

Morphological Redescription of the Rare Caprellid *Protogeton incertus* (Crustacea: Amphipoda: Caprellidae) from Korea

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ABSTRACT

Protogeton incertus Mayer, 1903 belonging to the family Caprellidae was collected from the South Sea, Korea. This species is very similar to *Protogeton inflatus* Mayer, but it is only distinguishable by the presence of biarticulate mandibular palp. Previous studies provided a very brief description of the species and lacked detailed illustration. In this study, the Korean *Protogeton incertus* is fully illustrated based on the mature and immature specimens.

Keywords: Crustacea, Amphipoda, Caprellidae, *Protogeton incertus*, Korea

INTRODUCTION

The genus *Protogeton* Mayer, 1903 is one of the 89 genera belonging to the family Caprellidae (WoRMS Editorial Board, 2016). Among them, the genus *Protogeton* is characterized by having (1) flagellum with 3–5 articles in antenna 2; (2) mandible lacking molar, with uni- or biarticulate palp; (3) pereonites 3–4 with gills; (4) pereopods 3–5 well developed, consisting of 6-articulates; and (5) lacking appendages on the abdomen (Arimoto, 1976). This genus is a taxon with only two species; *P. incertus* Mayer, 1903 and *P. inflatus* Mayer, 1903, which are distributed in the northern Pacific and Indian Ocean regions. *Protogeton incertus* is discernible from *P. inflatus* by the biarticulate mandibular palp and swollen carpus and propodus on pereopod 3 (Guerra-García, 2004). The original description of *P. incertus* by Mayer (1903) was incomplete, with only one illustration for mandibular palp. Later, Arimoto (1980) and Guerra-García (2004) redescribed this species; however, the redescriptions were also brief and not supported by detailed illustrations. Therefore, this time, we provide full description of Korean *Protogeton incertus* including illustrations for mouthparts and appendages and a description of the immature male, especially with the dimorphic character of pereopod 3. Specimens were collected by light trap from the shallow and sublittoral

waters in Korea (Fig. 1) and were deposited in the National Institute of Biological Resources (NIBR), Incheon, Korea and Dankook University (DKU), Cheonan, Korea.

SYSTEMATIC ACCOUNTS

Order Amphipoda Latreille, 1816

Family Caprellidae Leach, 1814

¹*Genus *Protogeton* Mayer, 1903

²**Protogeton incertus* Mayer, 1903 (Figs. 2–4)

Protogeton incertus Mayer, 1903: 29, Pl. 9, fig. 12; Arimoto, 1980: 101, fig. 3; Guerra-García, 2004: 161, fig. 2.

Material examined. Korea, 1♂: Jeollanam-do: Yeosu-si, Samsan-myeon, Seodo-ri, Seodo Port, 34°03'01"N, 127°17'53"E, 17 Apr 2009, Kim YH; 1♂, Yeosu-si, Dolsan-eup, Yulrim-ri, Impo Port, 34°35'35"N, 127°48'27"E, 23 Jun 2011, Kim NH, Hong SS; 4♂♂, 1 Juv.♂, Yeosu-si, Samsan-myeon, Geomun-ri, Geomun Port, 34°01'38"N, 127°18'30"E, 30 May 2014, Hong SS, Kim SH.

Description. Male (cat No. NIBRIV0000416866): Body (Figs. 2, 3A) slender, 12.0 mm long. Head smooth without process. Eye large, round. Pereonite 1 fused with head, su-

Korean name: ¹*두아가미원시바다대벌레속, ²*두마디원시바다대벌레



Fig. 1. Collecting sites of *Protogeton incertus* in this study. A, Seodo Port and Geomun Port, Geomundo Island, Yeosu-si; B, Impo Port, Dolsan-eup, Yeosu-si, Korea.

ture not present. Pereon slender, smooth; pereonites 3–4 with 6-articulate appendages and gills; length ratio of pereonites 2–7 = 1.00 : 1.44 : 1.69 : 1.69 : 0.62 : 0.50.

Antenna 1 (Fig. 3B) $0.78 \times$ body; length ratio of peduncular articles 1–3 = 1.00 : 1.67 : 0.80; flagellum 22-articulate, $1.24 \times$ peduncle, each article with 1 aesthetasc ventrodistally.

Antenna 2 (Fig. 3C) setose, much shorter than antenna 1; length ratio of peduncular articles 3–5 = 1.00 : 3.77 : 3.38; flagellum triarticulate, $0.49 \times$ peduncular articles 3–5.

Upper lip (Fig. 3D) rounded, notched midventrally.

Lower lip (Fig. 3E) well developed, inner and outer lobes with patch of pubescence apically.

Left mandible (Fig. 3F) incisor 6-teethed, lacinia mobilis well developed, 5-teethed, setal row with 7 setae, followed by 4 plates, lacking molar; mandibular palp slender, biarticulate, article 1 with 2 long simple setae distally, article 2 about $0.7 \times$ article 1, with 1 long simple seta apically and 11 short setae subdistally.

Right mandible (Fig. 3G) similar to left one, except incisor 6-teethed, lacking lacinia mobilis and setal row with 5 setae.

Maxilla 1 (Fig. 3H) inner plate absent; outer plate with 6 stout setal teeth (5 serrate and 1 simple) apically; palp biarticulate, distal article elongate, $2.78 \times$ proximal article.

Maxilla 2 (Fig. 3I) inner plate with 3 apical and 2 subapical setae; outer plate subequal to inner one, with 5 simple setae apically.

Maxilliped (Fig. 3J) inner plates fused with suture, subrectangular, serrate distally, with 2 robust nodular setae apicomediaally; outer plate serrate distally, with 5 medial setae;

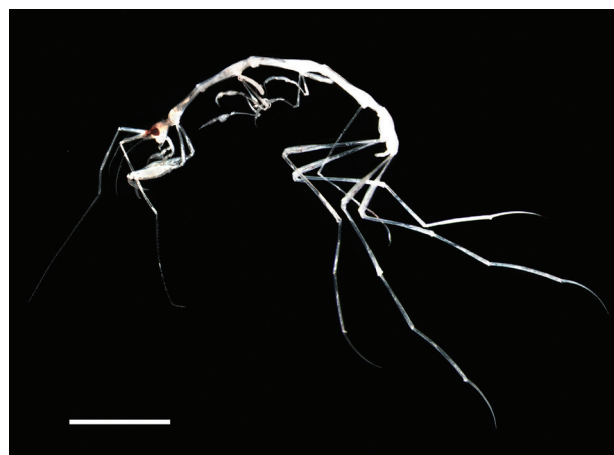


Fig. 2. *Protogeton incertus* Mayer, 1903. Mature male, 11.7 mm. Scale bar = 2.0 mm.

palp massive, 4 articulate, article 2 longest, with simple setae medially.

Gnathopod 1 (Fig. 3K) merus with pubescence and 9 simple setae midposteriorly; carpus subrectangular, setose, posterior margin pubescent; propodus subtriangular, widening distally, covered with patch of pubescence dorsally, palm slightly convex, with stout setae, proximal projection conspicuously provided; dactylus falcate, fitting palm; length ratio of 6 articles = 1.00 : 0.21 : 0.25 : 0.68 : 0.65 : 0.54.

Gnathopod 2 (Fig. 4A) long and slender; propodus longish elliptical, width $0.23 \times$ length, palm longer than posterior margin, with simple setae on palmar margin; dactylus fitting palm; length ratio of 6 articles = 1.00 : 0.10 : 0.26 : 0.10 : 1.06 : 0.71.

Pereopod 3 (Fig. 4B) $2.35 \times$ pereonite 3; basis to merus slender; carpus, propodus, and dactylus roundly swollen generally; length ratio of 6 articles = 1.00 : 0.09 : 0.86 : 0.40 : 0.28 : 0.28.

Pereopod 4 (Fig. 4C) $1.38 \times$ pereonite 4; similar to pereopod 3, but carpus, propodus and dactylus not swollen; carpus with 1 ventral stout seta; length ratio of 6 articles = 1.00 : 0.12 : 0.61 : 0.49 : 0.46 : 0.44.

Pereopod 5 (Fig. 4D) slender, elongate, 6-articulate; $2.89 \times$ pereonite 5; length ratio of 6 articles = 1.00 : 0.05 : 0.58 : 0.40 : 0.22 : 0.08.

Pereopod 6 (Fig. 4E) slender, elongate, 6-articulate, $10.8 \times$ pereonite 6; length ratio of 6 articles = 1.00 : 0.06 : 0.84 : 0.49 : 0.58 : 0.57.

Pereopod 7 (Fig. 4F) slender, elongate, 6-articulate, $15.2 \times$ pereonite 7; length ratio of 6 articles = 1.00 : 0.09 : 1.09 : 0.86 : 1.16 : 0.98.

Penes (Fig. 4G) cylindrical, situated medially, width $0.4 \times$ length.

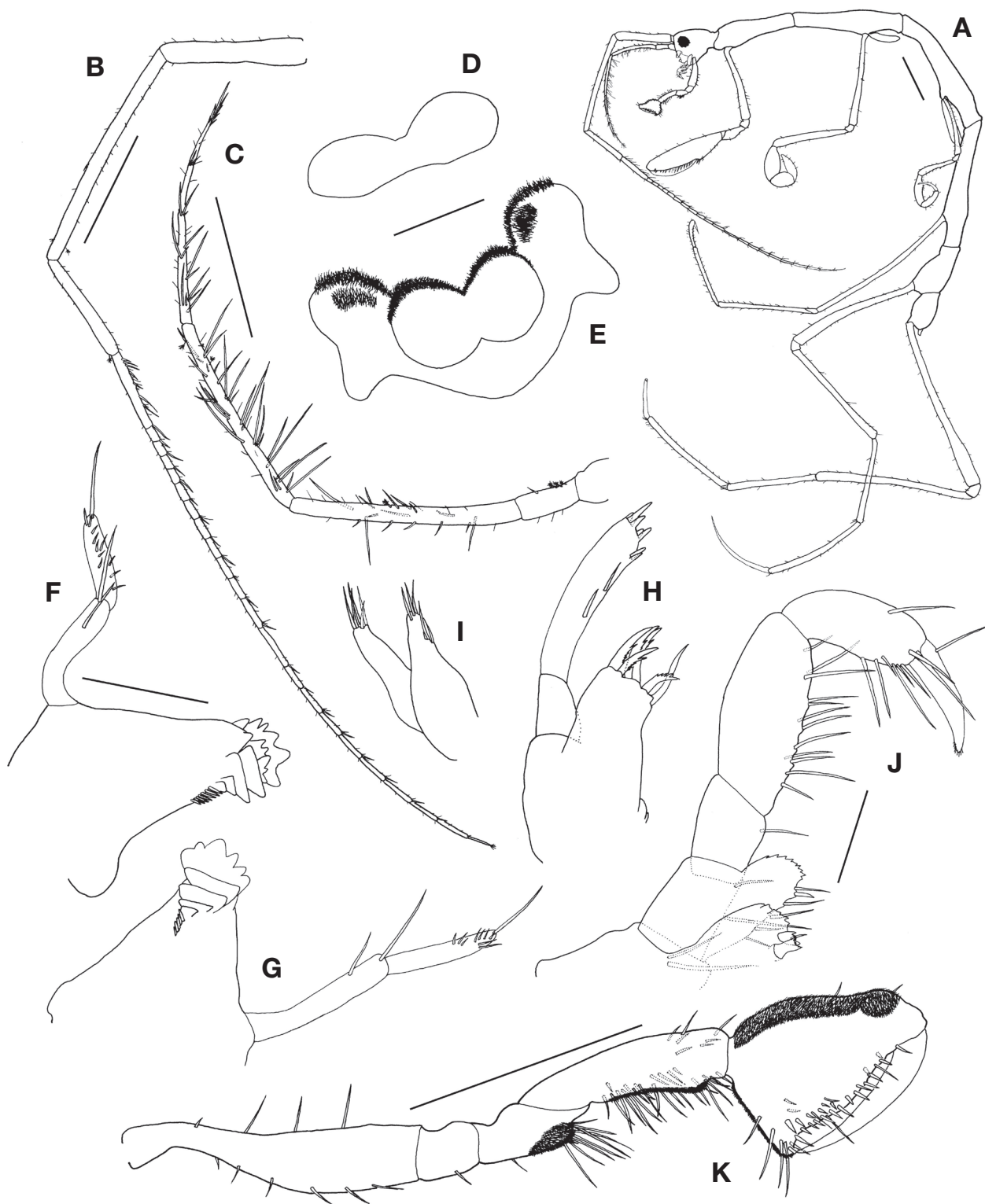


Fig. 3. *Protogeton incertus* Mayer, 1903, mature male, 12.0 mm. A, Habitus, lateral; B, Antenna 1; C, Antenna 2; D, Upper lip; E, Lower lip; F, Left mandible; G, Right mandible; H, Maxilla 1; I, Maxilla 2; J, Maxilliped; K, Gnathopod 1. Scale bars: A, B=1.0 mm, C, K=0.6 mm, D-J=0.1 mm.

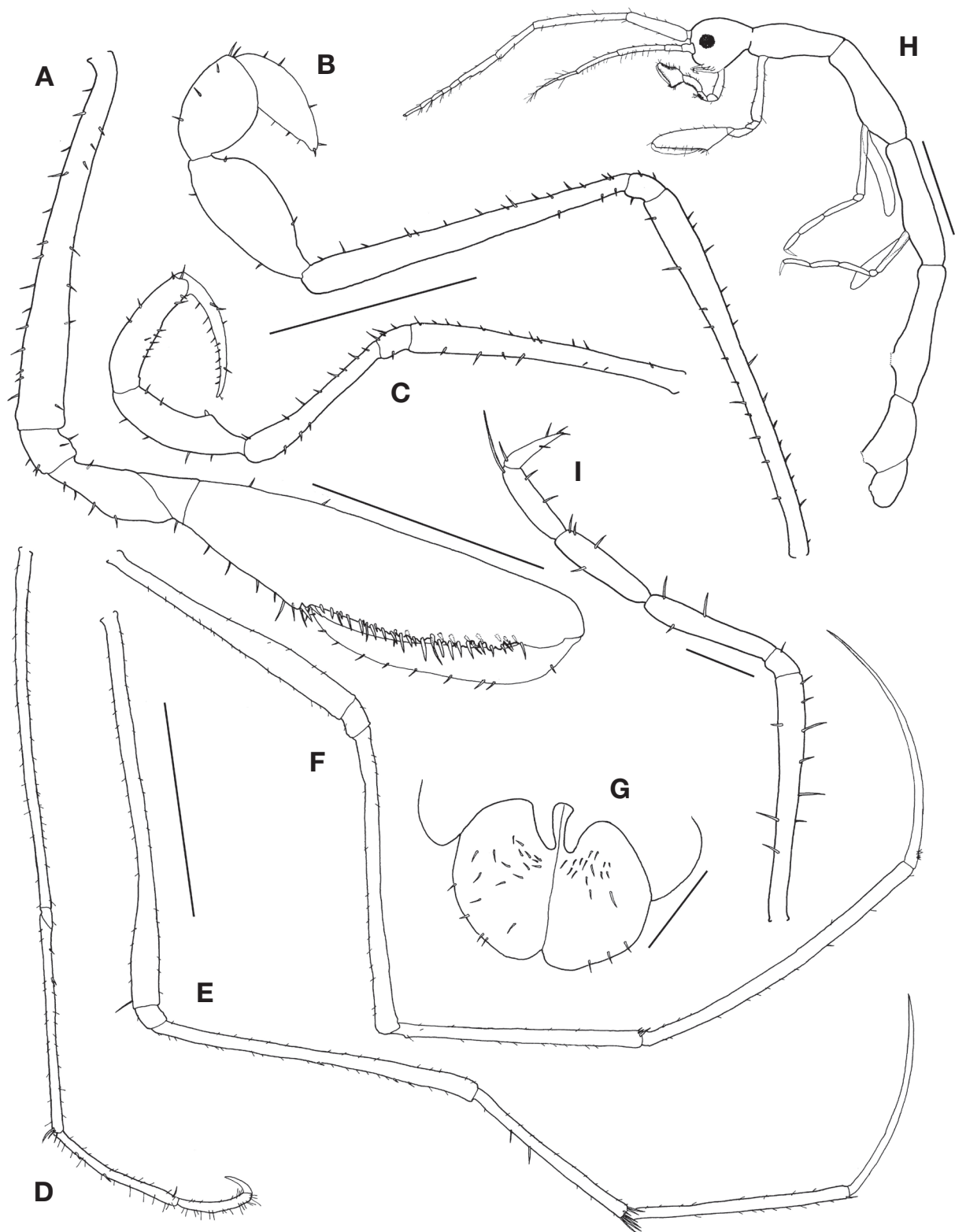


Fig. 4. *Protogeton incertus* Mayer, 1903, mature male, 12.0 mm. A, Gnathopod 2; B, Pereopod 3; C, Pereopod 4; D, Pereopod 5; E, Pereopod 6; F, Pereopod 7; G, Abdomen and pennes. Immature male, 6.5 mm; H, Habitus, lateral; I, Pereopod 3. Scale bars: A-C, H=1.0 mm, D-F=2.0 mm, G=0.1 mm, I=0.2 mm.

Abdomen (Fig. 4G) lacking appendages.

Immature male (cat No. NIBRIV0000416867): Body (Fig. 4H) 6.5 mm long. Body form general as in mature male; length ratio of pereonites 2–7 = 1.00 : 1.28 : 1.50 : 1.55 : 0.78 : 0.50.

Pereopod 3 (Fig. 4I) slender, differs from that of mature male; $1.33 \times$ pereonite 3; carpus, propodus and dactylus not swelled; length ratio of 6 articles = 1.00 : 0.09 : 0.54 : 0.44 : 0.34 : 0.26.

Distribution. Chuen Island, Thailand (Mayer, 1903; McCain and Steinberg, 1970), East China Sea, Korean Straits, East Jeju Island, Western Goto Islands (Arimoto, 1980), Phuket (Guerra-García, 2004).

Remarks. The genus *Protogeton* is a taxon with only two species distributed in the northern Pacific and Indian Ocean regions; *P. incertus* Mayer, 1903 and *P. inflatus* Mayer, 1903. *Protogeton incertus* is very similar to *P. inflatus* and the congeneric characteristics are as follows: (1) mandible lacking molar, palp uni- or biarticulate; (2) gnathopod 1, propodus subtriangular; (3) gnathopod 2 long and slender, propodus longish elliptical; (4) pereonites 3–4 with gills; (5) pereopods 3–4 consisting of 6-articulates; and (6) lacking appendages on the abdomen (Mayer, 1903; Arimoto, 1976). However, *P. incertus* is clearly distinguished from *P. inflatus* by the presence of biarticulate mandibular palp (Mayer, 1903; Guerra-García, 2004) and slender pereopod 3 (Guerra-García, 2004). Our immature specimens are in good agreement with the previous descriptions of Mayer (1903) and Guerra-García (2004), with respect to biarticulate mandibular palp and slender pereopod 3. On the contrary, our mature male specimens had swollen carpus, propodus and dactylus on pereopod 3, similar to *P. inflatus*. This difference in characteristics of pereopod 3 might be considered an intraspecific variation according to the growth stage, and

not an interspecific variation.

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