Calanoid Copepods Collected from the Near-bottom in Tanabe Bay on the Pacific Coast of the Middle Honshu, Japan. II. Arietellidae (cont.)

By

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With Text-figures 1–12 and Tables 1–3

The present paper deals with the description of two new species of *Paramisophria* and *Metacalanus* (Family Arietellidae) as the second report from my serial taxonomic works concerning the near-bottom calanoid copepods from Tanabe Bay on the Pacific coast of Honshu, Japan. With respect to the genus *Metacalanus*, this is the second report from Tanabe Bay since *M. acutioperculum* Ohtsuka, 1984 has already been described by me (Ohtsuka, 1984).

The sampling area, bottom topography, sampling technique, and laboratory procedure have been described in the previous paper (Ohtsuka, 1984). In addition to the sledge-type net, an ordinary conical net was employed. When towing the net from the shore to collect near-bottom calanoids, a weight of 0.69 kg was attached to the center of its mouth. The substrate near the shore was pebbly. An adult female of *Paramisophria* was found in a night neuston sample collected above a depth of 15 cm at the same locality.

In order to clarify the taxonomic status of the *Paramisophria* species from Tanabe Bay, I examined two adult females of *Paramisophria* which had previously been reported by Tanaka (1966) as *P. cluthae* Scott, 1897, from Kyushu, southwestern Japan. However, the specimens loaned by Dr. Tanaka for the present study were badly damaged, and it was unable to measure their precise body length. Hence, the body length of Tanaka's *P. cluthae* indicated in Table 2 is based on Tanaka's report (Tanaka, op. cit., p. 45).

The type-series are deposited in the Seto Marine Biological Laboratory, Kyoto University.

Before going further, I would like to express my sincere thanks to Dr. T. Itô of Kyoto University for his encouragements and reading the manuscript. I am most grateful to Dr. O. Tanaka, and Dr. S. Nishida of Tokyo University for the loan of the specimens of *Paramisophria*.

Paramisophria itoi n. sp.

(Figs 1–8)

Materials examined. An adult female dissected was designated as the holotype. An adult male

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dissected was designated as the allotype. Two dissected and an intact adult females were designated as paratypes. Type locality: Tanabe Bay. The holotypic female was obtained by the sledgenet (23–V–1983, night, 5 m deep). The allotypic male was found out in a near-surface sample collected near the shore by the ordinary conical net (24–XI–1984, night). Two paratypic females, one of which was intact and the other was dissected, were collected near the shore with the weighted conical net (12–II–1985, day; 6–IV–1985, day). Another paratypic female was obtained in a night neuston sample (26–VI–1983, 15 cm deep).

Female (holotype). Body (Fig. 1–A, B) 1.61 mm long, rather compact. Prosome, in dorsal view, oval in outline. Cephalosome considerably vaulted, producing anteriorly and forming a rostrum which is directed downwards and bears a pair of fine filaments. Fourth and 5th metasomal segments completely fused together; last metasomal segment forming a pair of sharp processes on its dorsoposterior rim and ending in a rounded lobe bilaterally. Urosome (Fig. 1–C) 4-segmented, very short and scarecely exceeding two-fifths the length of prosome; genital segment as long as 2nd and 3rd urosomal segments combined; anal segment very small. Caudal ramus considerably broadened and flattened dorsoventrally, furnished with four setae and one setula on the terminal and one seta on the subterminal. Both outer and inner margins fringed with minute hairs. Antennule. Aesthetascs much slenderer than in male. Both antennules composed of 21 segments, furnished with stout hairs along inner margins of 1st to 8th segments. Right antennule (Fig. 1–D) slightly longer than the left one (Fig. 1–E). Antenna (Fig. 2–A, B, C). Basipodite bearing a minute seta on its distal edge close to the base of endopodite. Endopodite consisting of two elongate segments, the apical segment about 0.7 times as long as the proxoimal segment; the proximal segment with a setula which arises from a point at distal a quarter of the length of the anterior margin and does not reach the distal end of the segment; the apical segment with three setae of unequal lengths on the middle of the anterior margin, and one short and five long setae apically. Each endopodite segment furnished with numerous fine spinules on one side of the surface (see Fig. 2–B). Exopodite 6-segmented, first three segments almost fused; 3rd, 4th and 5th segments carrying 1, 2 and 1 seta, respectively; terminal segment with a medial seta and two terminal setae of an equal length. Mandible (Fig. 2–D, E) with gnathal lobe heavily chitinized, bearing four cuspate teeth and three rows of spiniform setae on the surface. Basipodite furnished with a hairy row on inner margin and very fine spinules on outer margin; one plumose and one minute seta present on the inner distal end. Endopodite wanting. Exopodite 5-segmented; each segment bearing 1, 1, 1, 1 and 2 plumose setae. Maxillula (Fig. 2–G). Gnathobase (1st inner lobe) with four stout spines and one short process; 2nd inner lobe with no setae; outer lobe bearing eight plumose setae of unequal lengths. Endopodite bulb-like, with two minute setae of unequal lengths terminally. Exopodite leaf-like, with three plumose setae on the tip. Maxilla (Fig. 3–A) with six lobes on the basal segments; 1st lobe with one seta; 2nd lobe carrying two setae of unequal lengths; 3rd and 4th lobes each bearing two spinulose setae; 5th lobe furnished with a large naked spine; 6th lobe with a serrated strong seta. Endopodite 3-segmented; 1st segment with one minute serrate and two serrated strong setae; 2nd and 3rd

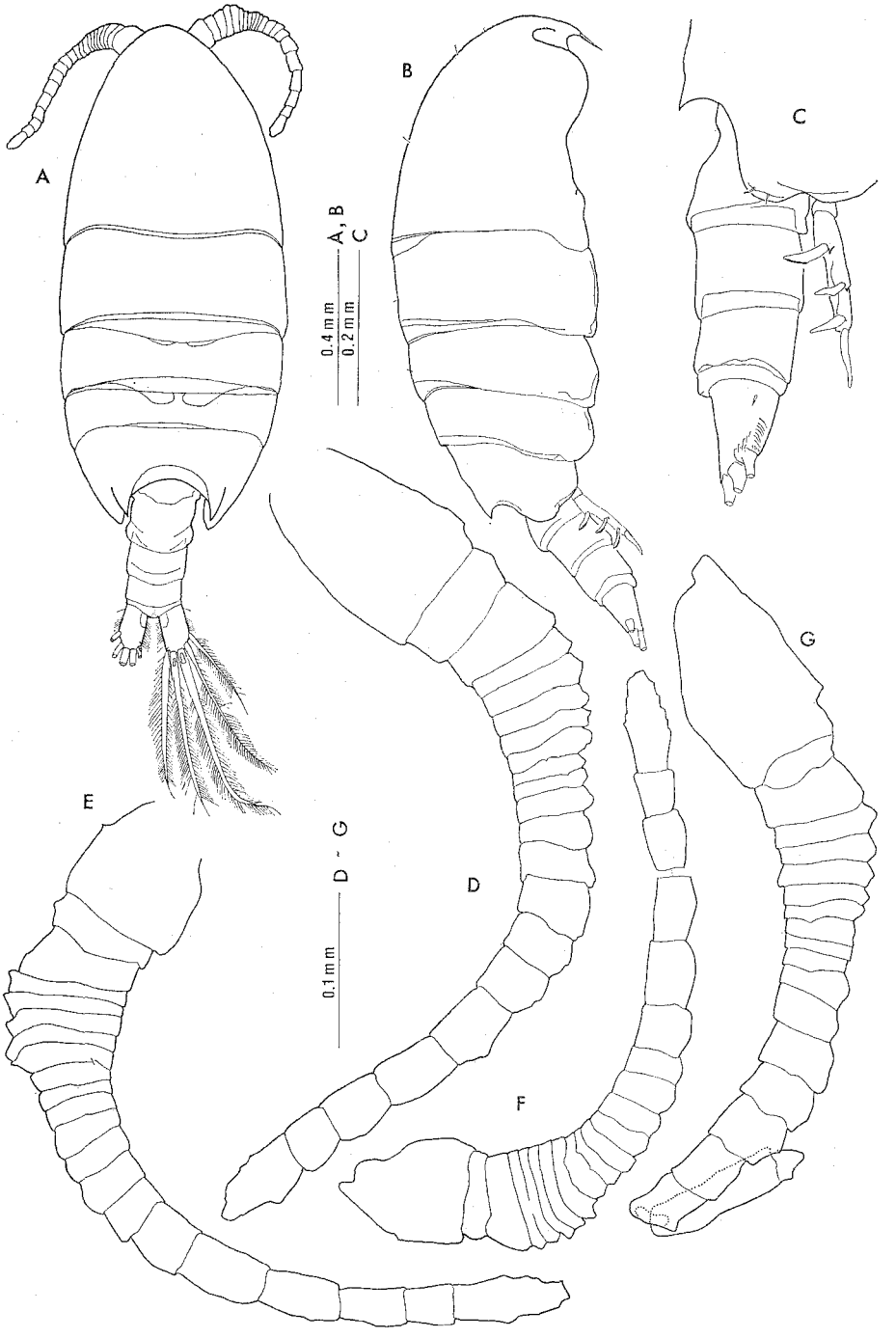

Fig. 1. *Paramisophria itoi* n. sp. Female (A-E. holotype); Male (F-G. allotype). A. habitus, dorsal view; B. habitus, lateral view; C. urosome, lateral view. D. right antennule; E. left antennule; F. right antennule; G. left antennule. All setae and aesthetascs of antennule omitted.

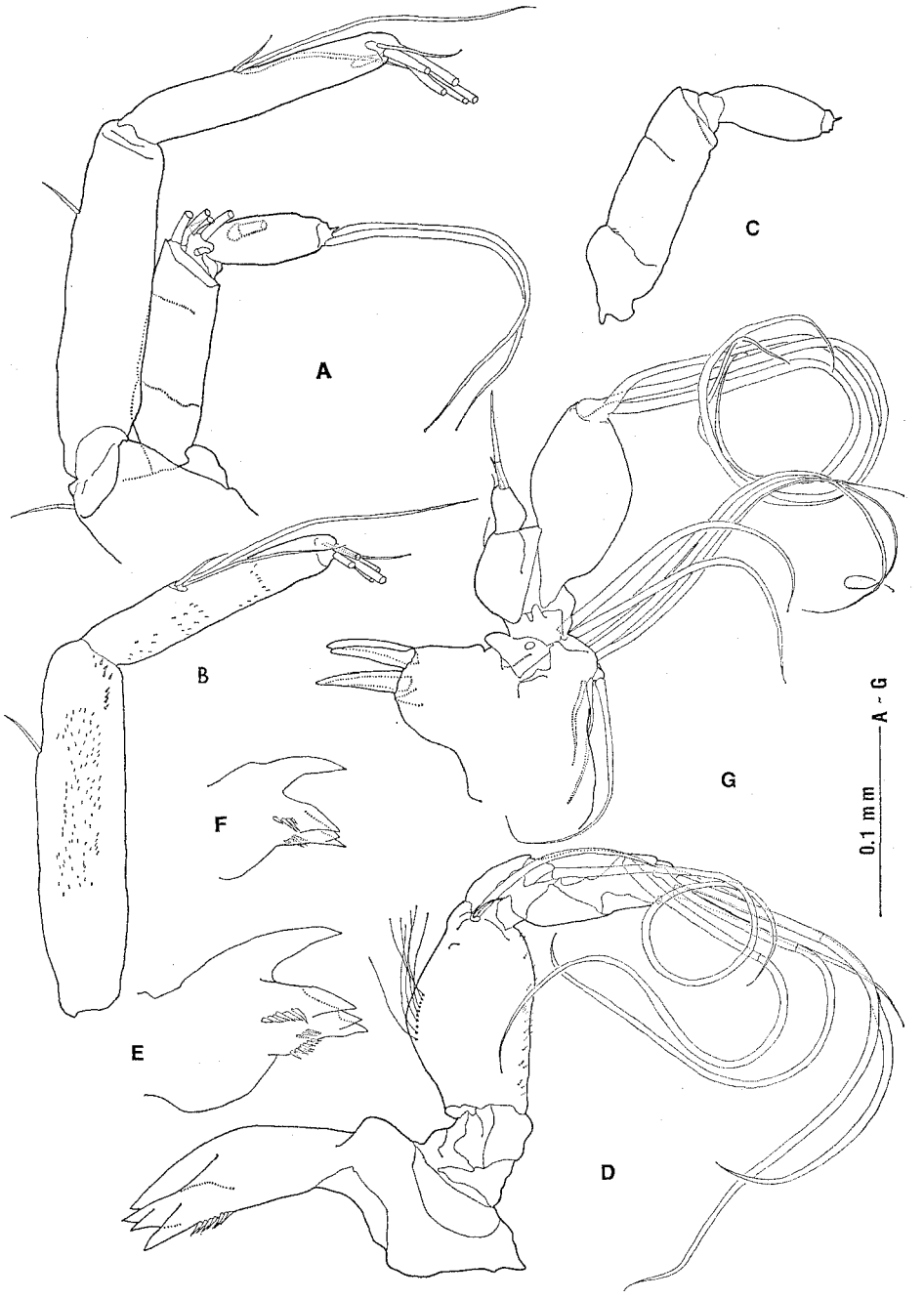

Fig. 2. *Paramisophria itoi* n. sp. Female (A-E, G. holotype); Male (F. allotype). A. antenna; B. endopodite of antenna; C. exopodite of antenna; D. mandible; E. mandibular cutting edge; F. mandibular cutting edge; G. maxillula

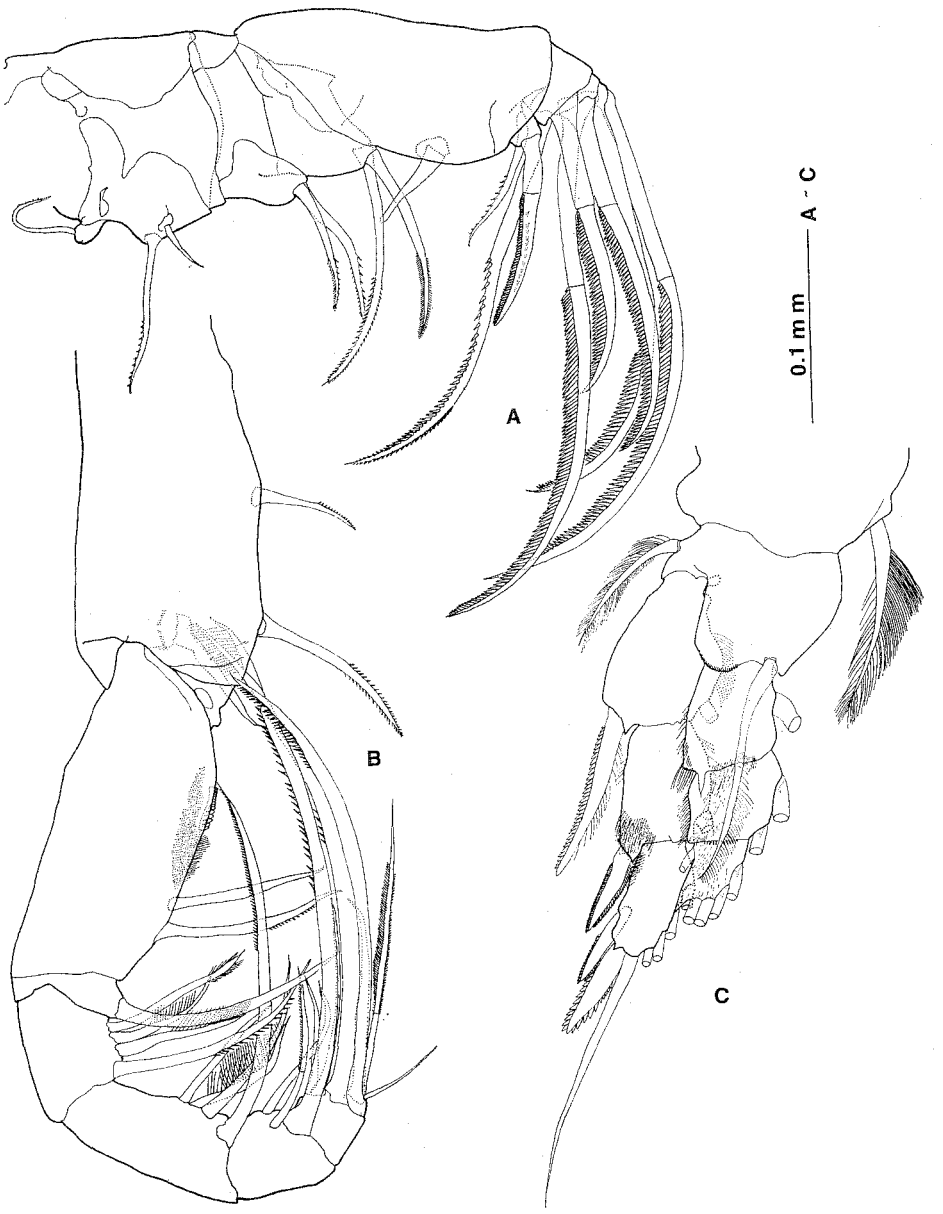

Fig. 3. *Paramisophria itoi* n. sp. Female (holotype). A. maxilla; B. maxilliped; C. leg 1, anterior surface.

segments each carrying two serrated strong setae. Maxilliped (Fig. 3–B) powerfully developed, 7-segmented, two basal segments very elongated. Basipodite 1 armed with two inner spinulose setae, one of which is located medially and the other is located subapically, and one anterior spine present near the distal end. Basipodite 2 with two setae at a distal third and one serrate seta distally; a row of "teeth"

present at a proximal third, around which stout hairs covers densely. First, 2nd, 3rd, 4th, and 5th endopodite segments bearing 1, 1, 1, 1, and 2 serrate setae and 3, 3, 2, 2, and 2 non-serrated setae, respectively; the terminal endopodite segment carrying three kinds of setae, namely, one naked, one spinulose and two serrated setae. Legs 1 to 4 composed of 3-segmented exopodite and 3-segmented endopodite. Leg 1 (Fig. 3–C) with basipodite 1 bearing a large plumose seta on the middle of the inner margin, and basipodite 2 carrying a plumose seta on the middle of the outer margin and a large plumose seta near the inner base of endopodite. Distal angle of basipodite 2 near the outer base of endopodite furnished with fine teeth as that of 2nd

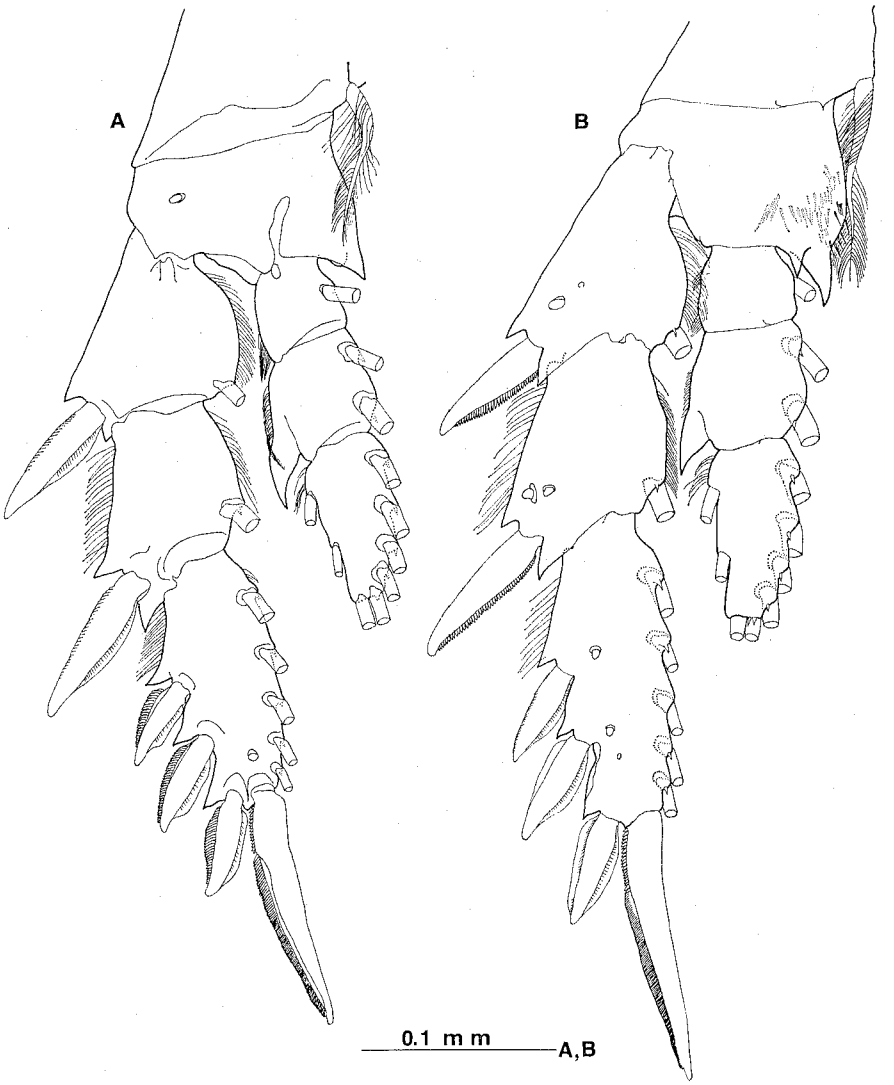

Fig. 4. *Paramisophria itoi* n. sp. Female (holotype). A. leg 2, posterior surface; B. leg 3, anterior surface.

endopodite segment. First exopodite segment with a large serrated spine on outer distal end. Endopodite: 1st segment bearing hairs on the distal margin; 2nd and 3rd segments covered with fine hairs on the anterior surface; the outer distal angle of 3rd segment produced into an acute process. Leg 2 (Fig. 4–A) with broadened basipodite segments; basipodite 1 carrying a plumose seta on the inner distal angle; basipodite 2 with no seta, and produced into an acute process and forming a semi-globular protrusion on the inner distal end. Second endopodite segment with a

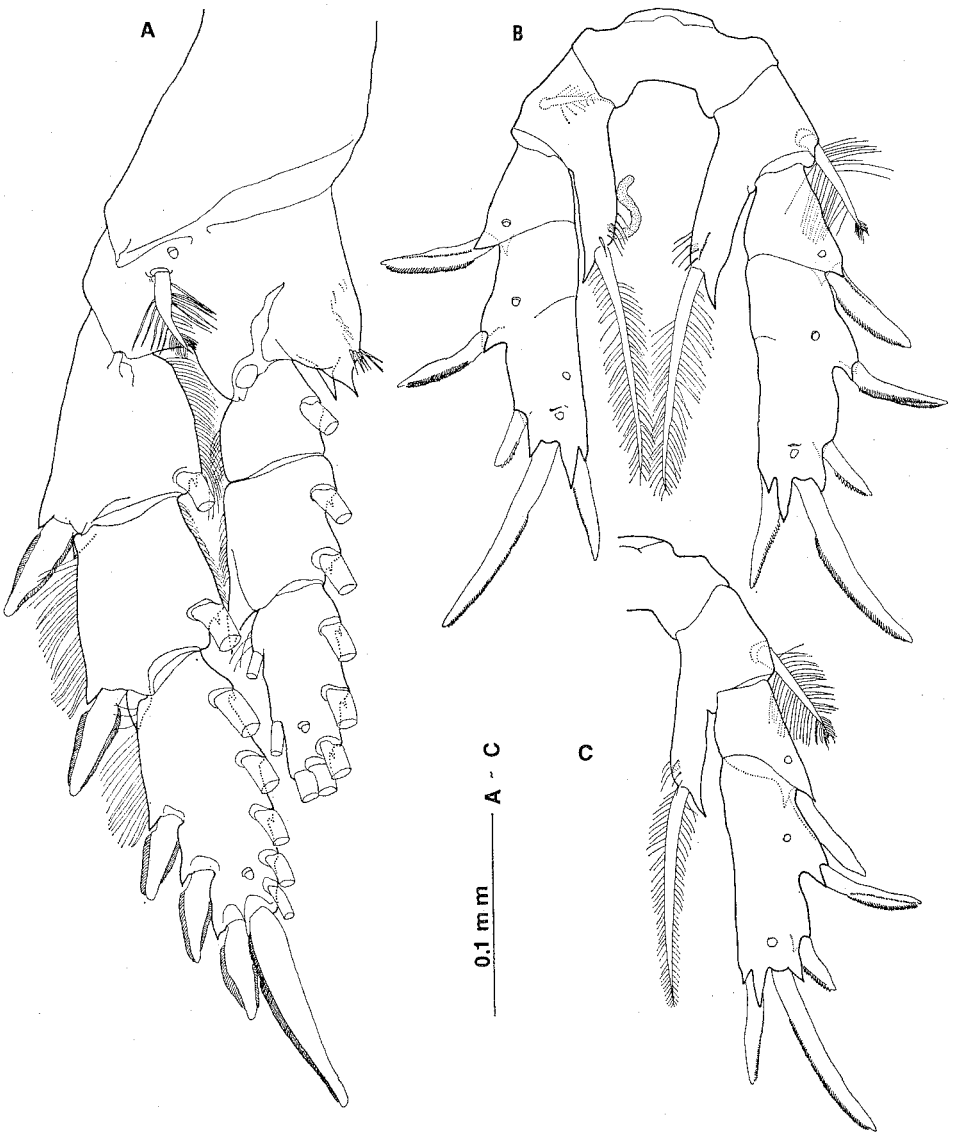

Fig. 5. *Paramisophria itoi* n. sp. Female (A-B. holotype; C. paratype). A. leg. 4, posterior surface; B. leg 5, anterior surface; C. right leg 5, anterior surface.

large acute process arising from the outer margin. Leg 3 (Fig. 4–B) similar to leg 2, but there are a few differences as follows: basipodite 2 with two acute processes of unequal sizes on its inner distal angle and stout hairs on anterior and posterior surfaces near the inner margin. Leg 4 (Fig. 5–A) with broadened basipodite 2, which has a plumose short seta on the posterior face, bears hairs around the distal half of the inner margin, and forms two acute processes of unequal sizes on its inner distal angle as that of leg 3. The seta and spine formula of legs 1 to 4 is shown in Table 1. Leg 5 (Figs 5–B, 8–A, B) nearly symmetrical, consisting of two segments in both legs with a common basipodite 1. The inner projection of basipodite 2 apically ending in an acute process accompanied with a large inner seta which is plumose and reaches the end of exopodite; hairs present near the base of the plumose seta; an opening of gland located near the inner distal end. Right basipodite 2 carrying a short and thick plumose seta, while the left bearing a small plumose seta on the middle of the posterior surface. Terminal segment fully twice as long as the other segments combined, furnished with three serrated strong spines on the outer margin and with two spines of unequal lengths and three processes on the tip. The inner margin of the segment comparatively smooth. Two superficial lines of fusion placed at a level of proximal a quarter of the length and on about the middle of the segment; these lines correspond to the distal limits of 1st and 2nd exopodite segments.

Male (allotype). Body (Fig. 6–A, B) 1.30 mm long, slenderer than the female. Urosome 5-segmented. Antennule. Aesthetascs much thicker and longer than the counterparts of the female. Right antennule (Fig. 1–F) composed of 21 segments, with long stout hairs on the inner margin of first eight segments. Fourth and 5th segments partly fused together. Left antennule (Fig. 1–G) consisting of 19 segments, modified to a poorly developed grasping organ, with long stout hairs on the inner margin of first two segments. Two free segments present distal to the articulation. Antenna, mandible, maxillula, maxilla, maxilliped and legs 1 to 4 accord with those of the female in shape and armature but smaller in size. Mandibular cutting edge in male shown in Fig. 2–F. Leg 5 (Figs 6–C, 7–A, B) asymmetrical, with a common basipodite 1. The left leg, the basipodite 1 disregarded, 4-segmented; basipodite 2 possessing a small bulbous rudimentary endopodite on the middle of the inner margin

Table 1. Seta and spine formula of legs 1 to 4 of *Paramisophria itoi*. Setae are represented by Arabic and spines by Roman numerals. Si=inner border of segment; St=terminal border of segment; Se=outer border of segment.

	basipodite				endopodite							exopodite						
	1		2		1		2		3			1		2		3		
	Si	Se	Si	Se	Si	Se	Si	Se	Si	St	Se	Si	Se	Si	Se	Si	St	Se
leg 1	1	0	1	1	1	0	2	0	3	1	1	1	I	1	I	4	1	II
leg 2	1	0	0	0	1	0	2	0	4	2	2	1	I	1	I	5	I	III
leg 3	1	0	0	0	1	0	2	0	4	2	2	1	I	1	I	5	I	III
leg 4	0	0	0	1	1	0	2	0	3	2	2	1	I	1	I	5	I	III

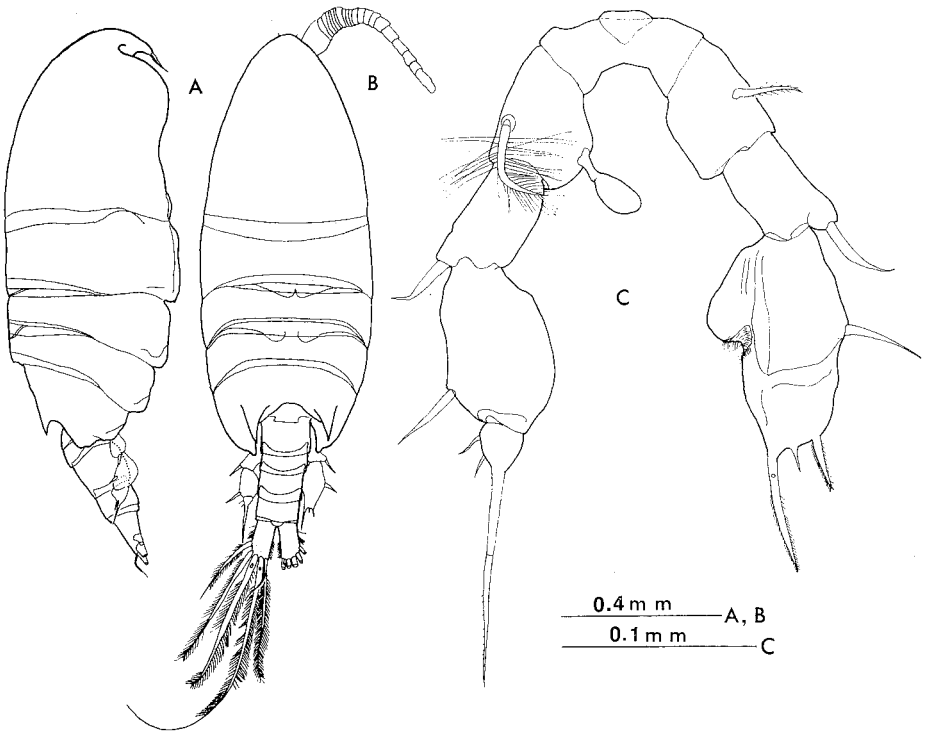

Fig. 6. *Paramisophria itoi* n. sp. Male (allotype). A. habitus, lateral view; B. habitus, dorsal view; C. leg 5, posterior surface.

and bearing a large plumose seta on about the middle of the outer margin; 1st exopodite segment bearing a seta on the outer distal end; 2nd exopodite segment considerably flattened, with a seta on a point at a distal third the length of the outer margin; last exopodite segment very small, with two naked setulae on the outer margin and one large apical seta whose base is not articulate. The right leg, the fused basipoidte 1 disregarded, 3-segmented; basipodite 2 with a small plumose seta on the posterior surface near the outer edge; proximal exopodite segment bearing a seta on the outer distal angle; apical segment probably consisting of two fused segments, very large and lamellarly expanded, with a seta on the middle of the outer margin and a hollow furnished with numerous minute hairs at the middle of the inner margin, and armed with three setae of unequal lengths apically.

Variation. In the females, the number of the inner "teeth" on the basipodite 2 of the maxilliped varies from 9 to 14; the male has 7 or 8 inner "teeth" on it. One paratype female (26–VI–1983) has two pointed processes on the inner distal angle of the basipodite 2 in both legs 2, while the other paratype female (6–IV–1985) has two pointed processes in the left leg 2 and is the same in the right leg 2 as in the holotype; the allotypic male is the same in both legs 2 as in the holotype. The first paratype is slightly different in leg 5 from the holotype: leg 5 has far clearer fusion

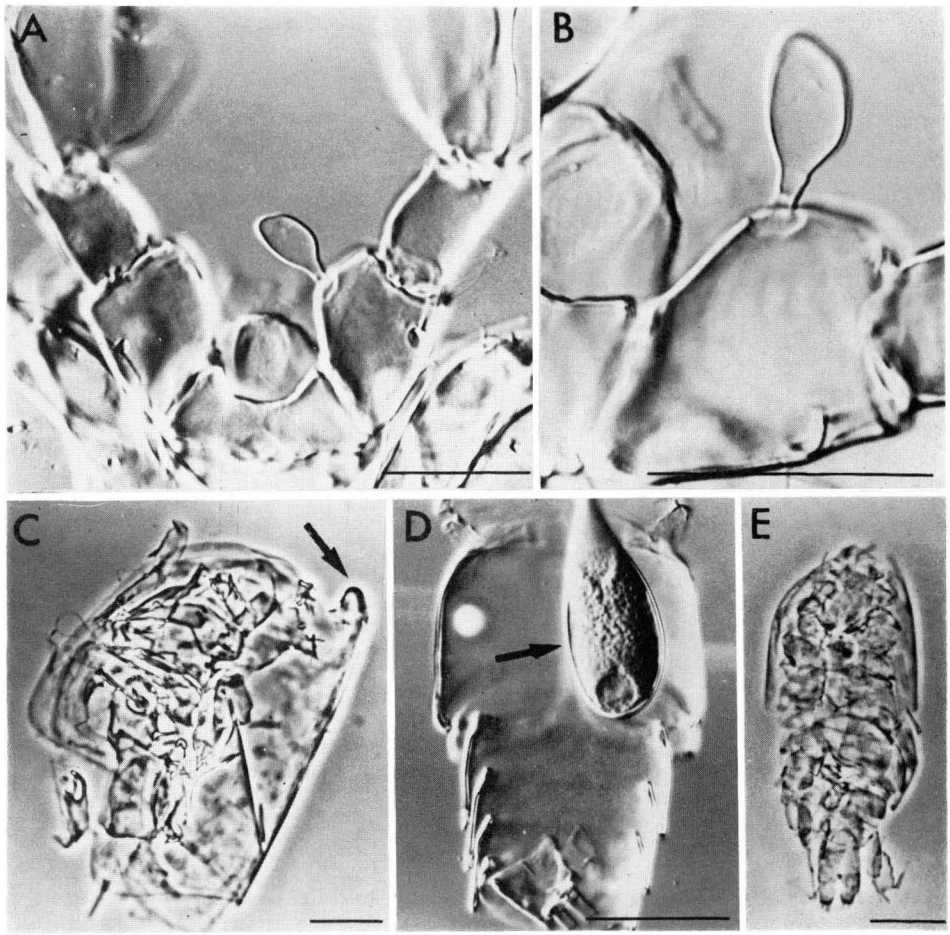

Fig. 7. *Paramisophria itoi* n. sp. (A-B. leg 5 of the allotypic male; C-D. food organisms in gut of the holotypic female; E. food organism in gut of the allotypic male). A. basal segments and 1st exopodite segment of leg 5; B. endopodite of leg 5; C. cephalosome of prey copepod (rostrum indicated by an arrow); D. urosome of a prey harpacticoid or cyclopoid copepod (spermatophore of the copepod indicated by an arrow); E. small prey copepod. All scale bars=0.05 mm

line at the level of a quarter the length of the terminal segment than in the holotype. However, the second fusion line is not visible at all. The second paratype has two weak fusion lines on both legs as in the holotype.

Remarks. Up to the present the genus *Paramisophria* has accomodated two species, *P. cluthae* Scott, 1897, and *P. ammophila* Fosshagen, 1968. This new species is easily distinguished in male leg 5 from these two known species: the right exopodite consisting of two segments. In contrast to the male, the female is similar to the other species. Table 2 shows main differences between three congeneric species. One of the most distinctive characters in the female from Tanabe Bay is the presence of the fusion lines on the surface of the exopodite of the leg 5.

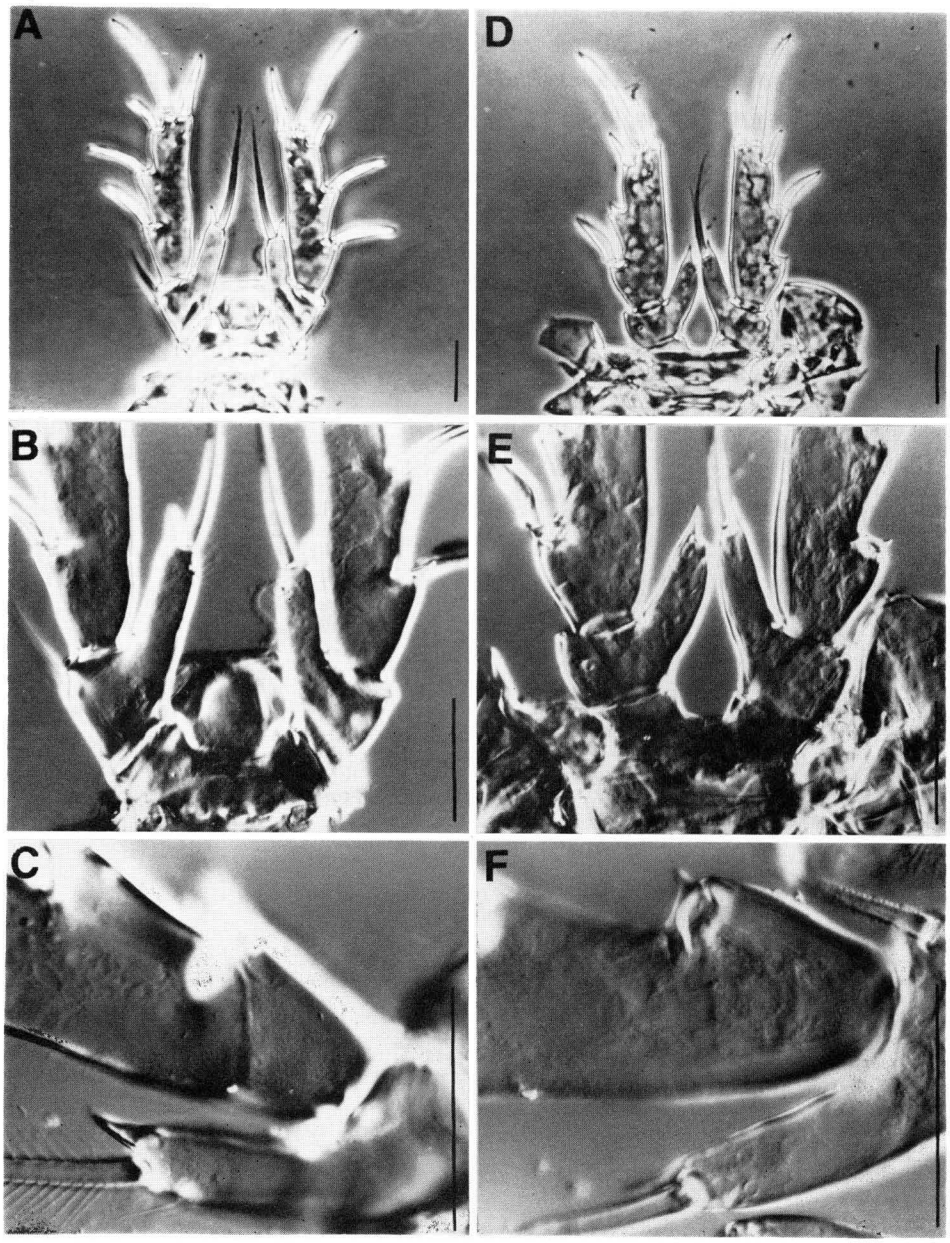

Fig. 8. Comparison of legs 5 of females (A-B. *Paramisophria itoi*, holotype; C. *P. itoi*, paratype; D-F. *P. cluthae* sensu Tanaka). A. leg 5; B. inner process of basipodite 2; C. line of fusion at a level of a quarter of the length of exopodite segment; D. leg 5 (right 1st and left 2nd lateral spines broken); E. inner process of basipodite 2; F. counterpart of Fig. 8-C. All scale bars=0.05 mm.

When the new species is compared with *P. cluthae* sensu Tanaka (1966) formerly reported from Japan, many differences would be found between them (see Fig. 8). The new species differs from Tanaka's *P. cluthae* in: larger subdorsal process on the last metasomal segment, the presence of "teeth" on the inner margin of the basipodite 2 of the maxilliped, the legs 1, 3 and 4 with hairs on their surfaces, the leg 5 with the outer distal end of the basipodite 1 which is not produced and with the inner processes slightly slenderer, and the inner margin of the exopodite of the leg 5 which is not slightly convex but straight. As shown in Table 2, Tanaka's materials differ from *P. cluthae* described by Scott (1897) in some characteristics of mandible and maxillula, as pointed out by Fosshagen (1968).

Table 2. Comparison of three species within the genus *Paramisophria*

Characters	*P. itoi*	*P. cluthae*	*P. ammophila*	*P. cluthae* sensu Tanaka
Body				
body length (mm) (female)	1.61 (holotype)	1.20	1.21–1.39 (average=1.28, N=18)	1.59
body length (mm) (male)	1.30 (allotype)	1.10	1.08–1.18 (average=1.10, N=10)	—
Antenna				
No. of segments of exopodite	6 (1st three segments almost fused)	6	4	6 (1st three segments almost fused)
Mandible				
a small tooth on base of most prominent tooth of cutting edge	absent	present	present	absent (a small protuberance)
Maxillula				
No. of spines on gnathobase	4	5	4	4
No. of setae on outer lobe	8	7	8	8
Maxilliped				
a row of teeth on inner margin of basipodite 2	present	absent	—	absent
Leg 1				
hairs on exopodite and endpodite	present	absent	—	absent
Legs 3 and 4				
hairs on basipodite 2	present	absent	—	absent
Leg 5 (female)				
fusion line of exopodite	present	absent	absent	absent
Leg 5 (male)				
endopodite	present	absent	present	—
fusion between penultimate and terminal segments of right leg	fused	separate	separate	—

An adult female and adult male of this near-bottom species were collected from the near-surface at night (26–VI–1983; 24–XI–1984). A certain species of the family Pseudocylcopidae, that is known to consist of bottom-living species (Bowman & González, 1961), was also collected near the surface at night in Tanabe Bay (Ohtsuka, unpublished). As already pointed out by Damkaer (1971), it is likely that some near-bottom calanoid copepods move upward at night, at least, in the shallow water.

As far as based on the structures of the oral appendages as well as gut contents, *P. itoi* seems to be a carnivore. A part of food organisms in the gut of the holotypic female is shown in Fig. 7 (C and D). Fig. 7–E shows a part of food organisms of the allotypic male. Both the female and male preyed on copepodids.

This species is named in honor of Dr. T. Itô of the Seto Marine Biological Laboratory, Kyoto University.

Metacalanus curvirostris n. sp.

(Figs 9–12)

Material examined. An adult female dissected was designated as the holotype. An adult male dissected was designated as the allotype. Type locality: Tanabe Bay. The holotypic female and allotypic male were collected by the sledge-type net (26–VI–1983, day, 8 m deep; 17–I–1982, day, depth not measured).

Female (holotype). Body (Fig. 9–A, B) 1.19 mm long. Prosome, viewed dorsally, egg-shaped, approximately twice as long as wide, posteriorly ending into a round process bilaterally. Rostrum (Fig. 9–C) directed backwards, curved sharply to the left side, with a pair of long filaments. First metasomal segment separated from cephalosome; 4th and 5th metasomal segments fused, with no line of fusion. Urosome 4-segmented, less than a quarter of the length of prosome. Genital segment (Fig. 9–D) very tumified ventrolaterally, with seminal receptacle of complex structure. Third and 4th urosomal segment subequal in length. Anal segment very small with a rounded anal operculum. Caudal ramus longer than wide, with two terminal and two subterminal setae and one setula at the base of the innermost terminal seta, and furnished with fine hairs along the inner margin. Antennule asymmetrical. Right antennule (Fig. 9–F) 19-segmneted, 8th and 9th segments partly fused together. Left antennule (Fig. 9–E) 18-segmented, 1st and 2nd, and 8th and 9th segments partly fused. Left antennule longer than the right one. Antenna (Fig. 10–A). Basipodite with one anterior distal seta. Endopodite 2-segmented; proximal segment with no seta, apical one with two setae of unequal lengths medially and five setae apically. Exopodite 6-segmented; 2nd and 5th segments each bearing one seta; terminal segment carrying a medial seta and two terminal setae. Mandible (Fig. 9–B). The cutting edge of the gnathal lobe furnished with four teeth, of which the posteriormost one apically forms itself into three points. Palpus rudimental. Basipodite with a row of hairs along the middle of the inner margin and one seta near the distal end. Endopodite wanting. Exopodite 5-segmented; proximal four

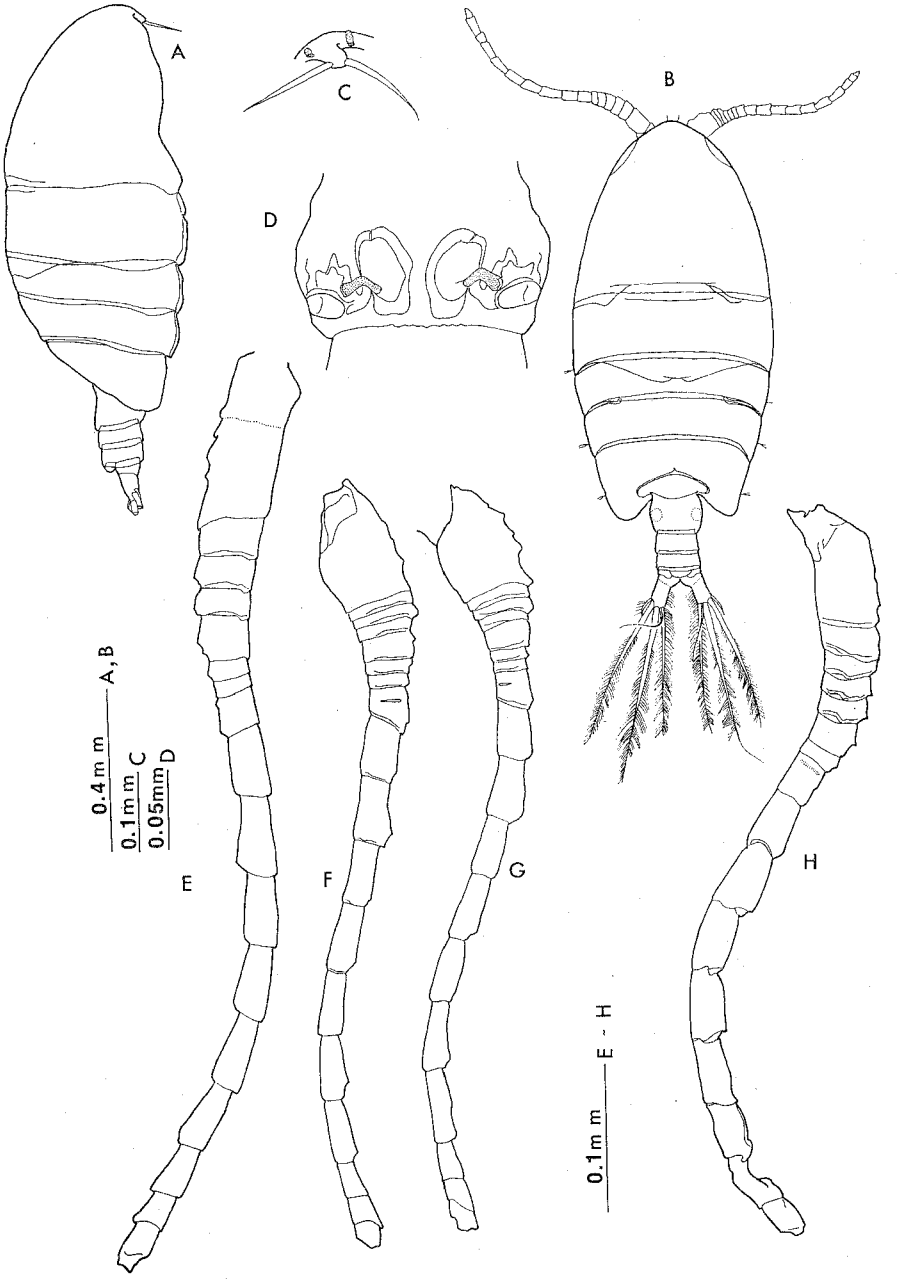

Fig. 9. *Metacalanus curvirostris* n. sp. Female (A-F. holotype); Male (G-H. allotype). A. habitus, lateral view; B. habitus, dorsal view; C. rostrum; D. genital segment showing seminal receptacle, ventral view; E. left antennule; F. right antennule; G. right antennule; H. left antennule. All setae and aesthetascs of antennule omitted.

Fig. 10. *Metacalanus curvirostris* n. sp. Female (holotype). A. antenna; B. mandible; C. maxillula; D. maxilla; E. maxilliped.

segments each bearing one seta; terminal segment with two setae of unequal lengths. Maxillula (Fig. 10-C) rudimentary. First inner lobe (gnathobase) bearing numerous fine hairs, but neither setae nor spines. Second inner lobe small, bearing one minute seta apically. Outer lobe with five plumose setae. Endopodite wanting. Exopodite swelling, armed with three plumose setae apically. Maxilla (Fig. 10-D) strongly developed. Basal segments carrying six inner lobes; 1st lobe bearing a plumose seta and four or five minute spinules; 2nd lobe with two setae of unequal lengths; 3rd and 4th lobes each with two spinulose setae; 5th lobe furnished with a large spines with two rows of very minute spinules on its basal half; 6th lobe bearing

one serrated seta. Endopodite 3-segmented; 1st segment with two serrated strong setae and one serrated minute seta; 2nd segment carrying two serrated strong setae; 3rd segment bearing two serrated strong setae. Maxilliped (Fig. 10–E) with 2-segmneted basipodite and 5-segmented endopodite. Basipodite 1 somewhat tumid, with one seta medially and two setae near the inner distal end; the inner distal end

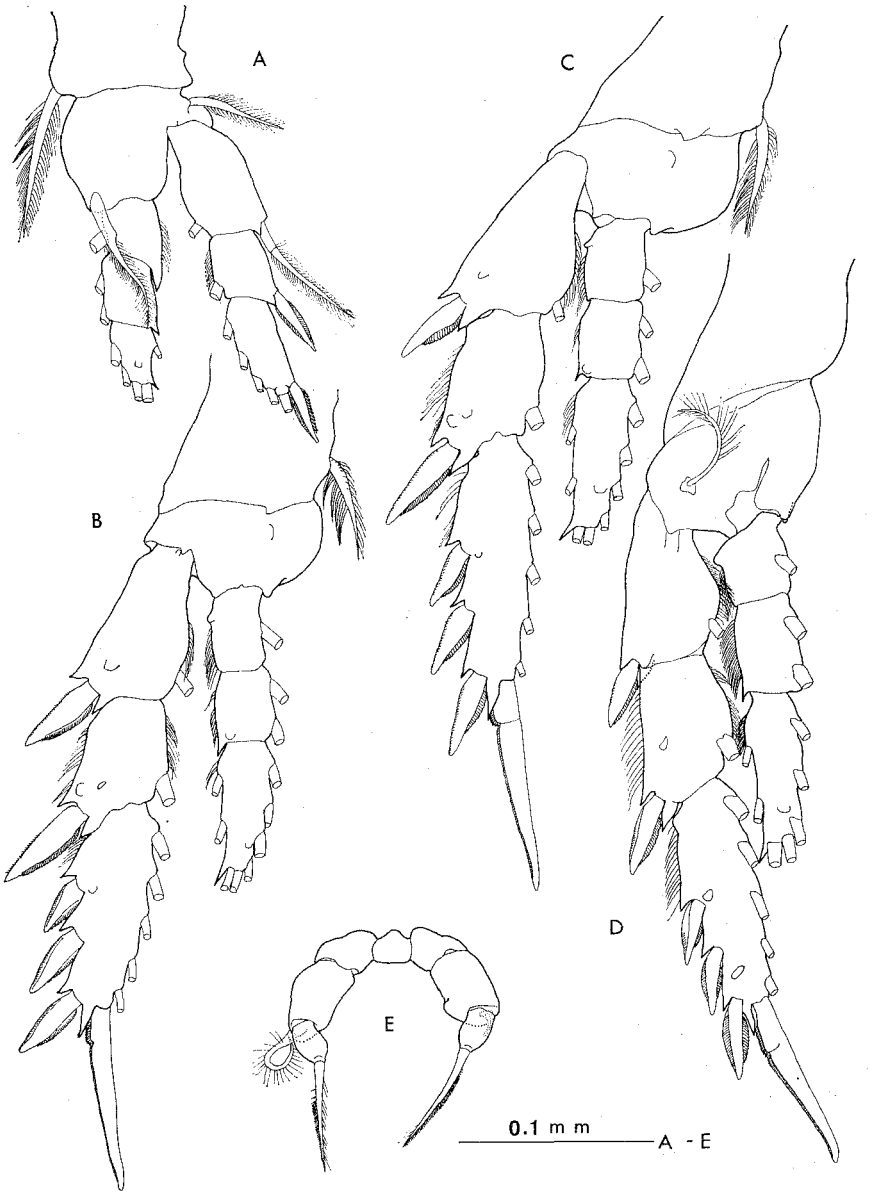

Fig. 11. *Metacalanus curvirostris* n. sp. Female (holotype). A. leg 1, anterior surface; B. leg 2, anterior surface; C. leg 3, anterior surface; D. leg 4, posterior surface; E. leg 5, anterior surface.

Table 3. Seta and spine formula of legs 1 to 4 of *Metacalanus curvirostris*. Setae are represented by Arabic and spines by Roman numerals. Si=inner border of segment; St=terminal border of segment; Se=outer border of segment.

	basipodite				endopodite							exopodite						
	1		2		1		2		3			1		2		3		
	Si	Se	Si	Se	Si	Se	Si	Se	Si	St	Se	Si	Se	Si	Se	Si	St	Se
leg 1	1	0	1	1	1	0	2	0	3	1	1	1	1	1	I	4	1	I
leg 2	1	0	0	0	1	0	2	0	4	2	2	1	I	1	I	5	I	III
leg 3	1	0	0	0	1	0	2	0	4	2	2	1	I	1	I	5	I	III
leg 4	0	0	0	1	1	0	2	0	3	2	2	1	I	1	I	5	I	III

with a small knob-like process fringed with stout hairs. Basipodite 2 fringed with many hairs along the inner margin, carrying a group of stout hairs at a proximal third, two serrated setae at a distal third, and one spinulose seta on the inner distal end. First and 2nd endopodite segments each bearing three medial setae and one serrated strong seta distally; terminal segment with two setae of unequal lengths and two serrated setae. Legs 1 to 4. Each leg consisting of 2-segmented basipodite, 3-segmented endopodite and 3-segmented exopodite. Leg 1 (Fig. 11–A) is very different from the following three legs: basipodite 2 bearing one plumose seta on the middle of the outer margin and one plumose stea near the inner base of endopodite; 1st exopodite segment with a large plumose seta on the outer distal angle; each segment of endopodite produced into an acute process on the outer distal end. Second and 3rd exopodite segments each bearing one serrated lateral spine. Legs 2 and 3 (Fig. 11–B, C) similar to each other, but the former slightly smaller than the latter. Each basipodite 1 with one plumose seta near the inner distal end; basipodite 2 convex along the inner margin. First endopodite segment of each leg with an obtuse prominence on the outer proximal margin; 2nd and 3rd endopodite segments ending in an acute process on the outer distal angle; each 2nd exopodite segment fringed with hairs on both sides. Leg 4 (Fig. 11–D) with basipodite 1 bearing no seta, and basipodite 2 slightly convex along the inner margin and bearing one plumose seta on the posterior surface near the the base of exopodite; 1st endopodite segment with an obtuse prominence on the outer proximal mragin as in legs 2 and 3; 2nd and 3rd endopodite segments each terminating in a small acute process on the outer distal angle; 2nd and 3rd exopodite segments each bearing stout hairs on the outer margin. The seta and spine formula of the legs 1 to 4 is shown in Table 3. Leg 5 (Fig. 11–E) nearly symmetrical, uniramous, and 3-segmented. First segment very small, with no armature. Second segment comparatively large, swelling and armed with one seta on the outer distal end; the seta of the right leg is plumose and thicker than the counterpart of the left leg. Terminal segment smallest, carrying one large seta which bears minute spinules along its outer margin and minute hairs on its inner margin.

Male (allotype). Body (Fig. 12–A, B) 0.89 mm long, slenderer than the female.

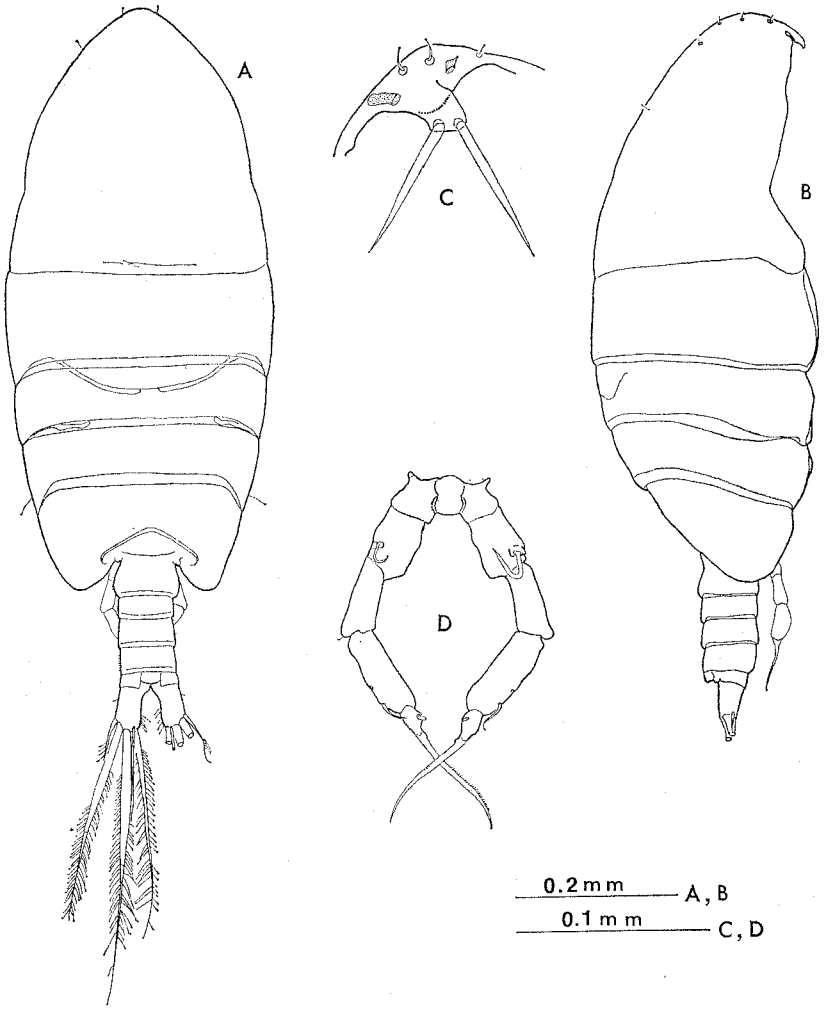

Fig. 12. *Metacalanus curvirostris* n. sp. Male (allotype). A. habitus, dorsal view; B. habitus, lateral view; C. rostrum; D. leg 5, posterior surface.

Rostrum (Fig. 12–C) sharply curved to the left side, bearing a pair of filaments. Urosome 5-segmented. Anal operculum with the posterior margin rounded. Antennule. Left antennule (Fig. 9–H) geniculate, 17-segmented, 8th and 9th segments partly fused, two free segments present distal to the articulation. Right antennule (Fig. 9–G) consisting of 19 segments, 8th and 9th segments almost fused together. Left antennule slightly longer than the right one. Antenna, mandible, maxillula, maxilla, maxilliped, and legs 1 to 4 very similar to the counterparts of the female, but smaller than the female. Leg 5 (Fig. 12–D) nearly symmetrical, uniramous and 5-segmented. Second segment slightly produced inwards on the distal angle; the seta near the outer distal margin is larger in the right leg than in the left leg and the seta of the right leg arising from a small protuberance. Left 3rd

segment bearing a very minute hair on the outer distal end. Fourth segment elongated and carrying a minute seta on a point at a distal fifth the length of the segment. Terminal segment apically bearing one large seta which carries minute spinules on its inner side.

Remarks. Campaner (1984) carefully reviewed the genera *Scottula* Sars and *Metacalanus* Cleve, and allocated *S. inaequicornis* Sars, 1903 to the genus *Metacalanus* and *S. abyssalis* Sars, 1905 to the genus *Sarsarietellius* that was newly erected by him. Therefore, the genus *Metacalanus* accomodates now three known species in addition to the present new species: *M. aurivilli* Cleve, 1901, *M. inaequicornis* (Sars) and *M. acutioperculum* Ohtsuka. The female of the new species described above is readily distinguishable from the other three congeneric species by some characteristics as follows: the new species, in dorsal view, is more compact; the rostrum is not straight but curved to the left side; the posterior margin of the anal operculum is not pointed but smoothly rounded. In the male, too, the new species is easily distinguished from three previously described species by the following characteristics: the curved rostrum, the anal operculum which is not pointed but rounded posteriorly, and the 3rd segment of the leg 5 which bears no outer marginal seta.

The present new species shows an intermediate condition between *M. aurivilli*—*M. acutioperculum* and *M. inaequicornis* in some characteristics of the female leg 5, which Campaner (1984) thought is the only remarkable difference between the former and the latter apart from the body shape. The females of *M. aurivilli* and *M. acutioperculum* have 2-segmented leg 5, of which the terminal segment markedly swells and bears one apical and subapical setae, while the female of *M. inaequicornis* has 3-segmented leg 5, of which the terminal segment is not so swollen and bears one apical seta and two lateral spines. In contrast to these females, the present new species has 3-segmented leg 5, of which the terminal segment is far more reduced than the counterpart of *M. inaequicornis* and bears only one terminal seta in all. This fact will support Campaner's opinion that the genus *Scottula* represented by *S. inaequicornis* is not separable from the genus *Metacalanus* represented by *M. aurivilli.*

Both sexes of this species have heavily chitinized mandibular gnathobases with their sharp teeth, stout maxillae, and maxillipeds as *M. acutioperculum.* Remains of copepods were detected in the gut of both sexes as in *Paramisophria itoi.* Probably this species is carnivorous.

The specific name *"curvirostris"* derives from the rostrum curved to the left side.

References

Bowman, T.E., & J.G. González. 1961. Four new species of *Pseudocyclops* (Copepoda: Calanoida) from Puerto Rico. Proc. U.S. Natn. Mus., 113: 37–59.

Campaner, A.F. 1984. Some taxonomic problems within the Arietellidae (Calanoida). Crustaceana, suppl., 7: 102–109.

Damkaer, D.M. 1970. *Parastephos occatum,* a new species of hyperbenthic copepod (Calanoida: Stephidae) from the inland marine water of Washington State. Proc. Biol. Soc. Wash., 83: 505–514.

Fosshagen, A. 1968. Marine biological investigations in the Bahamas. 8. Bottom-living Arietellidae (Copepoda, Calanoida) from the Bahamas. With remarks on *Paramisophria cluthae* T. Scott. Sarsia, 35: 57–64.

Ohtsuka, S. 1984. Calanoid copepods collected from the near-bottom in Tanabe Bay on the Pacific coast of the middle Honshu, Japan. I. Arietellidae. Publ. Seto Mar. Biol. Lab., 29: 359–365.

Sars, G.O. 1903. Copepoda. Calanoida. An account of Crustacea of Norway, 4, 171 pp., 108 pls. Bergen Museum, Bergen.

Scott, T. 1897. II. The marine fishes and invertebrates of Loch Fyne. A Rep. Fishery Bd. Scotl. 15, Part III. Scient. Invest.: 107–174.

Tanaka, O. 1966. Neritic Copepoda Calanoida from the northwest coast of Kyushu. Proc. Symp. Crust. Eranakulam, January 12–15, 1965, 1. Mar. Biol. Ass. India, Mandapan Camp. pp. 36–54.