

Three New Copepods from Brackish-Water Lakes of Japan

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THE PRESENT PAPER deals with three new copepods found in brackish-water lakes of Japan. Two of them were obtained from the brackish fish-culture ponds along the western coast of Ise Bay, Mie Prefecture. The third specimen was sent by Professor Kikuya Mashiko of Kanazawa University and was collected from a small brackish-water lake in Hegura Island, one of the isolated islands in the Sea of Japan.

I wish to acknowledge my indebtedness to Professor Yaichiro Okada who kindly afforded me the facilities for studying the specimens which I have described in the present paper; to Dr. Masuzo Ueno, Otsu Hydrobiological Station of Kyoto University for his valuable advice; and to Professor Kikuya Mashiko of Kanazawa University who sent me the material of *Halicyclops japonicus*.

Acartia iseana n. sp.

Fig. 1

FEMALE: Length 0.955 mm., not including furcal setae.

Head distinctly separated from first thoracic segment. Rostral filaments present (Fig. 1c). Fourth thoracic segment completely fused with fifth. Lateral angle of last thoracic segment rounded, furnished with 4 spinules on either side. Genital segment not laterally dilated, about as long as other two abdominal segments combined, second segment about twice as long as anal segment. First two abdominal segments each with 6 spinules along distal margin of dorsal surface.

Furcal rami about 2 times as long as wide; inner margin with a few hairs. First antenna

of 17 segments, when reflexed scarcely reaching end of anterior division of body.

Legs 1–4 with formula 3,2/3,2/3,2/3,2. Leg 5 with basal segment longer than wide; outer seta relatively short, shorter than terminal spine. Exopodite unsegmented, in form of a stout spine with rounded protuberance on ventral side of base; terminal spine nearly straight, about 3 times as long as basal segment, armed distally with stout spinules on either side. (Fig. 1b, i.)

MALE: Length 0.880 mm. Abdomen relatively longer than in female, and consisting of 5 segments, segment 4 well defined, but small. Furcal rami shorter than in female, 1.3 times as long as wide.

Leg 5: Right leg; basal segment longer than wide (about 2:1); lengths of basal segment and exopodites 1 and 2, 27:35:30 (μ); inner margin of exopodite 1 smooth, but with row of fine hairs; inner lobe of exopodite 2 very prominent, longer than wide, bifurcate at top; exopodite 3 very narrow at base, curved, without spine on outer margin, but with a spine on inner edge. Left leg; lengths of segments, 35:30:41 (μ); exopodite 2 elongate, more than 4 times as long as wide, bearing a small spine on top, with a few hairs on inner margin distally. (Fig. 1j.)

LOCALITY: Brackish-water fish ponds on coastal regions of Tsu and Matsusaka Cities, Mie Prefecture, middle Japan.

HOLOTYPE: Female, and allotype male. Taken from a mullet pond in Yonezu, Tsu City, Mie Prefecture. The type is deposited in the Faculty of Fisheries Collection, Prefectural University of Mie.

VARIATION IN BODY LENGTH: Female 0.856–1.054 mm., male 0.868–0.905 mm.

REMARKS: I found this species in six brack-

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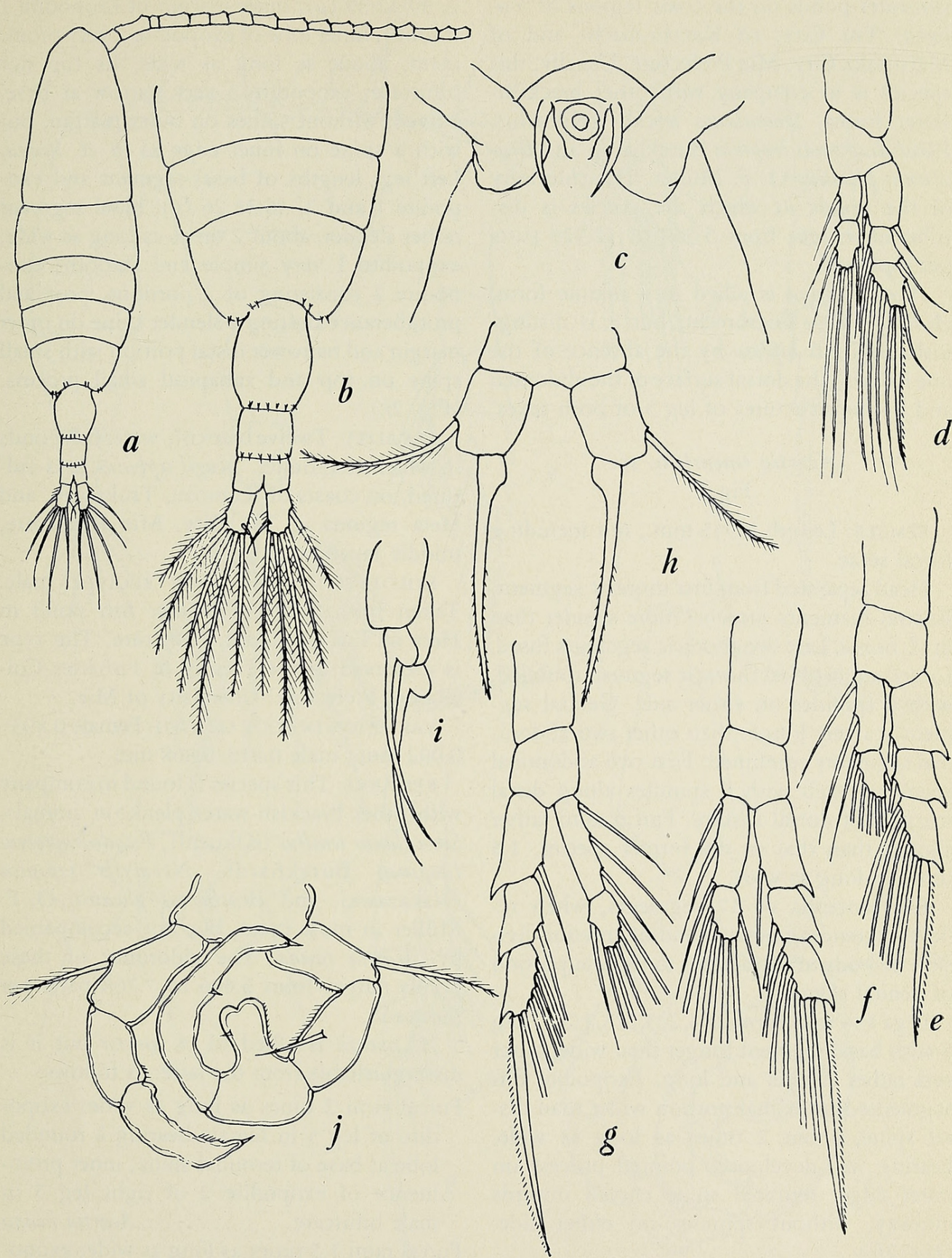


FIG. 1. *Acartia isana* n. sp.: *a*, Dorsal aspect of female; *b*, abdomen and furca (dorsal); *c*, rostrum; *d*–*g*, legs 1–4; *b*, *i*, leg 5 of female, dorsal and lateral; *j*, leg 5 of male.

ish-water ponds on the coast regions of Yonezu, Tsu City, of Karasu-machi and of Matsusaka City, Mie Prefecture. Usually, this species is in company with other brackish-water forms, *Sinocalanus tenellus* (Kikuchi), *Pseudodiaptomus inopinus* Burckhardt, and *Brachionus plicatilis* O. F. Müller. The chlorinity of the ponds in which the species is distributed, ranges from 5.560 to 12.928 parts per thousand.

Acartia iseana is allied to a marine form, *Acartia bifilosa* Giesbrecht, but it is distinguishable from *bifilosa* by the absence of the fine hairs on the dorsal surface of the abdomen and by the structures of leg 5 of both sexes.

Acartia tsuensis n. sp.

Fig. 2

FEMALE: Length 0.943 mm., not including furcal setae.

Head separated from first thoracic segment. Rostral filaments present, more slender than in *A. iseana*. Last two thoracic segments fused. Lateral angle of last thoracic segment rounded, with 6 spinules on either side. Genital segment scarcely longer than other two abdominal segments combined. First two abdominal segments each with 6 spinules along distal margins of dorsal surface. Furcal rami rather shorter than that of the former species, 1.5 times as long as wide.

First antenna of 17 segments, when reflexed extending beyond end of anterior division of body and reaching to middle portion of genital segment.

Legs 1-4 with formula 3,2/3,2/3,2/3,2. Leg 5 with basal segment longer than wide, outer seta rather slender and long. Exopodite unsegmented, proximal portion wider than distal spine, about 2 times as long as wide, bearing well-developed, pointed process on outer edge; terminal spine curved inwards midway, without spinules on either side. (Fig. 2*b*.)

MALE: Length 0.843 mm. Leg 5: Right leg; basal segment longer than wide (about 2:1); lengths of basal segment and exopodite 1 and

2, 39:42:39 (μ); inner margin of exopodite 1 smooth; inner lobe of exopodite 2 very prominent, about as long as wide, its top not bifurcate; exopodite 3 very narrow at base, curved, without spines on outer margin, but with a spine on inner edge as in *A. iseana*. Left leg; lengths of basal segment and exopodite 1 and 2, 46:31:26 (μ); basal segment rather slender, about 2 times as long as wide; exopodite 1 very simple and smooth; exopodite 2 consisting of 2 portions, proximal protuberance bearing a slender spine on inner margin and narrower distal portion with small spine on top and subapical small process. (Fig. 2*i*.)

LOCALITY: Twelve brackish-water fish ponds in which the mullet, *Mugil cephalus* L. is cultured, on coasts of Kumozu, Tsukaigan, and Heta regions in Tsu City, Mie Prefecture, middle Japan.

HOLOTYPE: Female, and allotype male. Taken from a brackish-water fish pond in Heta of Tsu City, Mie Prefecture. The type is preserved in the Faculty of Fisheries Collection, Prefectural University of Mie.

VARIATION IN BODY LENGTH: Female 0.893-0.992 mm., male 0.818-0.868 mm.

REMARKS: This species is found in company with other brackish-water plankton animals, *Sinocalanus tenellus* (Kikuchi), *Pseudodiaptomus inopinus* Burckhardt, *Neomysis japonica* (Nakazawa), and *Brachionus plicatilis* O. F. Müller in most cases, but not accompanied by *Acartia iseana*. The chlorinity of these ponds ranges from 6.696 to 7.768 parts per thousand.

A. tsuensis is allied to *A. iseana* but it is distinguishable from the latter as follows:

Furcal rami 2 times as long as wide; exopodite of leg 5 in female bearing a rounded lobe at base of terminal spine; inner prominence of exopodite 2 of right leg 5 in male bifurcate.	<i>Acartia iseana</i>
Furcal rami 1.5 times as long as wide; exopodite of leg 5 in female with a pointed process; inner prominence of right leg 5 in male rounded.	<i>Acartia tsuensis</i>

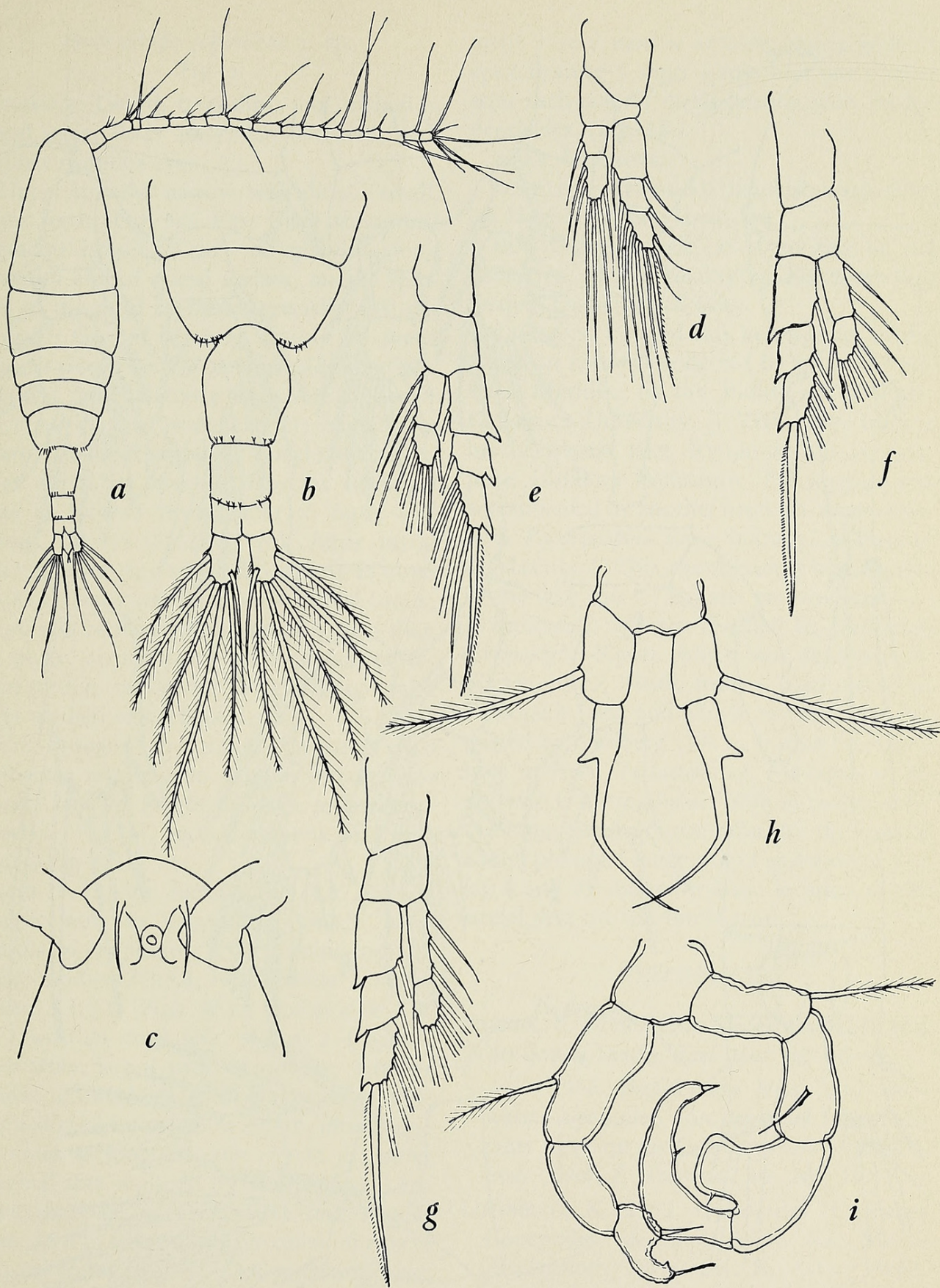


FIG. 2. *Acartia tsuensis* n. sp.: *a*, Dorsal aspect of female; *b*, abdomen and furca (dorsal); *c*, rostrum; *d*–*g*, legs 1–4; *h*, leg 5 of female; *i*, leg 5 of male.

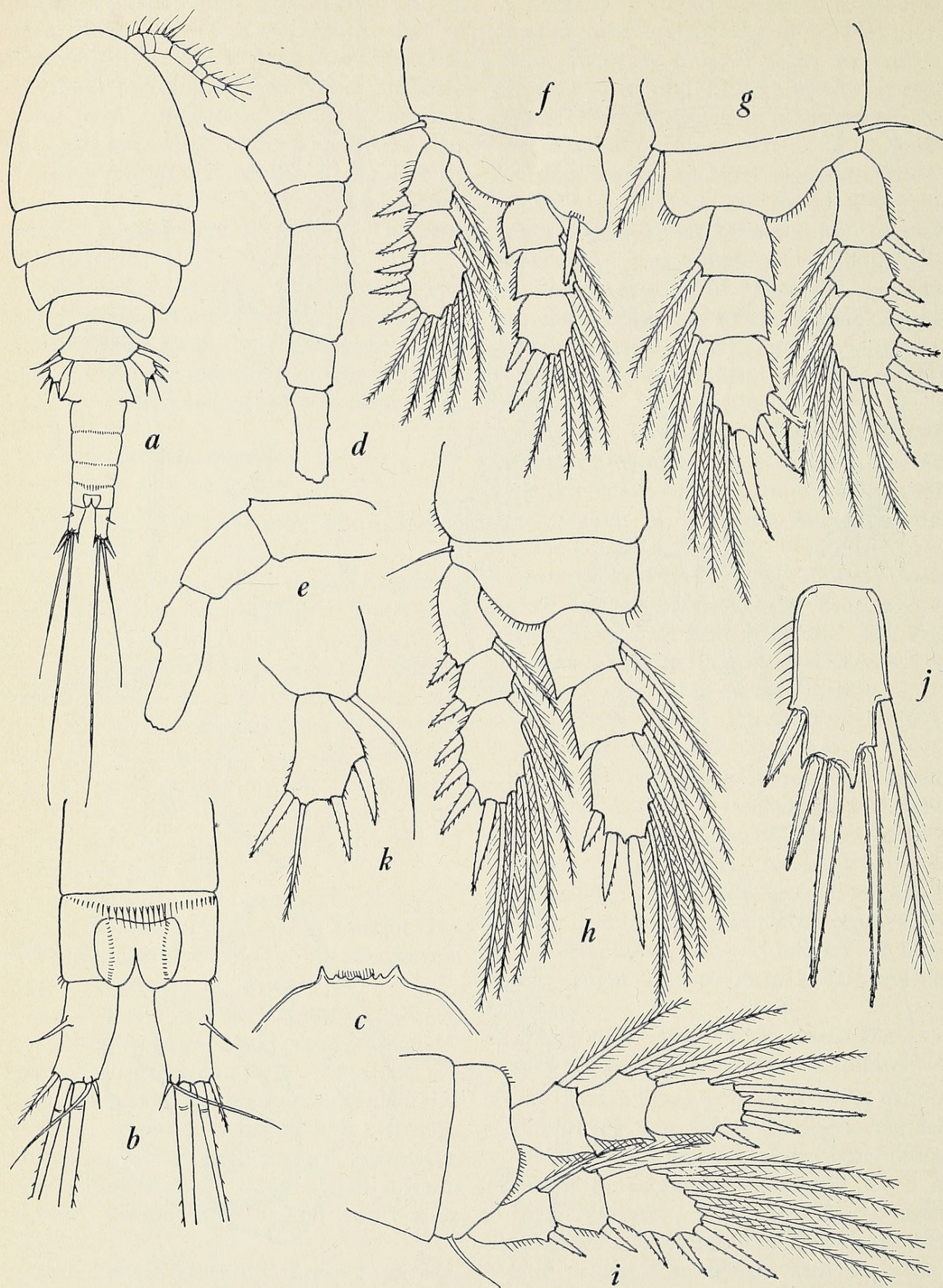


FIG. 3. *Halicyclops japonicus* n. sp.: a, Dorsal aspect of female; b, abdomen and furca (dorsal); c, upper lip; d, e, first and second antennae; f-i, legs 1-4; j, endopodite 3 of leg 4, k, leg 5.



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