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Short communication

Description of *Janiralata sagamiensis* (Isopoda, Asellota, Janiridae) from Korean Waters

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ABSTRACT

Janirid isopod, *Janiralata sagamiensis* Shimomura, 2006 is newly reported from Korean waters. This species can be distinguishable from its congeners by the following characteristics: the cephalon has a distinct anterolateral projection on the anterolateral margin; the frontal margin of the cephalon is lacking rostrum; the coxal plates are visible in dorsal view; the pleotelson is rounded distally without a posterolateral point; the first pleopod of the male has a pair of protrusions distally; the third pleopodal exopod is lacking plumose setae. In this paper, the detailed description and illustrations of the species are provided with a key to known *Janiralata* species in the surrounding waters of Korea, including China and Japan.

Keywords: *Janiralata*, Janiridae, isopods, morphology, Korea

INTRODUCTION

The *Janiralata* Menzies, 1951, comprising 32 species, is the third largest genus after the *Jaera* Leach, 1814 and *Janira* Leach, 1814 among 30 genera of the family Janiridae G. O. Sars, 1897 (Boyko et al., 2008). In the taxonomy of the Janiridae, it can be distinguished from other genera by the following features: the lateral margins of pereonites 2 and 3 are bi-lobed by a deep or broad cleft; coxal plate 1 is visible on the anterolateral margin of pereonite 1; the second mandibular palp article has a row of the small setae between the two larger denticulate setae; the propodus of pereopod 1 has a serrated margin proximoventrally; the distal region of pleopod 1 is laterally expanded (Menzies, 1951; Kussakin, 1962, 1988; Brandt, 1993; Wilson and Wägele, 1994; Shimomura, 2006).

All the *Janiralata* species have been reported from the northern hemisphere, especially showing limited geographical distributions within the northern Pacific (Krøyer, 1847; Richardson, 1899, 1905; Thielemann, 1910; Gurjanova, 1933; Menzies, 1951; Kussakin, 1962, 1972, 1988; Birstein, 1970; Jang, 1991; Brandt, 1993; Wilson and Wägele, 1994; Shimomura, 2006). In the surrounding waters of Korea, four *Janiralata* species have been known, including single record from Korea: *J. chuni* (Thielemann, 1910) from Japan; *J. koreaensis* Jang, 1991 from Korea; *J. sagamiensis* Shimomura, 2006 from Japan; *J. shiinoi* Kussakin, 1962 from the East China Sea (Thielemann, 1910; Kussakin, 1962; Jang, 1991; Shimomura, 2006). In this study, we report *J. sagamiensis* previously reported from only Japan as the second record of the genus from Korea with detailed description and illustrations. We also provide a key to known *Janiralata* species in the surrounding waters of Korea, including China and Japan.

The materials of *J. sagamiensis* were collected from the subtidal zone of Korean waters by SCUBA diving and using Smith-McIntyre grab. The collected materials were immediately fixed in 95% ethanol and transferred to the laboratory. The observation and dissection were carried out under a dissecting microscope (SZH-ILLD; Olympus, Japan) and light microscope (BX 50; Olympus). Measurements and drawings were performed with the aid of a drawing tube. Ratios described in this study were based on the illustrations. The ratios of the length to width of the body, cephalon, and pleotelson were calculated based on their maximum length and width. The drawings were digitally inked and arranged in accor-

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dance with Coleman (2003, 2009). The examined materials were moved into the glass vials filled with 95% ethanol and then deposited at the National Institute of Biological Resource (NIBR) and Chosun University in Korea.

SYSTEMATIC ACCOUNTS

Order Isopoda Latreille, 1817
Suborder Asellota Latreille, 1802
Family Janiridae G.O. Sars, 1897
Genus *Janiralata* Menzies, 1951

[1]**Janiralata sagamiensis* Shimomura, 2006 (Figs. 1–4)

Janiralata sagamiensis Shimomura, 2006: 51, figs. 4–9.

Material examined. Korea: 1♂, 1♀ (both specimens dissected and figured), Jeju-do: Jeju-si, Chuja-myeon, Chujado Island, 33°58′52″N, 126°19′33″E, 24 Oct 2018, 30 m, Smith-McIntyre grab, NIBRIV0000869428; 1♂, 1♀, the same location as previous, 17 Apr 2019; 2♀♀, 33°55′24″N, 126°19′17″E, 17 Apr 2019, 30 m, Smith-McIntyre grab; 1♂, 1♀, Gyeongsangbuk-do: Ulleung-gun, Ulleung-eup, Jukdo Island, 37°31′51″N, 130°56′11″E, 22 May 2019, 10 m, SCUBA diving.

Description of male. Body (Fig. 1A) 2.9 mm, 2.5 times longer than wide, dorsoventrally flattened; dorsal surface smooth, with dark brown pigments and few setae, lacking ornamentation; lateral margins parallel, with short simple setae. Cephalon oblong, 1.9 times wider than long; frontal margin slightly convex, without rostrum; anterolateral margin with anteriorly extending projection; eye large and dorsally bulging, composed of ommatidia. Pereonites (Fig. 1B) compact; lateral margin of pereonites 1 and 4 subacute, pereonites 2 and 3 bi-lobed, and pereonites 5–7 rounded; posterior margins of pereonites 1–3 convex, pereonite 4 almost straight, and pereonites 5–7 concave. Coxal plates visible in dorsal view; coxal plate 1 triangular, acute distally; coxal plates of pereonites 2 and 3 bi-lobed, whereas pereonites 5–7 non-lobed; coxal plates 2 and 3 similar in length, while anterior lobe of coxal plate 2 slightly bigger than posterior lobe; coxal plate 4 bi-lobed with anterior lobe almost twice longer than posterior lobe; coxal plate 7 slightly visible dorsally. Pleon (Fig. 1A, C) consisting of 1 free pleonite and pleotelson; pleotelson almost globular, 1.3 times longer than wide, with short simple setae on lateral margin, slightly concave posteriorly, and rounded distally without a posterolateral point.

Antennula (Fig. 1D) consisting of 4 peduncular articles and 11 flagellar articles; peduncular article 1 globular to oblong, with 1 simple seta laterally and 1 penicillate seta distally; article 2 oblong, about 0.6 times as long as article 1, slender, with 1 simple seta laterally, 5 simple setae and 3 penicillate setae distally; article 3 similar to article 2 in length, with 4 simple setae on distal end; article 4 about 0.4 times as long as article 3, with 2 simple setae; flagellar articles consecutively shorter; flagellar articles 3–10 with 1 aesthetasc distally; article 11 with 3 aesthetascs and 5 simple setae on distal end. Antenna (Fig. 1E) as long as body length, composed of 6 peduncular articles and 61 flagellar articles; peduncular articles 1 and 2 subequal in length, with 1 robust seta on distal end; article 3 2.5 times longer than article 2, with 2 robust setae and distinct scale laterally; article 4 0.3 times as long as article 3, with 1 robust seta and 1 simple seta on distal angle; article 5 about 8 times longer than article 4, with 5 robust setae and 6 simple setae on both lateral margins; article 6 1.3 times longer than article 5, with 2 penicillate setae and 4 simple setae; flagellar articles oblong, sequentially smaller, with several short simple setae on distal end.

Mandibles (Fig. 1F, G) asymmetrical; molar process serrated distally; palp composed of 3 articles; articles 1 and 3 similar to each other in length; article 2 1.3 times longer than article 1. Left mandible (Fig. 1F), incisor and lacinia with 4 cusps respectively; setal row with 5 denticulate setae; molar process with 4 simple setae distally; palp article 1 with 1 simple seta distally; articles 2 and 3 with 5 and 13 serrate setae on outer margin, respectively. Right mandible (Fig. 1G), incisor with 5 cusps; lacinia absent; setal row with 10 denticulate setae; molar process with 6 simple setae distally; palp article 1 with 1 simple seta distally; article 2 with 5 serrate setae on outer margin; article 3 with 27 serrate setae along with outer margin. Maxillula (Fig. 1H) consisting of 2 lobes; inner lobe with 3 serrate setae distally; outer lobe with 12 denticulate setae on distal end. Maxilla (Fig. 1I) composed of 3 lobes; inner lobe with 2 serrate setae, 2 denticulate setae, and 4 simple setae on distal end; mesial and outer lobes with 3 simple setae respectively. Maxilliped (Fig. 1J), endite reaching to proximal end of palp article 3, truncated distally, with 3 coupling hooks laterally, 7 plumose setae and 13 simple setae distally; palp with numerous simple setae, consisting of 5 articles; articles 4 and 5 much slender than articles 1–3; epipod triangular, extending to palp article 2, tapering distally; apex subacute.

Pereopods (Fig. 2A–G) slender; carpus elongated; dactylus short. Pereopod 1 (Fig. 2A), basis elongated oval, with 3 robust setae laterally and distally; ischium 0.8 times as long as basis, with 5 robust setae on anterior margin and 1 robust seta on posterodistal angle; merus 0.6 times as long as ischium, with 4 robust setae on anterior margin, 1 robust seta and 3 simple setae on posterior margin; carpus elongated elliptical, slightly swollen, 2.6 times longer than merus, with 2 robust setae and

Korean name: [1]*볼뿔두갈래바다좀 (신칭)

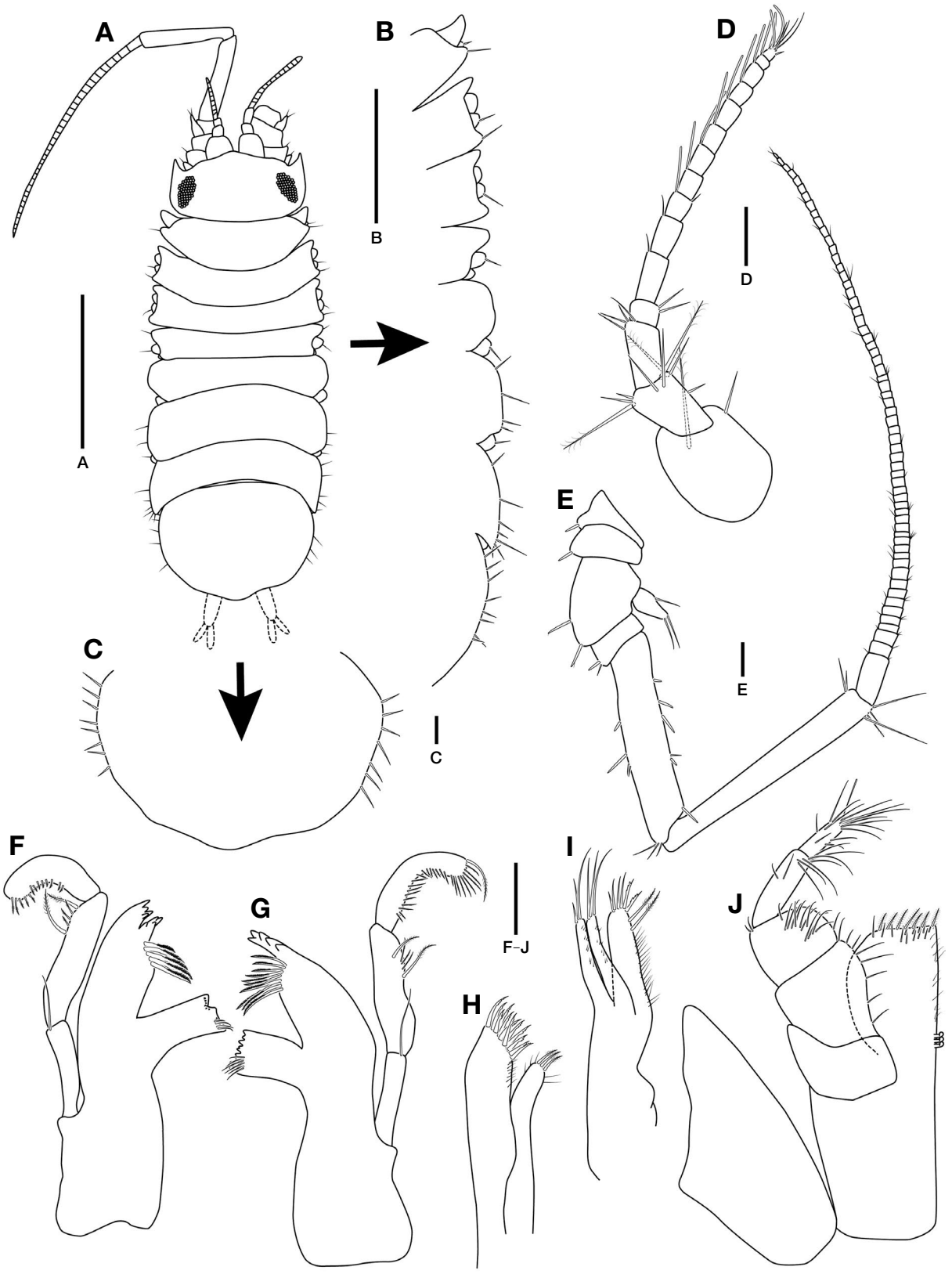

Fig. 1. *Janiralata sagamiensis*, male. A, Habitus; B, Lateral margin of habitus; C, Pleotelson; D, Antennula; E, Antenna; F, Left mandible; G, Right mandible; H, Maxillula; I, Maxilla; J, Maxilliped. Scale bars: A = 1 mm, B = 0.5 mm, C–J = 0.1 mm.

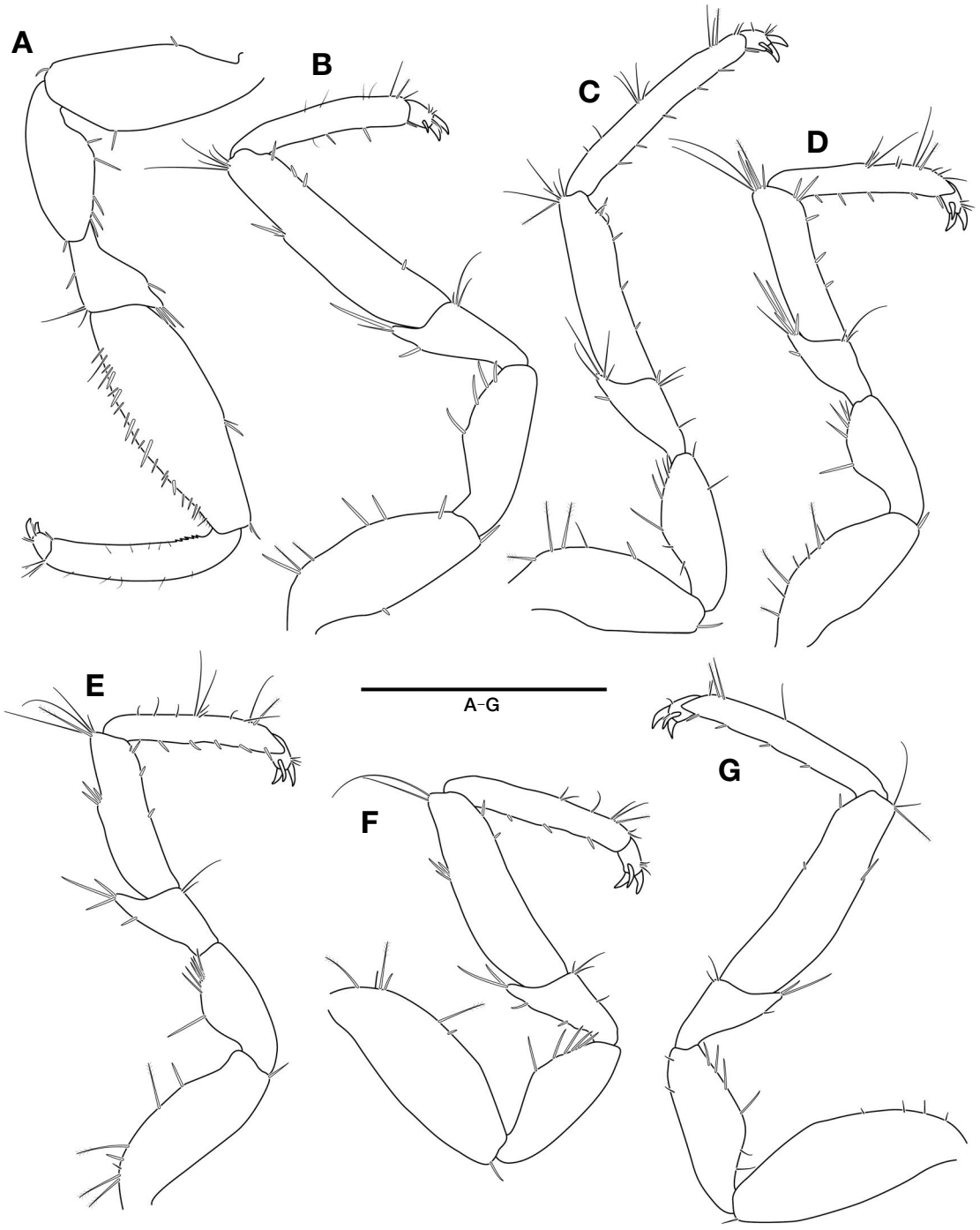

Fig. 2. *Janiralata sagamiensis*, male. A, Pereopod 1; B, Pereopod 2; C, Pereopod 3; D, Pereopod 4; E, Pereopod 5; F, Pereopod 6; G, Pereopod 7. Scale bar: A–G = 0.5 mm.

2 simple setae on anterior margin and 18 robust setae along with posterior margin; propodus 0.7 times as long as carpus, with a row of 5 serration proximally on posterior margin, 1 robust seta and 4 simple setae on distal end; dactylus with 2 claws and 4 simple setae distally. Pereopods 2–7 (Fig. 2B–G) resemble each other; basis elongated elliptical, with penicillate setae and robust setae on anterior margin and 1 robust seta on posterodistal angle; ischium slightly shorter than basis, with robust setae or simple setae on anterior margin; merus triangular, extending anterodistally, shorter than ischium, with

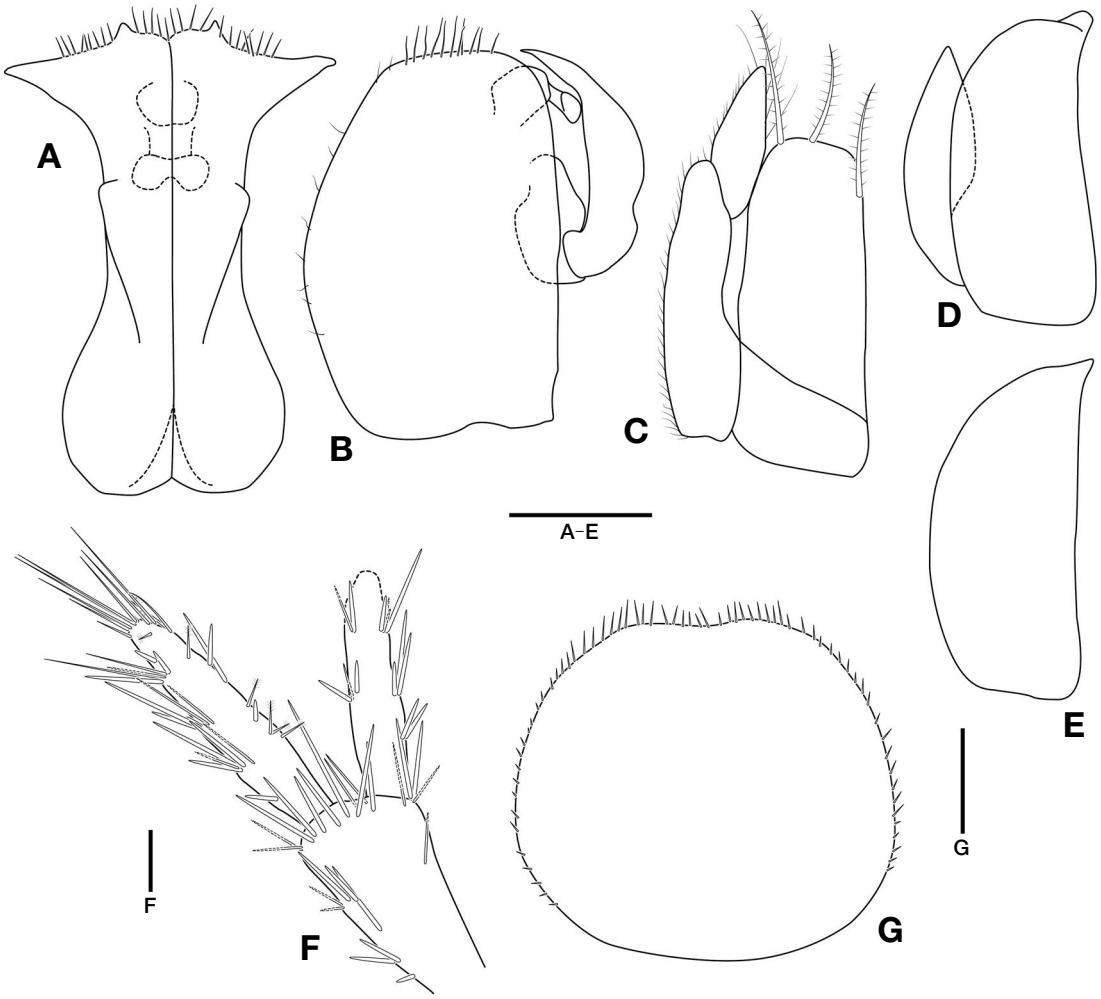

Fig. 3. *Janiralata sagamiensis*, male (A–F) and female (G). A, Pleopod 1; B, Pleopod 2; C, Pleopod 3; D, Pleopod 4; E, Pleopod 5; F, Uropod; G, Pleopod 2. Scale bars: A–G = 0.2 mm.

robust setae on posterodistal margin and simple setae on anterodistal end; carpus longer than merus, with penicillate setae, robust setae, and simple setae on both lateral margins; propodus similar to carpus in length, with robust setae along with posterior margin, penicillate setae and simple setae on anterior margin; dactylus with 3 claws and simple setae distally.

Pleopod 1 (Fig. 3A) 1.4 times longer than greatest width; lateral margin concave; apex extending laterally, with a pair of protrusions and several simple setae on distal margin; extended lateral region of apex occasionally rolled distally. Pleopod 2 (Fig. 3B), protopod globular to oblong, with 11 simple setae distally; endopod located at 0.6 length of protopod proximally; exopod curved inwardly; appendix masculina tapering distally, curved, and extending beyond distal end of protopod. Pleopod 3 (Fig. 3C), rami 2-articled; endopod rectangular, wider than exopod, with 3 plumose setae distally; exopod slender, longer than endopod, with fine setae on border, and without plumose setae. Pleopod 4 (Fig. 3D), rami with subacute apex; endopod 1.3 times longer than exopod. Pleopod 5 (Fig. 3E) without exopod, 2.3 times longer than greatest width; apex subacute.

Uropod (Fig. 3F) with numerous robust setae, protopod triangular to rectangular, 1.8 times longer than greatest width, narrowing proximally; rami elongated oblong to oval, with rounded end; endopod with 6 penicillate setae laterally and several simple setae distally.

Description of female. Female similar to male except for pleopod 2. Pleopod 2 (Fig. 3G) globular, with simple setae on border; distal end concave.

Variations. Several variations according to the individuals were observed from the Korean materials (Fig. 4). The shapes of the coxal plates in dorsal view were varied according to the individuals (Figs. 1A, 4A). This variation might be caused by altering the position of pereopods according to the poses of individuals. It was especially remarkable in coxal plates 2

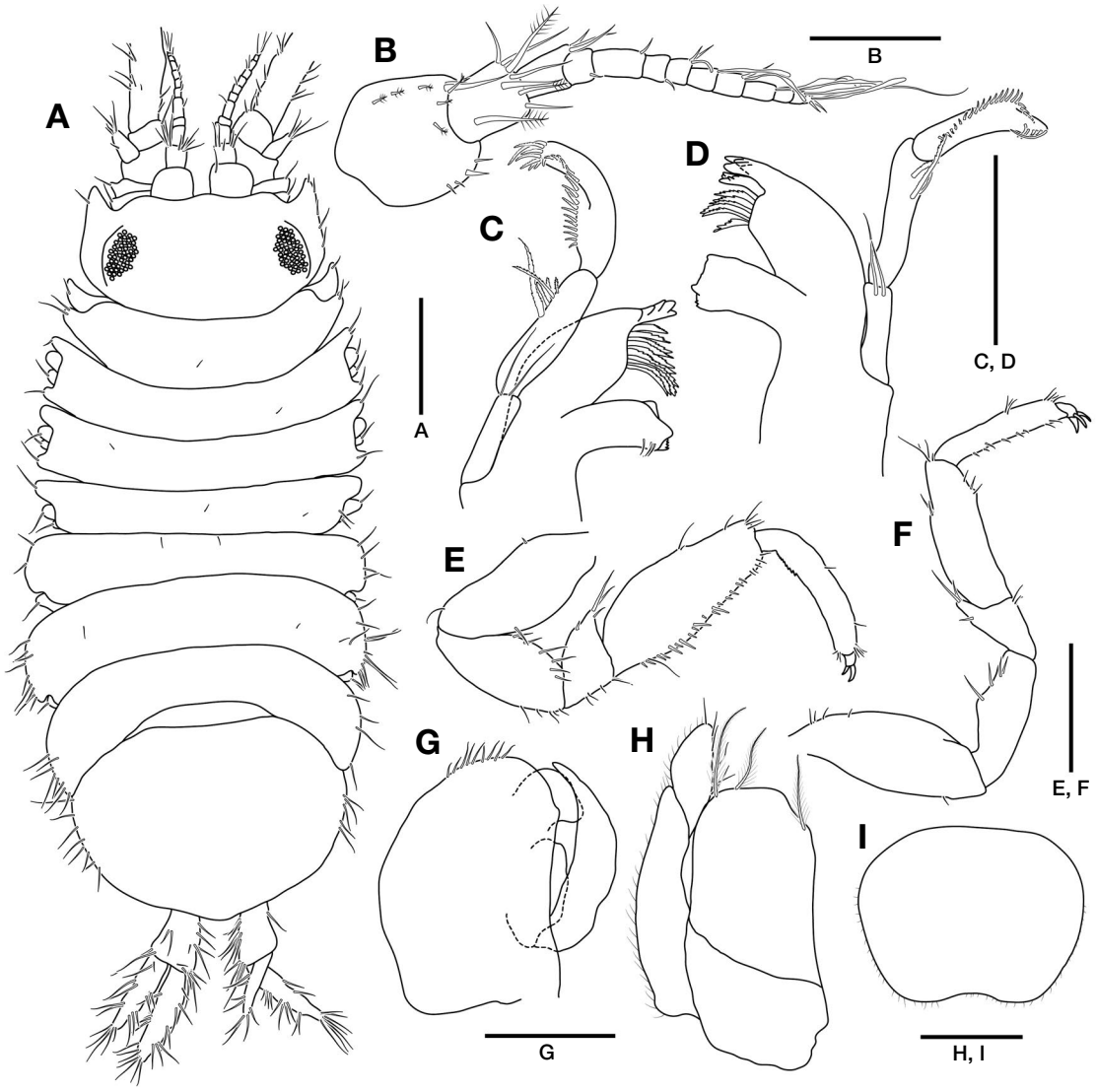

Fig. 4. *Janiralata sagamiensis*, male (A–H) and female (I). A, Habitus; B, Antennula; C, Right mandible; D, Left mandible; E, Pereopod 1; F, Pereopod 7; G, Pleopod 2; H, Pleopod 3; I, Pleopod 2. Scale bars: A, E, F = 0.5 mm, B–D, G–I = 0.2 mm.

and 3. The length ratio of article 2 to article 3 in the antennula was also variable according to the individuals, article 2 was slightly longer than article 3 or subequal to each other (Figs. 1D, 4B). Although the variation was not observed frequently, the second mandibular article occasionally had a different number of serrate setae (Fig. 4C, D). The number of the distal simple setae on the protopod of pleopod 2 is varied according to the individuals (Figs. 3B, 4G). The length to width ratio of the endopod of pleopod 3 was also varied according to the individuals, ranging from 1.1 to 2.3 (Figs. 3C, 4H). In female, the distally concave degree of pleopod 2 was variable according to the individuals (Figs. 3G, 4I). However, there were no variations found according to the localities.

Distribution. Korea (Present study), Japan.

Remarks. Wilson and Wägele (1994) divided the *Janiralata* species into four groups: (1) A group, the rostrum is reduced; the pleotelson is rounded distally; (2) B group, the rostrum is present; the pleotelson has shallow concavities distally; (3) C group, the rostrum is present or reduced; the pleotelson has posterolateral points and concavity distally; (4) D group, the anterior lobe of coxal plates 2–4 is twice longer than posterior lobe; the exopod of pleopod 3 has plumose setae. According to Wilson and Wägele (1994), *J. sagamiensis* can be classified as a member of the A group with five species, *J. koreaensis* Jang, 1991, *J. microphthalma* Kussakin, 1972, *J. modesta* Mezhov, 1981, *J. obliterata* Kussakin, 1972, and *J. rajata*

Menzies, 1951, in having the reduced or lacking rostrum, the distally rounded pleotelson, and the third pleopodal exopod lacking plumose setae. However, *J. sagamiensis* can be easily distinguished from other five species of the A group by having a large and distinct anterolateral projection on the cephalon (vs. lacking in the latter) (Menzies, 1951; Kussakin, 1972, 1988; Wilson and Wägele, 1994; Shimomura, 2006). *Janiralata sagamiensis* resembles *J. chuni* (Thielemann, 1910), *J. davisi* Menzies, 1951, and *J. shiinoi* Kussakin, 1962 in that the pleotelson is rounded distally, but the former differs from the latter by having the third pleopodal exopod lacking plumose setae (vs. having the third pleopodal exopod bearing plumose setae in the latter) (Thielemann, 1910; Menzies, 1951; Kussakin, 1962; Wilson and Wägele, 1994; Shimomura, 2006).

The Korean materials of *J. sagamiensis* are generally well accorded with the original description in the following characteristics: (1) the cephalon has anteriorly extending projection on the anterolateral margin; (2) the frontal margin of cephalon is lacking rostrum; (3) the pleotelson has a round and slightly concave distal end without a posterolateral point; (4) the distal end of pleopod 1 in male has lateral extension and a pair of protrusions; (5) the third pleopodal exopod is lacking plumose setae (Shimomura, 2006). The Korean materials have a few minor differences from the Japanese materials of the original description: (1) the Korean materials have more setae in mandibular article 2 than the Japanese materials; (2) the outermost plumose seta of the endopod of pleopod 3 is longest in the Korean materials, whereas it is shortest in the original description (Shimomura, 2006). While the Korean materials shows a variation in the number of setae on the second mandibular article according to the individuals. In addition, 32 *Janiralata* species have been traditionally distinguished from each other mainly based on the morphological appearance of the body and appendages, rather than on the number of setae (Kussakin, 1962, 1988; Wilson and Wägele, 1994; Shimomura, 2006). So, it is hard that these regional materials of Korea and Japan can be discriminated into different species based on the minor differences mentioned above. These differences seem to be the variations according to the regional populations.

Key to known *Janiralata* species in the surrounding waters of Korea, including China and Japan

1. Cephalon without anteriorly extending projection on anterolateral margin ····· *J. koreaensis*
− Cephalon with anteriorly extending projection on anterolateral margin ····· 2
2. Exopod of pleopod 3 without plumose setae ····· *J. sagamiensis*
− Exopod of pleopod 3 with plumose setae ····· 3
3. Anterolateral projection of cephalon blunt distally ····· *J. chuni*
− Anterolateral projection of cephalon acute or subacute distally ····· *J. shiinoi*

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CONFLICTS OF INTEREST

Seong Myeong Yoon, a contributing editor of the Animal Systematics, Evolution and Diversity, was not involved in the editorial evaluation or decision to publish this article. All remaining authors have declared no conflicts of interest.

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