominal somite are obscure; the telson does not reach the distal margin of the endopod of uropod; the first pereopod overreaches the scaphocerite. As these discrepancies, however, could be within the range of intraspecific variation or due to immaturity of the specimen, I assign the present specimen to *N. abyssorum* for the time being.

Crangon abyssorum reported by Yokoya (1933) with doubt were collected from scattered localities along the Pacific coast of southern Japan, and differs from the present material and previous descriptions in having somewhat longer scaphocerite and the posterior median spine situated at the middle of the carapace (Yokoya, 1933). Further, the vertical distribution of Yokoya's specimens is considerably shallower than that of the typical form (97-547m as against 887-2975m). Therefore, I suggest that Yokoya's (1933) *Crangon abyssorum* belongs to an undescribed species. Thus the present specimen represents the certain record of *N. abyssorum* from the Japanese waters for the first time.

This species is readily distinguished from the other known members of the genus by the spiniform rostrum and very large eye.

Distribution.—Bering Sea to southern California (Rathbun, 1904; Schmitt, 1921; Butler, 1980); Sea of Okhotsk (Birshtein & Vinogradov, 1951); Pacific side of Kurile Islands (Birshtein & Zarenkov, 1970); 887-2975m.

Neocrangon communis (Rathbun, 1899)

(Fig. 9)

Crangon communis Rathbun, 1899: 556.—Rathbun, 1904: 123, text-fig. 64.—Yokoya, 1933: 34.—Urita, 1942: 32.—Igarashi, 1969: 9, pl. 10, fig. 27, pl. 17, fig. 54.—Butler, 1980: 110.

Sclerocrangon communis, Brashnikov, 1907: 88, text-fig. 8.—Kobjakova, 1937: 136.—Vinogradov, 1950: 219, pl. 19, fig. 82.

Crago communis, Schmitt, 1921: 95, text-fig. 63.

Crangon (Neocrangon) communis, Zarenkov, 1965: 1762.

Neocrangon communis, Kuris & Carlton, 1977: 554.

Material.—HUMZ-C 1047, off Erimo, 42°29.8′N, 144°05.6′E, 352m, BIIF-1 (*TV Tanshu-Maru*), 29 May 1990, otter trawl, 1 male (10.8mm CL), 2 females (12.3, 12.5mm CL), coll. T. Komai; HUMZ-C 1053, data as for HUMZ-C 1047, 2 males (10.2, 10.6mm CL), 10 females (11.5-14.9mm CL); HUMZ-C 1054, off Hiroo, 42°16.31′N, 143°21.89′E, 512m, BIID-3 (*TV Tanshu-Maru*), 30 May 1990, otter trawl, 8 females (11.0-14.8mm CL), coll. T. Komai.

Coloration.—Not recorded. Miyake (1982) presented a color photograph of fresh specimen of this species from off Kamaishi, Iwate Prefecture.

Remarks.—The present specimens agree generally with the descriptions and figures given by Rathbun (1904) and Butler (1980), but apparently differ in having a proportionately longer scaphocerite (0.8-0.9 vs. about 0.7). Further, the eye of eastern Hokkaido specimens may be larger than that of the figure given by them. These differences may be due to geographical variation. The males differ from the females by smaller size, having longer and stouter outer antennular flagellum overreaching the scaphocerite (Fig. 9A, B), and the pleopodal morphology (Fig. 9C-G). The endopod of the 1st pleopod is short, about 1/3 of the exopod in male, while it is elongate, about half of in female. The endopod of the 2nd pleopod of male is not constricted; the appendix masculina is bud-like, and has some spinules on the distal portion;
in female the endopod is constricted at the part distal to the base of the rudimentary

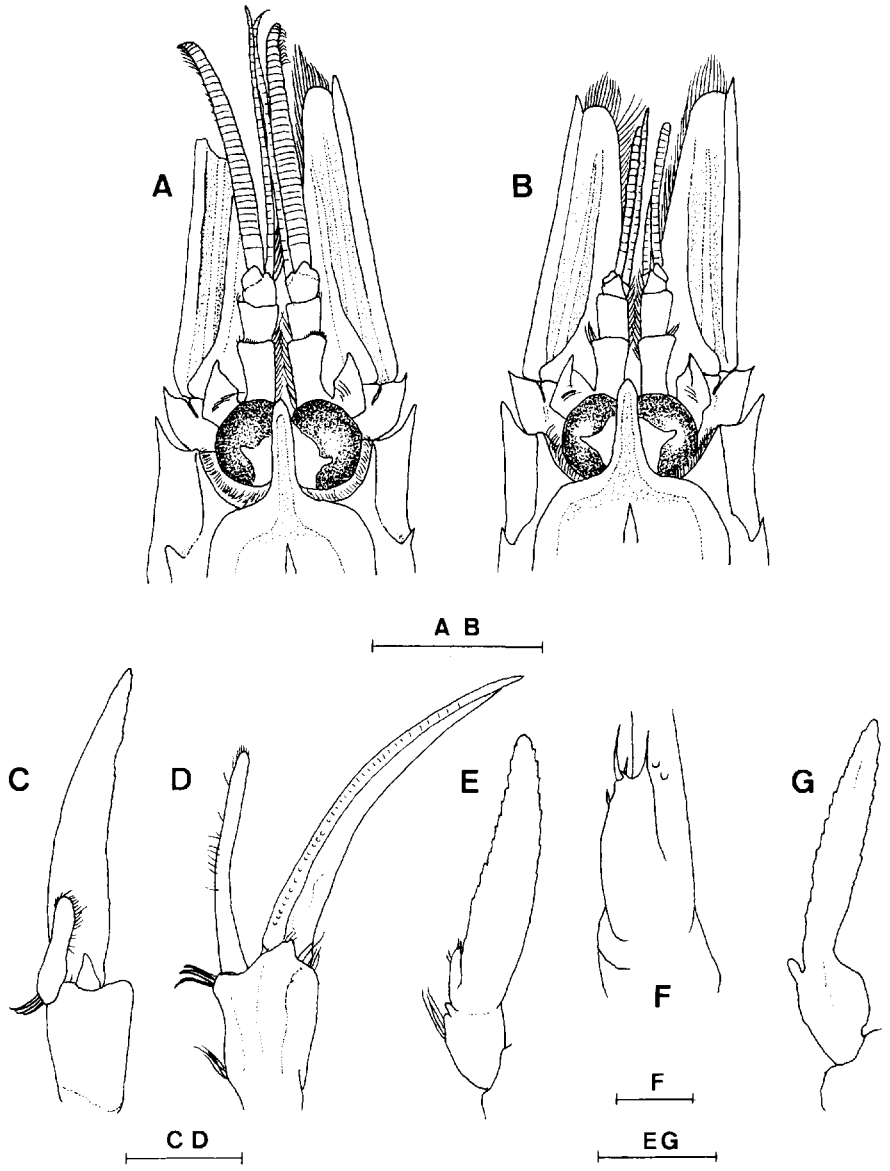

Fig. 9. *Neocrangon communis* (Rathbun, 1899). Sexual dimorphisms in antennule and pleopods (depicted from 2 specimens of HUMZ-C 1047). A, B, anterior part of carapace and cephalic appendages; C, left 1st pleopod of male in ventral aspect; D, same of female in ventral aspect; E, left 2nd pleopod of male in ventral aspect; F, same, appendix masculina; G, same of female in ventral aspect. (Scales: 5mm in A, B; 2mm in C, D; 1mm in E, G; 0.5mm in F)

appendix interna.

This species is very common in eastern Hokkaido. It occurs coastwide on mud bottoms from the sublittoral to the upper continental slope.

Distribution.—Bering Sea to San Diego (Rathbun, 1904); Chukchi Sea (Vinogradov, 1950); Sea of Okhotsk (Kobjakova, 1937); Sea of Japan southward to Toyama Bay (Miyake, 1982); Pacific coast of northern Japan southward to Iwate Prefecture (Yokoya, 1933).

Genus *Sclerocrangon* Sars, 1883

Remarks.—The genus is readily distinguished from the other related genera by having strongly sculptured integument of the body and 1 or 2 ventral teeth on each abdominal pleuron. A key to 8 species of the genus, which are considered to be valid, were presented by Komai & Amaoka (1991).

Sclerocrangon igarashii Komai & Amaoka, 1991

Sclerocrangon derjugini, Zarenkov, 1965: 1765, fig. 6 (not Kobjakova, 1937).
Sclerocrangon igarashii Komai & Amaoka, 1991: 27, figs. 1-5.

Material.—HUMZ-C 1340, off Kushiro, position not recorded, 200-300m, 20 August 1986, shrimp trawl, 5 males (19.7-26.8mm CL), 12 females (20.0-38.0mm CL), coll. unknown.

Coloration.—Unavailable.

Remarks.—*Sclerocrangon igarashii* was recently described by Komai & Amaoka (1991) based on the specimens collected from Urup Island, Kurile Islands, and off Kushiro. The newly obtained material from off Kushiro agree well with the type series. The maximum specimen of the present material (38.0mm CL) is larger than every specimen of the type series. The present material includes 6 ovigerous females (30.2-38.0mm CL). The eggs are apparently few and fairly large, measuring about 4.0mm in diameter. This suggests that *S. igarashii* has highly abbreviated postembryonic development.

Distribution.—Pacific off Urup Island, off Kushiro, Sea of Okhotsk (Komai & Amaoka, 1991); 200-450m.

DISCUSSION

The present collection excluding *Pandalopsis* comprises 21 species of penaeidean and caridean shrimps, almost all of which have come from depth ranging between 200 and 1300m. Some of these, such as the species of the family Benthesicymidae, are true pelagic inhabitants, but the majority are benthic. These species can be divided into 3 major groups on the basis of their distribution pattern. The largest component of this fauna, seen from a zoogeographic point of view, is that which occurs in northern North Pacific Ocean ranging from the Bering Sea to the Californian coast in east and to the Sea of Japan in west. The following 15 species (71. 4%) including 2 species recorded from Japanese waters for the first time are referable to this group, 5 of which also occur in the Arctic or North Atlantic Ocean: *Bentheogennema borealis* (Rathbun); *Sergestes similis* Hansen; *Hymenodora frontalis* Rathbun; *Pasiphaea tarda* Krøyer; *Eualus biungius* Rathbun; *Eualus fabricii* (Kroyer); *Spirontocaris murdochi* (Rathbun); *S. spinus* (Sowerby); *Lebbeus groenlandicus* (Fabricius); *Pandalus borealis* Krøyer; *P. hypsinotus* Brandt; *P. tridens* Rathbun; *Argis lar* (Owen); *Neocrangon abyssorum* (Rathbun); and *N. communis* (Rathbun). Most of the deepwater anomuran and brachyuran species enumerated by Takeda & Hayashi (1990) from this region belong to this group.

The following 4 species (19%) grouped together are widely distributed in tropical Indo-West Pacific Ocean: *Gennadas propinquus* Rathbun; *Aristeus mabahissae* Ramadan; *Acanthephyra eximia* Smith; and *A. quadrispinosa* Kemp. Of these, at least 2 species are bathypelagic inhabitants. The occurrence of these species seems to be rare in this area, and therefore it may be accidental. They were probably conveyed northward by a warm water mass of the Kuroshio Current.

The remaining 2 species (10%) are distributed in northwestern North Pacific around Japan including the Sea of Okhotsk: *Eualus middendorffi* Brashnikov; *Sclerocrangon igarashii* Komai & Amaoka. The latter species seems to be restricted to eastern Hokkaido and the Sea of Okhotsk. Further, *Pandalopsis coccinata* Urita and *P. japonica* Balss, both of which were not treated in this report, are referable to this group, though the former is not distributed in the Sea of Japan.

The prominence of boreal species including arctic ones indicates that the deep-sea fauna of eastern Hokkaido is very strongly influenced by the Oyashio Current. It should be noted that all of 8 anomuran and 4 brachyuran decapods enumerated by Takeda & Hayashi (1990) from eastern Hokkaido, which extend their vertical range to the bathyal zone, belong to the northwestern North Pacific group. On the other hand, for the littoral and sublittoral species it

is suspected that the northwestern North Pacifi group probably forms the largest faunal component.

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摘　　要

北海道東部太平洋の十脚甲殻類に関する分類学的知見は乏しく、最近、武田・林（1990）により、異尾類19種、短尾類19種が紹介されたが、エビ類についてはまとまった報告がなされていない。本報文では最近行われた生物調査で得られた深海性の根鰓類4種とコエビ類17種（2日本初記録種を含む）を報告した。そのリストは以下の通りである。日本初記録種は＊で示した。なお、タラバエビ科のモロトゲエビ属については5種が得られたが、本報告からは除外した。

Suborder Dendrobranchiata　根鰓亜目

Infraorder Penaeidea　クルマエビ下目

Family Benthesicymidae　ソコチヒロエビ科

Bentheogennema borealis (Rathhun, 1902)　シンカイエビ

Gennadas propinquus Rathbun, 1906　チヒロエビモドキ

Family Aristeidae　チヒロエビ科

Aristeus mabahissae Ramadan, 1938　ハクメイチヒロエビ

Family Sergestidae　サクラエビ科

Sergestes similis Hansen, 1903　キタノサクラエビ

Suborder Pleocyemata　抱卵亜目

Infraorder Caridea　コエビ下目

Family Oplophoridae　ヒオドシエビ科

Acanthephyra eximia Smith, 1884　トゲヒオドシエビ

A. quadrispinosa Kemp, 1939　サガミヒオドシエビ

Hymenodora frontalis Rathbun, 1902　マルヒオドシエビ

Family Pasiphaeidae　オキエビ科

Pasiphaea tarda Krøyer, 1845　キタシラエビ

Family Hippolytidae　モエビ科

Eualus biungius (Rarhbun, 1902)　ハサミモエビ

E. fabricii (Krøyer, 1841)　ヤイバツノモエビ（新称）

E. middendorffi Brashnikov, 1907　キタツノモエビ

Lebbeus groenlandicus (Fabricius, 1775)　イバラモエビ

Spirontocaris murdochi Rathbun, 1899　ユビナガトゲモエビ

S. spinus (Sowerby, 1805)　トゲモエビ

Family Pandalidae　タラバエビ科

Pandalus borealis Krøyer, 1838　ホッコクアカエビ

P. hypsinotus Brandt, 1851　トヤマエビ

* *P. tridens* Rathbun, 1902　タラバエビ（新称）

Family Crangonidae　エビジャコ科

Argis lar (Owen, 1839)　クロザコエビ

* *Neocrangon abyssorum* (Rathbun, 1902)　チヒロソコエビジャコ（新称）

N. communis (Rathbun, 1899)　フタトゲエビジャコ

Sclerocrangon igarashii Komai & Amaoka, 1991　コウダカキジンエビ

和名が提唱されていなかった種と日本初記録種には和名を提唱した。和名タラバエビには現在該当する種がいないので、タラバエビ属 *Pandalus* の模式種である *P. montagui* Leach の亜種として扱われたこともある *P. tridens* にこの和名を与えることを提唱する。

これら21種の基本的な分布は3型、すなわち、北太平洋北部型、北太平洋北西部型、およびインド太平洋型に分けられる。このうち北太平洋北部型に大半の15種（71.4%）が属し、当海域の深海性動物相は親潮に強く影響されていることが示唆される。また、4種が熱帯域に分布の中心を持つインド太平洋型に属するが、これらのうち、3種は浮遊性で、その出現は黒潮前線水塊の動向に強

く影響されると考えられる。残りの2種が北太平洋北西部型に属する。

質疑応答

永澤（日水研）：ハサミモエビは日本海側では普通にみられるが、道東沿岸ではどうなのか。

駒井(北大水産)：今回の調査はオッタートロールによって採集された標本が主で、はっきりしたことはいえないが、道東海域での出現はかなり限られていると思う。

永澤（日水研）：また、日本海側ではホッコクアカエビと共に多く漁獲されるトゲクロザコエビ *Argis dentata* が、今回のリストに出ていないが、この種の道東海域における記録はないのか。

駒井(北大水産)：トゲクロザコエビ *A. dentata* はオホーツク海や日本海からの報告はあるが、太平洋側からの報告はこれまで無いように思う。分布パターンから判断すると、東太平洋の *A. dentata* と日本海の種は別種である可能性が高い。