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FOUR NEW SPECIES OF SAND-BURROWING HAUSTORIID AMPHIPODA (CRUSTACEA) OF KOREA

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ABSTRACT

During intensive sandy beach sampling of the Korean coasts, only one haustoriid genus, *Eohaustorius*, which is endemic to the North Pacific, has been revealed. Four new species of this genus are described herein: *E. stocki* n. sp., *E. longidactylus* n. sp., *E. spinigerus* n. sp., and *E. setulosus* n. sp. Key to the known species and diagnosis of the genus are provided. No morphological differences were found between the male and female of these species except primary sexual characteristics.

E. stocki is distributed on the south coast of Korea, whereas *E. longidactylus* and *E. spinigerus* are confined to the west coast. The fourth species *E. setulosus* inhabits both marine and estuarine habitats on the eastern part of the south coast and the southern part of the west coast. Seven beaches were visited in Cheju Island but no haustoriids were encountered.

INTRODUCTION

The family Haustoriidae used to comprise a heterogeneous group of genera, variously adapted to burrowing on intertidal and shallow subtidal zones (Bousfield, 1965). In recent times several genera previously assigned to this family (e.g. *Pontoporeia*, *Urothoe*, *Platyschnopus* etc.) have been removed to the other families, leaving the family to contain 8 genera (Bousfield, 1978, 1982; Barnard & Drummond, 1979, 1982). Of these the genus *Eohaustorius* is endemic to the North Pacific and the remaining genera are confined to the North Atlantic.

As a fifth group in this series on shallow-water amphipod Crustacea of Korea (cf. Jo, 1988a, b; 1989; 1990), 4 new species of the genus *Eohaustorius* are described from sandy bottoms. Until recently 8 species and 1 subspecies of the genus have been de-

scribed from the both sides of the Pacific, viz. on the American coast: *E. washingtonianus* (Thorsteinson, 1941), *E. sencillus* Barnard, 1962, *E. brevicuspis* Bosworth, 1973, *E. sowyeri* Bosworth, 1973, *E. estuarius* Bosworth, 1973; on the Asian coast: *E. e. eous* (Gurjanova, 1951), *E. cheliferus* (Bulytscheva, 1952), *E. eous robustus* (Gurjanova, 1953), *E. subulicola* Hirayama, 1985.

Gurjanova reports and illustrates *E. washingtonianus* from the Japan Sea coast of Sakhalin, but it is unlikely that the American species has an amphipacific distribution. Her figures (1962:402-403, fig. 135B) show segment 2 of pereopod 7 lacking a cusp, strongly spinose apices of the rami of uropod 1, and many plumose setae on the telson, which are apparently different from *E. washingtonianus*.

The samples were taken from the intertidal and

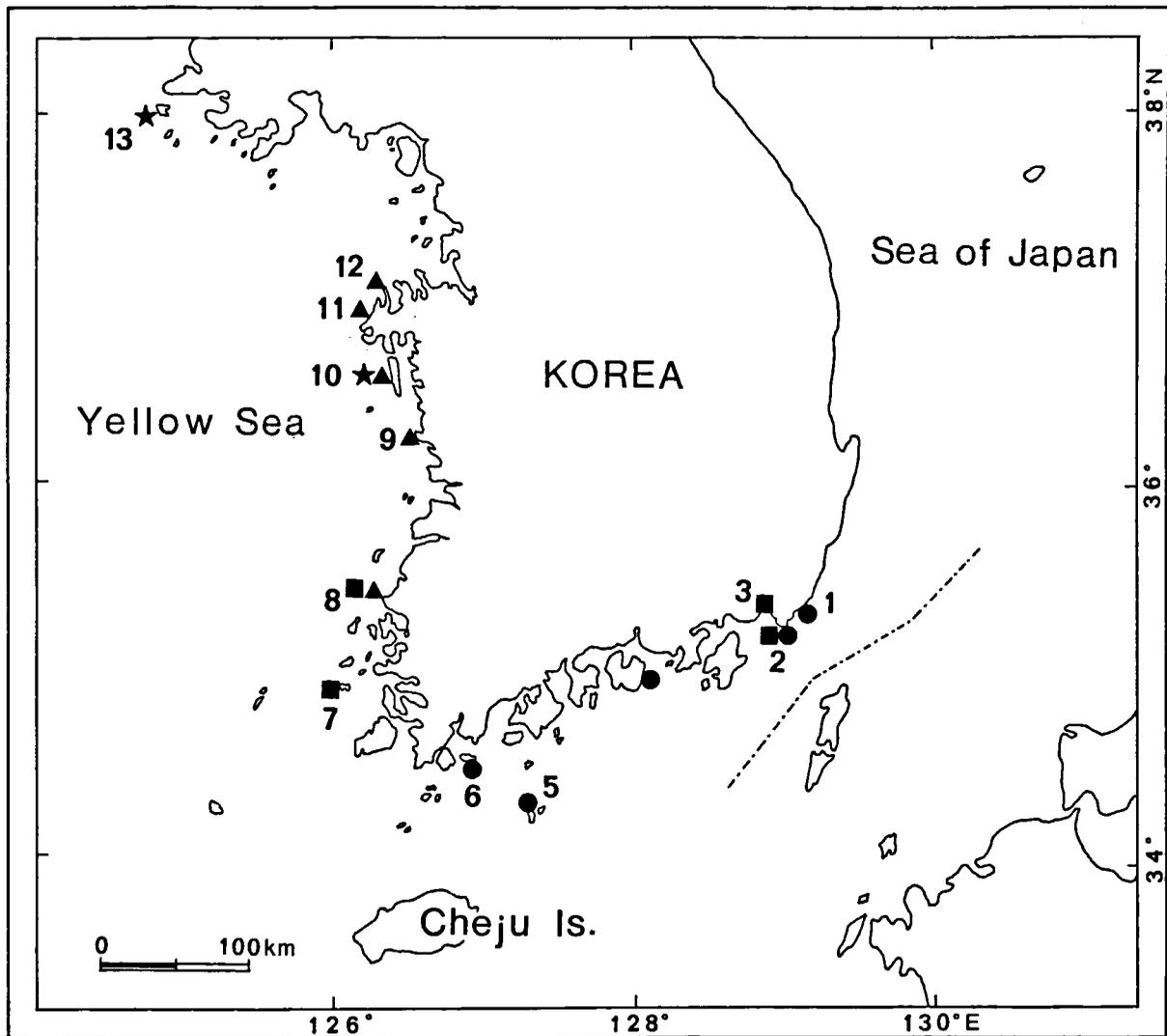


Fig. 1. Distribution of four species of *Eohaustorius* in Korea (dot: *E. stocki*; asterisk: *E. longidactylus*; triangle: *E. spinigerus*; square: *E. setulosus*). 1, Kwangan-ri; 2, Dadaepo; 3, Nakdong estuary; 4, Sangju; 5, Geomundo; 6, Sinjido; 7, Docho-do; 8, Gamami; 9, Chunjangdae; 10, Bangpo; 11, Malipo; 12, Hakampo; 13, Baekryeongdo.

very shallow water (<1 m depth). Beach sediments consist of fine sand in most localities but of muddy sand in some stations of the Nakdong estuary (Baekhabdeung, Myeongji, and Jinwoodo).

The body length was measured from the tip of the rostrum to the tip of the telson after straightening the animal. The type-specimens have been preserved in the Institute of Marine Sciences, National Fisheries University of Pusan (IMS) and in the Zoölogisch Museum, Amsterdam (ZMA).

TAXONOMIC PART

Family HAUSTORIIDAE Stebbing, 1906

Genus EOHAUSTORIUS Barnard, 1957

Barnard, 1957: 81; 1969: 256; Gurjanova, 1962: 400.

Diagnosis

Small haustoriids (2.25-7.0 mm). No sexual dimorphism. Antenna 1, accessory flagellum poorly developed, 2-segmented.

Mandibles symmetrical, incisor unicuspidate, both lacinia mobilis simple, with 2 rakers. Maxilla 1, inner lobes minute, with single medial seta. Maxilla 2, outer lobe not enlarged, nearly equal in size to inner lobe. Maxillipedal palp segment 3 not geniculate.

Coxal plates 1 and 2 much smaller than plates 3 and 4. Pereiopod 4 smaller than and unlike pereiopod 3. Pereiopod 7, segment 2 with or without cusp on posteroproximal margin, segment 4 triangular.

Uropod 1, rami subequal in length, apices spinose or setose. Uropod 3, endopodite 2-segmented, exopodite with plumose setae. Telsonic lobes completely detached basally.

Description

Eyes present or absent(?). Antenna 1, flagellum usually 5-segmented, number of aesthetascs on segments 2 to 4 is 2, 1, 1, respectively. Antenna 2 with strong gland cone, peduncle segment 4 deeply lobate, segment 5 not lobate.

Lower lip with broad inner lobes. Maxilla 1, outer lobe with 9-10 apical spines. Maxilla 2, lateral margin of outer lobe with 2 plumose, large setae.

Coxal plate 3 largest, usually excavated posteriorly. Coxal gills present on gnathopod 2 through pereiopod 6, on gnathopod 2 and pereiopod 3 elongate, on pereiopods 4-6 oval, with stalk. Oostegites present on gnathopod 2 through pereiopod 5, on pereiopod 5 vestigial, rounded. Pereiopod 4, segment 5 often greatly expanded posterodistally, setae on segments 5 and 6 simple or plumose.

Epimeral plate 3, posteroventral tooth variable in size and curvedness. Pleopods, peduncle much wider than long, with 2 retinacula, endopodite shorter than exopodite, basal segment of endopodite of pleopods 1 and 2 swollen laterally.

Remarks

There is a tendency towards development of segment 5 of pereiopod 4 in a way different between the members of the northwestern and northeastern Pacific coasts. The distal lobe of the segment is well developed in the northwestern Pacific group, while it almost lacks in the northeastern Pacific taxa. In the Okhotsk Sea species, *E. eous* (Gurjanova, 1951), however, the lobe shows intermediate size, possibly

implying the evolutionary transitional step between the two regional groups.

In general, haustoriid amphipods have spinose apices on the rami of uropod 1. In *E. washingtonianus* and *E. setulosus* n. sp., however, the apices of the rami are armed with numerous setae which appears an apomorphic character.

Eyes are not observed in our Korean material which has been preserved in alcohol. Bosworth (1973) states that living specimens of four American *Eohaustorius* species show bright and white eyes, but they are not discernible in preserved material. Accordingly it is considered that only examination of living animals can tell the presence or absence of eyes in the species of the genus.

Type-species

Haustorius washingtonianus Thorsteinson, 1941

Species content

E. e. eous (Gurjanova, 1951); *E. eous robustus* (Gurjanova, 1953); *E. cheliferus* (Bulytscheva, 1952); *E. sencillus* Barnard, 1962; *E. brevicuspis* Bosworth, 1973; *E. sawyeri* Bosworth, 1973; *E. estuarius* Bosworth, 1973; *E. subulicola* Hirayama, 1985; *E. stocki* n. sp.; *E. longidactylus* n. sp.; *E. spinigerus* n. sp.; *E. setulosus* n. sp.

KEY TO THE KNOWN SPECIES OF EOHAUSTORIUS

1. Pereiopod 4, hind lobe of segment 5 nearly reaching or exceeding end of segment 6 2
- Pereiopod 4, hind lobe of segment 5 smaller, reaching about middle of segment 6 or less..... 7
2. Uropod 1, apices of rami with setae only; antenna 1, basal segment of accessory flagellum densely setose distally..... *E. setulosus* n. sp.
- Uropod 1, apices of rami with spines and setae; antenna 1, basal segment of accessory flagellum with a few setae distally..... 3
3. Posteroventral tooth of epimeral plate 3 very long and strongly incurved (almost making semicircle); posteroventral corner of epimeral plate 2 acutely pointed..... 4
- Posterodistal tooth of epimeral plate 3 small or not strongly incurved; posteroventral corner of epimeral plate 2 bluntly pointed or rounded (this character unknown in *E. cheliferus*)..... 5
4. Segments 5 and 6 of pereiopod 4 with plumose setae; basis of gnathopod 1 not narrowing distally; exopodite of uropod 3 shorter than basal segment of endopodite..... *E. subulicola* Hirayama, 1985

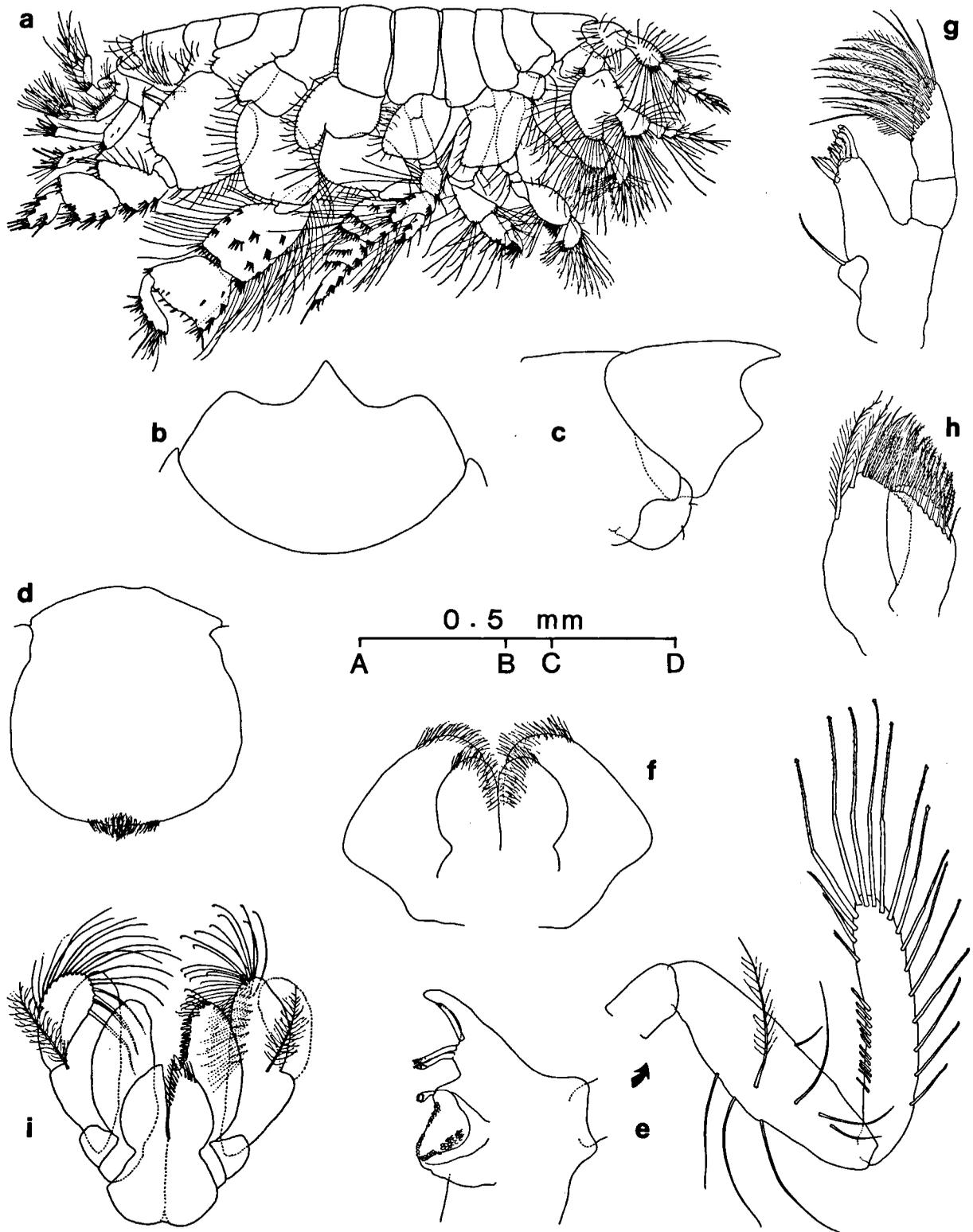


Fig. 2. *Eohaustorius stocki* n. sp. (a, ♂ 4.4 mm from Geomundo; b-i, ♀ holotype 4.1 mm from Kwangan-ri). a, entire animal, from the right; b, dorsal view of head (scale AB); c, lateral view of head (AB); d, upper lip (AD); e, right mandible (AD); f, lower lip (AD); g, maxilla 1 (AD); h, maxilla 2 (AD); i, maxilliped (AC). Each scale unit (AB, AC, AD) represents 0.5 mm.

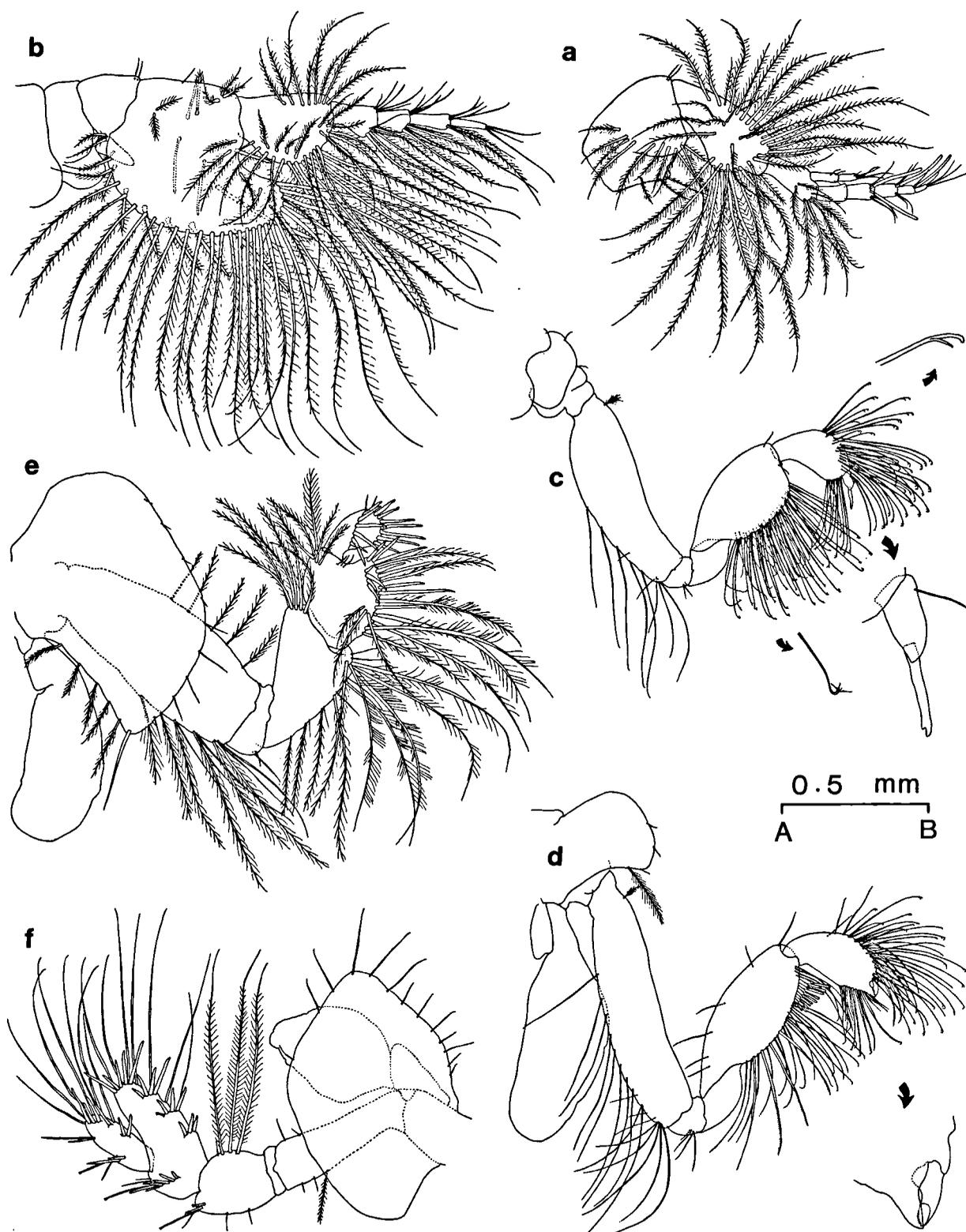


Fig. 3. *Eohaustorius stocki* n. sp. (♀ holotype 4.1 mm from Kwangan-ri). a, antenna 1; b, antenna 2; c, gnathopod 1; d, gnathopod 2; e, pereiopod 3; f, pereiopod 4. Scale: all AB (= 0.5 mm).

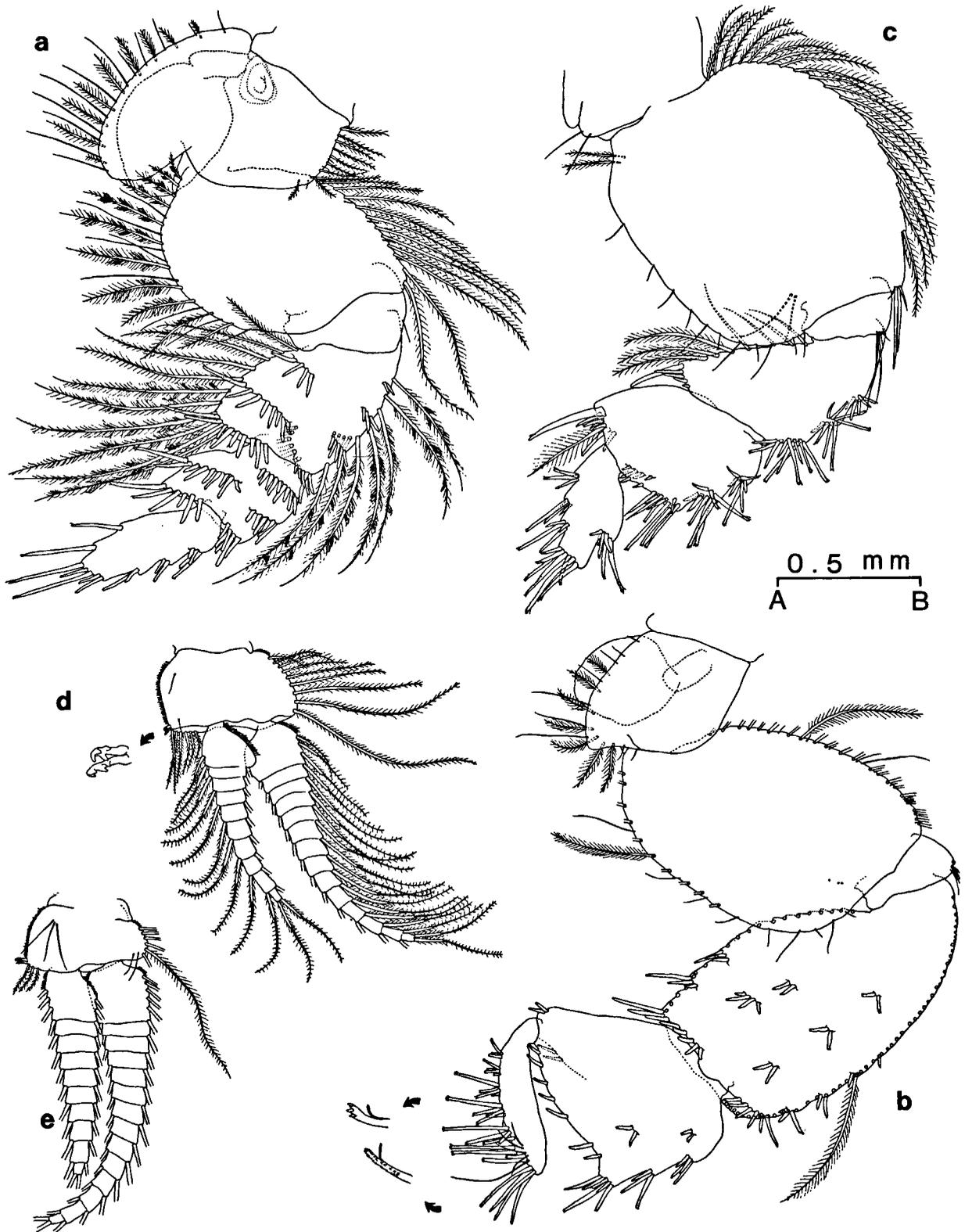


Fig. 4. *Eohaustorius stocki* n. sp. (♀ holotype 4.1 mm from Kwangan-ri). a, pereopod 5; b, pereopod 6; c, pereopod 7; d, pleopod 1; e, pleopod 3. Scale: all AB (= 0.5 mm).

- Segments 5 and 6 of pereopod 4 with simple setae; basis of gnathopod 1 narrowing distally; exopodite of uropod 3 longer than basal segment of endopodite..... *E. stocki* n. sp.
5. Pereiopod 6, setae on segment 6 longer than segment itself; pereiopod 7, proximal two-thirds of posterior margin on segment 6 with isolated spines; peduncle of uropod 1 with 8 dorsolateral spines distally..... *E. spinigerus* n. sp.
- Pereiopod 6, setae on segment 6 short; pereiopod 7, spines on posterior margin of segment 6 in groups; peduncle of uropod 1 with 2-3 dorsolateral spines distally..... 6
6. Coxal plate 2 small; pereiopod 5, anterior margin of segment 6 with 4 spine groups; segment 5 of pereiopod 7 twice as wide as segment 6; exopodite of uropod 3 shorter than endopodite..... *E. longidactylus* n. sp.
- Coxal plate 2 large; pereiopod 5, anterior margin of segment 6 with single spine group; segment 5 of pereiopod 7 one and half times as wide as segment 6; rami of uropod 3 subequal in length *E. cheliferus* (Bulytscheva, 1952)
7. Pereiopod 7, posterior margin of segment 2 with cusp proximally; segment 5 of pereiopod 7 with 3 spine groups on anterior margin..... 8
- Pereiopod 7, posterior margin of segment 2 without cusp; segment 5 of pereiopod 7 with 2 spine groups on anterior margin..... 9
8. Cusp prominent, crescent-shaped; segment 6 of pereiopod 5 about 1.45 times as long as segment 5; uropod 1, apices of rami mainly with setae (a few very slender spines on the exopodite)..... *E. washingtonianus* (Thorsteinson, 1941)
- Cusp small, triangular; segment 6 of pereiopod 5 about 1.25 times as long as segment 5; uropod 1, apices of rami with spines and setae..... *E. brevicuspis* Bosworth, 1973
9. Dactylus of gnathopod 1 as long as merus, unguis minute *E. sencillus* Barnard, 1962
- Dactylus of gnathopod 1 half as long as merus, unguis as long as or longer than dactylus..... 10
10. Segment 6 of pereiopod 5 with 4 spine groups on posterior margin, about 1.5 times as long as segment 5; segment 6 of pereiopod 7 with 4 spine groups on posterior margin *E. sawyeri* Bosworth, 1973
- Segment 6 of pereiopod 5 with 1 or 2 spine group (s) on posterior margin, slightly longer than segment 5 (about 1.1 times); segment 6 of pereiopod 7 with 2 or 3 spine groups on posterior margin 11
11. Coxal plate 3 greatly narrowing anterodistally; coxal plate 4 wider than deep; segment 5 of pereiopod 7 longer than wide, posteroventral spines shorter than half the length of segment 6 *E. estuarius* Bosworth, 1973
- Coxal plate 3 not greatly narrowing anterodistally; coxal plate 4 deeper than wide; segment 5 of pereiopod 7 wider than long, posteroventral spines

longer than half the length of segment 6
.....*E. eous* (Gurjanova, 1951)

Eohaustorius stocki n. sp.

(Figs. 2-5)

Material

Pusan, Kwangan-ri; 11 Apr. 1986, 1 ovig. ♀ holotype (ZMA Amph. 108.736), 1 ♂ allotype (ZMA Amph. 108.737), 14 paratypes (ZMA Amph. 108.738), and 15 paratypes (6 ovig. ♀♀) (IMS); 26 Mar. 1986, 27 paratypes (2 ovig. ♀♀) (ZMA Amph. 108.739) and 27 paratypes (IMS). Y. W. Jo coll.

Pusan, Dadaepo; 4 Mar. 1983, 1 specimen. Y. W. Jo coll.; 17 Apr. 1983, 1 specimen. Y. W. Jo & C. W. Ma coll.; 5 Apr. 1985, 1 specimen. Y. W. Jo coll.

Prov. Kyeongnam, Namhae-gun, Sangju; 25 May 1986, 22 specimens. C. W. Ma coll.

Prov. Cheonnam, Yecheon-gun, Geomundo, Seodo-ri; 23 July 1986, 320 specimens. D. R. Lee coll.

Prov. Cheonnam, Wando-gun, Sinjido, Myeongsasimri; 11 May 1986, 13 specimens (4 ovig. ♀♀). Y. W. Jo coll.

DESCRIPTION

Body length up to 5.1 mm (♀), or 4.6 mm (♂); head wider than long, from dorsal view, rostrum distinct (figs. 2b, c); eyes not observed in preserved specimens.

Antenna 1 (fig. 3a) shorter than antenna 2; peduncle segment 1 stout; segment 2 distally widened, subequal in length to segment 1; accessory flagellum inserted on peduncle segment 3 at distal two-thirds, distal margin of basal segment poorly setose; primary flagellum 5-segmented, segments 2 to 4 with 2, 1, and 1 long aesthetascs, respectively.

Antenna 2 (fig. 3b) with large gland cone; peduncle segment 4 broad, medial surface with about 13 plumose blades (6 on proximal half of posterior submargin), entire posterior margin with long plumose setae; flagellum 4-segmented.

Upper lip (fig. 2d) rounded, as wide as long, apex densely pilose.

Mandibles (fig. 2e) symmetrical; incisor simple; lacinia mobilis simple, similar in shape to raker; raker row with 2 spines; molar process well developed, molar triturative, bearing bell-shaped process distally. Palp large, segment 1 naked, segment 2 with 1 plumose and 7 simple setae; segment 3 with 12 comb-spines, 3 simple and 14 tubercled spines.

Lower lip (fig. 2f): Inner lobes broad.

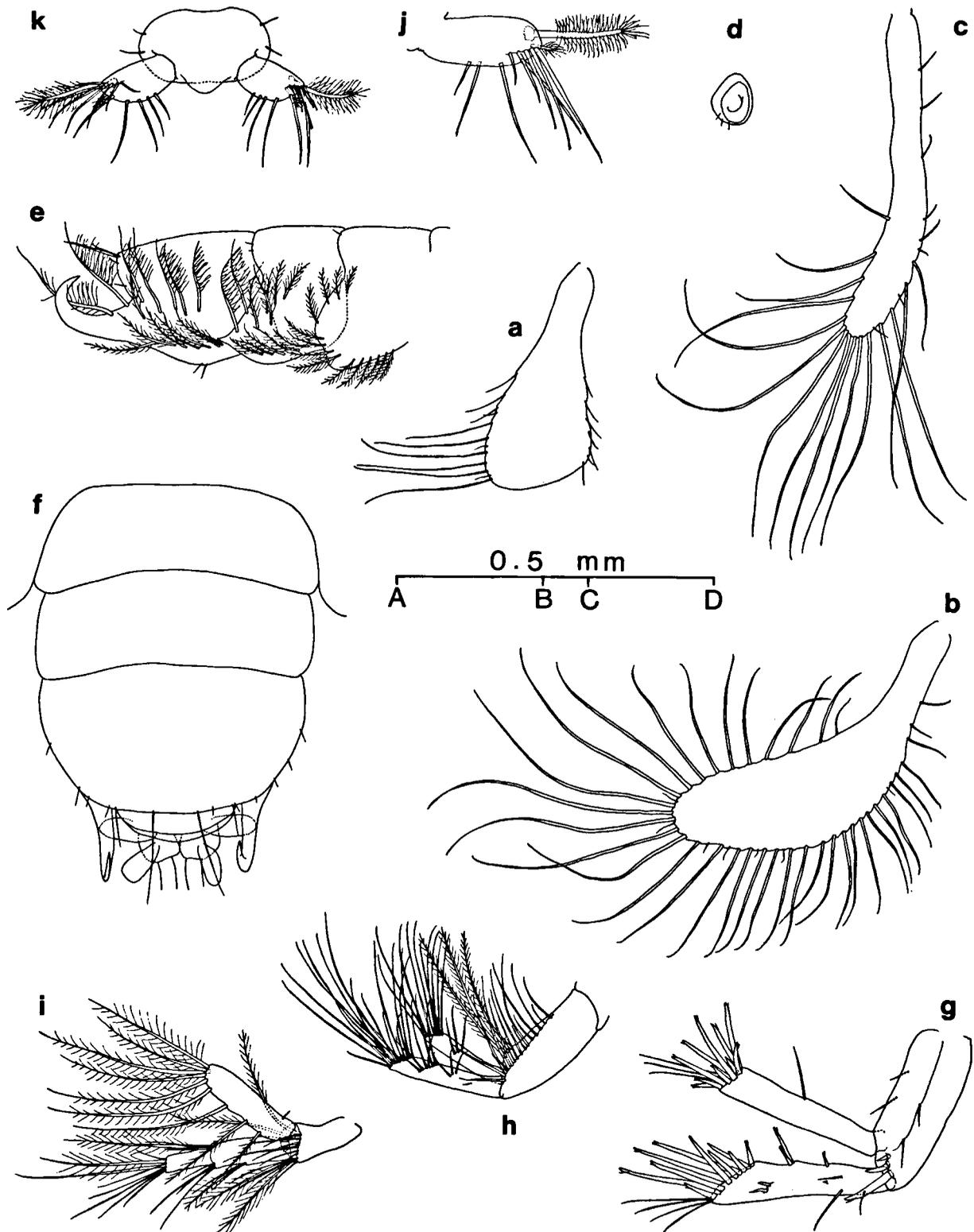


Fig. 5. *Eohaustorius stocki* n. sp. (a-j, ♀ holotype 4.1 mm; k, ♂ allotype 3.9 mm, from Kwangan-ri). a-d, oostegites on gnathopod 2 - pereopod 5 (scale AB); e, lateral view of pleosomites (AB); f, dorsal view of pleosomites (AB); g, uropod 1 (AC); h, uropod 2 (AC); i, uropod 3 (AC); j, right lobe of telson (AD); k, telson (AC). Each scale unit (AB, AC, AD) represents 0.5 mm.

Maxilla 1 (fig. 2g): Outer lobe narrowing distally, with 9-10 apical spines (lateral 3-4 spines spoon-shaped); palp broad, segment 2 with marginal and submarginal rows of plumose setae.

Maxilla 2 (fig. 2h): Inner lobe a little smaller than outer, with 2 rows of plumose setae; outer lobe with 2 large plumose setae on lateral margin and many setae on apex.

Maxilliped (fig. 2i): Inner lobe with 2 apical teeth and some 13 setae; outer lobe with about 15 spines and 9 apical setae. Palp segment 2 with 1 facial plumose seta, distal margin greatly expanded, reaching end of segment 3; segment 3 clavate, inner apical margin with a few thick setae, apical and lateral margins with many long setae.

Coxal plate 1 vestigial, plate 2 small, posterior margin excavated, with single plumose seta, distal margin with 3 setules; plate 3 deepest, anterior margin with 4 setules, posterior margin with 5 plumose setae and 1 long seta on distal corner; plate 4 rectangular, as wide as deep; plate 6 as wide as deep.

Gnathopod 1 (fig. 3c): Basis narrowing distally, anteroproximal margin with single plumose seta; unguis as long as dactylus, tip notched posteriorly.

Gnathopod 2 (fig. 3d): Anterior margin of basis with single plumose seta proximally; carpus about 1.7 times as long as propodus, posterodistal margin with 10 biarticulate, pectinate spines; chela small.

Pereiopod 3 (fig. 3e) stout; posterodistal margin of segment 5 with 4 submarginal and 8 marginal spines; segment 6 with semicircular row of 13 spines and 2 setules on apex.

Pereiopod 4 (fig. 3f): Anterior margin of segment 2 with 1 plumose and 2 simple setae; segment 4 with 3 long plumose setae on posterior margin; posterodistal margin of segment 5 extending to tip of segment 6, with 3 posterior and 1 distal spine groups, anterior margin with a spine group and 3 setae; segment 6 with 5 groups of 1-3 spines; setae on segments 5 and 6 simple, not plumose.

Pereiopod 5 (fig. 4a): Segment 2 longer than wide; segment 4 with 1 facial, 4 anterior and 2 posterior marginal spine groups; segment 5 a little wider than long, with 3 anterior and 2 posterior marginal spine groups; segment 6 about 1.5 times as long as segment 5, with 3 anterior marginal spine groups, posterior margin with 2 spines, apical margin 5 spines.

Pereiopod 6 (fig. 4b): Segments 2 and 4 with numerous setae along both anterior and posterior margins (omitted in fig. 4b); segment 2 longer than wide; segment 4 longer than segment 2, with 5 facial, 5 anterior and 3 posterior marginal spine groups; segment 5 quadrate, with 2 facial, 3 anterior and 1 posterodistal spine groups, ventral margin with 7 spines, medial surface with 2 spines near posteroventral margin; posterior margin of segment 6 with 6 spine groups, setae on posterodistal margin short.

Pereiopod 7 (fig. 4c): Segment 2 as wide as long; segment 4 subtriangular, with 3 anterior spine groups and 5 posteroventral spines; segment 5 wider than long, shorter than segment 4, with 3 spine groups along anterior margin, ventral margin with 2 single spines, medial surface with 4 spines, posteroventral corner with some 7 spines (one of them very large) and 1 plumose seta; segment 6 subequal in length to segment 5, posterior margin with 3 spine groups, apex with 7 spines.

Coxal gills: On gnathopod 2 and pereiopod 3 elongate, on pereiopods 4 to 6 ovate, with stalk.

Oostegites (figs. 5a-d): That on gnathopod 2 strongly widened distally, anterior margin with 7 setules, posterior margin with 6 long setae and 6 setules, ventral margin naked; on pereiopod 3 large, with numerous setae; on pereiopod 4 linear; on pereiopod 5 vestigial, rounded, posteroventral margin with 3 setules.

Pleosomes 1 to 3 (figs. 5e, f) strongly depressed; somite 3 largest, posterior margin with several long and short setae. Epimeral plates 1 to 3: Plate 1 slightly excavated posterodistally, with some 14 (sub)marginal plumose setae; plate 2 acutely pointed posterodistally, with 5 subventral, 2 posteromarginal and 5 facial plumose setae; plate 3 with strongly incurved tooth, with 7 subventral, 2 posteromarginal and 6 facial plumose setae.

Pleopod 1 (fig. 4d): Peduncle short and stout, much wider than long, with 2 retinacula, each armed with 2 pairs of hooks, medioventral margin with 6 plumose setae, lateral margin with 9 plumose setae, increasing in length distally; endopodite shorter than exopodite, basal segment expanded laterodistally. Pleopod 2 similar to pleopod 1 except lateral plumose setae of peduncle much shorter than those of pleopod 1. Pleopod 3 (fig. 4e): Lateral margin of peduncle shorter

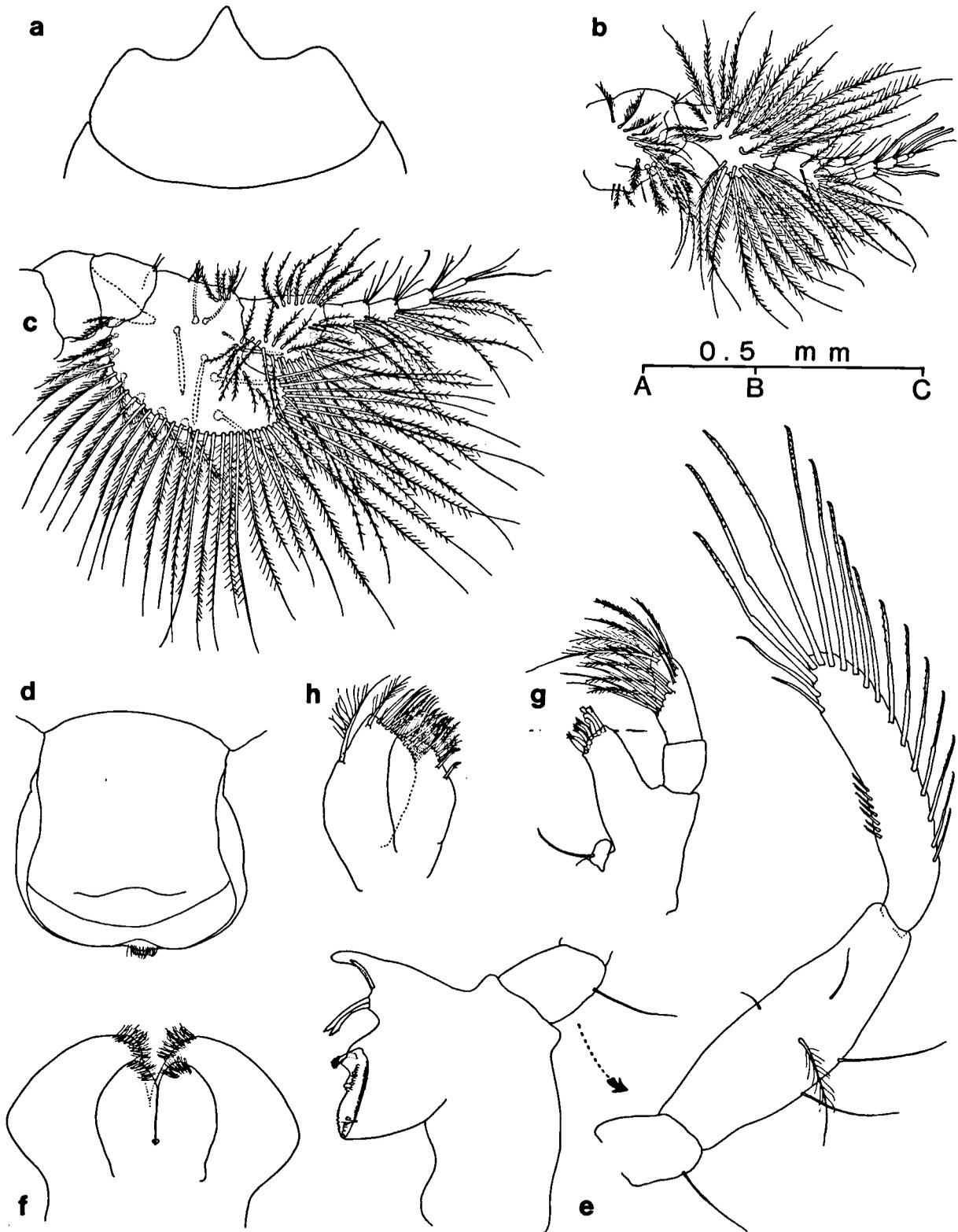


Fig. 6. *Eohaustorius longidactylus* n. sp. (♀ holotype 5.8 mm from Bangpo). a, dorsal view of head (scale AB); b, antenna 1 (AB); c, antenna 2 (AB); d, upper lip (AC); e, right mandible (AC); f, lower lip (AC); g, maxilla 1 (AC); h, maxilla 2 (AC). Each scale unit (AB, AC) represents 0.5 mm.

than medial margin; basal segment of endopodite hardly expanded laterodistally.

Uropod 1 (fig. 5g): Peduncle subequal in length to rami, dorsolateral margin with 3 spines distally; exopodite with 3 groups of 1, 2, 2 spines, apex with 10 spines and 4 setae; endopodite with single dorsal seta, apex with 10 spines and 3 setae.

Uropod 2 (fig. 5h) shorter than uropod 1, peduncle subequal in length to exopodite, with many dorsolateral setae, dorsomedial margin with 3 long plumose setae distally; endopodite shorter than exopodite, both rami with numerous apical setae.

Uropod 3 (fig. 5i): Peduncle shorter than exopodite, with many plumose and simple setae along distal margin; endopodite 2-segmented, longer than exopodite; exopodite longer than proximal segment of endopodite, with 9 plumose setae.

Telson (figs. 5j, k): Medial margin with 4-5 setae and group of 5 mid-facial setae, subapical margin with 1 long and 1 small plumose setae.

Remarks

E. stocki resembles *E. subulicola* Hirayama from West Kyushu, Japan in the acute hind corner of epimeral plate 2 and in strongly incurved tooth on epimeral plate 3. The new species, however, differs from *E. subulicola* by (1) the distally inserted accessory flagellum on peduncle segment 3 of antenna 1; (2) antenna 1 shorter than antenna 2; (3) the distally narrowing basis of gnathopod 1; (4) the simple setae on segments 5 and 6 of pereopod 4; (5) the broadly expanded segment 5 of pereopod 4; (6) the wide segment 5 of pereopod 5; (7) the longer segment 6 of pereopod 5 (segment 6 about 1.5 times as long as segment 5 in *E. stocki*, about 1.15 times in *E. subulicola*); (8) the peduncle subequal in length to rami in uropod 1; and (9) the exopodite of uropod 3 longer than basal segment of endopodite. Although the type material of *E. subulicola* seems to be an immature specimen (♂ 2.25 mm), it was possible to compare them with smaller specimen of the present species (♀ 2.43 mm), and the above-mentioned differences have been reconfirmed.

This species can be distinguished from *E. cheliferus* (Bulytscheva) from the Soviet side of the Sea of Japan by (1) the smaller coxal plate 2; (2) the shape of segment 5 in pereopod 7 (wider than long in *E.*

stocki); (3) the absence of anteroventral process on segment 2 of pereopod 7; (4) the strongly incurved tooth on epimeral plate 3; and (5) the presence of large plumose seta on the apical margin of the telson.

From *E. eous* (Gurjanova) the present species differs in (1) the strong expansion of segment 5 of pereopod 4; (2) the shape of segment 2 of pereopods 5 and 6 (longer than wide in *E. stocki*); (3) the setation of the endopodite of uropod 1 (single dorsal seta in *E. stocki*, 4-6 dorsal setae in *E. eous*); and (4) the strongly incurved tooth on epimeral plate 3.

In almost all respects, a smaller specimen (2.43 mm) corresponds with the adults, except for the slender and distally tapering coxal plate 4, longer setae on segment 6 of pereopod 6 (but not longer than segment itself), and smaller number of comb-spines on mandibular palp segment 3 (5 spines). Specimens from Sinjido and Sangju show longer setae on segment 6 of pereopod 6 as in the smaller specimen and higher number of spine groups (5 groups) on posterior margin of segment 6 of pereopod 7.

Etymology

The specific name is proposed in honour of Professor Dr. Jan H. Stock, Institute of Taxonomic Zoology, University of Amsterdam, in recognition of his great contributions to the knowledge of crustaceans and in commemoration of his honourable retirement this year.

Distribution and ecology

E. stocki is distributed along the south coast of Korea excepting Cheju Island (fig. 1). It lives intertidally in fine to medium-sized sand. The beaches are mainly marine habitats, but brackish in Dadaepo where this species and *E. setulosus* n. sp. coexist. On this estuarine beach only 3 specimens of *E. stocki* were collected during several sampling activities, while *E. setulosus* was collected abundantly (200 specimens). It presumably implies that the species prefer marine habitat to brackish water.

Ovigerous females were collected from March through May. The species shows a typical K-strategy producing a small number (1-7 eggs) of large eggs. The holotype (4.1 mm, April 1986) carries 5 eggs, of 0.46 x 0.63 mm.

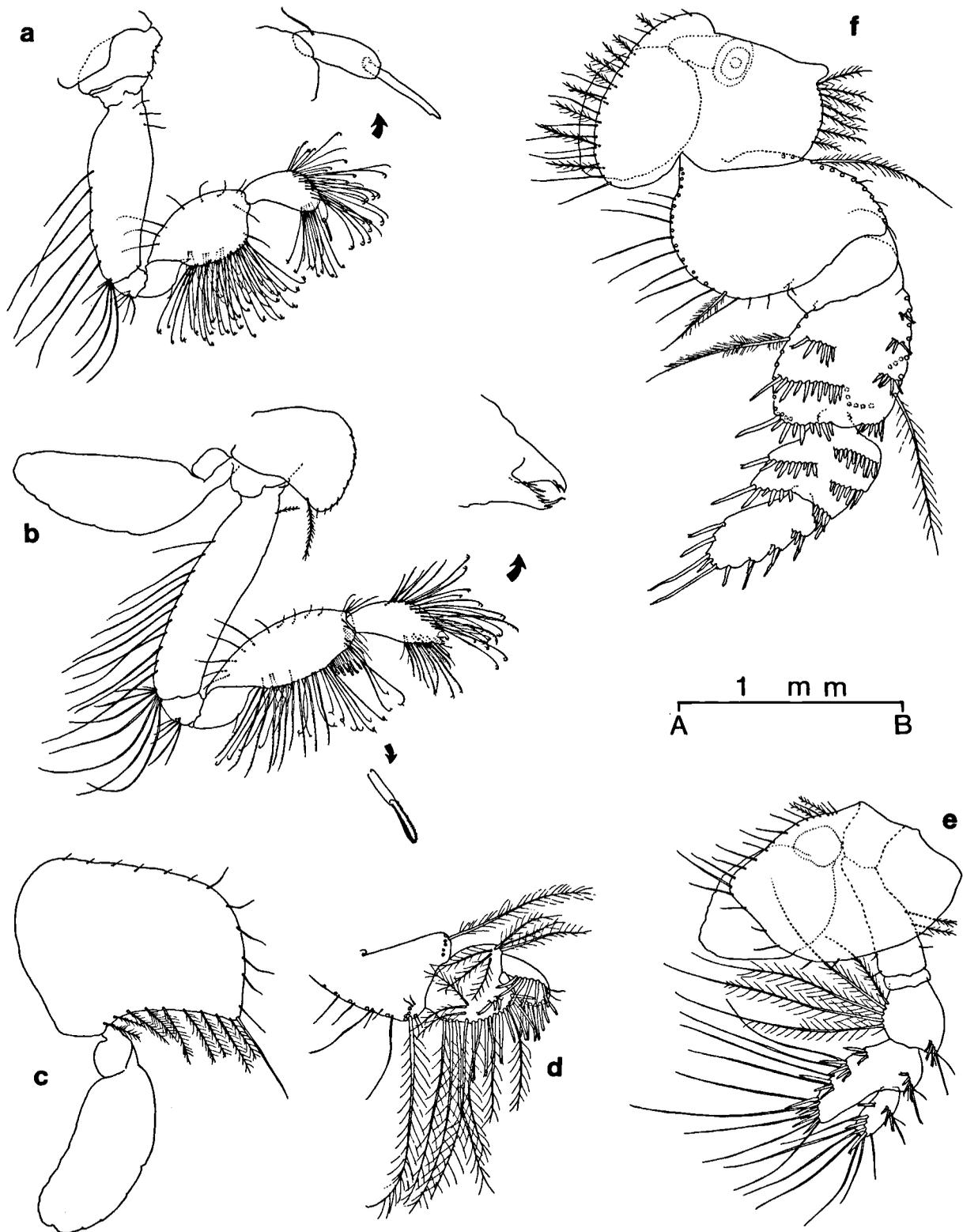


Fig. 7. *Eohaustorius longidactylus* n. sp. (♀ holotype 5.8 mm from Bangpo). a, gnathopod 1; b, gnathopod 2; c, coxal plate 3 and coxal gill; d, distal part of pereopod 3; e, pereopod 4; f, pereopod 5. Scale: all AB (= 1 mm).

Eohaustorius longidactylus n. sp.

(Figs. 6-9)

Material

Prov. Chungnam, Seosan-gun, Bangpo; 20 Oct. 1986, 1 ♀ holotype (ZMA Amph. 108.740), 1 ♂ allotype (ZMA Amph. 108.741), 9 paratypes (ZMA Amph. 108.742), and 10 paratypes (IMS). Y. W. Jo & H. J. Ko coll.

Prov. Kyeonggi, Ongjin-gun, Baekryeongdo, Yongkipo; 4 Nov. 1986, 22 specimens. B. S. Yeo & M. S. Jo coll.

DESCRIPTION

Body length up to 5.8 mm (♀), or 6.8 mm (♂); head (fig. 6a) wider than long, from dorsal view, rostrum long, acute; eyes not observed in preserved animals.

Antenna 1 (fig. 6b) shorter than antenna 2; accessory flagellum implanted at distal two-thirds of peduncle segment 3, distal margin of basal segment with a few setae; primary flagellum 5-segmented, segments 2 to 4 with 2, 1, 1 aesthetascs, respectively.

Antenna 2 (fig. 6c): Gland cone large; peduncle segment 4 with 6 posterior submarginal and 8 facial plumose blades on medial surface, entire posterior margin with long plumose setae; flagellum 4-segmented.

Upper lip (fig. 6d) as wide as long, apex weakly pilose.

Mandible (fig. 6e): Incisor simple; molar process well-produced. Palp segment 1 with single lateral seta, segment 2 with 4 simple and 1 plumose setae; segment 3 with 7 comb-spines, 2 simple and 15 tubercled spines.

Lower lip (fig. 6f): Inner lobes somewhat small; mandibular lobe of outer lobes rounded, weakly produced.

Maxilla 1 (fig. 6g): Outer lobes with 10 apical spines, lateral 4 spines spoon-shaped; palp segment 2 with some 8 plumose setae on apicomedial margin and 9 submarginal setae.

Maxilla 2 (fig. 6h): Inner lobe shorter and smaller than outer, with a small number (6) of submarginal setae.

Maxilliped like in *E. stocki*.

Coxal plate 1 with 4 distal setules; plate 2 expanded distally, posterior margin excavated, with single plumose seta, distal margin with 11 setules; anterior margin of plate 3 (fig. 7c) with 7 setules; plate 4 slightly deeper than wide, 2 of posterior marginal se-

tae plumose; plate 6 wider than deep.

Gnathopod 1 (fig. 7a): Basis narrowing distally, anterior margin with 3 simple setae proximally; propodus weakly swollen distally; dactylus slender, unguis as long as dactylus, tip slightly notched posteriorly.

Gnathopod 2 (fig. 7b): Basis with plumose seta anteroproximally; carpus about 1.6 times as long as propodus, posterodistal margin with 8 pectinate spines; palm of propodus serrate.

Pereiopod 3 (fig. 7d): Posterodistal margin of segment 5 with 3 submarginal and 8 marginal spines; segment 6 with semicircular row of 13 spines and 2 small setae apically.

Pereiopod 4 (fig. 7e): Anterior margin of basis with 2 plumose and 2 simple setae; segment 4 with 5 long plumose setae on posterior margin; segment 5 strongly produced posterodistally, far exceeding tip of segment 6; segment 6 small, with 3 groups of 1-4 spines; setae on segments 5 and 6 not plumose.

Pereiopod 5 (fig. 7f): Segment 2 wider than long, with many plumose and simple setae; segment 4 with 1 facial, 4 anterior and 2 posterior marginal spine groups; segment 5 wider than long, with 3 anterior and 2 posterior spine groups; segment 6 about 1.25 times as long as segment 5, with 4 anterior marginal spine groups, posterior margin with 2 spines, apex 3 spines.

Pereiopod 6 (fig. 8a): Segment 2 slightly longer than wide; segment 4 longer than segment 2, with 7 facial, 5 anterior and 4 posterior spine groups; segment 5 with 4 facial, 3 anterior and 1 posterodistal spine groups, ventral margin with 8 spines, medial surface with 4 spines; segment 6 with 5 spine groups, setae on posterodistal margin short.

Pereiopod 7 (fig. 8b): Segment 2 slightly longer than wide; segment 4 with 3 anterior spine groups and 6 posteroventral spines (outermost one large); segment 5 wider than long, shorter than segment 4, with 3 anteromarginal spine groups, posteroventral margin with 1 spine group (outermost one very large), ventral margin with 5 sharply pointed spines, medial surface with 4 spines; segment 6 subequal in length to segment 5, posterior margin with 4 spine groups, apex with 5 spines.

Coxal gills: Similar on gnathopod 2 and on pereiopod 3, elongate; on pereiopods 4 to 6 oval, with stalk.

Oostegites (figs. 8c-f): On gnathopod 2 small, with

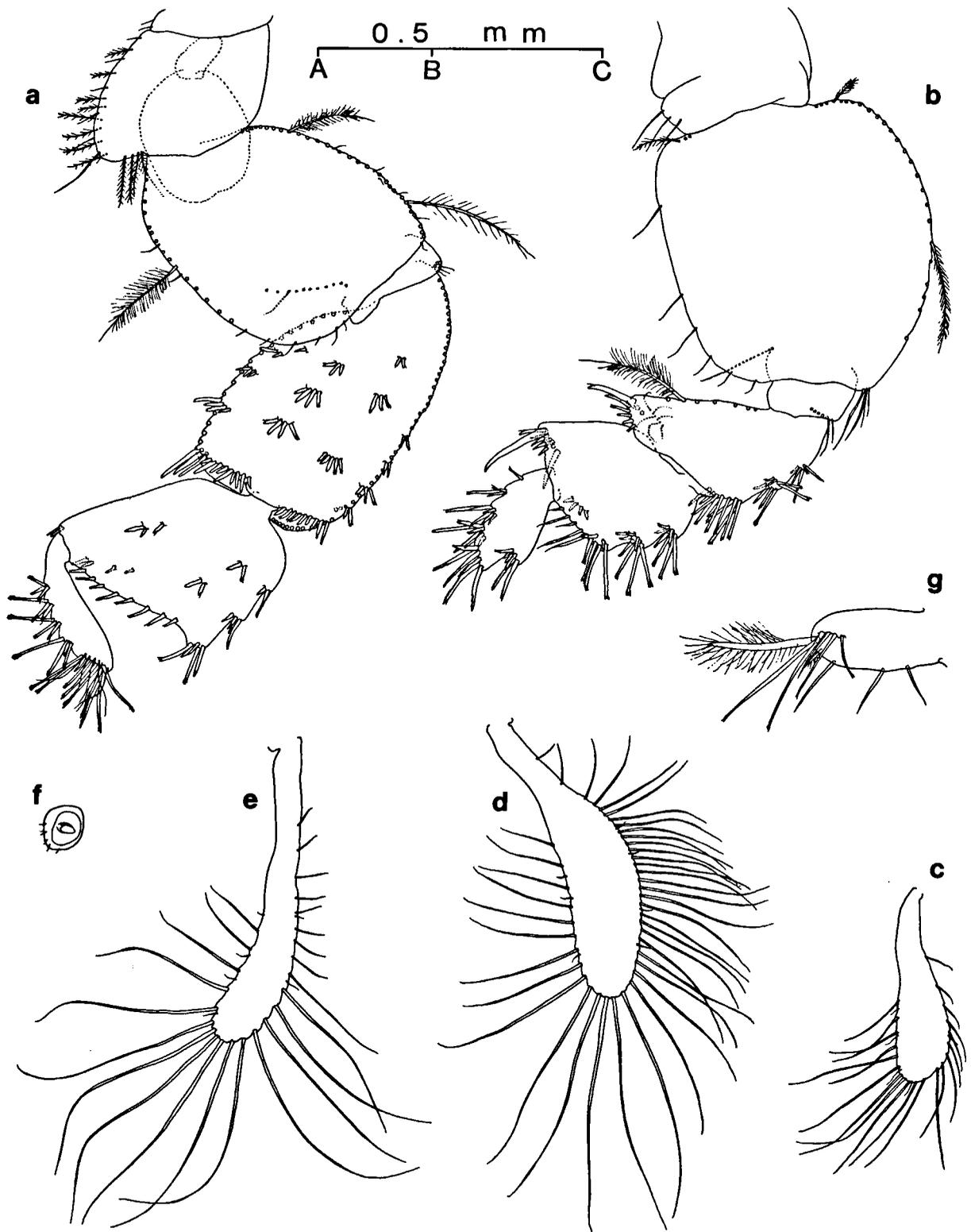


Fig. 8. *Eohaustorius longidactylus* n. sp. (♀ holotype 5.8 mm from Bangpo). a, pereopod 6 (scale AB); b, pereopod 7 (AB); c, oostegite on gnathopod 2 (AB); d, oostegite on pereopod 3 (AB); e, oostegite on pereopod 4 (AB); f, oostegite on pereopod 5 (AB); g, telson (AC). Each scale unit (AB, AC) represents 0.5 mm.

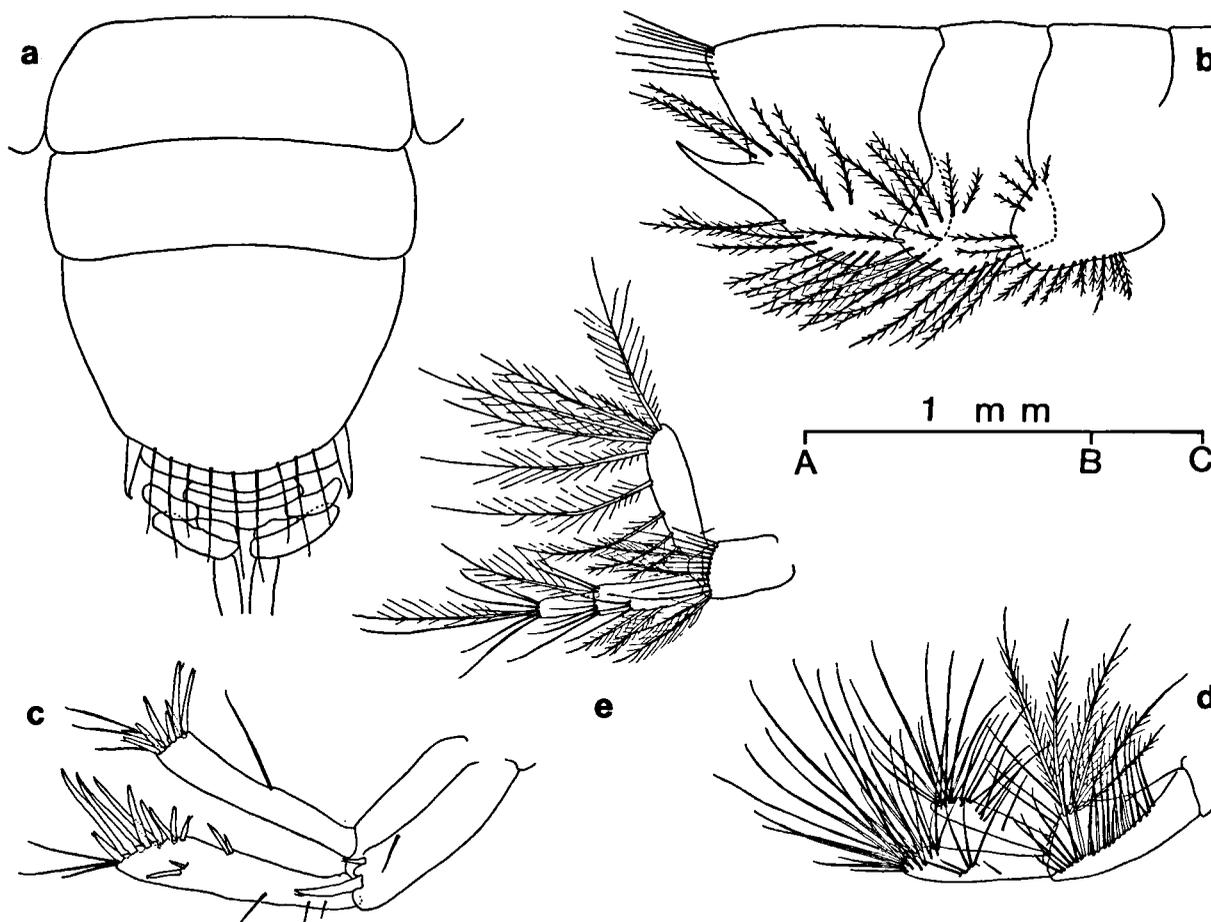


Fig. 9. *Eohaustorius longidactylus* n. sp. (♀ holotype 5.8 mm from Bangpo). a, dorsal view of pleosomites (scale AB); b, lateral view of pleosomites (AB); c, uropod 1 (AC); d, uropod 2 (AC); e, uropod 3 (AC). Each scale unit (AB, AC) represents 1 mm.

numerous setae, ventral margin setose; on pereopod 5 with 5 setules on posterior margin.

Pleosomites 1 to 3 (figs. 9a, b) less depressed than those of *E. stocki*; somite 3 longest, with 9 long posterior setae. Epimeral plates 1 to 3: Plate 1 with 18 plumose setae; posteroventral corner of plate 2 bluntly produced, with 12 ventral, 2 posterior marginal and 5 facial plumose setae; plate 3 with long but not curved tooth, with 8 ventral and 5 facial plumose setae.

Pleopods similar to those of *E. stocki*.

Uropod 1 (fig. 9c): Peduncle shorter than exopodite, dorsolateral margin with 2 apical spines; apices of both rami spinose, endopodite with single mid-dorsal seta.

Uropod 2 (fig. 9d): Peduncle subequal in length to exopodite, dorsolateral margin with numerous setae, dorsomedial margin with 6 plumose and 3 simple setae; endopodite shorter than exopodite.

Uropod 3 (fig. 9e): Peduncle shorter than exopodite; exopodite longer than proximal segment of endopodite.

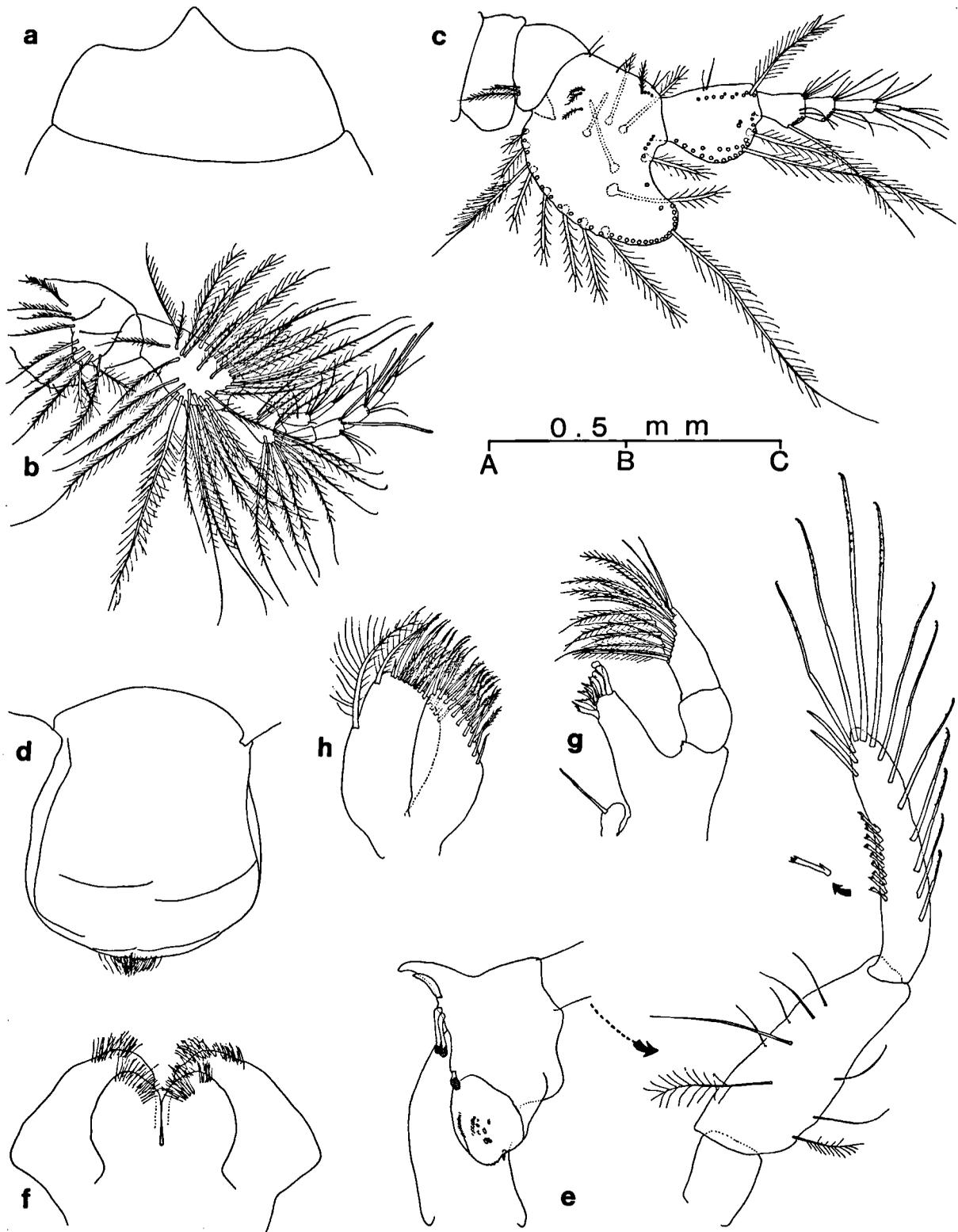


Fig. 10. *Eohaustorius spinigerus* n. sp. (♀ holotype 4.5 mm from Hakampo). a, dorsal view of head (scale AB); b, antenna 1 (AB); c, antenna 2 (AB); d, upper lip (AC); e, right mandible (AC); f, lower lip (AC); g, maxilla 1 (AC); h, maxilla 2 (AC). Each scale unit (AB, AC) represents 0.5 mm.

Telson (fig. 8g): Lobe with 3 mediomarginal and 5 mid-facial setae, subapical margin with 1 large and 1 small plumose setae.

Remarks

E. longidactylus differs from *E. cheliferus* in (1) the small coxal plate 2; (2) the slender dactylus of gnathopod 1; (3) the large number of spine groups on the anterior margin of segment 6 in pereopod 5; (4) the shape of segment 5 in pereopod 7 (twice as wide as segment 6); (5) exopodite shorter than endopodite in uropod 3; and (6) having plumose setae on the telson lobes.

This species can be distinguished from *E. stocki* and *E. subulicola* by the appearance of epimeral plates 2 and 3. In the present species, the tooth of epimeral plate 3 is not incurved and the posteroventral corner of epimeral plate 2 is blunt. In addition to these, there are a few more differences: (1) a seta present on the first segment of mandibular palp; (2) numerous setules on the distal margin of coxal plate 2; and (3) hind lobe of segment 5 well-exceeding the tip of segment 6 in pereopod 4.

There exists a difference in setal morphology of coxal plate 4 between populations. The animals from Bangpo mainly have simple setae on the posterior margin (a few of them plumose), but this margin is entirely covered with plumose setae in the specimens from Baekryeongdo.

Etymology

This species is named *longidactylus* in view of the slender dactylus of the first gnathopod.

Distribution and ecology

E. longidactylus was collected intertidally at two sandy beaches in the middle part of the west coast of Korea. The habitat was marine. At Bangpo it was found together with a single specimen of *E. spinigerus*, which is also confined to the west coast of the country.

No ovigerous females were encountered.

Eohaustorius spinigerus n.sp.

(Figs. 10-13)

Material

Prov. Chungnam, Seosan-gun, Hakampo; 19 Oct. 1986, 1

♀ holotype (ZMA Amph. 108.743), 1 ♂ allotype (ZMA Amph. 108.744), 53 paratypes (ZMA Amph. 108.745), and 55 paratypes (IMS). Y. W. Jo coll.; 28 June 1987, 3 paratypes (IMS). H. J. Ko coll.

Prov. Cheonnam, Youngkwang-gun, Gamami; 10 Aug. 1986, 13 specimens. C. W. Ma coll.

Prov. Chungnam, Seocheon-gun, Chunjangdae; 9 May 1986, 12 specimens. Y. W. Jo coll.

Prov. Chungnam, Seosan-gun, Bangpo; 20 Oct. 1986, 1 specimen. Y. W. Jo & H. J. Ko coll.

Prov. Chungnam, Seosan-gun, Malipo; 21 Oct. 1986, 62 specimens. Y. W. Jo coll.

DESCRIPTION

Body length up to 5.5 mm (♀), or 5.2 mm (♂); head wider than long, from dorsal view, rostrum moderate (fig. 10a); existence of eyes not clear in preserved material.

Antenna 1 (fig. 10b) subequal in length to antenna 2; accessory flagellum inserted on peduncle segment 3 at distal two-thirds, reaching tip of second segment of primary flagellum, basal segment with 5 distal setae; primary flagellum 5-segmented, segments 2 to 4 with 2, 1, 1 aesthetascs, respectively.

Antenna 2 (fig. 10c): Gland cone stout; peduncle segment 4 with 7 posterior and 6 facial plumose blades on medial surface, entire posterior margin with numerous plumose setae; flagellum 4-segmented.

Upper lip (fig. 10d) slightly longer than wide.

Mandible (fig. 10e): Incisor simple; rakers and process near to molar match-shaped; molar process well-produced. Palp segment 1 naked, segment 2 with 2 plumose and 7 simple setae, segment 3 with 9 comb-spines, 2 simple and 11 tubercled spines.

Lower lip (fig. 10f): Inner lobes broad, apically rounded.

Maxilla 1 (fig. 10g): Outer lobe narrowing distally, with 10 apical spines (lateral 4 spines spoon-shaped); palp as wide as outer lobe.

Maxilla 2 (fig. 10h): Inner lobe smaller than outer, tapering distally, with 2 rows of marginal and submarginal setae.

Maxilliped as in *E. stocki*.

Coxal plates: Plate 2 broad and shallow, posterior margin slightly excavated, with plumose seta, distal margin with 6 setules; anterior margin of plate 3 (fig. 11c) with 9 setules; plate 4 slightly deeper than wide; plate 6 wider than deep.

Gnathopod 1 (fig. 11a): Basis narrowing distally,

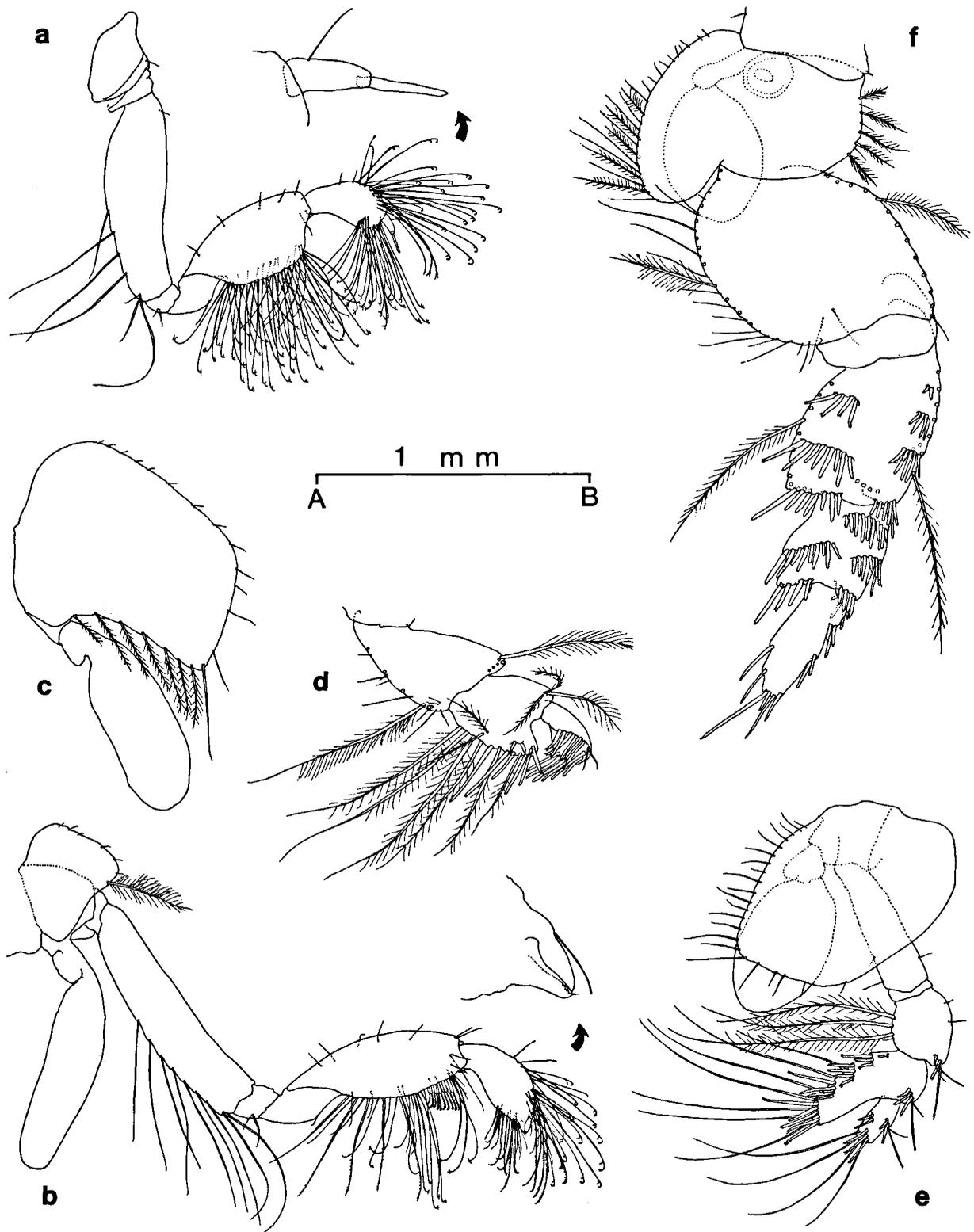


Fig. 11. *Eohaustorius spinigerus* n. sp. (Q holotype 4.5 mm from Hakampo). a, gnathopod 1; b, gnathopod 2; c, coxal plate 3 and coxal gill; d, distal part of pereopod 3; e, pereopod 4; f, pereopod 5. Scale: all AB (= 1 mm).

anteroproximal margin with 1 setule; unguis as long as dactylus, tip simple, not notched.

Gnathopod 2 (fig. 11b): Anterior margin of basis naked; carpus about 1.7 times as long as propodus, posterodistal margin with 10 pectinate spines; claw with single seta anteriorly.

Pereiopod 3 (fig. 11d): Segment 5 with pair of submarginal and 6 marginal spines on posterodistal margin; segment 6 with semicircular row of 13 spines and 2 setae apically.

Pereiopod 4 (fig. 11e): Basis with 1 seta on anterior margin, 2 setae on posterior margin; segment 4 with 3 plumose setae on posterior margin; posterodistal margin of segment 5 greatly expanded, far exceeding tip of segment 6, with 4 posterior and 1 apical spine groups; segment 6 small, with 3 spine groups; setae on segments 5 and 6 not plumose.

Pereiopod 5 (fig. 11f): Segment 2 slightly longer than wide; segment 4 with 1 facial, 4 anterior, 2 posterior marginal spine groups; segment 5 as wide as long, with 3 anterior, 2 posterior marginal spine groups; segment 6 about 1.25 times as long as segment 5, anterior margin with 2 spine groups, posterior margin with 2 spines, apex with 4 spines.

Pereiopod 6 (fig. 12a): Segment 2 longer than wide; segment 4 subequal in length to segment 2, with 5 facial, 5 anterior and 3 posterior marginal spine groups; segment 5 with 2 facial, 3 anterior marginal spine groups, ventral margin with 8 spines, medial surface with 5 spines; posterodistal setae on segment 6 very long (some of them longer than segment itself).

Pereiopod 7 (fig. 12b): Segment 2 as wide as long, anterior and posterior margins with many setae; segment 4 with 3 anterior marginal spine groups, posteroventral margin with 6 spines (outermost one very large); segment 5 as wide as long, subequal in length to segment 4, with 3 anterior spine groups, posteroventral margin with 5 spines (outermost one very large); segment 6 shorter than segment 5, posterior margin with 7 single spines on proximal two-thirds and group of 5 spines distally, apex with 9 spines.

Coxal gills: Similar on gnathopod 2 and pereiopod 3, elongate; on pereiopods 4 to 6 oval, with stalk.

Oostegites (figs. 12c-f): On gnathopod 2 strongly widened distally, anterior margin with 3 setules, posterior margin with 8 setae and 5 setules, ventral mar-

gin bare; on pereiopod 5 rounded, with 4 setules on posterodistal margin.

Pleosomes 1 to 3 (figs. 13a, b) less depressed than those of *E. stocki*; somite 3 longest, with 12 long posterior setae. Epimeral plates 1 to 3: Plate 1 excavated posteroventrally, with 10 plumose setae; posteroventral corner of plate 2 bluntly produced, with 5 ventral, 5 posterior (sub)marginal plumose setae; plate 3 with small, not curved tooth, with 8 ventral and 7 facial plumose setae.

Pleopods similar to those of *E. stocki*.

Uropod 1 (fig. 13c): Peduncle slightly longer than rami, dorsolateral margin with 8 spines distally; endopodite with single mid-dorsal seta; apex of both rami with spines and setae.

Uropod 2 (fig. 13d): Peduncle subequal in length to exopodite; endopodite shorter than exopodite.

Uropod 3 (fig. 13e): Peduncle slightly shorter than exopodite; exopodite slightly longer than proximal segment of endopodite; one of apical setae of endopodite extremely long.

Telson (fig. 13f): Each lobe with 4 mediomarginal, 4 mid-facial setae, subapical margin with 1 long and 1 small plumose setae.

Remarks

The following characteristics appear to be unique for *E. spinigerus* within the Korean species: (1) the very long setae on segment 6 of pereiopod 6; (2) the individually inserted spines on the distal two-thirds of posterior margin of segment 6 in pereiopod 7; and (3) the remarkably spinose peduncle of uropod 1.

In the shape of the oostegite on gnathopod 2 this species resembles *E. stocki*, but it can be distinguished from it by the not curved tooth of epimeral plate 3 and the more strongly expanded hind lobe of segment 5 in pereiopod 4, let alone the three above-mentioned characteristics.

E. subulicola also has long setae on segment 6 of pereiopod 6, but their length is not longer than segment itself. Besides, the new species has simple setae on segments 5 and 6 of pereiopod 4, the short and simple tooth on epimeral plate 3, and many spines on the peduncle of uropod 1.

The present species resembles *E. sowyeri* in having long setae on segment 6 of pereiopod 6 and having many spines on the peduncle of uropod 1. However,

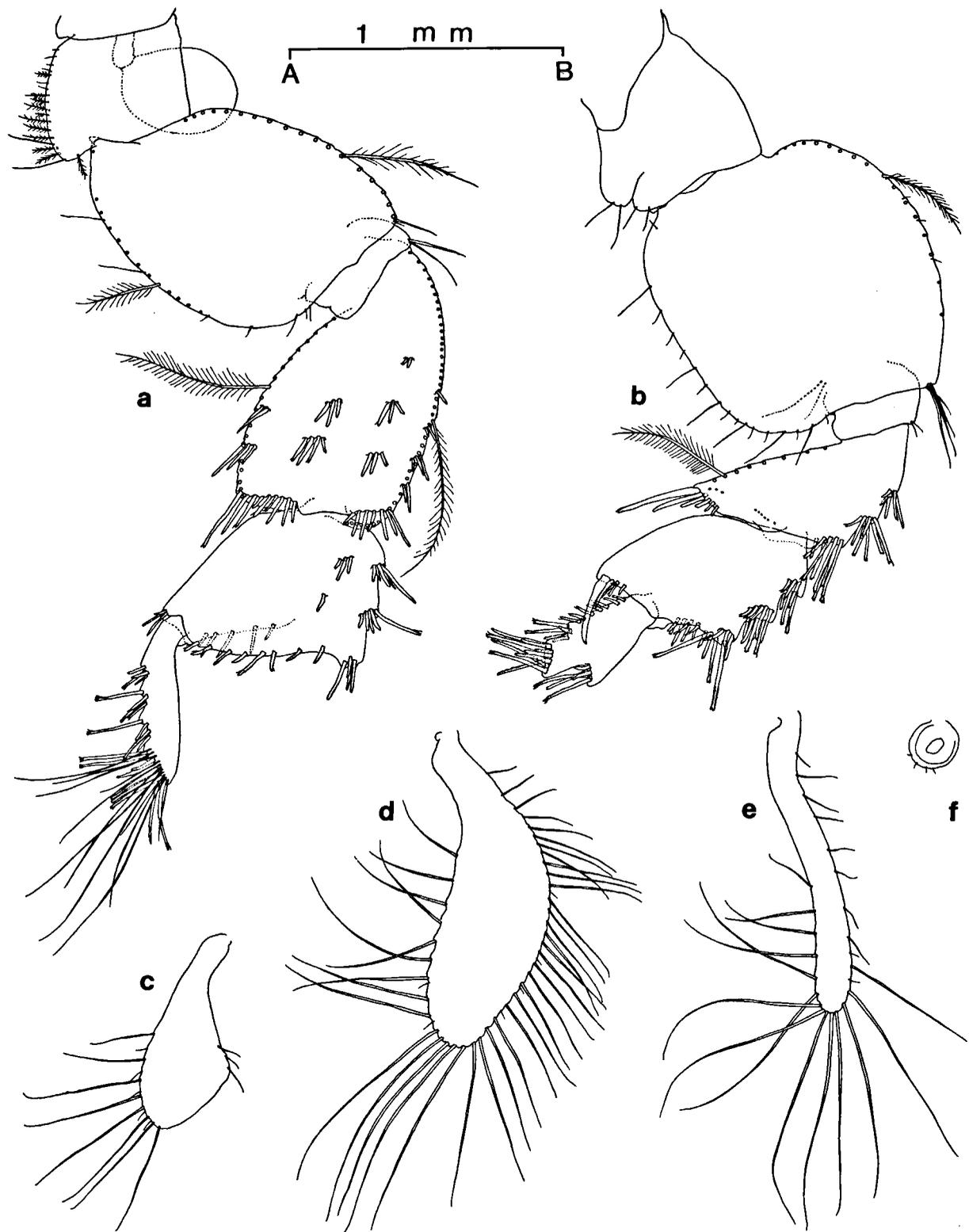


Fig. 12. *Eohaustorius spinigerus* n. sp. (♀ holotype 4.5 mm from Hakampo). a, pereopod 6; b, pereopod 7; c, oostegite on gnathopod 2; d, oostegite on pereopod 3; e, oostegite on pereopod 4; f, oostegite on pereopod 5. Scale: all AB (= 1 mm).

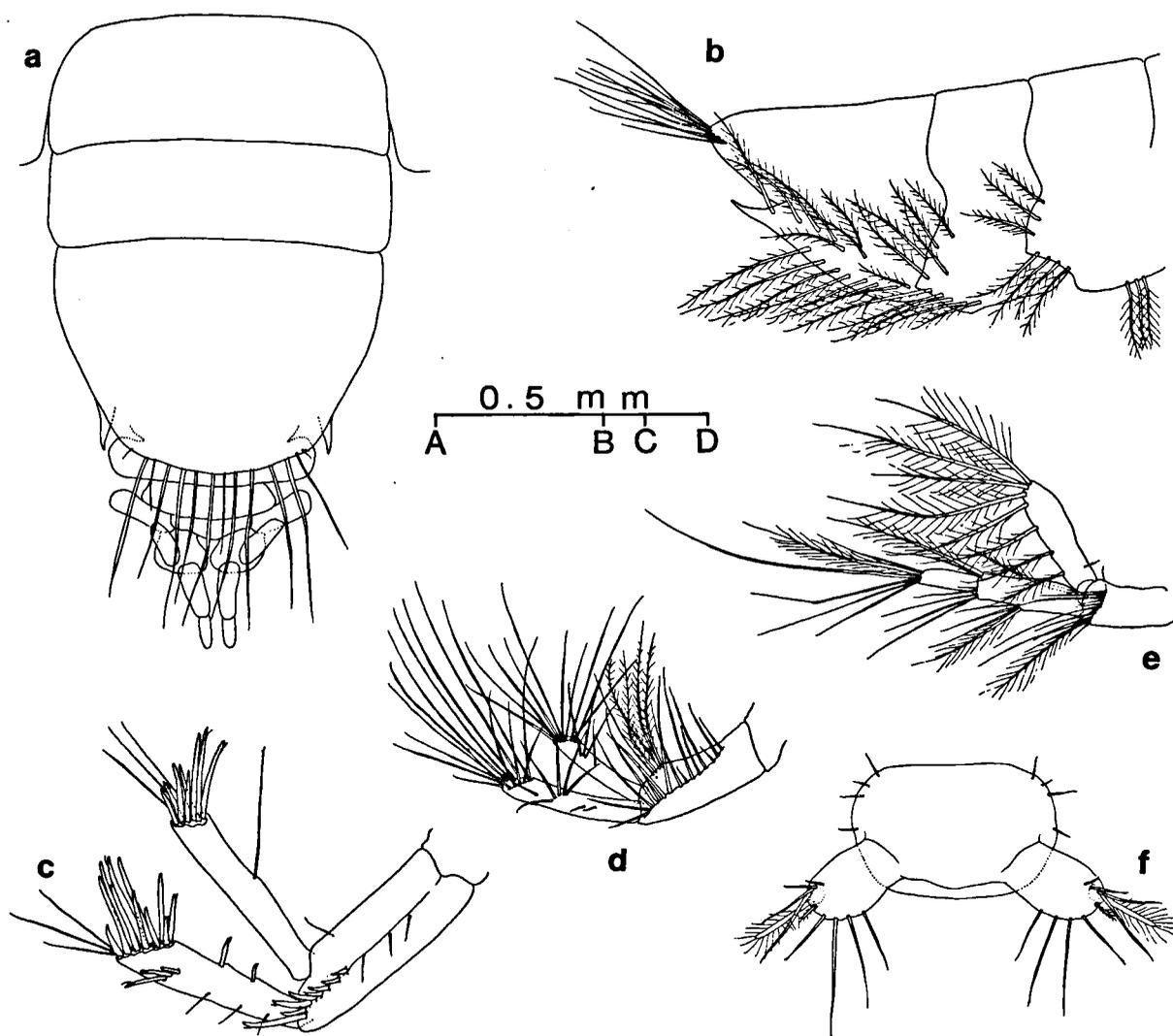


Fig. 13. *Eohaustorius spinigerus* n. sp. (♀ holotype 4.5 mm from Hakampo). a, dorsal view of pleosomites (scale AB); b, lateral view of pleosomites (AB); c, uropod 1 (AC); d, uropod 2 (AC); e, uropod 3 (AC); f, telson (AD). Each scale unit (AB, AC, AD) represents 0.5 mm.

the new species differs from it in the shape of segment 5 of pereopod 4 and in the individually implanted spines on the posterior margin of segment 6 of pereopod 7.

The number of comb spines on mandibular palp segment 3 varies between 7 and 11 among adult specimens. Similar variation has been observed in the number of the pectinate spines on the posterodistal margin of segment 5 in gnathopod 2.

Etymology

The name *spinigerus* (from the Latin, *spina*, spine; *gerere*, to bear) alludes to the spinose peduncle of the first uropod.

Distribution and ecology

E. spinigerus is distributed on the west coast of Korea. The substrate of all the localities consists of fine sand and the habitat is marine. At Gamami this spe-

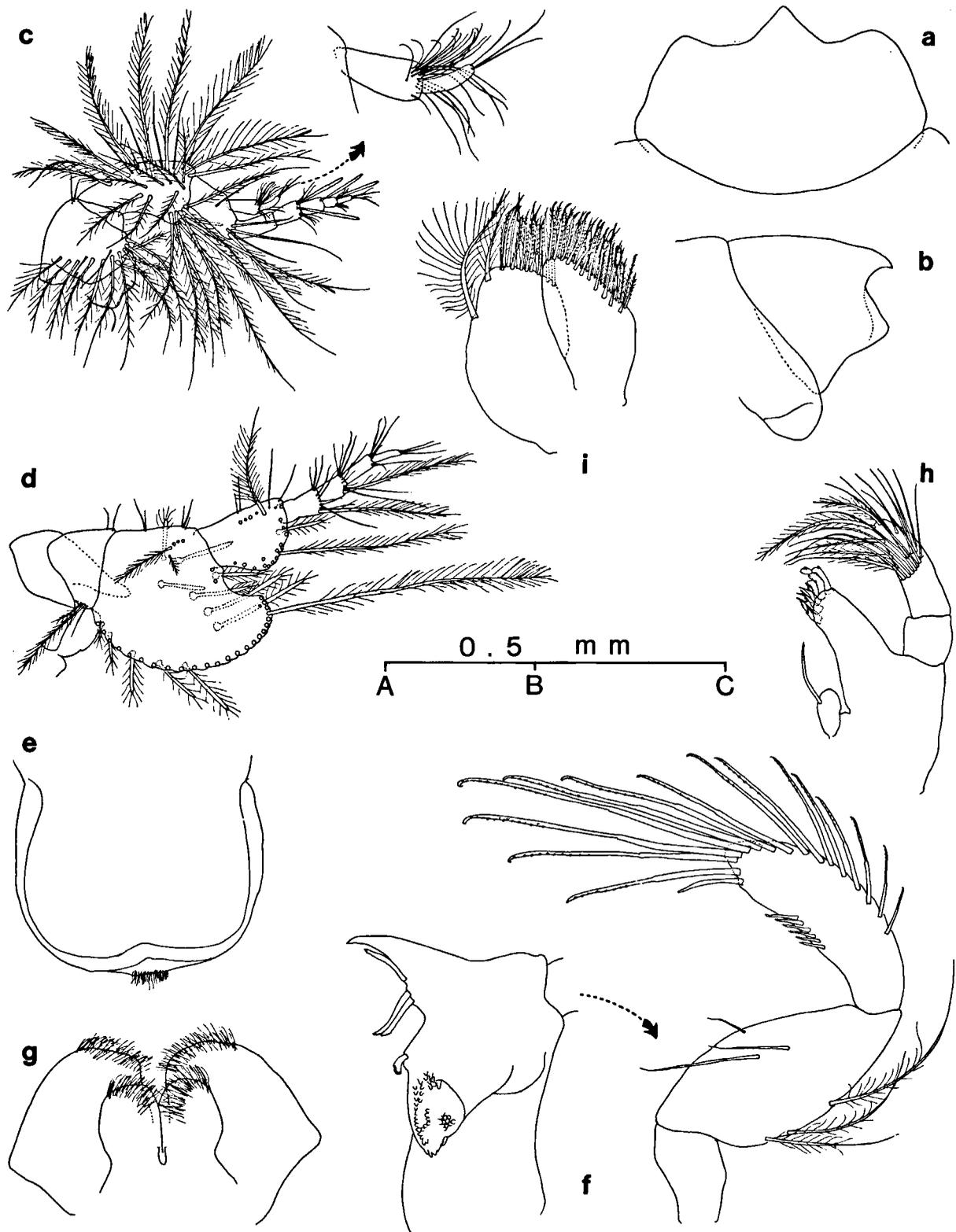


Fig.14. *Eohaustorius setulosus* n. sp. (♀ holotype 4.1 mm from Okryudeung, Nakdong estuary). a, dorsal view of head (scale AB); b, lateral view of head (AB); c, antenna 1 (AB); d, antenna 2 (AB); e, upper lip (AC); f, right mandible (AC); g, lower lip (AC); h, maxilla 1 (AC); i, maxilla 2 (AC). Each scale unit (AB, AC) represents 0.5 mm.

cies occurs with *E. setulosus*, and at Bangpo with *E. longidactylus*.

During the study no ovigerous females were obtained.

***Eohaustorius setulosus* n.sp.**

(Figs. 14-17)

Material

Pusan, Nakdong estuary, Okryudeung; 30 July 1984, 1 ♀ holotype (ZMA Amph. 108.746), 1 ♂ allotype (ZMA Amph. 108.747), and 71 paratypes (ZMA Amph. 108.748). Y. W. Jo & C. W. Ma coll.; 16 Nov. 1983, 44 paratypes (IMS). Y. W. Jo & G. Doornbos coll.; 20 Jan. 1984, 140 paratypes (IMS); 12 Apr. 1984, 204 paratypes (5 ovig. ♀♀) (IMS); 25 Oct. 1984, 169 paratypes (IMS). Y. W. Jo & C. W. Ma coll.; 7 Jan. 1985, 242 paratypes (5 ovig. ♀♀) (ZMA Amph. 108.749). Y. W. Jo & M. W. Jo coll.

Pusan, Nakdong estuary, Baekhabdeung; 19 Jan. 1984, 1 specimen; 30 July 1984, 1 specimen. Y. W. Jo & C. W. Ma coll.; 7 Jan. 1985, 2 specimens. Y. W. Jo & M. W. Jo coll.

Pusan, Nakdong estuary, Myeongji; 30 Jan. 1984, 2 specimens. Y. W. Jo & M. W. Jo coll.; 29 July 1984, 1 specimen; 25 Oct. 1984, 2 specimens. Y. W. Jo & C. W. Ma coll.

Pusan, Nakdong estuary, Jinwoodo; 30 Jan. 1984, 2 specimens. Y. W. Jo & M. W. Jo coll.

Pusan, Dadaepo; 4 Mar. 1983, 22 specimens. Y. W. Jo coll.; 17 Apr. 1983, 57 specimens (8 ovig. ♀♀); 11 Oct. 1984, 27 specimens (1 ovig. ♀). Y. W. Jo & C. W. Ma coll.; 22 Dec. 1984, 81 specimens. Y. W. Jo & M. W. Jo coll.; 5 Apr. 1985, 13 specimens. Y. W. Jo coll.

Prov. Cheonnam, Sinan-gun, Dochodo, Simok; 6 Oct. 1986, 194 specimens. K. C. Yoo coll.

Prov. Cheonnam, Youngkwang-gun, Gamami; 10 Aug. 1986, 55 specimens. C. W. Ma coll.

DESCRIPTION

Body length up to 4.1 mm (♀), or 4.0 mm (♂); head (fig. 14a) wider than long, from dorsal view; rostrum (fig. 14b) short; existence of eyes not clear in the present preserved specimens.

Antenna 1 (fig. 14c) shorter than antenna 2; accessory flagellum implanted on peduncle segment 3 at distal two-thirds, distal margin of basal segment heavily setose; primary flagellum 5-segmented, segments 2 to 4 with 2, 1, 1 aesthetascs, respectively.

Antenna 2 (fig. 14d): Gland cone large; peduncle segment 4 with 5 posteromarginal and 7 facial plumose blades on medial surface, entire posterior margin with numerous plumose setae; flagellum 4-segmented.

Upper lip (fig. 14e) broad, apex pilose.

Mandible (fig. 14f): Incisor simple; molar process well-developed; palp stout, segment 1 bare, segment 2 with 3 plumose, 3 simple setae, segment 3 with 6 comb-spines, 1 simple and 15 tubercled spines.

Lower lip (fig. 14g): Inner lobes short, apically truncated.

Maxilla 1 (fig. 14h): Outer lobe narrowing distally, with 10 apical spines (lateral 4 spines spoon-shaped); palp broad.

Maxilla 2 (fig. 14i): Inner lobe tapering laterodistally, with 2 rows of marginal and submarginal setae.

Maxilliped similar to that of *E. stocki*.

Coxal plates: Plate 2 not excavated posteriorly, with simple seta; distal margin bare; anterior margin of plate 3 (fig. 15c) without setules; plate 4 narrowing distally, posterior margin with plumose setae; plate 6 wider than deep.

Gnathopod 1 (fig. 15a): Basis not clearly narrowing distally, anterior margin without setae; propodus broad; dactylus short and stout, unguis much longer than dactylus, tip not notched.

Gnathopod 2 (fig. 15b): Basis without setae on anterior margin; carpus about 1.8 times as long as propodus, posterodistal margin with 8 pectinate spines; palm of propodus serrate; claw with single seta anteriorly.

Pereiopod 3 (fig. 15d): Posterodistal margin of segment 5 with 2 submarginal and 5 marginal spines; segment 6 with semicircular row of 7 spines and 2 small setae apically.

Pereiopod 4 (fig. 15e): Basis with 2 simple setae on anterior margin, 1 plumose and 1 simple setae on posterior margin; segment 4 with 2 plumose setae on posterior margin; posterodistal expansion of segment 5 not reaching tip of segment 6, with 2 posterior, 1 apical spine groups, 5 plumose and 1 simple setae; segment 6 with 3 groups of 1-2 spines, 4 plumose and 3 simple setae.

Pereiopod 5 (fig. 15f): Segment 2 as wide as long; segment 4 with 1 facial, 3 anterior and 2 posteromarginal spine groups; segment 5 as wide as long, with 3 anterior, 2 posterior marginal spine groups; segment 6 as long as segment 5, anterior margin with 2 spine groups, posterior margin with single spine, apex with 4 spines.

Pereiopod 6 (fig. 16a): Segment 2 longer than wide;

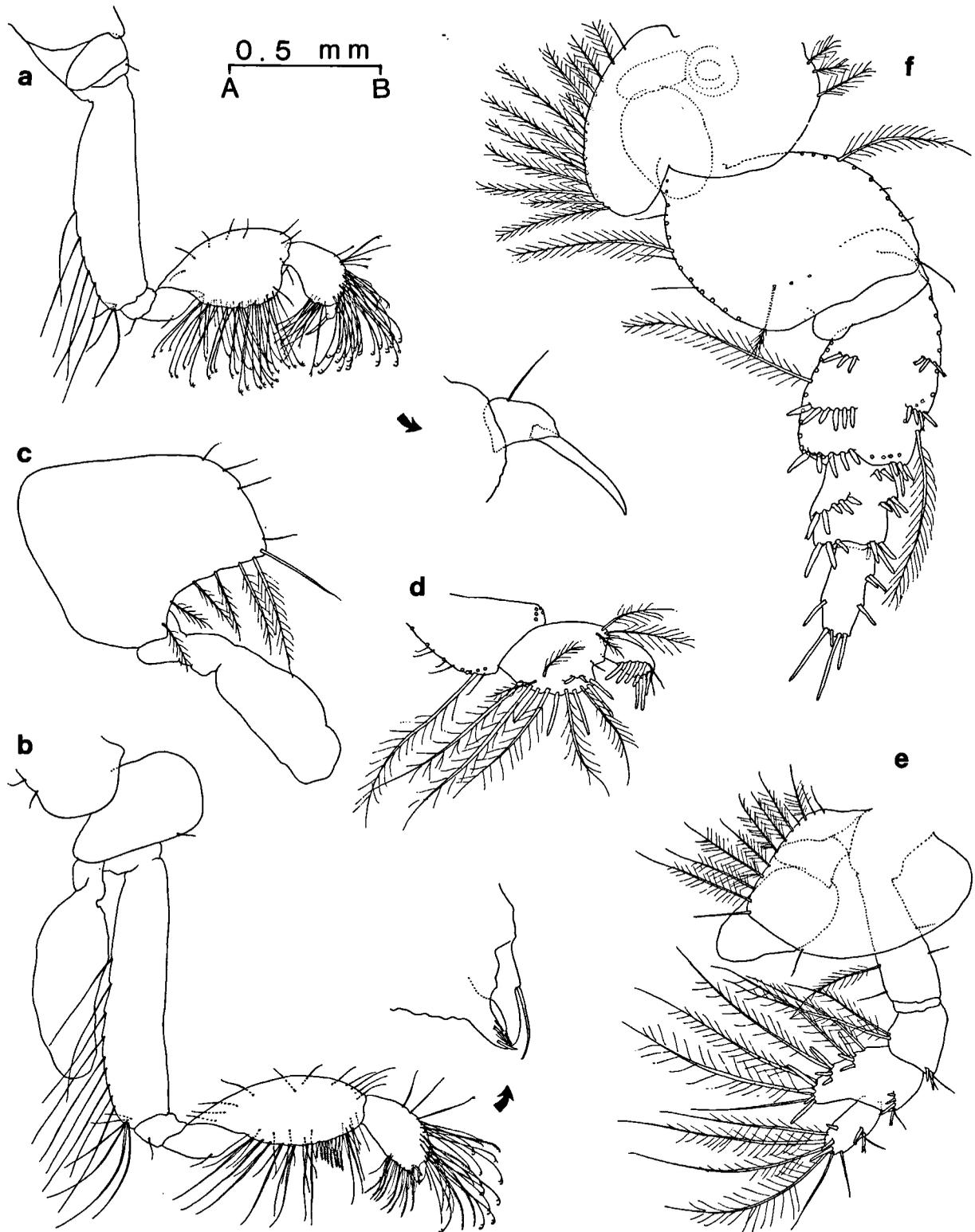


Fig.15. *Eohaustorius setulosus* n. sp. (♀ holotype 4.1 mm from Okryudeung, Nakdong estuary). a, gnathopod 1; b, gnathopod 2; c, coxal plate 3 and coxal gill; d, distal part of pereopod 3; e, pereopod 4; f, pereopod 5. Scale: all AB (= 0.5 mm).

segment 4 widened distally, subequal in length to segment 2, with 2 single facial, 2 anterior, 2 posterior marginal spine groups, posteroventral margin with 2 spines; segment 5 with 2 anteromarginal, 1 postrodiscal spine groups, ventral margin with 5 spines, medial surface with 3 spines; segment 6 with 5 short setae on posterodistal margin, spines not in group, twice as long as setae.

Pereiopod 7 (fig. 16b): Segment 2 much wider than long, posterior margin with a few setae distally; segment 4 with 3 anterior spine groups, posteroventral margin with 3 spines (outermost one not very large); segment 5 as wide as long, subequal in length to segment 4, with 3 anterior spine groups, posteroventral margin with 1 group of 5 spines (outermost one not stout), anteroventral margin with 3 spines; segment 6 shorter than segment 5, posterior margin with 2 spine groups, apex with 7 spines and 1 tiny plumose seta.

Coxal gills relatively small, on gnathopod 2 and on pereiopod 3 elongate, on pereiopods 4 to 6 ovate, with stalk.

Oostegites (figs. 16c-f): On gnathopod 2 clavate, small, ventral margin setose; on pereiopod 5 with 3 setules on posterior margin.

Pleosomes 1 to 3 (figs. 17a, b) strongly depressed; somite 3 largest, with 11 posterior setae. Epimeral plates 1 to 3: Plate 1 truncated posterodistally, with single posterior seta; plate 2 with 7 plumose setae, posteroventral corner rounded; plate 3 with small posteroventral tooth, with 8 plumose setae.

Pleopods similar to those of *E. stocki*.

Uropod 1 (fig. 17c): Peduncle subequal in length to rami, distally with 2 dorsolateral spines; rami subequal, exopodite with 2 setae and 3 groups of 1-2 lateral spines, endopodite with 6 dorsal and 1 medial setae; apices of both rami with setae only.

Uropod 2 (fig. 17d): Peduncle longer than rami, dorsomedial margin with 3 plumose setae distally; endopodite slightly longer than exopodite.

Uropod 3 (fig. 17e): Peduncle shorter than exopodite; both rami subequal in length.

Telson (fig. 17f): Lobe with 3 mediomarginal and 2-3 mid-facial setae, subapical margin with 1 large and 1 small plumose setae.

Remarks

E. setulosus may be distinguished from the other species of the genus by the following points: (1) The first antenna has heavily setose proximal segment of the accessory flagellum; (2) the unguis of the first gnathopod is about twice as long as the dactylus.

Like *E. subulicola* Hirayama, the new species has segments 5 and 6 of pereiopod 4 armed with plumose setae. However, it differs from it in (1) the setose apices of uropod 1; (2) the very short and not curved tooth of epimeral plate 3; (3) the long exopodite of uropod 3 (equal to endopodite); and the two above-mentioned characteristics.

E. washingtonianus, like the new species, has setose apices on the rami of uropod 1, a character considered to be unusual within the family Haustoriidae. Except for the setation of uropod 1, however, there are many differences between *E. setulosus* and *E. washingtonianus*. A few of them are: (1) pereiopod 4 of the former has strong hind lobe on segment 5; (2) pereiopod 7 lacks a cusp on segment 2; and (3) segments 5 and 6 of pereiopod 4 are armed with plumose setae.

A smaller specimen (♀ 2.5 mm from Dochodo) agrees well with the adults in almost all respects, except the length of spines on segment 6 of pereiopod 6. The spines of the young specimen are, contrary to the adult situation, longer than the segment itself.

Etymology

The name *setulosus* refers to the heavily setose accessory flagellum and to the setose apices of the rami of the first uropod.

Distribution and ecology

E. setulosus was collected intertidally from two different regions in Korea, i.e. a brackish habitat of 5 stations in the Nakdong estuary (including Dadaepo) and a marine habitat in the southern part of the west coast (fig. 1).

The substrate was muddy sand at some stations in the Nakdong estuary, but was fine sand at Gamami, Dochodo, Okryudeung, and Dadaepo. Detailed sediment data were available for the stations in the Nakdong estuary. The sediment contains a higher amount of silt and clay (< 63 μm, 5.5-20.6 %) at Baekhabdeung, Myeongji, and Jinwoodo, at which

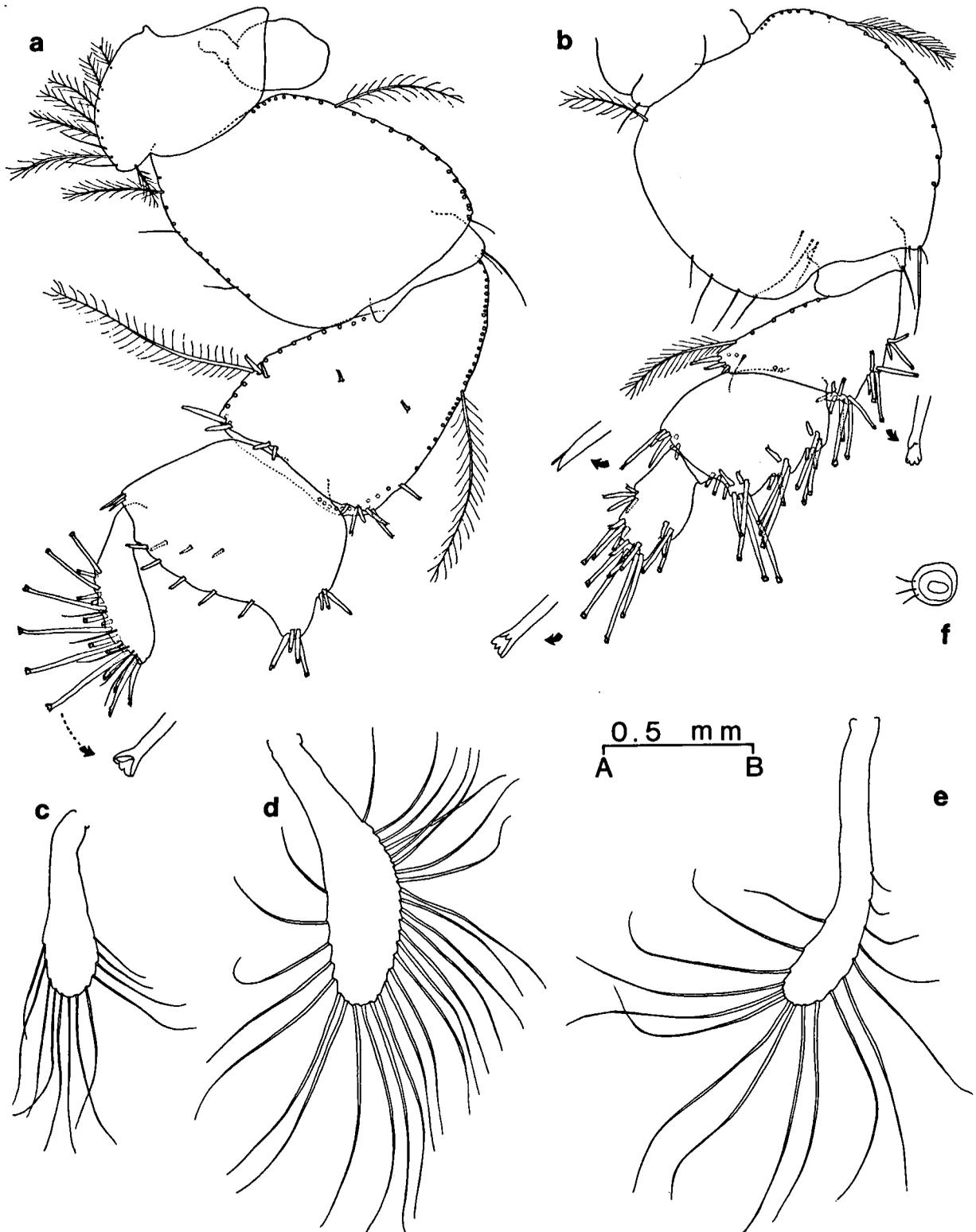


Fig. 16. *Eohaustorius setulosus* n. sp. (a & b, ♀ holotype 4.1 mm; c-f, ovigerous ♀ paratype 3.6 mm, from Okryudeung, Nakdong estuary). a, pereopod 6; b, pereopod 7; c, oostegite on gnathopod 2; d, oostegite on pereopod 3; e, oostegite on pereopod 4; f, oostegite on pereopod 5. Scale: all AB (= 0.5 mm).

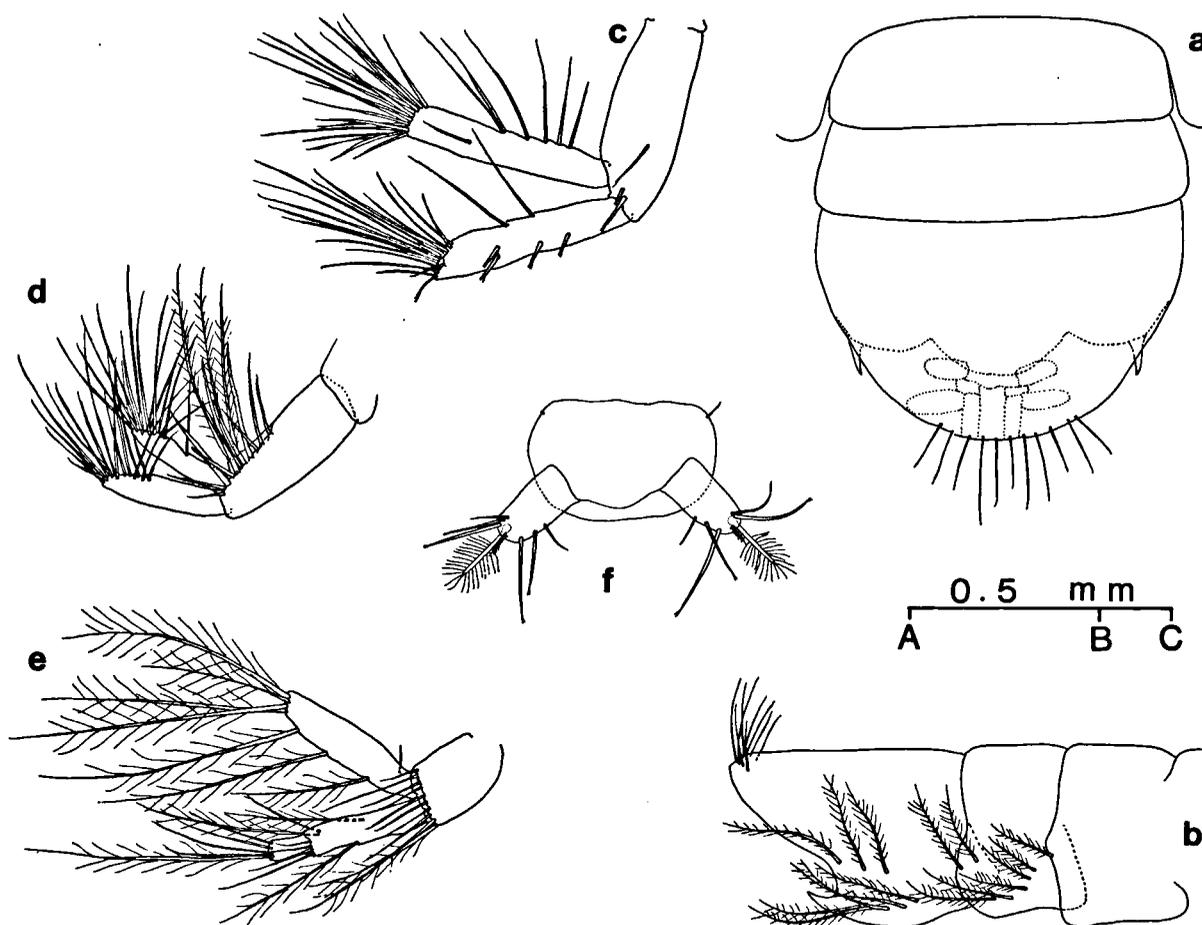


Fig. 17. *Eohaustorius setulosus* n. sp. (♀ holotype 4.1 mm from Okryudeung, Nakdong estuary). a, dorsal view of pleosomites (scale AB); b, lateral view of pleosomites (AB); c, uropod 1 (AC); d, uropod 2 (AC); e, uropod 3 (AC); f, telson (AC). Each scale unit (AB, AC) represents 0.5 mm.

only a small number of *E. setulosus* occurred. In contrast, beaches of Okryudeung and Dadaepo consist of purer sand (0.5-2.5% silt and clay) and yields a great number of *E. setulosus*. From this it is clear that *E. setulosus* prefers pure sand rather than muddy sand. At Gamami this species is found with *E. spinigerus*; at Dadaepo it coexists with *E. stocki*.

Ovigerous females were obtained in January, April, and October. A brood contains a few eggs (1-4) and the egg size is 0.39 x 0.50 mm.

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