

A New Species of the Genus *Dimorphostylis* (Cumacea, Diastylidae) from Korea

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Key Words:

Cumacea
Diastylidae
Dimorphostylis n. sp.
Korea

A new species, *Dimorphostylis namhaedoensis* (Cumacea, Diastylidae) is described on the basis of the specimens collected from southern shallow coast of Korean peninsula. The new species resembles four other species, *D. asiatica*, *D. valida*, *D. hisuta* and *D. acroplicata*, in having three apical spines on the terminal margin of the male telson and three pairs of the oblique ridges on the carapace, but are obviously distinguished from them in that the pattern of the ridges on the carapace is different and the third article of the antennular peduncle is very long in female. Furthermore, the dorsal carina of the female carapace has a row of forward spines and among the three apical spines of male telson, the median spine is much smaller than the lateral ones.

Since the genus *Dimorphostylis* was firstly established for *D. asiatica* from Japanese waters (Zimmer, 1920), 25 species have been reported over the world to date, including most recent record of a new species, *D. maledivensis*, from the Maldives of Indian Ocean (Băcescu, 1992; Mühlenhardt-Siegel, 1996). Of these, five species have been recorded from Korean waters (Kang & Lee, 1995; Hong et al., 1998): *D. asiatica*, *D. valida*, *D. acroplicata*, *D. brevicaudata* and *D. hisuta*.

Through examination of the cumacean specimens collected from southern shallow coast of Korean peninsula, we described a new species, *Dimorphostylis namhaedoensis* n. sp., in the present paper. Drawings and measurements were performed with the aid of a drawing tube. Measurements of body lengths were made from the anterior tip of carapace to the last abdominal segment, and those of appendages were made along the mid-line of segment, excluding the inflated outer angle.

Description of species

Order Cumacea Kröyer, 1846
Family Diastylidae Bate, 1856
Genus *Dimorphostylis* Zimmer, 1921

Dimorphostylis namhaedoensis n. sp.
(Figs. 1-7)

Type specimens: 95 ♀♀, 110 ♂♂, Chamyon-ri,

Namhaedo Is. (34° 54' N, 127° 51' E), 29 June 1998. Holotype (♀, Cum. 02) and paratypes (57 ♀♀, Cum. 02-1; 69 ♂♂, Cum. 02-2) are deposited in the National History Museum of Hannam University, and the remaining paratypes (including dissected 4 females and 5 males) in the collection of the authors.

Adult female: Body length (Figs. 1A, C) 4.1-4.6 mm, excluding telson and uropod; its integument covered with minute net-like patterns. Carapace (Figs. 1A, B, D) slightly shorter than 1/3 of body length, about 1.25 times as long as its width, twice as long as its depth; with 1 pair of small spines on ocular lobe, about 10 spines (other specimens 12-14 spines) on dorsal carina of frontal lobe; with 1 pair of frontal ridges, 3 pairs of oblique ridges (anterior, middle and posterior) finely serrated on each side. Frontal ridge connected with each other by transverse ridge lying in middle portion of frontal lobe. Anterior oblique ridge beginning at front portion of frontal ridge, running upward and turning abruptly forward to merge with dorsal median carina. Anterior ridge with 1 small branch directing downward at anterior turning point on side of frontal lobe. Middle and posterior oblique ridges almost parallel with anterior ridge. Middle ridge beginning at slight distance behind antero-lateral angle, running upward and turning abruptly forward to merge with anterior ridge, not connecting with submedian carina. Posterior ridge beginning near anterior part of middle ridge, running upward and not connecting with middle ridge and submedian carina. Dorsal groove formed on postero-medial surface of carapace. Antennal notch and antero-lateral angle prominent. Antero-lateral margin serrated. Pseudorostral lobe slightly longer than 2.5

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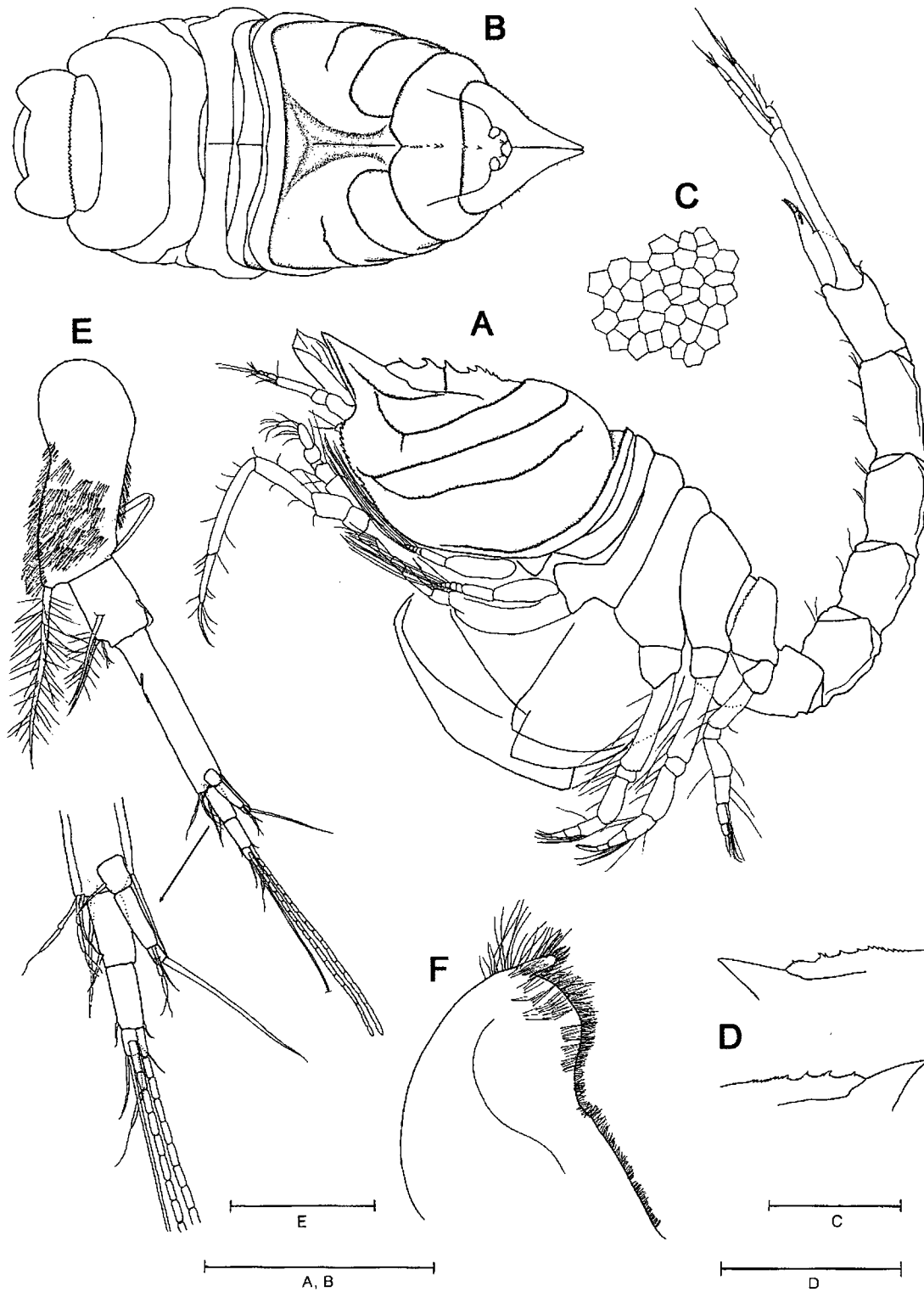


Fig. 1. *Dimorphostylis namhaedoensis* n. sp., adult female. A, Habitus, lateral. B, Cephalothorax, dorsal. C, Integument of carapace. D, Anterior portion of carapaces of other specimens. E, Antennule. F, Labium. Scale bars = 0.1 mm (E), 0.2 mm (C, D), and 1 mm (A, B).

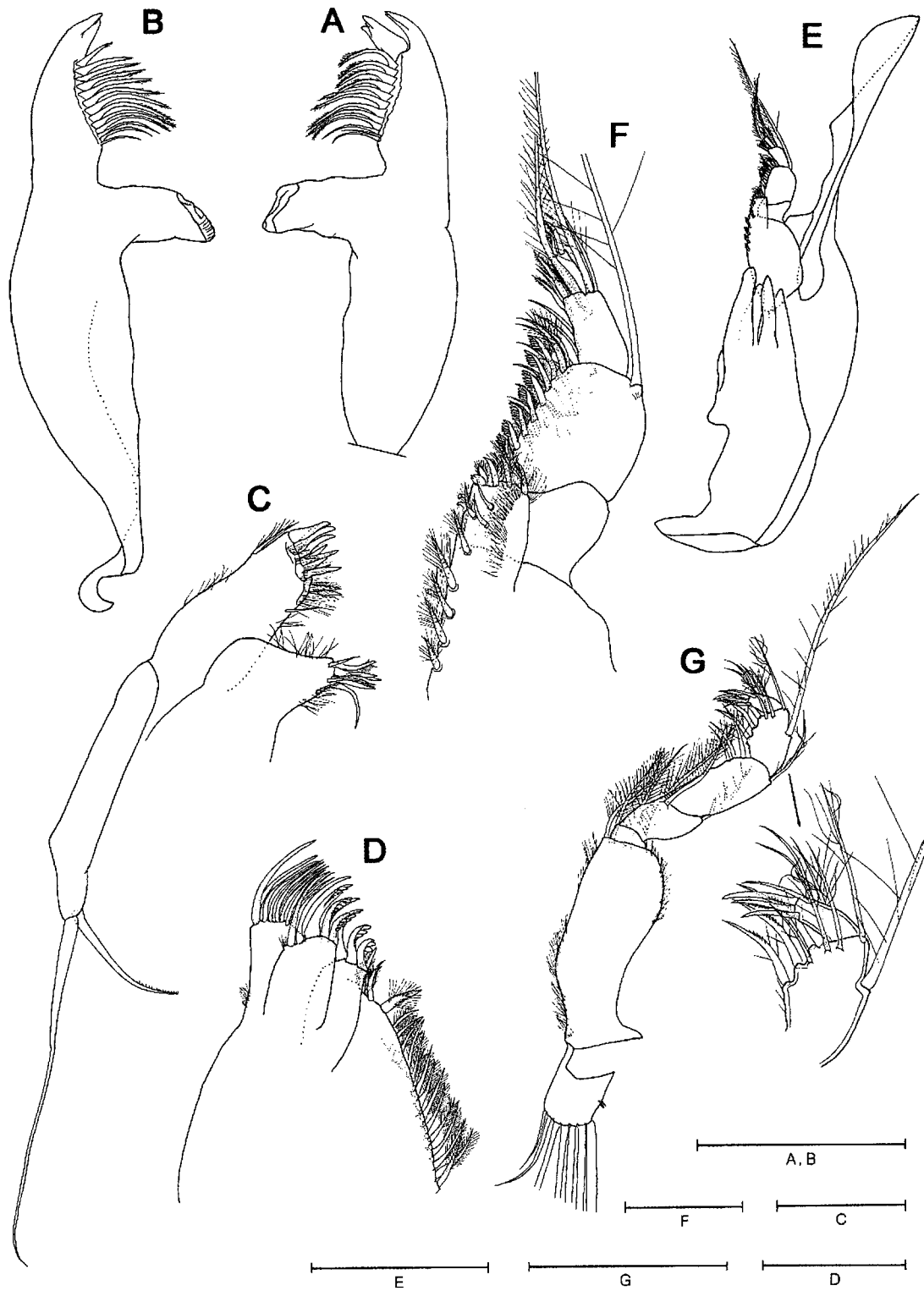


Fig. 2. *Dimorphostylis namhaedoensis* n. sp., adult female. A, Left mandible. B, Right mandible. C, First maxilla. D, Second maxilla. E, First maxilliped. F, First maxilliped omitted branchial apparatus and siphon. G, Second maxilliped. Scale bars = 0.1 mm (C, D, F), 0.2 mm (A, B), 0.3 mm (G), and 0.5 mm (E).

times of ocular lobe. Ocular lobe round, with 3 lenses.

Thorax (Figs. 1A, B) about 3/4 of carapace length, slightly longer than 1/5 of body length. First segment slightly shorter than second one; third segment subequal in length to second one; fourth segment subequal in length to second and third ones combined; fifth segment slightly shorter than fourth one.

Abdomen (Fig. 1A) about 0.78 times as long as cephalothorax. Fifth segment longest, about 0.6 times as long as third and fourth ones combined; sixth segment about 0.85 times as long as fifth segment.

Antennule (Fig. 1E): Peduncle composed of 3 articles; first article slightly longer than the remaining ones combined, with numerous hairs, 1 bent simple seta, 1 strong plumose seta distally on surface; second article about 0.35 times as long as first one, with 1 sensory seta, 1 plumose seta, 2 simple setae; third article about 2.2 times as long as second one, with 2 sensory setae, 2 simple setae near outer corner, 1 simple seta on inner corner. Main flagellum composed of 3 articles; first article longest, about 0.8 times as long as second and third ones combined, with 1 simple distal seta on outer margin; second article with 1 short simple seta both lateral margins, 1 aesthetasc on terminal margin; third article slightly shorter than 1/2 of third article, with 1 sensory seta, 1 long and 2 short simple setae, 1 aesthetasc. Accessory flagellum composed of 3 articles, about 0.7 times as long as main flagellum; second article longest, about twice as long as first one, with 1 simple distal seta; third article shorter than first one, with 1 sensory seta, 1 long simple seta.

Labium (Fig. 1F) with numerous hairs on inner margin; apex of process with 3 spiniform setae.

Left mandible (Fig. 2A) with 3 simple setae, 9 plumose setae between lacinia mobilis and pars molaris; pars incisiva with 2 teeth; lacinia mobilis with 3 teeth; pars molaris truncated. Right mandible (Fig. 2B) with 3 simple setae, 10 plumose setae between pars incisiva and pars molaris; pars incisiva and pars molaris same as in left one.

First maxilla (Fig. 2C): Protopod with numerous hairs, 9 spiniform setae, 1 plumose spiniform seta on terminal margin; outer margin with 1 plumose distal seta; palp long, with 2 filaments (one of them much longer than palp). Endite with 3 simple setae, 2 pectinated spiniform setae, 1 bifurcated spiniform seta.

Second maxilla (Fig. 2D): Protopod with 1 row of plumose setae (approximately 15) on inner margin; endites not exceeding protopod. Inner endite with 1 simple seta, 3 comb-like setae. Outer endite with 2 simple setae, 3 comb-like setae.

First maxilliped (Figs. 2E, F): Branchial apparatus with 4 lobules (branchial processes). Carpus of protopod with numerous simple setae, 7 comb-like setae, 1 plumose seta. Endite with 6 plumose setae, 2 hook-like spines on inner margin; terminal margin with 1 specialized tooth, 4 plumose spiniform setae.

Second maxilliped (Fig. 2G): Basis about 0.85 times

as long as remaining articles combined, with 4 long plumose setae on distal margin. Dactyl with 1 serrated spiniform seta, 2 simple spiniform setae on terminal margin, 1 simple distal seta on outer margin.

Third maxilliped (Fig. 3A): Basis about 1.55 times as long as remaining articles combined; inner margin serrated, with about 11 plumose setae; outer corner rather inflated, with 6 long plumose setae (one of them rather shorter); outer margin with numerous hairs distally. Ischium, merus and carpus subequal in length to each other. Propodus about 1.2 times as long as carpus, with 4 plumose setae on inner margin; outer corner with 1 plumose seta. Dactyl about 0.8 times as long as propodus, with 2 short simple setae distally on ventral surface; outer margin with 3 simple setae distally; inner corner 1 simple seta; terminal margin with 1 setiform spine; terminal spine slightly longer than propodus. Exopod well developed.

First pereopod (Fig. 3B): Basis about 0.7 times as long as remaining articles combined; inner margin serrated, with 9 plumose setae; outer margin with 8 plumose setae; distal margin with 6 plumose setae. Ischium about 1/2 of merus, with 1 short simple seta on inner margin. Merus slightly shorter than 2/3 of carpus, with 2 simple setae on inner margin. Carpus about 1.85 times as long as dactyl, with 2 simple setae inner margin, 2 simple setae outer margin, 1 simple seta near distal margin. Propodus about 1.25 times as long as carpus, with 4 simple setae inner margin, 5 simple setae outer margin. Dactyl slightly shorter than 1/2 of propodus; outer margin with 3 simple setae; inner margin with 1 simple seta; terminal margin with 1 simple seta, 1 setiform spine.

Second pereopod (Fig. 3C): Basis about as long as remaining articles combined; inner corner inflated, with 2 plumose setae; outer margin serrated; ventral margin with 9 simple setae. Ischium very short. Merus about 2/3 of carpus; outer corner with 1 plumose seta; inner margin with 2 simple distal setae. Carpus about 0.8 times as long as propodus and dactyl combined. Propodus with 1 sensory seta, 3 simple setae near terminal margin. Dactyl about 1.7 times as long as propodus, with 2 long and 6 short simple setae on surface; terminal margin with 2 long setae.

Third pereopod (Fig. 3D): Basis about 0.9 times as long as remaining articles combined, with 1 simple seta, 8 plumose setae near inner margin.

Fourth pereopod (Fig. 3E): Basis about 0.7 times as long as remaining articles combined, with 3 hairy setae, 4 plumose setae near inner margin.

Fifth pereopod (Fig. 3F): Basis about 1/2 of remaining articles combined.

Telson and Uropod (Figs. 4A, B): Telson about 0.8 times as long as last abdominal segment; both lateral margins depressed near proximal portion, serrated, with 2-3 pairs of hairy setae near middle portion, 1-3 pairs of bristles (most specimens usually with 1 pair of bristles) near distal portion; terminal margin with 2

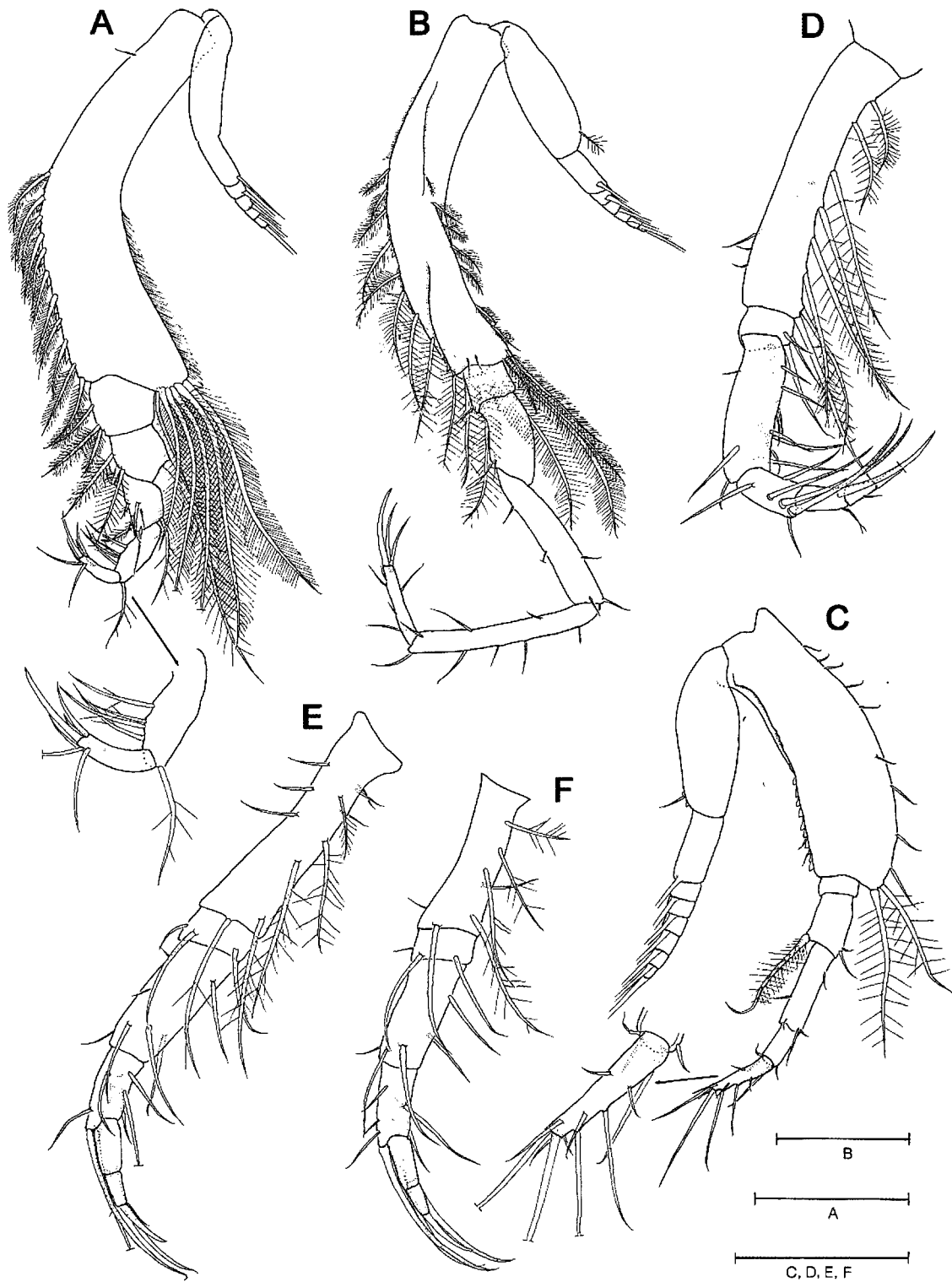


Fig. 3. *Dimorphostyis namhaedoensis* n. sp., adult female. A, Third maxilliped. B, First pereopod. C, Second pereopod. D, Third pereopod. E, Fourth pereopod. F, Fifth pereopod. Scale bars = 0.3 mm.

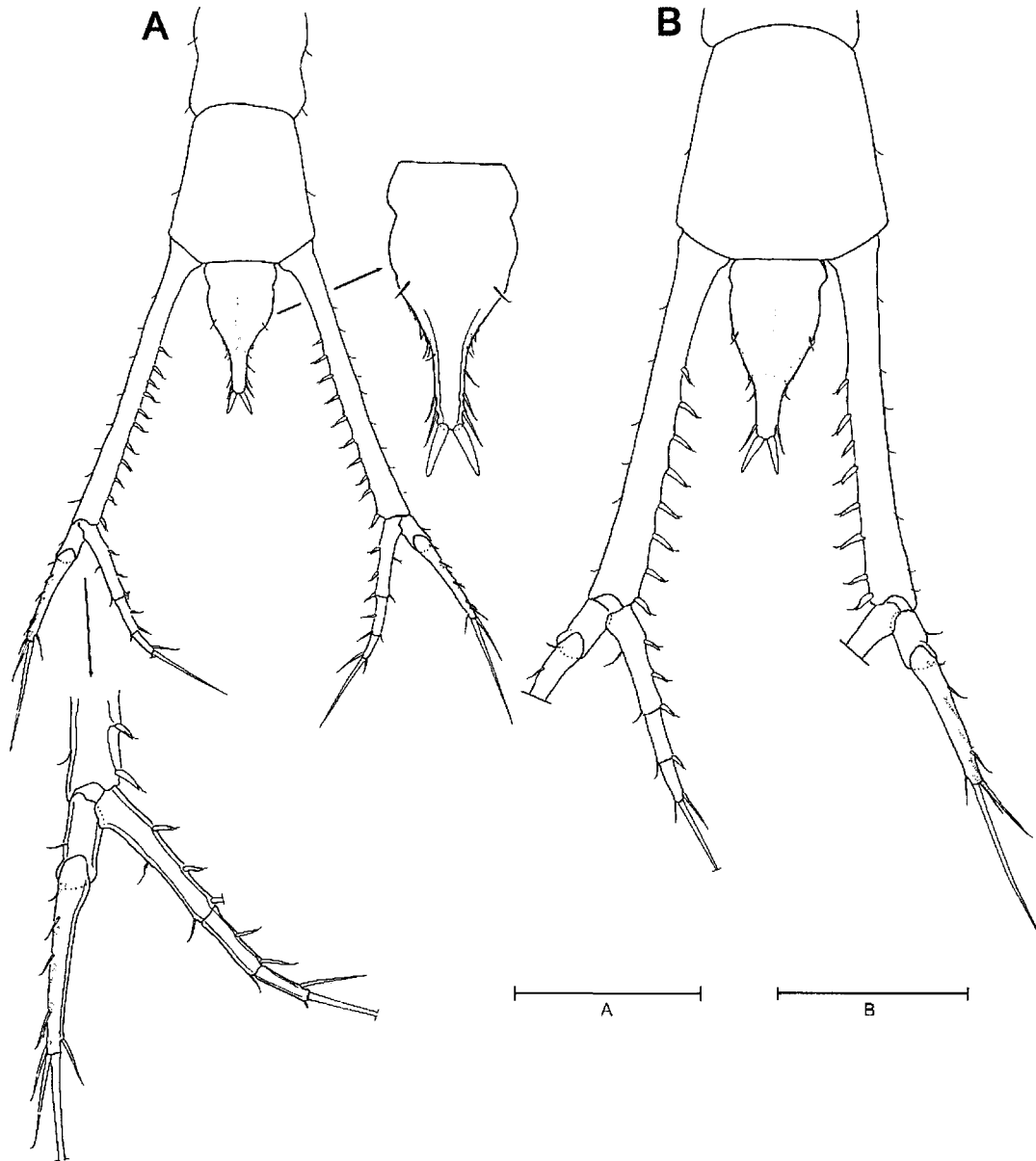


Fig. 4. *Dimorphostylis namhaedoensis* n. sp., adult female. A, Uropods, telson and last abdominal segment, dorsal. B, Uropods, telson and last abdominal segment of other specimen. Scale bars = 0.3 mm (B) and 0.5 mm (A).

apical spines. Uropodal peduncle slightly longer than twice of telson (but in other specimen it nearly twice as long as telson), with 8-11 spines on inner; outer margin with about 7-9 hairy setae. Endopod composed of 3 articles, equal to 1/2 of peduncle; first article slightly longer than remaining ones combined, with 3 spines on inner margin, 1 sensory seta, 1 short distal seta on outer margin; second article with 1-2 spines on inner margin, 1 short distal seta on outer margin; third article with 1 spiniform inner distal seta, 1 outer distal seta, 1 long terminal seta. Exopod composed of 2 articles, slightly shorter than endopod; first article slightly shorter than half of second one, with 1 short

outer seta; second article with 1 inner distal seta, 7-8 outer setae, 2 terminal setae (one of them long); long terminal seta slightly shorter than exopod.

Adult male: Body length 4.2-4.3 mm, excluding telson and uropod. Carapace (Figs. 5A, B) about 1/3 of body length, about 1.5 times as long as its width, 1.8 times as long as its depth; pattern of ridges same as in female. But posterior ridge beginning near anterior part of middle ridge, running upward and turning also abruptly forward to merge with anterior ridge. Its turning point lower than middle ridge. Dorsal groove formed on postero-median surface of carapace. Antennal

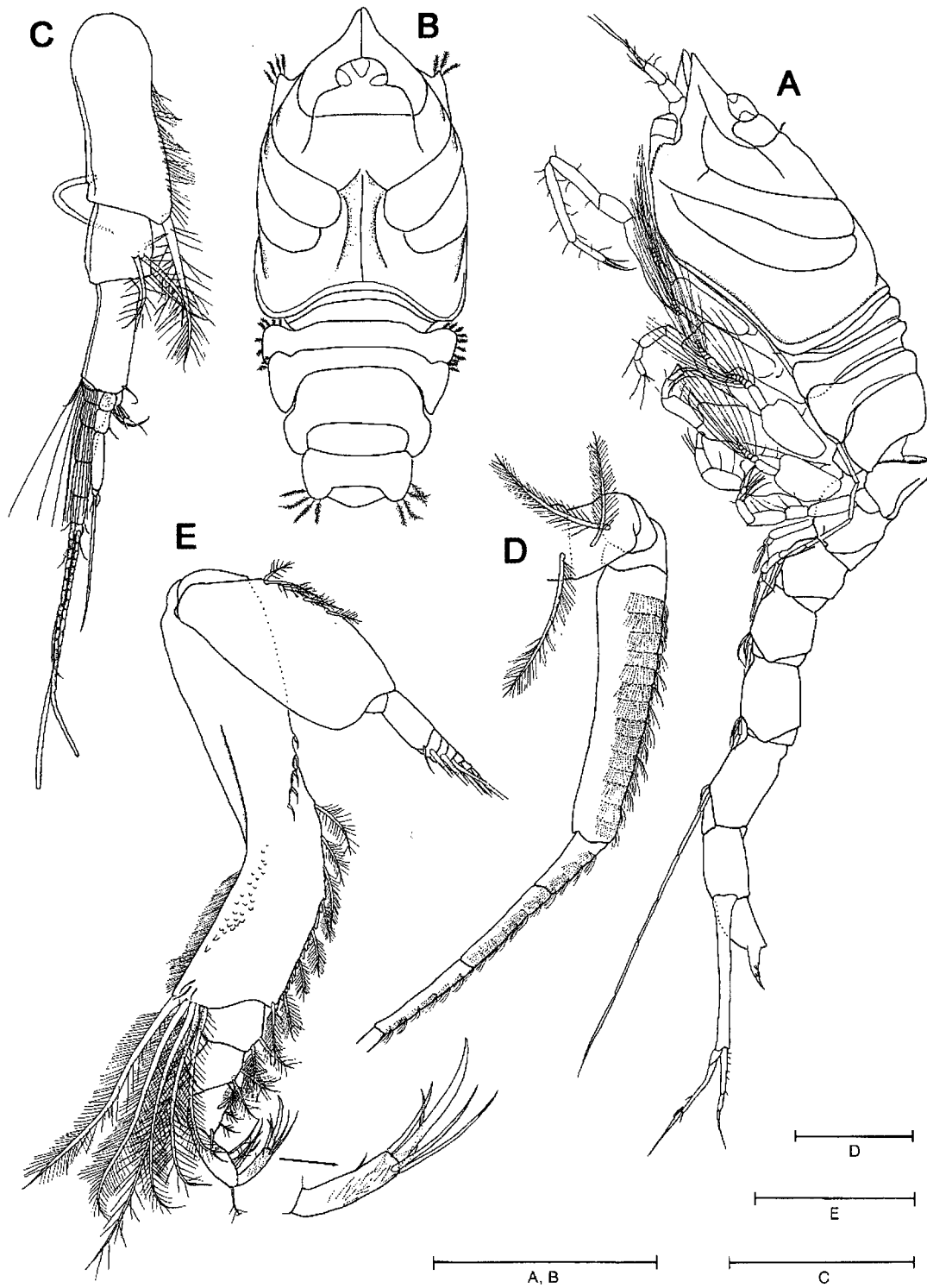


Fig. 5. *Dimorphostylis namhaedoensis* n. sp., adult male. A, Habitus, lateral. B, Cephalothorax, dorsal. C, Antennule. D, Antenna. E, Third maxilliped. Scale bars = 0.2 mm (C, D), 0.3 mm (E), and 1 mm (A, B).

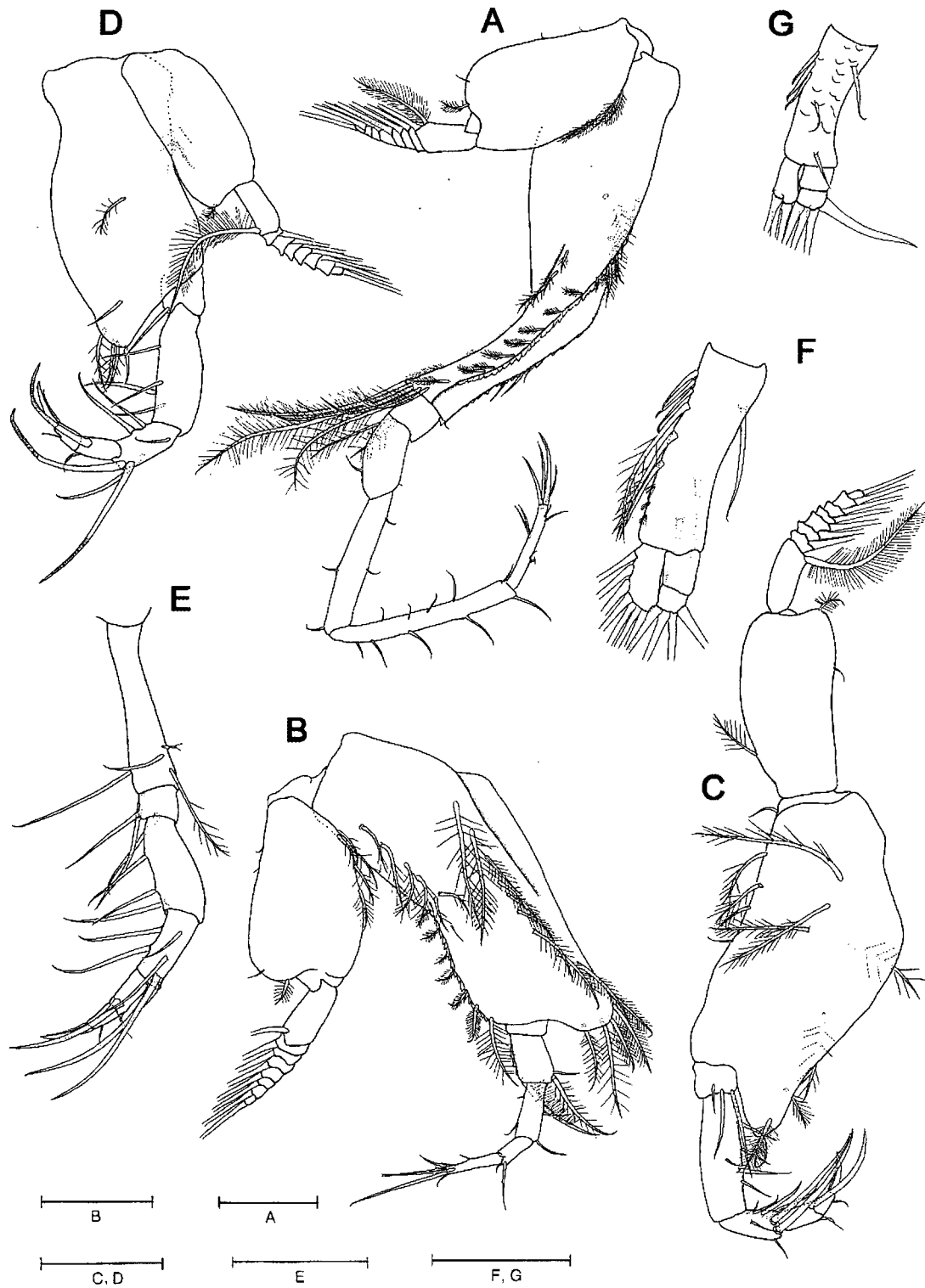


Fig. 6. *Dimorphostylis namhaedoensis* n. sp., adult male. A, First pereopod. B, Second pereopod. C, Third pereopod. D, Fourth pereopod. E, Fifth pereopod. F, First pleopod, ventral. Second pleopod, dorsal. Scale bars = 0.1 mm (F, G) and 0.2 mm (A-E).

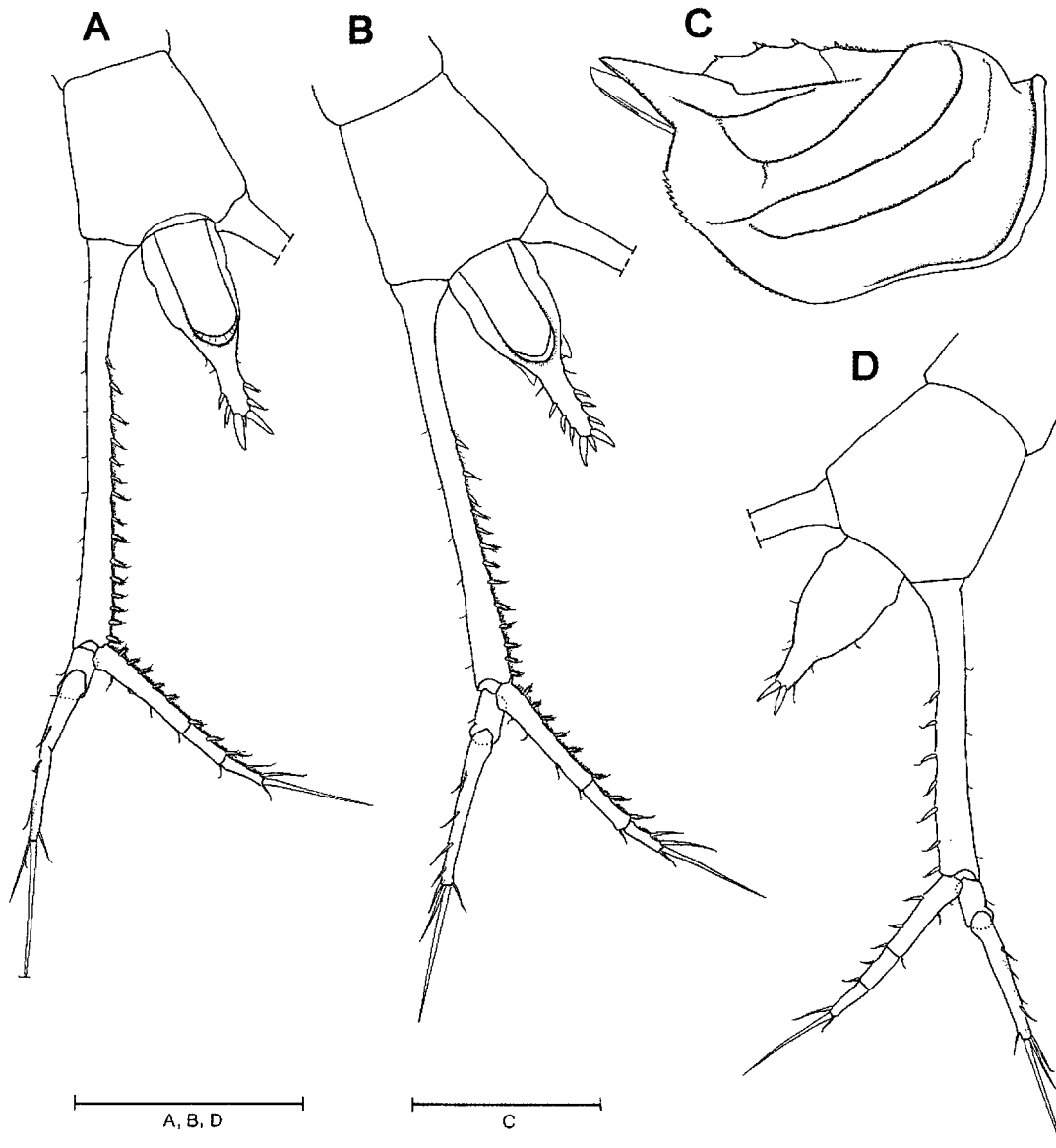


Fig. 7. *Dimorphostylis namhaedoensis* n. sp. A-B, adult male. A, Uropods, telson and last abdominal segment of one specimen. B, Uropods, telson and last abdominal segment of other specimen. C-D, Subadult male. C, Carapace, lateral. D, Uropods, telson and last abdominal segment. Scale bars = 0.4 mm (A, B, D) and 0.5 mm (C).

notch and antero-lateral angle prominent, about 3-4 plumose setae. Antero-lateral margin serrated. Pseudo-rostral lobe slightly longer than 1.5 times of ocular lobe. Ocular lobe round, with 3 lenses.

Thorax (Figs. 5A, B) about 2/3 of carapace length, 1/5 of body length.

Abdomen (Fig. 5A) about 0.8 times as long as cephalothorax. Fifth segment longest, about 0.65 times as long as third and fourth segments combined; sixth segment about 0.75 times as long as fifth segment.

Antennule (Fig. 5C): Peduncle composed of 3 articles; first article slightly longer than length of remaining ones combined, with numerous hairs, 1 bent simple seta, 1 strong plumose seta distally on surface;

second article about 0.35 times as long as first article, with 1 simple seta, 2 plumose setae; third article about 1.6 times as long as second article, with numerous long sensory hairs on inner corner, 1 simple seta, 1 projection bearing 1 simple seta and 2 sensory setae near outer corner. Main flagellum composed of 6 articles; third article longest, equal to first and second ones combined; fourth article slightly shorter than third one; fifth article slightly shorter than fourth one, with 1 aesthetasc, 2 short hairs; sixth article small, with 1 aesthetasc, 1 long and 1 short simple setae. Accessory flagellum composed of 4 articles, about 0.7 times as long as main flagellum; third article longest, much longer than first and second ones combined; fourth

article very small, with 1 long simple seta, 2 short setae.

Antenna (Figs. 5A, D) long, extending beyond telson; peduncle composed of 5 articles; first and second articles with 1 and 2 plumose setae respectively.

Third maxilliped (Fig. 5E): Basis about 1.95 times as long as remaining articles combined; inner margin serrated, with about 8 plumose setae, 1 row of setae near middle part; outer corner rather inflated, with 6 long plumose setae (one of them shorter), 3 short simple setae; outer margin with numerous hairs distally. Ischium, merus and carpus subequal in length to each other. Propodus about 1.4 times as long as carpus, with 4 plumose setae on inner margin; outer corner with 1 plumose seta. Dactyl about 0.7 times as long as propodus, with numerous hairs, 2 short simple setae distally on ventral surface; outer corner with 3 simple setae; inner corner with 1 simple seta; terminal margin 1 long setiform spine; terminal spine slightly longer than propodus. Exopod well developed.

First pereopod (Fig. 6A): Basis about 0.85 times as long as remaining articles combined; outer corner with 6 long plumose setae; inner margin serrated, 3 simple setae; medial surface with 1 row of serrations, 1 row of plumose setae running to distal margin. Ischium about 1/2 of merus, with 2 plumose setae on distal margin. Merus slightly shorter than 2/3 of carpus, with 1 simple seta on outer margin. Carpus about 1.55 times as long as dactyl, with 2 simple setae respectively on inner and outer margins. Propodus about 1.25 times as long as carpus, with 5 simple setae respectively on inner and outer margins. Dactyl about 1/2 of propodus; outer margin with 4 simple setae; inner margin with 2 simple setae; terminal margin with 3 simple setae, 1 setiform spine.

Second pereopod (Fig. 6B): Basis about 1.4 times as long as remaining articles combined; inner corner inflated, with 5 plumose setae; outer margin serrated, with 7 plumose setae; dorsal surface with 2 rows of plumose setae. Ischium very short. Merus slightly shorter than carpus; inner corner with 1 simple seta, 1 plumose seta; outer margin serrated, with 1 plumose distal seta. Carpus about 0.6 times as long as propodus and dactyl combined. Dactyl about 1.75 times as long as propodus, with 1 long and 5 short setae on surface; terminal margin with 2 simple setae.

Third pereopod (Fig. 6C): Basis about 1.15 times as long as remaining articles combined; inner corner inflated, with 1 simple seta, 2 plumose setae.

Fourth pereopod (Fig. 6D): Basis about 0.9 times as long as remaining articles combined; inner corner inflated, with 1 simple seta, 3 plumose setae.

Fifth pereopod (Fig. 6E): Basis about 0.6 times as long as remaining articles combined.

First pleopod (Fig. 6F): Basis about 3.3 times as long as inner ramus, with 3 simple setae, 3 plumose setae, 3 bundles of very fine setae on inner margin; with 3 simple setae on dorsal surface. Inner and outer

rami subequal to each other; outer ramus bi-articulate, distal article with 1 short and 3 long plumose setae; inner ramus uni-articulate, with 7 long plumose setae.

Second pleopod (Fig. 6G): Basis about about 3.2 times as long as inner ramus, with 3 simple setae on inner margin, 3 simple setae on dorsal surface. Outer ramus with 1 short and 3 long plumose setae; inner ramus with 3 long plumose setae.

Telson and uropod (Figs. 7A, B): Telson about 1.2 times as long as last abdominal segment; pre-anal section with U-shaped dorsal projection, post-anal section subequal to half of pre-anal, with 2-3 pairs of lateral spines (most specimens usually with 2 pairs of lateral spines); terminal margin with 3 apical spines, of which middle spine very small. Uropodal peduncle nearly twice as long as telson, with 13-15 spines on inner; outer margin with 6-8 hairy setae. Endopod composed of 3 articles, slightly longer than half of peduncle; first article slightly shorter than remaining ones combined, with 6 spines on inner margin, 4 short setae on outer margin; second article with 2 spines on inner margin, 1 short seta on outer corner; third article with 2 spiniform inner distal setae, 1 short outer distal seta, 1 long terminal seta. Exopod composed of 2 articles, slightly shorter than endopod; first article slightly shorter than half of second one, with 1 short outer seta; second article with 2 short outer setae, 3 terminal setae (one of them long).

Subadult male: Body length about 3.8 mm, excluding telson and uropod. Shape of carapace and telson closely allied as in female (Figs. 7C, D).

Telson (Fig. 7D) about 0.9 times as long as last abdominal segment; both lateral margins faintly serrated, with 2-3 pairs of hairy setae near middle portion, 1 pair of bristles near distal portion; terminal margin with 2 apical spines. Uropodal peduncle slightly shorter than twice of telson, with about 7 spines on inner margin; outer margin with about 4 hairy setae.

Etymology. The new species is named after the type locality, the Namhaedo Island.

Remarks: *Dimorphostylis namhaedoensis* n. sp. is closely allied to *D. asiatica* Zimmer, 1920, *D. valida* Harada, 1960, *D. hirsuta* Gamô, 1960 and *D. acroplicata* Harada, 1960, which are widely distributed in Korean waters, in having the sculpture caused by the oblique ridges on the carapace and telson furnished with three terminal spines. The new species, however, are obviously distinguished from them by a combination of following features: 1) the frontal lobe has a transverse ridge (while it is absent in *D. acroplicata*); 2) the female telson is rather large, which is about 4/5 of the last abdominal segment (while it is about 2/3 and 1/2 in *D. asiatica* and *D. valida* respectively); 3) a row of the forward spines (composed of 10-14) is ornamented on dorsal carina of the frontal

lobe of the female carapace (while absent in all four species mentioned above); 4) the third article of the female peduncle is very long, which is about 2.2 times as long as the second one (while it is about 1.8 times in *D. asiatica* and 1.9 times in *D. valida*). Furthermore, the new species has a small median spine against the lateral ones of the three apical telson spines. But, it is subequal to or slightly longer than the lateral ones of the three apical telson spines in *D. asiatica*, *D. valida* and *D. acroplicata*. In *D. hirsuta*, it is very long. This seems to be very important characters to separate the new species from the other congeneric species that have a telson ornamented with three apical spines.

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[Received January 4, 2002; accepted February 5, 2002]