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The marine amphipods (Arthropoda: Crustacea: Malacostraca) fauna from Ulleungdo Island in Korea

So-Yeon Shin, Jae-Hong Choi, June Kim, Kyung-Won Kim, Sung-Ho Han and Young-Hyo Kim*

Department of Biological Sciences, Dankook University, Cheonan 31116, Republic of Korea

**Correspondent: yhkim@dankook.ac.kr*

A faunal study on amphipods in Ulleungdo Island was conducted during the spring and summer periods in 2023. In this study, 64 amphipod species in 39 genera, 22 families were founded. Including previous studies, a total of 75 species of amphipods were reported in Ulleungdo Island. Among these 22 families, the family Caprellidae with 17 species showed the highest abundance. Ampithoidae with 5 species was subdominant family. *Protohyale* (*Boreohyale*) *triangulata* Hiwatari, 2003 belonging to the family Hyalidae, was identified at 16 of the 27 sites and had the highest frequency of appearance among the total species. Among the 64 species, *Aoroides longimerus* Ren & Zheng, 1996, *Melita panda* Tomikawa, Yamato & Ariyama, 2024, and *Vibilia australis* Stebbing, 1888 are newly recorded species in Korean fauna. The newly recorded species are fully illustrated and compared with related species. We provide an amphipod fauna in Ulleungdo Island with a list, figures, and tables.

Keywords: amphipod fauna, *Aoroides longimerus*, Korea, *Melita panda*, new record, Ulleungdo Island, *Vibilia australis*

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Introduction

Ulleungdo Island is an irregular pentagonal volcanic island located in the East Sea, approximately 130.3 km east of the Korean Peninsula. Due to the influence of the East Korea Warm Current, Ulleungdo Island experiences an oceanic climate. Although the seasonal variations in ocean currents are not significant, the currents become more pronounced in summer. Ulleungdo Island is the region in Korea that receives the most snowfall and rainfall, frequently experiencing natural disasters such as typhoons and heavy snowstorms. As a result, the humidity on Ulleungdo Island is higher compared to other areas. The coasts of this island consist of cliffs, with many coastal caves and sea stacks. The sea surrounding the island reaches depths of over 1,000 meters. Additionally, the island's coastline is steep, with waters shallower than 30 meters in depth mostly composed of rocky substrates. Consequently, Ulleungdo Island has a well-developed rocky shore ecosystem, with a variety of marine organisms adapted to this rocky environment. Recently, climate change and rising sea temperatures have led to changes in the biological community and an increase in the introduction of non-native species. This has resulted in a decrease in algae and the phenomenon of coral bleaching are becoming more severe (Kim and Kim, 2000; Hwang, 2008a; 2008b; Jeong, 2008; Kim *et al*., 2016; Yoon *et al*., 2019).

Ulleungdo Island is home to a diverse range of marine species that rely on the sea for their habitat. However, so far, there have not been many studies on these marine species. A total of 103 species of fish, spanning 41 families and 11 orders, have been identified, with Perciformes being the most abundant, comprising 72 species in 27 families (Kim *et al*., 2023a). 148 species of algae are distributed along the island's coast (Kim *et al*., 2016). Additionally, 19 species of marine sponges belonging to 14 genera, 12 families have been identified (Sim and Kang, 2004). Research on macrobenthos invertebrates has identified 226 species, with the phylum Mollusca being the most common (128 species), followed by the phylum Annelida (80 species), and the phylum Arthropoda (20 species) (Song *et al*., 2017).

Surveys of Ulleungdo Island have often been conducted in conjunction with Dokdo Island, given its geopolitical importance and proximity. A total of 28 species of crabs have been reported on Ulleungdo and Dokdo Islands (Kim, 1992). Additionally, 18 species of thalassinidean and anomuran crustaceans have been identified (Kim *et al*., 1993).

Research on macrobenthic invertebrates has identified 262 species, with Phylum Annelida being the most common, comprising 88 species (Kim *et al*., 2023c). Furthermore, 46 species of marine sponges across 24 families have been identified, including 12 unrecorded species (Kim *et al*., 2020).

Previous research has also been conducted on the amphipod species, which are the focus of this study. The first records of Ulleungdo Island amphipods were published by Kim and Kim in 1988. In this paper, they reported three species: *Ampithoe lacertosa* Bate, 1858, *Ampithoe valida shimizuensis* Stephensen, 1944, and *Peramphithoe baegryeongensis* Kim and Kim, 1988, collected from Sadong Port and Cheonbu Port in 1944. Subsequent research on amphipods specific to Ulleungdo Island was conducted by Kim and Kim in 1991a; 1991b; 1991c, where they reported 30 species belonging to 22 genera and 14 families in three papers. Among these, eight species (*Allorchestes angusta* Dana, 1856, *Ceinina japonica* Stephensen, 1933, *Ericthonius pugnax* (Dana, 1852), *Eusiroides monoculoides japonicus* Hirayama, 1985, *Leucothoe nagatai* Ishimaru, 1985, *L. spinicarpa* (Abildgaard, 1789), *Parapleustes derzhavini* (Gurjanova, 1938), and *Stenothoe valida* Dana, 1853) were newly recorded in Korea, and nine species (*Colomastix prionotos*, *Elasmopus koreanus*, *Hyale bisaeta*, *Maera brevispina*, *Paranamixis denticulus*, *Podocerus hoonsooi*, *P. ulreungensis*, *Sunamphithoe sineplumosa*, and *Ventojassa dentipalma*) were identified as new species (Kim and Kim, 1991a; 1991b; 1991c). In this way, a total of 33 species belonging to 22 genera, 14 families of amphipod have been reported in Ulleungdo Island. Subsequent studies on amphipods have been sparse.

Moreover, previous research focused on species living in the intertidal zone, primarily those associated with seaweed. In this study, we aim to provide a comprehensive account of Ulleungdo Island amphipods collected not only from the intertidal zone but also from the deeper subtidal zone using various methods such as light traps, conical net, SM grabs, and SCUBA diving. This research will enhance the understanding of the marine amphipod fauna of Ulleungdo Island and contribute significantly to the broader knowledge of crustacean biodiversity in Korean waters.

Materials and Methods

The specimens were collected by SCUBA diving, light trap, conical net, and SM grab from subtidal and sublittoral waters at 27 sites around Ulleungdo Island, Korea during the spring and summer periods from May 22 to 24, 2023 and August 23 to 24, 2023 (Fig. 1). Specimens were fixed in 95% ethanol and dissected in glycerol on Cobb's aluminum hole slides. The materials were examined using stereoscope (Olympus SZX 10) and compound microscopes (Olympus BX 51). Line drawings were produced using the program Clip Studio. Body length was measured from the tip of the rostrum to the posterior end of

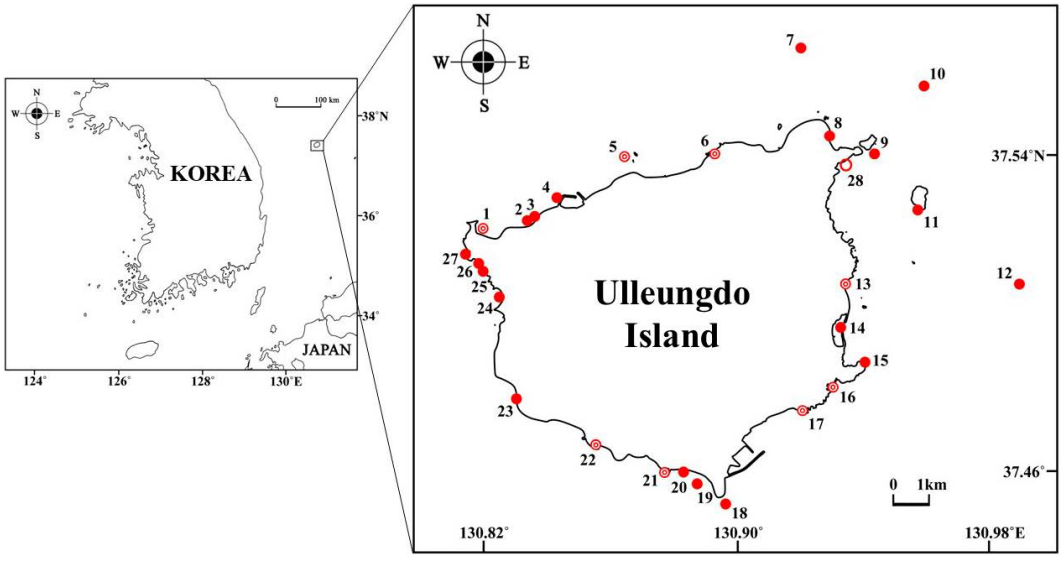


Fig. 1. Map showing collecting sites for amphipods in Ulleungdo Island, Korea (●, present study; ○, previous record; ◎, present study and previous record). 1, Daepunggam Rock; 2, KIOST station; 3, Ungpo Port; 4, Hyeonpo Port; 5, Gongam Rock; 6, Cheonbu Port; 7, Ulleung site 1; 8, Seonchang Port; 9, Ulleung site 2; 10, Ssangjeongcho Rock; 11, Jukdo Island; 12, Ulleung site 3; 13, Naesujeon Mongdol Beach; 14, Jeodong Port; 15, Haengnam Lighthouse; 16, Dodong Port; 17, Sadong Port; 18, Gaje Rock; 19, Tonggumi Beach; 20, Daeseok Rock; 21, Tonggumi; 22, Namyang Port; 23, Namyang Beach; 24, Hakpo Port; 25, Taeha Port; 26, Taeha Mongdol Beach; 27, Taeha-ri; 28, Seommok.

the urosome, along the dorsal parabolic line of the body. Specimens are deposited at the Marine Biodiversity institute of Korea (MABIK) in Seocheon, Korea and the Department of Biological Science, Dankook University (DKU), Cheonan, Korea.

Results

(The species recorded for the first time in Ulleungdo Island are marked with *, and the newly recorded species in Korea are marked with **)

Subphylum Crustacea Pennant, 1777 갑각아문
Class Malacostraca Latreille, 1806 연갑강
Order Amphipoda Latreille, 1816 단각목
Family Ampeliscidae Costa, 1857 안경옆새우과
Genus *Byblis* Boeck, 1871 비블리스속

1. *Byblis longiflagelis* Ren, 1998 긴더듬이안경옆새우*

Material examined. 2 inds., Gongam Rock, 23 May 2023; 1 ind., Taeha Port, 23 May 2023; 6 inds., Tonggumi Beach, 23 May 2023.
Distribution. Korea (east and south coasts), China.

Family Amphilochidae Boeck, 1871 짧은꼬리옆새우과
Genus *Paramphilochus* Ishimaru & Ikehara, 1986 내민손짧은꼬리옆새우속

2. *Paramphilochus parachelatus* Ishimaru & Ikehara, 1986 내민손짧은꼬리옆새우*

Material examined. 30 inds., Cheonbu Port, 23 May 2023; 1 ind., Tonggumi, 23 May 2023; 2 inds., Daeseok Rock, 24 May 2023; 1 ind., Taeha-ri, 24 May 2023; 21 inds., Taeha Port, 23 August 2023.
Distribution. Korea (Jejudo Island and east coast), Japan.

Family Ampithoidae Boeck, 1871 참옆새우과
Genus *Ampithoe* Leach, 1814 참옆새우속

3. *Ampithoe lacertosa* Spence Bate, 1858 태평양참옆새우

Material examined. 1 ind., Sadong Port, 22 May 2023; 6 inds., Ulleung site 3, 24 May 2023; 10 inds., Hyeonpo Port, 23 August 2023; 150 inds., Cheonbu Port, 23 August 2023; 25 inds., Taeha Port, 23 August 2023; 3 inds., Taeha-ri, 23 August 2023; 1 ind., Jeodong Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan, The Pacific, U.S.A.

4. *Ampithoe valida shimizuensis* Stephensen, 1944 오목손참옆새우

Material examined. 3 inds., Namyang Port, 23 May 2023; 1 ind., KIOST station, 23 May 2023; 4 inds., Cheonbu Port, 23 May 2023; 1 ind., Daeseok Rock, 24 May 2023; 100 inds., Cheonbu Port, 23 August 2023; 8 inds., Taeha Port 23 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan.

Genus *Pleonexes* Spence Bate, 1857

5. *Pleonexes koreana* (Kim & Kim, 1988) 큰손참옆새우*

Material examined. 3 inds., Sadong Port, 22 May 2023; 3 inds., Tonggumi, 23 May 2023; 6 inds., Cheonbu Port, 23 May 2023; 1 ind., Haengnam Lighthouse, 23 May 2023; 6 inds., Daeseok Rock, 24 May 2023; 45 inds., Taeha-ri, 24 May 2023; 1 ind., Ssangjeongcho Rock, 24 May 2023; 50 inds., Cheonbu Port, 23 August 2023; 1 ind., Taeha Port, 23 August 2023; 2 inds., Taeha-ri, 23 August 2023.
Distribution. Korea (Jejudo Island, east, south and north coasts), Japan.

Genus *Sunamphitoe* Spence Bate, 1857 민수염참옆새우속

6. *Sunamphitoe sineplumosa* Kim & Kim, 1991 매끈참옆새우

Material examined. 3 inds., Ssangjeongcho Rock, 24 May 2023.
Distribution. Korea (east coast).

7. *Sunamphitoe tea* (J.L. Barnard, 1965) 털다리참옆새우*

Material examined. 2 inds., Daeseok Rock, 24 May 2023; 40 inds., Ulleung site 3, 24 May 2023.
Distribution. Korea (east coast), Alaska, British Columbia, California.

Family Aoridae Stebbing, 1899 큰앞손옆새우과
Genus *Aoroides* Walker, 1898 털큰앞손옆새우속

8. *Aoroides longimerus* Ren & Zheng, 1996 긴팔털큰앞손옆새우 (신칭)** (Figs. 2–4)

Aoroides longimerus Ren & Zheng, 1996: 59, fig. 2. - Ariyama, 2004: 23, figs. 16–19.

Material examined. Adult male, 3.2 mm, Jeodong-port, Buk-myeon, Ulleung-gun, Gyeongsangbuk-do, Korea, 37° 30′48″N, 130°55′10″E, Y.H. Kim, by sieving from fishing gear, 23 May 2023; 1 male, Jeodong-port, Buk-myeon, Ulleung-gun, Gyeongsangbuk-do, Korea, 37°29′38″N, 130° 54′38″E, Y.H. Kim, by port survey, 24 August 2023.
Description. Male (MABIK CR00257939): Body (Figs. 2, 3A) 3.2 mm long, dorsally smooth; eyes well developed, ovate.

Antenna 1 (Fig. 3B) slender, elongated, less setose, length ratio of peduncular articles 1–3 = 1.00 : 1.11 : 0.46; flagellum 15-articulate, 1.33 × peduncle; accessory flagellum absent.

Antenna 2 (Fig. 3C) moderate, densely setose; gland

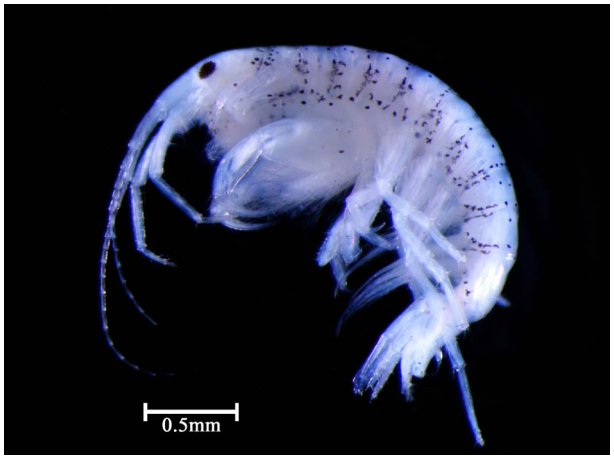


Fig. 2. *Aoroides longimerus*, adult male, 3.2 mm, habitus. Scale bar = 0.5 mm.

cone pointed; peduncular articles 1–3 short, peduncular articles 4, 5 subrectangular; length ratio of peduncular articles 3–5 = 1.00 : 2.75 : 2.67; flagellum 3-articulate, each article with 1 or 2 robust setae distally.

Gnathopod 1 (Fig. 3D) characteristic in form, massive, merochelate, densely setose, much larger than gnathopod 2; coxa subtriangular, width 2.19 × length, with 1 robust and 4 plumose setae on anterodistal corner; basis relatively long, widening distally, anterior margin with numerous plumose setae, distal half of lateral margin with a row of plumose setae; ischium short, 0.37 × basis, medial margin with 1 plumose seta; merus slender, elongate, 2.67 × ischium, located below carpus, narrowing distally, apex acute, anterior and posterior margins with numerous plumose setae; carpus elongate-ovate, stout, 0.96 × merus, anterior margin with 12 plumose setae, posterior margin with numerous plumose setae; propodus slender, slightly curved anteriorly, 0.67 × carpus, anterior margin with 13 simple setae, posterior margin with numerous setae; dactylus elongate, falcate, 1.14 × propodus, posterior margin with 17 simple setae.

Gnathopod 2 (Fig. 4A) subchelate; coxa subquadrate, width 0.85 × length; basis subrectangular, widening distally, slightly curved posteriorly, anterior margin with 12 simple setae, posterior margin with 4 simple setae; merus short, 1.71 × ischium, with simple 12 setae posterodistally; carpus subtriangular, widening distally, 1.79 × merus, anterior margin with 6 simple setae, half of posterior margin setose; propodus subrectangular, 0.88 × carpus, anterior margin with 10 simple setae, posterior margin with 1 robust and 16 simple setae, palm steeply angled; dactylus falcate, overreaching palm, 0.68 × propodus.

Pereopod 3 (Fig. 4B), coxa subquadrate, width 0.91 × length, posteroventral corner with 5 simple setae; basis subrectangular, slightly widening distally, anterior margin with 9 simple setae, posterior margin with 5 simple setae; merus subrectangular, 1.93 × ischium; carpus subrectangular, 1.04 × merus; propodus slender, subrectangular, 1.19 × carpus; dactylus falcate, 0.61 × propodus.

Pereopod 5 (Fig. 4C), coxa bilobate, wider than long, anterior lobe broadly rounded, protruding downward; basis elongate-ovate, slightly narrowing distally; ischium short, 0.21 × basis, anterior margin with 3 setae; merus subrectangular, slightly widening distally, 2.33 × ischium; carpus rectangular, 0.86 × merus, with 5 simple setae anterodistally, 2 robust and 3 simple setae posterodistally; propodus slender, slightly widening distally, 1.98 × carpus, anterior margin with 2-2-4 robust setae formula; dactylus falcate, 0.43 × propodus, posterior margin with 1 seta.

Pereopod 6 (Fig. 4D) similar to pereopod 5, but propodus with 1-2-2-2-2 robust setae formula.

Pereopod 7 (Fig. 4E) elongated, much longer than either pereopods 5 or 6; basis elongate-ovate, moderately expanded anteroposteriorly; ischium short, 0.25 × basis; merus subrectangular, 3.44 × ischium, anterior margin with 5 simple setae, posterior margin with 3 robust setae; carpus subrectangular, 0.72 × merus; propodus elongate, 1.42 × carpus, anterior margin with 2-2-1 robust setae formula, posterodistal corner with 10 simple setae; dactylus falcate, 0.41 × propodus, posterior margin with 1 seta.

Uropod 1 (Fig. 4F), peduncle subrectangular, length 0.89 × inner ramus, with 3 dorsolateral, 4 dorsomedial robust setae, and a large inter-ramal process; outer ramus × 1.09 inner ramus, dorsal margin with 5 robust setae, 4 robust setae on apex; inner ramus with 5 dorsal and 4 apical robust setae.

Uropod 2 (Fig. 4G), peduncle subrectangular, length 0.81 × inner ramus, with 1 dorsolateral and 2 dorsomedial robust setae; outer ramus × 1.12 inner ramus, with 5 dorsal and 4 apical robust setae; inner ramus with 4 dorsal and 4 apical robust setae.

Uropod 3 (Fig. 4H) short, × 0.59 uropod 2; peduncle subequal to outer ramus, with 3 dorsolateral, 1 dorsomedial simple setae, and 2 apicodorsal robust setae; outer ramus subequal to inner ramus, biarticulate, proximal article with 1 dorsal robust seta and 3 simple setae subapically, terminal article short, with 4 simple setae on apex; inner ramus with 2 robust setae.

Telson (Fig. 4I) short and fleshy, trapezoidal, narrowing distally, broader than long, truncate apically, with 6 unequal simple setae dorsally and 2 short setae apically.

Remarks. *Aoroides longimerus* Ren & Zheng, 1996 is similar to *A. ellipticus* Ariyama, 2004, *A. myojinensis* Ariyama, 2004, and *A. secunda* Gurjanova, 1951 in having densely setose anterior margins of basis and carpus of gnathopod 1. However, *A. longimerus* is distinguished from its congeners based on the following features (different characters of *A. ellipticus*, *A. myojinensis*, and *A. secunda* in brackets): 1) gnathopod 1, coxa with four plumose setae

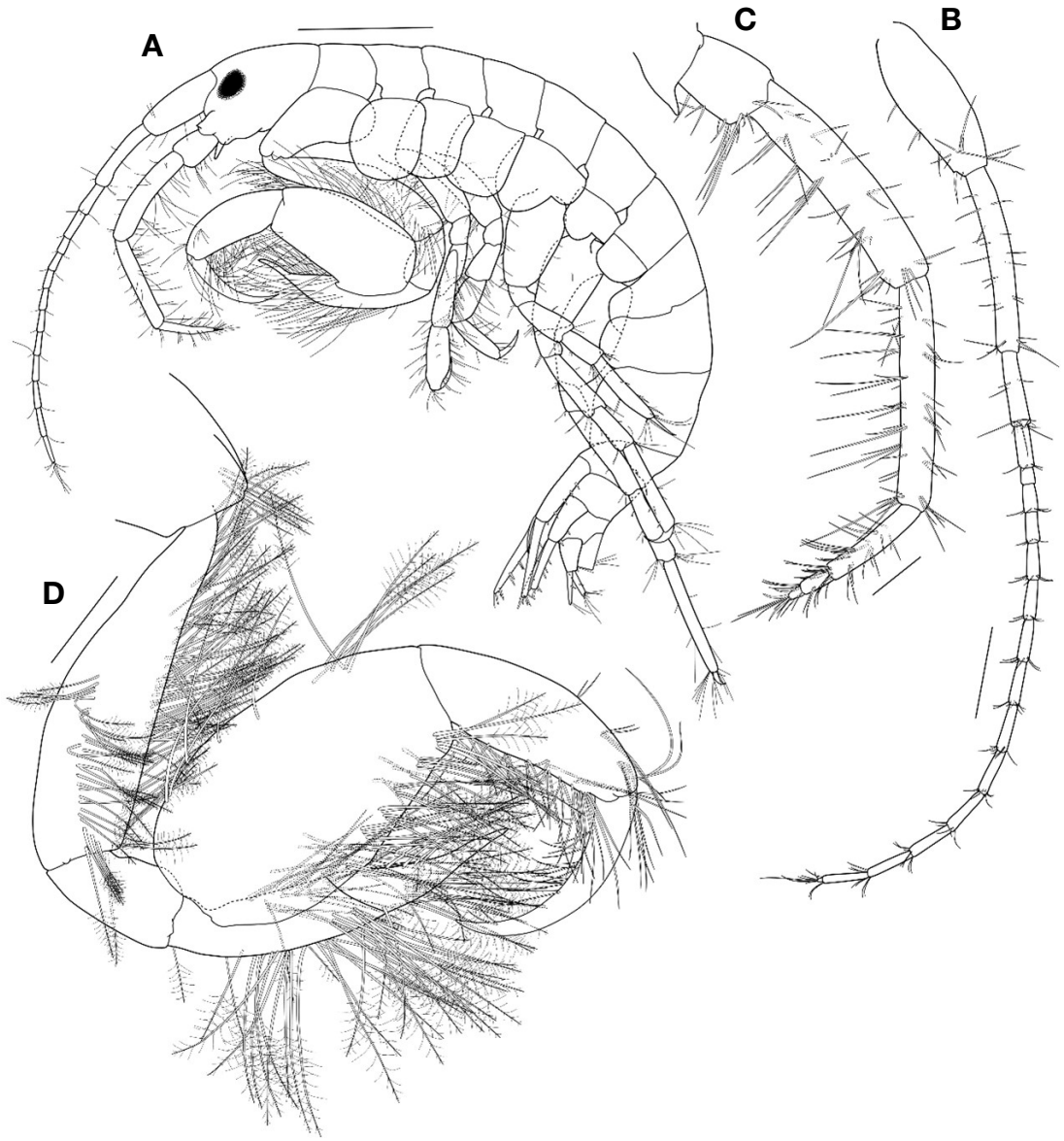


Fig. 3. *Aoroides longimerus*, adult male, 3.2 mm. A, habitus; B, antenna 1; C, antenna 2; D, gnathopod 1. Scale bars: A = 0.5 mm, B, D = 0.4 mm, C = 0.1 mm.

and a robust seta anterodistally (*vs*. 1 long robust seta in *A. ellipticus*, unarmed in *A. myojinensis*, and 2 robust setae in *A. secunda*); 2) gnathopod 1, carpus elongate-ovate (*vs*. ovate in *A. myojinensis* and *A. secunda*); 3) pereopod 3, basis anterior margins sparse with simple setae (*vs*. setose with plumose setae in *A. secunda*); 4) pereopod 7, basis slender, elongate ovate (*vs*. moderate, ovate in *A. ellipticus*); 5) uropod 3, both rami with robust setae (*vs*. inner ramus with a robust seta in *A. ellipticus*, both rami unarmed in *A. secunda*). The newly recorded species in Korea, *A. longimerus*, is well accorded with Ren & Zheng's original description.

Distribution. Korea (Ulleungdo Island), Japan, China.

Family Caprellidae Leach, 1814 바다대벌레과
Genus *Caprella* Lamarck,1801 바다대벌레속

9. *Caprella arimotoi* Takeuchi, 1993
나도혹등바다대벌레*

Material examined. 50 inds., Gaje Rock, 23 May 2023; 3 inds., Haengnam Lighthouse, 23 May 2023; 12 inds., Jukdo Island, 24 May 2023.

Distribution. Korea (east and south coasts), Japan.

10. *Caprella californica* Stimpson, 1856
뾰족머리가슴가시바다대벌레*

Material examined. 3 inds., Jeodong Port, 23 May 2023;

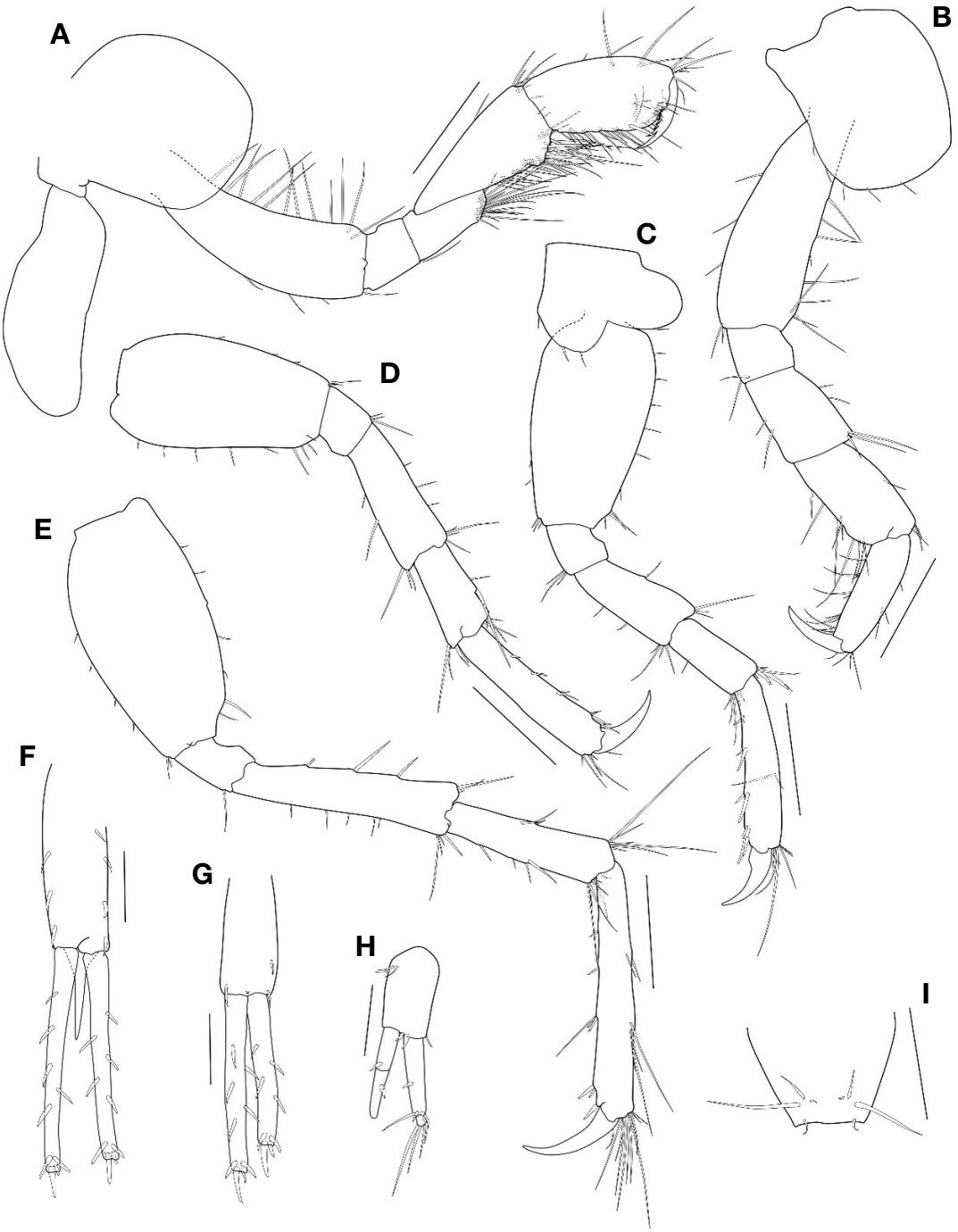


Fig. 4. *Aoroides longimerus*, adult male, 3.2 mm. A, gnathopod 2; B, pereopod 3; C, pereopod 5; D, pereopod 6; E, pereopod 7; F, uropod 1; G, uropod 2; H, uropod 3; I, telson. Scale bars: A–E = 0.2 mm, F–I = 0.1 mm.

20 inds., Gaje Rock, 23 May 2023; 51 inds., Haengnam Lighthouse, 23 May 2023; 150 inds., Gongam Rock, 23 May 2023; 24 inds., Jukdo Island, 24 May 2023; 269 inds., Ssangjeongcho Rock, 24 May 2023; 1 ind., Ulleung site 3, 24 May 2023.

Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan, Russia, U.S.A.

11. *Caprella danilevskii* Czerniavski, 1868
매끈이바다대벌레*

Material examined. 20 inds., Daeseok Rock, 24 May 2023; 5 inds., Ulleung site 3, 24 May 2023; 6 inds., Nam-

yang Beach, 23 August 2023; 20 inds., Taeha-ri, 23 August 23; 4 inds., Seonchang Port, 24 August 2023.
Distribution. Korea (east, south, and west coasts), Brazil, Italy, Japan, North Africa, the Black Sea, U.S.A.

12. *Caprella decipiens* Mayer, 1890
짧은마디더듬이민다리바다대벌레*

Material examined. 2 inds., Sadong Port, 22 May 2023; 3 inds., KIOST station, 23 May 2023; 29 inds., Cheonbu Port, 23 May 2023; 10 inds., Gaje Rock, 23 May 2023; 2 inds., Haengnam Lighthouse, 23 May 2023; 20 inds., Ulleung site 3, 24 May 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan, Russia.

13. *Caprella equilibra* Say, 1818 가슴가시바다대벌레*

Material examined. 100 inds., Ungpo Port, 23 May 2023; 4 inds., Taeha Port, 23 August 2023; 21 inds., Jeodong Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Africa, Brazil, Chile, Colombia, Malaysia, Mexico, Panama, The Black Sea, The Mediterranean Sea, U.S.A.

14. *Caprella eximia* Mayer, 1890
두줄등가시바다대벌레*

Material examined. 1 ind., Ssangjeongcho Rock, 24 May 2023.
Distribution. Korea (east coast), Russia, Japan.

15. *Caprella mutica* Schurin, 1935
털손가시투성바다대벌레*

Material examined. 1 ind., Ulleung site 3, 24 May 2023.
Distribution. Korea (east coast), worldwide.

16. *Caprella penantis* Leach, 1814
둥근아가미바다대벌레

Material examined. 14 inds., Sadong Port, 22 May 2023; 100 inds., Tonggumi, 23 May 2023; 2 inds., Namyang Port, 23 May 2023; 40 inds., KIOST station, 23 May 2023; 5 inds., Jeodong Port, 23 May 2023; 54 inds., Haengnam Lighthouse, 23 May 2023; 60 inds., Daeseok Rock, 24 May 2023; 5 inds., Jeodong Port, 24 May 2023; 12 inds., Naesujeon Mongdol Beach, 24 May 2023; 70 inds., Taeha-ri, 24 May 2023; 17 inds., Jukdo Island, 24 May 2023; 157 inds., Ssangjeongcho Rock, 24 May 2023; 20 inds., Ulleung site 3, 24 May 2023; 5 inds., Namyang Beach, 23 August 2023; 150 inds., Taeha-ri, 23 August 2023; 18 inds., Seonchang Port, 24 August 2023; 240 inds., Jeodong Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), worldwide.

17. *Caprella polyacantha* Utinomi, 1947
불꽃가시바다대벌레*

Material examined. 1 ind., Haengnam Lighthouse, 23 May 2023.
Distribution. Korea (east and south coasts), Japan, Russia.

18. *Caprella scaura* Templeton, 1836
뾰족머리바다대벌레

Material examined. 150 inds., Jeodong Port, 22 May 2023; 2 inds., Sadong Port, 23 May 2023; 1 ind., Namyang Port, 23 May 2023; 3 inds., Jeodong Port, 23 May 2023; 30 inds., Jeodong Port, 24 May 2023; 309 inds., Hyeonpo Port, 23 August 2023; 62 inds., Cheonbu Port, 23 August 2023; 169 inds., Jeodong Port, 24 August 2023; 1 ind., Dodong Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), worldwide.

19. *Caprella simia* Mayer, 1903
뾰족머리긴팔바다대벌레*

Material examined. 7 inds., Sadong Port, 22 May 2023; 4 inds., Jeodong Port, 23 May 2023; 30 inds., Jukdo Island, 24 May 2023; 5 inds., Ssangjeongcho Rock, 24 May 2023; 1 ind., Ulleung site 3, 24 May 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan.

20. *Caprella subinermis* Mayer, 1890
갈고리손바다대벌레*

Material examined. 5 inds., Cheonbu Port, 23 May 2023; 2 inds., KIOST station, 23 August 2023.
Distribution. Korea (east, south, and west coasts), Japan.

21. *Caprella tsugarensis* Utinomi, 1947
짧은팔바다대벌레*

Material examined. 2 inds., Sadong Port, 22 May 2023; 2 inds., Taeha Mongdol Beach, 23 May 2023; 40 inds., Tonggumi, 23 May 2023; 10 inds., Naesujeon Mongdol Beach, 24 May 2023; 10 inds., Jukdo Island, 24 May 2023; 2 inds., Ulleung site 3, 24 May 2023; 1 ind., Hakpo Port, 23 August 2023; 80 inds., Taeha Port, 23 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan, Russia.

22. *Caprella verrucosa* Boeck, 1871 혹등바다대벌레*

Material examined. 2 inds., Jeodong Port, 23 May 2023; 60 inds., Haengnam Lighthouse, 23 May 2023; 43 inds., Ssangjeongcho Rock, 24 May 2023; 25 inds., Ulleung site 3, 24 May 2023.

Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan, U.S.A.

Genus *Paracaprella* Mayer, 1890 바다대벌레붙이속

23. *Paracaprella crassa* Mayer, 1903
세옆돌기바다대벌레붙이*

Material examined. 2 inds., Jeodong Port, 23 May 2023; 6 inds., Gaje Rock, 23 May 2023; 63 inds., Haengnam Lighthouse, 23 May 2023.
Distribution. Korea (east and south coast), China, Japan.

Genus *Perotripus* Dougherty & Steinberg, 1953
세아가미불구다리원시바다대벌레속

24. *Perotripus koreanus* Lee & Hong, 2010
돌기머리세아가미불구다리원시바다대벌레 *

Material examined. 4 inds., Ssangjeongcho Rock, 24 May 2023.
Distribution. Korea (Jejudo Island, east and south coasts).

Genus *Pseudoproto* Mayer, 1903 의원시바다대벌레속

25. *Pseudoproto fallax* Mayer, 1903
세아가미의원시바다대벌레*

Material examined. 2 inds., Sadong Port, 22 May 2023; 7 inds., Hyeonpo Port, 23 May 2023; 11 inds., Daepunggam Rock, 23 May 2023; 250 inds., Tonggumi Beach, 23 May 2023; 60 inds., Ulleung site 1, 24 May 2023; 4 inds., Ulleung site 2, 24 May 2023; 200 inds., Ulleung site 3, 24 May 2023; 16 inds., Hyeonpo Port, 23 August 2023.
Distribution. Korea (Jejudo Island, east and south coasts), Australia, China, Japan.

Family Corophiidae Leach, 1814 육질꼬리옆새우과
Genus *Apocorophium* Bousfield & Hoover, 1997
이형뱀옆새우속

26. *Apocorophium acutum* (Chevreux, 1908)
뾰족이형뱀옆새우*

Material examined. 20 inds., Jeodong Port, 22 May 2023.
Distribution. Korea (east, north and south coasts), Algeria, British Isles, China, Mediterranean, Suez Canal, South Africa, New Zealand, Australia, Pakistan, Northeast Pacific, Northwest Atlantic, Southwest Atlantic.

Genus *Monocorophium* Bousfield & Hoover, 1997
단뱀옆새우속

27. *Monocorophium acherusicum* (Costa, 1853)
두가시육질꼬리옆새우*

Material examined. 2 inds., Jeodong Port, 23 May 2023; 20 inds., Jeodong Port, 24 May 2023; 60 inds., Hyeonpo Port, 23 August 2023; 33 inds., Jeodong Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Australia, China, Japan, New Zealand, The Indian Ocean, The Pacific.

28. *Monocorophium insidiosum* (Crawford, 1937)
잠복단뱀옆새우*

Material examined. 10 inds., Jeodong Port, 24 August 2023.
Distribution. Korea (east and south coasts), United Kingdom, North Atlantic Ocean, Mediterranean Sea, New South Wales, North and South Pacific Oceans.

Family Cyproideidae J.L. Barnard, 1974
넓은마디옆새우과
Genus *Moolapheonoides* J.L. Barnard, 1974
사이넓은마디옆새우속

29. *Moolapheonoides acutifalcatus* Kobayashi & Ishimaru, 2005 굽은손넓은마디옆새우*

Material examined. 11 inds., Tonggumi, 23 May 2023.
Distribution. Korea (east and south coasts), Japan.

Family Dexaminidae Leach, 1814 붙은꼬리옆새우과
Genus *Guernea* Chevreux, 1887 올찬붙은꼬리옆새우속

30. *Guernea ezoensis* Ishimaru, 1987
홋카이도붙은꼬리옆새우*

Material examined. 6 inds., KIOST station, 23 May 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan.

Genus *Paradexamine* Stebbing, 1899
옆가시붙은꼬리옆새우속

31. *Paradexamine acuta* Zhang, Kim & Kim, 2022
뾰족옆가시붙은꼬리옆새우*

Material examined. 1 ind., Jeodong Port, 22 May 2023.
Distribution. Korea (Jejudo Island, east, south and west coasts).

32. *Paradexamine fraudatrix* Tzvetkova, 1976
보통옆가시붙은꼬리옆새우*

Material examined. 1 ind., Jeodong Port, 22 May 2023; 6 inds., Sadong Port, 22 May 2023; 150 inds., Namyang Port, 23 May 2023; 20 inds., Tonggumi, 23 May 2023; 30 inds., Jeodong Port, 23 May 2023; 6 inds., Haengnam Lighthouse, 23 May 2023; 2 inds., Taeha-ri, 24 May 2023; 50 inds., Jukdo Island, 24 May 2023; 3 inds., Ssangjeongcho Rock, 24 May 2023; 110 inds., Hyeonpo Port, 23 August 2023; 6 inds., Cheonbu Port, 23 May 2023; 50 inds., Taeha Port, 23 August 2023; 13 inds., Jeodong Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west

coasts), Japan, Russia.

33. *Paradexamine gigas* Hirayama, 1984
넓적옆가시붙은꼬리옆새우*

Material examined. 3 inds., Ulleung site 3, 24 May 2023.
Distribution. Korea (east and south coasts), Japan.

Family Dogielinotidae Gurjanova, 1953 모래옆새우과
Genus *Allorchestes* Dana, 1849
34. *Allorchestes angusta* Dana, 1856
짧은자루해조숨이옆새우

Material examined. 15 inds., Ulleung site 3, 24 May 2023.
Distribution. Korea (east coast), Japan, Kurile Islands, Alaska, California.

Family Hyalidae Bulyčeva, 1957 해조숨이옆새우과
Genus *Apohyale* Bousfield & Hendrycks, 2002
35. *Apohyale punctata* (Hiwatari & Kajihara, 1981)
짧은채찍해조숨이옆새우

Material examined. 3 inds., Sadong Port, 22 May 2023; 15 inds., Tonggumi, 23 May 2023; 2 inds., Haengnam Lighthouse, 23 May 2023; 28 inds., Taeha-ri, 24 May 2023; 50 inds., Taeha-ri, 23 August 2023; 3 inds., Seonchang Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan.

Genus *Protohyale* Bousfield & Hendrycks, 2002
원해조숨이옆새우속
36. *Protohyale* (*Boreohyale*) *kajiharai* (Hiwatari, 2003)
오목손해조숨이옆새우*

Material examined. 1 ind., Taeha Mongdol Beach, 23 May 2023; 2 inds., Haengnam Lighthouse, 23 May 2023; 1 ind., Daeseok Rock, 24 May 2023; 10 inds., Ssangjeongcho Rock, 24 May 2023.
Distribution. Korea (Jejudo Islands, east and west coasts), Japan.

37. *Protohyale* (*Boreohyale*) *pumila* (Hiwatari & Kajihara, 1981) 꼬마채찍해조숨이옆새우*

Material examined. 10 inds., KIOST station, 23 May 2023; 12 inds., Cheonbu Port, 23 May 2023; 4 inds., Tonggumi, 23 May 2023; 2 inds., Daeseok Rock, 24 May 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan.

38. *Protohyale* (*Boreohyale*) *triangulata* (Hiwatari, 2003)
세모손해조숨이옆새우

Material examined. 3 inds., Sadong Port, 22 May 2023; 80 inds., Tonggumi, 23 May 2023; 3 inds., Namyang Port, 23 May 2023; 80 inds., KIOST station, 23 May 2023; 10 inds., Jeodong Port, 23 May 2023; 10 inds., Ungpo Port, 23 May 2023; 3 inds., Haengnam Lighthouse, 23 May 2023; 100 inds, Daeseok Rock, 24 May 2023; 80 inds., Naesujeon Mongdol Beach, 24 May 2023; 20 inds., Jukdo Island, 24 May 2023; 20 inds., Ssangjeongcho Rock, 24 May 2023; 50 inds., Namyang Beach, 23 August 2023; 5 inds., KIOST station, 23 August 2023; 20 inds., Hakpo Port, 23 August 2023; 10 inds., Taeha Port, 23 August 2023; 80 inds., Taeha-ri, 23 August 2023; 200 inds., Seonchang Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan.

Genus *Ptilohyale* Bousfield & Hendrycks, 2002
털채찍해조숨이옆새우속
39. *Ptilohyale barbicornis* (Hiwatari & Kajihara, 1981)
긴다리해조숨이옆새우*

Material examined. 2 inds., Namyang Beach, 23 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Japan.

Family Hyperiidae Dana, 1852 하늘옆새우과
Genus *Hyperia* Latreillee, 1823
40. *Hyperia galba* (Montagu, 1813)
작은머리하늘옆새우*

Material examined. 1 ind., Ulleung site 3, 24 May 2023.
Distribution. Korea (east coast), worldwide.

Genus *Themisto* Guérin, 1825
41. *Themisto compressa* Goës, 1866 가시배하늘옆새우*

Material examined. 2 inds., Taeha Mongdol Beach, 23 May 2023; 7 inds., Gaje Rock, 23 May 2023; 1 ind, Gongam Rock, 23 May 2023; 20 inds., Taeha Port, 23 May 2023; 2 inds., Ulleung site 2, 24 May 2023; 52 inds., Ulleung site 3, 24 May 2023.
Distribution. Korea (Jejudo Island, east and south coasts), worldwide.

Family Ischyroceridae Stebbing, 1899
육질꼬리옆새우붙이과
Genus *Ericthonius* H. Milne Edwards, 1830
42. *Ericthonius pugnax* (Dana, 1852)
넓은마디육질꼬리옆새우붙이

Material examined. 10 inds., Jeodong Port, 22 May 2023; 4 inds., Haengnam Lighthouse, 23 May 2023; 30 inds., Jukdo Island, 24 May 2023; 100 inds., Ssangjeongcho Rock, 24 May 2023; 23 inds., Jeodong Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west

coasts), China, Japan, New Zealand, Madagascar.

Genus *Jassa* Leach, 1814

43. *Jassa marmorata* Holmes, 1905
큰가위손육질꼬리옆새우붙이*

Material examined. 1 ind., Jeodong Port, 24 August 2023.
Distribution. Korea (east, south, and west coasts), China, Japan, The North Pacific.

44. *Jassa morinoi* Conlan, 1990
털꼬리육질꼬리옆새우붙이*

Material examined. 20 inds., KIOST station, 23 May 2023; 1 ind., Tonggumi, 23 May 2023; 14 inds., Gaje Rock, 23 May 2023; 1 ind., Haengnam Lighthouse, 23 May 2023; 10 inds., Taeha Port, 23 August 2023; 15 inds., Taeha-ri, 23 August 2023; 1 ind., Seonchang Port, 24 August 2023.
Distribution. Korea (ease and south coasts), Japan, The North Pacific.

Genus *Ventojassa* J.L. Barnard, 1970

45. *Ventojassa dentipalma* Kim & Kim, 1991
가시손육질꼬리옆새우붙이

Material examined. 1 ind., Jeodong Port, 23 May 2023; 3 inds., Gaje Rock, 23 May 2023; 16 inds., Haengnam Lighthouse, 23 May 2023; 31 inds., Jukdo Island, 24 May 2023; 4 inds., Ssangjeongcho Rock, 24 August 2023.
Distribution. Korea (Jejudo Island and east coast).

Family Leucothoidae Dana, 1852 공생옆새우과
Genus *Leucothoe* Leach, 1814

46. *Leucothoe spinicarpa* (Abildgaard, 1789)
긴손가락공생옆새우

Material examined. 3 inds., Haengnam Lighthouse, 23 May 2023.
Distribution. Korea (Jejudo Island and east coast), worldwide.

Genus *Paranamixis* Schellenberg, 1938 한손옆새우속

47. *Paranamixis denticulus* Kim & Kim, 1991
곰보병신옆새우

Material examined. 1 ind., Gaje Rock, 23 May 2023.
Distribution. Korea (Jejudo Island and Ulleungdo Island).

Family Maeridae Krapp-Schickel, 2008 마에라옆새우과
Genus *Elasmopus* Costa, 1853

48. *Elasmopus koreanus* Kim & Kim, 1991
한국멜리타옆새우

Material examined. 12 inds., Jeodong Port, 22 May 2023; 2 inds., Jeodong Port, 23 May 2023; 3 inds., Hyeonpo Port, 23 August 2023; 8 inds., Jeodong Port, 24 August 2023.
Distribution. Korea (east and south coasts).

49. *Elasmopus rapax* Costa, 1853 사마귀멜리타옆새우*

Material examined. 1 ind., Taeha-ri, 23 August 2023.
Distribution. Korea (Jejudo Island and east coast), worldwide.

Genus *Orientomaera* Ariyama, 2018

50. *Orientomaera brevispina* (Kim & Kim, 1991)
짧은가시멜리타옆새우

Material examined. 1 ind., Ssangjeongcho Rock, 24 May 2023.
Distribution. Korea (east and south coasts), Japan.

Genus *Quadrimaera* Krapp-Schickel & Ruffo, 2000

51. *Quadrimaera pacifica* (Schellenberg, 1938)
태평양멜리타옆새우

Material examined. 1 ind., Cheonbu Port, 23 May 2023; 1 ind., Haengnam Lighthouse, 23 May 2023; 1 ind., Ssangjeongcho Rock, 24 May 2023.
Distribution. Korea (Jejudo Island, east and south coasts), China, Japan, Hawaii, Micronesia, South Africa, Southern Polynesia.

Family Melitidae Bousfield, 1973 멜리타옆새우과
Genus *Abludomelita* Karaman, 1981 멜리타옆새우속

52. *Abludomelita japonica* (Nagata, 1965)
별난멜리타옆새우*

Material examined. 1 ind., Hyeonpo Port, 23 August 2023; 1 ind., Cheonbu Port, 23 August 2023; 2 inds., Jeodong Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east and south coasts), Japan.

53. *Abludomelita okhotensis* Labay, 2016
북방멜리타옆새우*

Material examined. 2 inds., Taeha Port, 23 May 2023.
Distribution. Korea (east and west coasts), Russia, Japan.

Genus *Melita* Leach, 1814

54. *Melita panda* Tomikawa, Yamato & Ariyama, 2024
얼룩멜리타옆새우 (신칭) ** (Figs. 5–8)

Melita panda Tomikawa, Yamato & Ariyama, 2024: 270, figs. 1–6.

Material examined. 92 males, 79 females (DKUAMP202406), KIOST station, Buk-myeon, Ulleung-gun, Gyeongsangbuk-do, Korea, 37°31′24″N, 130°48′52″E, Y.H. Kim, by sieving, 23 August 2023.
Description. Male (MABIK CR00257940): Body (Figs.

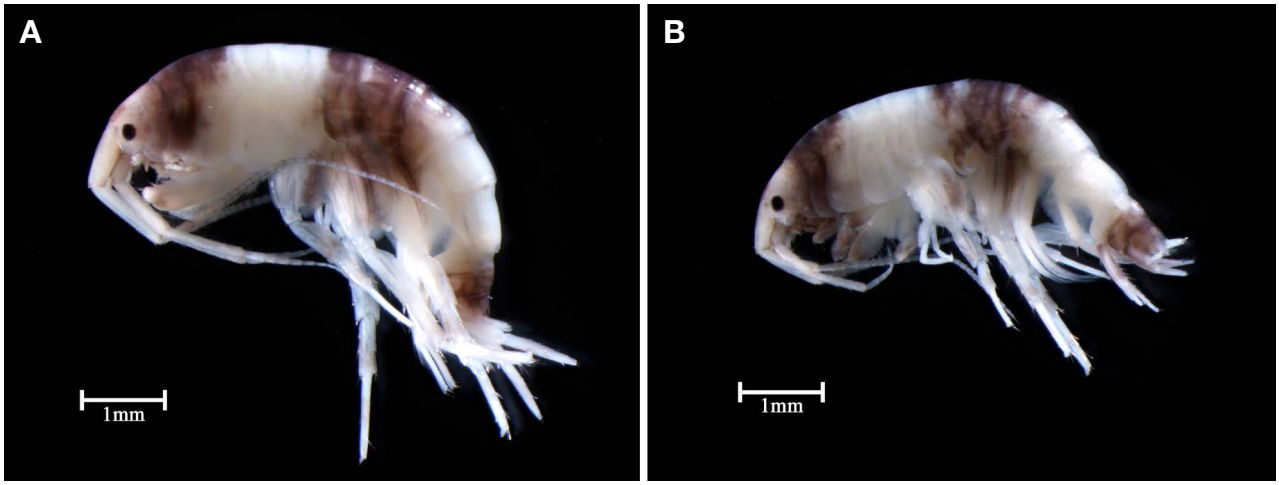


Fig. 5. *Melita panda*, A, adult male, 7.1 mm, habitus; B, adult female, 6.4 mm, habitus. Scale bars: A, B = 1.0 mm.

5A, 6A) 7.1 mm long, dorsally smooth; head subquadrate, subequal to pereonites 1–2 combined, lateral cephalic lobe subrounded; eye round, black; epimeral plates 1–3 (Fig. 6D) dorsally smooth, slightly pointed posteroventrally; epimeral plate 3 with 4 small robust setae ventrally.

Antenna 1 (Fig. 6B) elongate, 0.68 × body; peduncular article 1 subrectangular, with 3 robust setae and 3 simple setae ventrally; peduncular article 2 slender, with cluster of setae and 6 small robust setae ventrally; peduncular article 3 short, with cluster of setae on dorsal and ventral margins; length ratio of peduncular articles 1–3 = 1.00 : 2.63 : 0.55; flagellum 30-articulate, much longer than peduncle; accessory flagellum present, short, 4-articulate.

Antenna 2 (Fig. 6C) length 0.63 × antenna 1; peduncular article 3 short, with 2 robust setae ventrodistally; peduncular articles 4–5 slender, rectangular, ventrally setose; length ratio of peduncular articles 3–5 = 1.00 : 2.30 : 2.30; flagellum 9-articulate, shorter than peduncular articles 4–5 combined.

Upper lip (Fig. 6E) rounded and covered with patch of pubescence apically.

Lower lip (Fig. 6F) well developed, inner and outer lobes rounded with patch of pubescence apically, outer lobe with row of setules medially, mandibular lobes produced.

Left mandible (Fig. 6G), incisor with 4 teeth; lacinia mobilis with 4 blunt teeth; between molar and lacinia mobilis with 7 accessory setal row; molar triturative, with pappose seta; palp 3-articulate; article 1 short, unarmed; article 2 with 8 simple setae; article 3 slender, with 10 lateral and 5 distal simple setae; length ratio of articles 1–3 = 1.00 : 3.01 : 4.15.

Right mandible (Fig. 6H) similar to left one, except with 6 accessory setal row.

Maxilla 1 (Fig. 6I), inner plate small, with 7 plumose setae apically; outer plate with 9 setal-teeth; palp biarticulate, proximal article with 2 setae laterodistally, distal article expanded, with 4 simple setae and 10 robust setae apically.

Maxilla 2 (Fig. 6J), inner plate smaller than outer plate, with row of simple and unipectinate setae; outer plate with row of simple setae apically.

Maxilliped (Fig. 6K), inner plate subrectangular, about half length of outer plate, with 9 plumose setae medially, 2 conical robust setae and 8 plumose setae apically; outer plate broad, with a row of conical teeth medially, 5 plumose setae apically; palp 4-articulate, article 1 subquadrate; article 2 subrectangular, with unequal simple setae exteriorly; article 3 broadening distally, apex with unequal simple setae and pubescence; article 4 slender, falcate, with numerous setules medially and nail on apex; length ratio of articles 1–4 = 1.00 : 3.01 : 2.00 : 1.29.

Gnathopod 1 (Fig. 7A) subchelate; coxa trapezoidal, gradually widening distally, with a row of setules ventrally; basis subrectangular, narrowing proximally, with row of long setae anteriorly and 5 long setae posteriorly; merus 1.26 × ischium, densely pubescent ventrally; carpus 1.41 × propodus, ventral margin serrate, with clusters of pectinate setae; propodus (Fig. 7B) subovate, anterodistal hood deeply produced ventrodistally, with 1 mediodistal robust seta near the hood, and 3 robust setae on ventral margin; palm with two protuberances; dactylus small, stout, inner margin with small protuberances.

Gnathopod 2 (Fig. 7C) subchelate; coxa, basis, and ischium similar to those of gnathopod 1; merus 1.14 × ischium, distoventral corner acutely produced; carpus subtriangular, with pectinate setae and numerous pubescence ventrally; propodus large, subquadrate, width 0.60 × length, dorsal portion with 12 clusters of simple setae, medial and ventral portions with unequal simple setae; palm oblique, with a row of tiny robust setae; dactylus falcate, when folded,

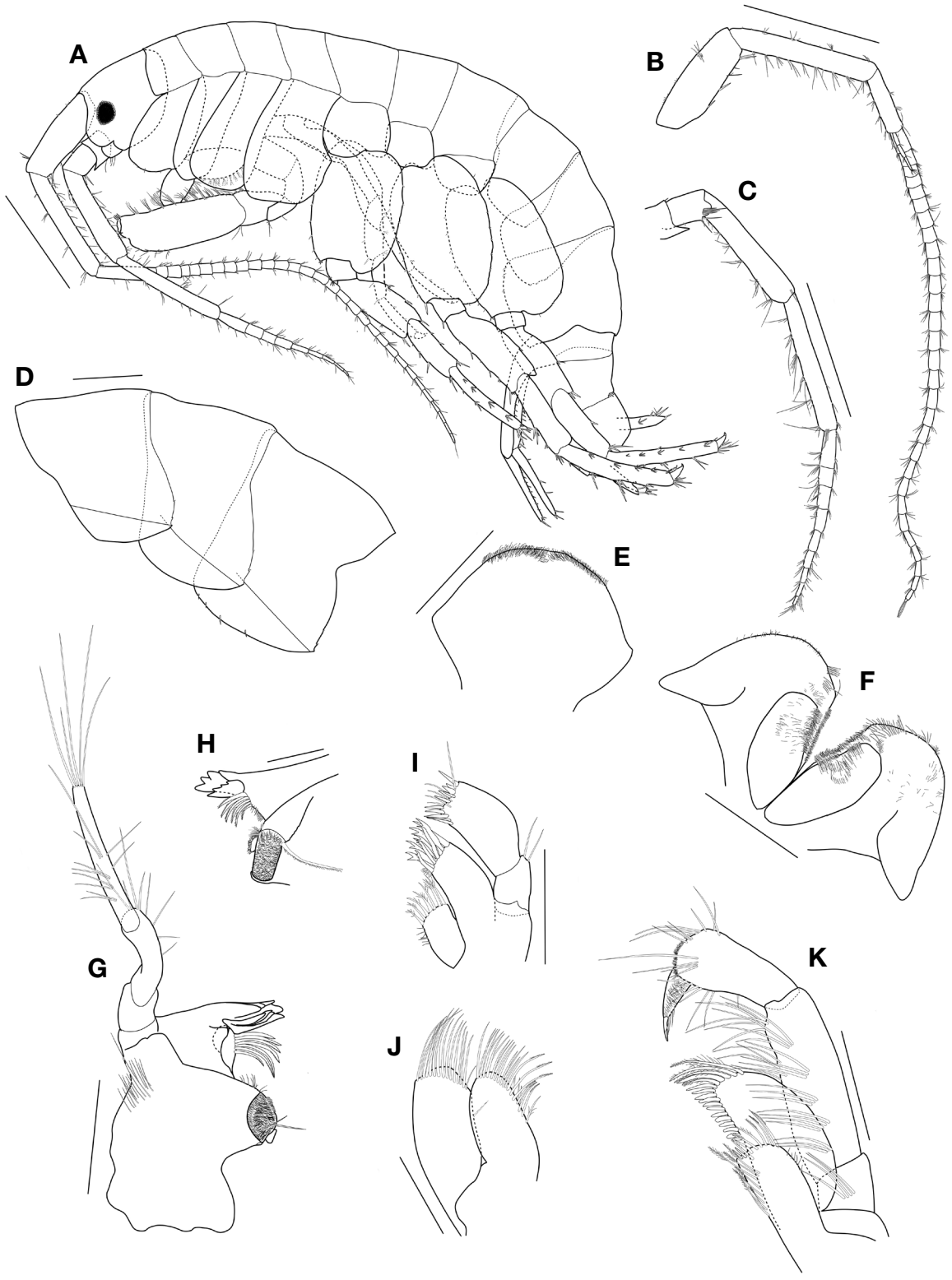


Fig. 6. *Melita panda*, adult male, 7.1 mm. A, habitus; B, antenna 1; C, antenna 2; D, epimeral plates 1–3; E, upper lip; F, lower lip; G, left mandible; H, right mandible; I, maxilla 1; J, maxilla 2; K, maxilliped. Scale bars: A–C = 1.0 mm, D = 0.4 mm, E–G, I–K = 0.2 mm, H = 0.1 mm.

located on the medial surface of propodus.

Pereopod 3 (Fig. 7D), coxa subrectangular, ventral margin with a row of setules; basis curved proximally; merus subrectangular, broader than carpus; carpus 0.86 × merus,

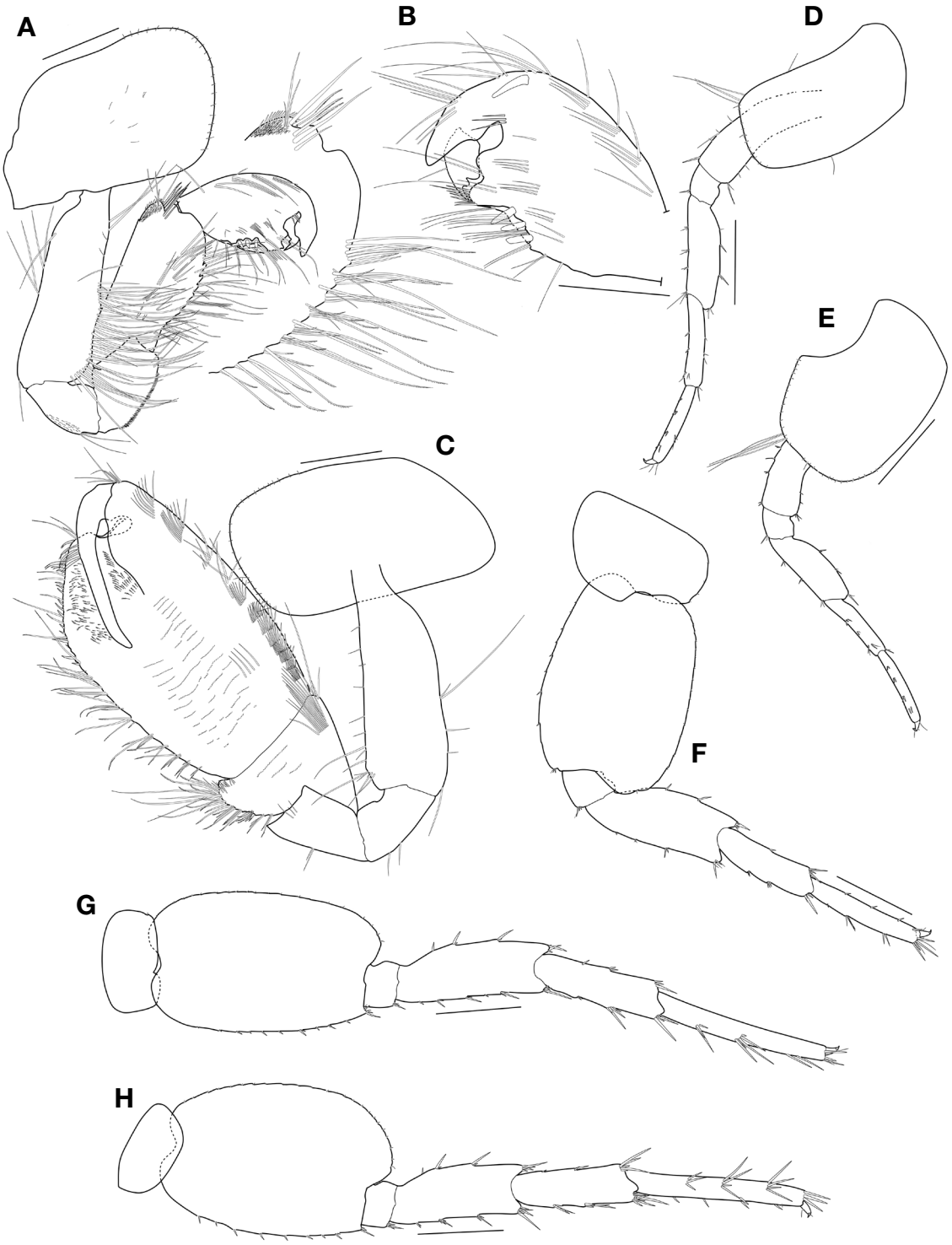


Fig. 7. *Melita panda*, adult male, 7.1 mm. A, gnathopod 1; B, propodus of gnathopod 1; C, gnathopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pereopod 6; H, pereopod 7. Scale bars: A, C = 0.3 mm, B = 0.2 mm, D–H = 0.5 mm.

anterior and posterior margins with robust setae; propodus subrectangular, slender, subequal to carpus, posterior margin with row of robust setae; dactylus short, falcate, with a nail.

Pereopod 4 (Fig. 7E) similar to pereopod 3, but coxa broader and excavate posteroproximally.

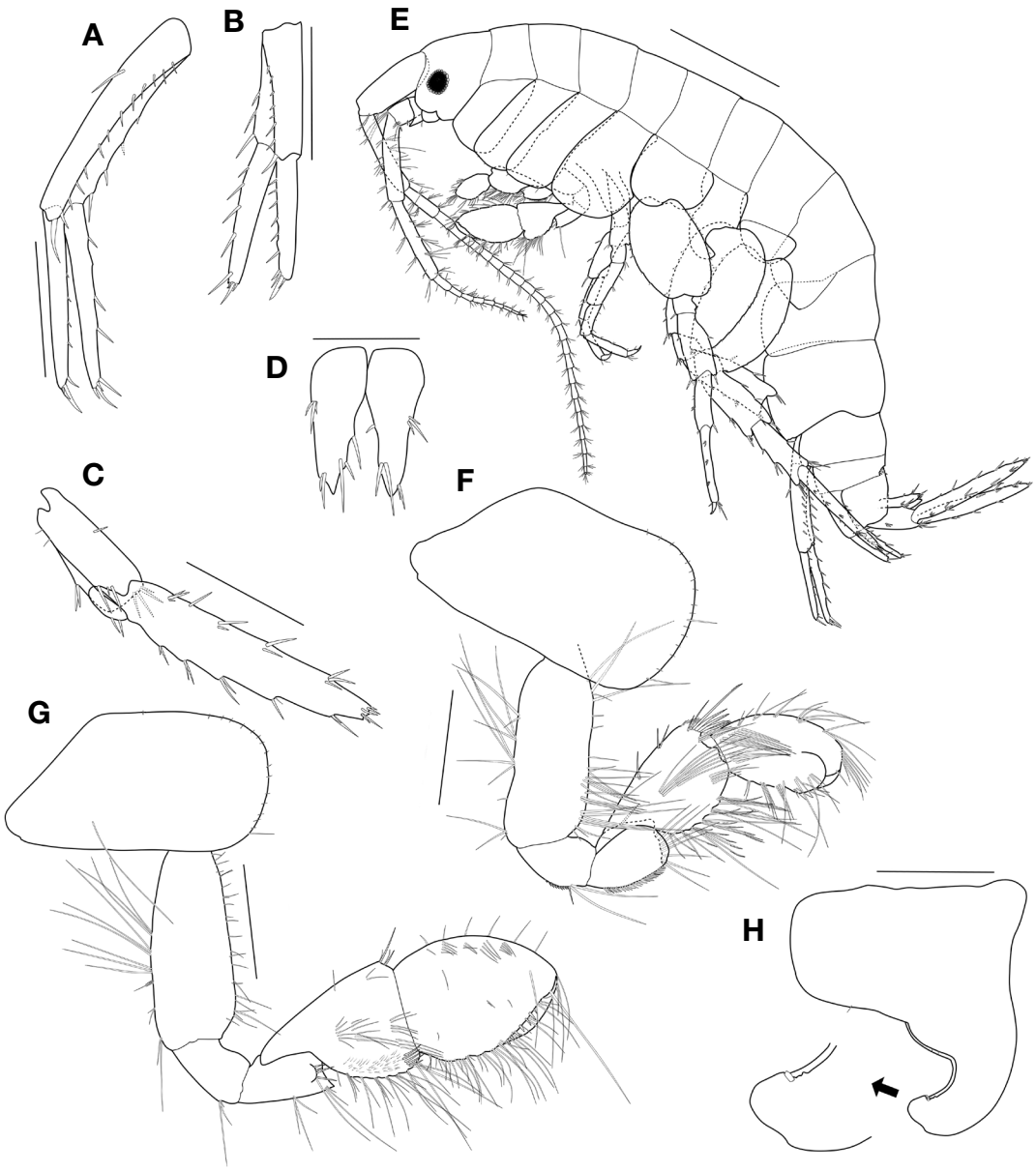


Fig. 8. *Melita panda*, adult male, 7.1 mm. A, uropod 1; B, uropod 2; C, uropod 3; D, telson; adult female, 6.4 mm: E, habitus; F, gnathopod 1; G, gnathopod 2; H, coxa 6. Scale bars: A–C = 0.5 mm, D, F–H = 0.3 mm, E = 1.0 mm.

Pereopod 5 (Fig. 7F), coxa broader than long, bilobate, anterior lobe slightly protruding downward; basis subovate, with a row of robust setae on anterior margin, row of setules on posterior margin; merus narrowing proximally, 0.91 × carpus; propodus slender, rectangular, 1.12 × carpus, with a row of robust setae on anterior and posterior margins.

Pereopod 6 (Fig. 7G) similar to pereopod 5, but coxa 6 smaller than coxa 5, each article longer than those of pereopod 5.

Pereopod 7 (Fig. 7H), similar to pereopod 6, but coxa small, unilobate.

Uropod 1 (Fig. 8A), peduncle subrectangular, 1.29 × outer ramus, with 12 dorsolateral, 4 dorsomedial, 1 basofacial, and 1 inter-ramal robust setae distally; outer ramus subequal to inner ramus, with 4 dorsal and 4 apical robust setae; inner ramus with 4 dorsal and 4 apical robust setae.

Uropod 2 (Fig. 8B), peduncle subrectangular, 1.04 × outer ramus, with 8 dorsolateral and 3 dorsomedial robust setae; outer ramus 0.91 × inner ramus, with 6 dorsal and 4 apical robust setae; inner ramus with 5 dorsal and 4 apical robust setae.

Uropod 3 (Fig. 8C), peduncle short, 0.46 × outer ramus; outer ramus elongate, uni-articulate, both margins with

robust setae; inner ramus scale-like, minute, 0.20 × outer ramus, with 5 robust setae apically.

Telson (Fig. 8D) thin, deeply cleft; apical portion pointed, each lobe with 1 medial and 3 lateral, and 4 subapical robust setae.

Female (DKUAMP202406): Body (Figs. 5B, 8E) about 6.4 mm long; similar to male in shape but, gnathopod 2 smaller and coxa 6 strongly hooked.

Gnathopod 1 (Fig. 8F) similar to that of male but each article shorter than those of male; propodus small, without anterodistal hood and mediodistal robust seta; palm oblique.

Gnathopod 2 (Fig. 8G) much smaller than male, propodus small, ovate, subequal to carpus.

Coxa 6 (Fig. 8H) bilobate, anterior lobe elongate and protruding downward, truncate distally, strongly hooked, subapical portion with small projection.

Remarks. The newly recorded species *Melita panda* is similar to *M. bingoensis*, *M. koreana*, and *M. nagatai* in having the following features: 1) gnathopod 2, propodus subrectangular; 2) uropod 3, outer ramus unarticulated. However, *M. panda* is distinguished from its congeners based upon the following features (different characters of *M. bingoensis*, *M. koreana*, and *M. nagatai* in brackets): 1) gnathopod 1, carpus ventral margin serrate (*vs*. smooth in *M. bingoensis*, *M. koreana*, and *M. nagatai*); 2) gnathopod 1, anterodistal hood of propodus deeply produced ventrodistally (not produced ventrodistally in *M. bingoensis*, *M. koreana*, and *M. nagatai*); 3) gnathopod 1, propodus with 1 anterodistal robust seta near the hood (*vs*. without *M. bingoensis*, *M. koreana*, and *M. nagatai*); 4) epimeral plates 1–3 posteroventral corners notched (*vs*. produced in *M. bingoensis* and *M. koreana*); 5) coxa 6, anterior lobe elongated, strongly hooked, apex with small projection in female (*vs*. extended posteriorly, apex without projection in *M. bingoensis*, apex without projection in *M. koreana*, and bearing strong projection in *M. nagatai*). Our specimens are accorded with original description of Tomikawa *et al*. (2024).

Distribution. Korea (Ulleungdo Island), Japan.

55. *Melita rylovae* Bulyčeva, 1955
두발가락멜리타옆새우*

Material examined. 15 inds., Hyeonpo Port, 23 August 2023.

Distribution. Korea (Jejudo Island, east, south and west coasts), China, Japan, Russia.

Family Phliantidae Stebbing, 1899 납작옆새우과
Genus *Pereionotus* Spence Bate & Westwood, 1862

56. *Pereionotus holmesi* (Gurjanova, 1938)
납작옆새우*

Material examined. 2 inds., Cheonbu Port, 23 May 2023; 6 inds., Tonggumi, 23 May 2023; 5 inds., Daeseok Rock, 24 May 2023.

Distribution. Korea (east and west coasts), Pacific coast of Russia.

Family Photidae Boeck, 1871 꼬리다리옆새우과
Genus *Gammaropsis* Lilljeborg, 1855

57. *Gammaropsis japonica* (Nagata, 1961)
극동육질꼬리옆새우

Material examined. 8 inds., Jukdo Island, 24 May 2023; 9 inds., Ssangjeongcho Rock, 24 May 2023.

Distribution. Korea (Jejudo Island, east, south, and west coasts), China, Japan.

Family Pleustidae Buchholz, 1874 주걱턱옆새우과
Genus *Incisocalliope* J.L. Barnard in J.L. Barnard & Reish, 1959

58. *Incisocalliope derzhavini* (Gurjanova, 1938)
북쪽주걱턱옆새우

Material examined. 4 inds., Jeodong Port, 22 May 2023; 10 inds., Haengnam Lighthouse, 23 May 2023; 10 inds., Jukdo Island, 24 May 2023; 3 inds., Ssangjeongcho Rock, 24 May 2023; 8 inds., Gongam Rock, 23 May 2023.

Distribution. Korea (east coast), Japan, Pacific coast of Russia, Hawaiian Islands.

Family Podoceridae Leach, 1814 긴배옆새우과
Genus *Podocerus* Leach, 1814

59. *Podocerus hoonsooi* Kim & Kim, 1991
등뿔긴배옆새우

Material examined. 1 ind., Haengnam Lighthouse, 23 May 2023; 10 inds., Jukdo Island, 24 May 2023; 12 inds., Ssangjeongcho Rock, 24 May 2023.

Distribution. Korea (Jejudo Island, east and south coasts).

60. *Podocerus ulreungensis* Kim & Kim, 1991
가시손긴배옆새우

Material examined. 100 inds., Jeodong Port, 22 May 2023; 32 inds., KIOST station, 23 May 2023; 10 inds., Cheonbu Port, 23 May 2023; 10 inds., Jeodong Port, 23 May 2023; 10 inds., Gaje Rock, 23 May 2023; 9 inds., Haengnam Lighthouse, 23 May 2023; 1 ind., Daeseok Rock, 24 May 2023; 40 inds., Jukdo Island, 24 May 2023; 2 inds., Ssangjeongcho Rock, 24 May 2023; 5 inds., Namyang Beach, 23 August 2023; 10 inds., Taeha Port, 23 August 2023; 10 inds., Taeha-ri, 23 August 2023; 6 inds., Seonchang Port, 24 August 2023; 19 inds., Jeodong Port, 24 August 2023.

Distribution. Korea (Jejudo Island, east and south coasts).

Family Pontogeneiidae Stebbing, 1906
Genus *Eusiroides* Stebbing, 1888
61. *Eusiroides japonica* Hirayama, 1985
극동짧은채찍옆새우

Material examined. 1 ind., Haengnam Lighthouse 23 May 2023; 1 ind., Jukdo Island, 24 May 2023.
Distribution. Korea (Jejudo Island and east coast), Bering Sea, Japan, Mexico.

Genus *Pontogeneia* Boeck, 1871
62. *Pontogeneia rostrata* Gurjanova, 1938
북태평양짧은채찍옆새우

Material examined. 3 inds., Sadong Port, 22 May 2023; 21 ind., Tonggumi, 23 May 2023; 1 ind., KIOST station, 23 May 2023; 10 inds., Cheonbu Port, 23 May 2023; 1 ind., Gaje Rock, 23 May 2023; 1 ind., Cheonbu Port, 23 August 2023; 3 inds., Hakpo Port, 23 August 2023; 10 inds., Taeha Port, 23 August 2023; 3 inds., Seonchang Port, 24 August 2023; 10 inds., Dodong Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east, south, and west coasts), Bering Sea, China, Japan, Mexico.

Family Stenothoidae Boeck, 1871 예쁜이옆새우과
Genus *Stenothoe* Dana, 1852
63. *Stenothoe valida* Dana, 1852 꼬마예쁜이옆새우

Material examined. 10 inds., Jeodong Port, 22 May 2023; 3 inds., Sadong Port, 22 May 2023; 5 inds., Jeodong Port, 23 May 2023; 5 inds., Gaje Rock, 23 May 2023; 100 inds., Gongam Rock, 23 May 2023; 1 ind., Jeodong Port, 24 May 2023; 40 inds., Jukdo Island, 24 May 2023; 22 inds., Ssangjeongcho Rock, 24 May 2023; 32 inds., Ulleung site 3, 24 May 2023; 7 inds., Cheonbu Port, 23 August 2023; 10 inds., Namyang Beach, 23 August 2023; 10 inds., Taeha Port, 24 August 2023; 48 inds., Jeodong Port, 24 August 2023.
Distribution. Korea (Jejudo Island, east and south coasts), worldwide.

Family Vibiliidae Dana, 1852 주걱옆새우과
Genus *Vibilia* H. Milne Edwards, 1830
64. *Vibilia australis* Stebbing, 1888
세줄눈주걱옆새우 (신칭)** (Figs. 9, 10)
Vibilia australis Stebbing 1888: 1287, pl. 149. - Shih & Chen 1995: 49, fig. 26. - Zeidler 2003: 43, figs. 18–19.

Material examined. 1 male, 12 females (DKUAMP20 2407), Taeha-port, Buk-myeon, Ulleung-gun, Gyeongsangbuk-do, Korea, 37°30′40″N, 130°47′41″E, K.W. Kim, by netting, 23 May 2023; 13 males, 38 females, Buk-myeon, Ulleung-gun, Gyeongsangbuk-do, Korea, 37°30′29″N, 130°58′11″E, K.W. Kim, by netting, 24 May 2023.
Description. Male (MABIK CR00257941): Body (Figs. 9, 10A) 4.8 mm long, dorsally smooth; head subequal in length to pereonites 1–2; eyes characteristic in form, with ocelli in three rows, shaped ovate; antenna 1 short; antenna 2 minute; coxae flat dorsoventrally, except coxa 7, much shallower than pereonites; pereopods slender, unarmed.

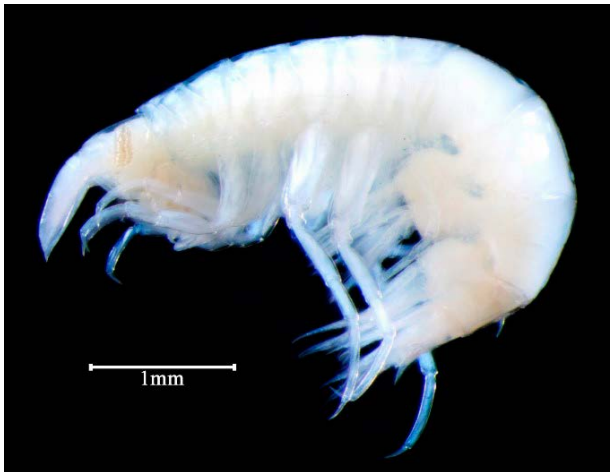


Fig. 9. *Vibilia australis*, adult male, 4.8 mm, habitus. Scale bar = 1.0 mm.

Antenna 1 (Fig. 10B) short, stout, subequal in length to head and pereonites 1–2; peduncle strongly compressed, length ratio of peduncular articles 1–3 = 1.00 : 0.23 : 0.21; flagellum 3-articulate, 3.11 × peduncle, article 1 elongated, narrowing distally, articles 2–3 minute, terminal article with 1 seta.

Gnathopod 1 (Fig. 10C) short, coxa quadrangular, with rounded corners, width 1.88 × length; basis moderate, elongate, anterior margin concave, posterodistal corner slightly produced; ischium subquadrate, 0.24 × basis, posterodistal corner with 2 robust setae; merus short, 0.79 × ischium, with 1 robust seta posterodistally; carpus 1.22 × ischium, midposterior margin serrulate, posterodistal corner with 1 tiny robust seta; propodus subrectangular, 1.61 × carpus, posterior margin serrulate; dactylus falcate, inner margin serrulate.

Gnathopod 2 (Fig. 10D) short, carpochelate; coxa subquadrate, width 1.92 × length; basis subrectangular, relatively long, anterior margin slightly concave; ischium short, with 1 robust seta posteriorly; merus 1.44 × ischium, posterior and distal margin with robust setae; carpus 1.04 × merus, carpal lobe produced, anterior margin of carpal lobe serrulate, with 1 tiny setule distally; propodus slender, subrectangular, 1.46 × carpus, posterior margin serrulate; dactylus falcate, 0.48 × propodus.

Pereopod 3 (Fig. 10E), coxa quadrangular, with rounded corners, width 1.54 × length; basis subrectangular, unarmed; ischium short, 0.21 × basis; merus subrectangular, 4.19 × ischium; carpus subrectangular, 0.48 × merus; pro-

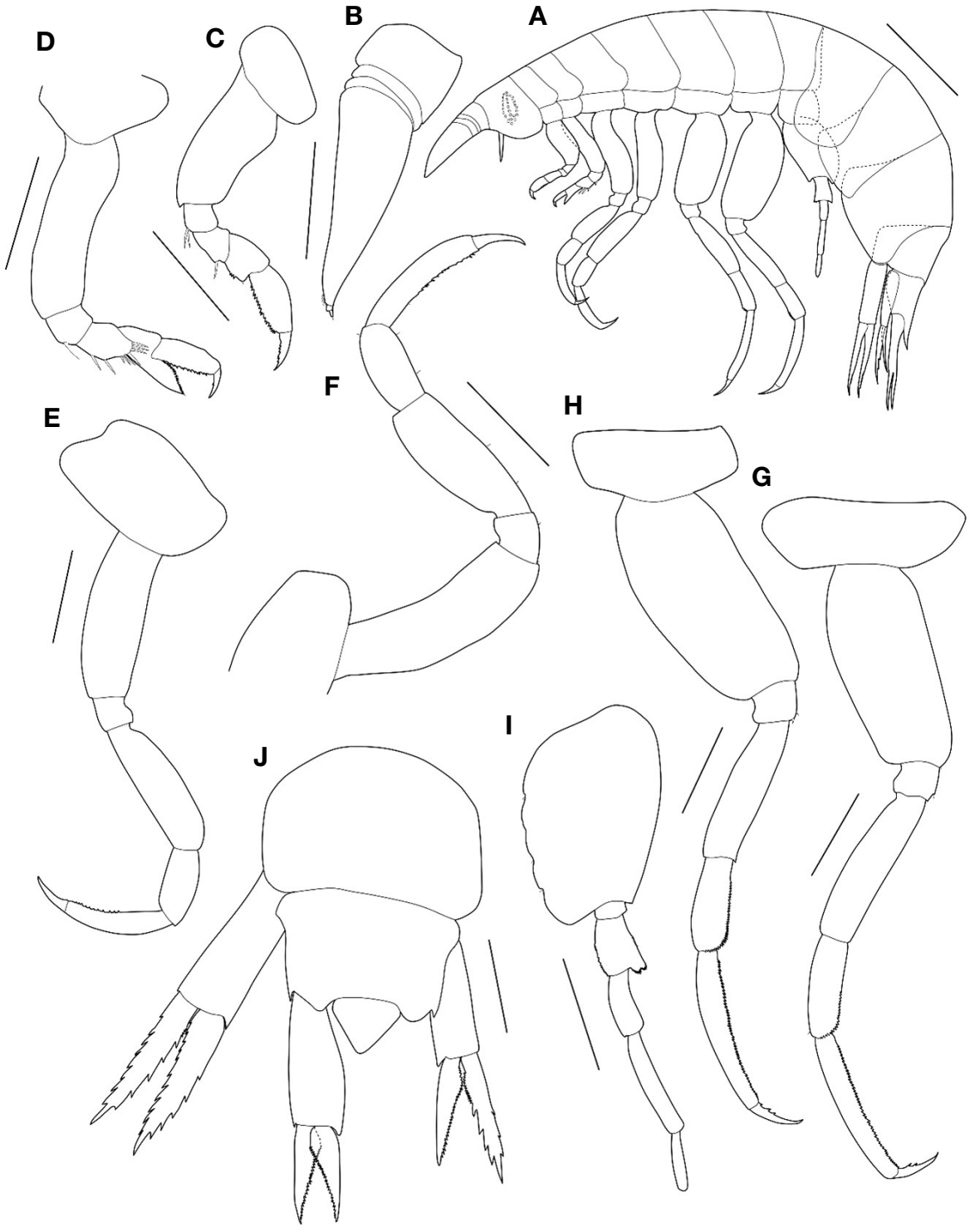


Fig. 10. *Vibilia australis*, adult male, 4.8 mm. A, habitus; B, antenna 1; C, gnathopod 1; D, gnathopod 2; E, pereopod 3; F, pereopod 4; G, pereopod 5; H, pereopod 6; I, pereopod 7; J, uropods 1–3 and telson. Scale bars: A = 0.5 mm, B–J = 0.2 mm.

podus slender, 1.51 × carpus, distal half of posterior margin serrulate; dactylus falcate, 0.48 × propodus.

Pereopod 4 (Fig. 10F) similar to pereopod 3, but slightly elongated.

Pereopod 5 (Fig. 10G), coxa shallow, subrectangular, with rounded corners, width 3.07 × length; basis elongate-

ovate; merus slender, elongated, 4.21 × ischium; carpus subrectangular, 0.63 × merus, distal half of anterior and distal margins serrulate; propodus slender, elongated, 1.89 × carpus, anterior margin serrulate; dactylus falcate, 0.48 × propodus, inner margin with 2 accessory teeth.

Pereopod 6 (Fig. 10H) similar to pereopod 5.

Pereopod 7 (Fig. 10I), basis subovate, width 0.75 × length, posterior margin wavy; merus stubby, 3.44 × ischium, anterior margin serrulate, anterodistal lobe present, bifid, serrulate, half of posterior margin serrulate; carpus subrectangular, 1.11 × merus; propodus slender, subrectangular, 1.74 × carpus; dactylus slender, blunt, 0.48 × propodus.

Uropod 1 (Fig. 10J), peduncle subrectangular, unarmed, laterodistal and mediodistal corners produced; outer ramus 0.96 × peduncle, both margins with serrations; inner ramus similar to outer ramus in shape and length.

Uropod 2 (Fig. 10J) shorter than uropod 1, peduncle subrectangular, mediodistal corner produced; outer ramus 1.08 × peduncle, proximal half of medial margin serrulate, distal half of lateral and medial margins with serrations; inner ramus 0.83 × outer ramus, medial margin serrulate.

Uropod 3 (Fig. 10J) subequal to uropod 2, peduncle subrectangular, widening distally, laterodistal and mediodistal corners produced; outer ramus short, 0.63 × peduncle, medial margin serrulate; inner ramus 0.94 × outer ramus, medial margin serrulate.

Telson (Fig. 10J) small, entire, subtriangular, unarmed.

Remarks. *Vibilia australis* Stebbing, 1888 is similar to *V. armata* Bovallius, 1887 and *V. caeca* Bulycheva, 1955 in having pointed distal apex of antenna 1. However, *V. australis* is distinguished from its congeners based on the following features (different characteristics of *V. armata* and *V. caeca* in brackets): 1) eyes with ocelli in three rows (*vs*. ovate in *V. armata* and absent in *V. caeca*); 2) antenna 1 ventral margin straight (*vs*. proximoventral margin convex in *V. armata*, distoventral margin concave in *V. caeca*); 3) antenna 2 short (*vs*. elongated in *V. armata*); 4) gnathopod 2, propodus anterior margin smooth (*vs*. serrated in *V. armata*); 5) pereopod 7, basis elongate, length subequal to ischium to half of propodus combined (*vs*. subequal to ischium to carpus combined in *V. armata* and *V. caeca*). Our specimens are accorded with the previous descriptions of Stebbing (1888) and Zeidler (2003).

Distribution. Korea (Ulleungdo Island), tropical and temperate regions.

Discussion

To date, 251 marine amphipod species belonging to 120 genera, 49 families have been recorded in Korea (National Marine Biodiversity Institute of Korea, 2023). A total of 64 amphipod species in 39 genera, 22 families were revealed in this faunal study at 27 sites of Ulleungdo Island during the periods from 22 May to 24 May and from 23 August

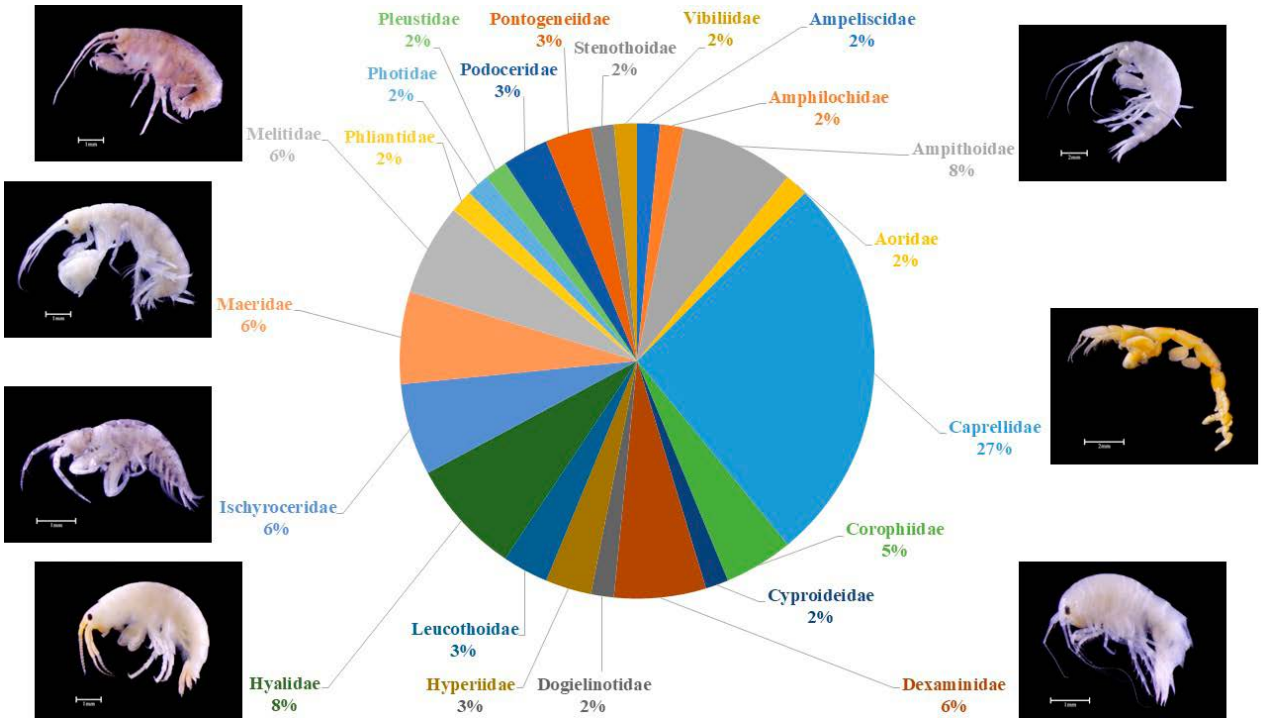


Fig. 11. The proportion of species in each family to the total number of species.

Table 1. Details of sampling localities of amphipods from Ulleungdo Island.

Station No.	Date	Locality	Latitude, Longitude	Sampling method	Depth (m)
1	23. 05. 2023	Daepunggam Rock	37°31′16″N, 130°47′55″E	Grab	–
2	23. 05. 2023	KIOST station	37°31′22″N, 130°48′52″E	Sieving	0–0.3 m
	23. 08. 2023		37°31′24″N, 130°48′52″E		0–0.3 m
3	23. 05. 2023	Ungpo Port	37°31′25″N, 130°48′53″E	Sieving	0–0.3 m
4	23. 05. 2023	Hyeonpo Port	37°31′40″N, 130°49′08″E	Grab	–
			37°31′36″N, 130°49′27″E	Port survey	1 m
				Light trap	5 m
5	23. 05. 2023	Gongam Rock	37°32′22″N, 130°50′38″E	Grab	–
6	23. 05. 2023	Cheonbu Port	37°32′33″N, 130°52′26″E	Port survey	2 m
	23. 08. 2023		37°32′26″N, 130°52′21″E	Port survey	3 m
				Light trap	4 m
7	24. 05. 2023	Ulleung site 1	37°33′48″N, 130°53′54″E	Grab	–
8	24. 08. 2023	Seonchang Port	37°32′41″N, 130°54′31″E	Sieving	0–0.3 m
9	24. 05. 2023	Ulleung site 2	37°32′20″N, 130°55′19″E	Grab	–
10	24. 05. 2023	Ssangjeongcho Rock	37°33′24″N, 130°56′22″E	Scuba diving	15 m
11	24. 05. 2023	Jukdo Island	37°31′32″N, 130°56′12″E	Scuba diving	35–40 m
12	24. 05. 2023	Ulleung site 3	37°30′29″N, 130°58′11″E	Grab	–
				Netting	–
				Sieving	0–0.3 m
13	24. 05. 2023	Naesujeon Mongdol Beach	37°30′28″N, 130°54′51″E	Sieving	0–0.3 m
14	22. 05. 2023	Jeodong Port	37°29′51″N, 130°54′42″E	Port survey	3 m
	23. 05. 2023		37°30′48″N, 130°55′10″E		4 m
	24. 08. 2023		37°29′60″N, 130°54′47″E		3 m
			37°29′38″N, 130°54′38″E		3 m
				Light trap	4 m
	24. 05. 2023		37°29′34″N, 130°54′41″E	Sieving	0–0.3 m
15	23. 05. 2023	Haengnam Lighthouse	37°29′14″N, 130°55′11″E	Scuba diving	20 m
16	24. 08. 2023	Dodong Port	37°28′54″N, 130°54′31″E	Light trap	5 m
17	22. 05. 2023	Sadong Port	37°28′29″N, 130°53′43″E	Sieving	0–0.3 m
	22. 05. 2023		37°27′40″N, 130°52′40″E	Light trap	5 m
18	23. 05. 2023	Gaje Rock	37°27′06″N, 130°52′32″E	Scuba diving	13–18 m
19	23. 05. 2023	Tonggumi Beach	37°27′27″N, 130°52′06″E	Grab	–
20	24. 05. 2023	Daeseok Rock	37°27′37″N, 130°51′43″E	Sieving	0–0.3 m

Table 1. Continued.

Station No.	Date	Locality	Latitude, Longitude	Sampling method	Depth (m)
21	23. 05. 2023	Tonggumi	37°27′36″N, 130°51′27″E 37°27′37″N, 130°51′24″E	Sieving Light trap	0–0.3 m 7 m
22	23. 05. 2023	Namyang Port	37°28′01″N, 130°50′01″E	Port survey	3 m
23	23. 08. 2023	Namyang Beach	37°28′41″N, 130°48′32″E	Sieving	0–0.3 m
24	23. 08. 2023	Hakpo Port	37°30′14″N, 130°48′18″E	Sieving	0–0.3 m
25	23. 05. 2023	Taeha Port	37°30′40″N, 130°47′41″E	Grab Netting	– –
	23. 08. 2023		37°30′39″N, 130°47′53″E	Port survey Light trap	2 m 6 m
26	23. 05. 2023	Taeha Mongdol Beach	37°30′41″N, 130°47′53″E	Sieving	0–0.3 m
27	24. 05. 2023 23. 08. 2023	Taeha-ri	37°30′52″N, 130°47′36″E	Sieving	0–0.3 m

to 24 August in 2023 (Table 1, Figs. 1, 11). The number of species found in this study represents about 25% of the total marine amphipod species recorded in Korea. According to previous studies, 68 species of amphipods in Chujado, 35 species of amphipods in Jindo, and 30 species of amphipods in Yeonggwang were recorded (Kim *et al*., 2005; Kim and Lee, 2008; Lee and Hong, 2008; Kim *et al*., 2023b).

The number of species recorded is thought to be a result of the number of survey sites and the diversity of survey methods. In the case of Ulleungdo Island, the current survey area, and Chujado Island, where recent surveys were conducted, there were more survey sites and a wider variety of methods compared to Jindo Island and Yeonggwang, where surveys were conducted relatively long ago.

The results of this study are about twice the 33 amphipod species identified in previous studies (Kim and Kim, 1988; Kim and Kim, 1991a; 1991b; 1991c). The 64 species recorded in this study represent nearly twice the number of amphipod species compared to the 33 species identified in previous studies.

Among the 64 species, three species, *Aoroides longimerus* Ren & Zheng, 1996, *Melita panda* Tomikawa, Yamato & Ariyama, 2024, and *Vibilia australis* Stebbing, 1888 are newly recorded in Korea, which is of major significance. In addition, 42 species in 24 genera, 15 families were confirmed for the first time in Ulleungdo Island. As a result, a total of 75 species in 41 genera, 24 families of amphipods are now known to inhabit Ulleungdo Island (Table 2).

As a result of examining the appearance ratio of each recorded amphipod family, the family Caprellidae, with 17 species (27%), showed the highest appearance ratio among the 64 species from 22 families. This result is consistent with past surveys conducted on Chujado Island, Jindo Island, and Yeonggwang (Kim *et al*., 2005; Kim and Lee, 2008; Lee and Hong, 2008; Kim *et al*., 2023b). The families Ampithoidae and Hyalidae, each represents by 5 species (8%), were revealed as subdominant families (Fig. 11). *Protohyale* (*Boreohyale*) *triangulata* (Hiwatari, 2003) was found at 16 of 27 sites (59%) and had the highest frequency of appearance among all species. *Caprella penantis* Takeuchi, 1993 was found at 14 of 27 sites (52%). These species were confirmed to be relatively common species with a wide habitat range in Ulleungdo Island (Table 2).

Research on amphipods inhabiting Ulleungdo Island has been confined to a limited area and conducted using restricted methods since Kim and Kim (1991a; 1991b; 1991c). However, in this amphipod faunal study, we employed various collection sites and methods. These included sieving stones (including pebbles), tidal pools adjacent to rocks, sampling seaweeds in intertidal zones, using grab and nets, conducting SCUBA diving in subtidal zones, as well as port surveys to collect amphipods dwelling on periphyton or artificial structures such as ropes, buoys, and fishing net. In addition, we utilized light traps at night to collect amphipods exhibiting positive phototaxis. Different amphipod species were caught depending on the survey method. The port survey method collected the highest number of species (n = 34), while both sieving and SCUBA diving each collected 32 species. Therefore, port survey, sieving, and SCUBA diving are essential collection methods for accurately understanding the amphi-

Table 2. All of amphipod from Ulleungdo Island and appearance of amphipod species in each sampling localities in Ulleungdo Island (●, present study; ○, previous record; ◎, present study and previous record. Refer to site number in table 1).

No.	Species	Site																										
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	*Byblis longiflagelis*					●														●						●			
2	*Paramphilochus parachelatus*						●														●	●				●		●	
3	*Ampithoe lacertosa*				●		◎						●		●			●								●		●	
4	*Ampithoe ramondi*	○				○								○								○	○						○
5	*Ampithoe valida shimizuensis*		●				●														●		●			●			
6	*Ampithoe valida valida*																						○						
7	*Pleonexes koreana*						●				●					●		●			●	●				●		●	
8	*Sunamphitoe baegryeongensus*						●																						
9	*Sunamphitoe orientalis*					○																							○
10	*Sunamphitoe sineplumosa*					○					●							○											○
11	*Sunamphitoe tea*												●								●								
12	*Aoroides columbiae*					○																							
13	*Aoroides longimerus*														●														
14	*Caprella acanthogaster*					○																							
15	*Caprella arimotoi*											●				●			●										
16	*Caprella californica*					●					●	●	●		●	●			●										
17	*Caprella danilevskii*								●				●								●			●				●	
18	*Caprella decipiens*		●				●						●			●		●	●										
19	*Caprella equilibra*			●											●											●			
20	*Caprella eximia*										●																		
21	*Caprella mutica*												●																
22	*Caprella penantis*		●			○			●		●	●	●	●	●	●	○	◎			●	●	●	●				●	○
23	*Caprella polyacantha*															●													
24	*Caprella scaura*				●		●								●		●	●				○	●						
25	*Caprella simia*										●	●	●		●			●											
26	*Caprella subinermis*		●				●																						
27	*Caprella tsugarensis*											●	●	●				●				●			●	●	●		

Table 2. Continued.

No.	Species	Site																										
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
28	*Caprella verrucosa*										●		●		●	●													
29	*Paracaprella crassa*														●	●			●										
30	*Perotripus koreanus*										●																		
31	*Pseudoproto fallax*	●			●			●		●			●					●		●									
32	*Colomastix prionotos*																					○							
33	*Apocorophium acutum*														●														
34	*Monocorophium acherusicum*				●										●														
35	*Monocorophium insidiosum*														●														
36	*Moolapheonoides acutifalcatus*																					●							
37	*Guernea ezoensis*		●																										
38	*Paradexamine acuta*														●														
39	*Paradexamine fraudatrix*				●		●				●	●			●	●		●				●	●			●		●	
40	*Paradexamine gigas*												●																
41	*Allorchestes angusta*												●				○												
42	*Ceinina japonica*	○																											
43	*Apohyale punctata*					○			●					○		●		●					◎					●	
44	*Protohyale* (*B.*) *kajiharai*										●					●					●						●		
45	*Protohyale* (*B.*) *pumila*		●				●														●	●							
46	*Protohyale* (*B.*) *triangulata*	○	●	●		○			●		●	●		◎	●	●		◎			●	●	◎	●	●	●		●	○
47	*Ptilohyale barbicornis*																							●					
48	*Ptilohyale bisaeta*																												○
49	*Hyperia galba*												●																
50	*Themisto compressa*					●				●			●						●							●	●		
51	*Ericthonius pugnax*	○									●	●		○	●	●							○						○
52	*Jassa marmorata*														●														
53	*Jassa morinoi*		●						●							●			●			●				●		●	
54	*Jassa slattery*	○				○								○			○	○											○

Table 2. Continued.

No.	Species	Site																										
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
55	*Ventojassa dentipalma*	○				○					●	●			●	●			●										○
56	*Leucothoe nagatai*	○				○																○							○
57	*Leucothoe spinicarpa*					○										●													
58	*Paranamixis denticulus*	○				○													●			○							
59	*Elasmopus koreanus*	○			●										●			○											○
60	*Elasmopus rapax*																											●	
61	*Orientomaera brevispina*	○									●			○								○	○						
62	*Quadrimaera pacifica*	○				○	●				●			○		●							○						○
63	*Abludomelita japonica*				●		●								●														
64	*Abludomelita okhotensis*																									●			
65	*Melita panda*		●																										
66	*Melita rylovae*				●																								
67	*Pereionotus holmesi*						●														●	●							
68	*Gammaropsis japonica*	○				○					●	●		○															○
69	*Incisocalliope derzharvini*	○				●					●	●		○	●	●						○							
70	*Podocerus hoonsooi*	○				○					●	●				●						○							
71	*Podocerus ulreungensis*	○	●			○	●		●		●	●		○	●	●			●		●	○		●		●		●	○
72	*Eusiroides japonica*	○				○						●				●						○	○						
73	*Pontogeneia rostrata*	○	●				●		●								●	◎	●			◎			●	●			○
74	*Stenothoe valida*	○				◎	●				●	●	●		●			●	●			○		●		●			
75	*Vibilia australis*												●													●			
	Total	19	11	2	8	23	16	1	7	2	20	15	17	12	23	21	5	16	11	2	11	23	11	6	3	16	3	11	15

Table 3. Collection methods for the amphipod species in Ulleungdo Island.

No.	Species	Light trap	SCUBA diving	Sieving	Port survey	Grab	Netting	No.	Species	Light trap	SCUBA diving	Sieving	Port survey	Grab	Netting
1	*Byblis longiflagelis*					●		33	*Paradexamine gigas*					●	
2	*Paramphilochus parachelatus*	●		●	●			34	*Allorchestes angusta*			●			
3	*Ampithoe lacertosa*	●		●	●			35	*Apohyale punctata*		●	●			
4	*Ampithoe valida shimizuensis*			●	●			36	*Protohyale* (*B.*) *kajiharai*		●	●			
5	*Pleonexes koreana*		●	●	●			37	*Protohyale* (*B.*) *pumila*		●	●	●		
6	*Sunamphitoe sineplumosa*		●					38	*Protohyale* (*B.*) *triangulata*	●		●	●		
7	*Sunamphitoe tea*			●				39	*Ptilohyale barbicornis*			●			
8	*Aoroides longimerus*				●			40	*Hyperia galba*						●
9	*Caprella arimotoi*		●					41	*Themisto compressa*		●	●		●	●
10	*Caprella californica*		●	●	●	●		42	*Ericthonius pugnax*	●	●		●		
11	*Caprella danilevskii*			●				43	*Jassa marmorata*				●		
12	*Caprella decipiens*	●	●	●	●			44	*Jassa morinoi*	●	●	●	●		
13	*Caprella equilibra*	●		●	●			45	*Ventojassa dentipalma*		●		●		
14	*Caprella eximia*		●					46	*Leucothoe spinicarpa*		●				
15	*Caprella mutica*			●				47	*Paranamixis denticulus*		●				
16	*Caprella penantis*		●	●	●			48	*Elasmopus koreanus*				●		
17	*Caprella polyacantha*		●					49	*Elasmopus rapax*			●			
18	*Caprella scaura*	●		●	●			50	*Orientomaera brevispina*		●				
19	*Caprella simia*	●	●		●	●		51	*Quadrimaera pacifica*		●		●		
20	*Caprella subinermis*			●	●			52	*Abludomelita japonica*	●			●		
21	*Caprella tsugarensis*	●	●	●	●			53	*Abludomelita okhotensis*					●	
22	*Caprella verrucosa*		●	●				54	*Melita panda*			●			
23	*Paracaprella crassa*		●		●			55	*Melita rylovae*				●		
24	*Perotripus koreanus*		●					56	*Pereionotus holmesi*	●		●	●		
25	*Pseudoproto fallax*	●				●		57	*Gammaropsis japonica*		●				
26	*Apocorophium acutum*				●			58	*Incisocalliope derzharvini*		●		●	●	
27	*Monocorophium acherusicum*	●		●	●			59	*Podocerus hoonsooi*		●				
28	*Monocorophium insidiosum*				●			60	*Podocerus ulreungensis*		●	●	●		
29	*Moolapheonoides acutifalcatus*	●						61	*Eusiroides japonica*		●				
30	*Guernea ezoensis*			●				62	*Pontogeneia rostrata*	●	●	●	●		
31	*Paradexamine acuta*				●			63	*Stenothoe valida*	●	●	●	●	●	
32	*Paradexamine fraudatrix*	●	●	●	●			64	*Vibilia australis*						●
				Total						18	32	32	34	9	3

pod fauna in Ulleungdo Island. Especially, grab and netting were effective in collecting deeper-dwelling amphipods such as *Aoroides longimerus*, *Abludomelita okhotensis*, *Paradexamine gigas*, and *Hyperia galba* (Table 3).

A total of 22 (34%) out of 64 species were collected at Jeodong Port using a combination of light trap, sieving, and port survey among 27 sites, while 20 (31%) out of 64 species were collected at Haengnam Lighthouse by SCUBA diving and Ssangjeongcho Rock by SCUBA diving. In contrast, Daepunggam Rock and the east coast of Ulleungdo Island (Ulleung site 1) surveyed by grab showed only one species (2%) out of 64 species. These results confirmed that Jeodong Port had the highest species diversity, whereas the east coast of Daepunggam Rock and Ulleung site 1 had the lowest species diversity. These results indicate that the survey sites where various collection methods were employed, exhibited high species diversity.

Through this amphipod survey using various methods, we were able to confirm nearly twice as many species inhabiting Ulleungdo Island compared to previous studies. The results obtained from this study are significant for documenting Korea's ecosystem, especially as climate and environmental change intensifying.

Conflicts of Interest

The authors of this paper have no affiliation with any interests and is solely responsible for the paper.

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