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New species of *Hatschekia* Poche, 1902 (Copepoda: Hatschekiidae) parasitic on marine fishes of Kuwait

Ju-shey Ho¹ & Il-Hoi Kim²

¹Department of Biological Sciences, California State University, Long Beach, California, 90840-3702, USA

²Department of Biology, Kangnung National University, Kangnung, 210-702, South Korea

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Abstract

Three new species of *Hatschekia* are described from the gill filaments of fishes taken in the Persian Gulf: *H. seyi* n. sp. from *Heniochus acuminatus* (Linnaeus), *H. nodosa* n. sp. from *Lutjanus coccineus* (Cuvier) and *H. tanysona* n. sp. from *L. fulviflamma* (Forsskål). *H. seyi* differs from its congeners in having the cephalothorax longer than the trunk; *H. nodosa*, in having multiple nodules on the posterolateral margins of the trunk; and *H. tanysona*, in having the trunk more than six times the length of cephalothorax and some pinnate setae on legs 1 and 2.

Introduction

The Hatschekiidae Kabata, 1979 is one of the major families of siphonostomatoid copepods, comprising more than 100 species classified in eight genera. *Hatschekia* Poche, 1902 is by far the largest genus of this family. In his revision of *Hatschekia*, Jones (1985) recognised 68 species; but since then ten new species were added to this genus by Kabata (1991), five by Jones & Cabral (1990), two by Castro & Baeza (1986), and one each by Pillai (1985) and Villalba (1986). Thus, 87 species are currently known in *Hatschekia*. They are all parasitic on the gill filaments of marine teleosts.

Information on parasitic copepods of the fishes of the Arabian Gulf is scanty. While nearly 300 species of copepods have been recorded parasitic on the fishes of Arabian Sea (Pillai, 1985), only 31 species are known so far from the fishes of the Gulf (Kabata & Tareen, 1987; Boxshall & Gurney, 1980; Ho & Sey, 1996, 1997; Ho et al., in press). In this paper, we shall add three new species of *Hatschekia* to this meager list of parasitic copepods from the Gulf. So far, two species of *Hatschekia* are known from Kuwait Bay, *H. cernae* Goggio, 1905 from *Epinephelus tauvina* (Forsskål) and *H. longigenitalis* Yamaguti, 1954 from *Scolopsis ruppelli* (Cuvier) (see Ho & Sey, 1996).

Materials and methods

Fishes infected with copepods were purchased from the local fish market in Kuwait and examined for parasites in the laboratory of the Department of Zoology at Kuwait University. The parasites were recovered from the gill filament of the host fish by carefully scraping the surface. They were separated from the scrapings under a dissection microscope and preserved in 70% alcohol. The subsequent microscopical studies of the parasites were made in a drop of lactic acid. The appendages of the parasites were dissected and examined with a compound microscope and magnified up to 1,500 times. All drawings were made with the aid of a camera lucida. Measurements are given in micrometres, unless otherwise mentioned.

Hatschekia seyi n. sp. (Figure 1A–J)

Material examined: 2 ♀♀ on gill filaments of *Heniochus acuminatus* (Linnaeus) caught on 5 April, 1997 from Kuwait Bay. Holotype (USNM 298364) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, DC. Paratype dissected and kept in the junior author's (IHK) personal collection.

Etymology: The species is named for Dr Otto Sey, who

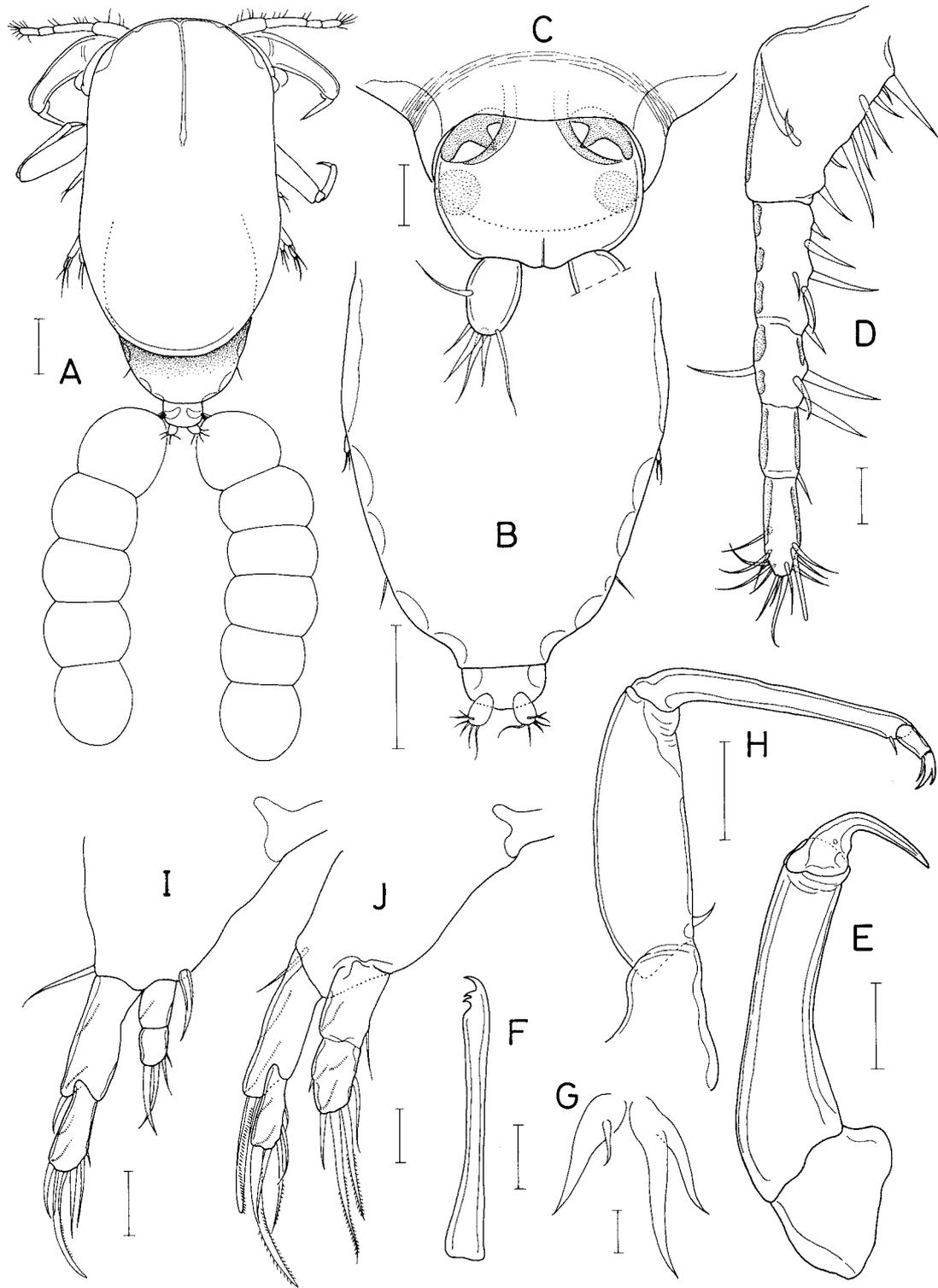


Figure 1. *Hatschekia seyi* n. sp. Adult female. A. habitus, dorsal; B. trunk, ventral; C. posterior end of trunk, dorsal; D. antennule; E. antenna; F. mandible; G. maxillule; H. maxilla; I. leg 1; J. leg 2. Scale-bars: A,B, 0.1 mm; C,D,I,J, 20 μ m; E,H, 50 μ m; F,G, 10 μ m.

has collected for several years the parasitic copepods from the fishes of Kuwait Bay.

Description

Female

Body (Figure 1A) 746 long (excluding setae on caudal rami), with large cephalothorax, 604×354 , greatly protruded backward over small trunk, 390×265 . Posterolateral margins of trunk tapering to genital area without lobes or processes (Figure 1B). Abdomen (Figure 1C) wider than long, 35×68 . Caudal ramus (Figure 1C) 1.44 times longer than wide (26×18), bearing one lateral and 5 terminal, naked setae. Egg-sac (Figure 1A) 625 long, uniseriate, containing 5 or 6 eggs.

Antennule (Figure 1D) 5-segmented; formula of armature: 11, 6, 4, 1 and $13 + 1$ aesthete. Antenna (Figure 1E) 3-segmented; proximal segment (coxobasis) smallest and unarmed; middle segment (endopod) long, wider at base; terminal claw (distal segment) sharp and strongly uncinat; fleshy parabasal papilla present (not shown in Figure 1E). Oral cone robust, slightly longer than wide, 73×63 . Mandible (Figure 1F) slender, with 3 sharp teeth. Maxillule (Figure 1G) bilobate; inner lobe tapering process with basal seta, and outer lobe with 2 tapering processes. Maxilla (Figure 1H) 4-segmented; proximal segment unarmed; second segment (lacertus) largest, with short seta on inner margin near base; third segment (brachium) slender, with small distal seta on inner margin; distal segment tipped with slender seta and bifid claw. Maxilliped absent.

Both leg 1 (Figure 1I) and leg 2 (Figure 1J) biramous, with 2-segmented rami bearing rows of spinules on anterior surfaces. Armature formula of these legs as follows:

	Protopod	Exopod	Endopod
Leg 1	1 - 1	1 - 0; 5	0 - 0; 4
Leg 2	1 - 0	1 - 0; 5	0 - 1; 5

Some setae on these two legs with rows of spinules along their margins. Leg 3 (Figure 1B) represented by a small lobe tipped with 2 simple setae and leg 4 (Figure 1B) by simple seta.

Remarks

The present new species can be easily distinguished from its 87 congeners by one character alone – the cephalothorax is larger than the trunk (including the neck comprising the first and second pedigers).

Hatschekia megacephala Kabata, 1991 is the only congener that shows a close resemblance of this feature. As the name indicates, *H. megacephala* possesses a large ‘head’ (= cephalothorax), but it is still smaller than its trunk (Kabata, 1991). In addition, the armature of the antennule and leg 1, and the structure of the antenna and the egg sac also show differences between these two species.

The host of the present new species, *Heniochus acuminatus*, is a fairly widely distributed angelfish (Chaetodontidae) in the Indo-West Pacific. However, as far as we are aware, no *Hatschekia* has been reported from this species of angelfish. *H. megacephala* is a parasite of the rudderfish (Lethrinidae), *Gymnocranius audleyi* Ogilby and is so far known only from Heron Island, Queensland (Kabata, 1991).

Hatschekia nodosa n. sp. (Figure 2A-J)

Material examined: 2 ♀♀ on gill filaments of *Lutjanus coccineus* (Cuvier) caught on 10 October, 1996 from Kuwait Bay. Holotype (USNM 298361) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, DC. Paratype dissected and kept in junior author’s (IHK) personal collection.

Etymology: The species name of the parasite, *nodosa*, is from *nodosus*, in Latin meaning ‘full of knots’. It refers to the nodules on the posterolateral margins of the trunk of this species.

Description

Female

Body (Figure 2A) cylindrical, 850 long (excluding setae on caudal rami). Cephalothorax (Figure 2B) wider than long, 148×208 , with prominent bulges on lateral margins; dorsal surface reinforced with sclerotised ridge. Trunk about 5 times as long as wide, 802×160 , with 4 or 5 nodules on posterolateral margins of trunk (Figure 2C). Abdomen (Figure 2C) wider than long, 47×53 , with distinctly protruded anal area. Caudal ramus (Figure 2C) nearly twice as long as wide, 25×13 , carrying one lateral and 5 terminal, simple setae. Egg-sac unknown.

Antennule (Figure 2D) 5-segmented; armature formula: 9, 5, 4, $3 + 1$ aesthete and 11. Antenna (Figure 2E) 3-segmented; proximal segment (coxobasis) smallest, bearing small, inner seta at distal corner; middle segment (endopod) with swollen proximal end; terminal segment sharp, uncinat; fleshy

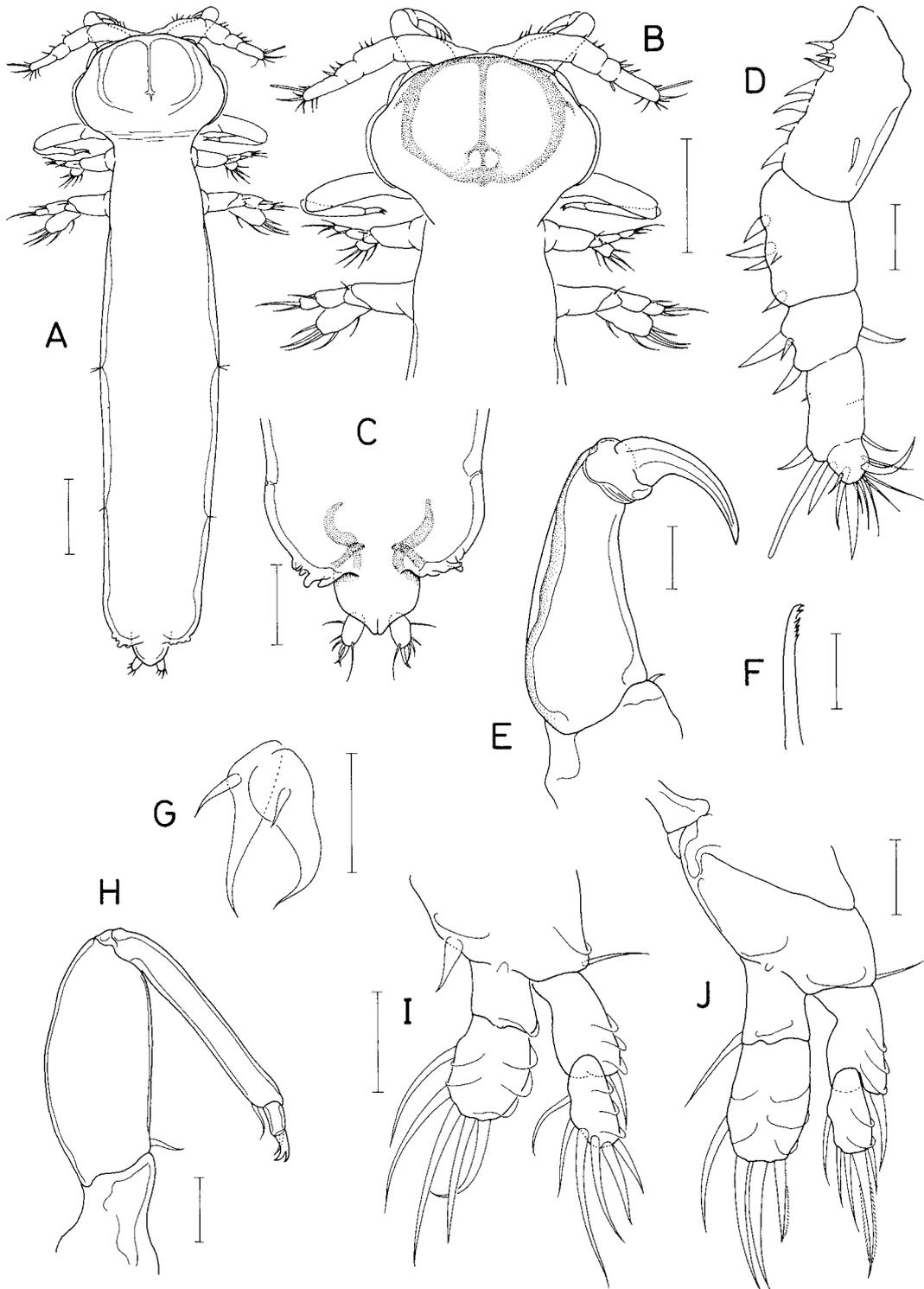


Figure 2. *Hatschekia nodosa* n. sp. Adult female. A. habitus, dorsal; B. anterior part of body, dorsal; C. posterior part of trunk, dorsal; D. antennule; E. antenna; F. mandible; G. maxillule; H. maxilla; I. leg 1; J. leg 2. Scale-bars: A,B, 0.1 mm; C, 50 μ m; D,E,G,H,I,J, 20 μ m; F, 10 μ m.

parabasal papilla present (not shown in Figure 2E). Mandible (Figure 2F) slender, with 6 small teeth. Maxillule (Figure 2G) bilobate; each lobe consisting of tapering process with seta in large, basal portion. Maxilla (Figure 2H) 4-segmented; proximal segment small and unarmed; second segment (lacertus) largest, with inner seta near proximal end; third segment (brachium) slender, with inner seta at distal end; distal segment tipped with slender seta and bifid claw. Maxilliped absent.

Both leg 1 (Figure 2I) and leg 2 (Figure 2J) biramous, with 2-segmented rami. Anterior surfaces of protopod and both rami bearing small, hyaline scluptures. Armature formula of these legs as follows:

	Protopod	Exopod	Endopod
Leg 1	1 - 1	1 - 0; 6	0 - 0; 5
Leg 2	1 - 0	1 - 0; 5	0 - 1; 4

Two setae on leg 2 with membranous flanges. Leg 3 represented by small lobe tipped with 2 naked setae and located on margin of trunk at about midway (Figure 1A). Leg 4 represented by single seta located on margin of trunk at beginning of posterior quarter (Figure 1A).

Remarks

In his key to the species of *Hatschekia*, Jones (1985) divided the 68 then recognised species into two groups based on the presence or absence of distinct 'cornute processes', or 'hemispherical knobs', on the posterolateral margins of the trunk. With the possession of multiple knobs on the posterolateral margins of the trunk (see Figure 2C), the new species apparently belongs to the first group. Ten species were placed in the first group by Jones (1985). They are: *H. albirubra* Wilson, 1913; *H. bodiani* Nunes-Ruivo, 1954; *H. cornifera* Yamaguti, 1939; *H. crenata* Hewitt, 1969; *H. mulli* (van Beneden, 1851); *H. oblonga* Wilson, 1913; *H. parva* Pearse, 1951; *H. pontini* Nunes-Ruivo, 1954; *H. quadrabdominalis* Yü, 1933; and *H. uncata* Wilson, 1913. To these ten species, we shall add the following six species which were reported after Jones' (1985) revision of *Hatschekia* and bear the same feature on the posterolateral margins of the trunk. They are: *H. amphiprocessa* Castro & Baeza, 1986; *H. bicaudata* Kabata, 1991; *H. crenulata* Kabata, 1991; *H. napoleoni* Jones & Cabral, 1990; and *H. squamigera* Kabata, 1991.

All of these 16 species have only one 'cornute process' or 'hemispherical knob' on each side of the posterolateral margin of the trunk, except for

H. napoleoni where there is bilobed projection (Jones & Cabral, 1990: p. 223). Nevertheless, it is still quite different from the multiple nodules of the new species. Aside from this feature, *H. napoleoni* also differs from *H. nodosa* in having an ovate trunk, a parabasal papilla at the base of antenna and different armature formulae on legs 1 and 2.

H. nodosa is unusual in bearing a distal seta on the inner margin of the proximal segment (coxobasis) of the antenna. An armature in this position has not been reported for species of *Hatschekia*. However, it is impossible to say whether it is unique in the present species, because for many species of *Hatschekia* the fine structure is unknown.

Hatschekia tanysoma n. sp. (Figure 3A-I)

Material examined: 4 ♀♀ on gill filaments of *Lutjanus fulviflamma* (Forskål) caught on 10 October, 1995 from Kuwait Bay. Holotype (USNM 298362) and 2 paratypes (USNM 298363) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, DC. Dissected paratype kept in the junior author's (IHK) personal collection.

Etymology: The species name of the parasite, *tanysoma*, is a combination of the Greek words *tany* (long) and *soma* (body). It refers to the unusually elongated trunk in this species.

Description

Female

Body (Figure 3A) cylindrical, 1.18 mm long (excluding setae on caudal rami). Cephalothorax (Figure 3B) wider than long, 156 × 196, with smoothly rounded lateral margins; dorsal surface reinforced with sclerotised ridge. Trunk about 6.5 times as long as wide, 1,024 × 163, with swollen posterolateral margins bearing nipple-like projection (Figure 3C). Abdomen (Figure 3C) wider than long, 41 × 66. Caudal ramus (Figure 3C) longer than wide, 21 × 13, carrying one lateral and 5 terminal, simple setae. Egg-sac 584 long, containing 4 eggs.

Antennule (Figure 3D) indistinctly 5-segmented; armature formula: 8, 5, 4, 3 + 1 aesthete and 10. Antenna (Figure 3E) 3-segmented; both proximal segment (coxobasis) and middle segment (endopod) unarmed; distal segment a strongly curved, sharp claw; fleshy parabasal papilla present (not shown in Figure 3E). Mandible as in *H. nodosa*. Maxillule (Figure 3F) bilobate; each lobe consisting of tapering

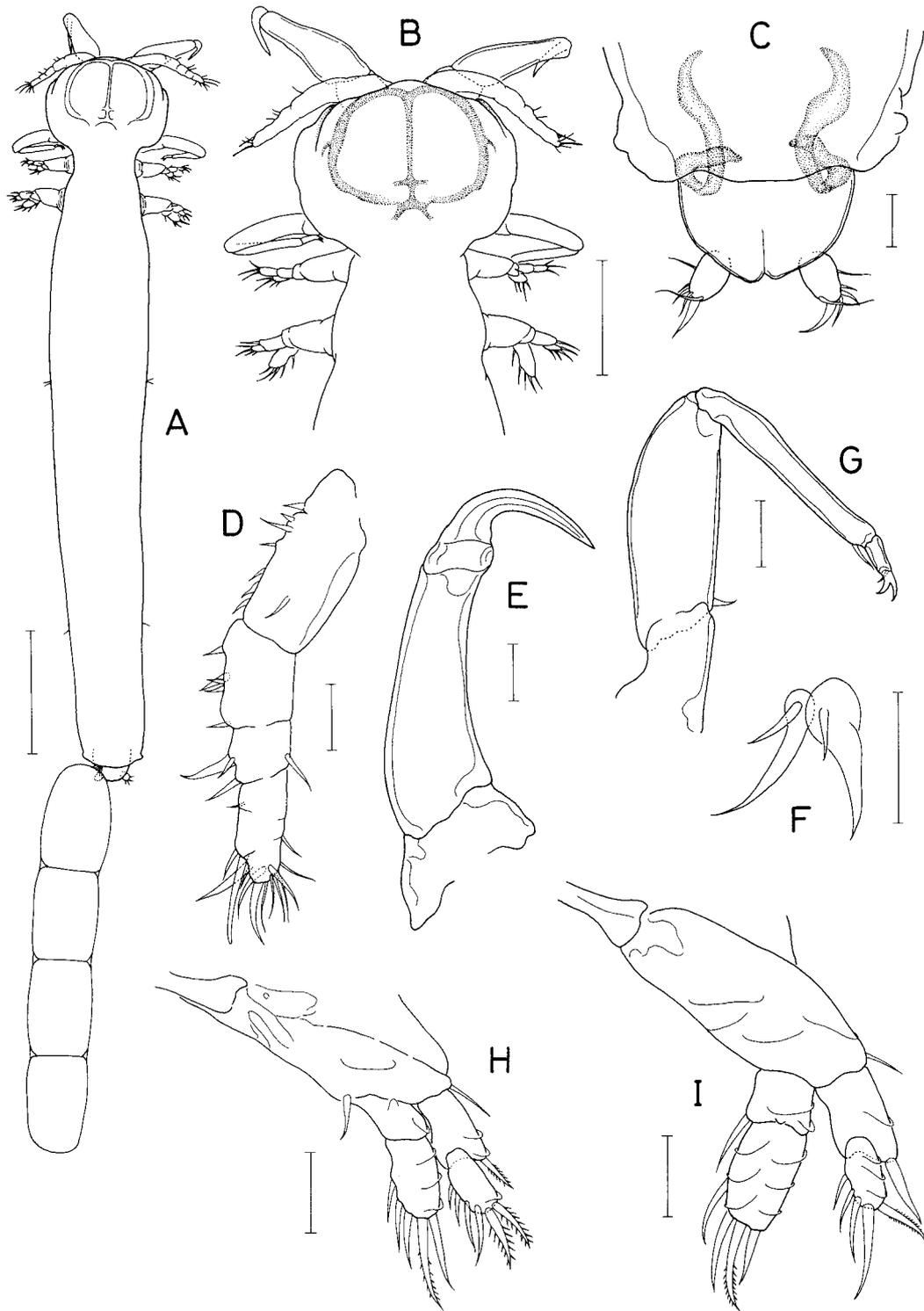


Figure 3. *Hatschekia tanysoma* n. sp. Adult female. A. habitus, dorsal; B. anterior part of body, dorsal; C. posterior part of trunk, dorsal; D. antennule; E. antenna; F. maxillule; G. maxilla; H. leg 1; I. leg 2. Scale-bars: A, 0.2 mm; B, 0.1 mm; C,D,E,F,G,H,I, 20 μ m.

process with seta in large basal portion; inner process larger. Maxilla (Figure 3G) 4-segmented, constructed as in *H. nodosa*. Maxilliped absent.

Both leg 1 (Figure 3H) and leg 2 (Figure 3I) biramous, with 2-segmented rami. Anterior surfaces of protopod and both rami bearing small, hyaline sculptures. Armature formula of these legs as in *H. nodosa*, but some setae pinnate as shown in Figures 3H and I. Leg 3 represented by small lobe tipped with 2 naked setae and leg with 4, single seta.

Remarks

Seventeen species of *Hatschekia*, including *H. nodosa* described above, have 'cornute processes' on the posterolateral margins of the trunk. However, only four of these 17 resemble the present new species in having smoothly rounded lateral margins on the cephalothorax and a long trunk (greater than six times the cephalothorax length) not tapering posteriorly. They are: *H. clava* Kabata, 1991; *H. conifera* Yamaguti, 1939; *H. difficilis* Kabata, 1991; and *H. squamigera* Kabata, 1991.

H. clava differs from the new species chiefly in having a relatively large terminal claw on the antenna and a formula of '0-0; 5' (instead of '0-1; 4') on the leg 2 endopod. *H. difficilis* is distinguished from *H. tanyosoma* by the posterolateral trunk swellings, the inner lobe of the maxillule and the armature on the terminal segments of leg 2 rami. *H. squamigera* resembles the new species only in the general appearance of the body, in particular the trunk. Not all appendages of *H. squamigera* are known, but of those five (antenna, maxillule, legs 1, 2 and 3) described by Kabata (1991), all differ from *H. tanyosoma*.

H. conifera is a widely distributed species. It has been reported from South Africa (Barnard, 1955; Kabata, 1981), Chile (Cressey, 1968; Villalba, 1986), Canada (Pacific coast; Kabata, 1981) and New Zealand (Jones, 1985), in addition to Japan (Yamaguti, 1939; Ho & Kim, 1996). It differs from the new species in the structure of the 'cornute processes' on the posterolateral margins of the trunk, the ornamentation on the middle segment (endopod) of the antenna and the armature on the endopods of both legs 1 and 2.

The setae on the first two thoracopods of *Hatschekia* are neither pinnate nor plumose (Kabata, 1991). However, the new species is unusual in carrying some pinnate setae on the rami of these two legs (see Figures 3H,I).

Acknowledgements

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