PROCEEDINGS OF THE BIOLOGICAL SOCIETY OF WASHINGTON
124(4):326–340. 2011.

A new species of the genus *Heterolaophonte* Lang, 1948 (Copepoda: Harpacticoida: Laophontidae) from Maxwell Bay, King George Island, Antarctica

Hyun Woo Bang, Yoon Lee*, and Wonchoel Lee*

(HWB) West Sea Fisheries Research Institute, NFRDI, 707, Eulwang-dong, Jung-gu, Incheon 400-420, Korea, e-mail: bang0119@nfrdi.go.kr;
*(YL) West Sea Fisheries Research Institute, NFRDI, 707, Eulwang-dong, Jung-gu, Incheon 400-420, Korea, e-mail: yoonlee@nfrdi.go.kr;
*(WL) Department of Life Science, College of Natural Science, Hanyang University, 17 Haengdang-dong, Sungdong-gu, Seoul 133-791, Korea, e-mail: wlee@hanyang.ac.kr

Abstract.—A new species of the genus *Heterolaophonte* is described from tidal pools near the King Sejong Station at King George Island, Antarctica. This species is described and named as *Heterolaophonte heejinae*, new species. The new species is closely related to *H. pauciseta* from the South Georgia Islands and *H. livingstoni* from Livingston Island, Antarctica. Both species share several characters with the new species, including the seven-segmented antennule, segmentations of swimming legs and setal numbers on P5. However, the new species is distinguishable from its congeners with the combined characters of spinules on the terminal claw of the P1 endopod, the antennary exopod with only two setae, and the seta numbers on the second exopod segment of the P4 and the distal segment of the P2 endopod. A key to species of the genus *Heterolaophonte* is also provided.

Keywords: Antarctica, copepod morphology, tide pools

Heterolaophonte Lang, 1948 is a genus of harpacticoid copepods, family Laophontidae T. Scott, 1905. The genus *Heterolaophonte* was divided into seven groups: *stroemii, minuta, littoralis, quinquespinosa, discophora, campbelliensis,* and *tenuispina* groups (reviewed by Lang 1944); subsequently, Wells et al. (1982) raised the *quinquespinosa* group to the new genus *Quinquelaophonte.*

Species of the genus *Heterolaophonte* inhabit the benthic environment of all oceanic basins, and until now 33 species and 3 subspecies are known in the world. The first report on *Heterolaophonte* species in the Antarctic area was by T. Scott (1912), who found many species during a survey of the "Entomostraca of the Scottish National Antarctic Expedition, 1902–1904," and he described *Laophonte australis, L. exigua, and L. rottenburgi* from South Orkney Island. Afterward, Lang (1936) described a new species *L. pauciseta* from South Georgia Island. The most recent description of a member of the genus *Heterolaophonte* in the Antarctic area was *H. livingstoni* by Apostolov & Pandourski (2000) from Livingston Island.

During a survey of the Nineteenth Korea Antarctic Research Program, a new species of *Heterolaophonte* was collected from tidal pools on the Barton Peninsula on King George Island, Antarctica. We describe the new species based on the newly collected specimens from Antarctica and provide an updated key to species of *Heterolaophonte.*

* Co-corresponding authors.

Materials and Methods

Samples were collected from a tidal pool on the coast of the Barton Peninsula in Maxwell Bay, King George Island, Antarctica. The specimens were fixed with neutral formalin and preserved with 70% ethanol. Specimens were dissected in lactic acid and the dissected parts were mounted on slides in lactophenol mounting medium. Preparations were sealed with Glyceel or transparent nail varnish. All drawings have been prepared using a drawing tube mounted on an Olympus BX51 differential interference contrast microscope.

The descriptive terminology is adopted from Huys et al. (1996). Abbreviations used in the text are: A1, antennule; A2, antenna; ae, aesthetasc; exp, exopod; enp, endopod; P1–P6, first to sixth thoracopod; exp (enp)-1 (2, 3) to denote the proximal (middle, distal) segment of a ramus. Specimens are deposited in the Marine Biodiversity Institute of Korea (MABIK). Scale bars in figures are indicated in μm.

Systematics

Family Laophontidae T. Scott, 1905

Heterolaophonte Lang, 1948

Heterolaophonte heejinae, new species

Figs. 1–8

Type locality.—A tidal pool on the coast of the Barton Peninsula in Maxwell Bay (62°14′S, 58°46′W), King George Island, Antarctica.

Material examined.—Holotype: 1♀ (CR00030043) dissected on 11 slides, from the type locality. Paratype 1♀ and 2♂♂ (CR00030044-46) each dissected on 14, 14, and 16 slides respectively, and 23♀♀ and 1♂ (CR00030047-70) in 70% ethanol. An additional 14♀♀ and 4♂♂ were deposited in the first author's collection. All from the type locality, collected by H. W. Bang on 27 Dec 2005.

Description of female.—Total body length 896 μm (n = 10; range: 818–966 μm, measured from anterior margin of rostrum to posterior margin of caudal rami). Body slender. Largest width measured at posterior margin of cephalic shield: 223 μm. Entire body surface denticulate. Urosome narrower than prosome (Fig. 1A, C).

Cephalothorax with smooth posterior margin. Pleural areas well developed and rounded, without lobate posterolateral angles. Entire surface covered with tiny spinules [indicated as dots] as illustrated in Fig. 1A, B. Sensilla and few pores present. Rostrum small, bell-shaped (Fig. 1A), completely fused to cephalothorax, and with pair of sensilla near anterior margin.

Pedigerous somites covered with reticulation and small spinules. All pedigerous somites without defined hyaline frills, and hind margin smooth. Body slightly constricted between individual somites.

Urosome (Figs. 1A, B, 2A) 5-segmented, comprising P5-bearing somite, genital double-somite and 3 free abdominal somites. All urosomites covered with small spinules dorsally and laterally. Hyaline frills of urosomites distinct.

Genital double-somite (Figs. 1A, B, 2A) with transverse, surface ridge dorsally and laterally, indicating original segmentation, and completely fused ventrally. Genital field located near anterior margin with small copulatory pore located in median depression (Fig. 2A). P6 with small protuberance bearing 2 bare setae, outer seta longer than inner seta.

Anal somite (Figs. 1A, 2C) with well-developed operculum bearing row of spinules and flanked by pair of sensilla.

Caudal rami short, ovoid, as long as wide, each ramus with 7 setae: seta I bare, shortest, setae II and III bare, seta II longer than seta III, setae IV and V fused basally, and pinnate (seta V longest, and longer than urosome); seta VI bare and small, seta VII tri-articulate at base.

Antennule (Fig. 2B) 7-segmented, with well-developed sclerite around base of segment 1. Segment 1 with long spinules at distal anterior margin, and

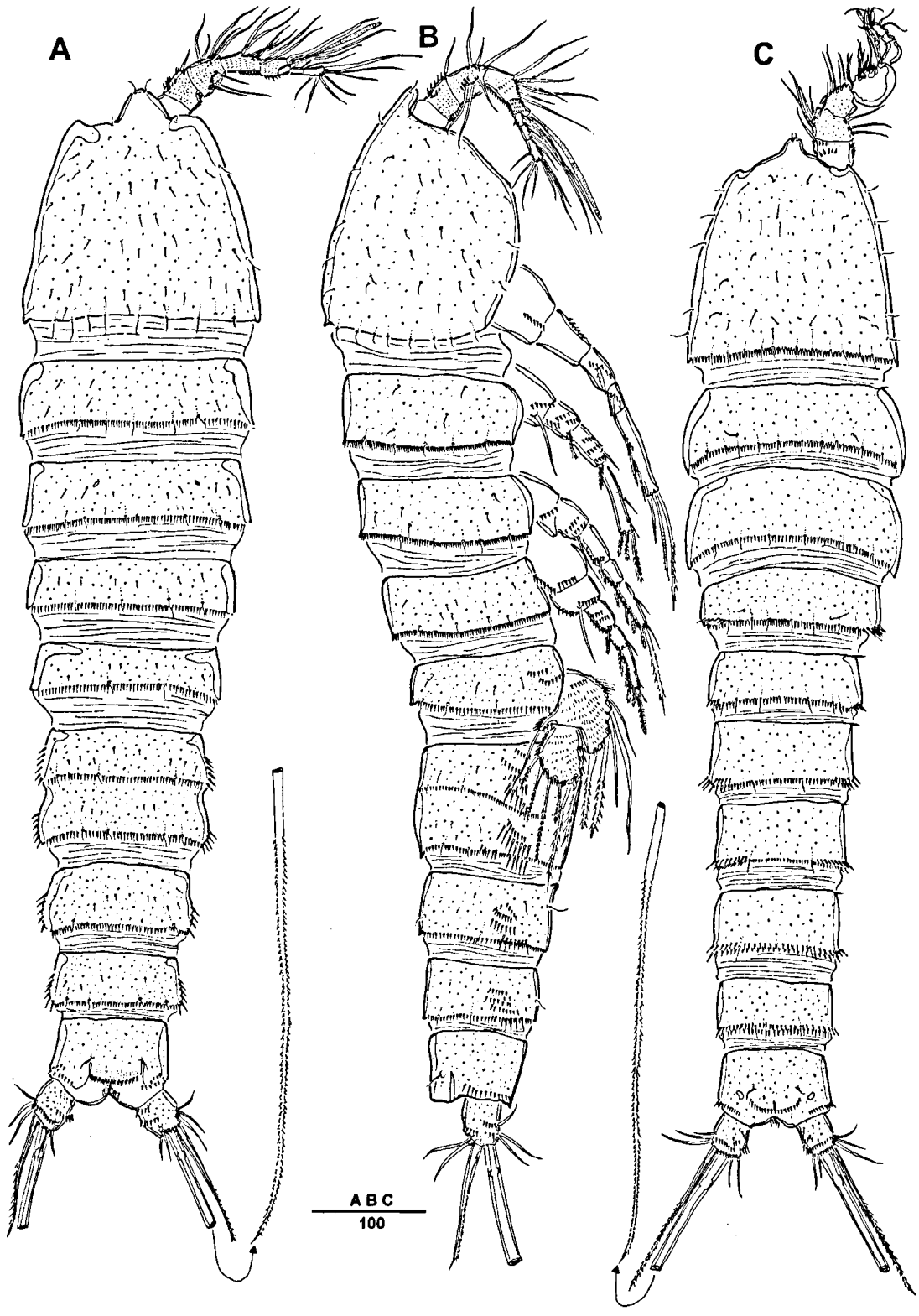

Fig. 1. *Heterolaophonte heejinae,* A, female, habitus, dorsal. B, female, habitus, lateral. C, male, habitus, dorsal.

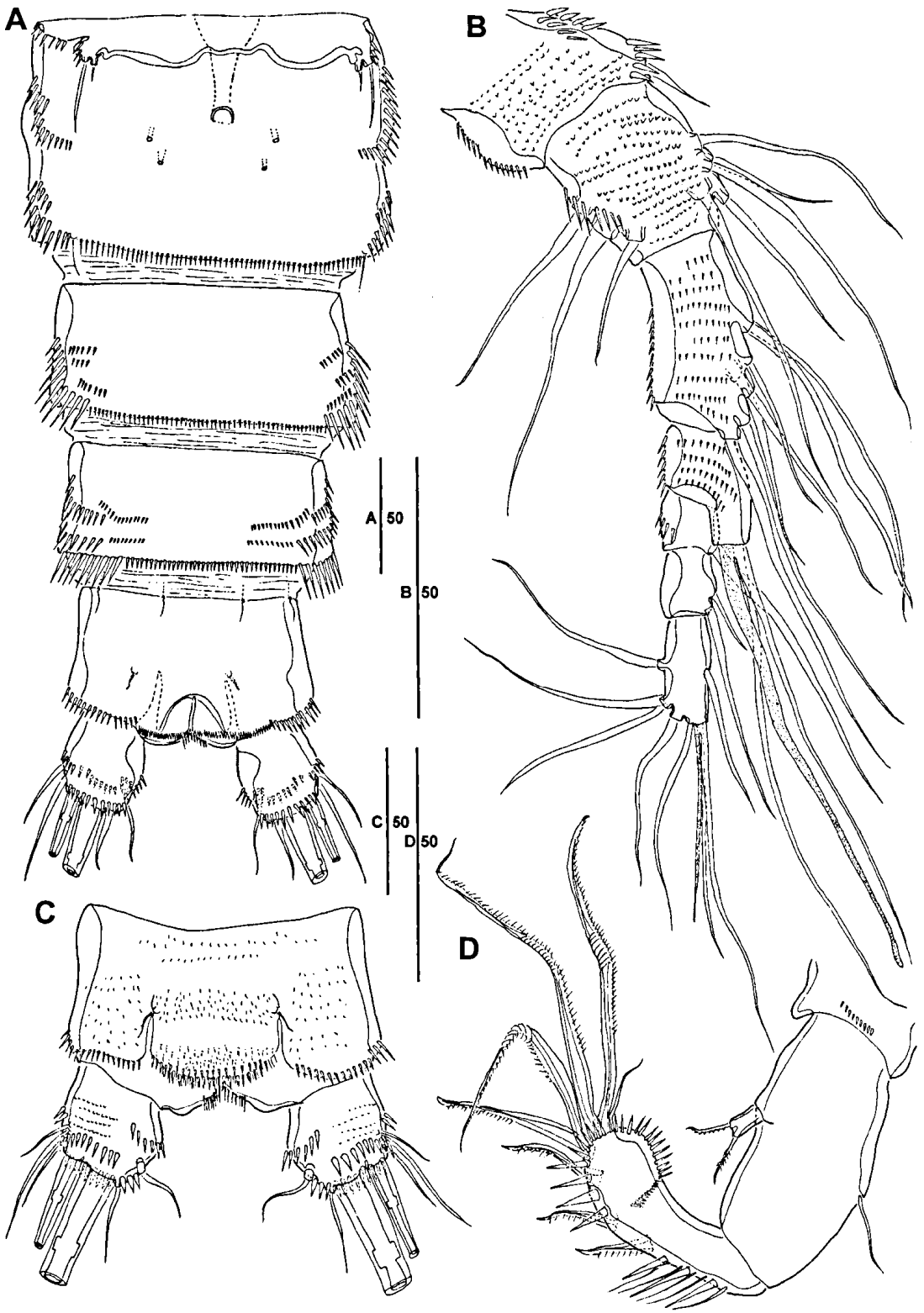

Fig. 2. *Heterolaophonte heejinae,* female. A, urosome, ventral. B, antennule. C, anal segment and caudal rami, dorsal. D, antenna.

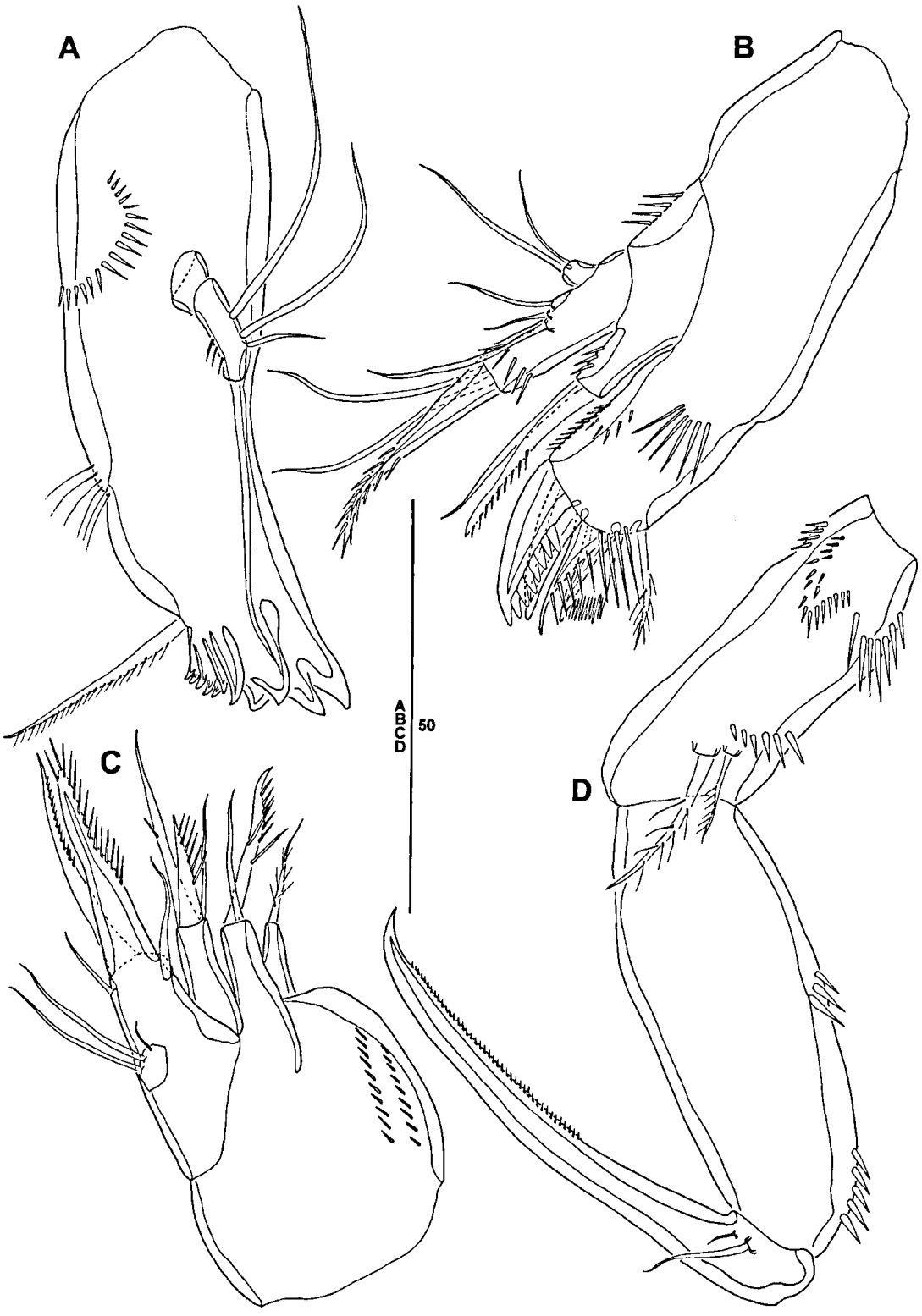

Fig. 3. *Heterolaophonte heejinae,* female. A, mandible. B, maxillule. C, maxilla. D, maxilliped.

surface densely covered with tiny denticles. Segment 3 longest. Armature formula: 1-[1], 2-[8], 3-[7], 4-[1 + (1 + ae)], 5-[1], 6-[2], 7-[6 + acrothek]. Apical acrothek consisting of small aesthetasc fused basally to 2 bare setae.

Antenna (Fig. 2D) 3-segmented, comprising coxa, allobasis and free 1-segmented

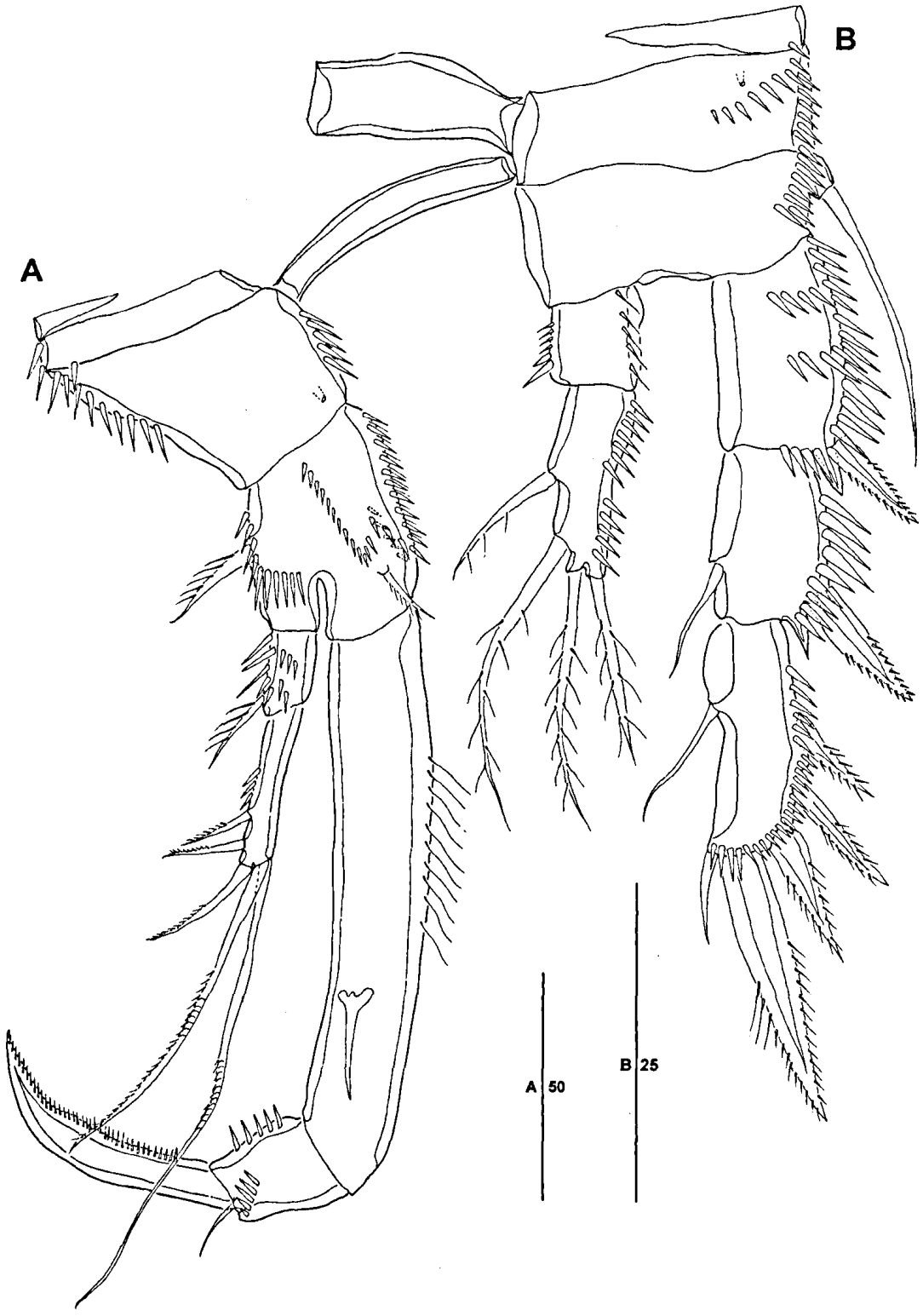

Fig. 4. *Heterolaophonte heejinae,* female. A, P1. B, P2.

endopod. Coxa small, bare. Allobasis elongated; without distinct surface sutures marking original segmentation, with 1 abexopodal bare seta near distal half. Exopod small, 2 times longer than wide, with 2 pinnate setae apically. Endopod shorter than allobasis. Lateral armature consisting of 2 pinnate spines; apical

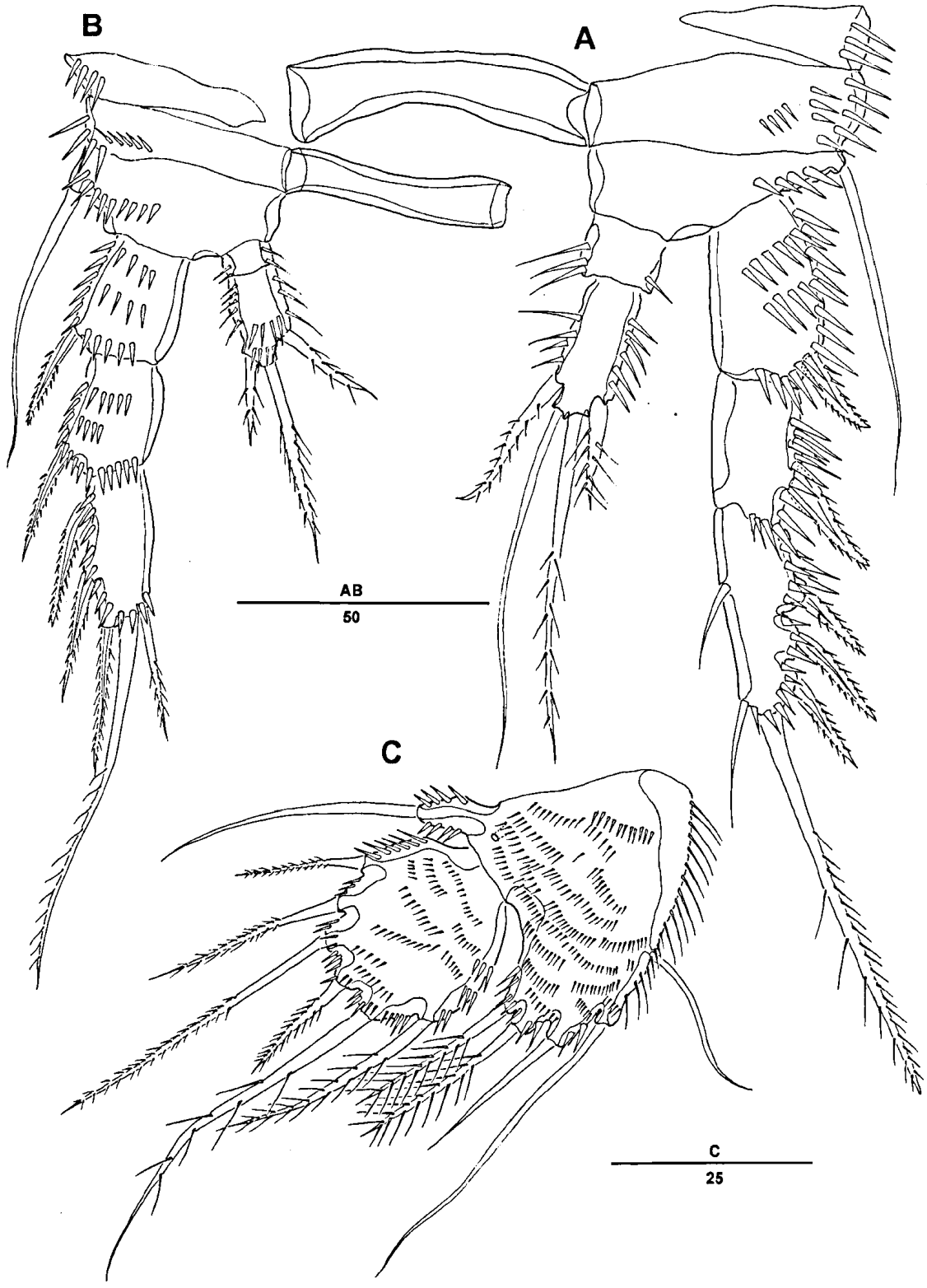

Fig. 5. *Heterolaophonte heejinae,* female. A, P3. B, P4. C, P5.

armature consisting of 2 pinnate spines, and 3 geniculate setae (1 geniculate seta fused basally to additional short seta). Endopod with row of long spinules laterally.

Mandible (Fig. 3A) with well-developed gnathobase bearing several multicuspidate teeth around distal margin and 1 long pinnate spine at distal corner. One

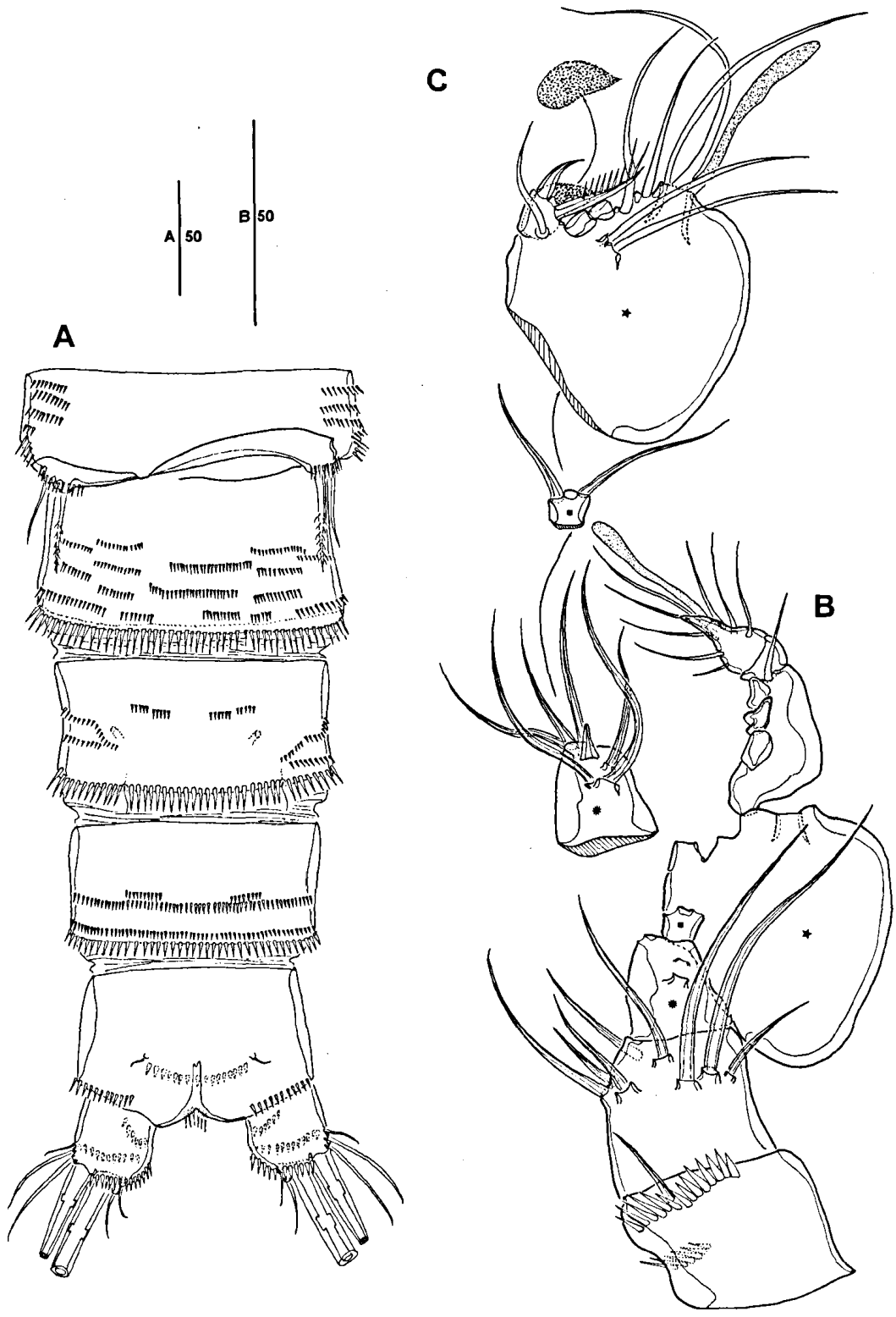

Fig. 6. *Heterolaophonte heejinae,* male. A, urosome, ventral. B, antennule.

row of spinules near base of palp. Palp 2-segmented, proximal segment without ornamentation, distal segment with 4 naked setae.

Maxillule (Fig. 3B). Precoxa with smooth outer margin; arthrite strongly developed, with 6 spines/setae around distal margin. Row of long spinules on

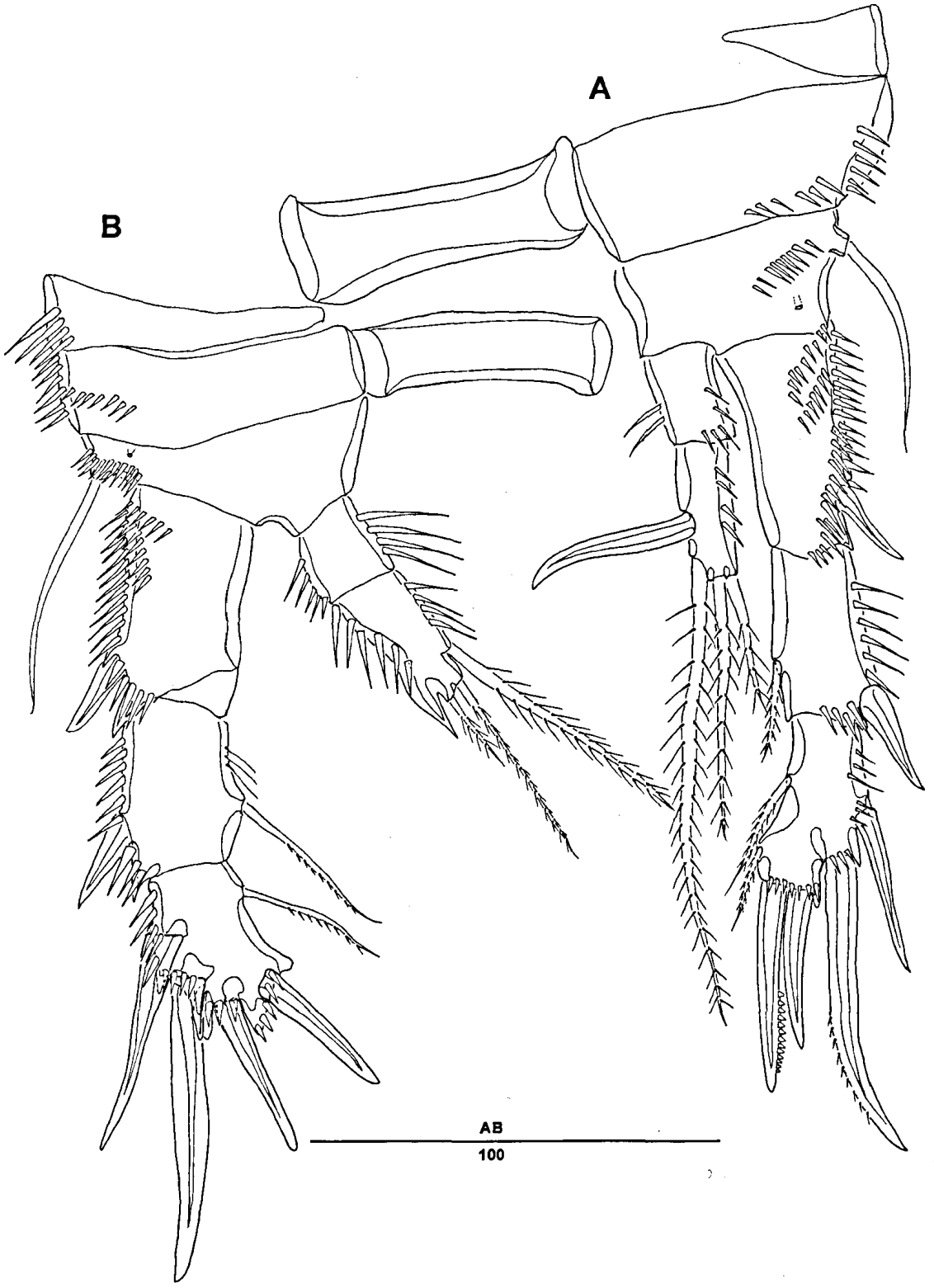

Fig. 7. *Heterolaophonte heejinae,* male. A, P2. B, P3.

posterior surface. Coxa with cylindrical endite bearing 1 naked seta, and 1 curved, pinnate spine; with spinular row on anterior surface, and several long spinules around outer margin. Basis with cylindrical endite bearing 2 naked setae, and 1 curved, pinnate spine; with several spinules around inner distal margin and base

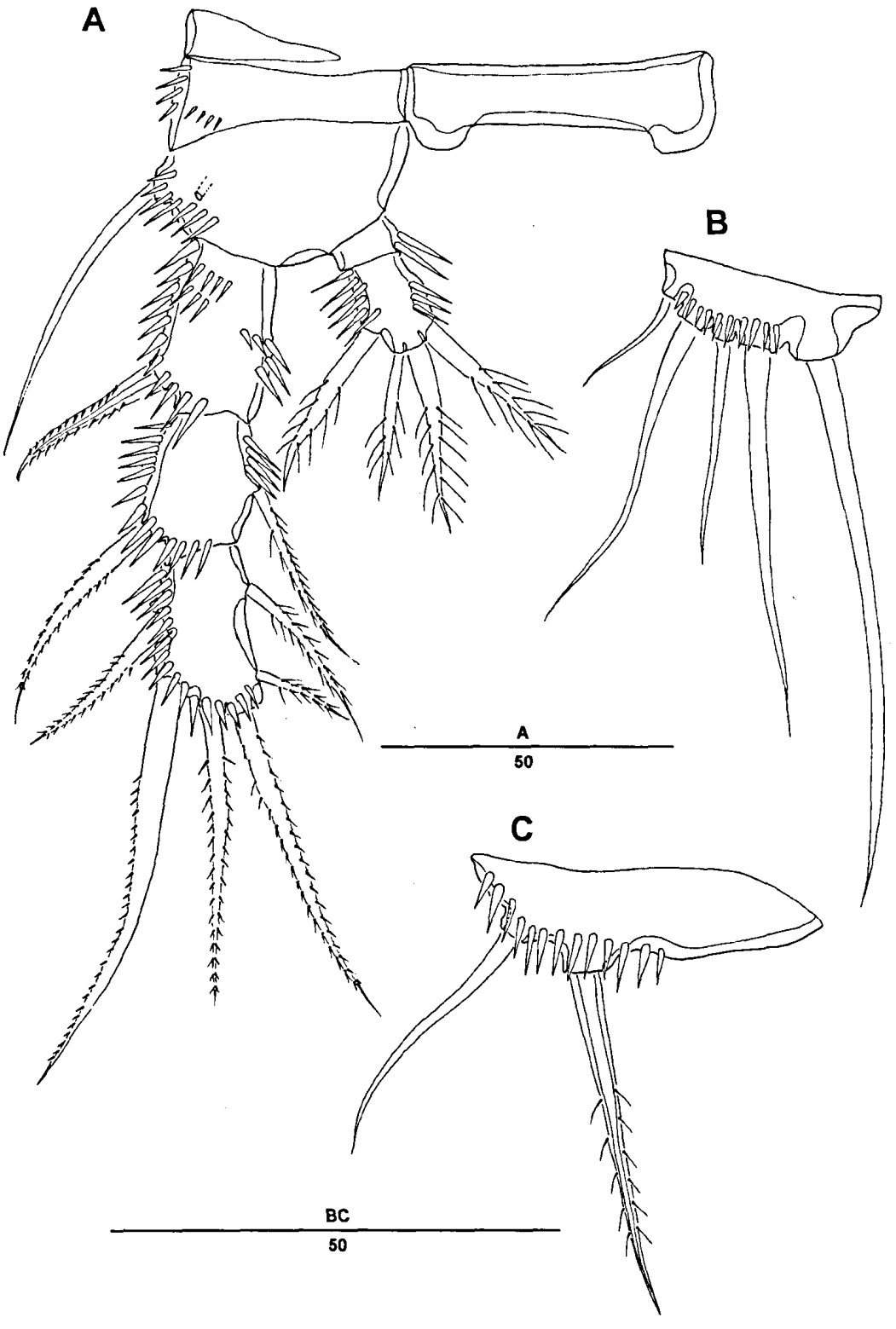

Fig. 8. *Heterolaophonte heejinae,* male. A, P4. B, P5. C, P6.

of endopod. Endopod nearly incorporated in basis, forming small peduncle with 3 naked setae; exopod 1-segmented, with 2 naked setae.

Maxilla (Fig. 3C). Syncoxa with 3 endites. Proximal endite small and with 1 strong, pinnate spine. Middle endite with 1 naked and 1 pinnate setae. Distal

endite with 1 pinnate and 2 naked setae. Allobasis produced into strong claw, with 1 strong pinnate spine and 1 shout naked seta posteriorly, 1 slender seta on anterior surface. Endopod 1-segmented, with 1 small and 2 slender setae.

Maxilliped (Fig. 3D) comprising syncoxa, basis, and 1-segmented endopod. Maxilliped with 2 plumose setae and several patches of spinules on syncoxa. Basis with spinules on outer lateral margin. Endopodal segment produced into strong claw with 1 short naked seta, and 1 tube pore.

Swimming legs 1–4 (Figs. 4A, B, 5A, B) with wide intercoxal sclerite, biramous, endopods 2-segmented, exopods 3-segmented except for P1. P1 exopod 2-segmented. Coxae and bases with row of spinules along outer margins as illustrated.

P1 (Fig. 4A). Coxa large, with inner and outer spinular rows. Basis with 1 strong pinnate spine on outer margin and 1 pinnate seta on inner distal surface. Anterior surface covered with spinules. Exopod small, 2-segmented. Exp-1 with 1 pinnate spine. Exp-2 with 3 pinnate spines and 2 geniculate setae. Enp-1 2.5 times as long as exopod, with row of long spinules along inner margin. Enp-2 surface covered with spinules and the presence of row spinules along outer margins. Enp-2 with 1 strong denticulate claw and 1 small naked seta.

P2–P4 (Figs. 4B, 5A, B). Coxae and bases with spinular rows along outer margin and anterior surface. Basis with naked long seta on outer margin, each seta arising from setophore. All segments with pattern of spinules as illustrated. Inner and outer margins of endopod segment with spinules. P2 praecoxa small, enp-2 1.8 times longer than enp-1; enp-1 as long as its width, without seta; enp-2 with 2 plumose inner setae and 2 distal setae; exopod 3-segmented; each segment with row of spinules along outer margins; exp-3 longest. P3 enp-2 2.6 times longer than enp-1. P4 smaller than P2 and P3; enp-2 3 times longer than enp-1. Spine and setal formulae as follows:

	Exopod	Endopod
P2	0.1.123	0.220
P3	0.0.123 [0.1.22 in ♂]	0.121
P4	0.0.023 [0.1.222 in ♂]	0.120 [0.121 in ♂]

P5 (Fig. 5C) with separate exopod and baseoendopod, each covered with spinules as illustrated. Baseoendopod forming short, outer setophore bearing basal seta. Endopodal lobe long but not reaching distal margin of exopod; with 3 naked inner lateral and 2 pinnate apical setae. Exopod ovoid, as long as wide, with 6 pinnate setae; rows of spinules along outer margin.

Description of male.—Male smaller and more slender than female. Body length 885 μm (N = 7; range: 792–924 μm, measured from anterior margin of rostrum to posterior margin of caudal rami). Body slender. Largest width measured at P2-bearing thoracic somite: 201 μm. Urosome distinctly narrower than prosome (Fig. 1C). Sexual dimorphism in antennule, swimming legs (P2–P4), P5, P6, and genital segmentation.

Prosome (Fig. 1C) 4-segmented, comprising cephalothorax (bearing first pedigerous somite) and 3 free pedigerous somites. Cephalothorax with spinules along posterior margin. Pleural areas well developed. Entire surface covered with tiny spinules as in female. Rostrum small, completely fused to cephalothorax, and with pair of sensilla near anterior margin. Pedigerous somites covered with minute spinules. All pedigerous somites without defined hyaline frills.

Urosome (Fig. 6A) 6-segmented, comprised of P5-bearing somite, genital somite, and 4 free abdominal somites. All urosomites with pattern of surface ornamentation consisting of dense denticles dorsally and ventrally.

Antennule 8-segmented (Fig. 6B) and subchirocer with geniculation between segments 5 and 6. Segment 1 with 1 row of long spinules along outer distal margin. Segment 2 without processes on dorsal

margin. Segment 4 represented by small sclerite along anterior margin. Segment 5 swollen. Segment 8 with triangular distal half. Armature formula: 1-[1], 2-[8], 3-[6 + 1 modified], 4-[2], 5-[6 + 1 pinnate + 2 modified + 2 modified elements + (1 + ae)], 6-[1 + 3 modified elements], 7-[0], 8-[6 + acrothek]. Apical acrothek consisting of aesthetasc and 2 naked setae.

P2–P4 (Figs. 7A, B, 8A). Shape and surface ornamentation of intercoxal sclerites and protopods as in ♀. Exopods and endopods of P2, P3 and P4 with sexual dimorphism. Proximal inner seta of P2 exp-2 and exp-3 (Fig. 7A) modified as strong plumose setae, and outer distal seta longer than in ♀. Inner setae of P2 end-2 modified as strong bare spine, and distal inner setae longer than in ♀. P3 (Fig. 7B) enp-2 with 1 short apophysis on outer lateral margin, outer spines and distal seta of exp-3 modified as strong bare spines, exp-3 shorter than ♀. P4 (Fig. 8A) enp-2 with 4 setae, exp-2 with 1 plumose inner seta, exp-3 with 2 short inner setae, and outer spines on exp-3 longer than those in ♀.

Exopod of baseoendopod of P5 (Fig. 8B) fused, and forming one plate with 5 seta. P6 (Fig. 8C) asymmetrical, represented on both sides by small plate (fused to ventral wall of supporting somite on one side; articulating at base and covering gonopore on other side). Outer distal corner produced into short process bearing 1 bipinnate inner spine and 1 naked outer seta.

Etymology.—The species is named after Ms. Heejin Moon, in recognition of her excellent illustrations of harpacticoid copepods.

Discussion

Lang (1965) provided a key to species of *Heterolaophonte*, and since then several new species were added by Hicks (1975: *H. hamondi*), Mielke (1975: *H. bisetosa*; 1981: *H. serratula*), Chislenko (1976: *H. tupitskyi*), Letova (1982: *H. murmanica*), Huys (1990: *H. letovae*), Apostolov & Pandourski (2000: *H. livingstoni*), and Varela & Ortiz (2008: *H. lalanai*). According to the latest checklist (Wells 2007), the genus *Heterolaophonte* currently includes 33 species and 3 subspecies.

Heterolaophonte heejinae belongs to the '*stroemii*' group within the genus, with the character sets of the 7-segmented female antennule, caudal rami with 2 well-developed terminal setae, 2-segmented P1 exopod, typical pattern of sexual dimorphism in male P2 and P3, and 2-segmented P1 endopod in the male.

Heterolaophonte livingstoni Apostolov & Pandourski is closely related to *H. heejinae.* Additionally, *H. pauciseta* (originally described by Lang (1936) as *Laophonte pauciseta),* is also closely related to these two species, with the 7-segmented female antennule, presence of six setae on the female P2 and P3 exopod, and 2-segmented exopod of female P1.

However, *Heterolaophonte heejinae* can readily be distinguished from its congeners by the seta on the antennary exopod, spinules on the terminal claw of the P1 endopod, and the seta formation of the thoracic legs. *H. livingstoni* has three setae on the antennary exopod and one inner seta on the first endopod segment of P2 and P3, whereas *H. heejinae* has two plumose setae on the antenna and lacks an inner seta on the P2 and P3 endopods. Additionally, *H. pauciseta* has four setae on the 2-segmented antennary exopod, and the terminal claw of endopod of P1 is bare, whereas that of *H. heejinae* has fine spinules on outer edge. Moreover, *H. livingstoni* has a 3-segmented endopod in the P3 in the male, whereas *H. heejinae* and *H. pauciseta* have a 2-segmented endopod in the P3.

The swimming leg sexual dimorphism in the family Laophontidae is more highly developed than in any other family (Wells 2007). The species of *Heterolaophonte* also have the same sexual dimorphism in the exopods and endopods of swimming legs.

Wells (2007) reported that the P2–P4 setation is variable in Laophontidae, and morphological variation often occurs within a population, between the sexes and even between the right and left members of a pair of legs in a single individual. In the present study, morphological variations of *H. heejinae* have been investigated based on 42 female specimens. Among them, a total of 19% of the specimens have variations in the seta formulae of swimming legs; six specimens displayed a reduction in the number of setae on the distal endopodal segment of P2, and two specimens showed an additional inner seta on the exopodal segment 2 of P4.

The 33 species and 3 subspecies currently recognized as valid in the genus *Heterolaophonte* can be identified with the specific key suggested below (amended from Lang 1965 and Wells 2007). Among the currently known species, *H. rottenburgi* (T. Scott) and *H. insignis* (T. Scott) are omitted from the key due to the incomplete descriptions. In addition, Varela & Ortiz (2008) distinguished *H. lalanai* from *H. serratula;* however, we cannot discriminate these species on the basis of their published descriptions, and therefore *H. lalanai* is not included in the present key.

Key to species of the genus *Heterolaophonte*

Amended from Lang (1965) and Wells (2007)

1. P1 exopod 2-segmented 2
– P1 exopod 3-segmented 12
2. P4 exopod 2-segmented and endopod 1-segmented ..... *H. serratula* Mielke
– P4 exopod 3-segmented and endopod 2-segmented 3
3. P1 endopod terminal claw with hairs or spinules on outer edge ... 4
– P1 endopod terminal claw bare ... 6
4. Exopod-2 of P3 and P4 without inner seta; P4 endopod-3 with 3 setae ..... *H. heejinae*
– Exopod-2 of P3 and P4 with inner seta; P4 endopod-3 with 2 setae ... . *H. curvata* (Douwe) 5
5. Anal operculum bare .... *H. curvata curvata* (Douwe)
– Anal operculum with spinules on free border ..... *H. curvata micrarthros* (Marcus & Por)
6. P4 exopod-3 with only 2 outer spines ... 7
– P4 exopod-3 with 3 outer spines ... 8
7. P3 and P4 exopod-2 without inner seta ..... *H. brevipes* Roe
– P3 and P4 exopod-2 with inner seta ..... *H. furcata* Noodt
8. P5 exopod with 7 setae .... *H. phycobates* (Monard)
– P5 exopod with 6 setae 9
9. P4 exopod-2 without inner seta.... ..... *H. pauciseta* (Lang)
– P4 exopod-2 with inner seta 10
10. P5 baseoendopod with 4 setae..... ..... *H. exigua* (T. Scott)
– P5 baseoendopod with 5 setae ... 11
11. P4 end-3 with 4 setae ..... *H. livingstoni* Apostolov & Pandourski
– P4 end-3 with 3 setae .... *H. pygmaea* (T. Scott)
12. P5 baseoendopod with 6 setae..... ..... *H. australis* (T. Scott)
– P5 baseoendopod with 5 setae ... 13
– P5 baseoendopod with 4 setae ... 29
13. P4 endopod 1-segmented 14
– P4 endopod 2-segmented 15
14. P4 exopod-3 with 3 setae .... *H. denticulata* Roe
– P4 exopod-3 with 6 setae .... *H. longisetigera* (Klie)
15. P4 exopod-3 with 1 or 2 outer spines ... 16
– P4 exopod-3 with 3 outer spines ... 23
16. P4 exopod-3 with inner seta 17
– P4 exopod-3 without inner seta ... 20
17. P5 exopod about as long as greatest width 18
– P5 exopod at least 1.5 times as long as greatest width .... *H. stroemi paraminuta* (Noodt)
18. A2 exopod with 4 setae; P5 baseoendopod extending nearly to end of exopod .... *H. stroemi brevicaudata* (Monard)
– A2 exopod with 2 setae; P5 baseoendopod scarcely extending to middle of exopod 19

19. P4 exopod-3 with 6 setae .... *H. manifera* (C. B. Wilson)
– P4 exopod-3 with 4 setae .... *H. murmanica* Letova
20. P4 exopod-2 without inner seta .... *H. minuta* (Boeck)
– P4 exopod-2 with inner seta 21
21. Exopod-3 of P2 and P3 without inner setae; distal endopod of P2 with 2 setae ..... *H. letovae* Huys
– Exopod-3 of P2 and P3 with inner setae; distal endopod of P2 with 4 setae 22
22. Baseoendopod of P5 extending nearly to end of exopod, with many rows of spinules on anterior surface; exopod of P5 widened distally, about 1.2 times as broad as long .... *H. variabilis* Lang
– Baseoendopod of P5 extending to about middle of exopod; exopod of P5 vase-shaped, not widened distally, about 1.5 times as long as greatest width ..... *H. hamatus* Jakobi
23. Exopod-3 of P2 and P4 each with 5 setae and spines in all 24
– Exopod-3 of P2 and P4 armed differently 27
24. P2 endopod-2 with 4 setae 25
– P2 endopod-2 with 2 setae 26
25. P3 endopod-2 with 5 setae..... ..... *H. mendax* (Klie)
– P3 endopod-2 with 6 setae..... ..... *H. tenuispina* (Lang)
26. A2 exopod with 1 seta .... *H. bisetosa* Mielke
– A2 exopod with 2 setae .... *H. hamondi* Hicks
27. Exopod-3 of P2 and P4 with 6 and 5 setae and spines, respectively .... *H. littoralis* (T. & A. Scott)
– Exopod-3 of P2 and P4 each with 6 setae and spines .... *H. stroemi stroemi* (Baird)
– Exopod-3 of P2 and P4 with 6 and 7 setae and spines, respectively 28
28. P5 exopod subcircular; caudal rami only a little longer than broad .... *H. campbelliensis* (Lang)
– P5 exopod spatulate; caudal rami nearly twice as long as broad .... *H. oculata* (Gurney)
29. P4 exopod 2-segmented .... *H. norvegica* Drzycimski
– P4 exopod 3-segmented 30
30. A2 exopod with 3 setae .... *H. discophora* (Willey)
– A2 exopod with 1 or 2 setae 31
31. Exopod-3 of P2 and P4 each with 6 setae; P4 exopod-2 with inner seta ..... *H. uncinata* (Czerniavski)
– Exopod-3 of P2 and P4 each with 4 setae; P4 exopod-2 without inner seta ..... *H. tupitskyi* Chislenko

Acknowledgments

This work was supported by grants from the Polar Academic Program (PAP), KOPRI (Korea Polar Research Institute), National Research Foundation of Korea (Grant No. R01-2007-000-11140-0), the "Study of coastal fisheries resources and environmental ecology in the West Sea of Korea" by NFRDI (National Fisheries Research & Development Institute), and the "discovery of marine species project" by NFRDI for MABIK (Marine Biodiversity Institute of Korea). This work was also supported by the research fund of HYU (HY-2010-HYURS). The authors extend their appreciation to Ms. Hee Jin Moon (Hanyang University) for her great help in preparing the artwork.

Literature Cited

Apostolov, A., & I. Pandourski. 2000. *Heterolaophonte livingstoni* sp. n. (Crustacea, Copepoda, Harpacticoida) de la zone littorale de l'île de Livingstone, Antarctique.—Annali del Museo Civico di Storia Naturale "Giacomo Doria" Genoa 93:239–252.

Chislenko, L. L. 1976. Two new species of harpacticids from hyponeuston of Dalneselenetzkaja Bay (Barents Sea).—Issledovaniya Fauny Morei 18:94–101. [in Russian]

Hicks, G. R. F. 1975. A new species of *Heterolaophonte* Lang 1948 (Copepoda: Harpacticoida) from Blakeney Point, Norfolk, UK.—Norwegian Journal of Zoology 23:141–147.

Huys, R. 1990. Amsterdam expeditions to the West Indian Islands, Report 64. A new family of harpacticoid copepods and an analysis of the phylogenetic relationships within the Laophontoidea T. Scott.—Bijdragen tot de Dierkunde 60:79–120.

———, J. M. Gee, C. G. Moore, & R. Hamond. 1996. Marine and Brackish Water Harpacticoid Copepods: Part 1.—Synopses of the British Fauna (New Series) 51:1–352.

Lang, K. 1936. Copepoda Harpacticoida.—Swedish Antarctic Expedition 1901–1903, Further Zoological Results 3:1–68.

———. 1944. Monographie der Harpacticiden (Vorläufige Mitteilung). Almqvist & Wiksells, Uppsala, 39 pp.

———. 1948. Monographie der Harpacticiden. Håkan Ohlsson, Lund, 2 volumes, 1682 pp.

———. 1965. Copepoda Harpacticoida from the Californian Pacific coast.—Kungliga Svenska Vetenskapsakademiens Handlingar, Fjarde Serien 10:1–560.

Letova, V. N. 1982. Harpacticoida (Crustacea, Copepoda) from the mud-sandy littoral of the East Murman.—Issledovaniya Fauny Morei 29:46–75. [in Russian]

Mielke, W. 1975. Systematik der Copepoda eines Sandstrandes der Nordseeinsel Sylt.—Mikrofauna des Meeresbodens 52:1–134.

———. 1981. Interstitielle Fauna von Galapagos. XXVIII. Laophontinae (Laophontidae), Ancorabolidae (Harpacticoida).—Mikrofauna des Meeresbodens 84:1–106.

Scott, T. 1905. On some new and rare Crustacea from the Scottish seas. Pp. 141–153, *in* Twenty-third annual report of the Fishery Board for Scotland, being for the year 1904. Part III.—Scientific investigations. James Hedderwick & Sons Limited, Glasgow.

———. 1912. The Entomostraca of the Scottish National Antarctic Expedition, 1902–1904.—Transactions of the Royal Society of Edinburgh 48:521–599.

Varela, C., & M. Ortiz. 2008. Especie nueva de *Heterolaophonte* (Copepoda: Harpacticoida: Laophontidae) para Cuba.—Solenodon 7: 1–6.

Wells, J. B. J. 2007. An annotated checklist and keys to the species of Copepoda Harpacticoida (Crustacea).—Zootaxa 1568:1–872.

———, G. R. F. Hicks, & B. C. Coull. 1982. Common harpacticoid copepods from New Zealand harbors and estuaries.—New Zealand Journal of Zoology 9:151–184.

Associate Editor: Janet W. Reid.