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OEDICEROTID AMPHIPODA (CRUSTACEA) FROM SHALLOW WATERS OF KOREA

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ABSTRACT

Eight species of the family Oedicerotidae are described from soft bottoms of Korea. Six of them represent new species belonging to the genera *Monoculodes* (3 spp.), *Perioculodes* (1 sp.) and *Synchelidium* (2 spp.), one is *S. lenorostralum* Hirayama, herein raised to specific rank, and the seventh new species is assigned to a new genus, *Chitinomandibulum*. This genus is closely related to the sympatric genus *Synchelidium*.

INTRODUCTION

The family Oedicerotidae is a very large cosmopolitan taxon comprising about 43 genera, and is most diverse in cold waters of the northern hemisphere. The family is classified as a member of the gammaridean superfamily Oedicerotoidea by Bousfield (1978), and based on selected anti-boreal genera of the southern hemisphere roughly revised phylogenetically (Bousfield, 1983).

Up to now, no records on oedicerotid were known from Korean waters. Amongst amphipod material collected from the region (1982-1987), 8 species belonging to 4 genera (*Monoculodes* Stimpson, *Perioculodes* Sars, *Synchelidium* Sars, and *Chitinomandibulum* n.g.) proved to be members of the family Oedicerotidae. Of these, 7 species are new to science and the remaining taxon, *Synchelidium lenorostralum* Hirayama, is raised to full specific rank in the present paper.

Out of 52 soft bottom samples 22 yielded

members of the family Oedicerotidae (fig. 1). Like the other two families of sand-burrowing amphipods in Korea (Dogielinotidae: Jo, 1988; Phoxocephalidae: Jo, 1989) their distributions are confined to the west and the south coasts of the country. In most localities the samples were taken from the intertidal zone to very shallow-water (1 m depth), whilst animals were dredged from a depth of 5 m at Oido. The substrate was sand in most of the sampled areas except for muddy sand or mud at Aamdo, Oido, Osikdo, and some stations in the Nakdong estuary.

The type-specimens described in the present paper are deposited in the Zoölogisch Museum, Amsterdam (ZMA) and in the Institute of Marine Sciences, National Fisheries University of Pusan (IMS).

TAXONOMIC PART

Superfamily OEDICEROTOIDEA Bousfield, 1978

Family OEDICEROTIDAE Lilljeborg, 1865

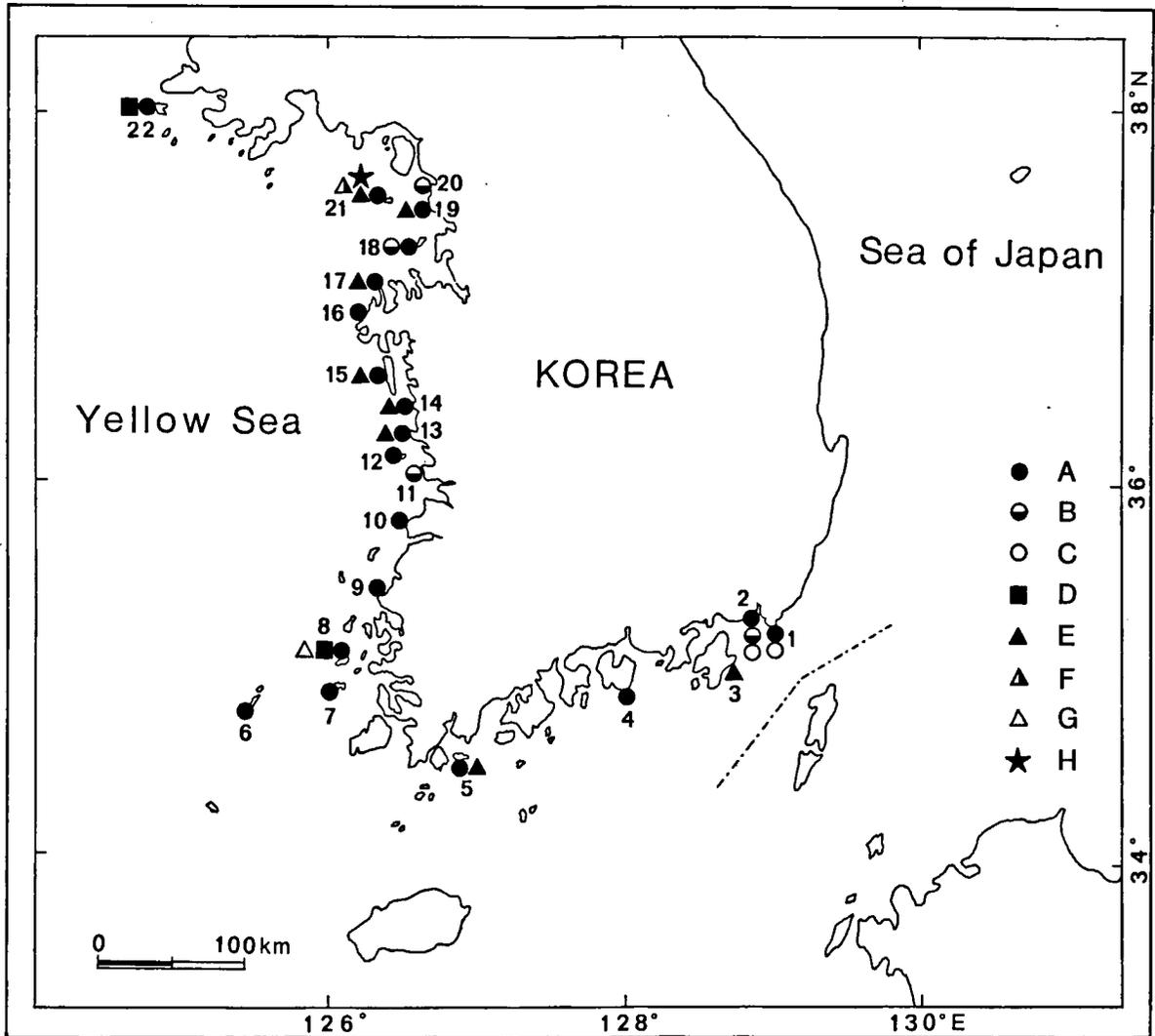


Fig. 1. Distribution of oedicerotid amphipods along the Korean coasts (A: *Monoculodes koreanus*; B: *M. muwoni*; C: *M. dentimanus*; D: *Periocolodes seohae*; E: *Synchelidium lenorostrum*; F: *S. carinorostrum*; G: *S. trioostegitum*; H: *Chitinomandibulum emargicoxa*). 1, Dadaepo; 2, Nakdong estuary; 3, Gujora; 4, Sangju; 5, Myeongsasimri, Sinjido; 6, Jin-ri, Huksando; 7, Simok, Dochodo; 8, Gurim-ri, Bigumdo; 9, Gamami; 10, Byeonsan; 11, Osikdo; 12, Gaeyado; 13, Chunjangdae; 14, Daecheon; 15, Bangpo; 16, Malipo; 17, Hakampo; 18, Bangameori, Daebudo; 19, Oido; 20, Aamdo, Incheon; 21, Eulwang-ri, Yongyodo; 22, Yongkipo, Baekryeongdo.

KEY TO THE KOREAN GENERA OF OEDICEROTIDAE

- | | | | |
|---|---|--|---------------------|
| 1. Gnathopod 2 subchelate; telson with apical setae | 2 | produced, broad; mandibular molar with triturating surface | <i>Monoculodes</i> |
| - Gnathopod 2 chelate; telson without apical setae | 3 | - Carpal lobe of gnathopod 1 very long and slender; mandibular molar lacking triturating surface | <i>Periocolodes</i> |
| 2. Carpal lobe of gnathopod 1 only moderately | | 3. Apical margin of mandibular incisor normal; ventral margin of coxal plate 3 not emarginate | <i>Synchelidium</i> |

- Apical margin of mandibular incisor articulate and chitinous; ventral margin of coxal plate 3 emarginate *Chitinomandibulum*

Genus **MONOCULODES** Stimpson, 1853

Stimpson, 1853: 54; Sars, 1892: 294; Gurjanova, 1951: 562; Lincoln, 1979: 348.

Diagnosis. — Rostrum distinct, but variable in length and shape. Antenna 1 in both sexes shorter than antenna 2, flagellum usually with numerous sensory hairs in the male. Antenna 2 in male with filiform flagellum.

Mandibular molar strong, with triturating surface. Inner lobes of lower lip distinct. Inner lobe of maxilla 1 with 1 or 2 apical setae, outer lobe with 7-9 spines.

Gnathopods subchelate. Gnathopod 1 stout; carpal lobe long, short, or rarely absent; propodus usually shorter but sometimes longer than that of gnathopod 2. Gnathopod 2 slender, carpal lobe reaching (rarely not reaching) end of hind margin of propodus.

Pereiopods 5 and 6 heavily setose. Pereiopod 7 very elongate, spinose and setose.

Description. — Eyes coalesced dorsally. Peduncle of antenna 1 in male short and stout. Dorsal margin of peduncle segments 4 and 5 of antenna 2 with numerous short hairs in male.

Left lacinia mobilis 4- or 5-dentate. Outer lobes of lower lip without cone.

Coxal plates moderately long, plates 4 and 5 large. Coxal gills present on gnathopod 2 through pereiopod 6. Oostegites present on gnathopod 2 through pereiopod 5, with many longish setae.

Peduncle of pleopods shorter than rami, with pair of retinacula, outer distal margin of peduncle on pleopod 3 expanded backwards. Peduncle of uropod 1 longer than rami, with row of basolateral spines. Inner ramus of uropods 1-3 often with 2 spine rows. Rami of uropod 3 longer or shorter than peduncle.

Remarks. — Species diversity within the genus *Monoculodes* is very great, and a generic or

subgeneric division is required. It is considered that the following characteristics can be used in a further revision of the genus: the absence or presence of the carpal lobe in gnathopod 1; the length ratio of the propodus between gnathopods 1 and 2.

Type-species: *Monoculodes demissus* Stimpson, 1853 (a dubious species, see Stebbing, 1906; Barnard, 1958, 1962)

Other species: A total of 57 (sub)species [45 species listed in Barnard (1962) to which must be added *M. limnophilus japonicus* Nagata, 1965; *M. perditus* Barnard, 1966; *M. diversisexus* Barnard, 1967; *M. necopinus* Barnard, 1967; *M. recandesco* Barnard, 1967; *M. sudor* Barnard, 1967; *M. vibei* Just, 1980; *M. jazdzewskii* de Broyer, 1981; *M. acutipes* Ledoyer, 1982; *M. koreanus* n. sp.; *M. muwoni* n. sp.; *M. dentimanus* n. sp.]

KEY TO THE (SUB)SPECIES OF *MONOCULODES* IN THE NW PACIFIC

1. Propodus of gnathopod 2 more or less oval, palm longer than or subequal to hind margin (especially in female)..... 2
 - Propodus of gnathopod 2 longish rectangular, palm shorter than hind margin 10
2. Gnathopod 1 of female, anterior margin of carpus less than half as long as propodus, carpal lobe reaching tip of hind margin of propodus 3
 - Gnathopod 1 of female, anterior margin of carpus as long as or more than half the length of propodus, carpal lobe absent or not reaching tip of hind margin 7
3. Propodus of gnathopod 1 as long as or shorter than that of gnathopod 2 4
 - Propodus of gnathopod 1 longer than that of gnathopod 2 5
4. Rostrum long and acute, reaching end of peduncle segment 1 of antenna 1; inner ramus of uropod 2 with dorsal spines only; left lacinia mobilis 4-dentate..... *M. koreanus* n. sp.

- Rostrum short and stout, reaching about halfway along peduncle segment 1 of antenna 1; inner ramus of uropod 2 with dorsal and ventral spine rows; left lacinia 5-dentate *M. muwoni* n. sp.
 - 5. Distal part of hind margin on gnathopods with a few denticles; inner ramus of uropods 2 and 3 with dorsal and ventral spine rows; rostrum stout; flagellum of antenna 1 with numerous sensory hairs in male..... *M. dentimanus* n. sp.
 - Hind margin of gnathopods not serrate; inner ramus of uropods 2 and 3 with dorsal spine row only; rostrum slender and acute; antenna 1 without sensory hairs on flagellum in male..... 6
 - 6. Posterodistal corners of epimeral plate 2 and coxal plate 4 not produced; claw of pereopods 3 and 4 slightly shorter than segment 6; segment 2 of pereopod 7 slender *M. l. limnophilus* Tattersall, 1922
 - Posterodistal corners of epimeral plate 2 and coxal plate 4 produced; claw of pereopods 3 and 4 extremely small; segment 2 of pereopod 7 as wide as long
..... *M. limnophilus japonicus* Nagata, 1965
 - 7. Carpal lobe of gnathopod 2 reaching end of hind margin of propodus, not shorter than claw *M. uncinatus* Bulytscheva, 1952
 - Carpal lobe of gnathopod 2 shorter than claw 8
 - 8. Gnathopod 1 without carpal lobe (see the original description, not fig. 373 in Gurjanova, 1951); claw of pereopods 3-6 longer than segment 6
..... *M. semenovi* Gurjanova, 1938
 - Gnathopod 1 with small carpal lobe; claw of pereopods 3-6 shorter than segment 6.. 9
 - 9. Propodus of gnathopod 1 shorter than that of gnathopod 2.....
..... *M. latimanus* (Goes, 1866)
 - Propodus of gnathopod 1 longer than that of gnathopod 2.....
..... *M. castalskii* Gurjanova, 1951
 - 10. Gnathopod 1 lacking carpal lobe; gnathopod 2 with very short carpal lobe ..
..... *M. mertensi* Gurjanova, 1951
 - Carpal lobe on gnathopods reaching end of hind margin of propodus 11
 - 11. Gnathopod 1, anterior margin of carpus less than half as long as propodus, carpal lobe somewhat lanceolate 12
 - Gnathopod 1, anterior margin of carpus more than half as long as propodus, carpal lobe not lanceolate..... 14
 - 12. Carpal lobe of gnathopod 1 just reaching end of hind margin; posterior margin of segment 2 of pereopod 7 with long setae; propodus of gnathopod 1 longer than that of gnathopod 2.....
.....*M. dembiensis* Bulytscheva, 1952
 - Carpal lobe of gnathopod 1 exceeding far beyond hind margin; segment 2 of pereopod 7 with short setae posteriorly; propodus of gnathopods subequal 13
 - 13. Segment 2 of pereopod 7 with weak hind lobe; segments 5 and 6 of pereopod 6 subequal in length
..... *M. crassirostris* Hansen, 1887
 - Segment 2 of pereopod 7 with strong hind lobe; segment 6 of pereopod 6 longer than segment 5
..... *M. synophthalmus* Bulytscheva, 1952
 - 14. Rostrum in front of eyes long and acute
..... *M. nasutus* Bulytscheva, 1952
 - Rostrum in front of eyes short 15
 - 15. Claw of pereopods 5 and 6 longer than segment 6; segment 2 of pereopod 5 narrowing distally, with many setae
..... *M. zernovi* Gurjanova, 1938
 - Claw of pereopods 5 and 6 shorter than segment 6; segment 2 of pereopod 5 not narrowing distally, poorly setose
..... *M. breviops* Bulytscheva, 1952
- Monocolodes koreanus** n. sp. (Figs. 2-4)
- Material examined. — Seocheon-gun, Chunjangdae; 9 May 1986, 1 ovig. ♀ holotype (ZMA Amph. 108.671), 1 ♂ allotype (ZMA Amph. 108.672), 45 ♀ (27 ovig.) and 23 ♂ paratypes (ZMA Amph. 108.673), and 46 ♀ (29 ovig.) and 24 ♂ paratypes (IMS); 1 Mar. 1986, 2 ♀ and 1 ♂ paratypes (IMS). Y. W. Jo coll.
- Ongjin-gun, Baekryeongdo, Yongkipo; 4 Nov. 1986, 1 ♀. B. S. Yeo & M. S. Jo coll.
- Ongjin-gun, Yongyoodo, Eulwang-ri; 27 Apr. 1986, 86 ♀ ♀ (45 ovig.) and 44 ♂ ♂. Y. W. Jo coll.

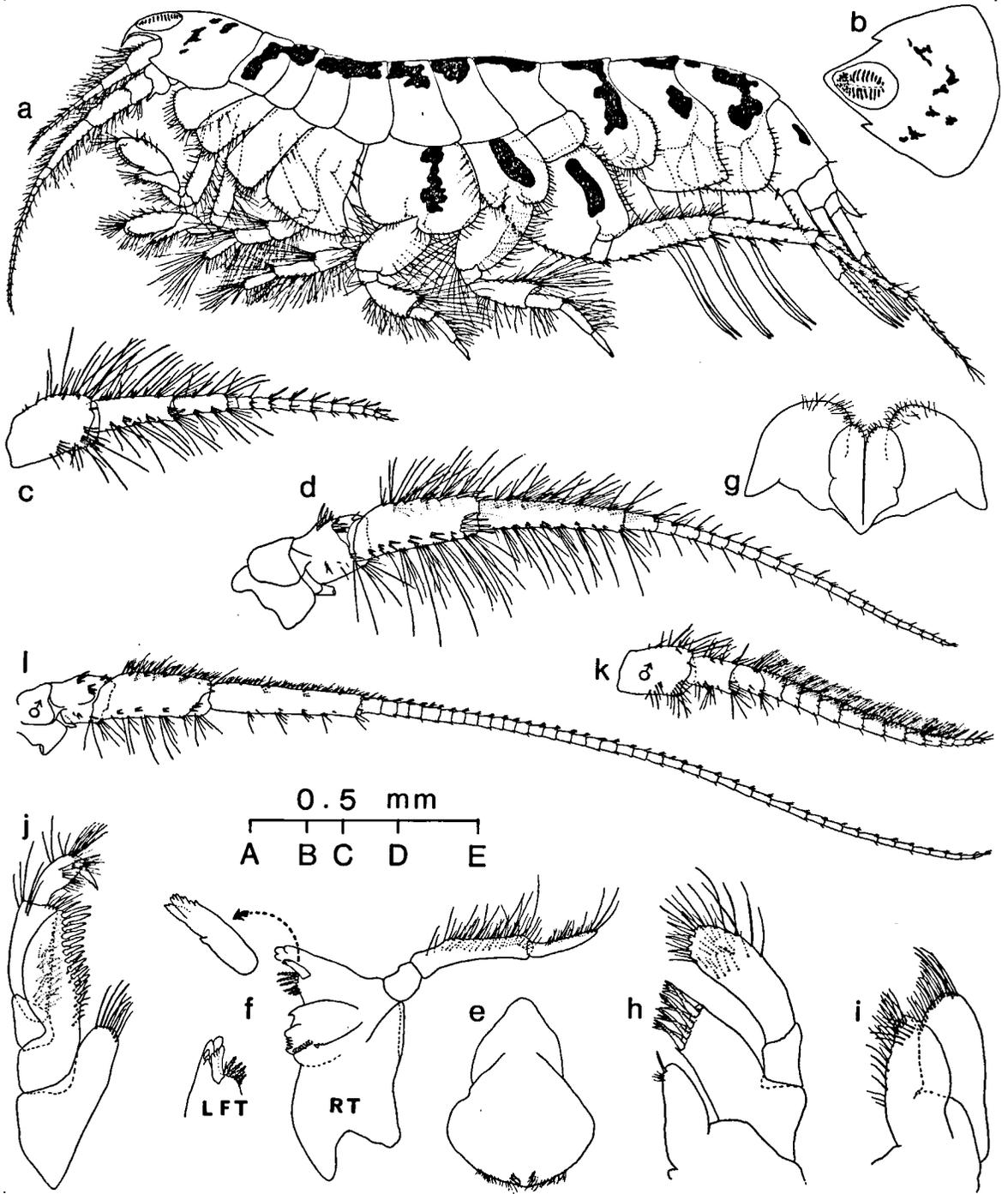


Fig. 2. *Monoculodes koreanus* n. sp. (a-j, ♀ holotype 9.8 mm; k-l, ♂ allotype 7.9 mm, from Chunjangdae). a, entire animal, from the left; b, dorsal view of head (scale AB); c, antenna 1 ♀ (AC); d, antenna 2 ♀ (AC); e, upper lip (AD); f, mandible (AD); g, lower lip (AD); h, maxilla 1 (AE); i, maxilla 2 (AE); j, maxilliped (AD); k, antenna 1 ♂ (AC); l, antenna 2 ♂ (AC). Each scale unit (AB, AC, AD, AE) represents 0.5 mm.

Siheung-gun, Oido; 20 July 1986, 1 ♀. Y. W. Jo coll.
Ongjin-gun, Daebudo, Bangameori; 25 Feb. 1986, 40 ♀ and 49 ♂. Y. W. Jo coll.

Seosan-gun, Hakampo; 19 Oct. 1986, 73 ♀♀ (36 ovig.) and 23 ♂♂. Y. W. Jo coll.; 28 June 1987, 5 ♀♀ (1 ovig.) and 6 ♂♂. H. J. Ko coll.

Seosan-gun, Malipo; 21 Oct. 1986, 70 ♀♀ (16 ovig.) and 10 ♂♂. Y. W. Jo coll.

Seosan-gun, Bangpo, 20 Oct. 1986, 177 ♀♀ (57 ovig.) and 54 ♂♂. Y. W. Jo coll.

Boryeong-gun, Daecheon; 9 May 1986, 2 ovig. ♀♀. Y. W. Jo coll.

Okgu-gun, Gaeyado; 29 Mar. 1987, 1 ♀ and 1 ♂. J. H. Lee coll.

Buan-gun, Byeonsan; 11 Aug. 1986, 28 ♀♀ (15 ovig.). C. W. Ma coll.

Youngkwang-gun, Gamami; 10 Aug. 1986, 27 ♀♀ (12 ovig.) and 6 ♂♂. C. W. Ma coll.

Sinan-gun, Bigumdo, Gurim-ri; 19 Oct. 1986, 27 ♀♀ and 1 ♂. S. J. Yoo coll.

Sinan-gun, Dochodo, Simok; 6 Oct. 1986, 14 ♀♀ (6 ovig.) and 8 ♂♂. K. C. Yoo coll.

Sinan-gun, Huksando, Jin-ri; 22 July 1986, 17 ♀♀ (ovig.) and 2 ♂♂. J. M. Lim coll.

Wando-gun, Sinjido, Myeongsasimri; 11 May 1986, 194 ♀♀ (39 ovig.) and 86 ♂♂. Y. W. Jo coll.

Namhae-gun, Sangju; 25 May 1986, 98 ♀♀ (55 ovig.) and 10 ♂♂. C. W. Ma coll.

Pusan, Nakdong estuary, Baekhabdeung; 19 Jan. 1984, 2 ♀♀ and 3 ♂♂; 3 Apr. 1984, 1 ovig. ♀. Y. W. Jo & C. W. Ma coll.; 23 Oct. 1984, 3 ♀♀. Y. W. Jo, C. W. Ma & M. W. Jo coll.

Pusan, Nakdong estuary, Okryudeung; 20 Jan. 1984, 6 ♀♀; 12 Apr. 1984, 11 ♀♀ (3 ovig.) and 3 ♂♂. Y. W. Jo & C. W. Ma coll.

Pusan, Nakdong estuary, Jinwoodo; 30 Jan. 1984, 1 ♀. Y. W. Jo & M. W. Jo coll.; 7 Nov. 1984, 2 ♀♀. Y. W. Jo, C. W. Ma & M. W. Jo coll.

Pusan, Nakdong estuary, Myeongji; 25 Oct. 1984, 1 ♀. Y. W. Jo & C. W. Ma coll.

Pusan, Nakdong estuary, Sinho; 7 Nov. 1984, 9 ♀♀. Y. W. Jo, C. W. Ma & M. W. Jo coll.

Pusan, Dadaepo; 4 Mar. 1983, 39 ♀♀ (34 ovig.) and 17 ♂♂. Y. W. Jo coll.; 17 Apr. 1983, 162 ♀♀ (116 ovig.) and 7 ♂♂. Y. W. Jo & C. W. Ma coll.; 7 Mar. 1985, 137 ♀♀ (113 ovig.) and 6 ♂♂. Y. W. Jo & H. S. Kim coll.

Description. — Largest female 11.3 mm (excluding antennae and telson), largest male 8.8 mm. Female habitus is shown in fig. 2a.

Female (holotype 9.8 mm): Rostrum acute, moderately deflexed, extending to end of peduncle segment 1 of antenna 1. Head with an acute lateral lobe. Eyes large (fig. 2b), longer

than rostrum. Urosomite 1 with 1 posteroventral spine and 1 posterodorsal seta.

Antenna 1 (fig. 2c) about as long as peduncle of antenna 2; peduncle densely setose, segment 1 subequal to segment 2 in length; flagellum shorter than peduncle, 11-segmented, bearing 1 aesthetasc on dorsodistal margin of segments 3 through 9 each.

Antenna 2 (fig. 2d): Dorsal margin of peduncle segment 3 with a group of spines, distalmost facial spine group of segment 4 strong, segment 5 about 1.2 times as long as segment 4; flagellum 21-segmented.

Upper lip (fig. 2e) Epistome strongly projected anteriorly, seen in lateral view.

Mandible (fig. 2f): Right incisor with 3 teeth, left with 5 teeth; right lacinia mobilis mainly bicuspidate, outer cusp with several denticles, inner cusp with 2 apical denticles plus 1 lateral tooth, left lacinia 4-dentate; molar large, inner and lower margins toothed. Palp segment 3 about 60% of length of segment 2, both segments with numerous short and long setae.

Lower lip (fig. 2g) with separate inner lobes.

Maxilla 1 (fig. 2h): Inner lobe with 1 distal seta; outer lobe with 9 apical spines; palp segment 2 with 3 apical spines and many setae.

Maxilla 2 (fig. 2i): Inner lobe with 2 setae rows; outer lobe as wide as inner lobe.

Maxilliped (fig. 2j): Inner lobe with 9 distal setae; outer lobe large, reaching end of palp segment 2, inner margin with 12 stout spines and several setae; palp small, claw shorter than segment 3.

Coxal plates 1-4 much deeper than wide, with 3-5 spines on the posterior margin, plate 1 moderately expanded distally, plate 4 strongly projecting posterodistally; plate 6 with 8 spines on the anterior margin, twice as deep as plate 7.

Gnathopod 1 (fig. 3a): Basis not slender, posterior margin densely setose, anterodistal margin with group of spiniform setae; carpus about 35% of length of propodus, lobe long and broad, exceeding end of hind margin of propodus; palm of propodus oblique, longer than hind margin.

Gnathopod 2 (fig. 3b): Carpus about 38% of length of propodus, lobe densely setose, ex-

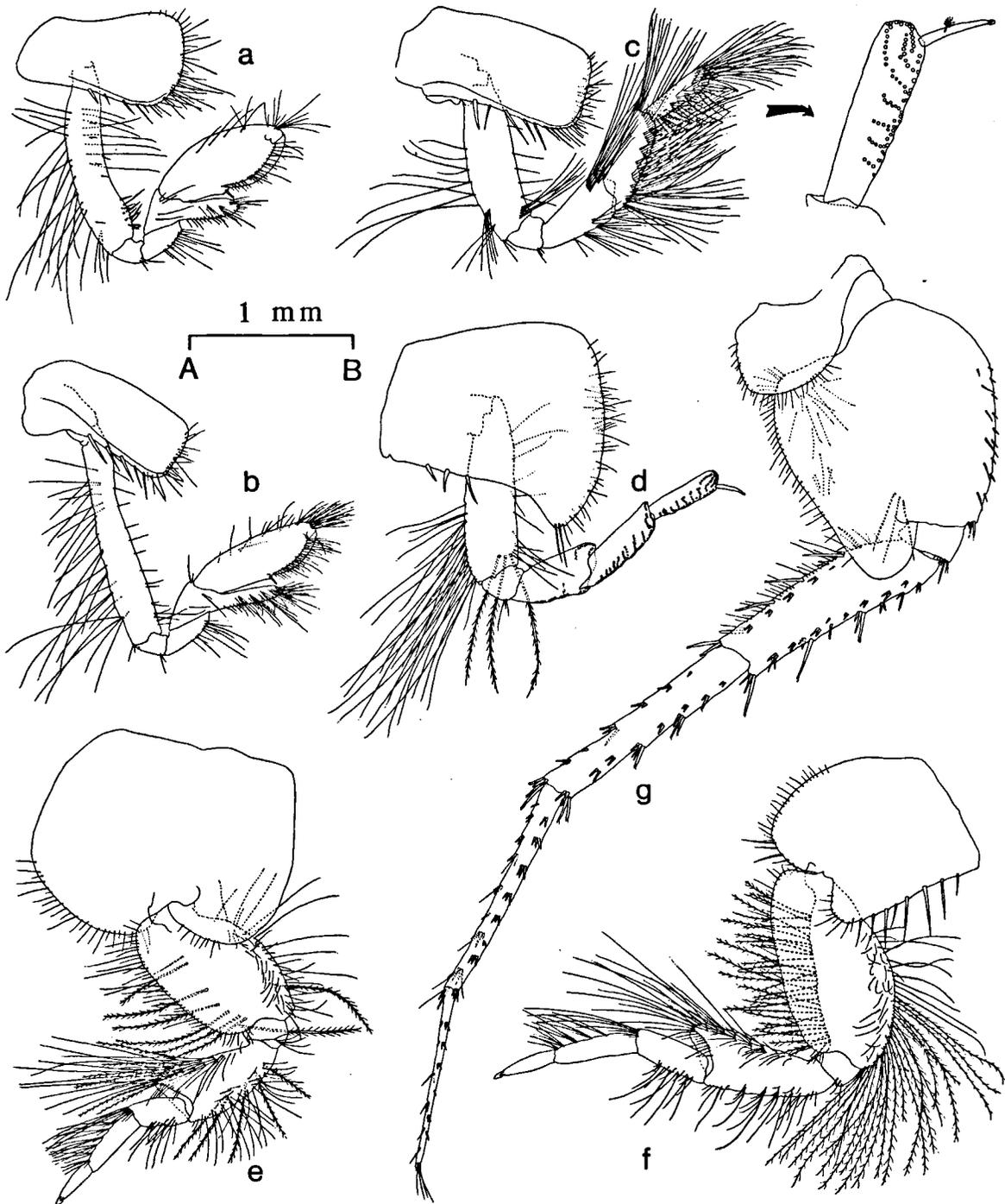


Fig. 3. *Monoculodes koreanus* n. sp. (♀ holotype 9.8 mm from Chunjangdae). a, gnathopod 1; b, gnathopod 2; c, pereiopod 3; d, pereiopod 4; e, pereiopod 5; f, pereiopod 6; g, pereiopod 7. Scale: all AB (= 1 mm).

ceeding end of hind margin of propodus; propodus more slender than, but as long as that of gnathopod 1, palm oblique, subequal in length to hind margin.

Pereiopods 3 and 4 (figs. 3c, d) strongly setose; segment 6 shorter than segment 5; claw about 40% of length of segment 6; segment 2 of pereiopod 4 with long posterodistal setae group.

Pereiopods 5 and 6 (figs. 3e, f) heavily armed with plumose and simple setae; anterior margin of segment 6 naked; claw about 3/4 as long as segment 6.

Pereiopod 7 (fig. 3g) spinose; segment 2 slightly longer than wide, posterodistal lobe long, much exceeding segment 3; segments 4-6 subequal in length; segment 7 shorter than segment 6.

Coxal gills present on gnathopod 2 through pereiopod 6 (figs. 4a-e); on pereiopods 4 and 5 largest, on pereiopod 6 smallest.

Oostegites (figs. 4f-i) present on gnathopod 2 through pereiopod 5, linear in shape, on gnathopod 2 more setose anteriorly, on pereiopods 4 and 5 more setose posteriorly.

Pleopods 1-3 of equal length, peduncle shorter than rami, with 2 retinacula, each armed with 2 hooks; outer posterior margin of peduncles 1 (figs. 4j, k) and 2 with a vertical row of plumose setae; outer posterodistal margin of peduncle 3 (fig. 4-l) expanded posteriorly in lateral view, with a row of plumose setae on the distal part only.

Epimeral plates (figs. 4m-o) setose along the posterior and ventral margins; plate 1 somewhat tapering ventrally; posteroventral corner of plate 2 gently pointed.

Uropod 1 (fig. 4p) reaching end of uropods 2 and 3; peduncle with 6 slender proximolateral, 11 short dorsolateral and 5 dorsomedial spines; outer ramus shorter than inner, with 5 dorsal spines; inner ramus with 3 dorsal and 2 ventrolateral spines.

Uropod 2 (fig. 4q): Peduncle shorter than inner ramus, with 5 dorsolateral and 3 dorsomedial spines; outer ramus shorter than inner, with 4 spines; inner ramus with 2 spines.

Uropod 3 (fig. 4r): Peduncle shorter than rami, with 2 dorsomedial spines and pair of

proximal setules; both rami subequal in length, the outer with 3 dorsal spines, the inner unarmed.

Telson (fig. 4s) tapering distally; its lateral corners slightly notched, each with small seta; distal margin weakly emarginate, with pair of marginal setae; dorsolateral margin with 1 plumose and 1 simple setae on either side.

Male (allotype 7.9 mm): Antenna 1 (fig. 2k) stout, flagellum much longer than peduncle, with numerous sensory hairs.

Antenna 2 (fig. 2l) about 2/3 as long as body length, dorsal margin of peduncle segments 4 and 5 with numerous short setae, flagellum very long and slender, 40-segmented.

Remarks. — *Monoculodes koreanus* differs from *M. limnophilus japonicus* Nagata in the following aspects: (1) the propodus of gnathopod 1 as long as that of gnathopod 2 (in the latter propodus of gnathopod 1 longer), (2) the claw of pereiopods 3 and 4 are not extremely small; (3) the inner ramus of uropod 1 with dorsal and lateral spine rows; (4) the carpal lobe of the gnathopods not very slender; (5) the flagellum of antenna 1 in the male with numerous sensory hairs.

The new species can be distinguished from the Chinese freshwater species *M.l. limnophilus* Tattersall by (1) the equal length of the propodi of gnathopods 1 and 2; (2) the strongly produced posterodistal corner of coxal plate 4 and epimeral plate 2; (3) the broad segment 2 of pereiopod 7; (4) the shorter claw of pereiopods 3 and 4 (claw nearly as long as segment 6 in *M.l. limnophilus*).

Normally the molar of this species has a blade on the lower margin, which is broken off in the holotype. The right mandible rarely has the incisor 4-dentate instead of 3-dentate. The number of anterior marginal spines on coxal plates 6 varies between 2 and 8.

Male characters are primarily found in antennae 1 and 2: first antenna with short peduncle and heavily setose flagellum; second antenna with short setae on the peduncle and with filiform flagellum. Segment 6 of pereiopod

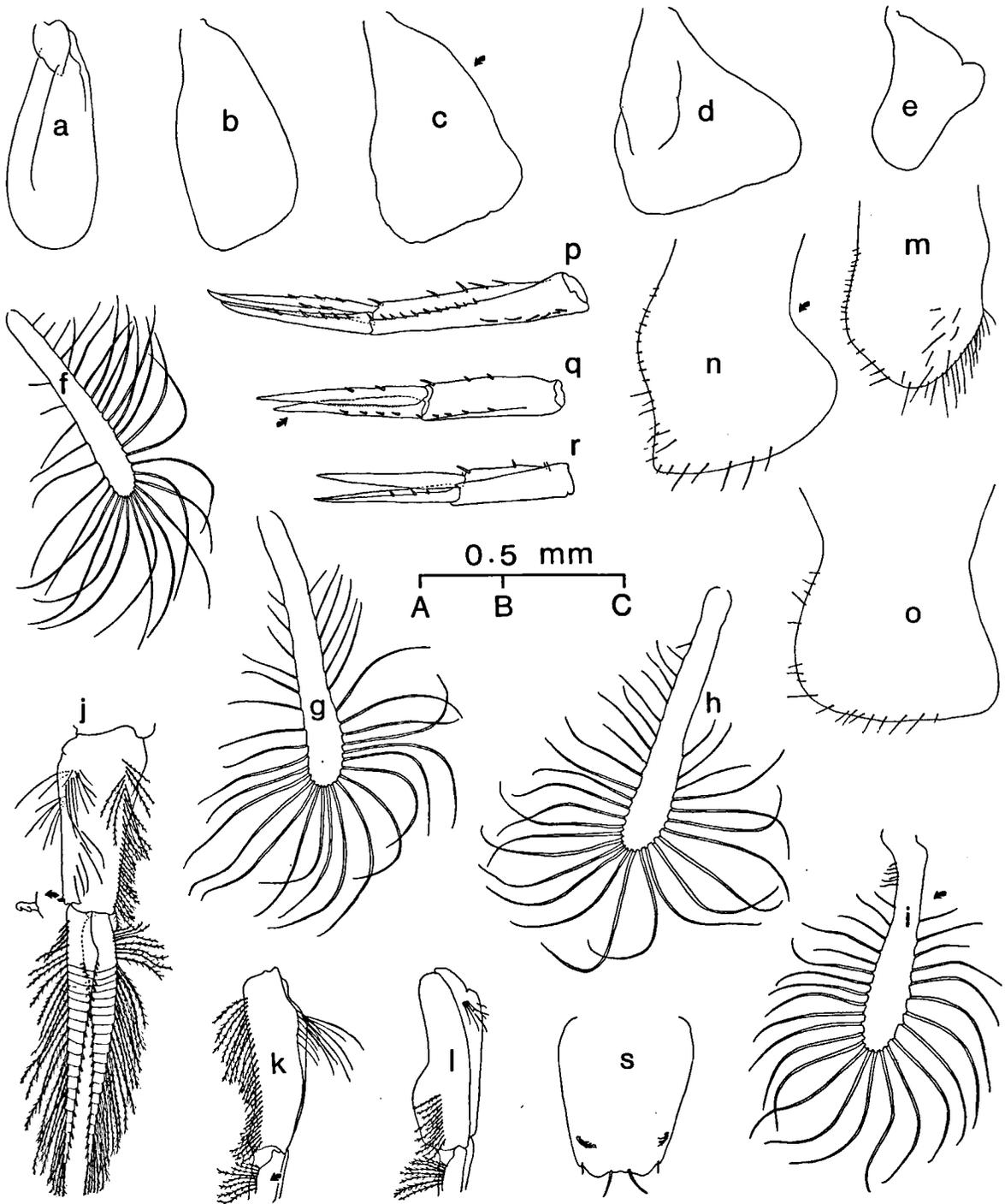


Fig. 4. *Monoculodes koreanus* n. sp. (♀ holotype 9.8 mm from Chunjangdae). a-e, coxal gills on gnathopod 2 - pereopod 6 (scale AB); f-i, oostegites on gnathopod 2 - pereopod 5 (AB); j, pleopod 1 (AB); k, peduncle of pleopod 1, lateral view (AB); l, peduncle of pleopod 3, lateral view (AB); m-o, epimeral plates 1-3 (AB); p-r, uropods 1-3 (AB); s, telson (AC). Each scale unit (AB, AC) represents 0.5 mm. Arrows indicate the anterior margin or outer ramus of appendages except for that on 'j'.

4 is stouter than that of pereopod 3 in male, but these segments are subequal in female.

Distribution and ecology. — *M. koreanus* is one of the most abundant shallow water gammarids in Korea (it showed up in 19 out of 22 localities, fig. 1). It is collected from intertidal to subtidal habitats (up to a depth of 5 m). The substratum is mainly fine to medium sand, but in certain areas (Nakdong estuary and Oido) it is muddy sand. The new species occurs in both sea water and brackish water. In the Nakdong estuary, this species is distributed more seaward than *M. muwoni* n. sp. and *M. dentimanus* n. sp., possibly indicating a stronger preference for marine waters than the latter two.

Compared with the other species of the genus in Korea, females of *M. koreanus* produce large numbers of relatively large eggs. Ovigerous females were collected from March through October. The holotype (9.8 mm, May 1986) carries 75 eggs, sized 0.36×0.45 mm. A female (11.3 mm, April 1986) from Yongyodo carries 94 eggs.

Monoculodes muwoni n. sp. (Figs. 5-7)

Material examined. — Pusan, Nakdong estuary, Jinwoodo; 30 Apr. 1984, 1 ♀ holotype (ZMA Amph. 108.668), 1 ♂ allotype (ZMA Amph. 108.669), 10 ♀ and 1 ♂ paratypes (ZMA Amph. 108.670), and 11 ♀ and 1 ♂ paratypes (IMS). Y. W. Jo & C. W. Ma coll.; 30 Jan. 1984, 1 ♀ paratype (IMS). Y. W. Jo & M. W. Jo coll.; 29 July 1984, 9 ♀ (1 ovig.) and 2 ♂ paratypes (IMS). Y. W. Jo & C. W. Ma coll.; 7 Nov. 1984, 2 ♀ paratypes (IMS). Y. W. Jo, C. W. Ma & M. W. Jo coll.

Pusan, Nakdong estuary, Jangrim; 15 Feb. 1984, 1 ♀. Y. W. Jo & C. W. Ma coll.

Pusan, Nakdong estuary, Eulsukdo; 13 Aug. 1984, 19 ♀ ♀ (7 ovig.) and 4 ♂ ♂. C. W. Ma coll.; July 1985, 1 ♀. S. L. Suh coll.

Pusan, Nakdong estuary, Baekhabdeung; 19 Jan. 1984, 14 ♀ ♀; 3 Apr. 1984, 5 ♀ ♀ (1 ovig.); 30 July 1984, 2 ♀ ♀. Y. W. Jo & C. W. Ma coll.; 23 Oct. 1984, 1 ♀. Y. W. Jo, C. W. Ma & M. W. Jo coll.

Pusan, Nakdong estuary, Okryudeung; 12 Apr. 1984, 1 ovig. ♀. Y. W. Jo & C. W. Ma coll.

Pusan, Nakdong estuary, Myeongji; 30 Jan. 1984, 1 ♀. Y. W. Jo & M. W. Jo coll.

Pusan, Nakdong estuary, Sinho; 2 Mar. 1984, 7 ♀ ♀; 30 Apr. 1984, 14 ♀ ♀; 1 Aug. 1984, 2 ♀ ♀ (1 ovig.) and

2 ♂ ♂. Y. W. Jo & C. W. Ma coll.; 7 Nov. 1984, 8 ♀ ♀. Y. W. Jo, C. W. Ma & M. W. Jo coll.

Incheon, Nam-gu, Aamdo; 26 Apr. 1986, 4 ovig. ♀ ♀ and 6 ♂ ♂. Y. W. Jo coll.

Ongjin-gun, Daebudo, Bangameori; 25 Feb. 1986, 9 ♀ ♀ and 7 ♂ ♂. Y. W. Jo coll.

Okgu-gun, Osikdo; 24 July 1986, 4 ♀ ♀ (3 ovig.). Y. W. Jo coll.

Description. — Largest female 7.7 mm (excluding antennae and telson), male up to 4.4 mm.

Female (holotype 7.7 mm): Rostrum (fig. 5a) stout, scarcely deflexed, reaching halfway the length of first peduncle segment of antenna 1. Eyes large, ovoid.

Antenna 1 (fig. 5b) slightly exceeding peduncle of antenna 2; peduncle moderately setose; flagellum slightly shorter than peduncle, 10-segmented, each segment except first and last bearing 1 aesthetasc.

Antenna 2 (fig. 5c): Peduncle segment 4 as long as segment 5, flagellum 16-segmented.

Upper lip (fig. 5f), lower lip (fig. 5h) and maxilla 2 (fig. 5j) as in the previous species (*M. koreanus*).

Mandible (fig. 5g): Right incisor with 6 teeth, the left with 5 teeth; right lacinia mobilis bicuspidate, its inner cusp with a few apical teeth and 1 lateral tooth, outer cusp with numerous fine apical teeth; left lacinia 5-dentate; molar strongly triturative. Palp segment 3 about 70% of length of segment 2, with 16 short setae widely spread on the inner margin, 3 long apical setae, and 3-4 midfacial setae.

Maxilla 1 (fig. 5i): Inner lobe with 1 apical seta and several apicomедial setules; outer lobe with 9 apical spines; palp segment 2 broadened distally, with 3 inner marginal spines and many setae.

Maxilliped (fig. 5k): Inner lobe with 6 distal and 6 inner setae; outer lobe nearly reaching end of palp segment 2, carrying 16 spines plus several setae; claw shorter than palp segment 3, apicomедial margin with 3 blades.

Coxal plates 1-4 not so deep, plate 1 strongly expanded distally, plate 4 slightly projecting

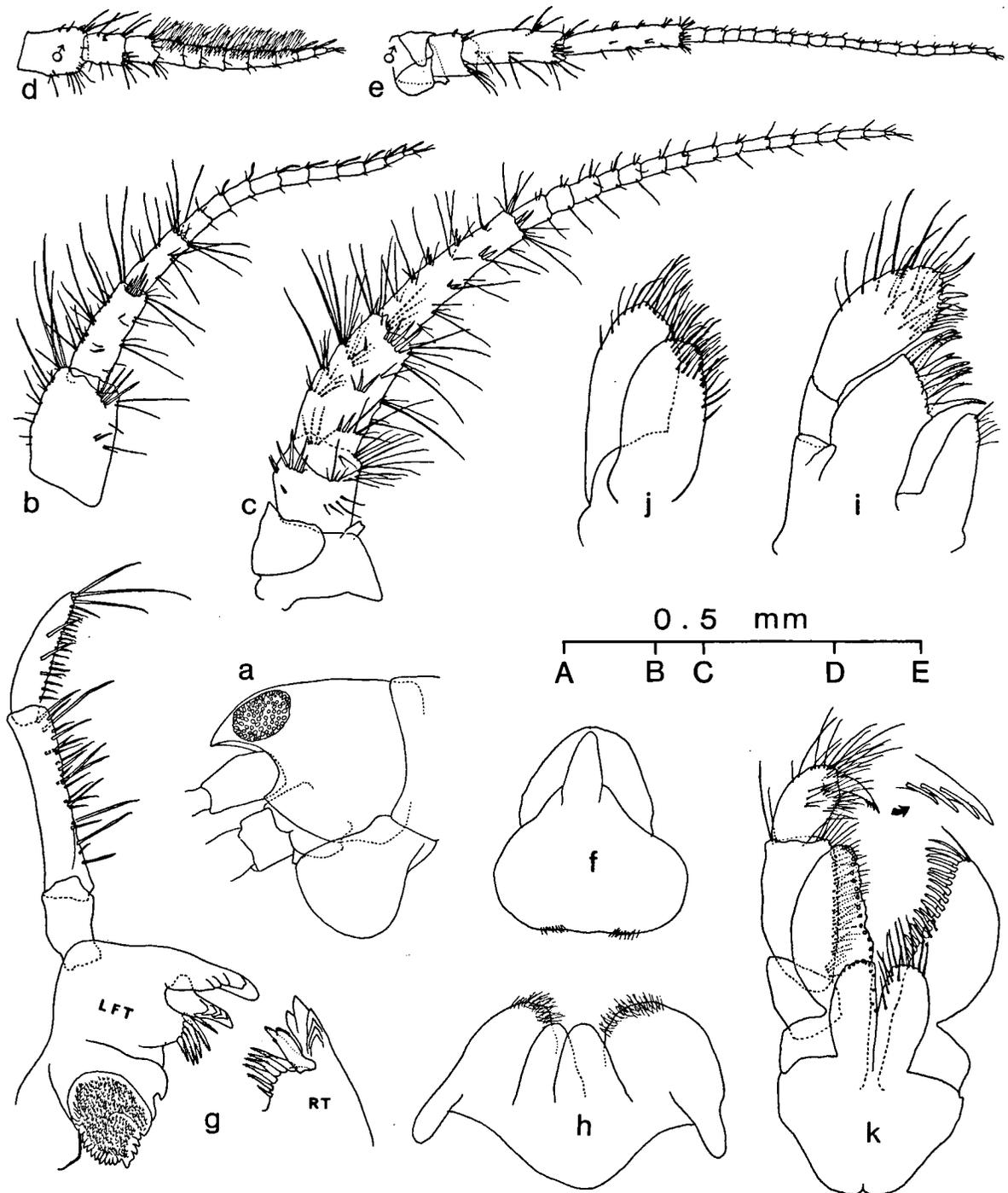


Fig. 5. *Monoculodes muwoni* n. sp. (a-c, f-k, ♀ holotype 7.7 mm; d-e, ♂ allotype 4.4 mm, from Jinwodo, Nakdong estuary). a, head (scale AB); b, antenna 1 ♀ (AC); c, antenna 2 ♀ (AC); d, antenna 1 ♂ (AC); e, antenna 2 ♂ (AC); f, upper lip (AD); g, mandible (AE); h, lower lip (AD); i, maxilla 1 (AE); j, maxilla 2 (AE); k, maxilliped (AD). Each scale unit (AB, AC, AD, AE) represents 0.5 mm.

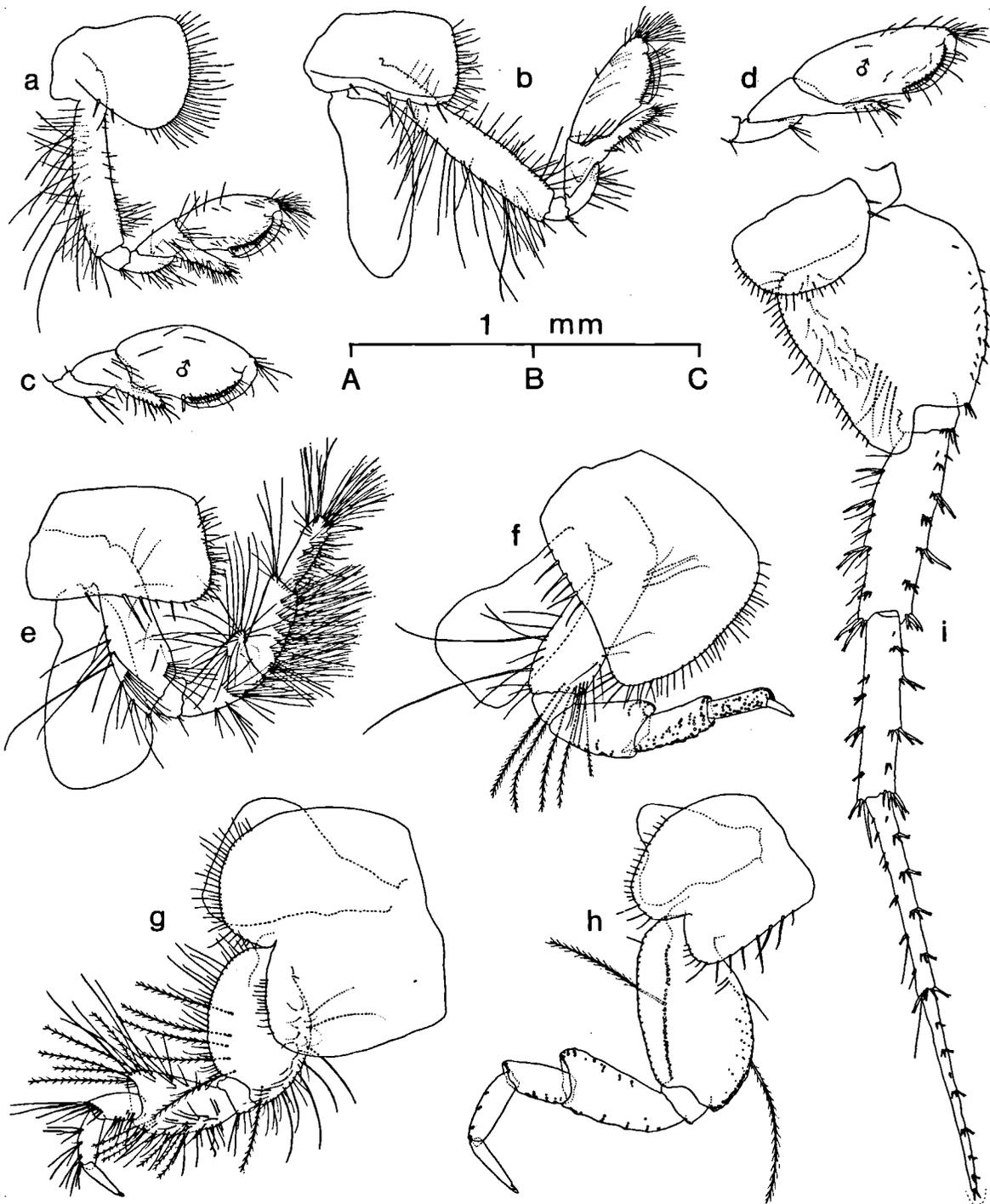


Fig. 6. *Monoculodes muwoni* n. sp. (a-b, e-i, ♀ holotype 7.7 mm; c-d, ♂ allotype 4.4 mm, from Jinwoodo, Nakdong estuary). a, gnathopod 1 ♀ (scale AB); b, gnathopod 2 ♀ (AB); c, distal part of gnathopod 1 ♂ (AC); d, distal part of gnathopod 2 ♂ (AC); e, pereopod 3 (AB); f, pereopod 4 (AB); g, pereopod 5 (AB); h, pereopod 6 (AB); i, pereopod 7 (AB). Each scale unit (AB, AC) represents 1 mm.

posterodistally, plate 6 about 1.7 times as deep as plate 7, plate 7 with 2 spines on anterior margin.

Gnathopod 1 (fig. 6a): Carpus long, about half the length of propodus, carpal lobe exceeding hind margin of propodus; propodus stout, twice as long as broad, palm longer than hind margin.

Gnathopod 2 (fig. 6b): Carpus about half the length of propodus, carpal lobe exceeding hind margin of propodus; propodus longer than that of gnathopod 1 (about 1.2 times), palm subequal in length to hind margin.

Pereiopods 3 and 4 (figs. 6e, f): Segment 7 about 45% of length of segment 6.

Pereiopods 5 and 6 (figs. 6g, h): Segment 2 of pereiopod 5 rounded oval, a little longer than wide; anterior margin of segment 6 naked, about subequal in length to segment 7.

Pereiopod 7 (fig. 6i): Segment 2 slightly longer than wide, posterodistal lobe longer than segment 3; segments 4-7 subequal in length.

Coxal gills and oostegites (figs. 7a-d) as in *M. koreanus*.

Pleopods (fig. 7e) as in *M. koreanus*.

Epimeral plates (fig. 7f): Posterior margin of plate 1 hardly setose, posteroventral corner of plate 2 hardly produced.

Uropod 1 (fig. 7g) slightly exceeding distal end of uropods 2 and 3; peduncle with 7-8 slender proximolateral, 13-14 short dorsolateral, and 6-7 long dorsomedial spines; rami subequal in length, outer ramus with 3 dorsal spines; inner ramus with 2-3 dorsal and 3-4 ventrolateral spines.

Uropod 2 (fig. 7h): Peduncle shorter than rami, with 7 dorsolateral and 2-3 dorsomedial spines; outer ramus subequal to inner, with 2-3 dorsal and 1 proximoventral spines; inner ramus with 3 dorsal and 7 ventrolateral spines.

Uropod 3 (fig. 7i): Peduncle with 3 dorsomedial spines, lacking dorsolateral spines; rami subequal in length, with 2 spines each.

Telson (fig. 7j) elongate, almost parallel-sided, distal margin slightly emarginate.

Male (allotype 4.4 mm): Antenna 1 (fig. 5d) stout, peduncle segment 3 subequal to

flagellum segment 1; flagellum longer than peduncle, 9-segmented, with numerous sensory hairs.

Antenna 2 (fig. 5e) about half the body length, dorsal margin of peduncle segments 4 and 5 poorly setose; flagellum slightly longer than peduncle, 18-segmented.

Gnathopods 1 and 2 (figs. 6c, d) with short carpal lobe, reaching about 2/3 along the hind margin of propodus, anterior margin of carpus shorter than half the length of propodus.

Remarks. — *M. muwoni* can be distinguished from *M. koreanus* by (1) the short and stout rostrum; (2) the longer propodus of gnathopod 2; (3) the poorly produced posterodistal corner of coxal plate 4; (4) the double spine rows of the inner ramus of uropod 2; (5) the 5-dentate left lacinia mobilis and 6-dentate right incisor.

The new species resembles *M. latimanus* Goës and *M. uncinatus* Bulycheva from the Soviet side of the Sea of Japan in having (1) a longer propodus of gnathopod 2, and (2) the longer carpus of the gnathopods. It can be, however, distinguished from *M. latimanus* by (1) the long carpal lobes of gnathopods in the female; (2) the elongated telson; and (3) the strongly developed hind lobe of segment 2 in pereiopod 7.

From *M. uncinatus* the present species differs in (1) the shorter and stouter rostrum; (2) the short claw of pereiopods 3 and 4; and (3) the more rounded segment 2 of pereiopods 5 and 6.

The degree of excavation of the telson is variable within a population. Smaller animals or male specimens show very slightly emarginated telsons. The number of ventrolateral spines on the inner ramus of uropod 2 varies 3 to 12 according to body size or among populations. In some specimens, it is observed that the spinulation of uropod 3 is paired or that the inner ramus lacks spines.

Major sexual dimorphism is found in antennae and gnathopod morphology. Pereiopod 7 of the male shows a larger number of setae on the distal segments than that of the female.

Derivatio nominis. — The new species is named after Mr. Mu-Won Jo, who helped the

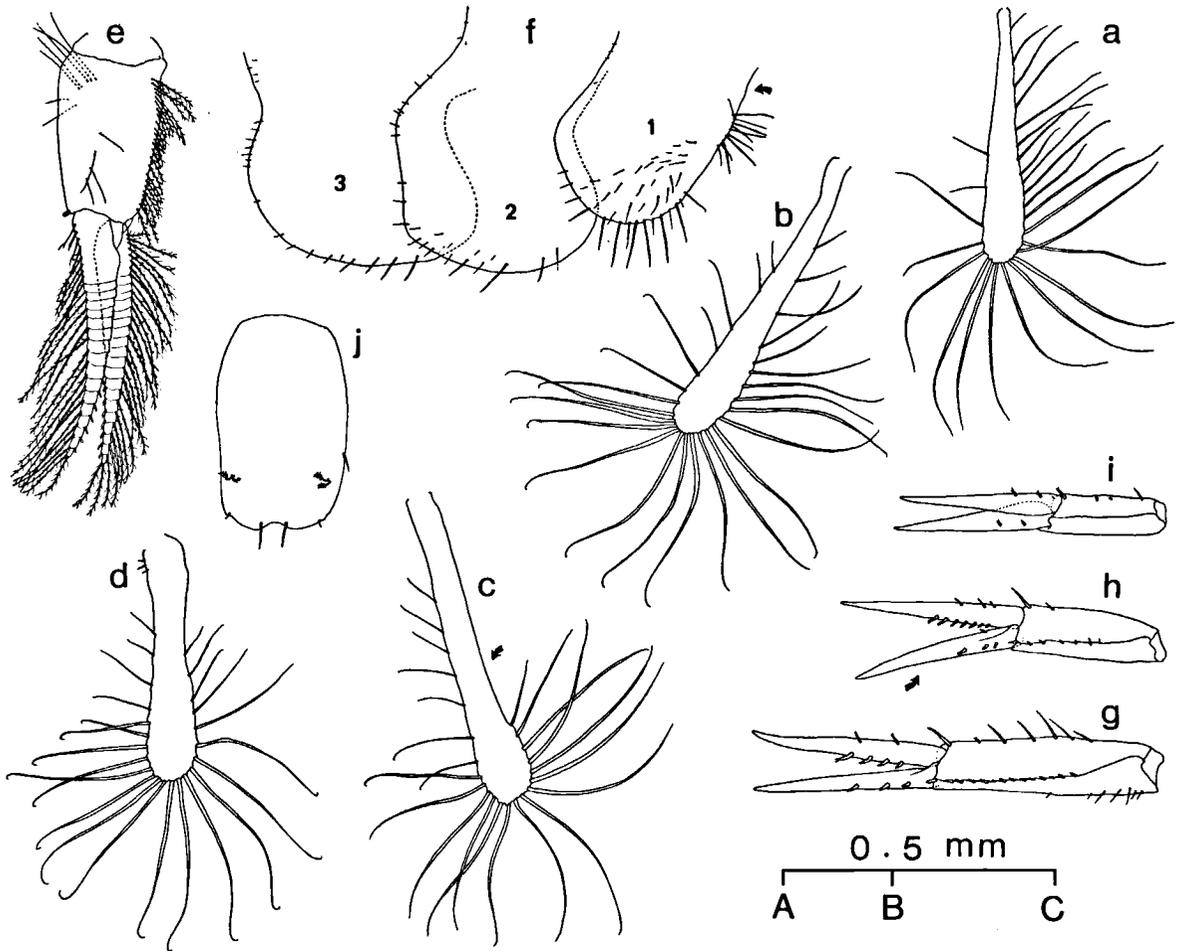


Fig. 7. *Monoculodes muwoni* n. sp. (♀ holotype 7.7 mm from Jinwoodo, Nakdong estuary) a-d, oostegites on gnathopod 2 - pereopod 5 (scale AB); e, pleopod 1 (AB); f, epimeral plates (AB); g-i, uropods 1-3 (AB); j, telson (AC). Each scale unit (AB, AC) represents 0.5 mm. Arrows indicate the anterior margin or outer ramus of appendages.

author with collecting material despite severe winter cold and muddy feet.

Distribution and ecology. — Specimens of *M. muwoni* were taken intertidally on the west coast and the south coast of Korea (fig. 1). The species occurs both on sandy and muddy bottoms. In the Nakdong estuary, it is found in the upper part of the estuary where the salinity is widely fluctuating according to the tides and freshwater run-off.

Ovigerous females were found in April, July and August. A female from the Nakdong estuary (5.9 mm, August 1984) carries a small

number of eggs (8), sized 0.27×0.35 mm, while another female from Aamdo, Incheon (6.6 mm, April 1986) carries 35 eggs.

***Monoculodes dentimanus* n. sp. (Figs. 8-10)**

Material examined — Pusan, Dadaepo; 4 Mar. 1983, 1 ovig. ♀ holotype (ZMA Amph. 108.665). Y. W. Jo coll.

Pusan, Nakdong estuary, Hadan; 29 Mar. 1984, 1 ♂ allotype (ZMA Amph. 108.666). Y. W. Jo & C. W. Ma coll.

Pusan, Nakdong estuary, Jangrim; 15 Feb. 1984, 1 ♀ paratype (ZMA Amph. 108.667). Y. W. Jo & C. W. Ma coll.

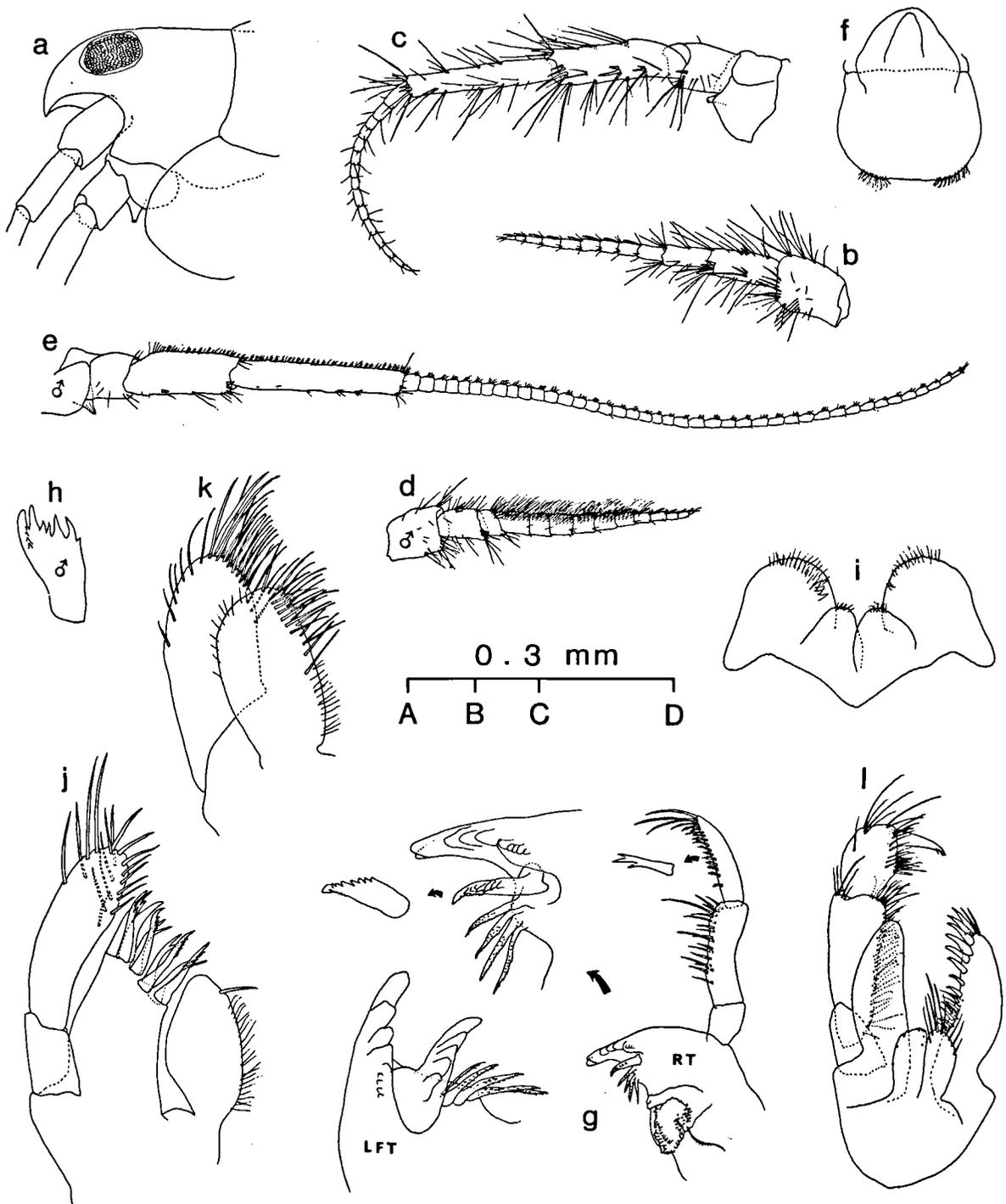


Fig. 8. *Monoculodes dentimanus* n. sp. (a-c, f-g, i-l, ♀ holotype 7.2 mm from Dadaepo; d-e, h, ♂ allotype 6.6 mm from Hadan, Nakdong estuary). a, head (scale AB); b, antenna 1 ♀ (AB); c, antenna 2 ♀ (AB); d, antenna 1 ♂ (AB); e, antenna 2 ♂ (AB); f, upper lip (AC); g, mandible (AC); h, right lacinia mobilis ♂ (AD × 2); i, lower lip (AC); j, maxilla 1 (AD); k, maxilla 2 (AD); l, maxilliped (AC). Each scale unit (AB, AC, AD, AD × 2) represents 0.3 mm.

Pusan, Nakdong estuary, Baekhabdeung; 18 Oct. 1983, 2 ♀ (1 ovig.) paratypes (IMS). Y. W. Jo & G. Doornbos coll.; 23 Oct. 1984, 1 ♀ and 2 ♂ paratypes (IMS). Y. W. Jo, C. W. Ma & M. W. Jo coll.; 7 Jan. 1985, 1 ♀ and 3 ♂ paratypes (IMS). Y. W. Jo & M. W. Jo coll.

Description. — Largest female 7.2 mm (excluding antennae and telson), largest male 6.6 mm.

Female (holotype 7.2 mm): Rostrum (fig. 8a) slightly deflected, nearly reaching end of peduncle segment 1 of antenna 1. Eyes medium-sized, partially occupying rostrum.

Antenna 1 (fig. 8b) nearly as long as peduncle of antenna 2, peduncle segment 1 subequal in length to segment 2; flagellum slightly shorter than peduncle, 9-segmented, each segment, except last, bearing 1 aesthetasc.

Antenna 2 (fig. 8c): Peduncle segment 4 as long as segment 5, flagellum short, 15-segmented.

Upper and lower lips (figs. 8f, i): Inner lobe of lower lip small, reaching about halfway of outer lobe.

Mandible (fig. 8g): Right incisor 6-dentate, the left 5-dentate, outermost tooth of both incisors with a few small denticles; right lacinia mobilis with 8 apical denticles and several fine serrations on distal inner margin, left lacinia 5-dentate. Palp segment 3 about 90% of length of segment 2, with 14 short trifurcated setae and 3 long apical setae.

Maxilla 1 (fig. 8j): Inner lobe large, outer lobe with 9 apical spines.

Maxilla 2 (fig. 8k) as in *M. muwoni*.

Maxilliped (fig. 8l): Inner lobe with 10 distal setae; outer lobe with 12 stout spines and several setae, not reaching end of palp segment 2; claw shorter than palp segment 3, with 2-3 blades on apicomedial margin.

Coxal plates relatively poorly setose and spinose, shallow; plate 1 strongly expanded distally, posterodistal corner of plate 4 moderately projecting, plate 6 about 1.5 times deeper than plate 7.

Gnathopod 1 (fig. 9a) larger than gnathopod 2; carpus about one-fifth of length of propodus, carpal lobe reaching end of hind margin of pro-

podus; propodus massive, distal part of hind margin with 3-4 denticles, palm finely serrate, longer than hind margin.

Gnathopod 2 (fig. 9b): Carpus about one-third of length of propodus, carpal lobe reaching end of hind margin of propodus; propodus small, about 3/4 times as long as that of gnathopod 1, distal part of hind margin with a few denticles, palm subequal in length to hind margin.

Pereiopods 3 and 4 (figs. 9e, f): Claw about two-thirds of length of segment 6.

Pereiopods 5 and 6 (figs. 9g, h): Segment 6 with naked anterior margin, a little longer than claw.

Pereiopod 7 (fig. 9i) with plumose setae and spines; segment 2 somewhat long, hind lobe strong; segments 4-7 subequal in length.

Coxal gills, oostegites (figs. 10a-d) and pleopods (fig. 10e) as in *M. koreanus*.

Epimeral plates (fig. 10f) poorly setose, plate 2 weakly pointed posteroventrally.

Uropod 1 (fig. 10g): Peduncle with 2 proximolateral spines plus 2 setae, 7 small dorsolateral, 5 dorsomedial spines; outer ramus shorter than inner, with 4 spines; inner ramus with 3 spines.

Uropod 2 (fig. 10h) reaching slightly beyond uropod 1; peduncle subequal in length to inner ramus, with 2 proximolateral setae, 6 dorsolateral and 5 dorsomedial spines; outer ramus shorter than inner, with 4 dorsal spines; inner with 4 dorsal and 3 ventrolateral spines.

Uropod 3 (fig. 10i): Peduncle with 2 dorsolateral and 3 dorsomedial spines plus 1 proximal seta; outer ramus nearly subequal in length to inner ramus, with 4 dorsal spines; inner ramus with 3 dorsal and 3 ventrolateral spines.

Telson (fig. 10j) slightly tapering, apex faintly emarginate.

Male (allotype 6.6 mm): Antenna 1 (fig. 8d): Peduncle segment 3 very short, shorter than first segment of flagellum; flagellum 11-segmented, with numerous sensory hairs.

Antenna 2 (fig. 8e) about two-thirds of body length; dorsal margin of peduncle segments 4

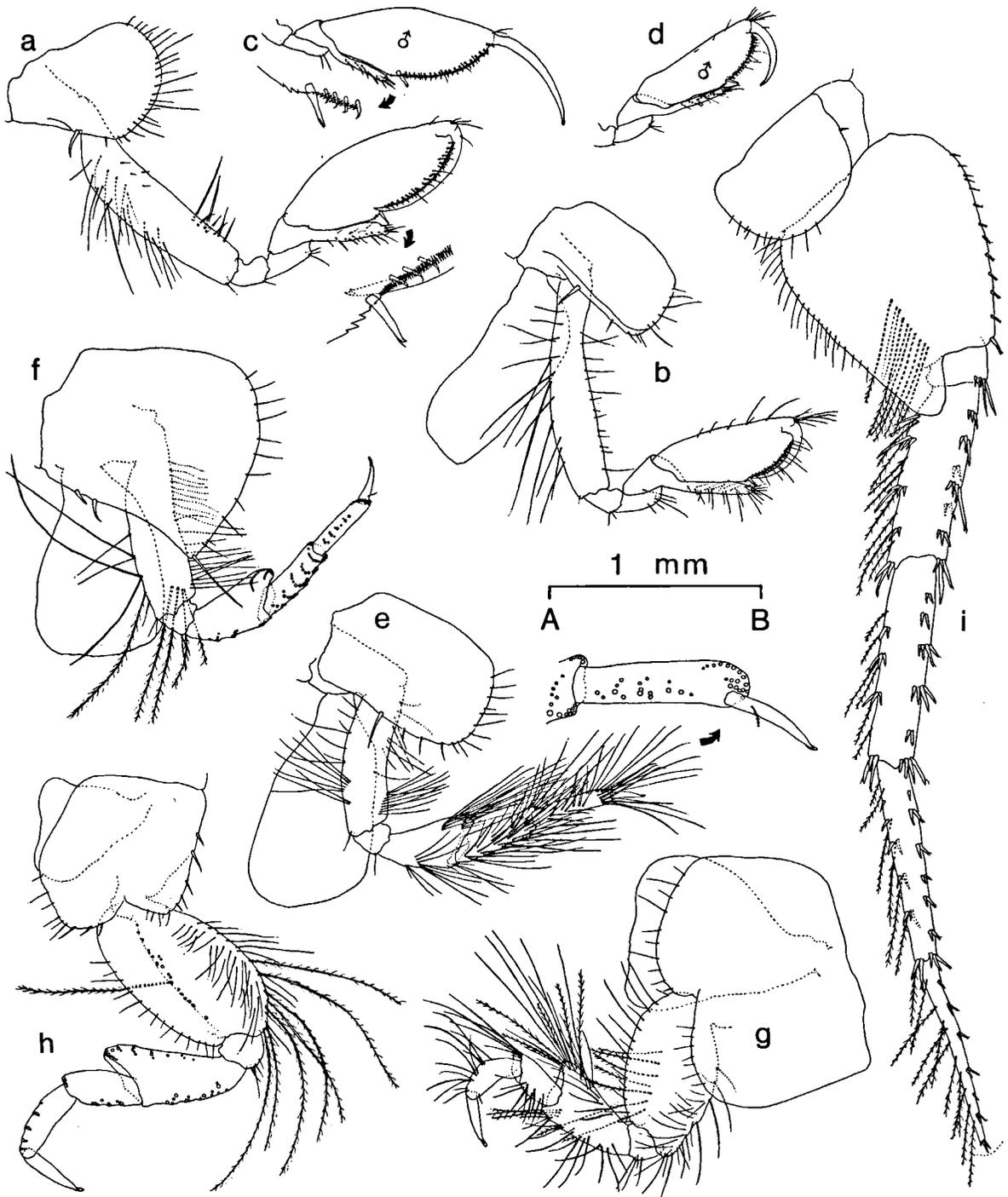


Fig. 9. *Monoculodes dentimanus* n. sp. (a-b, e-i, ♀ holotype 7.2 mm from Dadaepo; c-d, ♂ allotype 6.6 mm from Hadan, Nakdong estuary). a, gnathopod 1 ♀; b, gnathopod 2 ♀; c, distal part of gnathopod 1 ♂; d, distal part of gnathopod 2 ♂; e, pereopod 3; f, pereopod 4; g, pereopod 5; h, pereopod 6; i, pereopod 7. Scale: all AB (= 1 mm).

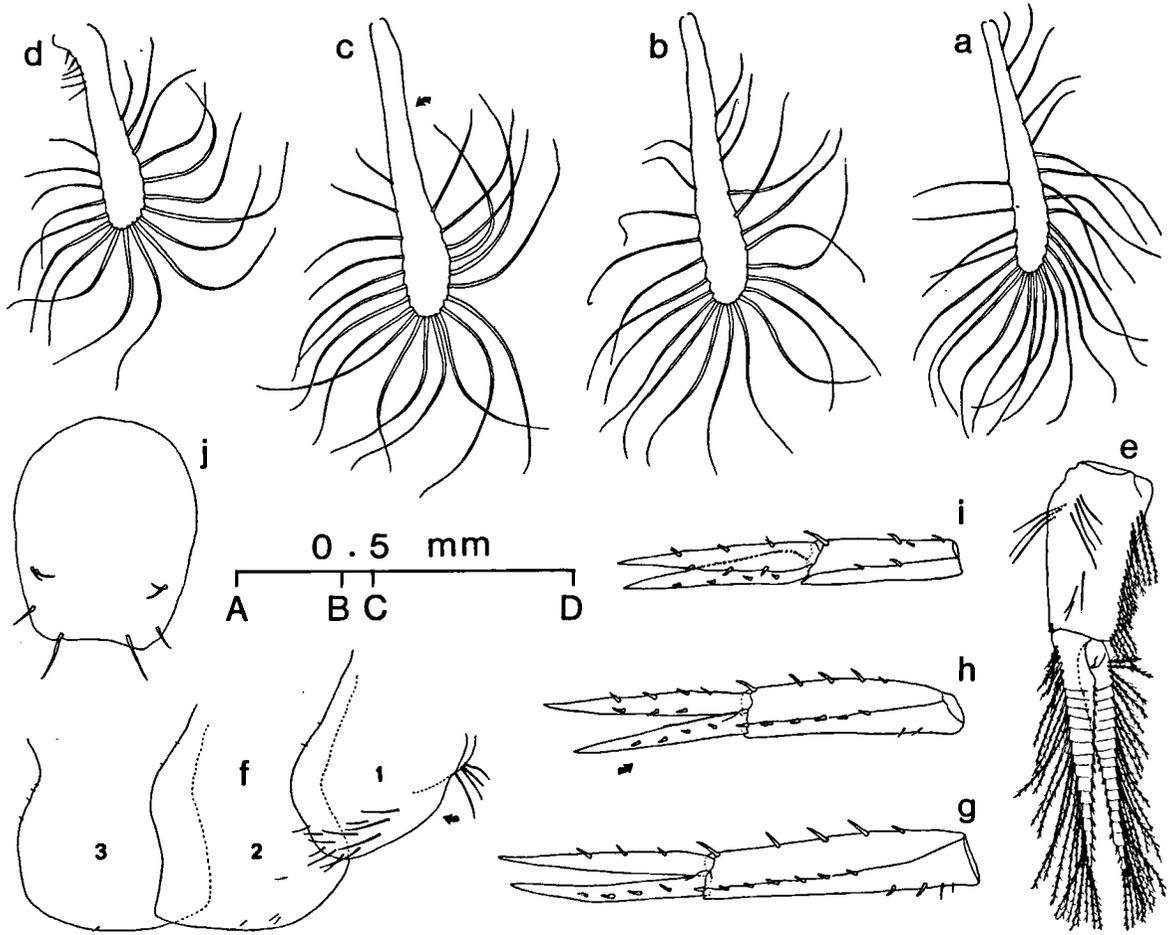


Fig. 10. *Monoculodes dentimanus* n. sp. (♀ holotype 7.2 mm from Dadaepo). a-d, oostegites on gnathopod 2 - pereopod 5 (scale AB); e, pleopod 1 (AB); f, epimeral plates (AB); g-i, uropods 1-3 (AC); j, telson (AD). Each scale unit (AB, AC, AD) represents 0.5 mm. Arrows indicate the anterior margin or outer ramus of appendages.

and 5 with numerous short setae; flagellum long, 42-segmented.

Gnathopods 1 and 2 (figs. 9c, d): Carpal lobe nearly reaching end of hind margin of propodus, propodus of gnathopod 1 longer than that of gnathopod 2 as in female.

Remarks. — *M. dentimanus* may be distinguished from all other species of the genus by the denticulated hind margin of the propodus of gnathopods 1 and 2. It differs from *M. koreanus* in the following respects: (1) stout rostrum; (2) propodus of gnathopod 1 longer than that of gnathopod 2; (3) a single spine row on the inner

ramus of uropod 1; (4) double spine rows on the inner ramus of uropods 2 and 3; and (5) 5-dentate left lacinia mobilis.

From *M. muwoni* it differs by (1) longer propodus of gnathopod 1; (2) less longish telson; (3) spination of inner ramus of uropods 1 and 3; and (4) strong dorsomedial spines on peduncle of uropod 1.

In the length ratio of the propodi of gnathopods 1 and 2 it resembles *M. l. limnophilus* Tattersall and *M. limnophilus japonicus* Nagata. But the new species can be distinguished from these by (1) the short and stout rostrum; (2) the presence of double spine rows on the inner

ramus of uropods 2 and 3; and (3) the numerous sensory hairs on the flagellum of the first antenna in the male.

Major sexual dimorphism is confined to antennae and gnathopods: Antenna 1 of the male bears numerous sensory hairs on the flagellum; the peduncle of antenna 2 in the male has very short setae and its flagellum is filiform with many segments; the carpal lobe of male gnathopods does not exceed the tip of the hind margin.

Derivatio nominis. — The proposed specific name, *dentimanus*, alludes to the denticulated hind margin of the propodus of gnathopods.

Distribution and ecology. — *M. dentimanus* appears to be a species from brackish water. Twelve specimens of this species were collected at Dadaepo and in the Nakdong estuary. Both localities exhibit marked fluctuations in salinity by freshwater run-off from the River Nakdong. The substrate is sand, muddy sand or mud.

Ovigerous females were found in March and October. The holotype (7.2 mm, March 1983) carries 57 eggs, sized 0.26×0.34 mm.

Genus *Perioculodes* Sars, 1892

Sars, 1892: 312; Lincoln, 1979: 338; Thomas & Barnard, 1985: 98.

Diagnosis. — Eyes present or absent. Antennae 1 and 2 in female usually about equal length. Peduncle of antenna 1 stout in male.

Mandibular molar small, usually with 2 apical spines; left lacinia mobilis 5-dentate; palp feeble, in male segment 3 elongate. Inner lobes of lower lip coalesced or notched, outer lobe bearing 1 or 2 cone(s). Outer lobe of maxilla 1 with 7 spine-teeth. Maxillipedal inner lobe small; outer lobe large, poorly or strongly armed.

Coxal gills present on gnathopod 2 through pereopod 6. Oostegites usually on gnathopod 2 through pereopod 5, that on gnathopod 2 vestigial or absent.

Gnathopods 1 and 2 subchelate, alike, but

propodus of gnathopod 1 shorter than that of gnathopod 2; carpal lobe guarding propodus in both legs.

Epimeral plates simple, poorly armed, posteroventral corners not projecting. Telson emarginate or rounded.

Type-species: *Monoculodes longimanus* Bate & Westwood, 1868

Species content: *P. a. aequimanus* (Kossmann, 1880); *P. megapleon* (Giles, 1888); *P. serra* Walker, 1904; *P. acuticoxa* Ledoyer, 1973; *P. pallidus* Griffiths, 1975; *P. longimanus angustipes* Ledoyer, 1982; *P. cerasinus* Thomas & Barnard, 1985; *P. brevicarpus* Ledoyer, 1986; *P. aequimanus mozambicus* Ledoyer, 1986; *P. longirostratus* Hirayama, 1987; *P. pinguis* Hirayama, 1987; *P. seohae* n. sp.

KEY TO THE KNOWN SPECIES OF *PERIOCULODES*

1. Claw of pereopods 3 and 4 small, less than one-third of length of segments 6 2
- Claw of pereopods 3 and 4 relatively long, more than half as long as segment 6 5
2. Inner ramus of uropod 1 strongly serrate .
..... *P. serra* Walker, 1904
- Inner ramus of uropod 1 smooth..... 3
3. Carpal lobe of gnathopods 1 and 2 just reaching end of hind margin of propodus; outer ramus of uropod 3 shorter than inner
..... *P. pallidus* Griffiths, 1975
- Carpal lobe of gnathopods extending far beyond hind margin; rami of uropod 3 subequal in length 4
4. Telson rounded; outer lobe of maxilliped reaching halfway along palp segment 2....
..... *P. seohae* n. sp.
- Telson emarginate; outer lobe of maxilliped nearly extending to end of palp segment 2
..... *P. megapleon* (Giles, 1888)
5. Coxal plate 3 with anteroventral cusp.....
..... *P. acuticoxa* Ledoyer, 1973
- Coxal plate 3 without cusp 6
6. Carpus of gnathopods 1 and 2 more than half as long as propodus; segment 2 of pereopod 7 much longer than wide 7

- Carpus of gnathopods less than one-third of length of propodus; segment 2 of pereopod 7 not narrow 8
- 7. Propodus of gnathopods 1 and 2 ovate, about twice as long as broad, palm strongly oblique, as long as hind margin.....
..... *P. brevicarpus* Ledoyer, 1986
- Propodus of gnathopods sublinear, about 5 times as long as broad, palm weakly oblique, much shorter than hind margin
..... *P. longirostratus* Hirayama, 1987
- 8. Peduncle segment 3 of antenna 1 in female as long as segment 1; outer lobe of maxilliped nearly reaching end of palp segment 2; posterodistal corner of coxal plate 4 projecting
... *P. longimanus* (Bate & Westwood, 1868)
- Peduncle segment 3 of antenna 1 in female shorter than segment 1; outer lobe of maxilliped reaching middle of palp segment 2; posterodistal corner of coxal plate 4 scarcely produced 9
- 9. Apex of telson truncate; anteroventral corner of coxal plate 1 not bevelled
..... *P. pinguis* Hirayama, 1987
- Telson rounded; anteroventral corner of coxal plate 1 bevelled..... 10
- 10. Coxal plate 6 broad, as deep as plate 7; segment 4 of pereopod 3 shorter than segments 5 and 6 combined
..... *P. cerasinus* Thomas & Barnard, 1985
- Coxal plate 6 deeper than wide; segment 4 of pereopod 3 longer than segments 5 and 6 combined
..... *P. a. aequimanus* (Kossmann, 1880)

Perioculodes seohae n. sp. (Figs. 11-13)

Material examined. — Ongjin-gun, Baekryeongdo, Yongkipo; 4 Nov. 1986, 1 ♀ holotype (ZMA Amph. 108.663) and 2 ♀ paratypes (IMS). B. S. Yeo & M. S. Jo coll.

Sinan-gun, Bigumdo, Gurim-ri; 19 Oct. 1986, 1 ♀ paratype (ZMA Amph. 108. 664). S. J. Yoo coll.

Description. — Female up to 2.7 mm. Female habitus is given in fig.11a.

Female (holotype 2.6 mm): Rostrum (figs. 11b, c) deflexed, ventral keel distinct. Lateral

lobe of head broadly rounded. No trace of eyes observed.

Antenna 1 (fig. 11d): Peduncle segments 1-3 subequal in length, segment 1 extending beyond apex of rostrum; flagellum as long as peduncle, 7-segmented, one aesthetasc on segments 5 and 6.

Antenna 2 (of female 2.7 mm, fig. 11e) about as long as antenna 1; peduncle segments 4 and 5 subequal in length; flagellum slightly shorter than peduncle, 6-segmented.

Upper lip (fig. 11f): Ventral margin with long hairs, mid-ventral protrusion small.

Mandible (fig. 11g): Right incisor with 4 teeth, left with 3 teeth; right lacinia mobilis absent, left lacinia 5-dentate; molar process small, with 2 spines. Palp segment 1 as long as segment 3; segment 2 thick, with 3 setae; segment 3 with 3 apical setae.

Lower lip (of female 2.3 mm, fig. 11h): Inner lobes notched apically; outer lobes with pair of cones on either lobe.

Maxilla 1 (fig. 11i): Outer lobe with 7 apical spines, palp segment 2 with 6 apical and subapical setae.

Maxilla 2 (fig. 11j): Inner lobe shorter than outer, with 5 short setae; outer lobe with 5 long setae.

Maxilliped (fig. 11k): Inner lobe slender, with 3 apical setae; outer lobe relatively short, reaching about middle of palp segment 2, with 3 long spines and 2 setae. Palp segment 1 with 1 apicolateral seta; claw simple, shorter than palp segment 3.

Length of coxal plates 1-4 increasing backward, poorly setose; distal margin of plate 1 straight, not bevelled; plate 2 much narrower than plate 1 or 3; plate 4 moderately expanded posterodistally; plate 6 more than twice as deep as plate 7.

Gnathopods 1 and 2 (figs. 12a, b) similar, carpus about one-fifth of length of propodus, carpal lobe long, well extending beyond proximal end of palm; propodus of gnathopod 2 slightly longer than that of gnathopod 1.

Pereopods 3 and 4 (figs. 12c, d) with long and thick setae, segment 2 not widening distally; posterior margin of segment 6 with 2 short

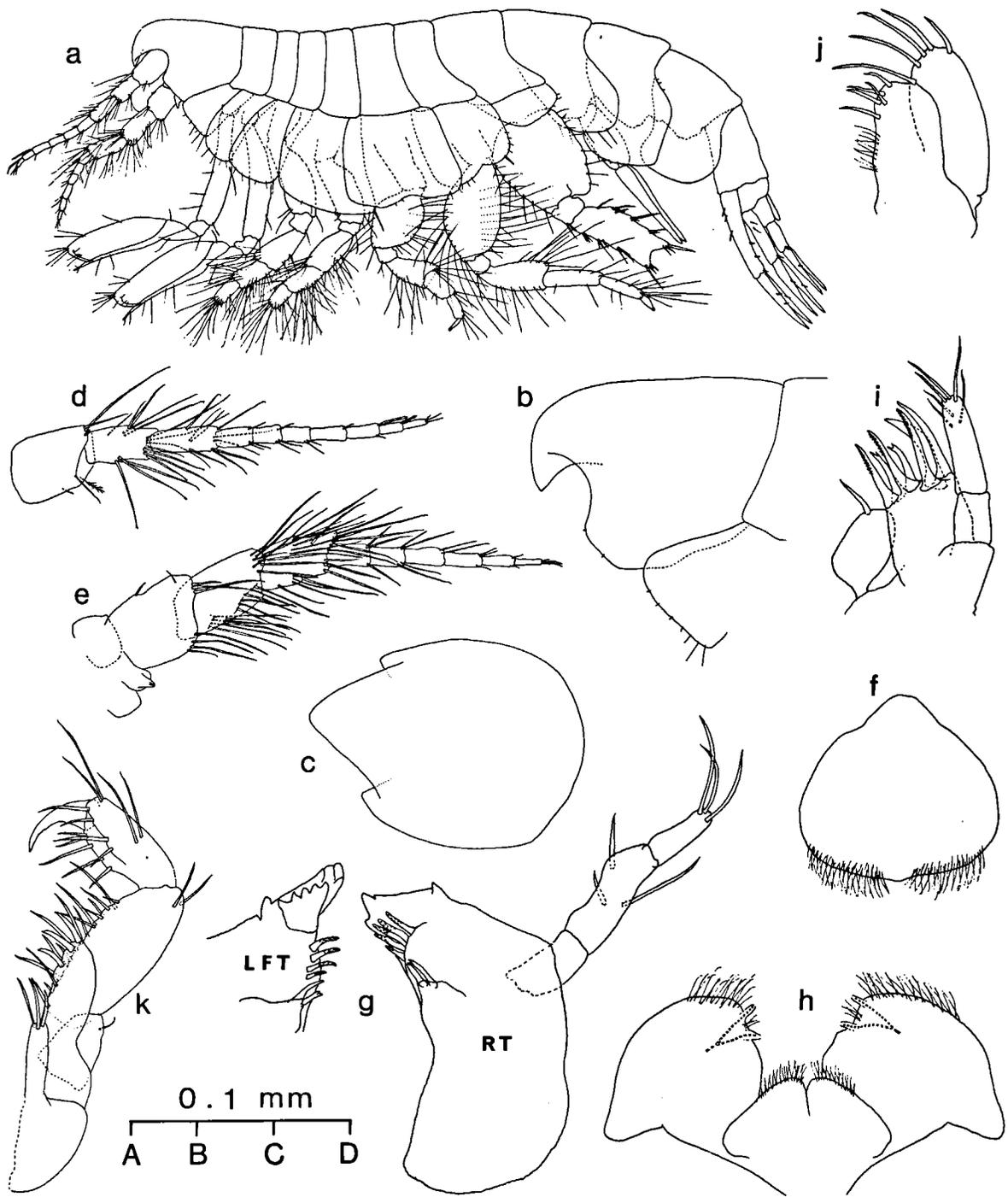


Fig. 11. *Periculodes seohae* n. sp. (a, h, ♀ paratype 2.3 mm from Gurim-ri, Bigumdo; b-d, f-g, i-k, ♀ holotype 2.6 mm from Yongkipo, Baekryeongdo; e, ♀ paratype 2.7 mm from Yongkipo, Baekryeongdo). a, entire animal, from the left; b, head, lateral view (scale AB); c, head, dorsal view (AB); d, antenna 1 (AB); e, antenna 2 (AB); f, upper lip (AD); g, mandible (AD); h, lower lip (AD); i, maxilla 1 (AD); j, maxilla 2 (AD); k, maxilliped (AC). Each scale unit (AB, AC, AD) represents 0.1 mm.

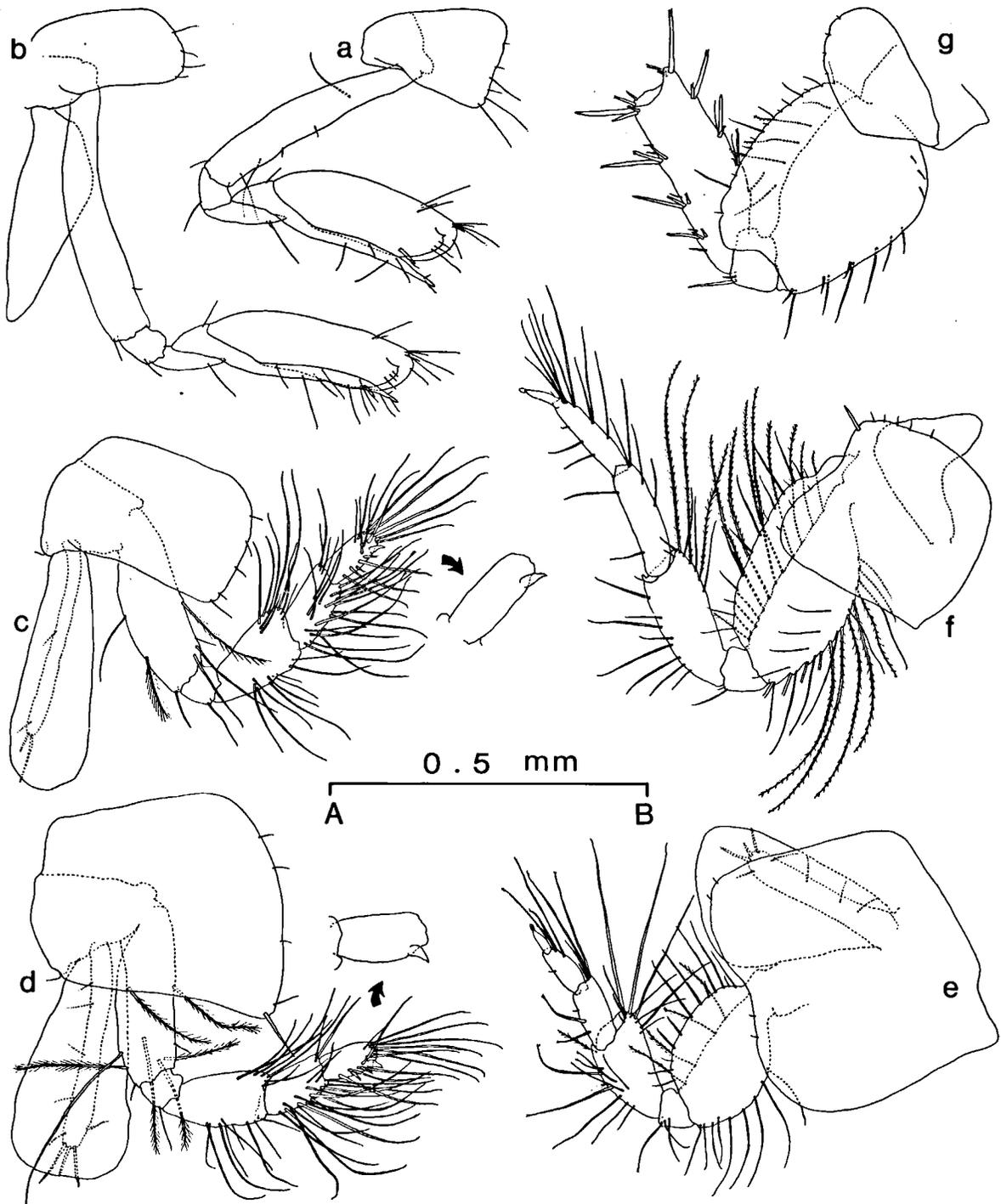


Fig. 12. *Periculodes seohae* n. sp. (♀ holotype 2.6 mm from Yongkipo, Baekryeongdo). a, gnathopod 1; b, gnathopod 2; c, pereopod 3; d, pereopod 4; e, pereopod 5; f, pereopod 6; g, proximal part of pereopod 7. Scale: all AB (= 0.5 mm).

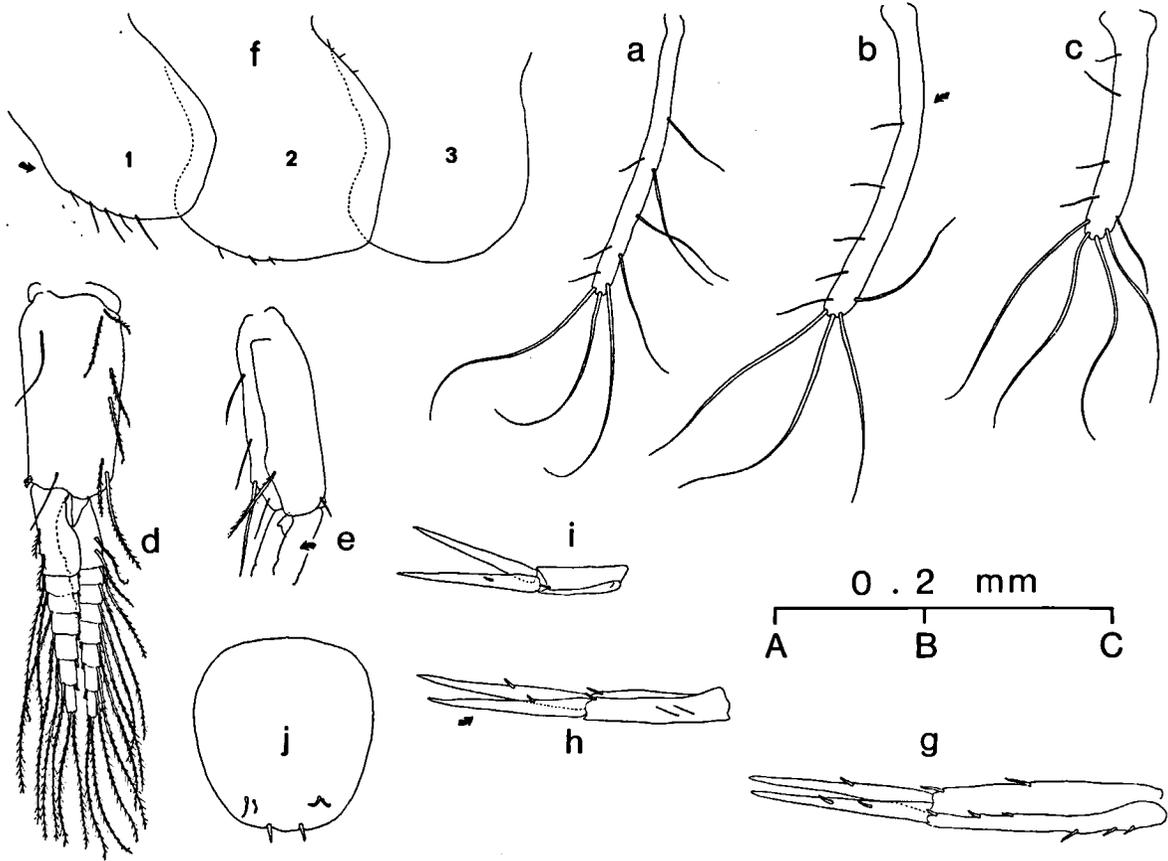


Fig. 13. *Periculodes seohae* n. sp. (a-c, ♀ paratype 2.7 mm from Yongkipo, Baekryeongdo; d-h, j, ♀ holotype 2.6 mm from Yongkipo, Baekryeongdo; i, ♀ paratype 2.3 mm from Gurim-ri, Bigumdo). a-c, oostegites on pereopods 3-5 (scale AB); d, pleopod 1 (AB); e, peduncle of pleopod 3, lateral view (AB); f, epimeral plates (AB); g-i, uropods 1-3 (AB); j, telson (AC). Each scale unit (AB, AC) represents 0.2 mm. Arrows indicate the anterior margin or outer ramus of appendages.

spines and a few setae; claw tiny, one-fourth of length of segment 6.

Pereopod 5 (fig. 12e) much shorter than 6, segment 2 broadly oval, segment 4 strongly expanded distally, claw shorter than segment 6.

Pereopod 6 (fig. 12f): Segment 6 shorter than segment 5; claw short, less than half of segment 6.

Pereopod 7 (fig. 12g) with distal segments broken off in this specimen, anterior margin of segment 2 setose, not spinose, posterodistal lobe broad and shallow.

Coxal gills present on gnathopod 2 through pereopod 6.

Oostegites (of female 2.7 mm, figs. 13a-c)

present on pereopods 3 through 5, long and thin, that of pereopod 3 with 5 long setae widely spread along the anterior margin; those on pereopods 4 and 5 mainly naked anteriorly.

Pleopods (figs. 13d, e): Peduncle robust, slightly shorter than rami, with 2 retinacula, retinaculus 2-hooked; outer posterior margin of peduncles 1 and 2 with 6 plumose setae; peduncle 3 with small expansion on outer posterodistal margin, single plumose seta distally; rami 6- or 7-segmented.

Epimeral plates (fig. 13f): Plate 1 somewhat pointed distally, with 5 anteroventral setae; plate 2 widest; plate 3 unarmed, rounded posteroventrally.

Uropod 1 (fig. 13g): Peduncle longer than rami, with 3 proximolateral, 3 dorsolateral, and 2 dorsomedial spines; rami subequal in length, outer ramus with 2 spines, inner ramus with 1 spine.

Uropod 2 (fig. 13h): Peduncle shorter than rami, with 2 proximolateral setae, both dorsolateral and dorsomedial margins each with a single apical spine; outer ramus shorter than inner, both rami with a single spine each.

Uropod 3 (of female 2.3 mm, fig. 13i): Peduncle shorter than rami, with 1 proximolateral seta and 1 dorsolateral spine; outer ramus with 1 spine.

Telson (fig. 13j) ovate, slightly longer than wide; apex rounded, with 2 separate spines; each dorsolateral margin with pair of setae.

Male: Unknown.

Remarks. — The present specimens do not show any trace of eyes. But, it is not clear whether or not the eyes have 'disappeared' after preservation in alcohol. Retraction of visual elements after fixation has been reported in some species of the genus (e.g., *P. longimanus*: Sars, 1892; *P. longimanus angustipes*: Ledoyer, 1982; *P. brevicarpus*: Ledoyer, 1986).

P. seohae is most closely related to the Indian species *P. megapleon* (Giles). It may be distinguished from the latter by (1) its shorter outer lobe of the maxilliped; (2) the entire telson morphology; (3) the not bevelled anteroventral corner of coxal plate 1; and (4) the absence of eyes.

From the Japanese species *P. pinguis* Hirayama the new species differs in (1) the minute claw of pereopods 3 and 4; (2) the wide coxal plate 6; (3) the peduncle of uropod 1 longer than the rami; and (4) the notched inner lobes of the lower lip. In the original description of *P. pinguis*, the holotype has been indicated as a female specimen (Hirayama, 1987: 26, 28, 29). There are, however, certain appendages showing male characters: peduncle segment 3 of antenna 1 shorter than flagellum segment 1; flagellum of the first antenna with many setae; long and filiform flagellum in antenna 2; elongated and densely setose mandibular palp

segment 3; absence of oostegites. Such male characters have been observed in *P. megapleon* (cf. Rabindranath, 1972), *P. longimanus* (cf. Ledoyer, 1972; 1973), *P. acuticoxa* (cf. Ledoyer, 1973), and *P. a. aequimanus* (cf. Ledoyer, 1972). Therefore, it is more likely that the holotype specimen of *P. pinguis* represents the male of the species.

The present species differs from another Japanese species, *P. longirostratus* Hirayama, by (1) the shorter claw of pereopods 3-6; (2) the narrow carpus of both gnathopods; (3) the short rostrum; (4) absence of oostegites on gnathopod 2; (5) the wide segment 2 of pereopod 7; (6) the notched inner lobes of the lower lip; (7) the short outer lobe of the maxilliped; and (8) the two-hooked retinacula of the pleopods.

Derivatio nominis. — The specific name, *seohae*, alludes to the distribution of the new species in the Yellow Sea. The Korean name of the Yellow Sea is Seohae (= West Sea).

Distribution and ecology. — Four specimens of this species were found in intertidal samples from Baekryeongdo and Bigumdo (fig. 1). The substrate is fine sand, the habitat is marine.

Ovigerous females were not encountered.

Genus *Synchelidium* Sars, 1892

Sars, 1892: 317; Stebbing, 1906: 241; Lincoln, 1979: 344.

Diagnosis. — Head with more or less strongly deflexed rostrum. Eyes coalesced dorsally, situated at base of rostrum. Peduncle segment 3 of antenna 1 usually reduced in male, shorter than flagellum segment 1. Antenna 2 in male very elongate, flagellum filiform.

Mandibular molar small, with 1 or 2 apical blade(s), not ridged; palp segment 1 in female shorter than segment 3; left lacinia mobilis 5-dentate. Inner lobes of lower lip fused or partly separate. Outer lobe of maxilliped with a few or many strong spines.

Gnathopods 1 and 2 dissimilar. Gnathopod 1 subchelate, border of palm denticulate, carpal lobe exceeding hind margin of propodus. Gnathopod 2 chelate, carpal lobe prolonged beneath and fused to propodus along entire length, propodus long and slender, chela quite small.

Description. — Rostrum with ventral keel. Antenna 1 of female longer or shorter than antenna 2; flagellum of male usually with densely implanted sensory setae.

Mandibular palp of male usually stouter than that of female, with more numerous comb setae on segment 3. Inner lobe of maxilla 1 with apical seta, outer lobe with 7 or 9 spine-teeth.

Coxal plate 3 not emarginate, posteroventral corner bevelled or entire. Coxal gills present on gnathopod 2 through pereopod 6. Oostegites on gnathopod 2 through pereopod 5, rarely lacking on gnathopod 2.

Carpus of gnathopod 1 less than one-third of length of propodus. Claw of gnathopod 2 less than one-third of length of propodus.

Peduncle of pleopods shorter than rami, with pair of retinacula, outer distal margin of pleopod 3 produced backward. Peduncle of uropod 1 longer than rami, with row of proximalateral spines. Inner ramus of uropods 1-3 armed with a single spine row. Rami of uropod 3 usually longer than peduncle.

Type-species: *Kroyeria haplocheles* Grube, 1864
 Species content: *S. tenuimanum* Norman, 1871; *S. intermedium* Sars, 1892; *S. maculatum* Stebbing, 1906; *S. longidigitatum* Ruffo, 1947; *S. rectipalmum* Mills, 1962; *S. shoemakeri* Mills, 1962; *S. miraculum* Imbach, 1967; *S. a. americanum* Bousfield, 1973; *S. gurjanovae* Kudrjaschov & Tzvetkova, 1975; *S. bulytschevae* Kudrjaschov & Tzvetkova, 1975; *S. micropleon* Barnard, 1977; *S. americanum latipalpum* Hirayama, 1986; *S. lenorostratum* Hirayama, 1986; *S. rostriopiculum* Hirayama, 1987; *S. carinorostrum* n. sp.; *S. trioostegitum* n. sp.

KEY TO THE KNOWN SPECIES OF *SYNCHELIDIUM*

1. Palm of propodus on gnathopod 1 shorter than hind margin, carpal lobe long, extending tip of propodus 2
 - Palm of gnathopod 1 strongly oblique, longer than hind margin, carpal lobe not reaching tip of propodus 7
2. Coxal plate 6 much deeper than wide; claw of pereopods 3 and 4 long
 - *S. gurjanovae* Kudrj. & Tzvet., 1975
 - Coxal plate 6 as deep as wide; claw of pereopods 3 and 4 minute 3
3. Posteroventral corner of epimeral plate 2 produced 4
 - Posteroventral corner of epimeral plate 2 rounded 5
4. Propodus of gnathopod 2 not tapering distally; coxal plate 4 wider than deep.....
 - *S. trioostegitum* n. sp.
 - Propodus of gnathopod 2 tapering distally; coxal plate 4 deeper than wide
 - *S. americanum latipalpum* Hirayama, 1986
5. Claw of gnathopod 2 long, about one-third of propodus; segment 2 of pereopod 7 narrow, posterior margin with long setae
 - *S. rectipalmum* Mills, 1962
 - Claw of gnathopod 2 about one-fifth of propodus; segment 2 of pereopod 7 broad, with short posteromarginal setae 6
6. Telson truncate; uropod 3 nearly attaining tip of uropod 1; inner lobes of lower lip deeply notched.....
 - *S. a. americanum* Bousfield, 1973
 - Telson ovate; uropod 3 reaching less than halfway along rami of uropod 1; inner lobes of lower lip fused
 - *S. micropleon* Barnard, 1977
7. Claw of pereopods 3 and 4 long, more than half the length of segment 6..... 8
 - Claw of pereopods 3 and 4 small or minute 12
8. Claw of gnathopod 2 long, nearly one-third of propodus; claw of pereopods 3 and 4 longer than segment 6 *S. carinorostrum* n. sp.
 - Claw of gnathopod 2 about one-fifth of propodus; claw of pereopods 3 and 4 not longer than segment 6 9

9. Telson with dozen of apical setae; segment 4 of pereopods 3-6 slender, not expanding distally; segment 2 of pereopod 7 lacking hind lobe *S. longidigitatum* Ruffo, 1947
 - Telson without apical setae; segment 4 of pereopods 3-6 widened distally; segment 2 of pereopod 7 with large hind lobe.... 10
10. Rostrum galeate; segment 2 of pereopod 7 narrow . *S. rostriopiculum* Hirayama, 1987
 - Rostrum not galeate; segment 2 of pereopod 7 not narrow 11
11. Rostrum gently deflexed; posteroventral corner of epimeral plate 2 projecting.....
 - *S. lenorostralum* Hirayama, 1986
 - Rostrum perpendicularly deflexed, with enormous ventral keel; posteroventral corner of epimeral plate 2 rounded.....
 - *S. miraculum* Imbach, 1967
12. Telson emarginate 13
 - Telson truncate or rounded14
13. Rostrum short, reaching about halfway peduncle segment 1 of first antenna; claw of gnathopod 2 about 1/5 of propodus.....
 - *S. haplocheles* (Grube, 1864)
 - Rostrum nearly reaching end of peduncle segment 1 of antenna 1; propodus of gnathopod 2 very slender, claw about 1/9 of propodus ... *S. tenuimanum* Norman, 1871
14. Rami of uropod 3 unarmed; segment 2 of pereopod 7 without hind lobe 15
 - Rami of uropod 3 with spines; segment 2 of pereopod 7 with hind lobe 16
15. Telson truncate; in female, first antenna longer than second antennae
 - *S. intermedium* Sars, 1892
 - Telson rounded; in female, first antenna shorter than second antenna
 - *S. maculatum* Stebbing, 1906
16. Posterodistal corner of merus on gnathopod 1 pointed; posterior margin of segment 2 of pereopod 7 with long setae; mandibular palp segment 3 of male with a few setae..
 - *S. bulytschevae* Kudrj. & Tzvet., 1975
 - Posterodistal corner of merus on gnathopod 1 not pointed; segment 2 of pereopod 7 with short setae posteriorly; mandibular palp segment 3 of male with numerous comb setae..... *S. shoemakeri* Mills, 1962

Synchelidium lenorostralum Hirayama, new rank (Figs. 14-16)

S. miraculum lenorostralum Hirayama, 1986: 362-366, figs. 5-7.

Material examined. — Ongjin-gun, Youngyodo, Eulwang-ri; 27 Apr. 1986, 6 ♀♀ (2 ovig.) and 3 ♂♂ (IMS), and 5 ♀♀ (2 ovig.) and 3 ♂♂ (ZMA Amph. 108.681). Y. W. Jo coll.

Siheung-gun, Oido; 20 July 1986, 1 specimen. Y. W. Jo coll.

Seosan-gun, Hakampo; 19 Oct. 1986, 8 ♀♀ (4 ovig.). Y. W. Jo coll.

Seosan-gun, Bango; 20 Oct. 1986, 10 ♀♀ (2 ovig.) and 5 ♂♂. Y. W. Jo coll.

Boryeong-gun, Daecheon; 9 May 1986, 1 ♀. Y. W. Jo coll.

Seocheon-gun, Chunjangdae; 9 May 1986, 21 ♀♀ (10 ovig.) and 3 ♂♂. Y. W. Jo coll.

Wando-gun, Sinjido, Myeongsasimri; 11 May 1986, 1 ovig. ♀ and 1 ♂. Y. W. Jo coll.

Geoje-Gun, Gujora; 20 Apr. 1986, 1 ovig. ♀. C. W. Ma coll.

Description. — Largest female 8.6 mm (excluding antennae and telson), largest male 7.3 mm.

Female (8.6 mm): Rostrum moderately deflexed, reaching end of peduncle segment 1 of antenna 1, ventral keel of rostrum medium to large.

Antenna 1 (fig. 14e) densely setose, peduncle segment 2 slightly longer than segment 1, segment 3 about half as long as segment 2; flagellum shorter than peduncle, 9-segmented, one aesthetasc on segments 3 through 8.

Antenna 2 (fig. 14f): Peduncle segments 4 and 5 slender, segment 4 shorter than 5, with 3 spine groups posteriorly; flagellum 19-segmented.

Upper lip (fig. 14g) resembles D-shaped larvae of certain bivalves, ventral margin rounded, with small protrusion.

Mandible (fig. 14h): Right incisor with 4 teeth, left with 3; right lacinia mobilis broad, with 3 main denticles, left lacinia 5-dentate; molar process with bundle of setules and 1 serrated long blade. Palp segment 1 with lateral

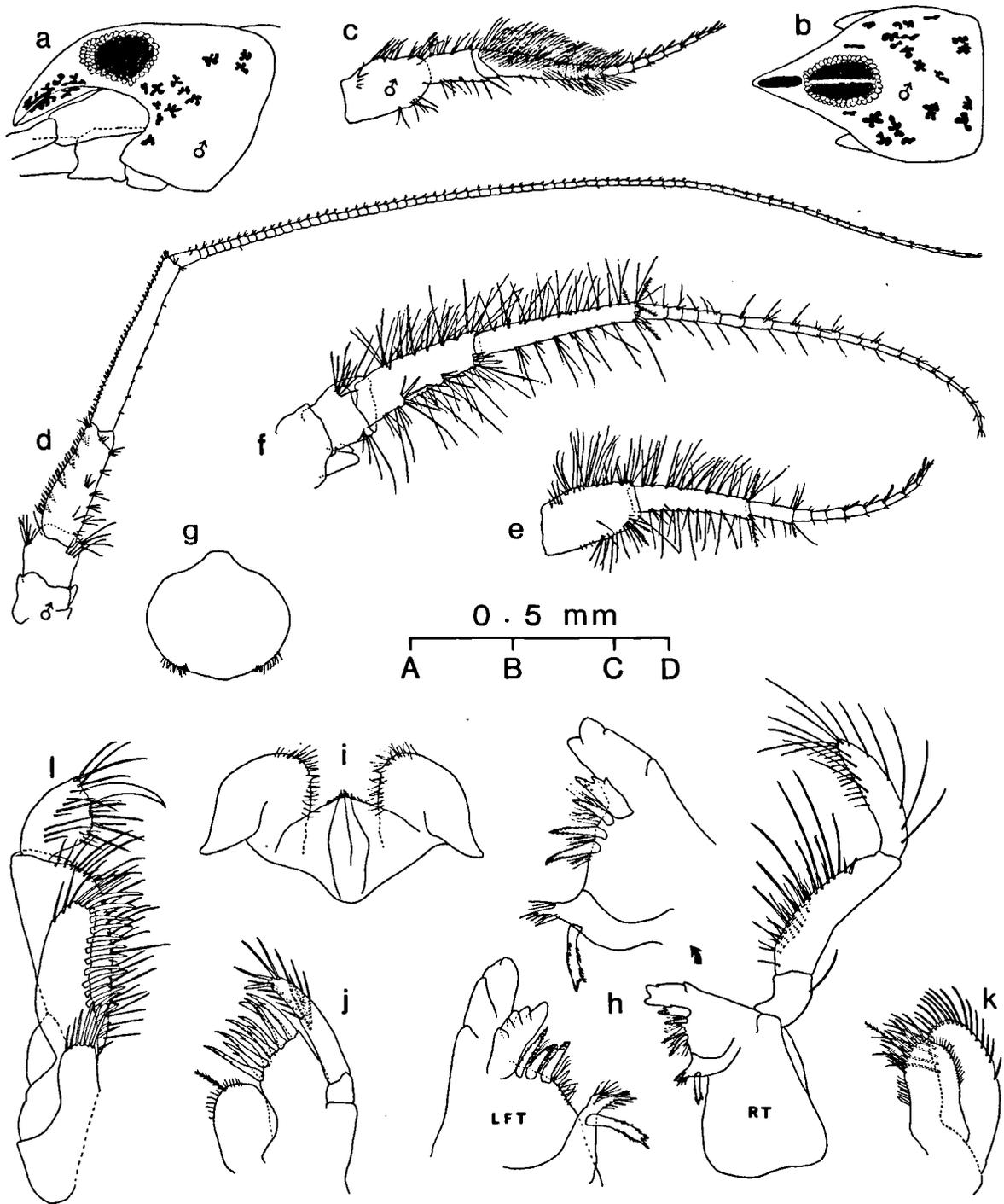


Fig. 14. *Synchelidium lenorostralum* Hirayama, 1986 (a-d, ♂ 7.3 mm; e-l, ♀ 8.6 mm, from Eulwang-ri, Yongyodo). a, head, lateral view (scale AB); b, head, dorsal view (AB); c, antenna 1 ♂ (AB); d, antenna 2 ♂ (AB); e, antenna 1 ♀ (AB); f, antenna 2 ♀ (AB); g, upper lip (AC); h, mandible (AC); i, lower lip (AC); j, maxilla 1 (AD); k, maxilla 2 (AD); l, maxilliped (AC). Each scale unit (AB, AC, AD) represents 0.5 mm.

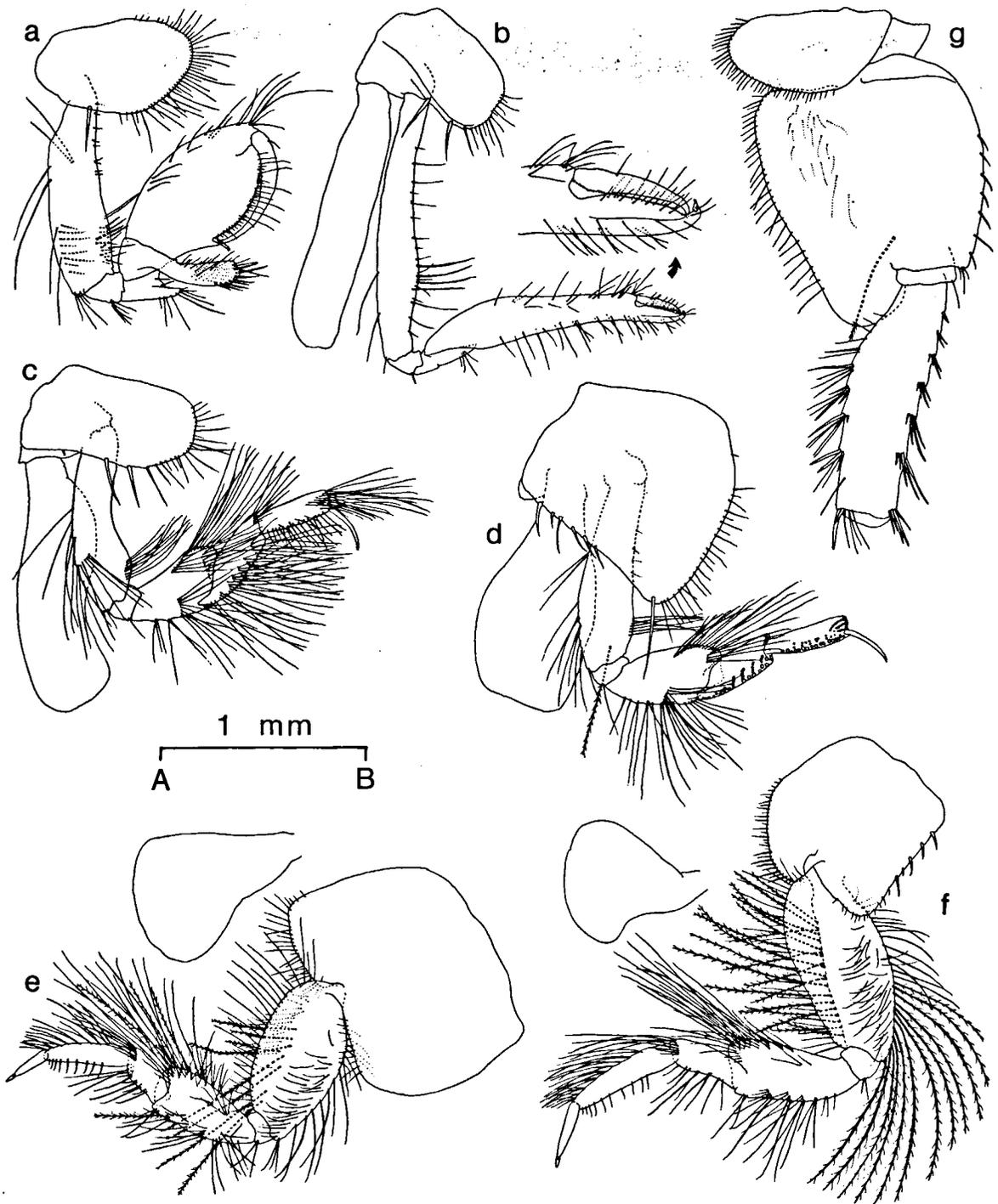


Fig. 15. *Synchelidium lenorostralum* Hirayama, 1986 (♀ 8.6 mm from Eulwang-ri, Yongyoodo). a, gnathopod 1; b, gnathopod 2; c, pereopod 3; d, pereopod 4; e, pereopod 5 and coxal gill; f, pereopod 6 and coxal gill; g, proximal part of pereopod 7. Scale: all AB (= 1 mm).

seta; inner margin of segment 2 densely setose; inner margin of segment 3 with many comb setae and several long apical (submarginal) setae, outer margin with 6 long setae.

Lower lip (fig. 14i): Inner lobes fused, outer lobes with cone near inner distal margin.

Maxilla 1 (fig. 14j) and maxilla 2 (fig. 14k): Outer lobe of first maxilla with 9 apical spines, one of them simple.

Maxilliped (fig. 14l): Inner lobe with 6 apical setae; outer lobe with 16 inner marginal spines and 5 picolateral setae.

Coxal plate 3 about as wide as plate 2, posteroventral corner bevelled; plate 4 as wide as deep, posteroventral corner slightly produced; anterior margin of plate 6 with several spines.

Gnathopod 1 (fig. 15a): Basis stout; merus produced posterodistally; carpal lobe broad and strongly setose, exceeding hind margin of propodus; palm of propodus oblique, finely pectinate, with a few denticles near hind margin, twice as long as hind margin.

Gnathopod 2 (fig. 15b): Propodus about as long as basis, tapering distally; claw about 18% of length of propodus.

Pereiopods 3 and 4 (figs. 15c, d): Segments 5 and 6 long and slender, claw two-thirds of length of segment 6.

Pereiopods 5 and 6 (figs. 15e, f): Segment 6 longer than segment 5, anterior margin with several stules; claw about half the length of segment 6.

Pereiopod 7 (fig. 15g): Posterodistal lobe of segment 2 large, extending far beyond segment 3.

Coxal gills present on gnathopod 2 through pereiopod 6, those on second and third legs long.

Oostegites (figs. 16a-d) present on gnathopod 2 through pereiopod 5, carrying numerous long setae.

Pleopods 1-3: Peduncle with pair of retinacula, retinaculum 2-hooked; outer posterior margin of peduncles 1 (figs. 16e, f) and 2 with a long row of plumose setae; outer posterodistal margin of peduncle 3 (fig. 16g) expanded backwards in lateral view, with a short

row of plumose setae along the distal margin only.

Epimeral plates 1-3 (figs. 16h-j): Plate 1 with long anterior marginal and submarginal setae, posterior margin with short setae; posteroventral corner of plate 2 produced.

Uropod 1 (fig. 16k): Peduncle longer than rami, with 14 thin proximolateral, 11 small dorsolateral and 7 long dorsomedial spines; outer ramus shorter than inner, with 5 spines; inner ramus with 4 spines.

Uropod 2 (fig. 16l): Peduncle shorter than rami, with 2 proximolateral setae, 8 short dorsolateral and 6 dorsomedial spines; outer ramus slightly shorter than inner, both rami with 4 spines each.

Uropod 3 (fig. 16m): Peduncle shorter than rami, dorsolateral margin unarmed, dorsomedial margin with 3 spines and 3 proximal spinules; length of rami subequal, outer with 3, inner with 4 spines.

Telson (fig. 16n) longish, distal margin emarginate, unarmed, dorsolaterally with pair of setules on either side.

Male (7.3 mm): Antenna 1 (fig. 14c) with short and stout peduncle, especially segment 3 very short; flagellum 11-segmented, segment 1 elongate, proximal 3 segments covered by numerous sensory hairs.

Antenna 2 (fig. 14d) elongate, about four-fifths of body length; dorsal margin of peduncle segments 4 and 5 with many short setae; flagellum filiform, 73-segmented.

Remarks. — The Korean material agrees well with the original description given by Hirayama (1986) except for a few minor differences such as the number of setae (or spines) on the appendages and the shape of the inner lobe of lower lip. But the dense setation or spinulation in the present specimen is due to the larger size of the animal (8.6 mm against 4.75 mm), and the notched inner lobe in the Japanese material is probably due to misdrawing of the raphus.

After re-examination of Imbach's type material (including the holotype) of the Vietnamese species *S. miraculum*, deposited in the Zoologisk

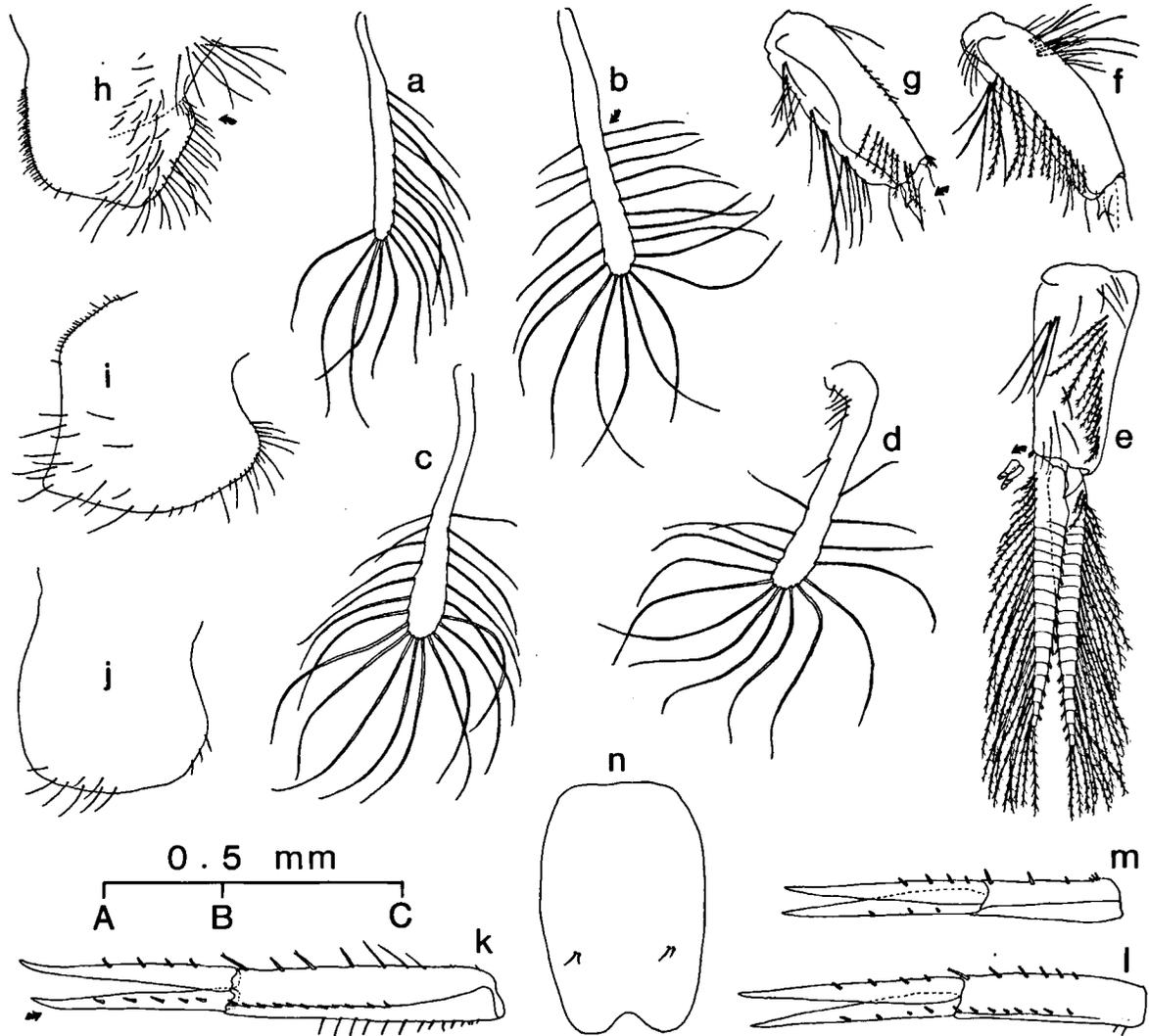


Fig. 16. *Synchelidium lenorostralum* Hirayama, 1986 (♀ 8.6 mm from Eulwang-ri, Yongyoodo). a-d, oostegites on gnathopod 2 - pereopod 5 (scale AB); e, pleopod 1 (AB); f, peduncle of pleopod 1, lateral view (AB); g, peduncle of pleopod 3, lateral view (AB); h-j, epimeral plates 1-3 (AB); k-m, uropods 1-3 (AB); n, telson (AC). Each scale unit (AB, AC) represents 0.5 mm. Arrows indicate the anterior margin or outer ramus of appendages except for that on 'e'.

Museum (Copenhagen), it seems justified that the subspecies *lenorostralum* should be raised to full specific rank. It differs from *S. miraculum*, as mentioned by Hirayama (1986), in (1) the not perpendicularly deflexed rostrum; (2) the emarginate telson; and (3) the produced posteroventral corner of epimeral plate 2. Other distinguishing characters of *lenorostralum* observed in the present study are the spinose outer ramus of uropods 1 and 2 (absence of

spines in *miraculum*), and the denser setation of antennae 1 and 2 in the female.

Usually the rostrum just reaches to the end of peduncle segment 1 of the first antenna but some animals have a long rostrum with weak ventral keel (fig. 14a). Coxal plate 6 of smaller animals (4-5 mm) has only 1-2 spines on the anterior margin. In some animals the right lacinia mobilis shows a finely serrated distal margin.

The male differs only in antennae 1 and 2; having shortened peduncle segments 2-3; the elongation of the first flagellum segment of antenna 1; the densely setose proximal segments of flagellum of antenna 1; the poorly setose peduncle of antenna 2; and the plurisegmented, filiform flagellum of antenna 2. No sexual dimorphism has been noticed in the mandibular palp segment 3.

Distribution and ecology. — This species occurs along the west and the south coasts of Korea, and in the Otsuchi Bay, Northeast Japan. The specimens in the present study were collected from intertidal to infralittoral habitats (up to 5 m depth). The substrate is sand or mud, the salinities marine.

Ovigerous females were obtained in April, May and October. A female from Yongyoodo (8.6 mm, April 1986) carries 54 eggs, sized 0.30×0.36 mm.

***Synchelidium carinorostrum* n. sp.** (Figs. 17-19)

Material examined. — Ongjin-gun, Yongyoodo, Eulwang-ri; 27 Apr. 1986, 1 ovig. ♀ holotype (ZMA Amph. 108.679), 1 ♂ allotype (ZMA Amph. 108.680) and 4 ♀ (2 ovig.) paratypes (IMS). Y. W. Jo coll.

Description. — Female up to 5.0 mm (excluding antennae and telson), male up to 4.4 mm.

Female (holotype 5.0 mm): Rostrum (fig. 17a) deflexed, with a strong ventral keel, reaching beyond peduncle segment 1 of antenna 1. Eyes large, nearly same length to rostrum.

Antenna 1 (fig. 17b): Peduncle segments 1 and 2 subequal in length; flagellum 6-segmented, one aesthetasc on segments 3-5.

Antenna 2 (fig. 17c): Peduncle segment 4 shorter than 5, without spines on posterior margin; flagellum 9-segmented.

Upper and lower lips (figs. 17f, i) as in *S. lenorostralum*.

Mandible (fig. 17g): Right lacinia mobilis biramous, the left 5-dentate; palp segment 3

with 6 apical and subapical setae plus 2 submarginal setae, outer margin with 2 setae.

Maxilla 1 (fig. 17j) and maxilla 2 (fig. 17k): Outer lobe of first maxilla with 9 apical spines, 4 of them simple.

Maxilliped (fig. 17-1): Inner lobe with 7 apical and outer marginal setae; outer lobe with 16 spines; claw as long as palp segment 3.

Coxal plates weakly setose on distal margin; apex of plate 1 gently pointed medially; posterodistal corner of plate 3 strongly bevelled; plate 4 deeper than wide, slightly produced posterodistally; anterior margin of plate 6 without spines.

Gnathopod 1 (fig. 18a): Posterodistal corner of merus slightly produced; carpal lobe long, exceeding hind margin of propodus, with several setae; palm oblique, coarsely toothed near hind margin, twice as long as hind margin.

Gnathopod 2 (fig. 18b): Propodus not tapering distally, shorter than basis; claw about 30% of length of propodus.

Pereiopods 3 and 4 (figs. 18c, d): Segment 2 of pereiopod 3 abruptly expanded distally; segments 5 and 6 of pereiopod 4 relatively short; claw longer than segment 6 in both legs.

Pereiopods 5 and 6 (figs. 18e, f): Segments 6 longer than segment 5, anterior margin with 1 setule distally; length of claw equal to segment 6.

Pereiopod 7 (fig. 18g): Segment 2 narrow, much longer than wide, proximal half of posterior margin setose, posterodistal lobe long and narrow.

Coxal gills on gnathopod 2 and pereiopod 4 shorter than basis; that on pereiopod 3 largest.

Oostegites (figs. 19a-d) present on gnathopod 2 through pereiopod 5, more setose on anterior margin.

Pleopods 1 (fig. 18h), 2 and 3 as in *S. lenorostralum*.

Epimeral plates 1-3 (fig. 19e) with round distal margin; posteroventral corner of plate 2 not pointed.

Uropod 1 (fig. 19f): Peduncle with 5 thin proximolateral, 7 small dorsolateral and 6 large dorsomedial spines; outer ramus shorter than

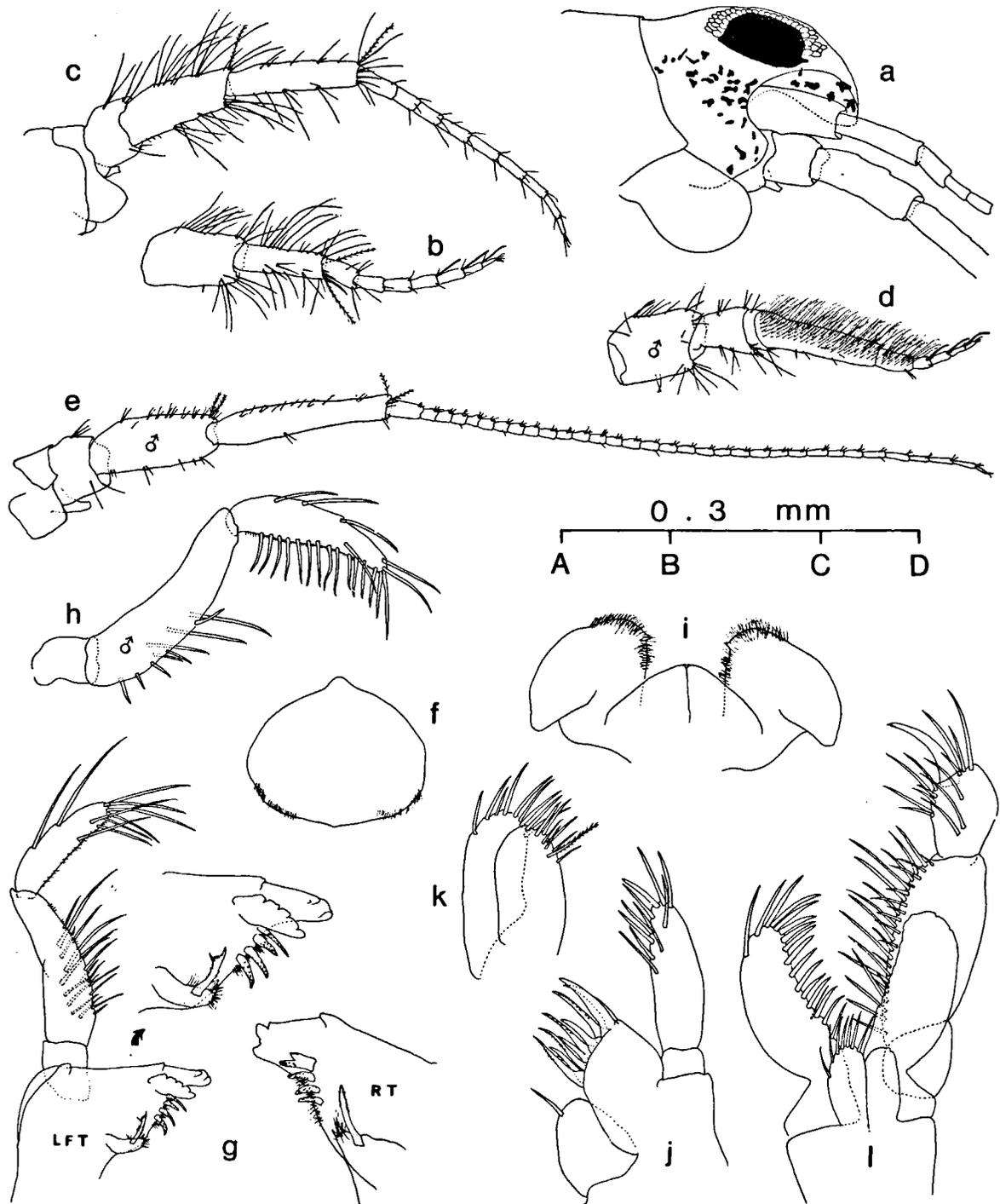


Fig. 17. *Synchelidium carinorostrum* n. sp. (a-c, f-g, i-l, ♀ holotype 5.0 mm; d-e, h, ♂ allotype 4.4 mm, from Eulwang-ri, Yongyodo). a, head (scale AB); b, antenna 1 ♀ (AB); c, antenna 2 ♀ (AB); d, antenna 1 ♂ (AB); e, antenna 2 ♂ (AB); f, upper lip (AC); g, mandible (AC); h, mandibular palp ♂ (AC); i, lower lip (AC); j, maxilla 1 (AD); k, maxilla 2 (AD); l, maxilliped (AC). Each scale unit (AB, AC, AD) represents 0.3 mm.

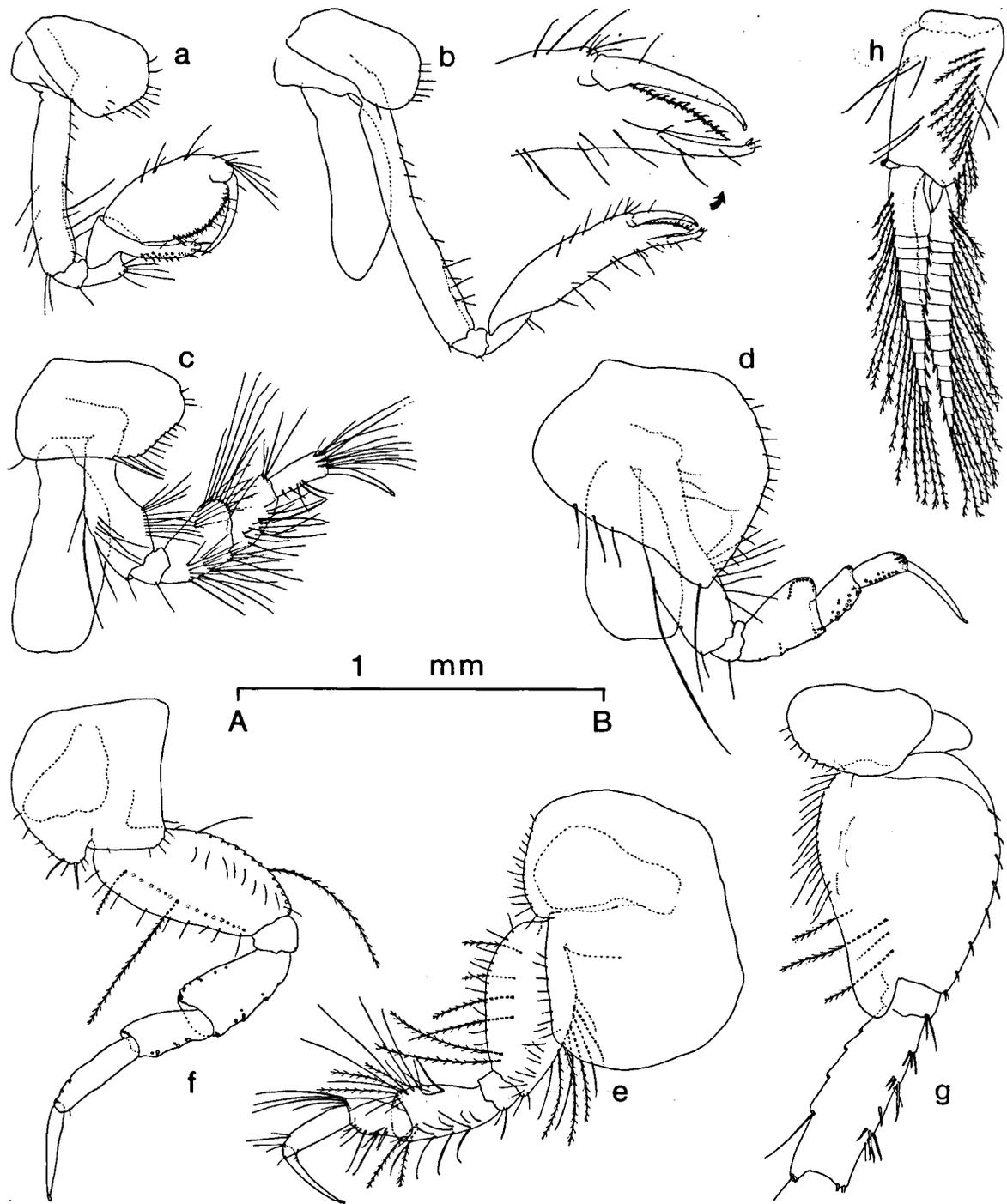


Fig. 18. *Synchelidium carinorostrum* n. sp. (♀ holotype 5.0 mm from Eulwang-ri, Yongyoodo). a, gnathopod 1; b, gnathopod 2; c, pereopod 3; d, pereopod 4; e, pereopod 5; f, pereopod 6; g, proximal part of pereopod 7; h, pleopod 1. Scale: all AB (= 1 mm).

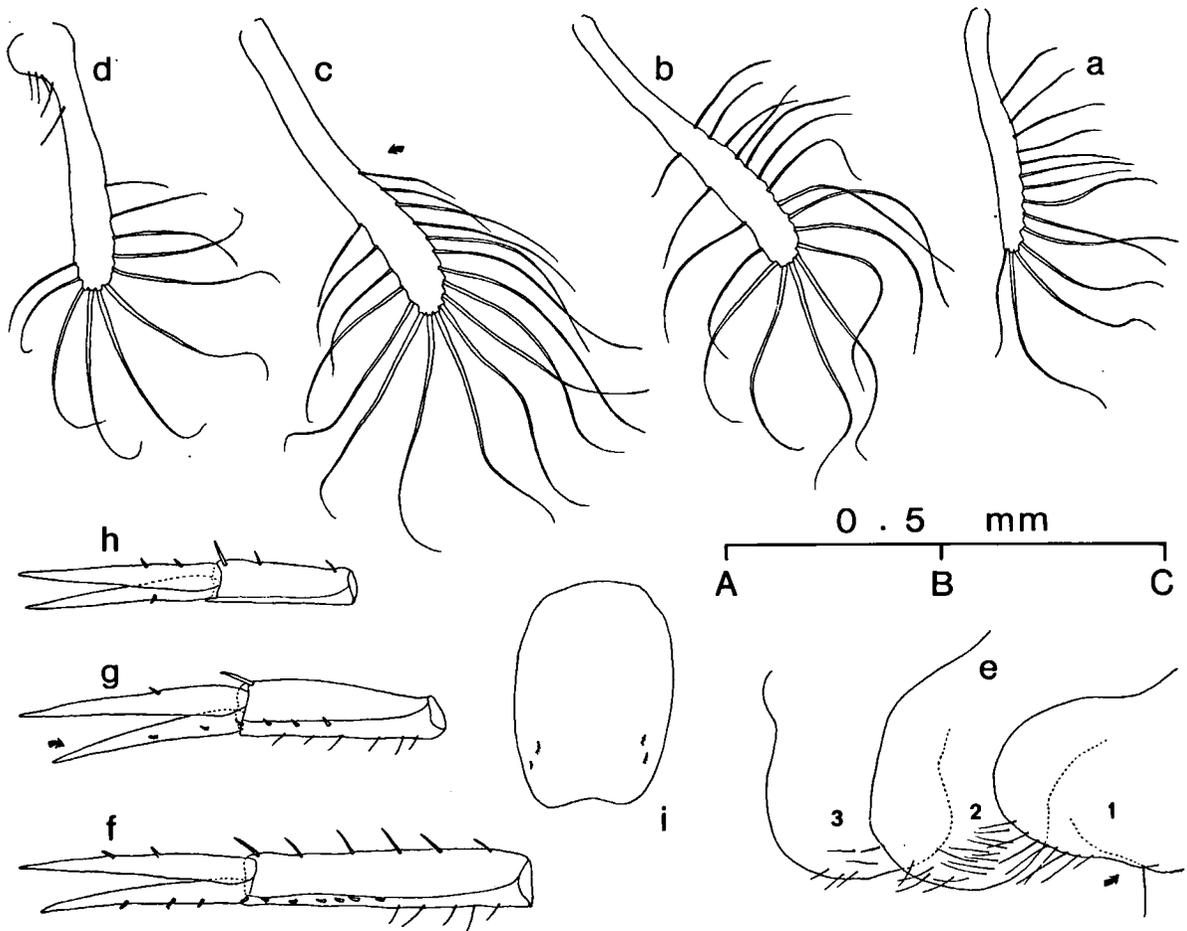


Fig. 19. *Synchelidium carinorostrum* n. sp. (♀ holotype 5.0 mm from Eulwang-ri, Yongyodo). a-d, oostegites on gnathopod 2 - pereopod 5 (scale AB); e, epimeral plates (AB); f-h, uropods 1-3 (AB); i, telson (AC). Each scale unit (AB, AC) represents 0.5 mm. Arrows indicate the anterior margin or outer ramus of appendages.

inner, with 3 spines; inner ramus with 2 spines.

Uropod 2 (fig. 19g): Peduncle with 6 thin ventrolateral, 4 small dorsolateral and 1 dorsomedial spines; outer ramus shorter than inner, with 2 spines; inner with 1 spine.

Uropod 3 (fig. 19h): Peduncle with 3 dorsomedial spines, dorsolateral margin unarmed; length of rami subequal, outer with 1, inner with 2 spines.

Telson (fig. 19i): Apex weakly emarginate, dorsolateral margin with 2 feathered setules on either side.

Male (allotype 4.4 mm): Antenna 1 (fig. 17d) with short, stout peduncle; flagellum 6-segmented, segment 1 elongate, a little shorter

than peduncle, segments 1 and 2 with numerous sensory hairs.

Antenna 2 (fig. 17e) about 60% of body length; dorsal margin of peduncle segments 4 and 5 relatively poorly setose; flagellum filiform, 33-segmented.

Mandibular palp (fig. 17h): Segment 2 with smaller number of setae than in female, inner margin of segment 3 with many comb setae and fine setules.

Remarks. — *S. carinorostrum* is characterized by (1) its strong ventral keel of the rostrum; (2) the long claw of pereopods 3 and 4; (3) the strongly bevelled posteroventral corner of coxal

plate 3; and (4) the long chela of gnathopod 2. The new species resembles *S. miraculum* Imbach but it can be distinguished from it by (1) the shape of rostrum (not perpendicular); (2) the very long claw of pereopods 3 and 4; (3) the spinose outer ramus of uripods 1 and 2; (4) the bevelled coxal plate 3; and (5) the distally widened segment 2 of pereiopod 3.

The new species differs from *S. lenorostralum* in (1) having a strongly bevelled coxal plate 3; (2) the longer claw of pereiopods 3 and 4; (3) the short coxal gills on gnathopod 2 and pereiopod 4; (4) the slender segment 2 of pereiopod 7; (5) the rounded posteroventral corner of enimeral plate 2; and (6) the almost naked anterior margin of segment 6 of pereiopods 5 and 6.

Male characters are found in antennae 1-2 and mandibular palp segment 3.

Derivatio nominis. — The specific name, *carinorostrum* (Latin "carina" = keel), refers to the strong ventral keel of rostrum.

Distribution and ecology. — Six specimens of this species were collected from the intertidal sandy beach at Yongyodo (up to 1 m depth at low water of spring tide).

Ovigerous females were found in April, carrying very small numbers of eggs. The holotype (5.0 mm) carries 3 eggs, sized 0.27 × 0.38 mm.

***Synchelidium trioostegitum* n. sp.** (Figs. 20-22)

Material examined. — Sinan-gun, Bigumdo, Gurim-ri; 19 Oct. 1986, 1 ovig. ♀ holotype (ZMA Amph. 108.677), 2 ♀ paratypes (ZMA Amph. 108.678) and 4 ♀ (2 ovig.) paratypes (IMS). S. J. Yoo coll.

Description. — A small species. Female up to 3.8 mm (excluding antennae and telson). Female habitus, see fig. 20a.

Female (holotype 3.8 mm): Rostrum deflexed, almost reaching tip of peduncle segment 1 of antenna 1. Lateral lobe of head very blunt. Eyes large, ommatidia scattered. Setae on

antennae and legs thick and bifurcated at the tips.

Antenna 1 (fig. 20b): Peduncle segments short and stout, slightly longer than wide, mid-dorsal margins naked; flagellum slightly shorter than peduncle, 6-segmented, one aesthetasc on segments 2 through 5.

Antenna 2 (fig. 20c) without spines, about 1.4 times as long as antenna 1; peduncle stout, segment 5 shorter than 4; flagellum 7-segmented, each segment carrying setae with bifurcate tips.

Upper lip (fig. 20d) widened distally, ventral margin rounded.

Mandible (fig. 20e): Right lacinia mobilis weakly bifid, left 5-dentate; molar process armed with 1 plumose and 1 simple blades; palp short, segments 2 and 3 with 5 and 6 setae, respectively.

Lower lip (fig. 20f): Cone on outer lobes lacking.

Maxilla 1 (fig. 20g): Outer lobe with 7 apical spines (1 simple, 2 bifid, 1 trifold and 3 serrate).

Maxilliped (fig. 20i): Inner lobe with 2 thick apical setae; outer lobe with 7 spines; claw slightly shorter than palp segment 3.

Coxal plates weakly setose; plate 1 widened distally, anteroventral margin with setules only; plate 3 twice as wide as plate 2, posterodistal margin swollen, not bevelled; plate 4 wider than deep, strongly produced posterodistally; anterior margin of plate 6 with 4 spines plus setae, produced distally; posterior margin of plate 7 rectangular, with 3 setae, anterior margin with 2 setae.

Gnathopod 1 (fig. 21a) poorly setose; posterodistal corner of merus not produced; carpal lobe tapering distally, as long as propodus, with 1 spine and seta apically, exceeding palm of propodus; propodus widened distally, palmar margin coarsely toothed, weakly oblique, shorter than hind margin.

Gnathopod 2 (fig. 21b) scarcely setose; propodus not tapering distally, about subequal to basis in length; claw about one-fourth of length of propodus.

Pereiopods 3 and 4 (figs. 21c, d): Segment 2 of pereiopod 3 not widened anterodistally;

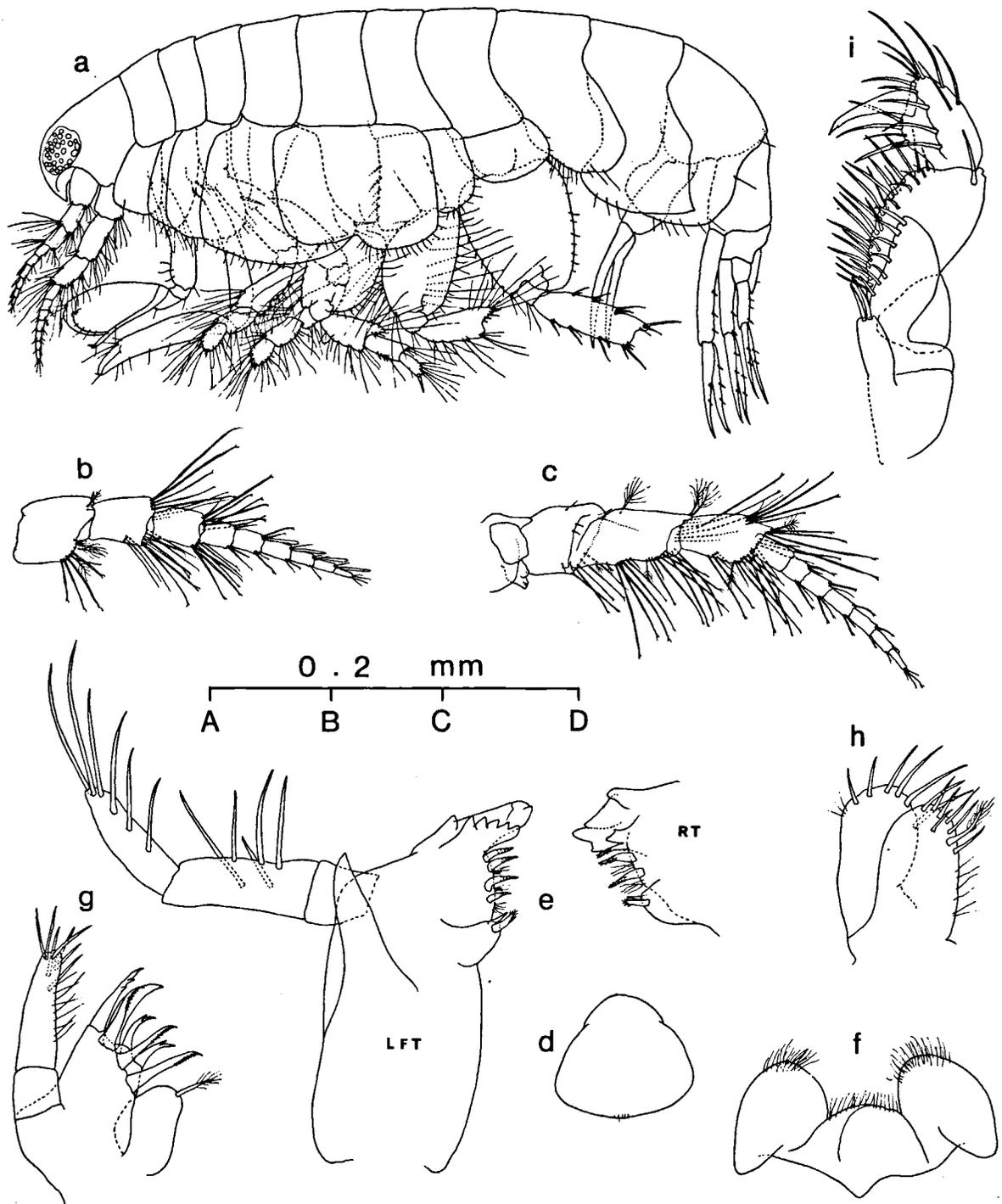


Fig. 20. *Sychelidium trioostegitum* n. sp. (♀ holotype 3.8 mm from Gurim-ri, Bigumdo). a, entire animal, from the left; b, antenna 1 (scale AB); c, antenna 2 (AB); d, upper lip (AC); e, mandible (AD); f, lower lip (AC); g, maxilla 1 (AD); h, maxilla 2 (AD); i, maxilliped (AC). Each scale unit (AB, AC, AD) represents 0.2 mm.

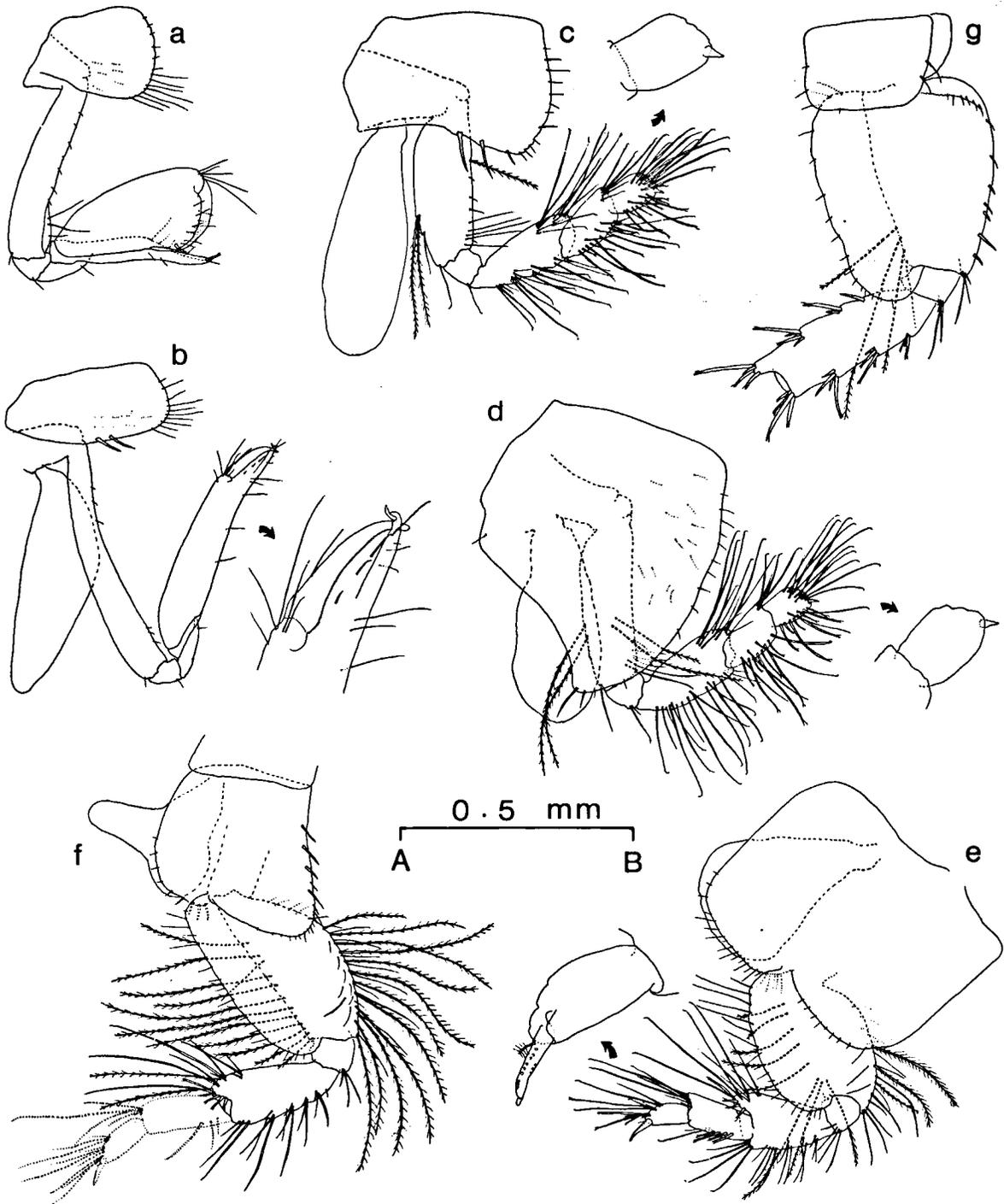


Fig. 21. *Synchelidum trioostegitum* n. sp. (♀ holotype 3.8 mm from Gurim-ri, Bigumdo). a, gnathopod 1; b, gnathopod 2; c, pereopod 3; d, pereopod 4; e, pereopod 5; f, pereopod 6 (distal 3 segments reconstructed from ♀ paratype 3.4 mm); g, proximal part of pereopod 7. Scale: all AB (= 0.5 mm).

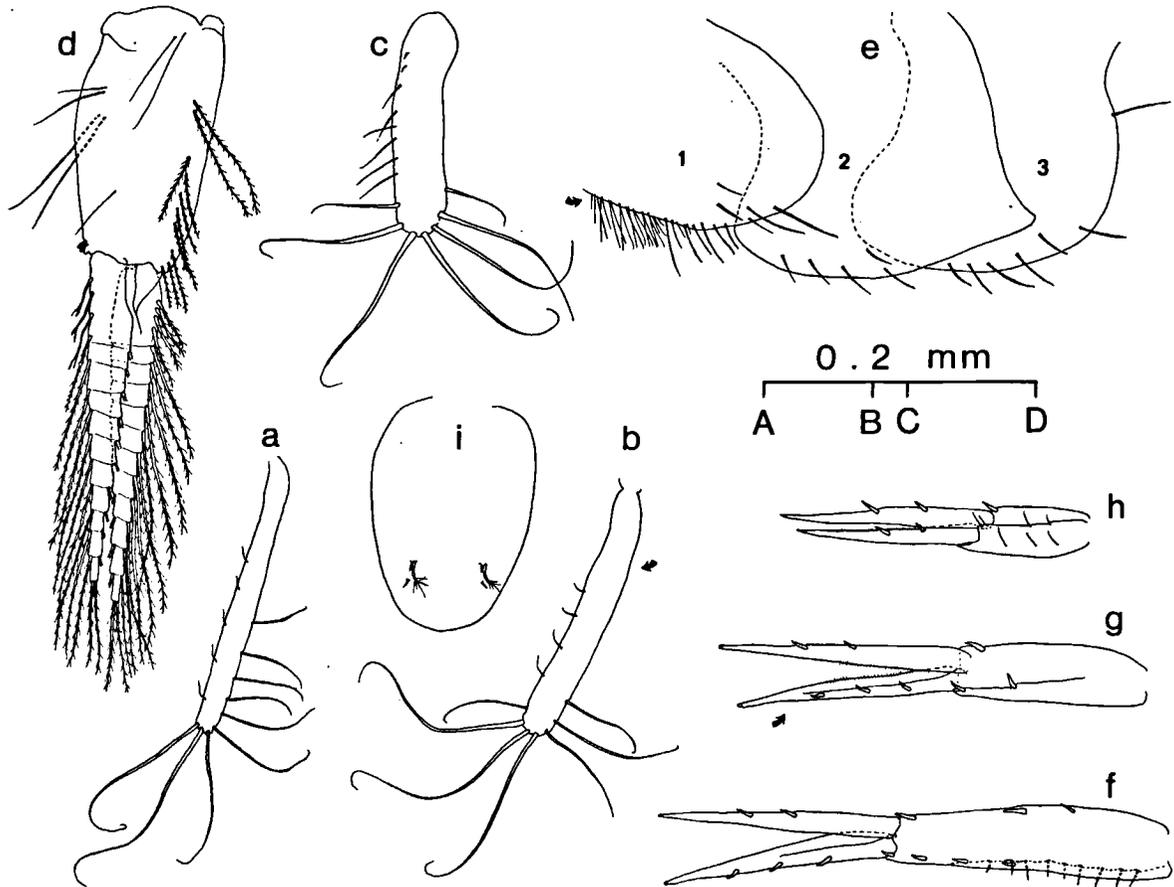


Fig. 22. *Synchelidium trioostegitum* n. sp. (♀ holotype 3.8 mm from Gurim-ri, Bigumdo). a-c, oostegites on pereopods 3-5 (scale AB); d, pleopod 1 (AC); e, epimeral plates (AC); f-h, uropods 1-3 (AC); i, telson (AD). Each scale unit (AB, AC, AD) represents 0.2 mm. Arrows indicate the anterior margin or outer ramus of appendages.

segments 5 and 6 of both legs very short and stout; claw minute, about one-fifth of length of segment 6.

Pereopods 5 and 6 (figs. 21e, f): Posterodistal end of segment 4 armed with 4-5 spines; segment 5 longer than segment 6, with a few spines and setae along the anterior margin; anterior margin of segment 6 naked; claw about half as long as segment 6; segment 2 of pereopod 5 broad oval.

Pereopod 7 (fig. 21g): Posterior margin of segment 2 with small setae widely spread, posterodistal lobe large and blunt.

Coxal gills: Gill on gnathopod 2 as long as basis; that on pereopod 4 relatively small.

Oostegites (fig. 22a-c) present on pereopods 3 through 5, lacking on gnathopod 2, with small number of long setae, posterior margins with setules.

Pleopods 1-3 (fig. 22d) as in *S. lenorostralum*.

Epimeral plates 1-3 (fig. 22e): Anterior margin of plate 1 densely setose, posteroventral corner of plate 2 well produced, that of plate 3 somewhat bevelled.

Uropod 1 (fig. 22f): Peduncle with 9 thin lateral, 4 dorsolateral and 3 dorsomedial spines; length of rami subequal, outer with 3, inner with 2 spines.

Uropod 2 (fig. 22g): Dorsolateral and dorsomedial margins of peduncle with 2 and 1

spines, respectively; outer and inner ramus with 3 and 2 spines, respectively.

Uropod 3 (fig. 22h): Peduncle with 3 slender lateral, 4 slender dorsolateral and 1 dorsomedial spines; outer ramus shorter than inner, both with 2 spines.

Telson (fig. 22i) long, somewhat tapering distally, apex rounded, dorsolateral margin with 1 plumose seta and 1 tiny setule on either side.

Male: Unknown.

Remarks. — *S. trioostegitum* is closest related to *S. americanum latipalpum* Hirayama. It may be distinguished from the latter by (1) the non-tapering propodus of gnathopod 2; (2) the non-spinose flagellum of antenna 2 in female; (3) the very broad coxal plate 4; and (4) the distally rounded coxal plate 1.

From the northwestern Atlantic species *S. a. americanum* Bousfield this species differs in (1) its pointed posteroventral corner of epimeral plate 2; (2) the rounded telson; (3) having 2 spines on the mandibular molar process; (4) the relatively long rostrum; (5) the fused inner lobes of lower lip; and (6) the poorly setose posterior margin of segment 2 of pereopod 7.

The new species can be distinguished from the Sakhalin species *S. gurjanovae* Kudrjaschov & Tzvetkova by (1) the minute claw of pereopods 3 and 4; (2) the stout segments 5 and 6 of the same legs; (3) the broad coxal plate 6; and (4) the strong hind lobe of segment 2 of pereopod 7.

It differs from the other Korean species, *S. carinorostrum* and *S. lenorostratum*, in (1) having only 3 pairs of oostegites; (2) the longer carpal lobe of gnathopod 1; (3) the minute claw of pereopods 3 and 4; (4) the rounded telson; and (5) having 7 apical spines on the outer lobe of maxilla 1 instead of 9 spines.

Derivatio nominis. — The specific epithet alludes to the three pairs of oostegites on pereopods 3 through 5 in the female of this new species, a character which distinguishes this species from the former two species treated.

Distribution and ecology. — Seven specimens of this new species were obtained from the lower intertidal zone at Bigumdo. The bottom consisted of fine sand and the habitat was of marine salinity.

An ovigerous female (holotype, 3.8 mm) was found in October and carries 5 eggs, sized 0.29×0.37 mm.

Chitinomandibulum n. g.

Diagnosis. — Rostrum acute, moderately deflexed. Eyes rounded, coalesced dorsally, Peduncle segment 3 of antenna 1 in male much shorter than flagellum segment 1, flagellum with heavy sensory hairs. Antenna 2 in male very elongate, flagellum filiform.

Mandible massive, apex of pars incisiva articulate and chitinous; incisor weakly projecting, weakly toothed; molar small, with an apical blade, not ridged; left lacinia mobilis 4-dentate.

Coxal plate 3 deeply excavated on distal margin. Coxal gills present on gnathopod 2 through pereopod 6. Oostegites slender, with long simple setae, present on gnathopod 2 through pereopod 5.

Gnathopods 1 and 2 markedly dissimilar. Gnathopod 1 subchelate, carpal lobe exceeding hind margin of propodus. Gnathopod 2 chelate, carpal lobe coalesced with propodus.

Peduncle of pleopods 1-3 shorter than rami, with pair of retinacula, outer mid-margin of pleopod 3 swollen posteriorly. Peduncle of uropods 1-3 with numerous lateral setae, inner ramus of uropods 1 and 2 with slender setae. Telson entire, truncate.

Description. — Antenna 1 subequal to antenna 2 in length, with very long setae.

Inner lobes of lower lip apically notched, outer lobe without cone. Inner lobe of maxilla 1 with 1 apical seta, outer lobe with 9 spine-teeth. Inner lobe of maxilliped small, outer lobe long, nearly reaching end of palp segment 2.

Carpus of gnathopod 1 half the length of propodus, palm neither denticulate nor pectinate.

Propodus of gnathopod 2 not tapering distally, chela nearly half as long as propodus.

Posterodistal margin of coxal plate 4 not produced, anterodistal margin bevelled. Claw of pereopods 3 and 4 well developed, long and broad. Segment 2 of pereopod 7 narrow, without hind lobe.

Peduncle of uropod 1 longer than rami. Rami of uropods 2 and 3 longer than peduncle.

Relationship. — *Chitinomandibulum* has close affinities with *Synchelidium* Sars, 1892 and *Pontocrates* Boeck, 1871 in the chelate 2nd gnathopod. It differs from *Synchelidium* in (1) the articulate and chitinous apex of the mandible, (2) the 4-dentated left lacinia mobilis (5 in the latter), (3) the strongly excavated coxal plate 3, and (4) having setae only on the inner ramus of uropods 1 and 2.

The new genus differs from *Pontocrates* in (1) the peculiar shape of the mandible and coxal plate 3, (2) the unridged molar of mandible, (3) the coalesced carpal lobe of gnathopod 2 with propodus, (4) the well developed claw of pereopods 5 and 6, and (5) the setose inner ramus of uropods 1 and 2.

Type-species: *Chitinomandibulum emargicoxa* n.sp.

Derivatio nominis. — The generic name *Chitinomandibulum* is derived from the chitinous apex of the mandible.

***Chitinomandibulum emargicoxa* n. sp. (figs. 23-25)**

Material examined. — Ongjin-gun, Yongyodo, Eulwang-ri; 27 Apr. 1986, 1 ovig. ♀ holotype (ZMA Amph. 108.674), 1 ♂ allotype (ZMA Amph. 108.675), 10 paratypes (ZMA Amph. 108.676), and 15 paratypes (IMS). Y. W. Jo coll.

Description. — Largest female 8.4 mm (excluding antennae and telson), largest male 6.8 mm. Female habitus, see fig. 23a.

Female (holotype 7.3 mm): Rostrum acute, short, reaching halfway peduncle segment 1 of antenna 1, ventral keel weak. Eyes round, capsule indistinct.

Antenna 1 (fig. 23b) a little shorter than

antenna 2, peduncle segment 2 slightly longer than segment 1, dorsal margin with several spines and setae, ventral margin with long setae; flagellum longer than that of antenna 2, 15-segmented, setae very long except for those on distal few segments, one aesthetasc on segments 12 through 14.

Antenna 2 (fig. 23c) with long gland cone, peduncle segment 4 nearly subequal in length to segment 5, with group of long setae dorsally; flagellum 12-segmented, shorter than peduncle segments 4 and 5 combined.

Upper lip (fig. 23f) long, distally widened.

Mandible (fig. 23g): Apex of pars incisive articulate and chitinous, cutting edge of both incisors generally 3-toothed; right lacinia mobilis bifid, left lacinia with 4 blunt teeth; molar process with a single blade; palp segment 1 as long as segment 3, inner margin of segment 2 with many setae, segment 3 with 7 inner marginal and 2 apical setae.

Lower lip (fig. 23i) with notched inner lobe, outer lobe without cone.

Maxilla 1 (fig. 23j): Outer lobe with 9 apical spines, 7 of them finely serrated on their distal half.

Maxilla 2 (fig. 23k): Inner lobe tapering distally.

Maxilliped (fig. 23l): Inner lobe with 4 apical setae; outer lobe nearly reaching tip of palp segment 2, with 18 spines and several setae; claw subequal in length to palp segment 3.

Coxal plates densely setose; plate 1 expanded anterodistally; plate 3 of peculiar shape, ventral margin markedly excavated medially; plate 4 as wide as deep, posterodistal corner not produced; hind lobe of plate 6 deeper than anterior lobe.

Gnathopod 1 (fig. 24a) small; posterodistal margin of merus pointed; carpus long, about half as long as propodus, carpal lobe exceeding hind margin of propodus; palm oblique, longer than hind margin.

Gnathopod 2 (fig. 24b): Propodus as long as basis, not tapering distally; claw very long, about 45% of length of propodus.

Pereopod 3 (fig. 24c): Claw not slender, about two-thirds of length of segment 6.

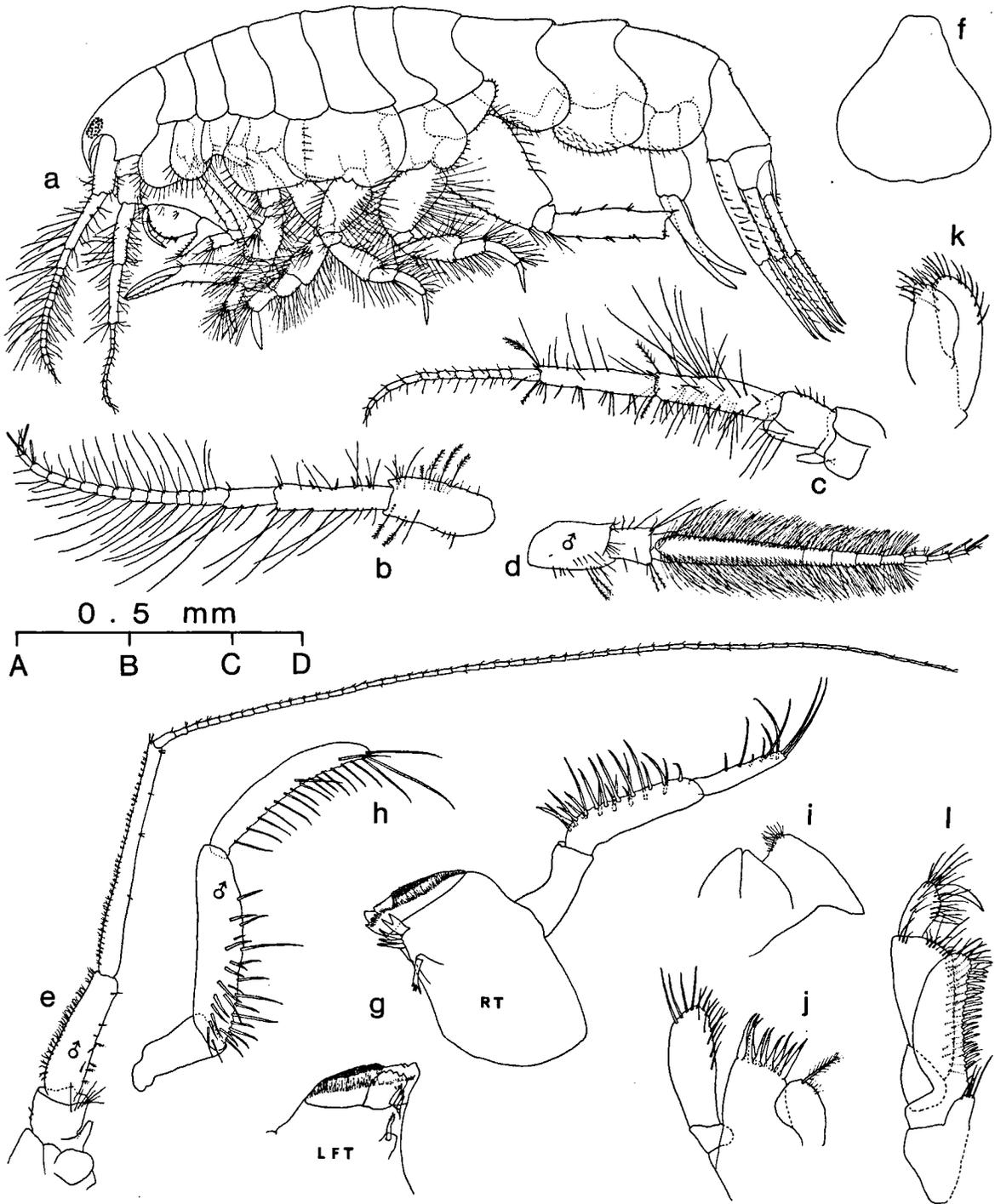


Fig. 23. *Chitinomandibulum emargicoxa* n. g., n. sp. (a, ♀ paratype 8.4 mm; b-c, f-g, i-l, ♀ holotype 7.3 mm; d-e, h, ♂ allotype 6.8 mm, from Eulwang-ri, Yongyodo). a, entire animal, from the left; b, antenna 1 ♀ (scale AB); c, antenna 2 ♀ (AB); d, antenna 1 ♂ (AB); e, antenna 2 ♂ (AB); f, upper lip (AC); g, mandible (AD); h, mandibular palp ♂ (AD); i, lower lip (AC); j, maxilla 1 (AD); k, maxilla 2 (AD); l, maxilliped (AC). Each scale unit (AB, AC, AD) represents 0.5 mm.

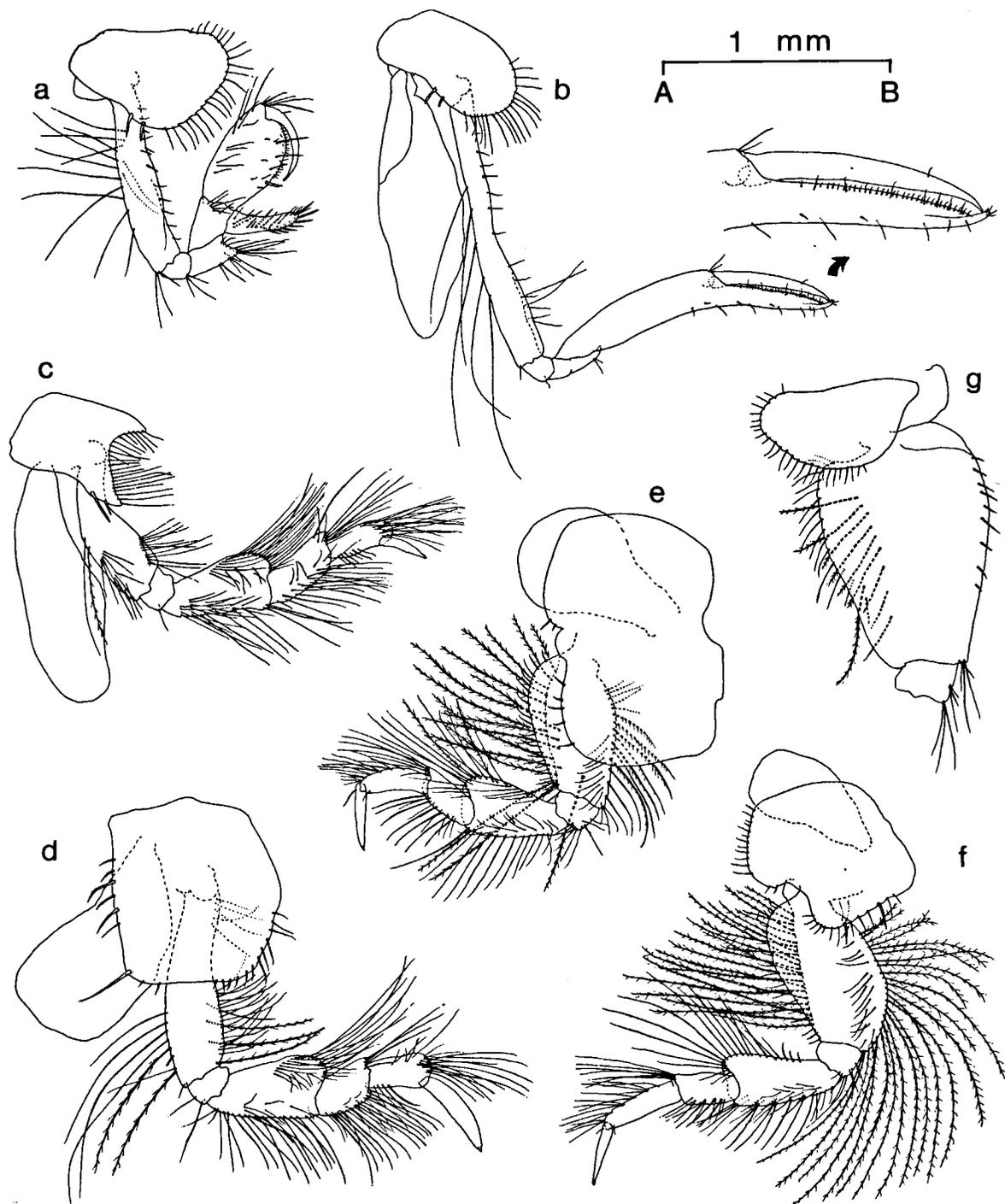


Fig. 24. *Chitinomandibulum emargicoxa* n. g., n. sp. (♀ holotype 7.3 mm from Eulwang-ri, Yongyoodo). a, gnathopod 1; b, gnathopod 2; c, pereopod 3; d, pereopod 4; e, pereopod 5; f, pereopod 6; g, proximal part of pereopod 7. Scale: all AB (= 1 mm).

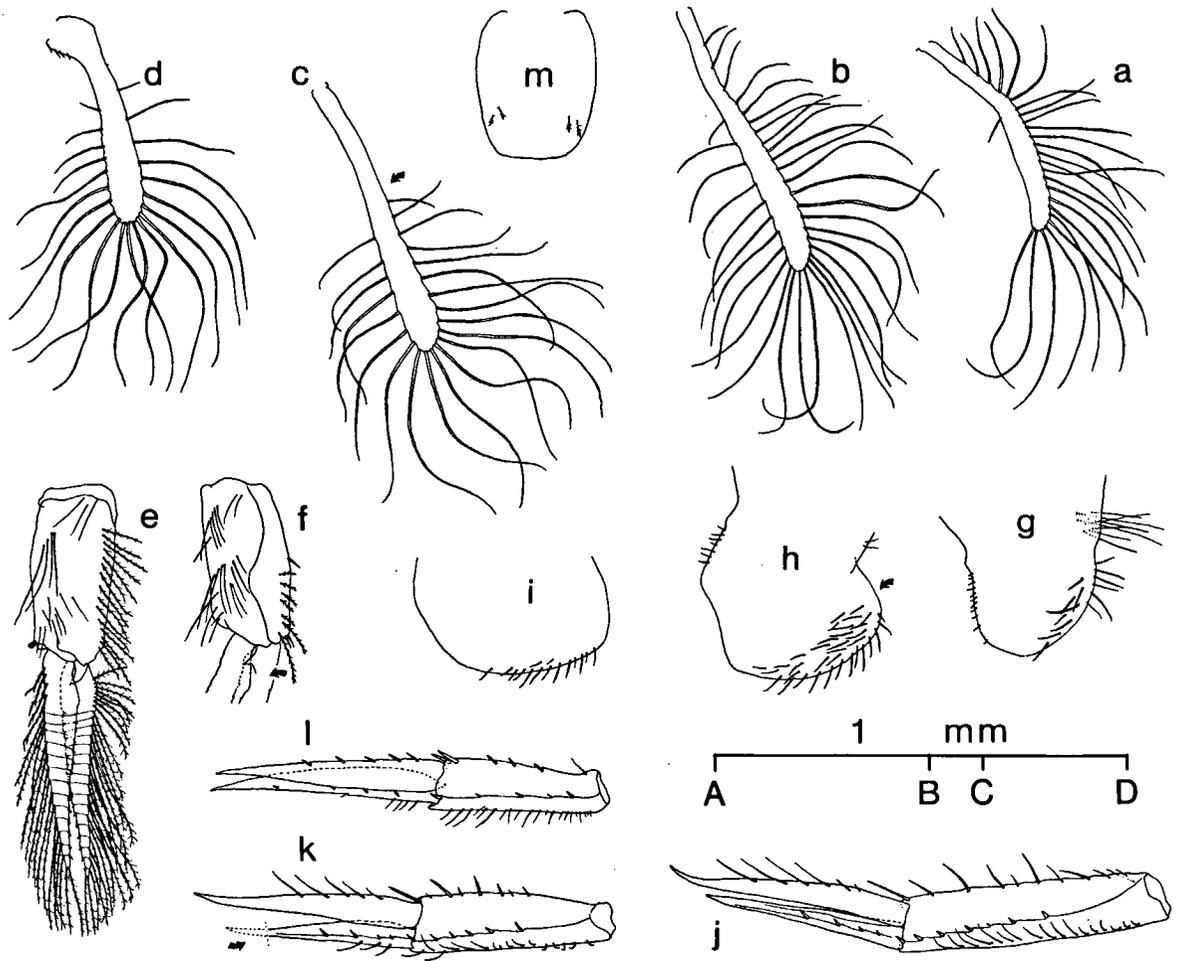


Fig. 25. *Chitinomandibulum emargicoxa* n. g., n. sp. (a-k, m, ♀ holotype 7.3 mm; 1, ♀ paratype 8.4 mm, from Eulwang-ri, Yongyodo). a-d, oostegites on gnathopod 2 - pereopod 5 (scale AB); e, pleopod 1 (AB); f, peduncle of pleopod 3, lateral view (AB); g-i, epimeral plates 1-3 (AB); j-l, uropods 1-3 (AC); m, telson (AD). Each scale unit (AB, AC, AD) represents 1 mm. Arrows indicate the anterior margin or outer ramus of appendages.

Pereopod 4 (fig. 24d): Segments 5 and 6 shorter and stouter than those of pereopod 3; claw broad, longer than segment 6.

Pereopod 5 (fig. 24e): Posterior margin of segment 2 with many plumose submarginal setae; segment 6 subequal in length to segment 5, anterior margin with 1 terminal setule; claw slightly shorter than segment 6.

Pereopod 6 (fig. 24f): Segment 6 longer than segment 5, claw about three-fourths of length of segment 6.

Pereopod 7 (fig. 24g): Segment 2 much longer than wide, both anterior and posterior

distal margins unarmed, posterodistal lobe absent.

Coxal gills: Gill on gnathopod 2 nearly as long as basis; those on pereopods 3 and 4 longer than basis.

Oostegites (fig. 25a-d) with numerous long setae, that on gnathopod 2 with a single small seta on the posterior margin.

Pleopods 1-3: Peduncle shorter than rami, retinaculum 2-hooked; outer posterior margin of peduncles 1 (fig. 25e) and 2 with long row of plumose setae; outer posteromedial margin of peduncle 3 (fig. 25f) expanded backwards in

lateral view, with short row of plumose setae along the distal margin.

Epimeral plates 1-3 (figs. 25g-i): Plate 1 small, anterior margin with long setae, posterior margin with setules; posteroventral corner of plate 2 not produced, posterior margin with small setae proximally, ventral margin with many marginal and submarginal setae; ventral margin of plate 3 setose.

Uropod 1 (fig. 25j) reaching end of uropod 2; peduncle longer than rami, with 17 lateral setae, 7 stout dorsolateral and 11 slender dorsomedial spines; outer ramus shorter than inner, with 4 small spines; inner ramus with 6 setae.

Uropod 2 (fig. 25k): Peduncle shorter than rami, with 15 lateral setae, 6 stout dorsolateral and 8 dorsomedial spines; outer ramus shorter than inner, with 3 lateral setae and 4 small dorsal spines; inner ramus with 5 long setae.

Uropod 3 (of female paratype 8.4 mm, fig. 25l): Peduncle much shorter than rami, with about 20 lateral setae, 5 dorsolateral and 6 dorsomedial spines; outer ramus subequal to inner in length, with several lateral setae and 4 small dorsal spines; inner ramus with 5 spines.

Telson (fig. 25m) very slightly tapering distally, apex truncate, dorsolateral margin with 2 plumose setae on either side.

Male (allotype 6.8 mm): Antenna 1 (fig. 23d): Peduncle shorter than flagellum segment 1, segment 3 excavated mediodistally; flagellum 9-segmented, proximal 5 segments carrying numerous sensory hairs.

Antenna 2 (fig. 23e) about four-fifth of body length; dorsal margin of peduncle segments 4 and 5 with many small setae, segment 5 about 1.7 times as long as segment 4; flagellum filiform, 57-segmented.

Mandibular palp (fig. 23h): Segment 3 much longer than segment 1, with 15 comb-shaped setae and 2 submarginal setae, apex with 2 long setae.

Remarks. — *C. emargicoxa* resembles the sympatric species *Synchelidium lenorostralum*, but can be easily distinguished from it by (1) the long setae of flagellum of female antenna 1; (2) the

long chela of gnathopod 2; (3) the markedly excavated coxal plate 3; (4) the setose inner ramus of uropods 1 and 2; and (5) the truncate telson.

Sexual dimorphism can be observed in antennae 1-2 and mandibular palp segment 3.

Derivatio nominis. — The specific name, *emargicoxa*, refers to the emarginate ventral margin of the 3rd coxal plate.

Distribution and ecology. — *C. emargicoxa* was found at the intertidal sandy beach at Yongyodo (fig. 1). The bottom consisted of fine to muddy sand, the salinity was marine. At the type locality the new species occurs with *S. lenorostralum*, *S. carinorostrum*, and *M. koreanus*.

Ovigerous females were found in April. The holotype (7.3 mm) carried 43 eggs, sized 0.25 × 0.33 mm.

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