

**Marine Gammaridean Amphipoda (Crustacea) of  
Cheju Island and its Adjacent Waters, Korea**

**Kim, Hoon Soo and Kim, Chang Bae**

(Department of Zoology, College of Natural Sciences, Seoul National University, Seoul, 151 Republic of Korea)

濟州島 海域의 옆새우類(甲殼類: 端脚類)

金 熙 洙 · 金 昌 培  
(서울대학교 自然大 動物學科)

---

摘 要

추자도를 포함한 제주도 해역의 옆새우류상을 밝히기 위하여 1985년 8월부터 1986년 2월까지 제주도 내의 10지소에서 채집한 표본과 조사기간 이전에 추자도를 포함한 제주도 해역에서 채집되어 서울대 동물학과에 보관되어 있던 표본을 대상으로 하여 동정한 결과 8과 16종이 확인되었는데 이중 12종은 한국 미기록종이고 3종은 제주도 미기록종으로 밝혀졌다. 16종을 새로이 기재하고 도판과 Remark 를 첨부하였다.

Key words: Amphipoda, Gammaridea, Cheju Island, Korea.

**INTRODUCTION**

The fauna of Korean marine gammaridean Amphipoda is poorly known compared with that of other countries as Japan where 194 species in 32 families already were recorded (Hirayama, 1983). Iwasa (1939) and Stephensen (1944), as foreign investigators, described and figured 4 species — *Hyale schmidtii* (Heller); *Paramoera koreana* Stephensen, 1944; *Melita koreana* Stephensen, 1944; *Melita loevidorsum* Stephensen, 1944 — at Seikiho (Cheju Island) and Makinoshima (Pusan) respectively.

---

본 연구는 1985년도 문교부 학술연구조성비에 의해 “한국산 동, 식물의 종속지적 연구(II)”라는 제목하에 연구된 것의 일부임.

Hong (1983), as a native investigator, first described, figured, and recorded ecological matters of 3 species — *Jassa falcata* (Montagu, 1808); *Corophium acherusicum* Costa, 1857; *Erichthonius brasiliensis* (Dana, 1853) — at Deukryang Bay in the southern coast of Korea.

For the previous studies are very scant, we intend to clarify Korean gammaridean fauna. In this purpose, researches are needed at first in Cheju Island waters because Cheju Island waters have the most diverse fauna of many macrocrustaceans in Korean waters.

In this paper, our purpose is to describe shallow-water gammaridean Amphipoda in Cheju Island waters.

### MATERIALS AND METHODS

This study is based on the materials collected by authors during from August, 1985 to February, 1986 at 10 localities in Cheju Island, and on the specimens collected in Cheju Island and Chuja Island before this period and not reported until now (Fig. 1).

Collections were made at various habitats as tide pool, rocky intertidal zone and various collection methods as naked hand, pincettes, and insecticide were used. In addition to the above mentioned materials, considerable materials obtained from fishing nets. Materials were preserved in 70% alcohol. For more detailed observation, stereomicroscope and research microscope were used. Figures were made with drawing tube and camera lucida. Classification of superfamily and family level based on Barnard (1969a, 1972, 1973), Bousfield (1982a), and Bowman and Abele (1982).

All specimens reported are deposited in the Department of Zoology, Seoul National University.

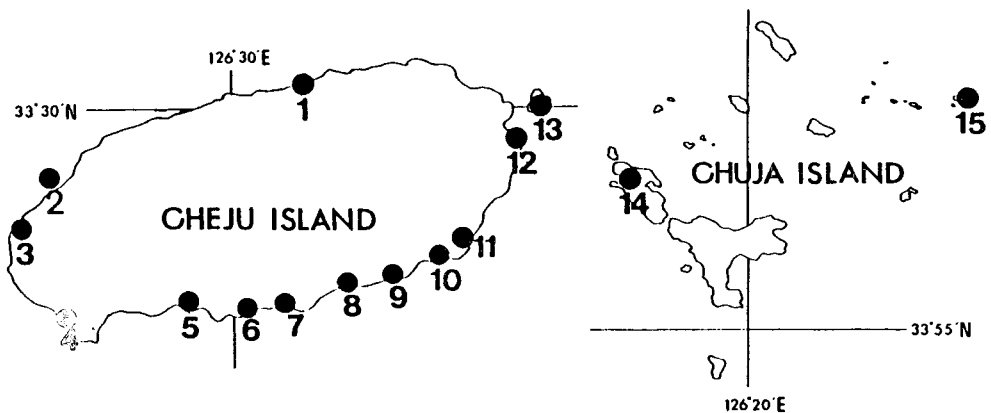


Fig. 1. Map showing collection localities. 1, Sinch'on (新村); 2, Piyangdo (飛揚島); 3, Sinch'ang (新昌); 4, Mosulp'o (慕瑟浦); 5, Taep'o (大浦); 6, P'ophwan (法還); 7, Sögwip'o (西歸浦); 8, Wimi (爲美); 9, Namwön (南元); 10, Sehwa (細花); 11, P'yosön (表善); 12, Söngsanp'o (城山浦); 13, Udo (牛島); 14, Upper Chujado (上楸子島); 15, Sasudo (泗水島).

## RESULTS

The results of examining the specimens of the Cheju Island gammaridean amphipods are as the following systematic account in which single asterisk (\*) indicates the species newly reported from Cheju Island waters, and double asterisks (\*\*) do the species newly reported from Korean waters.

Superclass Crustacea Pennant, 1777      甲殼上綱  
 Class Malacostraca Latreille, 1806      軟甲綱  
 Order Amphipoda Latreille, 1816      端脚目  
 Suborder Gammaridea Latreille, 1803      열새우아문  
 Superfamily Corophioidea Dana, 1849 (new status Barnard, 1973)  
 Family Ampithoidae Stebbing, 1899  
 Genus *Ampithoe* Leach, 1814

1. \*\**Ampithoe lacertosa* Bate, 1858

(Fig. 2)

*Ampithoë lacertosa* Bate, 1858, (p. 362); 1862, (pp. 236, 237, pl. 41, fig. 5).

*Ampithoe lacertosa*: Barnard, 1954, (pp. 31-33, pls.29, 30); 1965a, (pp.9-12, figs.4, 5); 1969b, (p.83); Nagata, 1960, (pp.175, 176, pl.16, figs. 95, 96); 1965b, (pp.313, 314); Reish & Barnard, 1967, (p.15); Colan & Bousfield, 1982a, (pp.47-49, fig. 2); Hirayama, 1983, (p.115, fig.21).

*Ampithoë macrurus* Stephensen, 1944, (pp.80-83, figs.30, 31).

*Dexamine scitulus* Harford, 1877, (p.116).

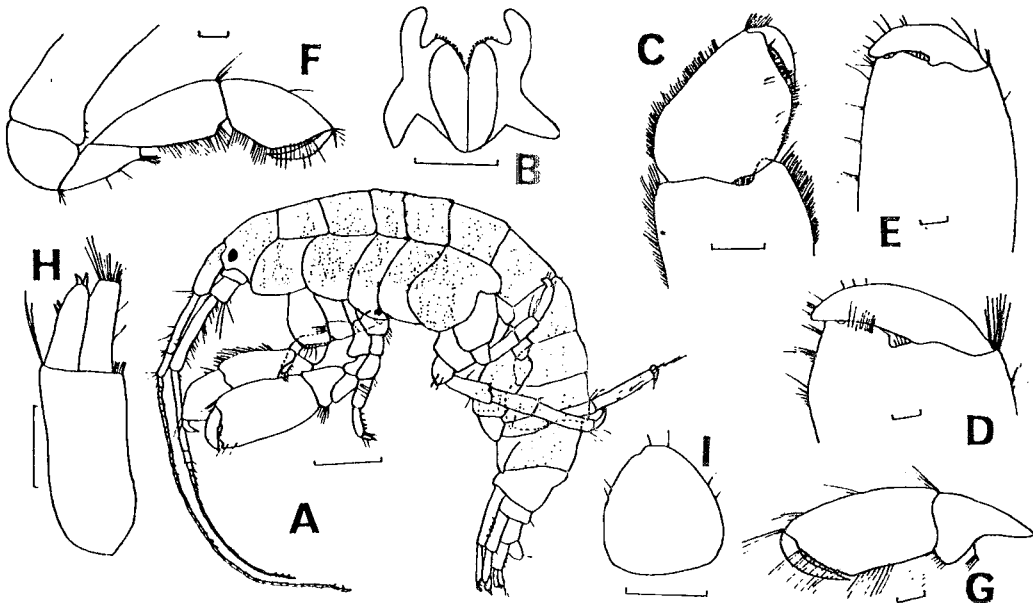


Fig. 2. *Ampithoe lacertosa* Bate. A, lateral view of male, left part (scale bar = 1mm); B, lower lip; C, distal part of male gnathopod 1, right part (scale bar = 0.3mm); D, distal part of male gnathopod 2 (body length: 20mm); E, distal part of male gnathopod 2 (body length: 15mm); F, female gnathopod 1, right part; G, distal part of female gnathopod 2; H, uropod 3; I, telson. scale bars = 0.2mm, if not mentioned.

**Material examined:** Söngsanp'o, 1♂, 3♀♀, Aug. 16, 1986 (C.B. Kim); Sinch'ang, 7♂♂, 13♀♀, May 3, 1985 (H.S. Kim); Piyangdo, 6♂♂, 11♀♀, May 2, 1985 (H.S. Kim & C.Y. Chang); Sehwa, 1♂, 1♀, May 4, 1985 (H.S. Kim); Udo, 2♀♀, Jul. 15, 1973 (K.S. Lee).

**Diagnosis:** Flagellum of antenna 1 about 2.5 times as long as peduncle, and about 48-articulate. Antenna 2 slightly shorter than antenna 1, and flagellum about 1/3 times as long as antenna 1. Each lobe of lower lip well separated; outer lobe nearly 2 times as long as apical lobe. In male gnathopod 1, article 5 and article 6 nearly equal in length, posterior margin of article 5 protrude distally; palm oblique; dactyl fitting the palm. Article 5 of female gnathopod 1 longer than article 6, and palm oblique. Palm of male gnathopod 2 transverse, and protrude distally, forming chelate state (complete chelate state is shown in individuals which have 20 mm body length). Article 5 of female gnathopod 2 shorter than article 6, and palm oblique, not forming chelate state. Peduncle of uropod 3 about 2 times as long as rami, and have dorsal spines. Posteroventral corners of pleonal epimera 2, 3 protrude as sharp teeth, and each pleonal epimeron with lateral ridge. Dark spots are heavily distributed as belt on the head, pereon, coxae, and pleon.

**Remarks:** *Ampithoe lacertosa* is boreo-arctic species, and relatively large-sized species (body length reaches up to 26mm), and widely distributed in the Cheju Island waters. All specimens were collected among algae in tide pools.

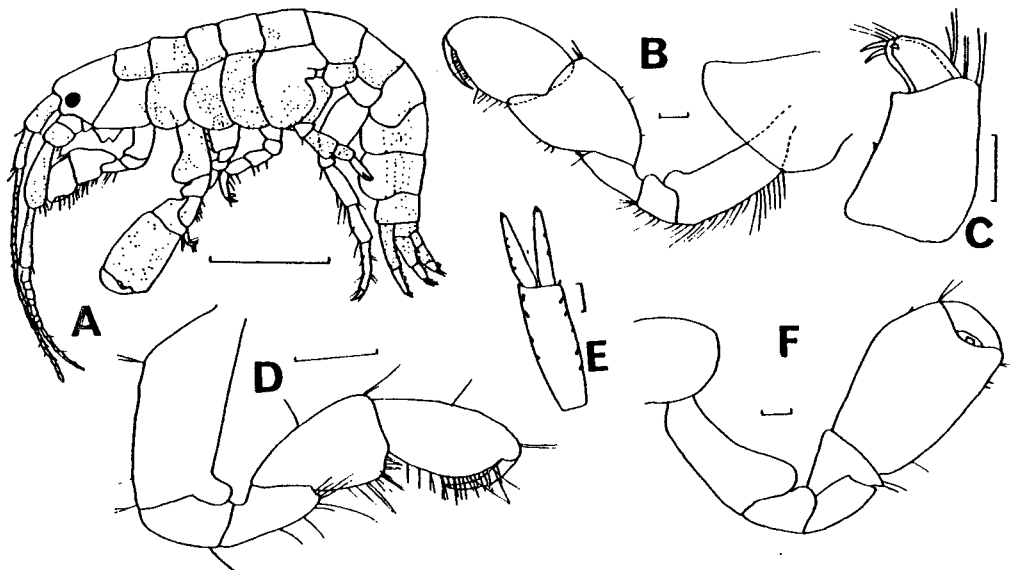
**Distribution:** Only Pacific Ocean-Kodiak Alaska, British Columbia, Washington, Oregon, Baja California, Southern California, Japan.

## 2. ***Ampithoe valida* Smith, 1873**

(Fig. 3)

*Ampithoë valida*: Paulmier, 1905, (pp. 164, 165, fig. 34).

*Ampithoe valida*: Alderman, 1936, (p. 68); Barnard, 1954, (pp. 34, 35, pl. 31); 1965a, (pp. 34-36, figs. 22, 23); Nagata, 1960, (p. 176, pl. 16, figs. 97, 98); 1965b, (p. 314, figs. 38, A,B); Reish & Barnard, 1967, (p. 15); Bousfield,



**Fig. 3.** *Ampithoe valida* Smith. A, lateral view of male, left part (scale bar = 1mm); B, male gnathopod 1; C, uropod 3; D, female gnathopod 1, right part; E, uropod 1; F, inner view of male gnathopod 2. remaining scale bars = 0.1mm.

1973, (pp. 180, 181, pl. LV, fig. 1); Conlan & Bousfield, 1982a, (pp. 49, 50, fig. 3); Hirayama, 1983, (p. 117, fig. 25).

*Ampithoë schmizuensis* Stephensen, 1944, (pp. 77-80, figs. 28, 29).

**Material examined:** Taep'o, 4♂♂ 7♀♀ (1 ovi.), Aug. 14, 1985 (H.S. Kim & C.B. Kim); P'yosŏn, 1♀, Aug. 15, 1985 (C.B. Kim); Sinch'on, 7♂♂ 10♀♀, Apr. 30, 1985 (H.S. Kim).

**Diagnosis:** Antenna 1 slightly shorter than antenna 2, and flagellum about 2 times as long as peduncle. Flagellum of antenna 2 shorter than peduncle. In male gnathopod 1, anterior margin of articles 2, 3 protrude distally; article 5 slightly longer than article 6, posterior margin protuberant distally; palm oblique. In female gnathopod 1, article 2 protrude distally; article 5 shorter than article 6, and posterior margin not protuberant; palm oblique. In male gnathopod 2, anterior margin of articles 2, 3 protrude distally; palm transverse, and palm bears quadrate hump on central part. Posteroventral corners of pleonal epimera 1-3 rounded. Peduncle of uropod 3 about 2 times as long as rami. Dark spots are heavily distributed on the antennal peduncle, pereon, pleon, urosome, and coxae.

**Remarks:** *Ampithoë valida* differs from *A. lacertosa* in rounded posterior corners of pleonal epimera 2, 3, and in the presence of quadrate hump on palm of male gnathopod 2. *A. valida* is warm temperate species. Specimens were collected among algae in tide pools and in dent on rocks in intertidal zone.

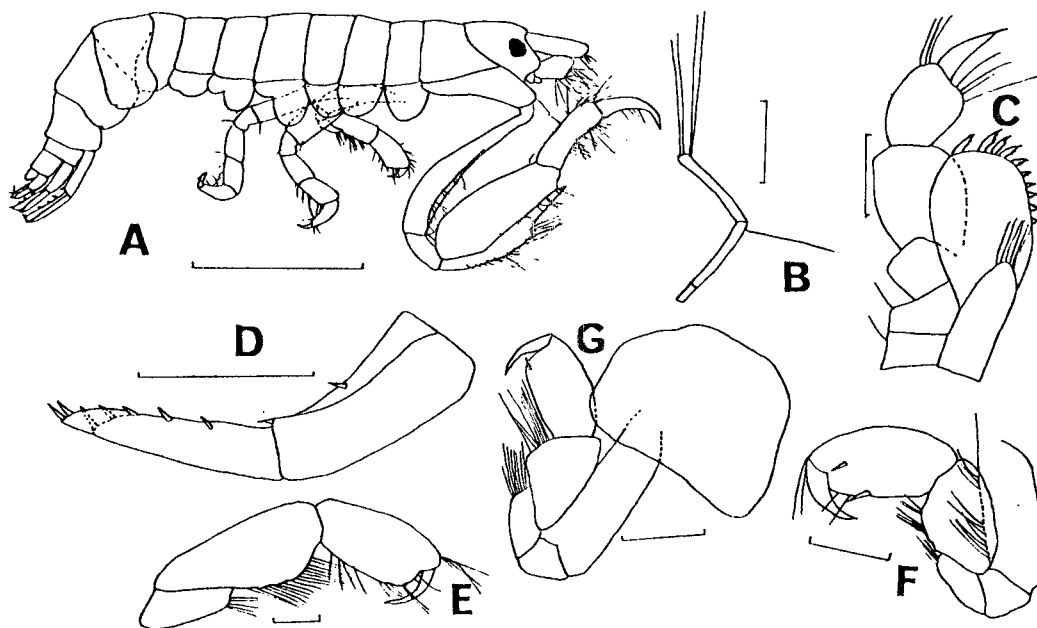
**Distribution:** Atlantic Ocean — Long Island, New Jersey, New England; Pacific Ocean — British Columbia, Washington, Oregon, California, Japan.

Family Corophiidae Dana, 1849

Genus *Aoroides* Walker, 1898

3. ***Aoroides columbiae*** Walker, 1898

(Fig. 4)



**Fig. 4.** *Aoroides columbiae* Walker. A, lateral view of male, right part (scale bar = 1mm); B, mandibular palp; C, maxilliped; D, inner view of uropod 3, left part; E, male gnathopod 2; F, female gnathopod 1, left part; G, female gnathopod 2, left part. scale bars = 0.1mm, if not mentioned.

*Aoroides columbiae*: Barnard, 1969b, (pp. 89, 90); Barnard, 1970, (pp. 68-70, figs. 31, 32); Nagata, 1960, (p. 175, pl. 16, fig. 94); 1965b, (p. 309); Conlan & Bousfield, 1982b, (pp. 89-92, figs. 6-8); Hirayama, 1984, (p. 86, fig. 97).

*Aoroides californica* Alderman, 1936, (pp. 63-66, figs. 33-38).

**Material examined:** Sögwip'o, 1♂, 1♀, Feb. 20, 1986. (C.B. Kim).

**Diagnosis:** Segment 2 of mandibular palp bears one long seta, and segment 3 bears long terminal setae. Outer lobe of maxilliped has serrated spines on apical and lateral margin. In male gnathopod 1, coxa triangular shaped, elongated anterioventrally, and ventral margin dented; anterior margin of article 2 densely setose, but posterior margin naked; article 4 elongated as long as article 5, apex pointed, and posterior margin densely setose; article 6 and article 7 equal in length. Female gnathopod 1 has normal shape; palm and posterior margin of article 6 not distinguished. In male gnathopod 2, plam slightly oblique, and dactyl overlapping the palm; concave margin of dactyl indented. In female gnathopod 2, plam slightly oblique, and dactyl overlapping the palm. In each pleonal epimeron, posteroventral corner slightly pointed. In uropod 3, outer ramus slightly shorter than inner ramus, and bears 2 lateral spines; lateral margin of outer ramus naked.

**Distribution:** California, Japan, Hawaii, Alaska, Washington, Oregon.

#### Family Ischyroceridae Stebbing, 1899

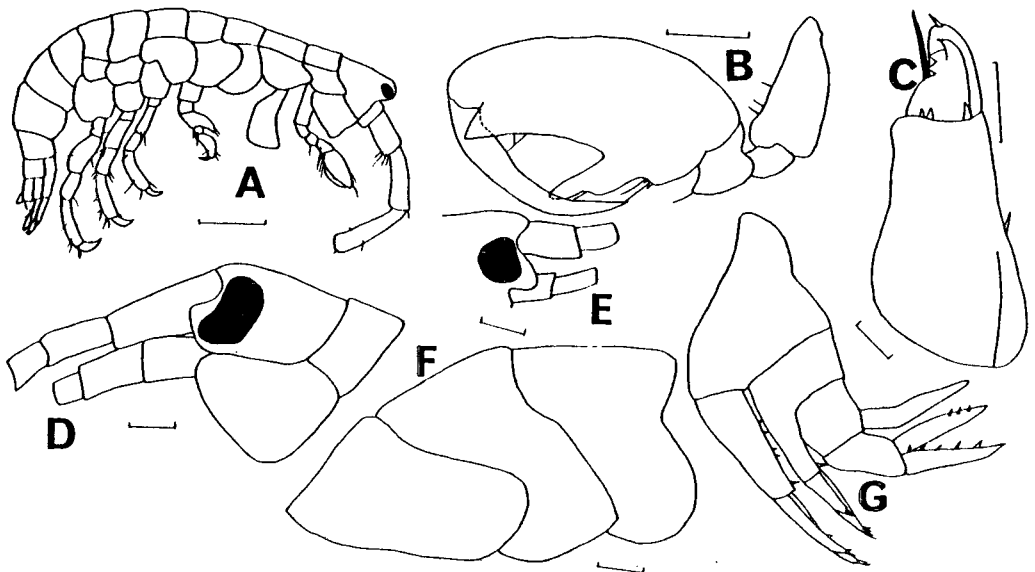
#### Genus *Jassa* Leach, 1814

#### 4. \**Jassa falcata* (Montagu, 1808)

(Fig. 5, A-C)

*Podocerus falcatus*: Bate, 1862, (p. 255); Sars, 1895, (p. 594, pl. 212).

*Podocerus odontonyx* Sars, 1895, (pp. 597, 598, pl. 213, fig. 2).



**Fig. 5.** *Jassa falcata* (Montagu). A, lateral view of male, right part (scale bar = 0.2mm); B, male gnathopod 2, left part; C, uropod 3; *Paramoera koreana* Stephensen. D, head of male, left part; E, head of female; F, pleonal epimera of male, left part; G, urosomites and uropods, left part. scale bars = 0.1mm, if not mentioned.

*Jassa falcata*: Shoemaker, 1942 (p. 40); Barnard, 1969b, (pp. 155-159); 1972, (p. 135); Nagata, 1965b, (p. 315); Griffiths, 1974, (p. 300); Lincoln, 1979, (p. 550, fig. 264); Hong, 1983, (pp. 137-143, figs. 3-5); Bousfield, 1973, (pp. 190, 191, pl. LVIII, fig. 2).

*Jassa dentex*: Irie, 1957, (p. 2).

**Material examined:** Sögwip'o, 1♂, Aug. 16, 1985 (C.B. Kim).

**Remarks:** This species is one of the most important fouling animals, and has various morphological forms. Our specimen is appropriate to Barnard's (1969b) thick form. The specimen was obtained from fishing net.

**Distribution:** Widely distributed in shallow waters of all oceans except in high polar region.

Superfamily Eusiroidea Stebbing, 1888

Family Eusiridae Stebbing, 1888

Genus *Paramoera* Miers, 1875

5. \**Paramoera koreana* Stephensen, 1944

(Fig. 5, D-G; Fig. 6)

*Paramoera koreana* Stephensen, 1944, (pp. 33-36, figs. 4,5).

**Material examined:** Sögwip'o, 1♂, 1♀, Aug. 16, 1985 (C.B. Kim); Mosülp'o, 1♂, Aug. 13, 1985 (C.B. Kim).

**Diagnosis of male:** Lateral cephalic lobe quadrate shaped. Eye larger than eye of female. Ac-

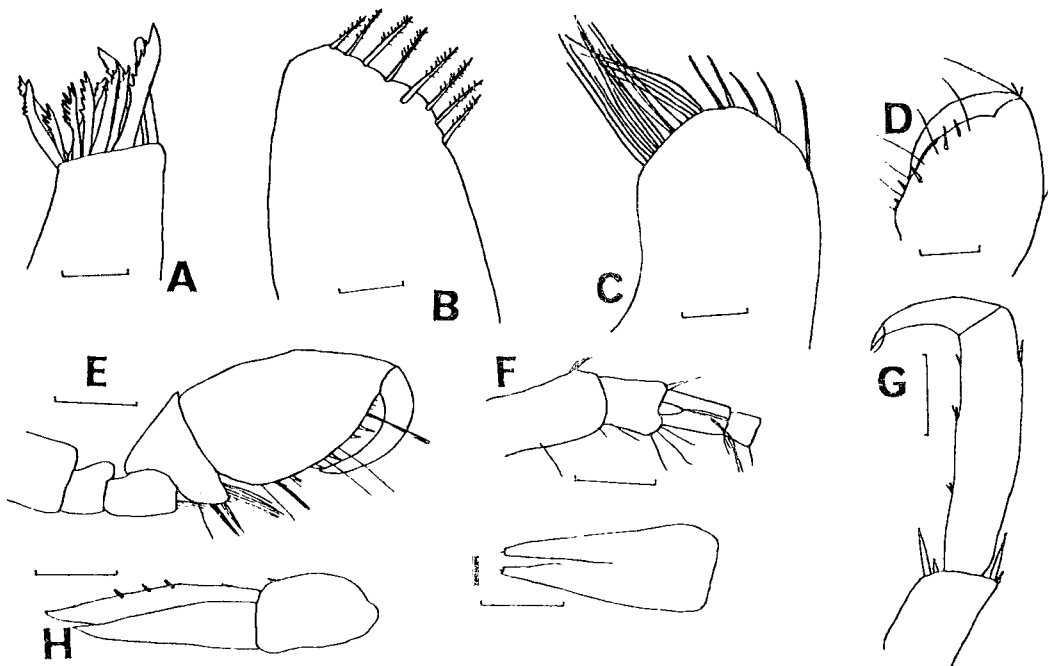


Fig. 6. *Paramoera koreana* Stephensen. A, outer plate of maxilla 1, right part; B, inner plate of maxilla 1, left part; C, inner plate of maxilla 2, left part; D, distal part of male gnathopod 1; E, male gnathopod 2; F, antenna 1; G, distal part of pereopod 5; H, uropod 3; I, telson. A, B, C scale bars = 0.02mm, and remaining scale bars = 0.1mm.

cessory flagellum about  $1/3$  times as long as article 1 of flagellum of antenna 1. Inner plate of maxilla 1 with 8 setae; outer plate with 11 strongly serrated spines on apical margin. Inner plate of maxilla 2 with 5 setae on medial edge. In gnathopod 1, palm oblique; dactyl defined with 2 spined depression on terminal of palm. In gnathopod 2, anterior margin of article 3 protrude distally; posterior margin of article 5 protrude distally; palm oblique, and lined with several spines; dactyl fitting the palm. Each pereopod with seta on concave margin of dactyl. Posteroventral corners of pleonal epimera 1, 3 somewhat rounded, but posteroventral corner of pleonal epimeron 2 slightly pointed. Rami of uropod 3 somewhat pointed, and much longer than peduncle. Telson cleft about half of total length, each lobe with seta on notched apex.

**Remarks:** This species originally described by stephensen (1944) from Makinoshima, Fuzan, SE. Korea (c. 35 N., 129 E.). But, He was described only female specimen. Our female specimen well agree with Stephensen's description. We newly supplemented description of male. Male differs from female in larger eye, in the presence of more rounded posteroventral corner of pleonal epimera, and in the shorter article 5 and much more bulged article 6 of gnathopod 2. This species newly described from Cheju Island waters. The specimens were obtained from fishing net.

**Distribution:** Korea (Pusan, Cheju Island).

Genus *Pontogeneia* Boeck, 1871

6. **\*\**Pontogeneia rostrata*** Gurjanova, 1938

(Fig. 7)

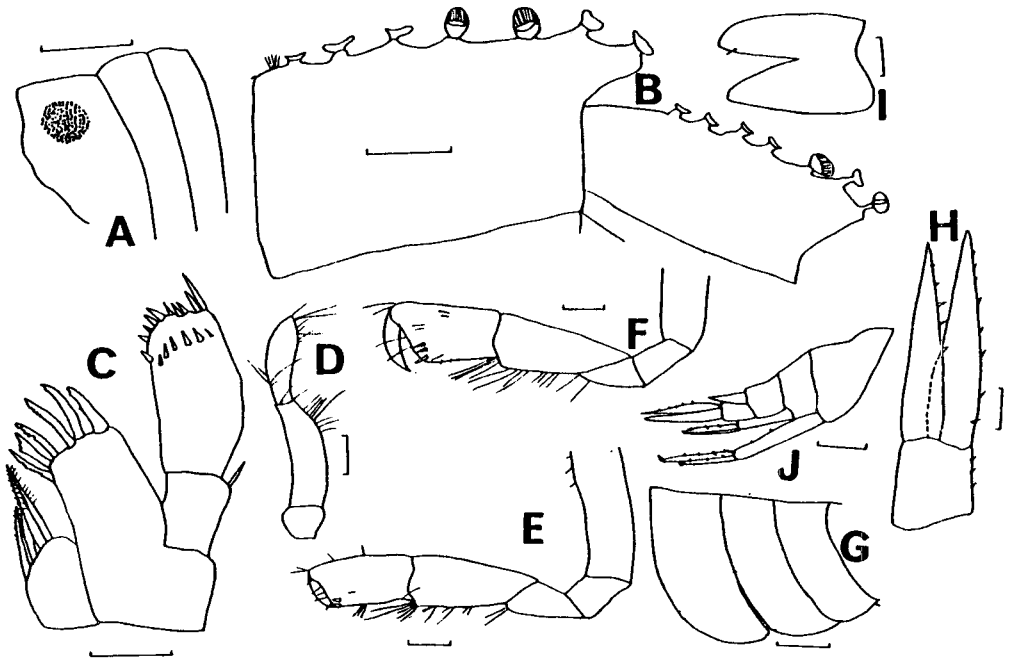


Fig. 7. *Pontogeneia rostrata* Gurjanova. A, head and pereonites 1,2 (scale bar = 1mm); B, peduncular articles 4, 5 of antenna 2; C, maxilla 1, right part; D, mandibular palp; E, male gnathopod 1; F, male gnathopod 2; G, pleonal epimera (scale bar = 0.3 mm); H, uropod 3; I, telson; J, urosomites and uropods, right part (scale bar = 0.3mm). remaining scale bars = 0.1mm, if not mentioned.



*Pontogeneia rostrata* Gurjanova, 1938, (p. 330, fig. 39); Barnard, 1962, (p. 81); 1964, (pp. 114-116, fig. 20); 1969b, (pp. 111-114); 1979, (p. 49, figs. 25-27); Nagata, 1960, (pp. 171-173, pl. XV, figs. 72-79, pl. XVI, figs. 80-92); 1965a, (pp. 185, 186, fig. 26).

**Material examined:** Mosŭlp'o, 54 individuals, Aug. 16, 1985 (C.B. Kim); Sŏgwip'o, 10 individuals, Aug. 16, 1985 (C.B. Kim); Sŏgwip'o, 5♂♂, Feb. 20, 1986 (C.B. Kim).

**Diagnosis of male:** Lateral cephalic lobe somewhat rounded. Head slightly longer than pereonites 1, 2. Eye light orange-colored in alcohol. Antenna 1 slightly shorter than antenna 2; peduncular articles 2, 3 bear the dish-shaped calceoli on posterior margin. Antenna 2 also bears the dish-shaped calceoli on anterior margin of peduncular articles 4, 5. Mandibular palp 3-articulate; article 2 somewhat bulged, and apex of article 3 pointed. Maxilla 1 with 4 plumose setae on the apex of inner plate; palp 2-segmented, and apex of segment 2 spinose. Gnathopod 1 and gnathopod 2 of nearly equal length. In gnathopod 1, palm oblique and defined with 2 spines, and dactyl fitting the palm. In gnathopod 2, palm more oblique than palm of gnathopod 1. In pleonal epimeron 1, posteroventral corner rounded, and in pleonal epimera 2, 3, posteroventral corners slightly pointed. Uropod 1 extending to the end of uropod 3. Inner ramus of uropod 3 longer than outer ramus; peduncle about ½ times as long as rami. Telson deeply cleft and each lobe triangular shape, and apex rounded. The specimens were obtained from the fishing net.

**Distribution:** Japan Sea, Bering Sea, Okhotsk Sea, Southern California, Japan, Mexico.

Superfamily Leucothoidea Dana, 1852

Family Colomastigidae Stebbing, 1899

Genus *Colomastix* Grube, 1861

7. **\*\**Colomastix lunalilo*** Barnard, 1970

(Fig. 8)

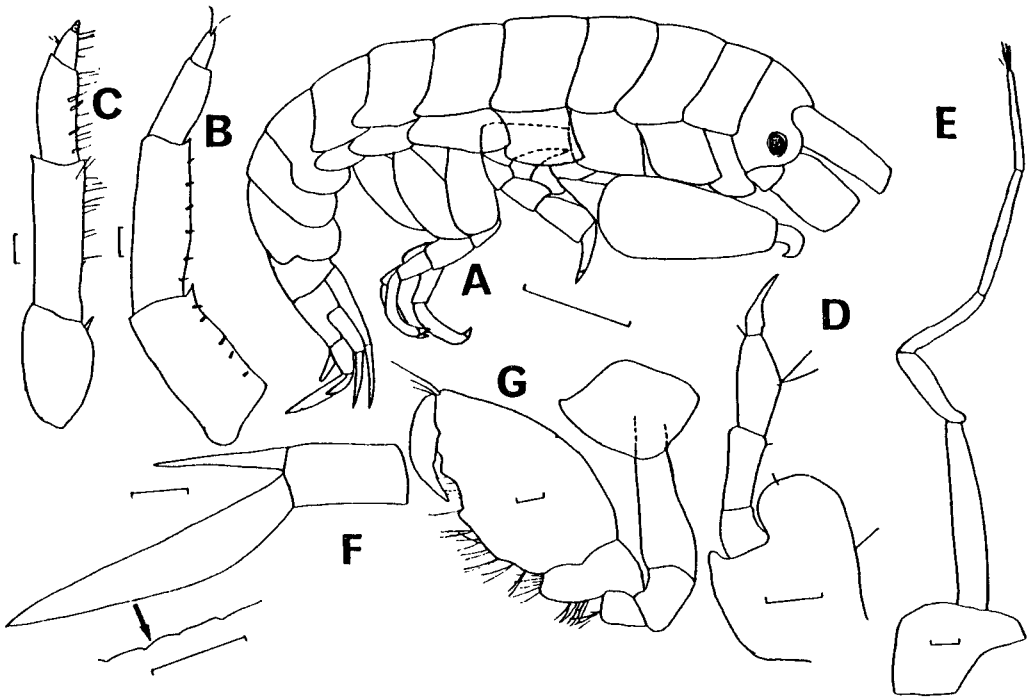
*Colomastix lunalilo* Barnard, 1970, (pp. 96, 100, figs. 51, 52); 1971. (p. 55, figs. 24, 25).

**Material examined:** Sŏgwip'o, 1♂, Aug. 16, 1986 (H.S. Kim & C.B. Kim); Mosŭlp'o, 2♂♂, Aug. 13, 1986 (I.H. Kim); Upper Chuja-do, 2♂♂, Jul. 18, 1985 (H.S. Kim & I.H. Kim).

**Diagnosis of male:** Lateral cephalic lobe rounded anteriorly. Antenna 1 bearing disteroventral teeth on peduncular articles 1-3, and lateral sides of peduncular articles 1-3 spinose in a row at three margins; flagellar article 2 nearly obsolescent. Antenna 2 also bearing teeth and spines like antenna 1; flagellum 4-articulate, article 1 fairly longer than the other articles. Coxae 1-5 pointed anteriorly. Gnathopod 1 bears elongated article 3; article 6 about 80 percent as long as article 5; tip of article 6 densely setose and dactyl vestigial. In gnathopod 2, posterior margin of articles 4-6 densely setose; posterior margin of article 6 longer than palm; palm defined with large spine, and with nearly quadrate shaped protuberance on the medial part; dactyl shorter than palm, and with small quadrate shaped protuberance on concave margin. Posteroventral corner of each pleonal epimeron rounded. Urosomite 3 vestigial; in uropod 1, 2, peduncle and rami of nearly equal length. Outer ramus of uropod 3 about 40 percent as long as inner ramus; lateral margin of inner ramus with continuous serration. Telson triangular and slightly more extending than peduncle of uropod 3.

**Remarks:** The specimens collected in *Myxilla setoensis* and *Callyspongia confederata* obtained from fishing net.

**Distribution:** Hawaiian Islands.



**Fig. 8.** *Colomastix lunulito* Barnard. A, lateral view of male, right part (scale bar = 1mm); B, antenna 1; C, antenna 2; D, maxilliped, left part; E, male gnathopod 1, left part; F, uropod 3; G, male gnathopod 2, left part. scale bars = 0.2mm, if not mentioned.

Superfamily Melitoidea Bousfield, 1977

Family Melitidae Bousfield, 1973

Genus *Elasmopus* Costa, 1853

8. **\*\**Elasmopus pectenircus*** (Bate, 1862)

(Fig. 9)

*Moera pectenircus* Bate, 1862, (p. 192, pl. 34, fig. 8).

*Elasmopus serrula* Walker, 1904, (pp. 277, 278, pl. 8, fig. 37).

*Elasmopus pectenircus*: Barnard, 1955, (pp. 8-10, fig. 4); 1970, (p. 125, figs. 73, 74); 1971, (p. 75, figs. 33-35).

**Material examined:** Sŏngsanp'o, 1♂, Aug. 16, 1985 (C.B. Kim).

**Diagnosis of male:** Lateral cephalic lobe somewhat rounded quadrate shape. Accessory flagellum about 2-articulate. Antenna 2 reaching up to the end of peduncle of antenna 1. Mandibular palp falcate, and article 3 densely setose. In gnathopod 2, article 6 S shaped, posterior margin heavily setose; palm with hump bearing 4 spines near the dactyl hinge; dactyl curved, and shorter than posterior margin of article 6; concave margin of dactyl with one undulated depression. In pereopods 3-5, posterior margin of article 2 undulated distally, especially in pereopod 4. Locking spines of each pereopod normal. Pleonal epimera 1, 2 with lateral ridges, and posteroventral corners pointed. Posteroventral corner of pleonal epimeron 3 rounded. Inner ramus of uropod 3 about 2/3 times as long as outer ramus, and each ramus rectangular shape. Telson deeply cleft, and apex of each ramus transverse and spinose.

**Remarks:** Our specimen was collected among the algae attaching to rocks in tide pools.

**Distribution:** Caribbean Sea, Red Sea, Indian Ocean, Tropical waters of Pacific ocean.

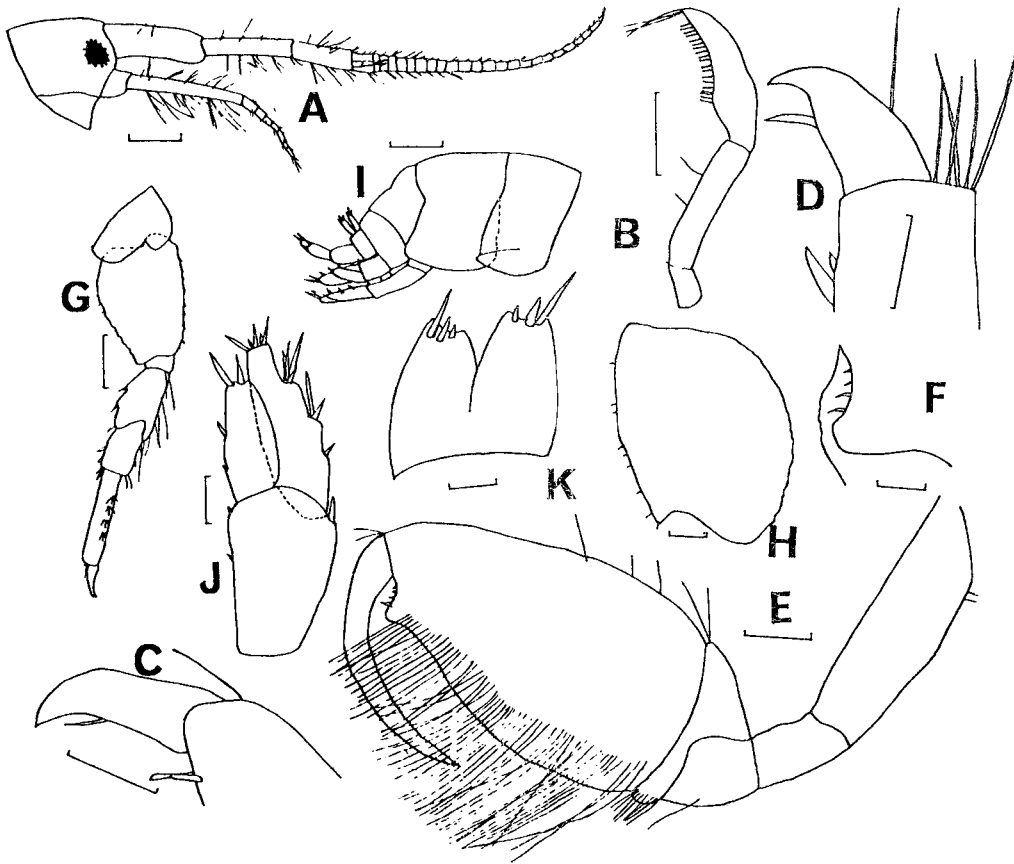


Fig. 9. *Elasmopus pecteniscus* (Bate). A, male head and antennae; B, mandibular palp; C, distal part of pereopod 2; D, distal part of pereopod 5; E, male gnathopod 2, left part; F, enlargement of hump on palm of male gnathopod 2; G, pereopod 4; H, article 2 of pereopod 5; I, pleonal epimera and urosomites; J, uropod 3; K, telson. A, G, I scale bars = 0.5 mm, and remaining scale bars = 0.1 mm.

Genus *Maera* Leach, 1814

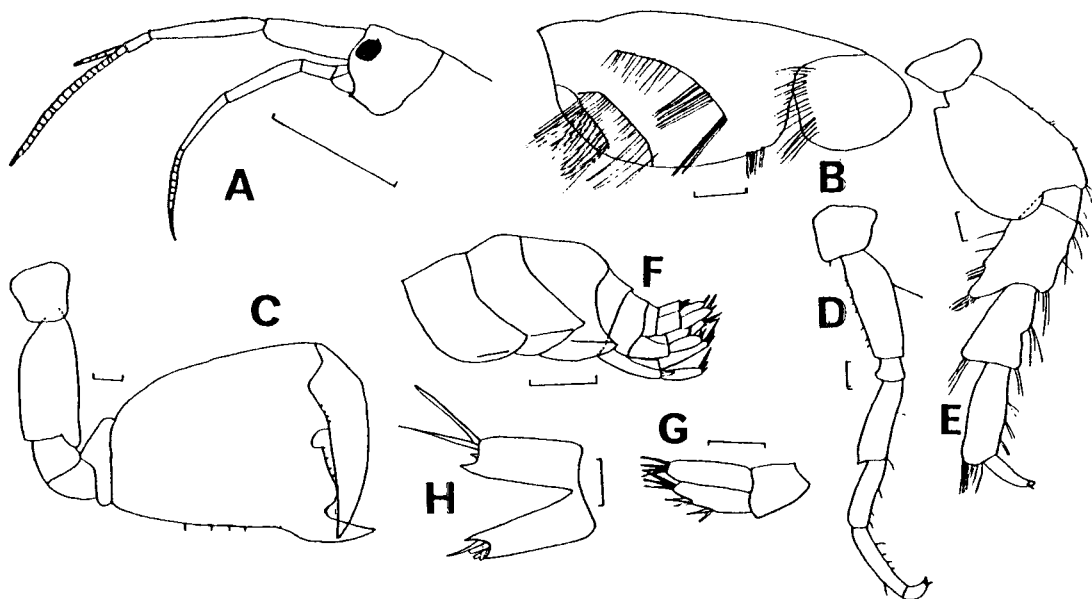
9. **\*\**Maera pacifica*** Schellenberg, 1938.

(Fig. 10)

*Maera pacifica* Schellenberg, 1938, (pp. 42-45, figs. 19, 20); Barnard, 1965b, (p. 511); 1970, (pp. 150, 151, fig. 92); 1971, (p. 84, figs. 38, 40, 41); Griffiths, 1976, (pp. 25, 26, fig. 8).

**Material examined:** Mosŭlp'o, 6♂♂, Aug. 16, 1985 (H.S. Kim & C.B. Kim); Mosŭlp'o, 1♂, Aug. 13, 1985 (C.B. Kim); Sinch'ang, 1♂, May 3, 1985 (H.S. Kim); Upper Chuja-do, 1♂, Jul. 18, 1985 (H.S. Kim & I.H. Kim).

**Diagnosis of male:** Lateral cephalic lobe somewhat rounded. Ventral margin of head pointed anteriorly. Antenna 1 and antenna 2 of nearly equal length. In antenna 1, flagellum longer than peduncular articles 2, 3 combined, 21-articulate; accessory flagellum 5-articulate. Flagellum of antenna 2 about 12-articulate, and 1.3 times as long as peduncular article 5. Article 6 of gnathopod 1 with 3 lines of spinules on medial part. In gnathopod 2, coxa tapered distally; anterior margin of articles 2, 3 somewhat protruded; article 5 relatively large, widens distally; palm transverse, with 2 depressions,



**Fig. 10.** *Maera pacifica* Schellenberg. A, head and antennae (scale bar = 1mm); B, articles 5, 6 of male gnathopod 1; C, male gnathopod 2, right part; D, pereopod 2; E, pereopod 5, right part; F, pleonal epimera and urosomites; G, uropod 3; H, telson. B,G,H scale bars = 0.1mm, and remaining scale bars = 0.2mm.

and defined with large pointed hump; dactyl fitting the palm.

Article 2 of pereopods 4, 5 elongated and swollen. In all pereopods, inner margin of dactyl somewhat dented terminally, and they bear one small accessory spine by the dactyl. Peduncle of uropod 1 slightly longer than rami. Outer ramus of uropod 3 somewhat longer than inner ramus; each ramus with apical and lateral spines. Telson deeply cleft, and with one pointed protrusion and spinose indentation on apex of each lobe.

The specimens were obtained from fishing net.

**Distribution:** Southern Polynesia, Micronesia, Hawaiian Islands, South Africa.

#### Genus *Melita* Leach, 1814

##### 10. \**Melita koreana* Stephensen, 1944

(Fig. 11)

*Melita koreana* Stephensen, 1944, (pp. 39-44, figs. 6-8); Nagata, 1965b, (pp. 292, 293).

*Melita rylovae* Bulycheva, 1955, (pp. 201-204, fig. 5).

**Material examined:** Söngsanp'o, 5♂♂, 4♀♀ (3 ovi.), Aug. 16, 1985 (H.S. Kim & C.B. Kim); Udo, 1♂, Feb. 22, 1986 (C.B. Kim); Sinch'ang, 1♂, May 3, 1985 (H.S. Kim); Mosülp'o, 1♂, Jan. 17, 1985 (C.B. Kim).

**Diagnosis:** Peduncle of antenna 1 shorter than flagellum, flagellum about 22-articulate; accessory flagellum 4-articulate and article 4 small. Peduncle of antenna 2 longer than flagellum, and peduncular article 5 slightly longer than article 4. In male gnathopod 1, palm nearly transverse, defined

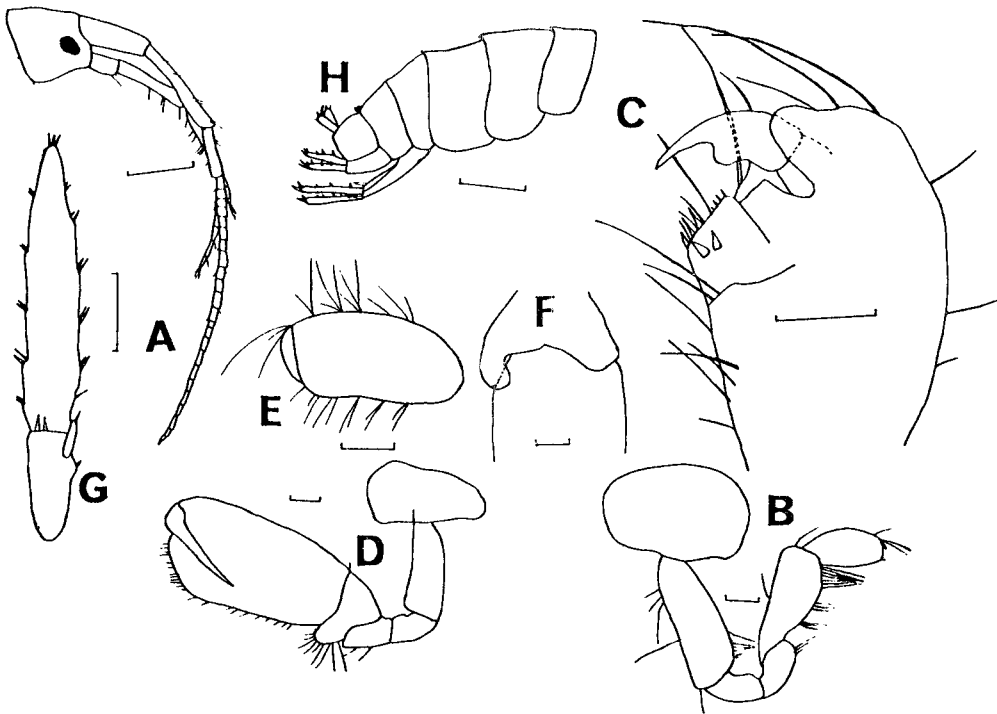


Fig. 11. *Melita koreana* Stephensen. A, head and antennae; B, male gnathopod 1; C, enlargement of article 6 and dactyl of male gnathopod 1; D, male gnathopod 2, left part; E, article 6 and dactyl of female gnathopod 1, left part; F, articles 1,2 of female pereopod 4; G, uropod 3; H, pleonal epimera and urosomites. C, E scale bars = 0.1mm, and remaining scale bars = 0.2mm.

with 3 spines on hind edge, 2 spines on anterior edge, and bulged near the dactyl hinge; dactyl curved, and with protuberance on medial part of concave margin. In male gnathopod 2, article 3 somewhat protruded anteriorly; posterior margin of article 5 protruded; article 6 elongate, rectangular shape, and heavily setose. Female gnathopod 2 has normal shape. Each pleonite with a pair of pointed protuberance dorsoposteriorly. Urosomite 2 with 3 spines on each side. In female pereopod 4, ventral margin of coxa hooked shape. Outer ramus of uropod 3 about 5.6 times as long as inner ramus, with paired spine and 3 spines on lateral side and apex respectively; inner ramus about 50 percent as long as peduncle. Telson deeply cleft; apex of each lobe of telson pointed and with 2 spines on lateral side.

**Remarks:** This species originally described by Stephensen (1944) at Makinoshima, Fuzan, SE. Korea. But, he did not given detailed description of male gnathopod 1. We newly described male gnathopod 1 more minutely especially palm and dactyl. *Melita koreana* is newly recorded in Cheju Island waters. All specimens were collected on the bottom of tide pools.

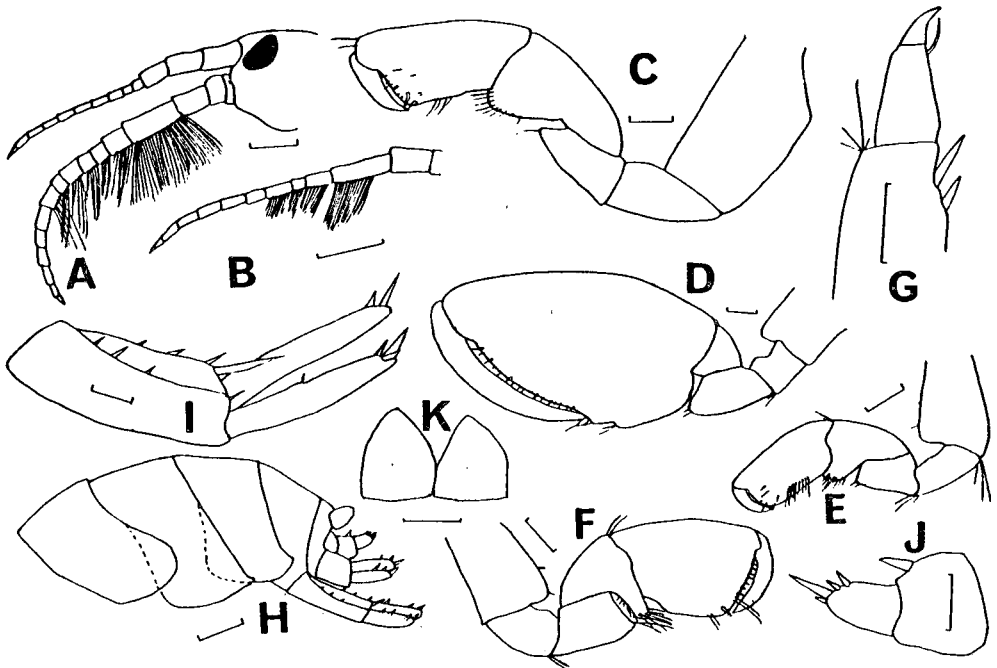
**Distribution:** Korea (Pusan, Cheju Island), Japan.

Genus *Hyalé* Rathke, 183711. **\*\**Hyalé crassicornis*** (Haswell, 1880)

(Fig. 12)

*Allorchestes crassicornis* Haswell, 1880, (p. 252, pl. 7, fig. 5); 1885, (p. 1, pl. 10, figs. 2-5).*Hyalé crassicornis*: Barnard, 1974, (pp. 51, 53, 54, figs. 33-35).**Material examined:** Taep'ŏ 18♂♂, 16♀♀ (6 ovi.), Aug. 14, 1985 (H.S. Kim & C.B. Kim).

**Diagnosis:** Lateral cephalic lobe rounded. In male antenna 2, peduncular article 5 and flagellar articles 1-6 thickly setose on posterior margin. In female antenna 2, half of peduncular article 5 and flagellar articles 1-3 densely setose on posterior margin. In male gnathopod 1, article 4 protrude anteriorly; article 5 bearing setose protuberance; article 6 posteriorly tapering and palm somewhat oblique and defined with 2 spines. In female gnathopod 1, each margin of article 6 paralleled and posteriorly setose; palm nearly transverse. In male gnathopod 2, articles 2, 3 anteriorly bulged; article 6 relatively large; palm roundly oblique, lined with spines, and defined with 2 spined depression. Article 6 of female gnathopod 2 relatively small compared with article 6 of male gnathopod 2; palm nearly transverse and defined with spine. Distal locking spine of pereopods 3-5 longer than proximal spine on article 6. Posteroventral corner of pleonal epimeron 1 rounded, and posteroventral corner of pleonal epimera 2, 3 pointed. In uropod 1, peduncle and rami of nearly equal length; large inner spine and moderate outer spine on apex of peduncle, and 3 spines on lateral side. In uropod 3, peduncle and ramus of equal length, 1 spine on lateral side of peduncle, 4 spines on apex of ramus. Telson deeply cleft, and each lobe triangular shape.



**Fig. 12.** *Hyalé crassicornis* (Haswell). A, head and antennae; B, female antenna 2; C, male gnathopod 1; D, male gnathopod 2; E, female gnathopod 1; F, female gnathopod 2, right part; G, distal part of pereopod 5; H, pleonal epimera and urosomites; I, uropod 1; J, uropod 3; K, telson. A, H scale bars = 0.2mm, and remaining scale bars = 0.1mm.

**Remarks:** *Hyale crassicornis* differs from *H. rubra* in male and female with dense setae on posterior margin of antenna 2, in the presence of inner large spine of apex of peduncle of uropod 3, and in the presence of longer distal spine between locking spines on pereopods 3-5.

This species differs from *Hyale punctata* in male and female with dense setae on posterior margin of antenna 2, in the absence of subterminal spine on apex of ramus of uropod 3, and in the inner large spine and next proximal spine which are not separated by especially long gap.

Our specimens were collected in dent on rocks in intertidal zone.

Distribution: Australia.

12. **\*\**Hyale punctata*** Hiwatari & Kajihara, 1981

(Fig. 13)

*Hyale punctata* Hiwatari & Kajihara, 1981, (pp. 26-30, figs. 4-6).

*Hyale novaezealandiae*: Iwasa, 1939, (pp. 276-278, pl. 16, fig. 16) (not Thomson, 1879).

**Material examined:** Taep'o, 5♂♂, 2♀♀, Aug. 14, 1985 (H.S. Kim & C.B. Kim); Taep'o, 70 individuals, Jan. 15, 1985 (C.B. Kim).

**Diagnosis:** Antenna 1 reaching up to the flagellar article 3 of antenna 2. Antenna 2 about 1/3 times as long as body length, and flagellum about 12-articulate.

In male gnathopod 1, posterior margin of article 5 bearing setose protrusion; palm nearly transverse and spinose, and dactyl fitting the palm. In female gnathopod 1, posterior margin of article 6 bearing medial setose protuberance; palm oblique. In male gnathopod 2, article 6 tapering, and anterior margin naked; palm lined with spines and setae, and defined with spines in depression. In female gnathopod 2, article 6 bearing medial setose protuberance; palm oblique, and defined with large spine. Distal locking spines of pereopods 3-5 slightly longer than proximal locking spines. Posteroventral corners

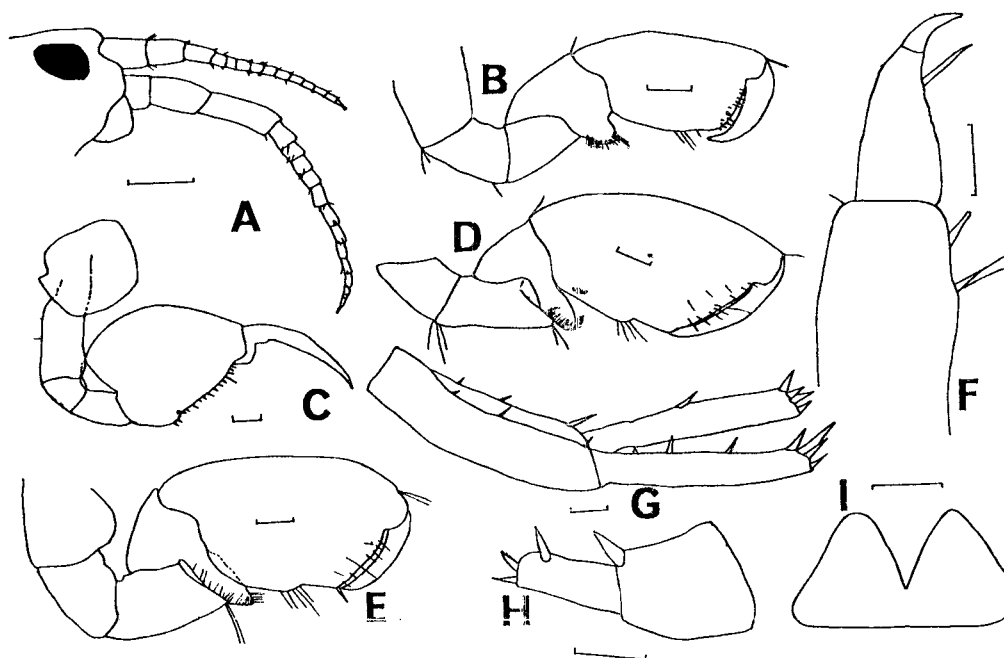


Fig. 13. *Hyale punctata* Hiwatari & Kajihara. A. head and antennae; B. male gnathopod 1; C. male gnathopod 2; D. female gnathopod 1; E. female gnathopod 2; F. distal part of pereopod 5; G. uropod 1; H. uropod 3; I. telson. A,B,C scale bars = 0.2mm, and remaining scale bars = 0.1mm.

of pleonal epimera 2, 3 pointed. In uropod 1, peduncle and rami of equal length, inner large spine of apex of peduncle and next proximal spine separated by especially long gap. In uropod 3, peduncle and ramus of equal length, and ramus bearing apex spines and one subterminal spine. Telson deeply cleft, and each lobe triangular shape. This species and *H. crassicornis* were collected in dent on rocks in intertidal zone together.

**Remarks:** This species differs from *Hyale rubra* in the presence of inner large spine separated from next proximal spine by especially long gap on the apex of peduncle of uropod 1, in relatively short antennae, and in pereopods 3-5 which have longer distal locking spines than proximal locking spines.

**Distribution:** Japan.

**13. *Hyale rubra* (Thomson, 1879)**

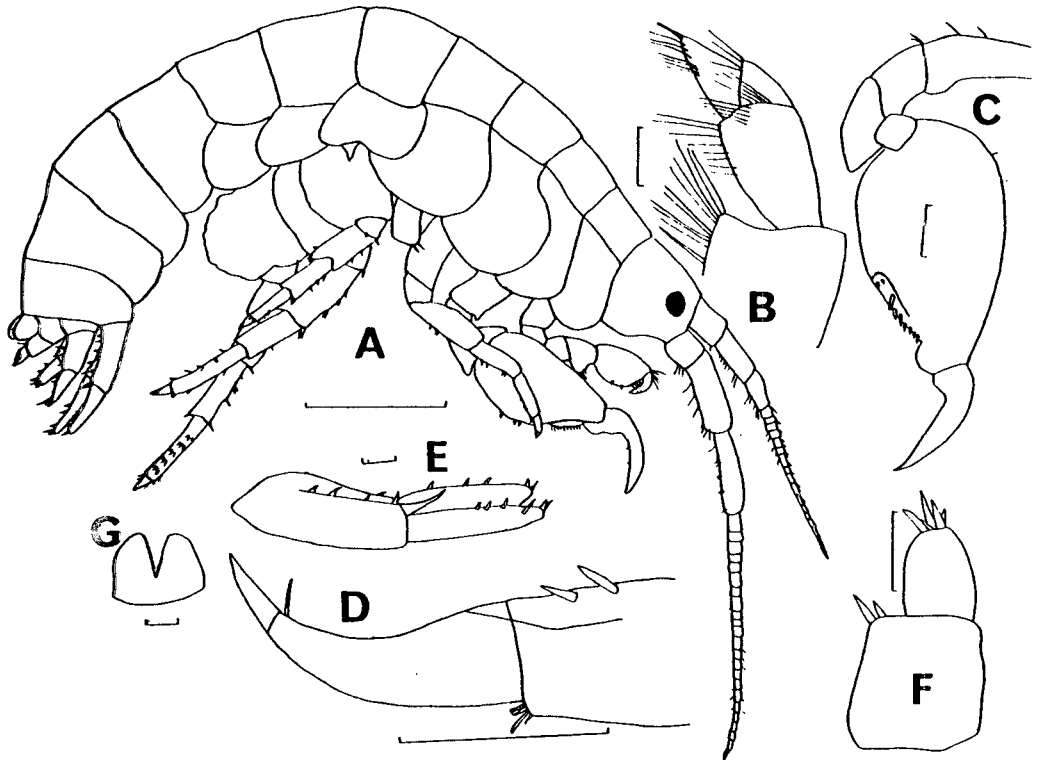
(Fig. 14)

*Nicea rubra* Thomson, 1879, (p. 236, pl. 10B, fig. 3)

*Hyale rubra*: Hurley, 1957, (pp. 910-913, figs. 2, 3); Baranard, 1974 (pp. 67, 71, 72, figs. 43-45); 1979, (pp. 101, 102, fig. 56).

*Hyale schmidtii*: Iwasa, 1939, (pp. 278-280, fig. 17, pl. 17).

**Material examined;** Söngsanp'o, 60 individuals, Aug. 16, 1985 (H.S. Kim & C.B. Kim); Sögwip'o, 2♂♂, 5♀♀, Aug. 16, 1985 (C.B. Kim); Upper Chuja-do, 3♂♂, 1♀, Aug. 7, 1969 (H.S. Kim); Upper Chuja-do, 3♂♂, 6♀♀, Jul. 17, 1985 (H.S. Kim & I.H. Kim); Sasudo, 10♂♂, 3♀♀, Jul. 16, 1985 (H.S.



**Fig. 14.** *Hyale rubra* (Thomson). A, lateral view of male, right part (scale bar = 1mm); B, maxilliped, right part; C, male gnathopod 2 (scale bar = 0.2mm); D, distal part of pereopod 5, left part; E, uropod 1; F, uropod 3; G, telson. scale bars = 0.1mm, if not mentioned.



Kim & I. H. Kim); Piyangdo, 4♂♂, 1♀, May 2, 1985 (H. S. Kim & C. Y. Chang); Sōgwip'o, 2♂♂, 2♀♀, Jul. 14, 1974 (K.S. Lee); Udo, 2♂♂, 4♀♀, Jul. 15, 1973 (K.S. Lee).

**Diagnosis of male:** Antenna 1 slightly longer than peduncle of antenna 2, flagellum about 1.8 times as long as peduncle. Peduncle of antenna 2 about 50 percent as long as flagellum, flagellum about 29-articulate. Maxilliped with terminal spine on the apex of palp about 1/5 times as long as article 4. Palm of gnathopod 1 somewhat rounded, and defined with one spine. In gnathopod 2, anterior margins of articles 2, 3 protuberant distally; anterior margin of article 6 about 2 times as long as posterior margin, and with 2 spinules; palm defined with 2 spined depression. Posterior margin of article 2 of pereopods 3-5 bulged, wrinkled, and with spines. In all pereopods, article 6 bears shorter distal locking spine and longer next proximal locking spine that tandemly arranged on anterior margin. Posteroventral corners of pleonal epimera 2, 3 pointed. Peduncle and rami of uropod 1 equal in length. Peduncle of uropod 3 about 2 times as long as ramus, and with 2 spines on apex; with 5 spines on apex of ramus. Telson deeply cleft, and apex of lobes blunt.

**Remarks:** This species first described in Korea from Seikiho (Sōgwip'o) in Cheju Island as *Hyale schmidti* by Iwasa (1939). *Hyale schmidti* originally described from Mediterranean Sea. Korea is far away from Mediterranean Sea.

On the other hand, Hurley (1957) and Barnard (1970) pointed out Iwasa's mis-identification. Barnard (1974) represented that Japanese specimen subspecifically distinct from *H. rubra* in several characters (poor armaments of the antennae, short apical nail of maxillipedal palp, the better trituration surface of the mandibles, smaller teeth of epimera 2-3, poorly developed double cuspid of coxa 4). Barnard (1979) regarded *H. rubra* as species complex composed of several subspecies.

Our specimens nearly agree with Iwasa's description. We treated *H. schmidti* as synonym of *H. rubra* according to Barnard's indications. It is necessary that *H. rubra* complex is split into subspecies to remove confusion.

**Distribution:** Australia, Korea (Cheju Island), Japan, Hawaii, Juan Fernan dez Islands, Peru, Chile.

#### Genus *Parhyalella* Kunkel, 1910

#### 14. \*\**Parhyalella pietschmanni* Schellenberg, 1938 (Fig. 15)

*Parhyalella pietschmanni* Schellenberg, 1938, (pp. 71-74, figs. 36, 37); Barnard, 1970, (p. 271, figs. 179, 180); 1971, (p. 131, figs. 64-66, 68).

**Material examined:** Sōgwip'o, 6♂♂, 5♀♀, Aug. 16, 1986 (H.S. Kim & C.B. Kim).

**Diagnosis:** In male antenna 2, peduncular articles extremely bulged; flagellum slender and 6-articulate. Peduncular articles of female antenna 2 normal; flagellum 11-articulate. Palm of male gnathopod 1 oblique and lined with spines. In male gnathopod 2, article 6 somewhat rounded, and palm and posterior margin of equal length; palm lined with spines and defined with 2 spined depression. Posteroventral corners of pleonal epimera 2, 3 pointed. Peduncle of uropod 3 slightly longer than ramus, and with 2 spines on apex; apex of ramus with setae. Telson fused into single flap, somewhat triangular shape, and with 2 setules on both lateral sides.

**Remarks:** This species is relatively large-sized one inhabited in tropical waters (body length reaches up to 15mm). Our specimens were obtained from fishing net.

**Distribution:** Hawaiian Islands.

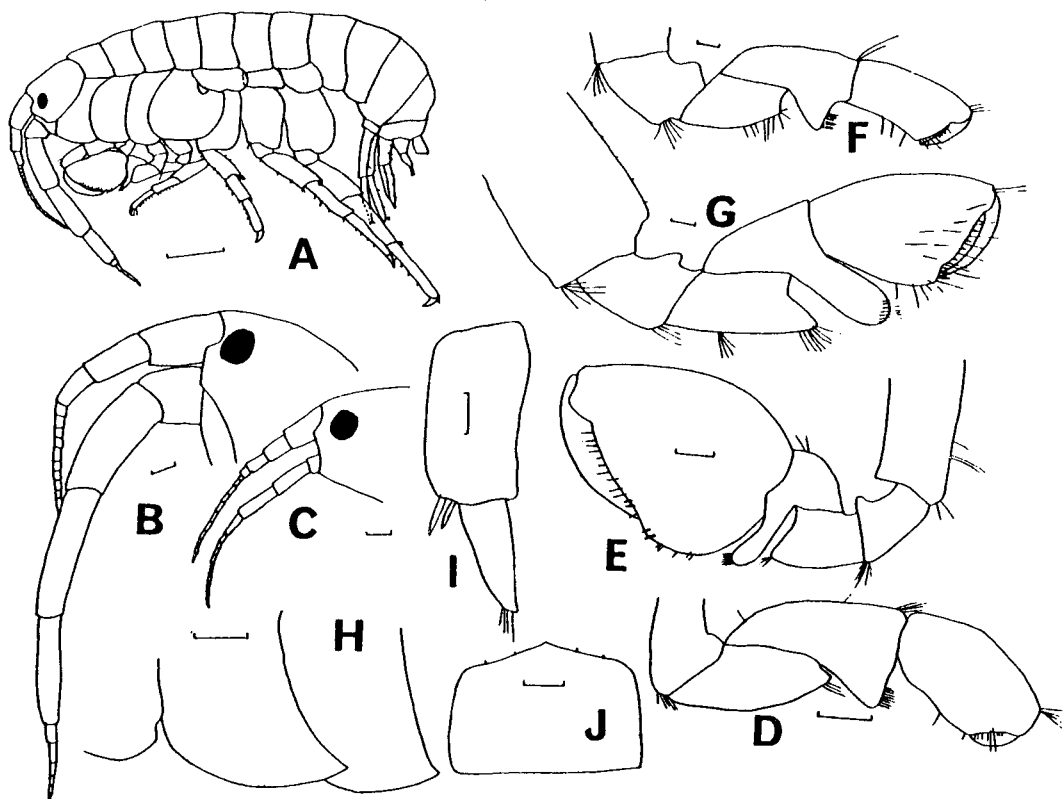


Fig. 15. *Parhyalella pietschmanni* Schellenberg. A, lateral view of male, left part (scale bar = 1mm); B, head of male; C, head of female; D, male gnathopod 1, right part; E, male gnathopod 2; F, female gnathopod 1, right part; G, female gnathopod 2, right part; H, pleonal epimera; I, uropod 3; J, telson. H,I,J scale bars = 0.1mm, and remaining scale bars = 0.2mm.

Family Talitridae Refinesque, 1815

Genus *Platorchestia* Bousfield, 1982

15. **\*\**Platorchestia platensis*** (Krøyer, 1845)

(Fig. 16, A-G)

*Orchestia platensis*: Pearse, 1913, (p. 372); Iwasa, 1939, (pp. 257-261, figs. 1-3, pl. 9); 1965, (pp. 57, 58); Stephensen, 1944, (pp. 57-59, figs. 15, 16); Bulycheva, 1957, (pp. 159-162, fig. 57); Morino, 1975, (pp. 172-175, figs. 1-3); 1979, (p. 34); Chilton, 1921, (pp. 538-541, fig. 7).

*Platorchestia platensis*: Bousfield, 1982b, (p. 26).

**Material examined:** P'õphwan, 30 individuals, Feb, 21, 1986 (C.B. Kim); Udo, 7♂♂, 3♀♀, Feb. 23, 1986 (C.B. Kim & S.M. Yoon); Wimi, 50 individuals, Feb. 22, 1986 (C.B. Kim); Namwõn, 3♂♂, 9♀♀, Feb. 22, 1986 (C.B. Kim); Mosulp'o, 40 individuals, Feb. 22, 1986 (C.B. Kim); Sehwa, 40 individuals, Feb. 23, 1986 (C.B. Kim); P'õphwan, 14♂♂, 1♀, Jan. 19, 1986 (C.B. Kim); Upper Chujado, 4♂♂, 11♀♀, Jul. 18, 1985 (H.S. Kim & I.H. Kim).

**Diagnosis:** Antenna 1 slightly shorter than peduncular articles 1-4 combined of antenna 2; flagellum

5-articulate. In antenna 2, peduncular articles swollen; flagellum longer than peduncular article 5, and 11-articulate. Article 4 of maxillipal palp short. Male gnathopod 1 nearly chelate, and posterior margins of articles 5, 6 protruded anteriorly. Female gnathopod 1 subchelate, and articles 5, 6 not bearing protrusion. Palm of male gnathopod 2 bears 2 protuberances with spines; dactyl fitting the palm. Female gnathopod 2 boxing globes shape. Coxae of pereopods 3, 4 bilobed; anterior lobe of pereopod 4 larger than posterior lobe and flaped ventrally. Peduncles of uropods 1, 2 longer than rami, and spinose. Peduncle and ramus of uropod 3 of equal length. Telson slightly cleft, and spines on apex and medial part.

**Remarks:** Our specimens were collected under the stranded matter, in the soil, and under the stone on the supratidal zones. This species is widely distributed in Cheju Island.

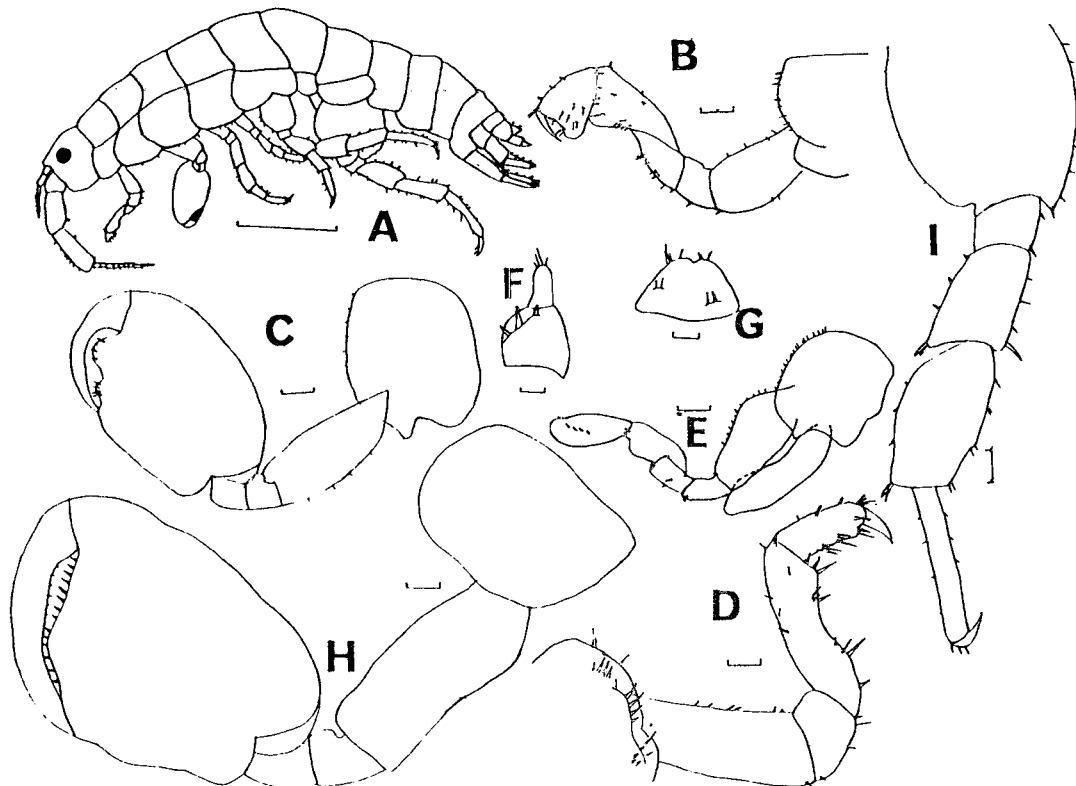
**Distribution:** Gulf of Mexico, Japan, Sakhalin, Kuril Island, Taiwan.

**16. \*\**Platorchestia pachypus* (Derzhavin, 1937)**

(Fig. 16, H, I)

*Talorchestia pachypus* Derzhavin, 1937, (pp. 109, 110, fig. 3) (in English summary); Bulycheva, 1957, (p. 146, fig. 52).

*Orchestia platensis japonica* Tattersall, 1921, (pp. 452, 453, pl. 21, figs. 1-10); Iwasa, 1939, (pp. 261-263, figs. 4-6, pl. 10); Stephensen, 1944, (p. 59, fig. 17).



**Fig. 16.** *Platorchestia platensis* (Krøyer). A, lateral view of male, left part (scale bar = 1mm); B, male gnathopod 1; C, male gnathopod 2; D, female gnathopod 1, right part; E, female gnathopod 2; F, uropod 3; G, telson. *Platorchestia pachypus* (Derzhavin). H, male gnathopod 2; I, pereopod 5, right part. scale bars = 0.1mm, if not mentioned.

*Orchestia pachypus*: Morino, 1975, (pp. 175-180, figs. 4-7).

*Platorchestia pachypus*: Bousfield, 1982b, (p. 26).

**Material examined:** P'öphwan, 30 individuals, Feb. 21, 1986 (C.B. Kim).

**Diagnosis:** Peduncle of antenna 1 about 1.5 times as long as flagellum, flagellum 4-articulate. Flagellum of antenna 2 slightly longer than peduncular article 5. In male gnathopod 1, posterior margins of article 5, 6 protruded anteriorly; article 6 nearly chelate. Palm of male gnathopod 2 heavily spinose, and wave shape. Female gnathopod 2 boxing gloves shape. Article 5 of male pereopod 5 heavily bulged. Peduncles of uropods 1, 2 longer than rami; ramus of uropod 3 shorter than peduncle.

**Remarks:** This species differs from *Platorchestia platensis* in palm shape of male gnathopod 2, and in heavily bulged article 5 of male pereopod 5. At P'öphwan, this species and *P. platensis* were collected together. Our specimens were obtained under the stones on the supratidal zone.

**Distribution:** Kuril Island, Aniwa Bay, Gulf of Peter the Great, Japan.

## ABSTRACT

This study on marine gammaridean Amphipoda of Cheju Island and its adjacent waters was based on the materials collected by authors in 10 localities from August, 1985 to February, 1986, and the specimens that had been deposited in Department of Zoology, Seoul National University. 16 species in 8 families were identified, of which following 12 species were new to Korean waters: *Ampithoe lacertosa* Bate, 1858; *Ampithoe valida* Smith, 1873; *Aoroides columbiae* Walker, 1898; *Pontogeneia rostrata* Gurjanova, 1938; *Colomastix lunalilo* Barnard, 1970; *Elasmopus pecteniscrus* (Bate, 1862); *Maera pacifica* Schelleberg, 1938; *Hyale crassicornis* (Haswell, 1880); *Hyale punctata* Hiwatari & Kajihara, 1981; *Parhyalella pietschmanni* Schellenberg, 1938; *Platorchestia platensis* (Krøyer, 1845); *Platorchestia pachypus* (Derzhavin, 1937). *Jassa falcata* (Montagu, 1808), *Paramoera koreana* Stephensen, 1944, and *Melita koreana* Stephensen, 1944 were first recorded in Cheju Island and its adjacent waters.

## REFERENCES

- Alderman, A. L., 1936. Some new and little known amphipods of California. University of California Publication in Zoölogy, **41**: 53-74, figs. 1-51.
- Barnard, J. L., 1954. Marine Amphipoda of Oregon. Oregon State Monographs, Studies on Zoology, **8**: 1-103, fig. 1, pls. 1-33.
- Barnard, J. L., 1955. Gammaridean Amphipoda (Crustacea) in the collections of Bishop Museum. Bernice P. Bishop Mus. Bull., **215**: 1-46, figs. 1-20.
- Barnard, J. L., 1962. Benthic marine Amphipoda of Southern California: Families Tironidae to Gammaridae. Pacific Naturalist, **3**: 73-115, figs. 1-23.
- Barnard, J. L., 1964. Marine Amphipoda of Bahia de San Quintin, Baja California. Pacific Naturalist, **4**: 55-139, figs. 1-21.

- Barnard, J. L., 1965a. Marine Amphipoda of the family Ampithoidae from Southern California. *Proc. U.S. Nat. Mus.*, **118**, (3522): 1-46, figs. 1-28.
- Barnard, J. L., 1965b. Marine Amphipoda of Atolls in Micronesia. *Proc. U. S. Nat. Mus.*, **117**: 459-552, figs. 1-35.
- Barnard, J. L., 1969a. The families and genera of marine gammaridean Amphipoda. *U. S. Nat. Mus., Bull.*, **271**: 1-535.
- Barnard, J. L., 1969b. Gammaridean Amphipoda of the rocky intertidal of California: Monterey Bay to La Jolla. *U.S. Nat. Mus. Bull.*, **258**: 1-230, figs. 1-65.
- Barnard, J. L., 1970. Sublittoral Gammaridea (Amphipoda) of the Hawaiian Islands. *Smithsonian Contr. Zool.*, **34**: 1-286, figs. 1-180.
- Barnard, J. L., 1971. Keys to the Hawaiian marine Gammaridea, 0-30 meters. *Smithsonian Contr. Zool.*, **58**: 1-135, figs. 1-68.
- Barnard, J. L., 1972. The marine fauna of New Zealand: Algae-living littoral Gammaridea (Crustacea Amphipoda). *New Zealand Oceanogr. Inst. Mem.*, **62**: 1-216, figs. 1-109.
- Barnard, J. L., 1973. Revision of Corophiidae and related families (Amphipoda). *Smithsonian Contributions to Zool.*, **151**: 1-27.
- Barnard, J. L., 1974. Gammaridean Amphipoda of Australia, part II. *Smithsonian Contr. Zool.*, **139**: 1-148, figs. 1-83.
- Barnard, J. L., 1979. Littoral gammaridean Amphipoda from the Gulf of California and the Galapagos Islands. *Smithsonian Contr. Zool.*, **271**: 1-149.
- Bate, C. S., 1858. On some new genera and species of Crustacea Amphipoda. *Ann. Mag. Nat. Hist.*, ser. 3, **1**: 361-362.
- Bate, C. S., 1862. Catalogue of the specimens of amphipodous Crustacea in the collection of the British Museum, London, pp. 1-399, pls. 1, la, 2-58.
- Bousfield, E. L., 1973. Shallow-water gammaridean Amphipoda of New England. Ithaca: Cornell University Press. pp. 312.
- Bousfield, B. L., 1982a. Amphipoda: Gammaridea. In: *Synopsis and classification of living organisms*, vol. 2, edited by S. P. Parker, McGraw-Hill, pp. 254-285.
- Bousfield, E. L., 1982b. The amphipod superfamily Talitroidea in the Northeastern Pacific Region. I. Family Talitridae: Systematics and distributional ecology. *Natl. Mus. Nat. Sci. (Ottawa) Publ. Biol. Oceanogr.*, **11**: 1-73.
- Bowman, T. E. and L. G. Abele, 1982. Classification of the recent Crustacea. In: *The biology of Crustacea*, vol. 1, Systematics, the fossil record, and biogeography, edited by L. G. Abele, Academic Press, pp. 1-27.
- Bulycheva, A. I., 1955. Novye vidy bokoplavov (Amphipoda, Gammaridae) iz Japonskogo Morja, II. *Trudy Zool. Inst., Akad. Nauk SSSR*, **21**: 193-207. (In Russian)
- Bulycheva, A. I., 1957. Morskie bloxi morej SSSR i sopredel'nyx vod (Amphipoda-Talitroidea). *Opred po Faune SSSR, Acad. Nauk SSSR*, **65**: 1-185, figs. 1-66. (In Russian)
- Chilton, C., 1921. Fauna of the Chilka Lake: Amphipoda. *Mem. Indian Mus.*, **5**: 521-558, figs. 1-12.
- Conlan, K. E. and E. L. Bousfield, 1982a. The amphipod superfamily Corophioidea in the Northeastern Pacific Region. Family Ampithoidae: Systematics and distributional ecology. *Natl. Mus. Nat. Sci. (Ottawa) Publ. Biol. Oceanogr.*, **10**: 41-75.
- Conlan, K. E. and E. L. Bousfield, 1982b. The superfamily Corophioidea in the North Pacific Region. Family Aoridae: Systematics and distributional ecology. *Natl. Mus. Nat. Sci. (Ottawa) Publ. Biol. Oceanogr.*, **10**: 77-101.
- Derzhavin, A. N., 1937. Talitridae of the Soviet coast of the Japan Sea. *Issledovaniya Morej SSSR*, fasc. **23**: 87-112.

- pls. 1-6. (In Russian, with English summary)
- Griffiths, C. L., 1974. The Amphipoda of Southern Africa, Part 4. The Gammaridea and Caprellidea of the Cape Province East of Cape Agulhas. *Annal. South African Mus.*, **65**, 9: 251-336.
- Griffiths, C. L., 1976. Some new and notable Amphipoda from Southern Africa. *Annal. South African Mus.*, **72**, 2: 11-35.
- Gurjanova, E., 1938. Amphipoda, Gammaroidea of Siauikhu Bay and Sudzukhe Bay (Japan Sea). *Rep. Japan Sea Hydrobiol. Exped. of Zool. Inst. of the Acad. Sci. USSR, 1934*, pt. 1, pp. 241-404, figs. 1-59. (In Russian, with English summary)
- Harford, W. G. W., 1877. Description of three new speices of sessile-eyed Crustacea, with remarks on *Ligia occidentalis*. *Proc. California Acad. Sci.*, **7**: 116-117.
- Haswell, W. A., 1880. On Australian Amphipoda. *Proc. Linnean Soc. New South Wales*, **4**: 245-279, pls. 7-12.
- Haswell, W. A., 1885. Notes on the Australian Amphipoda. *Proc. Linnean Soc. New South Wales*, **10**: 95-114, pls. 10-18.
- Hirayama, A., 1983. Taxonomic studies on the shallow water gammaridean Amphipoda of West Kyushu, Japan. I. Acanthonotozomatidae, Ampeliscidae, Ampithoidae, Amphilochidae, Anamixidae, Argissidae, Atylidae and Colomastigidae. *Publ. Seto Mar. Biol. Lab.*, **28**, 1/4: 75-150.
- Hirayama, A., 1984. Taxonomic studies on the shallow water gammaridean Amphipoda of West Kyushu, Japan. II. Corophiidae. *Publ. Seto Mar. Biol. Lab.*, **29**, 1/3: 1-92.
- Hiwatari, T. and T. Kajihara, 1981. Taxonomy of the family Hyalidae (Amphipoda, Crustacea) in Japan. I. Three new species of the Genus *Hyale*. *Proc. Jap. Sco. Syst. Zool.*, **20**: 21-34.
- Hông, J.S., 1983. Three tube-building amphipods from experimental plates in Deukryang Bay in the Southern Coast of Korea. *Korean J. Zool.*, **26**, 2: 135-153.
- Hurley, D. E., 1957. Studies on the New Zealand Amphipodan Fauna No. 14-The Genera *Hyale* and *Allorchestes* (Family Talitridae). *Trans. Roy. Soc. New Zealand*, **84**, 4: 903-933, text-figs. 1-9.
- Irie, H., 1957. Tube-building amphipods occurring at the "wakame" (a species of brown algae: *Undaria pinnatifida*) grounds of Simabara, Nagasaki Prefecture. *Bull. Fac. Fish. Nagasaki Univ.*, **4**: 1-6.
- Iwasa, M., 1939. Japanese Talitridae. *J. Fac. Sci., Hokkaido Imp. Univ., Series VI, Zoology*, **6**, 4: 255-296. pls. 9-22.
- Iwasa, M., 1965. On a small collection of amphipods and isopods from Korea, Foremosa, and the Loo-Choo Islands. *Researches on Crustacea*, **2**: 56-59.
- Lincoln, R. J., 1979. British marine Amphipoda: Gammaridea. British Museum (Natural History), Publication number 818, pp. 658.
- Morino, H., 1975. Studies on the Talitridae (Amphipoda, Crustacea) in Japan II. Taxonomy of sea-shore *Orchestia*, with notes on the habitats of Japanese sea-shore talitrids. *Publ. Seto Mar. Biol. Lab.*, **22**, 1/4: 171-193.
- Morino, H., 1979. Preliminary report on the gammaridean Amphipoda around Sesoko Island. *Sesoko Mar. Sci. Lab. Tech. Rep.*, **6**: 33-36.
- Nagata, K., 1960. Preliminary notes on benthic gammaridean Amphipoda from the *Zostera* region of Mihara Bay, Seto Inland Sea, Japan. *Publ. Seto Mar. Biol. Lab.*, **8**, 1: 163-182, pls. 13-17.
- Nagata, K., 1965a. Studies on marine gammaridean Amphipoda of the Seto Inland Sea. II. *Publ. Seto Mar. Biol. Lab.*, **8**, 3: 171-186.
- Nagata, K., 1965b. Studies on marine gammaridean Amphipoda of the Seto Inland Sea. III. *Publ. Seto Mar. Biol. Lab.*, **13**, 4: 291-326.
- Paulmier, F. C., 1905. Higher Crustacea of New York city. *New York State Mus. Bull.*, **91** (Zool., 12): 117-189, figs. 1-59.

- Pearse, A. S., 1913. Notes on certain amphipods from the Gulf of Mexico, with descriptions of new genera and new species. *Proc. U.S. Nat. Mus.*, **43**, (1936): 369-379.
- Reish, D. J. and J. L. Barnard, 1967. The benthic Polychaeta and Amphipoda of Morro Bay, California. *Proc. U.S. Nat. Mus.*, **120**, 3565: 1-26.
- Sars, G. O., 1895. Amphipoda: An account of the Crustacea of Norway with short descriptions and figures of all the species, vol. 1, pp. viii + 711, pls. 1-240, suppl. pls. 1-8, Alb. Cammermeyer.
- Schellenberg, A., 1938. Litorale Amphipoden des tropischen Pazifiks. *Kungl. Svenska Vetenskapsakademiens Handlingar*, **16**: 1-105, figs. 1-48.
- Shoemaker, C. R., 1942. Amphipod crustaceans collected on the Presidential Cruise of 1938. *Smithsonian Misc. Coll.*, **101**, 11: 1-52.
- Stephensen, K., 1944. Some Japanese amphipods. *Vidensk. Medd. fra Dansk Naturh. Foren.*, **108**: 25-88, figs. 1-33.
- Tattersall, W.M., 1921. Amphipoda with notes on additional species of Isopoda. *Zoological Results of a Tour in the Far East. Mem. Asiatic Soc. Bengal.*, **6**: 437-459, pls. 18-21.
- Thomson, G. M., 1879. New Zealand Crustacea, with descriptions of new species. *Trans. Proc. New Zealand Inst.*, **11**: 230-248, pl. 10.
- Walker, A. O., 1904. Report on the Amphipoda collected by Professor Herdman, at Ceylon, in 1902. *Supplementary Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar 1904*, **17**: 229-330, pls. 1-8.

RECEIVED: 25 JULY, 1986.

ACCEPTED: 25 APRIL, 1987.