



Benthic Ostracoda (Myodocopina, Philomedidae) of the East Sea (Sea of Japan), with description of a new species from the Korean Peninsula

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Abstract

The philomedid fauna of the East Sea (Sea of Japan) contains nine species, including four species of *Philomedes*, three of *Euphilomedes* and two of *Scleroconcha*. *Euphilomedes pseudosordidus* new species is described from the southeastern Korean shelf. It is closely related to *E. sordidus* (Müller 1890) but differs in size and ornamentation of the carapace, number and length of bristles, teeth and claws on the limbs, and structure of the mandible. Comparison is made between these two species. The distribution of philomedids is shown for the East Sea.

Key words: Ostracoda, Myodocopina, Philomedidae, taxonomy, distribution, East Sea (Sea of Japan), Korea

Introduction

The first contribution to the knowledge on Philomedidae from the East Sea (Sea of Japan) was made by Hiruta (1976), who gave a detailed description of *Euphilomedes nipponicus* Hiruta, 1976 and redescribed the poorly known *E. sordidus* (Müller 1890) from Oshoro Bay, Hokkaido. *E. nipponicus* was later recorded from the coastal zone of Amursky Bay and Peter the Great Bay (South Primorye) (Chavtur 1978). In 1980 Hiruta (1980) investigated the morphology of all larval stages of this species. Chavtur (1983) identified, described and illustrated seven species of Philomedidae of the East Sea from samples collected by Russian expeditions 1932–1978. Chavtur (1985) recorded three species of this family for the shelf zone of Monneron Island (near South Sakhalin). The recent data on distribution of the philomedids in the East Sea were published at the end of the last century (Chavtur 1992). All species cited above were collected near the Russian and Japanese coasts. At present the species composition of the suborder Myodocopina is unknown in Korean waters, and there is only one account (Lee *et al.* 2000) providing a preliminary list of myodocopines for the region and including 24 species (identified by Chavtur). The species preliminarily identified (by Chavtur in Lee *et al.* 2000) as *E. sordidus* (Müller 1890) in that list is described below as *E. pseudosordidus* new species. This species is closely related to *E. sordidus*. A comparison of characteristics of these two species is presented below. The distribution of philomedids in the East Sea is shown in Fig. 1.

Material

During the summer of 1997 vast numbers of ostracods were collected from shallow waters at depths less than 50 m along the east coast of the Korean Peninsula between Chumunjin and Pusan by E. I. Shornikov & E. H. Lee. The locations of stations and data are available in Lee *et al.* (2000).

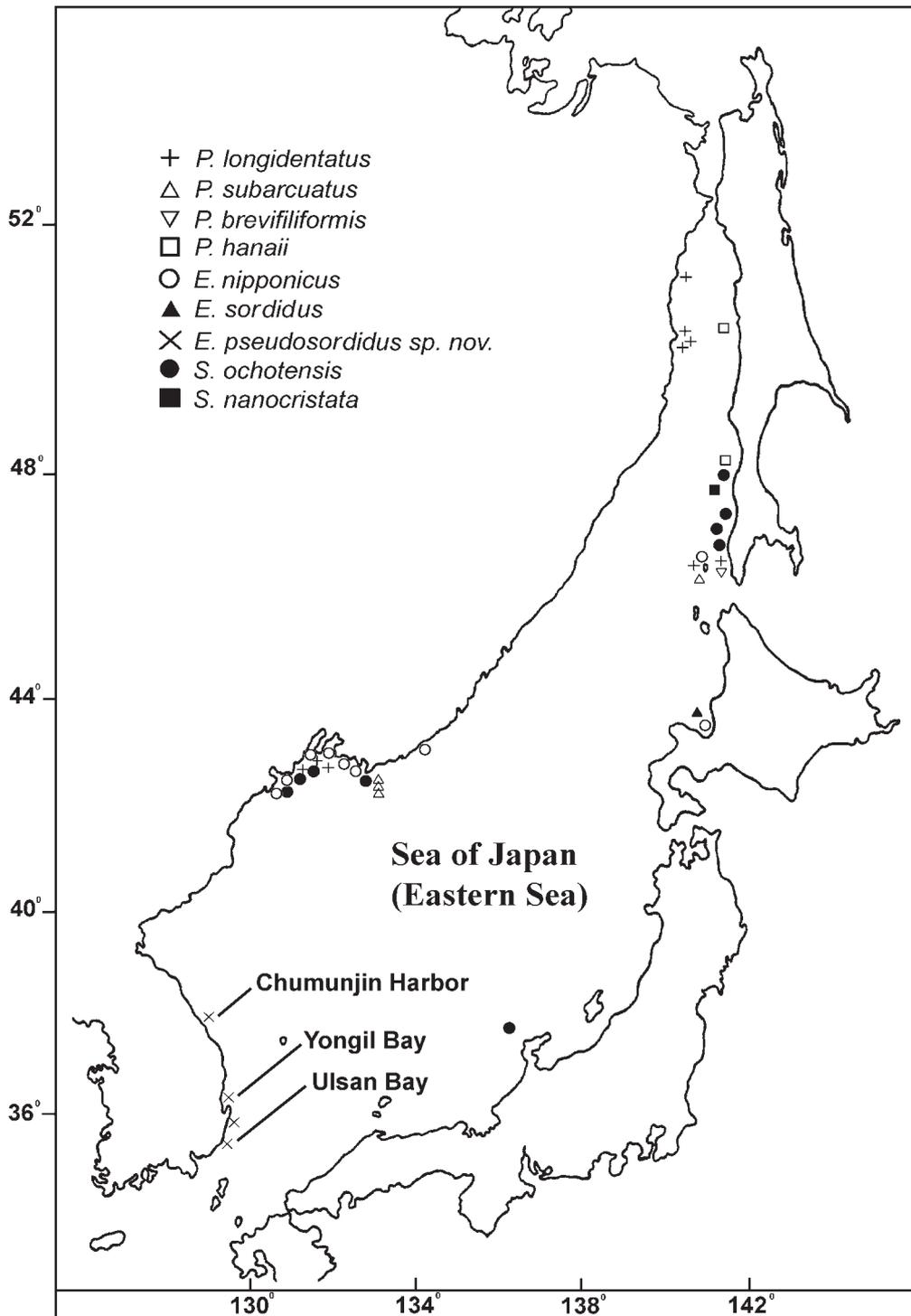


FIGURE 1. Map showing locations of stations containing ostracods of Philomedidae.

Taxonomy

Superorder MYODOCOPA Sars, 1866

Order MYODOCOPIDA Sars, 1866

Suborder MYODOCOPINA Sars, 1866

Family PHILOMEDIDAE Müller, 1912

Subfamily PHILOMEDINAE Müller, 1912

Genus *PHILOMEDES* Lilljeborg, 1853

Philomedes longidentatus Chavtur, 1983

Philomedes longidentata Chavtur, 1983: 22, 23, 25, 28, 39, 50–51, fig. 10, 3–10, table 2 (list); 1985: 58, 61, 62.

Distribution and Ecology. The species widely inhabits the subarctic waters of the northwestern Pacific at the salinity and temperature ranges of 33.4–33.9‰ and 0.6–12°C respectively (mainly muddy sand) (Chavtur 1983). In the East Sea (Sea of Japan) *P. longidentatus* was found (Fig. 1) in Peter the Great Bay (South Primorye, numerous samples collected between 42°30′–42°50′N and 131°15′–131°50′E) from 53 to 62 m (muddy sand, fine sand), in the Tatar Strait (51°21′N, 141°20′E; 50°49.4′N, 140°36.2′E; 50°03.3′N, 141°28′E and 50°00′N, 140°41.3′E) at a depth range of 43–145 m (muddy sand without or with an admixture of pebble and gravel), in the coastal waters of Monneron Island (46°17.8′N, 141°13.9′E; 46°17.5′N, 141°12.8′E and 46°15.2′N, 141°18′E) between 30–100 m (stone with sponges and bryozoans, broken shell and bryozoans) and near South Sakhalin (46°10′N) at 40 m (muddy pebble). It is known also for the Sea of Okhotsk (20–186 m) and Pacific Ocean from Hokkaido to Kamchatka (75–241 m).

Philomedes subarcuatus Chavtur, 1983

Philomedes subarcuata Chavtur, 1983: 24, 25, 28, 39, 41–43, figs. 5, 2–6 and 6, table 2 (list); 1985: 58, 62; 1987: 460, fig. 2, I–T.

Distribution and Ecology. In the East Sea *P. subarcuatus* occurs only in the deep zone (Chavtur 1983). Near Cape Povorotny (South Primorye: 42°37′N, 134°19.2′E; 42°41.7′N, 134°17.2′E and 42°51.1′N, 134°19.9′E) it was found at a depth range of 205–1130 m (mud) and southwest of Monneron Island (South Sakhalin) at 320 m (mud) (Fig. 1). The species is also known in the Sea of Okhotsk from 150 to 200 m (mainly mud with an admixture of sand). It occurs at the salinity and temperature ranges of 33.2–33.5‰ and –1.8–2.7°C respectively (Chavtur 1983).

Philomedes brevifiliformis Chavtur, 1983

Philomedes brevifiliformis Chavtur, 1983: 22, 24, 25, 27, 28, 39, 48–50, figs. 9, 2–9 and 10, 1–2, table 2 (list); 1992: table 2 (list).

Distribution and Ecology. In the East Sea *P. brevifiliformis* was found only in the coastal waters of Sakhalin Island (46°10′N) at a depth of 40 m (muddy pebble) (Fig. 1); it is also known from the Sea of Okhotsk (40–205 m), Pacific waters of the Kuril (47–105 m) and Aleutian (510–700 m) Islands (Chavtur 1983).

Philomedes hanaii Chavtur, 1983

Philomedes hanaii Chavtur, 1983: 25, 28, 39, 53–56, figs. 12 and 13, 1, table 2 (list); 1992: table 2 (list).

Distribution and Ecology. Known only from subarctic waters of the East Sea (Chavtur 1983, 1992); described from the Tatar Strait (47°59.5'N, 141°16.7'E and 50°13.1'N, 14°44.0'E) at a depth range of 125–300 m (muddy bottom) (Fig. 1).

Genus *EUPHILOMEDES* Poulsen, 1962

Euphilomedes sordidus (Müller, 1890)

Philomedes sordida Müller, 1890: 237–238, pl. 25, fig. 17, pl. 26, fig. 17, pl. 27, fig. 28, 33; 1912: 28.

Philomedes japonica; Kajiyama, 1912 (part): 613, fig. 16a.

Euphilomedes sordida; Poulsen, 1962: 359, 362, 363; Hiruta, 1976: 589–598, figs. 7–12; Hanai et al., 1977: 79; Chavtur, 1983: 23, 28, 61, 66, table 2 (list); 1992: table 2 (list).

Not *Philomedes sordida*; Brady, 1902: 186, table 24, fig. 23–26.

Distribution and Ecology. In the East Sea *E. sordidus* occurs only at Oshoro Bay, coast of Hokkaido (approximately 37°N–137°E, at a depth of 0–4 m, muddy sand) (Hiruta 1976). Also it is known from the coastal zone of Hakodate, Hokkaido (Müller 1890) and Mizaki, Honshu, Kanagawa Prefecture (Kajiyama 1912).

Euphilomedes nipponicus Hiruta, 1976

Euphilomedes nipponica Hiruta, 1976: 580–589, figs. 1–6; 1980: 156–166, figs. 12–23; Chavtur, 1978: 149; 1983: 23, 25, 28, 61, 62, table 2 (list); 1985: 58, 61; 1992: table 2 (list).

Distribution and Ecology. *E. nipponicus* is common in the coastal waters of the northwestern Pacific as a low-boreal species. In the East Sea it occurs in Peter the Great Bay at a depth range of 0–40 m (rocky bottom; fine, coarse, muddy sand; sand with an admixture of broken shell, pebble, plant detritus; *Zostera nana*; *Sargassum myabey*; *Phyllospadix iwatensis*; gravel with sand), in the Middle Primorye (43°20'N, 134°20'E) at the littoral (0–0.3 m; grass on rocks, sand with an admixture of pebble and detritus), off Monneron Island (46°17'N, 141°13'E) at 10–70 m (shell, rock, sand) (Chavtur 1983); and also this species was found at Oshoro Bay, coast of Hokkaido from 0 to 4 m (muddy sand) (Hiruta 1976, 1980). Besides, it is known (Chavtur 1983) from South Sakhalin and South Kuril Islands at a depth range of 0–100 m, mainly 0.5–25 m (sand or muddy sand without or with shell and algae; gravel with sand, bryozoans and sponges; rock and gravel without or with sponges, bryozoans and algae).

Euphilomedes pseudosordidus Chavtur, new species

(Figs. 2–13, tables 1, 2)

Euphilomedes sordida (Müller, 1890); Lee, Huh, Shornikov, 2000: 451 (list).

Not *Philomedes sordida* Müller, 1890: 237–238, pl. 25, fig. 17, pl. 26, fig. 17, pl. 27, fig. 28, 33; 1912: 28; Hiruta, 1976: 589–598, figs. 7–12;

Etymology. The species name “*pseudosordidus*”, from the Latin “*pseudo*” (=sham, seeming) and “*sordidus*” [=muddy], denotes the close similarity but not the identity to *E. sordidus* (Müller 1890).

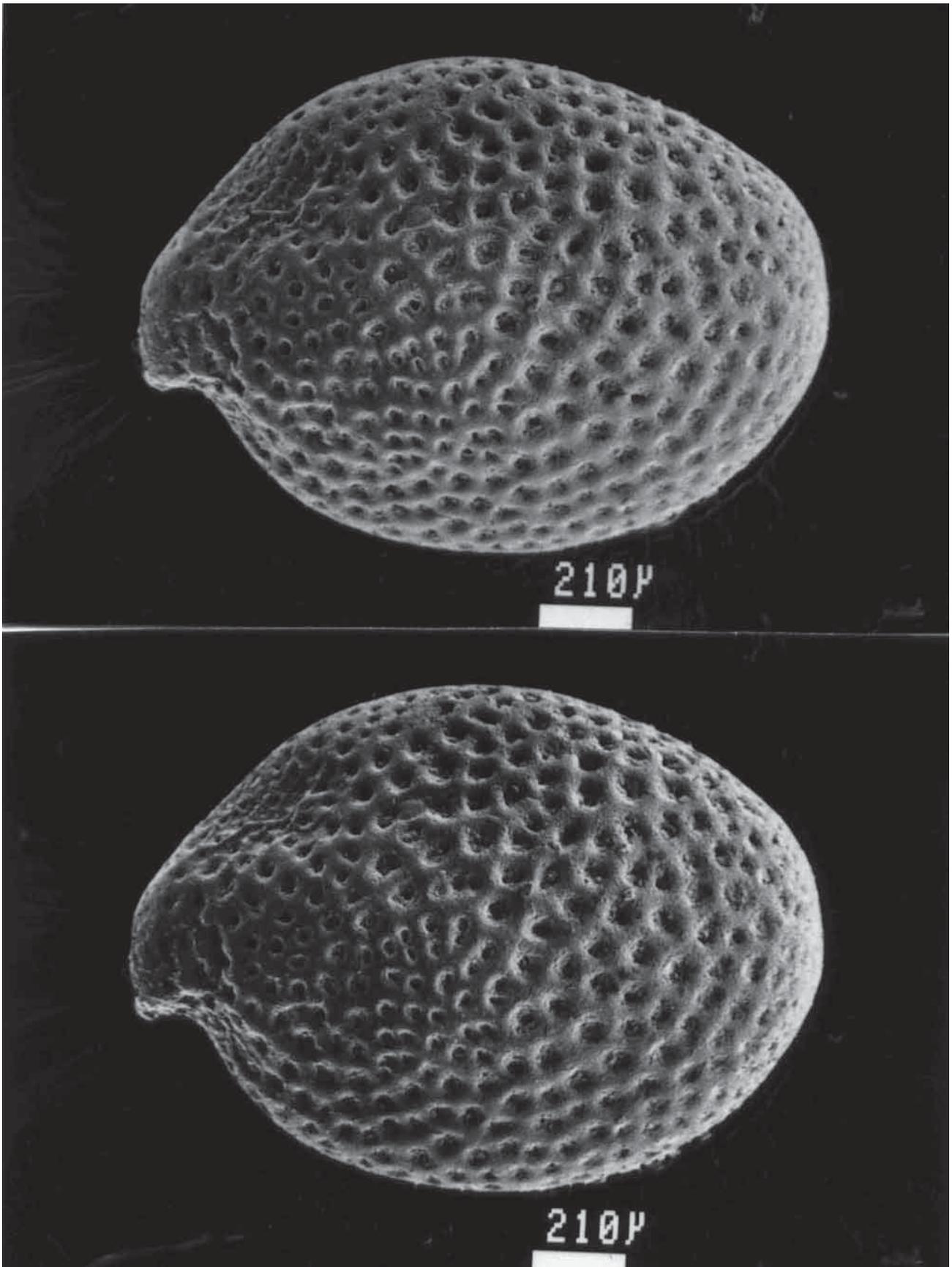


FIGURE 2. *Euphilomedes pseudosordidus* new species (Female: PLKU-0-2402). Stereo pair of the lateral view of left valve (scale bar = 210µm).

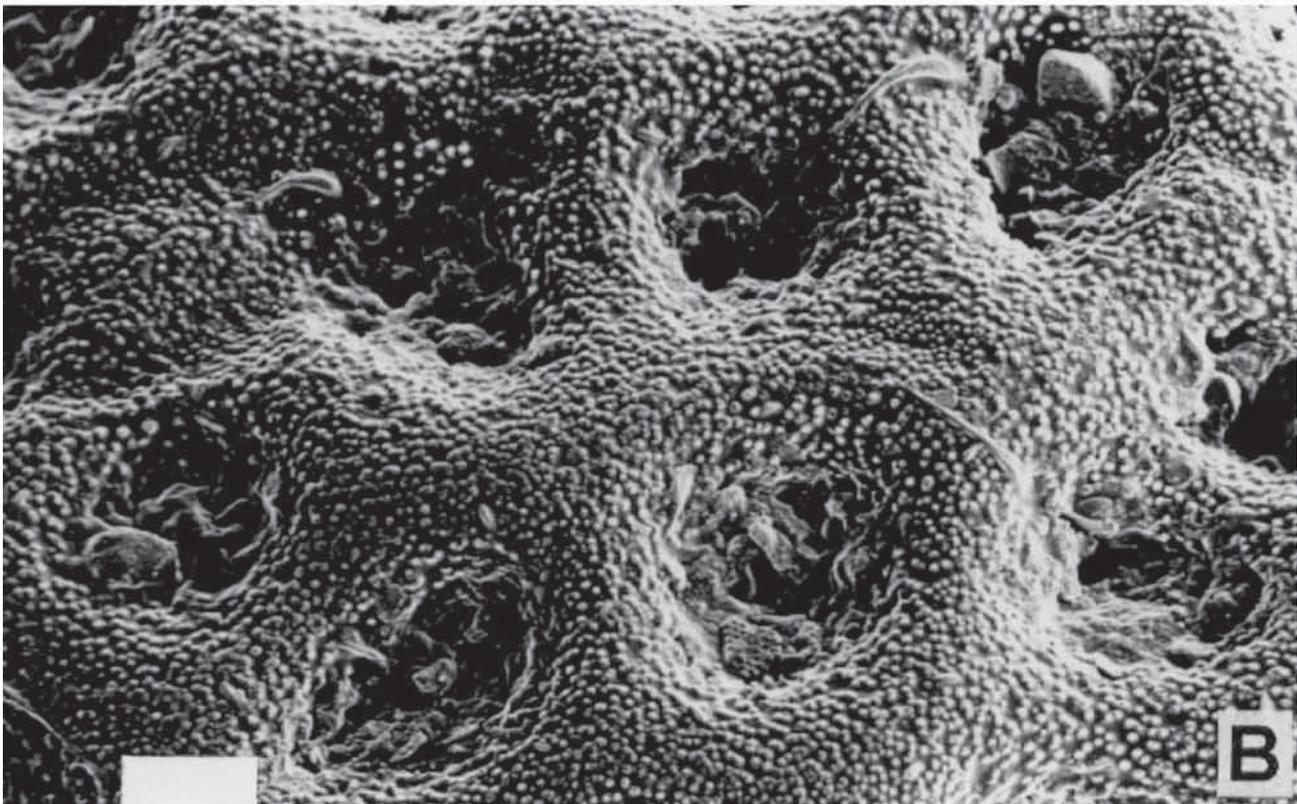
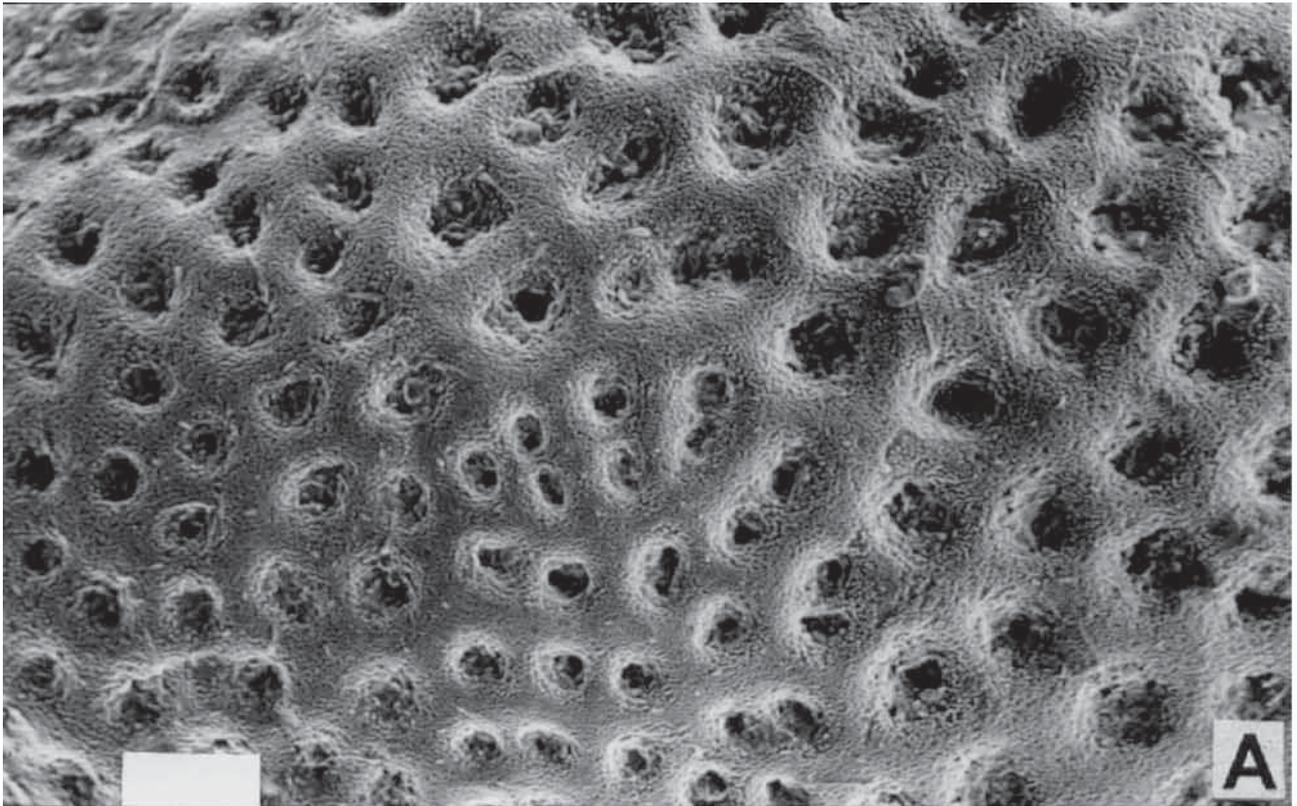


FIGURE 3. *Euphilomedes pseudosordidus* new species (Female: PLKU-0-2402). Details of the carapace exterior surface (scale bars: A=86mm, B=38mm).

TABLE 1. Station data of *Euphilomedes pseudosordidus* new species.

Station	Data	Position	Depth (m)	Substrate	Material
19	16.08.1997	37°53.54'N, 128°51.22'E (Chumunjin Harbor, Kangnung)	28	Coarse-grained sand	16 females, male, 138 juveniles (48 A-1, 62 A-2, 28 A-3)
48	23.08.1997	36°00.59'N, 129°2.21'E (Yongil Bay, Pohang)	12	Brown mud, many coal particles	2 females, male and 6 juveniles (4 A-1, 1 A-2, 1 A-3)
52	23.08.1997	36°01.20'N, 129°29.04'E (Yongil Bay, Pohang)	18.8	Grey mud with shell, moderate amount of coal particles	22 juveniles (10 A-2, 1 A-3, 11 A- 4)
55	23.08.1997	36°04.35'N, 129°28.04'E (Yongil Bay, Pohang)	22.5	Fine-grained sand, many polychaete tubes and little coal particles Fine-grained sand with black mud layer (H ₂ S), large amount of polychaete tubes	juvenile (A-3)
59	23.08.1997	36°03.08'N, 129°23.19'E (Yongil Bay)	7		3 juveniles (1 A-1, 2 A-2)
61	24.08.1997	36°06.06'N-129°26.54'E (Yongil Bay)	15.5	Rocky bottom with algae	18 females, 2 males, 61 juveniles (60 A-1, 1 A-1)
66	24.08.1997	36°04.43'N-129°32.25'E (Yongil Bay)	25.5	Gravel with shells	female, 25 juveniles (1 A-1, 22 A- 2, 2 A-3)
70	25.08.1997	35°59.28'N, 129°27.30'E (Yongil Bay, Pohang)	1.0	<i>Phyllospadix</i> and algae (polluted water, thin film of oil on the surface of water	16 females, 2 males, 75 juveniles (42 A-1, 8 A-2, 18 A-3, 7 A-4)
73	26.08.1997	35°29.27'N, 129°29.25'E (Ulsan Beach, Ulsan)	1-3	<i>Phyllospadix</i> , algae (consist mainly of <i>Caulerpa</i>)	2 females
76	26.08.1997	35°28.08'N, 129°25.03'E (Ulsan Bay, Ulsan)	15.5	Coarse-grained sand with rocks and algae	12 females, male, 15 juveniles (6 A-1, 2 A-2, 2 A-3, 5 A-4)

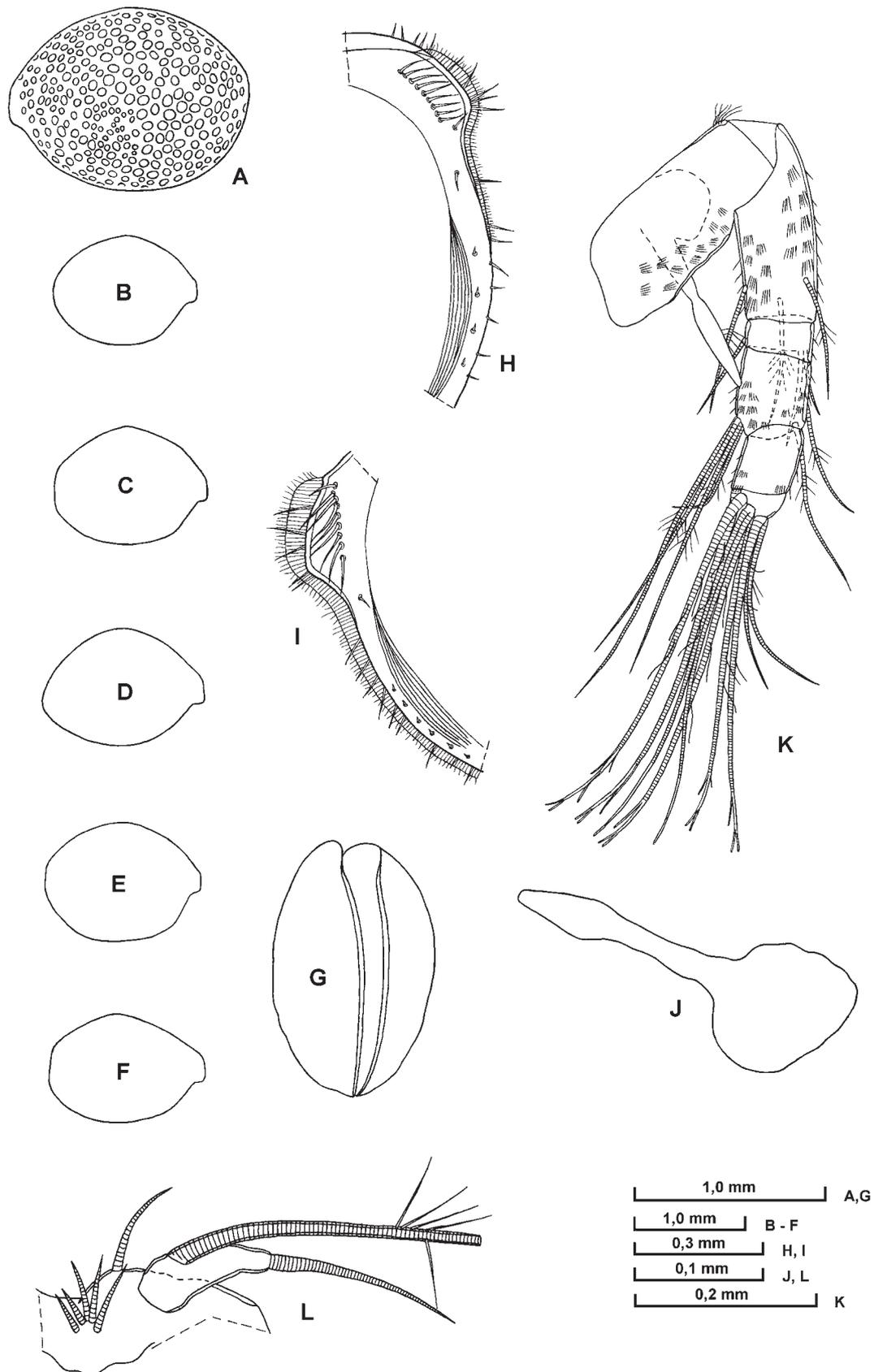


FIGURE 4. *Euphilomedes pseudosordidus* new species (Female: A and B, IMB 2789; C, IMB 2791; D, IMB 2788; E, IMB 2787; G-I, IMB 2789; L and J, IMB 2785; K, IMB 2786). A, lateral view of the left valve; B-F, lateral view of the right valve; G, ventral view of the valves; H and I, inside view of the anterior part of left and right valves; J, Bellonci organ and medial eye; K, Bellonci organ and first antenna; L, endopodite of the second antenna.

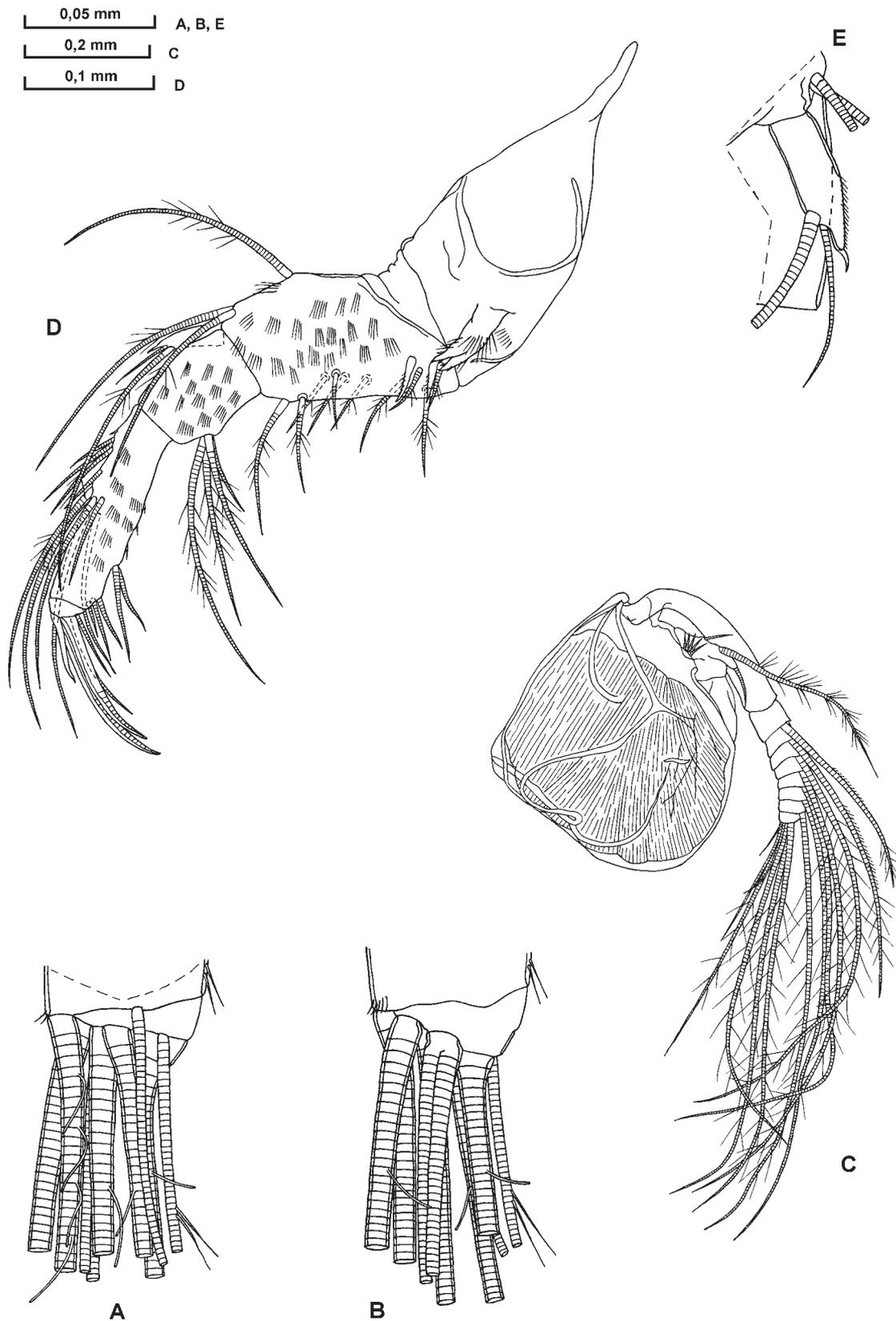


FIGURE 5. *Euphilomedes pseudosordidus* new species (Female: A, B and E, IMB 2786; C and D, IMB 2785). A and B, medial and lateral views of the distal part of the first antenna; C, second antenna; D, mandible; E, exopodite of the mandible.

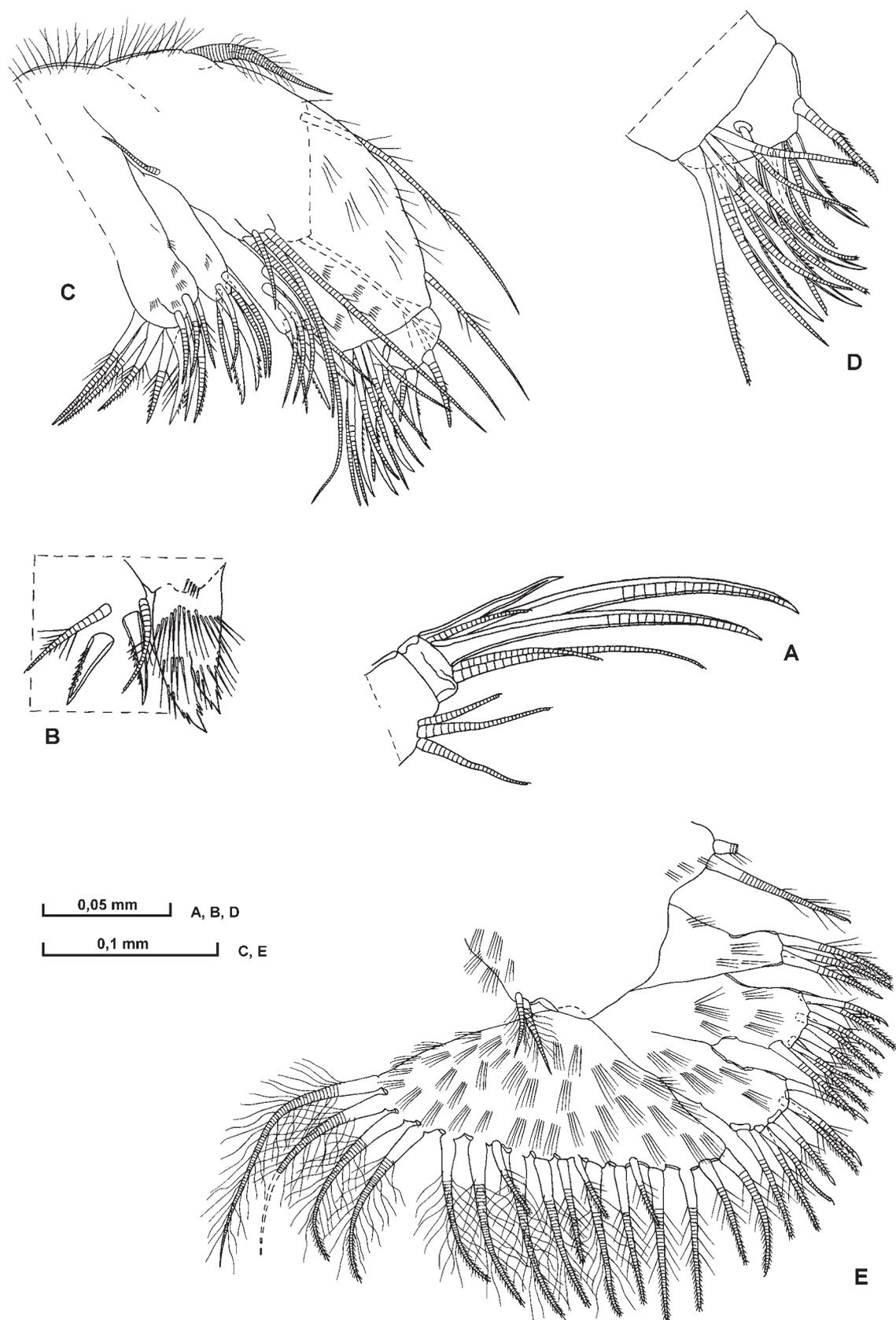


FIGURE 6. *Euphilomedes pseudosordidus* new species (Female: A – D, IMB 2786; E, IMB 2785). A, distal part of the mandible; B, coxale endite and adjacent surface of the basal of mandible; C maxillula; D, distal part of the maxillula; E, sixth limb.

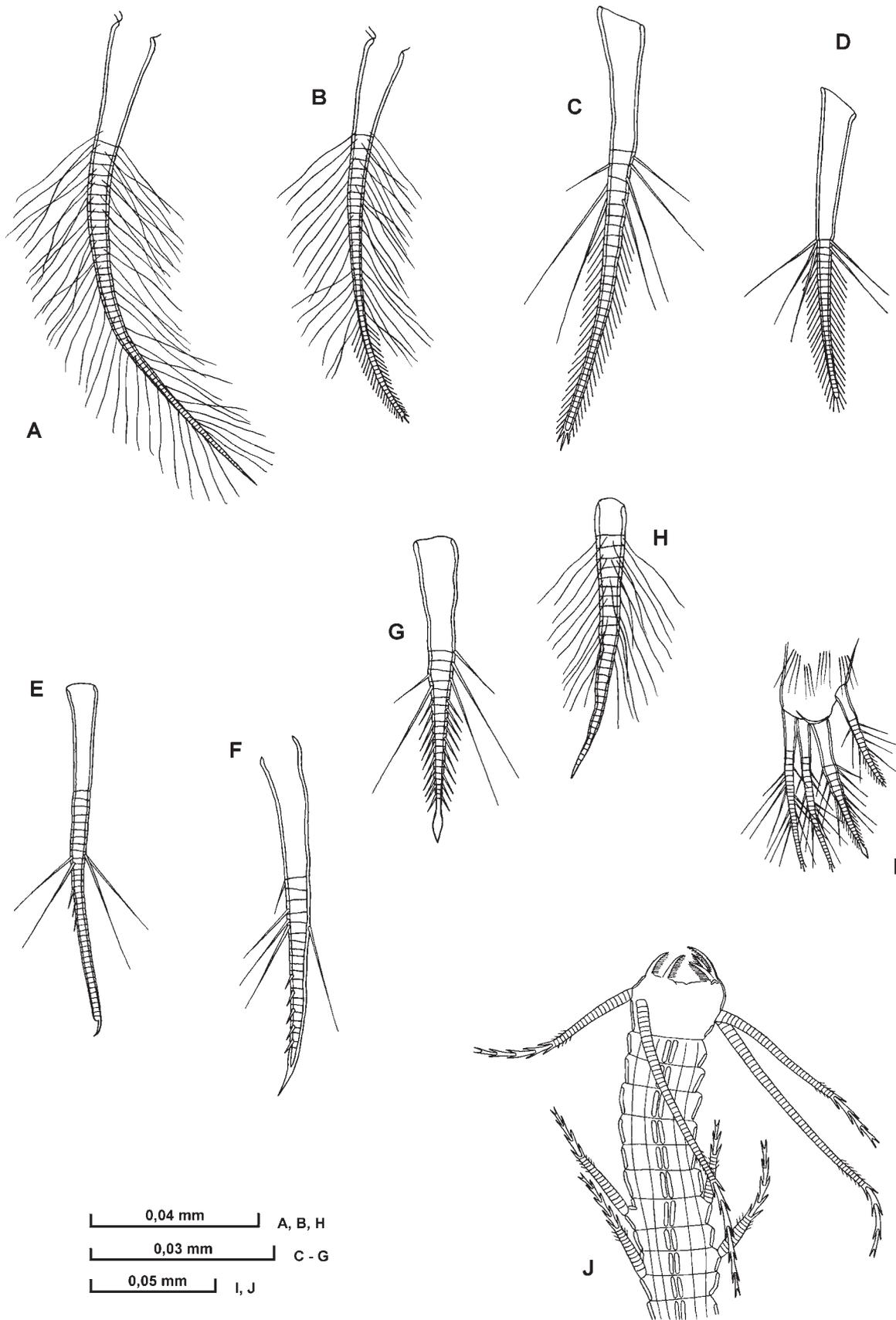


FIGURE 7. *Euphilomedes pseudosordidus* new species (female: A-I, IMB 2785; male: J, IMB 2784). A-H, bristles of the sixth limb; I, second endite of the sixth limb; J, seventh limb.

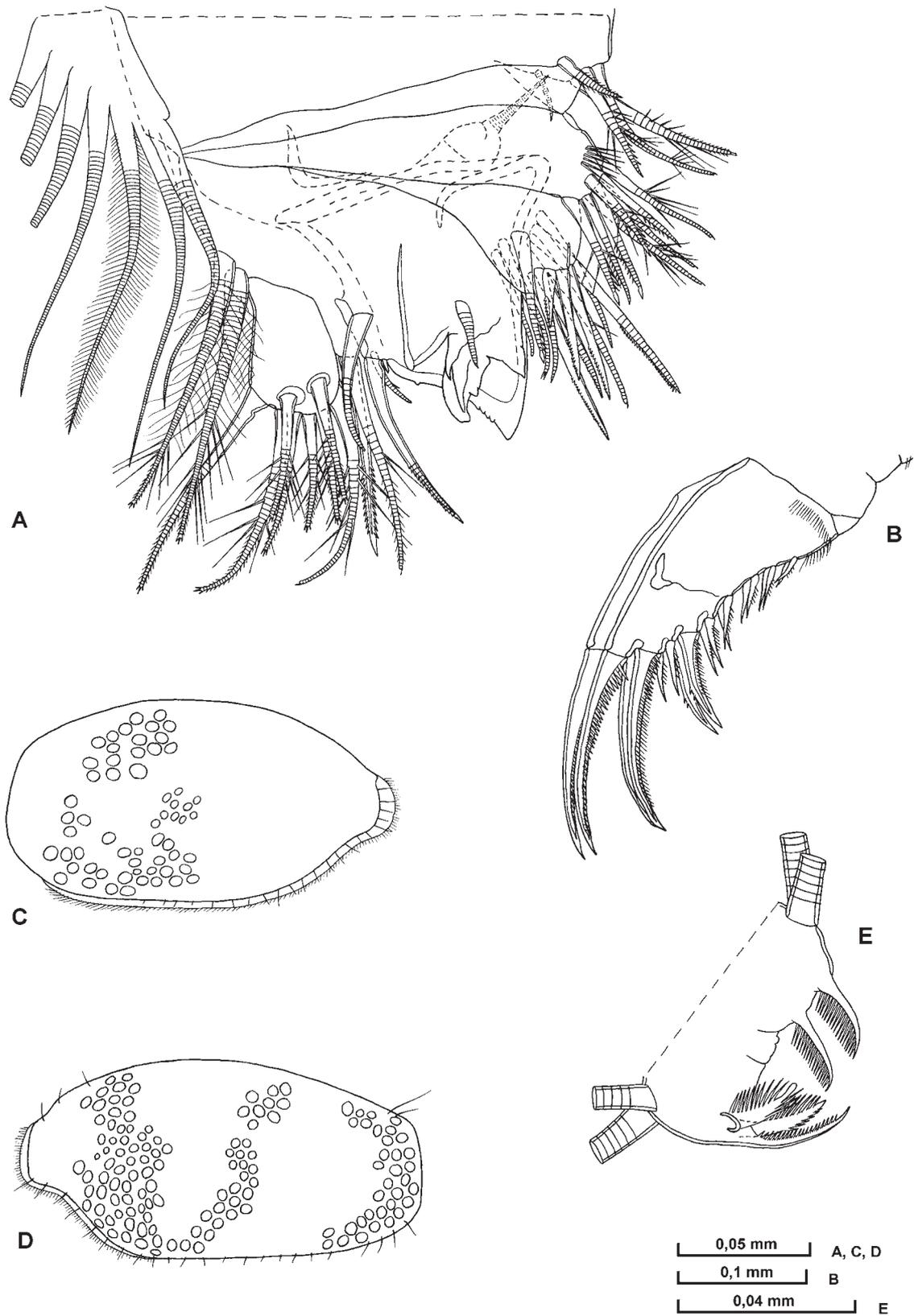


FIGURE 8. *Euphilomedes pseudosordidus* new species (Female: A, IMB 2786; B, IMB 2785; male: C-E, PLKU 0.2401). A, distal part of the second maxilla; B, furca; C and D, lateral view of the right and left valves; E, distal part of the seventh limb.

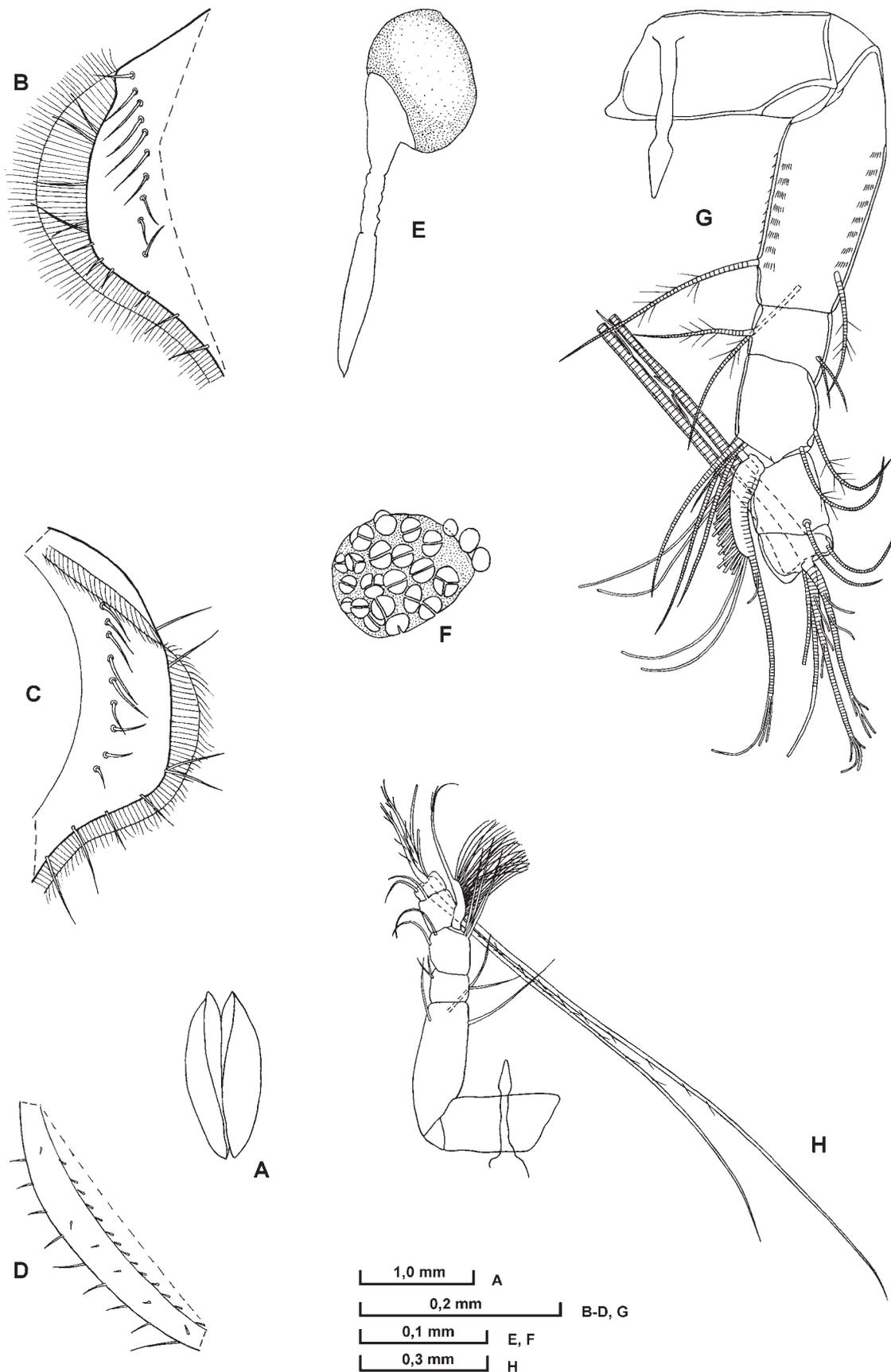


FIGURE 9. *Euphilomedes pseudosordidus* new species (Male: A-F, PLKU 0.2401; G and H, IMB 2784). A, ventral view of the shell; B and C, inside view of the rostrum of right and left valves; D, anteroventral part of the inner lamella of right valve; E, Bellonci organ and medial eye; F, lateral eye; G and H, Bellonci organ and first antenna.

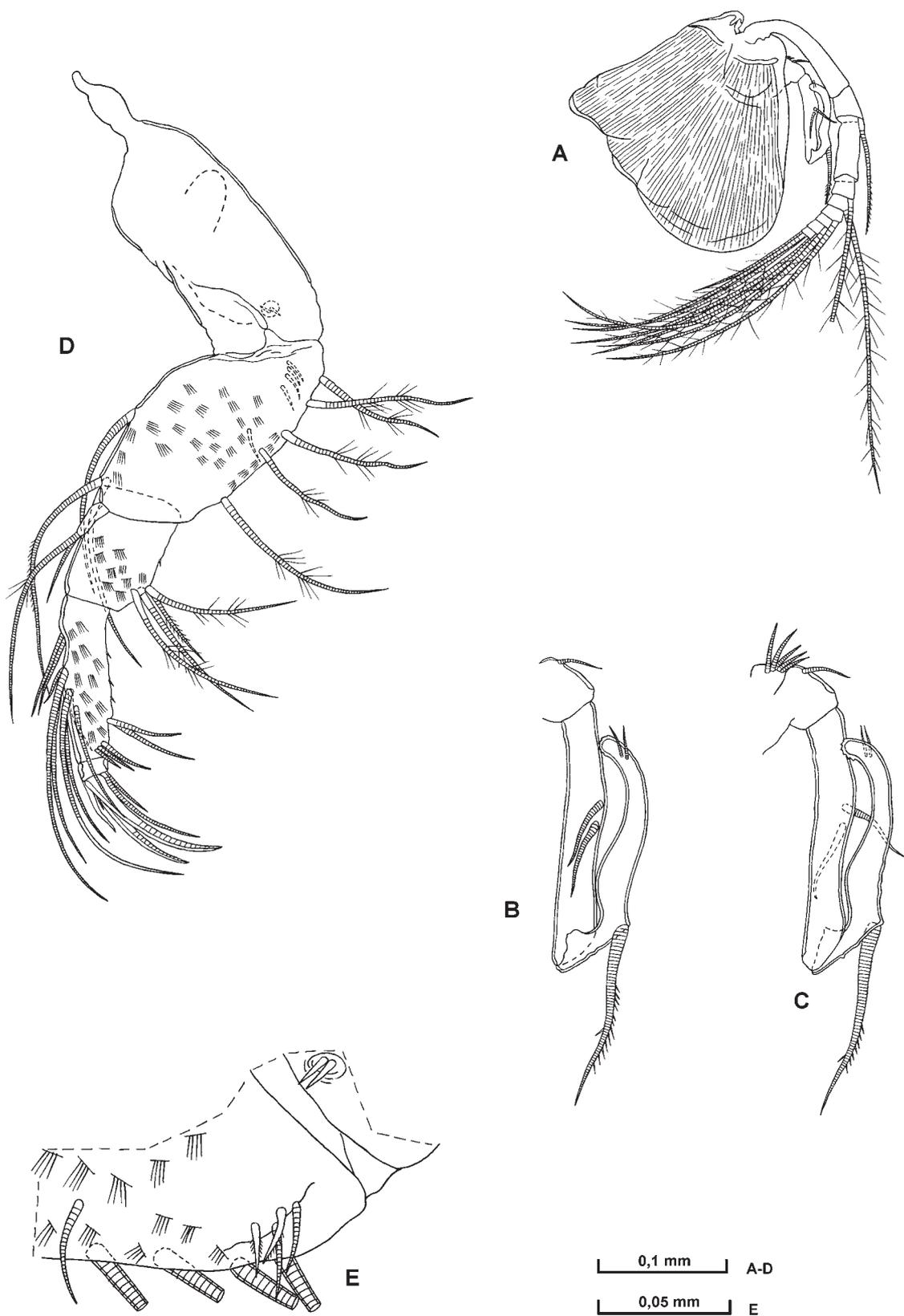


FIGURE 10. *Euphilomedes pseudosordidus* new species (Male: A-D, PLKU 0.2401; E, IMB 2784). A, second antenna; B and C, endopodite of the second antenna; D, mandible; E, coxale endite and adjacent surface of the basal of mandible.

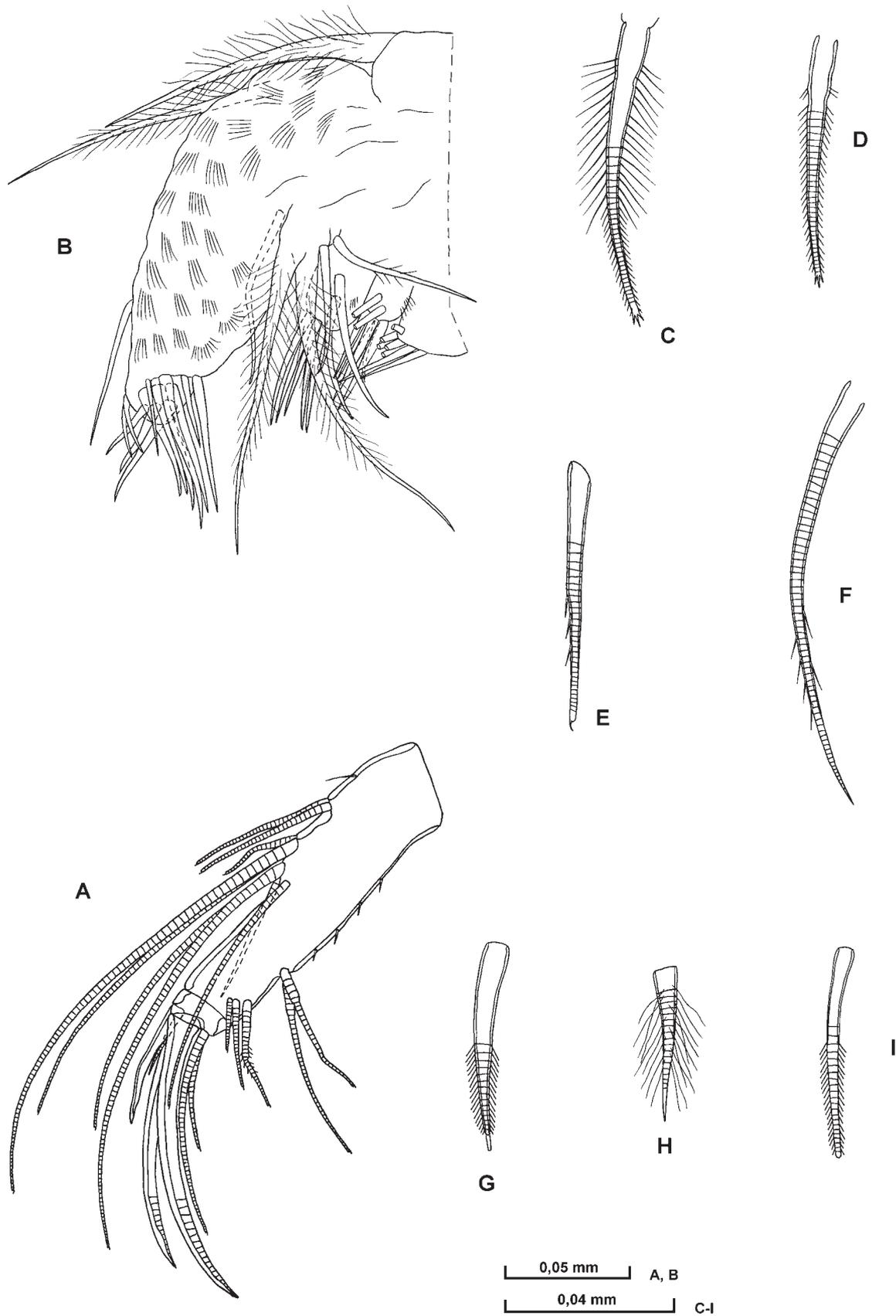


FIGURE 11. *Euphilomedes pseudosordidus* new species (Male: A,C-I, PLKU 0.2401; B, IMB 2784). A, endopodite of the mandible; B, maxillula; C-I, bristles of the sixth limb. The number of different types of bristles can be in the future the morphological attribute distinguishing species of this genus.



FIGURE 12. *Euphilomedes pseudosordidus* new species (Male: A-D, PLKU 0.2401). A, exopodite of the mandible; B and C, distal part of the second maxilla; D, sixth limb.

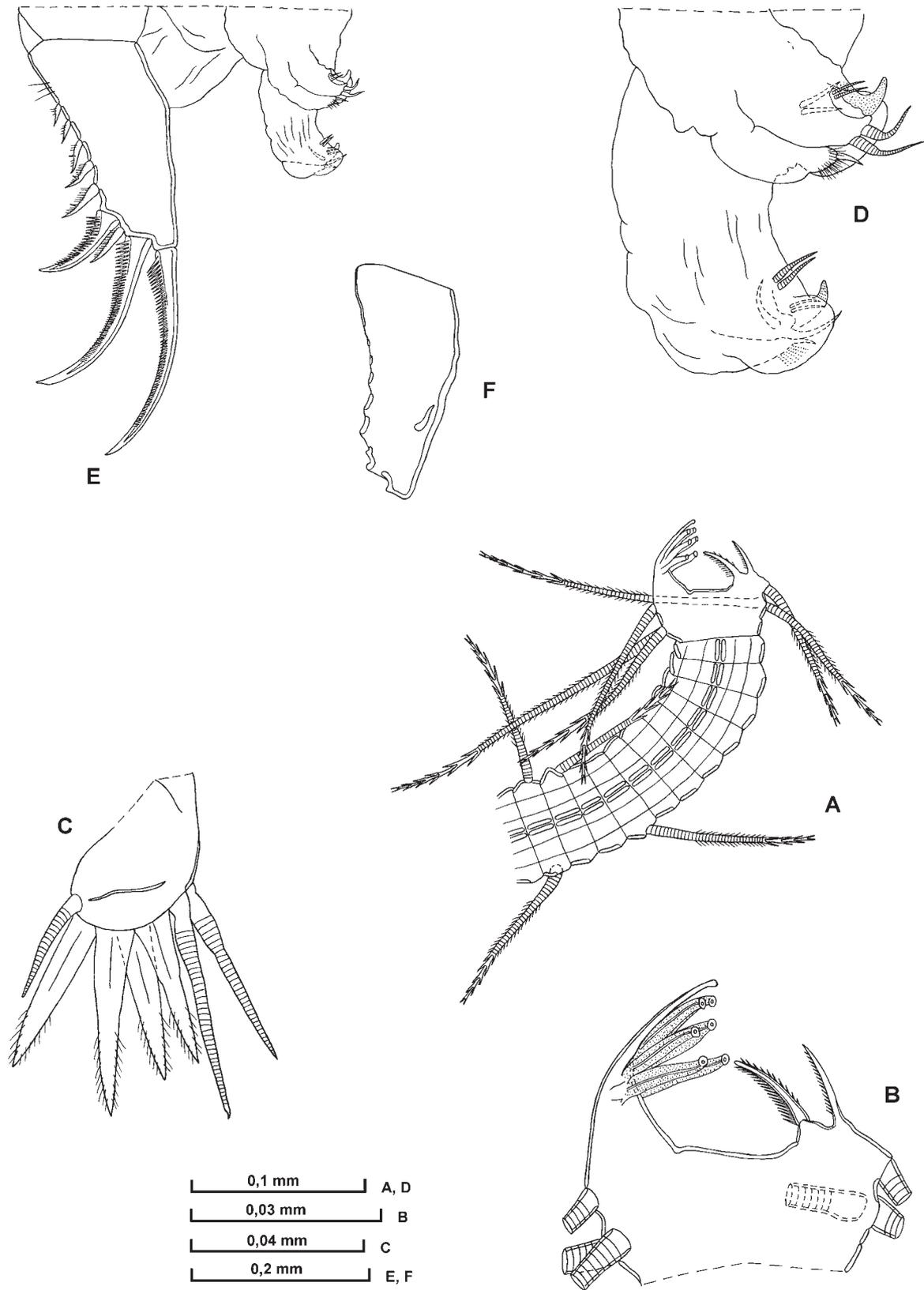


FIGURE 13. *Euphilomedes pseudosordidus* new species (Female: A and B, IMB 2786; male: C-F, PLKU 0.2401). A, seventh limb; B, distal part of the seventh limb; C, first endite of the maxillulla; D, copulatory appendages; E, copulatory appendages and right furcal lamella; F, left furcal lamella (claws not shown).

TABLE 2. The comparison of the characteristics of *Euphilomedes pseudosordiusa* new species and *E. sordidus* (Müller 1890).

Character	<i>E. pseudosordidus</i>	<i>E. sordidus</i> (on Hiruta 1976)
Female		
<i>Carapace</i> , length (mm)	1.25–1.50	1.59–1.63
Height (mm)	0.95–1.05	1.19–1.23
Height (%) of length	68–78%	about 75%
number of anterior striations on inner lamella	7	5
tiny bristles(spines) on anterior part of inner lamella	present	absent
size of oval pits on surface of valves	moderate	large
Bellonci organ	fused with the medial eye	separated by suture from medial eye
<i>First antenna</i> , 4 th segment	short ventral seta extends beyond end of limb	short ventral seta does not reach end of limb
<i>Second antenna</i> , exopodite	setae on 2nd and 3rd segments bear distal natatory hairs	setae on 2nd and 3rd segments without natatory hairs
endopodite	terminal seta is about 1.5 of the length of 2nd segment	terminal seta is 1.5 times (or longer) of the length of 2nd segment
<i>Mandible</i> , exopodite	slightly more than one half of the length of 1st endopodite segment	about one-third of the length of 1st endopodite segment
<i>Maxillula</i> , 3rd endite	7 setae	10 setae
terminal endopod segment	4 claws	3 claws
<i>Second maxilla</i> , 2nd segment	with three setae and small tooth on distolateral corner	with one seta on distolateral corner
<i>Sixth limb</i> , 4th endite	16–18 setae	19–24 setae
<i>Seventh limb</i> , terminal comb	7 teeth	8 teeth
Male		
<i>Carapace</i> , length (mm)	1.32–1.50	1.58–1.63
Height (mm)	0.77–0.80	0.91–0.98
Height (%) of length	51–60	about 60
size oval pits on surface of valves	moderate	small
<i>Second antenna</i> , endopodite	1st and 2nd segments are subequal in width	2nd segment is thinner than 1st segment
2nd segment	stout proximal seta	slight proximal seta
<i>Mandible</i> , coxale endite	2 separated spines	bifurcate
basale	5 ventral setae	6 ventral setae
<i>Second maxilla</i> , 4th segment	5 short and 1 long setae	6 short and 1 long setae
<i>Sixth limb</i> , 3rd endite	6 setae	7–8 setae
<i>Seventh limb</i> , terminal comb	3 teeth	7 teeth
Furca	9 claws	7–8 claws

Holotype. 0.2401 PLKU, adult male, length 1.50 mm, appendages are mounted on slide and valves are preserved in alcohol, stored in the collection of the Paleontological Laboratory, Department of Earth and Environmental Sciences, Korea University (PLKU).

Type-locality. Imgok, Pohang, St. 70, 35°9.28'N, 129°27.30'E, depth 1 m, substrate of *Phyllospadix* and algae, 25 August 1977, coll. E. I. Shornikov and E.-H. Lee.

Paratypes. Paleontological Laboratory, Department of Earth and Environmental Sciences, Korea University: 0.2402 PLKU, adult female left valve in a cardboard cell slide (length 1.50 mm), St. 73, 35°29.27'N, 129°29.25'E, depth 3 m, 26 August 1977. 0.2403 PLKU, adult female (1.45 mm), 0.2404 PLKU, adult female (1.40 mm) and PLKU 0.2405, adult female (1.41 mm) preserved in alcohol, location as in holotype. The Museum of the Institute of Marine Biology, Vladivostok, Russia: IMB 2784, adult male (1.41 mm), IMB 2785, adult female (1.48 mm), IMB 2786, adult female (1.49 mm), IMB 2787, adult female (1.42 mm), IMB 2788, adult female (1.30 mm), IMB 2789, adult female (1.40 mm), IMB 2790, adult female (1.42 mm) and IMB 2791, adult female (1.42 mm) location as in holotype, appendages are mounted on slide and valves are preserved in alcohol.

Additional material (paratypes) is listed in table 1.

Diagnosis. Carapace rounded, surface with oval medium-size pits; length of adult female 1.25–1.50 mm, of adult male 1.32–1.50 mm. Female: Bellonci organ fused with the medial eye; short ventral bristle on fourth segment of 1st antenna extends beyond end of limb; exopodite of mandible more than one half of the length of first endopodite segment; third endite of maxillula with 7 bristles, and terminal endopod segment with 4 claws; second segment of second maxilla with 3 bristles and small tooth in distolateral corner; fourth endite of sixth limb with 16–18 bristles; terminal comb of seventh limb with 7 teeth. Male: second segment of 2nd antenna with stout proximal bristle; coxale endite of mandible with 2 separated spines, and basale with 5 ventral bristles; fourth segment of second maxilla with 5 short and one long bristles; third endite of sixth limb with 6 bristles; terminal comb on seventh limb with 3 teeth; furca with 9 claws.

Description of adult female. *Carapace* (Figs. 2, 3, 4A–I). Shape and size vary exceedingly. Lengths 1.25–1.50 mm. Carapace oval in lateral and ventral views, with greatest height (68–78% of the length) at midlength, with prominent rostrum and shallow rostral incisure. Dorsal margin well arched. Left valve overlaps right valve along anterodorsal margin. Hingement not distinct. Surface of valves with numerous large oval pits, most of which are larger than individual scars of adductor muscle and some of which in the area of adductor muscle are small. Inner lamella behind rostrum with row of 9–10 long bristles and separated short bristle. Anterior part of inner lamella with row of some tiny bristles (spines) and with 7 striations.

Bellonci organ (Fig. 4J,K). It relatively short, swelling in distal third or near half of the length, and tapering distally. Capitulum section fused to a stem, and rounded or slightly pointed at the tip. Bellonci organ attached to ventral part of medial eye.

Eyes. (Fig. 4J). Medial eye large, with dark brown pigments. Lateral eyes small, with orange red tint and without ommatidia.

First antenna (Figs. 4 K; 5 A, B). First segment slightly longer than second and with clusters of hairs on ventrolateral surface and some long hairs on distodorsal surface. Second segment with same clusters of hairs on broad surface and with one distodorsal (on Fig 4K shown as dotted bristle), one distolateral and one distoventral bristles. Third segment very short and bare (or almost bare) and with 2 dorsal (one of which is short and the other moderately long) and one ventral (moderately long) bristles. Surface of the fourth segment with a number of clusters of short hairs and 2 long distodorsal, 3 long distoventral and one short bristles. Last short bristle extends well beyond the end of the limb. Fifth segment almost bare and with one stout, long S-shaped bristle with 4 sensory filaments. Bristle of the sixth segment about 1/3 the length of the limb. Seventh segment with a-, b- and c-bristle, of which a-bristle as long as bristle of the preceding segment; 2 other bristles long, stout and with 3 sensory filaments. The b-bristle subequal to the S-shaped bristle, and c-bristle somewhat shorter than it. Terminal segment with 4 long bristles of scarcely equal length, of which e- and d-bristles bare, whereas f- and g-bristles with 3 sensory filaments.

Second antenna (Figs. 4L; 5C). Posterodorsal angle of protopodite distinct and about 90°. Exopodite nine-segmented. First segment longer than following segments combined; second to ninth segments with long bris-

gles. Bristles of the second and third segments with anterior denticulation in medial part and with natatory hairs distally; bristles of fourth to eighth segments with natatory hairs; terminal segment with 7 bristles, 4 of which long and with natatory hairs, the remaining 3 bristles short, without hairs and different in length. Endopodite two-segmented. First segment with cluster of 5 short proximal bristles and one distal moderately long bristle. Second segment elongate, with long bristle with wreaths of stiff hairs near anteroproximal edge, and with one distal strong and bare bristle about 1.4 times longer than the second segment.

Mandible (Figs. 5D,E; 6A,B). Coxale endite large, stout and bifurcate, with secondary teeth and clusters of long spinules; with row of small spinules near coxale base. Basale: surface with clusters of hairs; ventral margin with 7 bristles (with wreaths of hairs each), of which the distal one longest, 3 short, and 3 others moderately long; dorsal margin with 3 long bristles (with wreaths of hairs each), one of these bristles at midlength of margin, others at distal edge; medioproximal surface with 2 short bristles (both with wreaths of hairs) and 2 claws with secondary teeth; mediocentral surface with short bare bristle. Exopodite relatively thick and somewhat longer than a half of the length of first endopodite segment, with terminal curved spine and 2 bristles, one of which short bare and somewhat extending beyond distal end of first endopodite segment, the other of which long, with stiff hairs in the third proximal part, reaching approximately the distal edge of second endopodite segment; distodorsal margin with a row of fine hairs. Endopodite three-segmented; first one about one half the length of second, with combs of hairs on broad inner surface and with 4 bristles on distoventral edge, one of which short bare, the remaining 3 long with wreaths of stiff hairs. Second segment with the same combs of hairs on inner surface, and with 9 (10, as exception) bristles on dorsal margin, which are separated into 2 groups, 2 (rare 3) short bristles in proximal group, one short and 6 long bristles in distal group near midlength of margin, and with 2 clusters of bristles on ventral margin, 2 bristles in proximal group and 3 in terminal group. Terminal segment very small, with 2 long stout medial claws, with one short slightly dorsal claw and 3 bristles, one (ventral) of which longer than others.

Maxillula (Figs. 6C,D) Dorsal surface of precoxale and coxale with long fine hairs; coxale with thick distodorsal plumose bristle; basale with one short bare proximal bristle and 3 long distal bristles with wreaths of hairs each. Three endites: first one with 10 bristles (3 stout, with denticulation); second one with 6 bristles (2 stout, with denticulation); third one with 7 bristles (2 stout, with denticulation). Exopodite rather small with one short bare bristle and 2 long bristles with stiff hairs each, reaching the distal ends of endopodite bristles. First endopodite segment elongate, with some combs of long hairs on the anterior surface and short hairs on the lateral surface, and with one alpha-bristle with wreaths of long hairs and 4 juxtaposed beta-bristles of different length. Second endopodite segment small with 4 claws (one b-bristle and 3 d-bristles) of different length on distal edge, and with 7 bristles, of which b-bristle near anterior edge, 2 a-bristles of different length near posterior edge, and 3 c-bristles of different length and one very long stout distal d-bristle near distal edge.

Second maxilla (Fig. 8A). Epipodial appendage with 43–46 plumose bristles. First exopodite segment: main tooth with 4 constituent teeth, one (anterior) of which very stout and broad, 2 other slender, and the remaining one bristle-like with pointed tip; with 3 bristles, 2 bristles near midlength of anterior side and singular (very broad proximally) near upper edge. Second segment posteriorly with a group of one long, stout bristle with distal denticulation, one short slight bare bristle, and one tiny peg, and proximally with moderately long stout bristle. Third segment with 2 long plumose bristles on outer margin and 2 long usual bristles (one of which with distal denticulations) on inner margin. Fourth and fifth segments with 5 moderately long bristles of usual type and 2 long stout ones (all these bristles with wreaths of stiff hairs in the middle parts) and with distal short hairs; outer surface of segments with long hairs. Endites: first one with 5 bristles, second one with 8 bristles, and third one with 12 bristles.

Sixth limb. (Figs. 6E; 7A–H,I) Limb with bristles of various types as exemplified by letters in Fig. 7. Epipodial appendage with one or 2 short, plumose H-bristles. First endite small, and other endites long and well-developed; first endite with 2 bristles (bristle: 1H+1E; position them from anterior to posterior part of limb), second one with 3 to 4 bristles (2 or 3C+1G), third one with 8 bristles (1F+1C+1F+1C+1G+1E+2C), and

fourth one with 7 bristles (2F+1C+1G+1E+2C); all endites with clusters of hairs. Terminal segment triangular, with 16 to 18 bristles (1E+2 or 3C+1D+1C+1B+1D+0?A or 1C+2B+1D+4B+2A); surface with clusters of long hairs.

Seventh limb (Fig. 13A,B) with 3 bristles of different length in each of 2 distal groups and 2 proximal bristles of an equal length on each side; bristles with 4 to 6 bells, and dense rows of short marginal spines proximally of the bells; proximal first third of stems bare. Terminal comb with long, thin medial tooth with rounded tip, and with 3 shorter and slender teeth around it. Opposite the comb are 2 spine-like pegs, of which larger (proximal) has rows of long and short marginal spines; the other has a row of short spines only.

Furca (Fig. 8B). Each lamella with 9 to 10 claws and proximal row of short hairs. First, second and fourth claws primary, remaining claws (spine-like) secondary; all claws separated from lamella. Primary claws with rows of secondary teeth, secondary claws with spinules along posterior margins.

Description of adult male. *Carapace* (Figs. 8C,D; 9A–D). Length range of 1.32–1.50 mm. Carapace elongate, oval in lateral view, with greatest height (51–60% of length) near midlength and about two-fifths the length of carapace, with prominent rostrum and shallow rostral incisure. Posterodorsal angle distinct and posteroventral margin arched. Dorsal margin straight or slightly arched. Rostrum on the right valve with a dorsal tubercle (Fig. 9 B). Left valve overlaps right valve along anterodorsal margin. Carapace oblong in ventral view, with greatest width near midlength. Surface of valves with numerous relatively large oval pits and with slender setae on lateral surface of shell near outer margins. Inner lamella behind rostrum with row of 9–10 bristles, ventrally to rostral incisure with some tiny spines.

Bellonci organ (Fig. 9E,G,H). It relatively short, swelling in distal part and tapering distally. Capitulum section fused to stem, and with pointed or slightly rounded tip.

Eyes (Fig. 9E,F). Medial eye with dark brown pigments. Lateral eyes slightly larger than medial one and with more than 20 ommatidia.

First antenna (Fig. 9G,H). First segment about 80% of length of second one. Second segment with clusters of tiny hairs along dorsal and ventral margins, and with one distodorsal, one distolateral and one distoventral bristles with wreaths of hairs each. Third segment short and about 1/4 to 1/5 of length of preceding one, with one long ventral and 2 short dorsal bristles. Fourth segment about twice length of third one, with distoventral cluster of 4 bristles of different length (3 long, the remaining one short), of which 2 are long dorsal bristles, one bristle is near distal edge, and the other stems from the distal edge. Fifth segment (inserted ventrally between the fourth and sixth ones) with long sensory bristle (broad base at proximal third) and numerous long thin filaments and 4 short filaments (one distal and 3 terminal filaments). Sixth segment somewhat shorter than the fourth one, with single slight bristle near distal edge. Seventh and eighth segments typical for the genus, with 7 bristles: a-bristle bare and short (same as the bristle of the sixth segment), b- and g-bristles stout and about twice length of a-bristle (each bristle with 2–3 proximal and 4 terminal filaments), e- and d-bristles slender and bare, c- and f- bristles very stout long with 9–12 short filaments.

Second antenna (Fig. 10A–C). Protopodite subtriangular; posterodorsal angle distinct and somewhat less than 90°. Exopodite nine-segmented; first segment about 3.5 times as long as the second one; second segment about one half length of third one, with anterodistal moderately long bristle (with denticulation along anterior margin but without natatory hairs) that extends to distal end of sixth segment; each of the 3–8 segments with one long bristle with natatory hairs; ninth segment with 4 bristles, of which 2 long and 2 short, all bristles with natatory hairs. Endopodite three-segmented; first one with 5 proximal and one distal short bristles; second one elongate, with greatest width in proximal (near midlength) and distal parts, and with two relatively long bristles of equal length (about 1/3 length of this segment) at midlength of segment; third segment elongate arcuate, somewhat shorter and thinner than the second one, with straight anteroproximal margin, with thick long bristle (with denticulation along anterior margin) arising from a point at about one-fourth length, with 2 short slender and bare subterminal bristles, and with several serrate ridges on distal margin.

Mandible (Figs. 10D,E; 11A; 12A). Coxale endite reduced, represented by two spinules, and without bristle near its base. Basale: surface hirsute; ventral margin with 5 long bristles with wreaths of hairs each, which

longer than those of female; dorsal margin with 3 long bristles without wreaths of hairs, one of these bristles at midlength of margin, others at distal edge; lateral surface with 4 short slender proximal bristles and one same bristle at midlength. Exopodite narrow, about one half length of first endopodite segment, with terminal spine and 2 bristles, one of which short bare and extending beyond distal end of first endopodite segment, and other long and wreathed by stiff hairs in midlength and extending to distal end of third endopodite segment; distal parts of the dorsal and ventral exopodite margins with rows of fine hairs. Endopodite three-segmented. First segment about one half as long as second one, with combs of hairs on broad inner surface, with 4 bristles on distoventral edge, one of which short and short-haired, the remaining 3 long with wreaths of stiff hairs each. Inner surface of second segment also hirsute. This segment with 9 dorsal bristles separated into two groups, of which proximal group with 2 short bristles and distal one with one short and 6 long bristles; with two ventral clusters of bristles, proximal cluster with two bristles and the distal one with 3 bristles. Terminally limb with 2 long stout medial claws, one short slightly dorsal claw, one short dorsal bristle and two ventral bristles, one of which is long.

Maxillula (Figs. 11B; 13C). Limb more weakly developed than that in female. Dorsal margin of precoxale, coxale and basale with fringes of hairs. Coxale with long plumose bristle (thick base). Basale with long plumose anterior bristle and two moderately long usual posterior bristles. Exopodite with one short bare bristle and two very long powerful and plumose ones. Surface of the first endopodite segment with clusters of long hairs. Distal part of endopodite with 13 slight bristles. First, second and third endites with 7 slight bristles in each.

Second maxilla (Fig. 12B,C). Epipodial appendage with about 45 plumose bristles. Distal part of first exopodite segment with moderately long finger-shaped tooth (with long hairs), proximal part with 3 short bristles. Second segment with large distal finger-shaped tooth (with long hairs) and 3 short proximal bristles. Third segment with 2 short bristles on inner lobe and 2 very long thick and plumose bristles on outer lobe. Fourth and fifth segments distally with one very long thick unplumose bristle and 5 short bristles; outer surface with long hairs. First endite with 3 bristles, second one with 8 bristles, and third one with 9 bristles.

Sixth limb (Figs. 11C–I; 12D). Limb with bristles of various types (only A-, B- and H-bristles same as those of the female, remaining bristles other type). Epipodial appendage with 2 short plumose H-bristles.

First endite small, other endites long and well developed; first endite with 2 bristles (1E+1H), second one with 4 bristles (2G+1I+1H), third one with 7 bristles (2F+1G+1I+3G), and fourth with 6 bristles (2F+1G+3D); all endites with clusters of long hairs. Terminal segment triangular, with 14 bristles (1C+1D+1C+1D+1B+1C+6B+2A); surface densely covered with clusters of long hairs.

Seventh limb (Figs. 7J; 8E) with 2 bristles of different length in each of two distal groups and 2 equal-length proximal bristles on each side; these bristles with 4–6 distal bells and proximal dense rows of short marginal spines; the first proximal third of stems bare. Terminal comb with long thin stout medial tooth (with pointed tip) and row of short marginal spines; with 2 broad slightly pectinate (in each side) teeth; opposite with 2 curved pectinate pegs.

Furca (Fig. 13E,F). Each lamella with 8 or 9 claws. First, second and fourth claws primary, remaining claws secondary; all claws separated from lamella. Primary claws with rows of secondary teeth and remaining claws with spinules along posterior margins.

Copulatory appendage (Fig. 13D,E) with slender anteriorly bent stem. Each limb relatively wide and short (considerably not reaches of terminal margin of furcal lamella). Distally each limb with three lobes: posterior lobe with one short distal bristle and long hairs, inner lobe with two short proximal bristles, and outer lobe with two long distal bristles (with thick base), two slim short proximal bristles and distally tapering curved tooth.

Comparisons. This species is closely related to *E. sordidus* (Müller 1890). A difference between that species and *E. pseudosordidus* is that the Bellonci organ of *E. pseudosordidus* in adult female is fused with the medial eye, whereas on *E. sordidus* this organ is separated from it. Also, the third endite and the terminal seg-

ment of maxillula of the new species have respectively 10 bristles and 4 claws (9 bristles and 3 claws in *E. sordidus*), the 4th endite of the sixth limb has 16–18 bristles (19–24 bristles in *E. sordidus*), and the terminal comb of the seventh limb has 7 teeth (8 teeth in *E. sordidus*). In addition, the adult male of *E. pseudosordidus* has 2 separated spines on the coxale endite and 5 ventral bristles on the basale of the mandible (bifurcate spine and 6 bristles in *E. sordidus*); besides, the terminal comb of the seventh limb has only 3 teeth, whereas on *E. sordidus* it has 7 teeth. Some differences between *E. pseudosordidus* and *E. sordidus* are listed in table 2.

Distribution and Ecology. All specimens of new species were obtained from the subtropical water of the South-East Korean shelf (East Sea) in the latitudinal limits from 35° to 38°N at the depth range of 1–28 m, at soft and hard bottoms (table 1). The closely related species *E. sordidus* is known only from the coastal waters of Hokkaido near the Hakkodate (Müller 1890) and in Oshoro Bay (Hiruta 1976).

Genus *SCLEROCONCHA* Skogsberg, 1920

Scleroconcha ochotensis Chavtur, 1978

Scleroconcha ochotensis Chavtur, 1978: 150–154, figs. 1–3; 1983: 22; 23, 24, 26, 28, table 2 (list); 1992: table 2.

Distribution and Ecology. The species widely inhabits the subarctic waters of the northwestern Pacific at the salinity and temperature ranges of 33.2–34.0 ‰ and –0.4–6.4°C, respectively (Chavtur 1983). In the East Sea *S. ochotensis* occurs (Fig. 1) at the shelf of the South Primorye (Peter the Great Bay and 24°51.5'N, 134°19.9'E) at the depth range of 58–219 m (sand, sand with pebble mud), in the coastal waters of South Sakhalin (47°26.5'N, 141°43'E; 47°05'N, 141°53.5'E and 46°35'N, near coast) from 40 to 143 m (muddy sand, sand with pebble and gravel, sand with shell rock), and near Honshu (37°42.2'N, 136°20'E) at 209 m. It also is known from the Sea of Okhotsk (78–420 m), Bering Sea (depth?), and Pacific waters of the Kuril Islands and Kamchatka (75–320 m) (Chavtur 1978, 1983).

Scleroconcha nanocristata Chavtur, 1983

Scleroconcha nanocristata Chavtur, 1983: 25, 28, 62, 70, figs. 20, 3–7 and 21, 1–2, table 2 (list); 1992: table 2 (list).

Distribution and Ecology. Only a single specimen of *S. nanocristata* is known. It was collected in the Tatar Strait, near the South Sakhalin (East Sea: 47°26'N, 141°27'E) at a depth of 90 m (grey mud) (Fig. 1).

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