

A new record of the species *Caprella carinata* (Crustacea, Amphipoda, Caprellidae) from Korean waters

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A newly recorded species *Caprella carinata* Arimoto, 1934 belonging to the family Caprellidae Leach, 1814 was collected from the East Sea, Korea. This species is morphologically similar to *Caprella acantogaster* Mayer, 1890, *Caprella eximia* Mayer, 1890, and *Caprella mutica* Schurin, 1935 as all four species share dorsal projections on pereonites and possess robust (grasping) setae on pereopods 5–7. However, *C. carinata* can be distinguished from relative species by the curved projections on pereonites 1 and 2, as well as by the distinct shape of the poison tooth on gnathopod 2. In this study, *C. carinata* is illustrated based on mature specimens and its morphological characteristics are compared with those of relative species.

Keywords: amphipod, *Caprella*, Korea, new record, taxonomy



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INTRODUCTION

The genus *Caprella* Lamarck, 1801 is one of the 96 genera belonging to the family Caprellidae Leach, 1814, encompassing 187 species (Horton *et al.*, 2024). This genus is defined by the following morphological characteristics: (1) antenna 2 with biarticulate flagellum; (2) mandibular palp absent; (3) gills present on pereonites 3–4; (4) pereopods 3–4 absent; and (5) abdomen with a pair of appendages and a pair of lobes in male. Species in the genus *Caprella* show various morphological differences, such as variations in body thickness, length, and protrusions (McCain, 1968; Arimoto, 1976; Heo *et al.*, 2020). In Korean waters, a total of 11 genera 44 species of caprellids have been reported. Among these 11 genera, the genus *Caprella* with 34 species showed the highest diversity and abundance (Ryu and Park, 2023; National Marine Biodiversity Institute of Korea, 2023; Shin *et al.*, 2023; Heo *et al.*, 2024). *Caprella carinata* was originally described by Arimoto in 1934 from its type locality in Yamada Bay, Japan. Later, Arimoto (1976) conducted further taxonomic

study on this species. *Caprella carinata* is morphologically similar to *C. eximia*, and some specimens of *C. carinata* have historically been misclassified as *C. eximia* (Lee and Hong, 2011). However, despite these morphological resemblances, the two species exhibit distinct differences. In this paper, we provide detailed illustrations of *C. carinata* and compare its morphology with *C. eximia*, emphasizing the distinguishing features that differentiate the two species.

MATERIALS AND METHODS

The specimens were collected by SCUBA diving, port survey from subtidal and sublittoral waters of east sea, Korea (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 Paint (Celsys, Japan). 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

Subphylum Crustacea Pennant, 1777 갑각아문
Class Malacostraca Latreille, 1806 연갑강
Order Amphipoda Latreille, 1816 단각목
Family Caprellidae Leach, 1814 바다대벌레과
Genus *Caprella* Lamarck, 1801 바다대벌레속

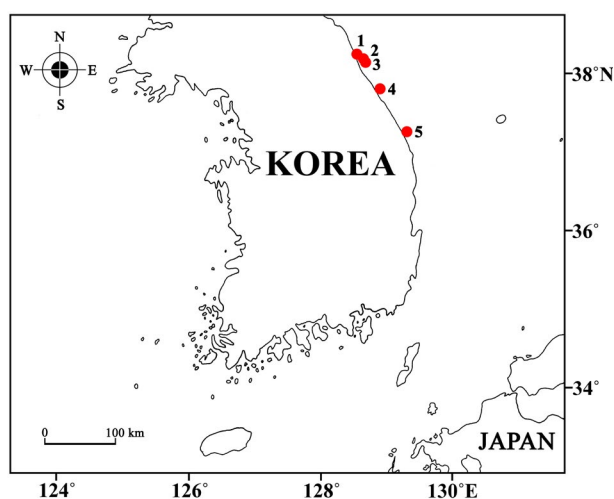


Fig. 1. Distribution of *Caprella carinata* from Korean waters (1, Chodo-port, Hyeonnae-myeon, Goseong-gun; 2, Gajin-ri, Jukwang-myeon, Goseong-gun; 3, Geojin-ri, Geojin-eup, Goseong-gun; 4, Namae-ri, Hyeonnam-myeon, Yangyang-gun; 5, Gyo-dong, Samcheok-si).

Caprella carinata Arimoto, 1934

나도가시투성바다대벌레 (신칭)* (Figs. 2-4)

Caprella carinata Arimoto, 1934: 496, figs. 2, 8, 17, 21-22, 27.

Caprella (Caprella) carinata: Arimoto, 1976: 97, figs. 51-53.

Caprella eximia sensu Lee & Hong, 2011: 59, fig. 42D, E.

Material examined. 35 males, 41 females, Geojin-ri, Geojin-eup, Goseong-gun, Gangwon-do, Korea, 38°27'09"N, 128°28'24"E, S.G. Lee, by SCUBA diving, 29 August 2018; 12 males, 6 females, Namae-ri, Hyeonnam-myeon, Yangyang-gun, Gangwon-do, Korea, 37°56'39"N, 128°47'43"E, S.G. Lee, by SCUBA diving, 30 August 2018; 8 males, 9 females, Gyo-dong, Samcheok-si, Gangwon-do, Korea, 37°28'01"N, 129°10'55"E, S.G. Lee, by SCUBA diving, 31 August 2018; 2 males, 3 females, Gajin-ri, Jukwang-myeon, Goseong-gun, Gangwon-do, Korea, 38°22'44"N, 128°31'32"E, S.G. Lee, by SCUBA diving, 21 April 2019; 2 males, Chodo-port, Hyeonnam-myeon, Goseong-gun, Gangwon-do, Korea, 38°29'08"N, 128°26'19"E, Y.H. Kim, by port survey, 11 January 2023.

Description. Male (MABIK CR00257943): Body (Figs. 2A, 3A) 11.6 mm long. Head smooth without process. Eyes small and round. Pereonite 1 elongate and fused with head; pereonite 2 with a projection anterodorsally, a pair of projections laterally, two pairs of projections posterodorsally and two pairs of anteriorly curved projections middorsally and posterodorsally; pereonite 3 longest; pereonites 3, 4 with dorsal and lateral projections, elongated gill; pereonite 5 subequal to pereonites 2, 4, with dorsal and lateral projections; pereonites 6, 7 short, with dorsal projections; length ratio of pereonites 2-7 = 1.00 : 1.06 : 0.99 : 1.00 : 0.50 : 0.40.

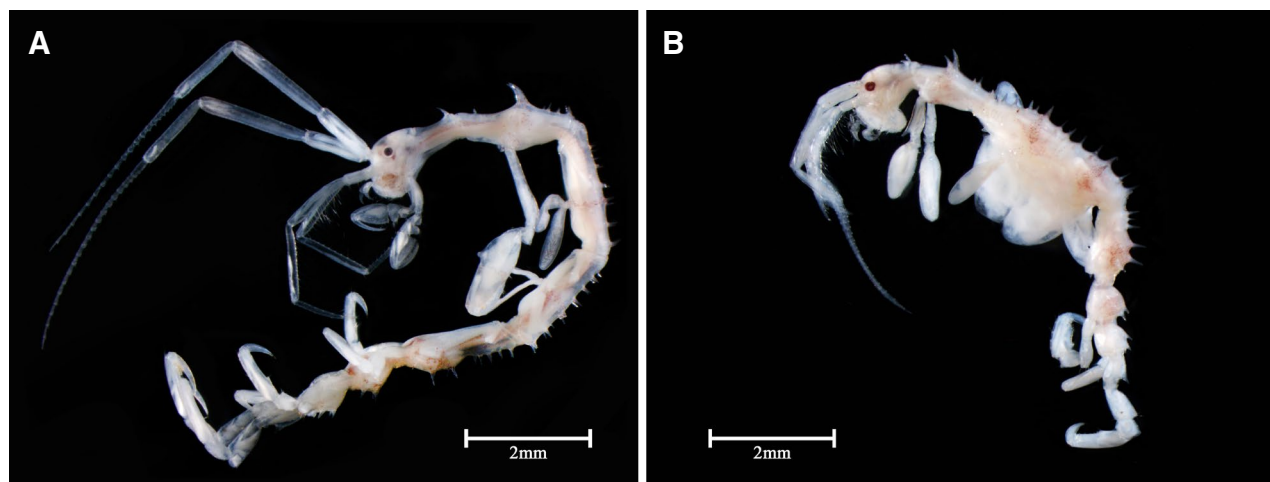


Fig. 2. *Caprella carinata*, A, adult male, 11.6 mm, habitus; B, adult female, 7.9 mm, habitus. Scale bars: A, B = 2.0 mm.

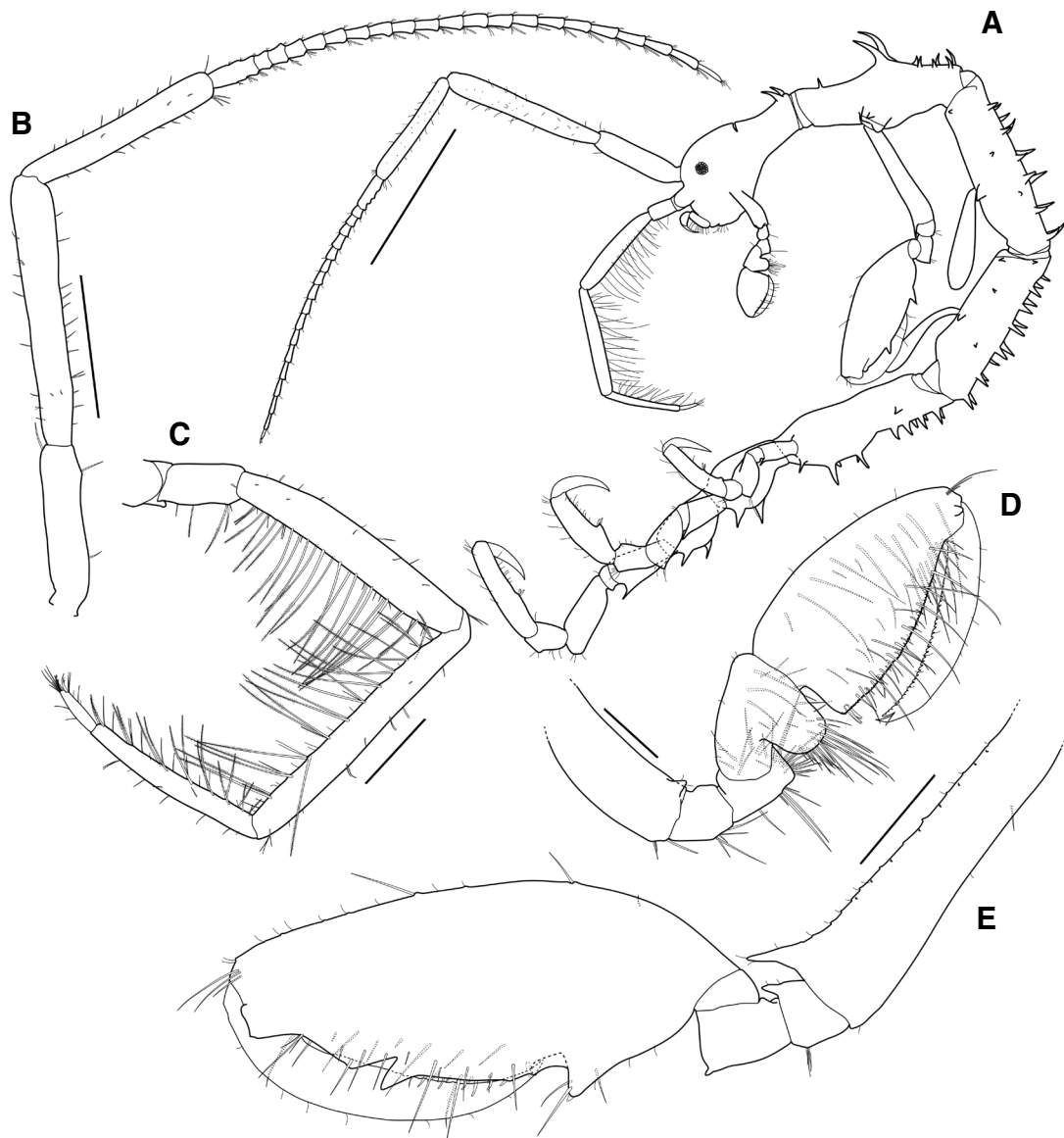


Fig. 3. *Caprella carinata*, adult male, 11.6 mm. A, habitus; B, antenna 1; C, antenna 2; D, gnathopod 1; E, gnathopod 2. Scale bars: A = 2 mm, B = 1 mm, C, E = 0.4 mm, D = 0.2 mm.

Antenna 1 (Fig. 3B) $0.67 \times$ body length; peduncular articles with sparse short; length ratio of peduncular articles 1–3 = $1.00 : 1.58 : 1.17$; flagellum slender, 21-articulate, $0.84 \times$ peduncle, each article with 1 aesthetasc ventrodistally.

Antenna 2 (Fig. 3C) setose, shorter than antenna 1, not reaching the distal end of peduncular article 3 of antenna 1; peduncular articles 4, 5 and flagellum article 1 with many long swimming setae ventrally; length ratio of peduncular articles 3–5 = $1.00 : 3.72 : 4.02$; flagellum biarticulate, $0.85 \times$ peduncular article 5.

Gnathopod 1 (Fig. 3D) small; basis broken, with anterodistal process; merus with simple setae distally; car-

pus subtriangular, with expending rounded lobe and long simple setae ventrodistally; propodus narrowing distally, palm slightly convex, with unequal setae, proximal projection conspicuously provided; dactylus falcate, slightly exceeding palm; length ratio of 6 articles = $1.00 : 0.31 : 0.37 : 0.70 : 1.45 : 1.33$.

Gnathopod 2 (Fig. 3E) attached midanterior margin of pereonite 2, long and slender; basis, anterior margin serrate slightly; basis, ischium, merus with process on each distal portion, propodus elongate, longer than basis, width $0.38 \times$ length, with a small robust (grasping) seta on proximal projection, palm with triangular projection near distal margin, small poison tooth situated nearly triangular

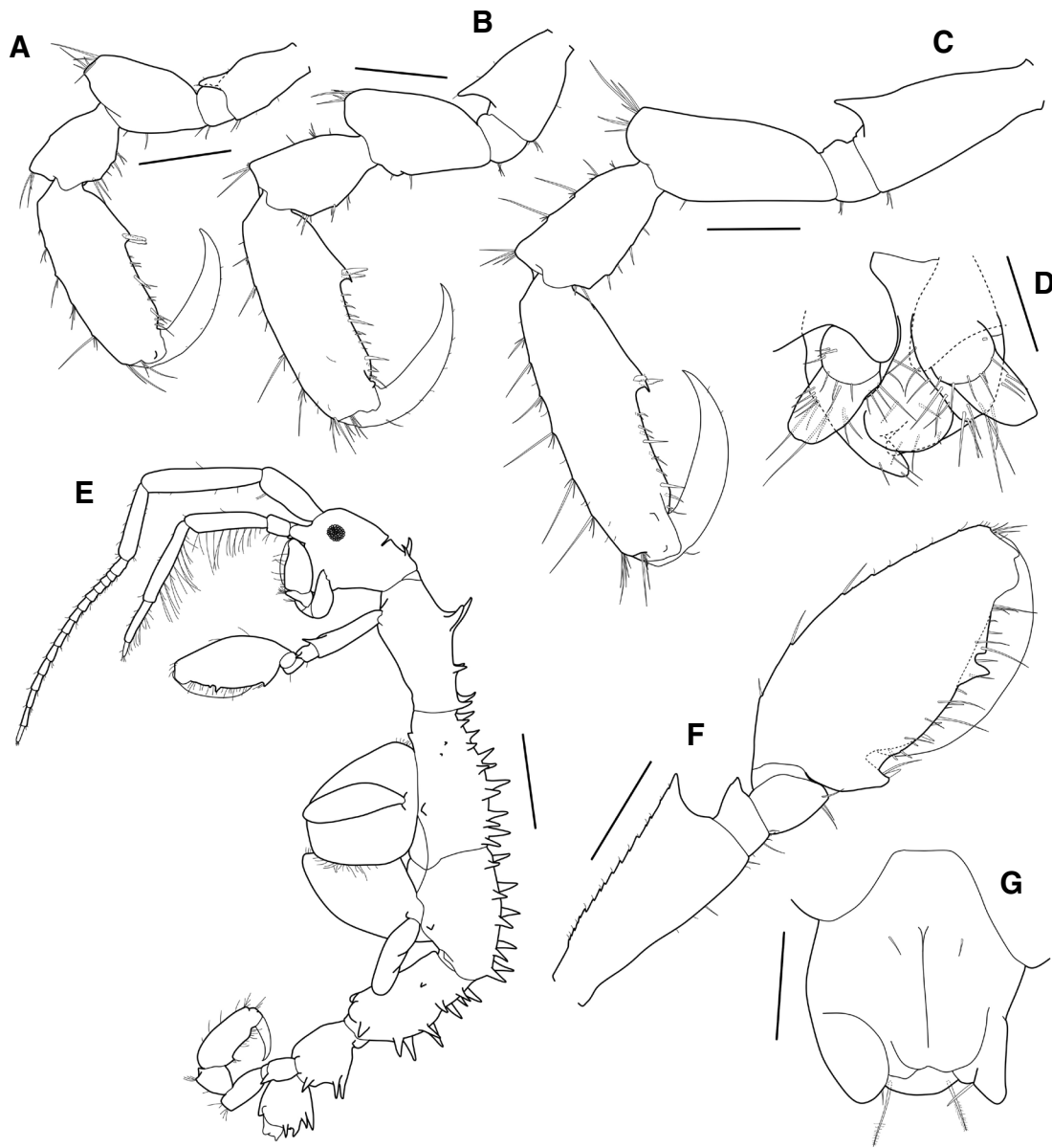


Fig. 4. *Caprella carinata*, adult male, 11.6 mm. A, pereopod 5; B, pereopod 6; C, pereopod 7; D, abdomen. Adult female, 7.9 mm. E, habitus; F, gnathopod 2; G, abdomen. Scale bars: E = 1 mm, A–C, F = 0.4 mm, D, G = 0.1 mm.

projection; dactylus falcate, slightly curved; length ratio of 6 articles = 1.00 : 0.13 : 0.24 : 0.09 : 1.33 : 0.98.

Pereopod 5 (Fig. 4A), stout; basis with large triangular process posterodistally; ischium short; merus expanded posteriorly with simple setae; propodus longest, with long simple setae posteriorly, palm defined by a pair of robust (grasping) setae midanteriorly; dactylus falcate; length ratio of 6 articles = 1.00 : 0.32 : 1.05 : 1.08 : 2.16 : 2.11.

Pereopod 6 (Fig. 4B) similar to pereopod 5, but merus more elongated than that of pereopod 5; length ratio of 6 articles = 1.00 : 0.25 : 1.14 : 1.08 : 2.16 : 2.11.

Pereopod 7 (Fig. 4C) similar to pereopod 6, but ba-

sis and merus narrower and more elongated than that of pereopod 6; length ratio of 6 articles = 1.00 : 0.18 : 0.91 : 0.77 : 1.50 : 1.16.

Abdomen (Fig. 4D) with a pair of appendages, lateral lobes and a dorsal lobe; plumose setae on dorsal lobe missing; penes medial.

Female (DKUAMP202410): Body (Figs. 2B, 4E) about 7.9 mm long; generally as in male, but stouter than male, pereonites 3, 4 with rounded brood pouches.

Gnathopod 2 (Fig. 4F) similar to that of male but each article shorter than those of male.

Abdomen (Fig. 4G) without appendage, with a pair of

Table 1. Morphological characters of *Caprella carinata* and related species.

Characters	Species (male)			
	<i>C. acanthogaster</i>	<i>C. mutica</i>	<i>C. eximia</i>	<i>C. carinata</i>
Body length (mm)	25.0–38.0	17.7–25.0	27.0	11.6–24.5
Antenna 1, peduncular article 3	Widening distally	Widening distally	Straight	Straight
Pereonite 1, anteriorly curved dorsal projection	×	×	×	○
Pereonite 2 and pereopod 2	Without hair	With hair	Without hair	Without hair
Gnathopod 2, poison tooth of propodus	Straight	Straight	Curved	Straight
Pereonites 2–5, lateral projection	○	○	×	○
Distribution	North-Pacific Ocean, South America	Cosmopolitan	Korea, Japan	Korea, Japan
References	Mayer, 1890, 1903; Utinomi, 1943, 1947; McCain & Steinberg, 1970; Vassilenko, 1974; Arimoto, 1976; Martin, 1977; Kim & Lee, 1978; Heo <i>et al.</i> , 2020; Takeuchi <i>et al.</i> , 2022	Scurin, 1935; Ashton <i>et al.</i> , 2007; Peters & Robinson, 2017; Heo <i>et al.</i> , 2020	Mayer, 1890, 1903; Schurin, 1937; Utinomi, 1947; Vassilenko, 1967; Arimoto, 1971, 1976; Kim & Lee, 1975	Arimoto, 1934, 1976; Present study

lateral lobes and a dorsal lobe; with a pair of plumose setae on dorsal lobe.

Remarks. *Caprella carinata* is morphologically similar to *C. acanthogaster* Mayer, 1890, *C. eximia* Mayer, 1890, and *C. mutica* Schurin, 1935, and can be characterized by the following features: (1) pereonites 2–5 with dorsal projections; (2) gnathopod 2 elongate, with propodus bearing a poison tooth and a robust (grasping) seta; (3) gill elongated; and (4) pereopods 5–7, bases with triangular process posterodistally and palms of propodi defined by a pair of midanterior robust (grasping) setae (Mayer, 1890; Arimoto, 1976; Lee and Hong, 2011; Heo *et al.*, 2020). These morphological similarities often lead to misidentification among these species. However, *C. carinata* can be distinguished from these species by the following features: (1) pereonite 1 with anteriorly curved dorsal projection (vs. without dorsal projection on *C. acanthogaster*, *C. eximia*, and *C. mutica*); (2) pereonite 2 and gnathopod 2 without hair (vs. with hair on *C. mutica*); (3) pereonites 2–5 with lateral projections (vs. without lateral projection in *C. eximia*); (4) antenna 1, peduncular articles of equal thickness (vs. peduncular article 3 widening distally in

C. acanthogaster and *C. mutica*); and (5) gnathopod 2, propodus with straight poison tooth (vs. curved poison tooth in *C. eximia*) (see Table 1).

Confusion between *Caprella acanthogaster* and *C. mutica* is common (Arimoto, 1976; Kim and Lee, 1978; Heo *et al.*, 2020), and historical records have also misidentified *C. carinata* as *C. eximia* (Lee and Hong, 2011). Distinguishing these species is particularly challenging in juvenile or female specimens, underscoring the need for refined classification keys and molecular data to clarify the taxonomy of these closely related species.

Distribution. Korea (East Sea), Japan (Yamada Bay, Kuji Bay, Sunosaki to Kinkazan).

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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