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Apodomyzon n. gen., a highly transformed siphonostome cyclopoid copepod, parasitic in the sponge *Haliclona* from Roscoff

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RÉSUMÉ

Description d'un nouveau genre, *Apodomyzon*, et de deux espèces nouvelles, *A. brevicorne* et *A. longicorne*, de Copépodes cyclopoïdes siphonostomes, endoparasites d'une éponge intercôtidale, *Haliclona indistincta*, à Roscoff (Bretagne, France).

Quoique les appendices céphaliques de la femelle ressemblent à ceux de la famille des Artotrogidae, l'absence totale de pattes et de toute segmentation du corps, ainsi que la structure des antennes antérieures du mâle, rendent difficile l'attribution à une famille déterminée.

A l'intérieur des Cyclopoïdes siphonostomes, le présent parasite est le plus transformé qu'on connaît.

INTRODUCTION

The new genus described in this paper is, through the loss of body segmentation and the loss of all thoracic legs, the most profoundly modified siphonostome known at present. The relatively unchanged cephalosomal appendages make relationship to the Cyclopoida siphonostoma clear at once.

The small, gherkin-shaped, parasitic copepod, was discovered in the tissues of the sponge *Haliclona indistincta* (Bowerbank, 1866) collected intertidally in front of the Biological Station, Roscoff, France. The entire posterior portion of the body, homologous to the metasome and urosome of less modified cyclopoids, was transformed into an elongated pouch containing the reproductive organs and devoid of any appendage, except for 4 minute terminal setae that no doubt represent the rudiments of the caudal rami. For obvious reasons, the name *Apodomyzon* is proposed for the new genus, created for the reception of the two new species found in *Haliclona*.

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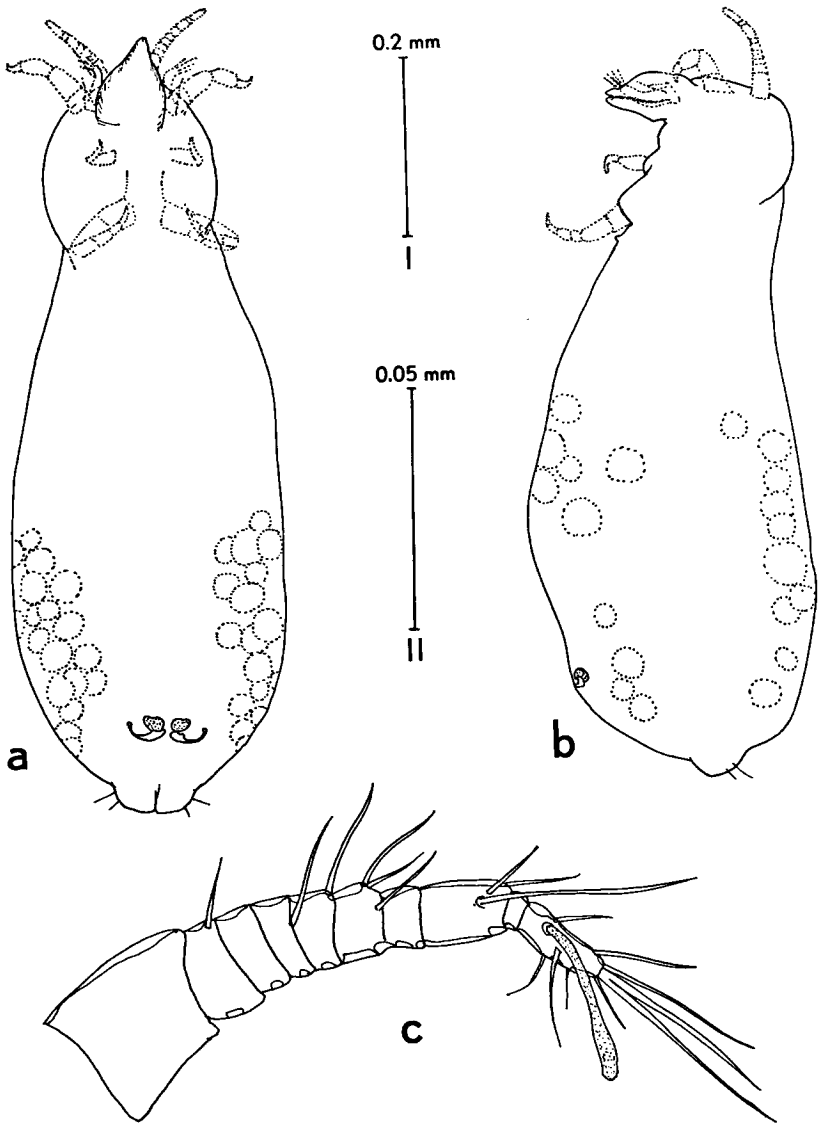

Fig. 1. *Apodomyzon brevicorne* n. gen., n. sp., ♀.
a, entire body, ventral (scale I); b, entire body, from the left (I); c, anterior antenna (II).

As far as the female cephalosomal appendages are concerned, *Apodomyzon* could belong to the Artotrogidae (sensu Eiselt, 1962), but the subchelate structure of the male anterior antennae seems to prevent inclusion into that family. For the moment, I thus prefer to leave its taxonomic position incertae sedis. Of course, it is tempting to compare *Apodomyzon* with other highly transformed parasitic copepods, such as *Spongiocnizon* Stock et al., 1964 (living likewise in sponges) or *Dichelina* Stephensen, 1933 (an endoparasite of deep-sea echinids). However, although these genera agree in modified ("degenerate") body shape, there is little or no evidence from the cephalosomal structures that bears out a close relationship.

ACKNOWLEDGEMENTS

The hospitality of the director, scientific and technical staff of the Station Biologique, Roscoff, during a visit in spring 1965 is gratefully acknowledged. Sincere thanks are also due to Dr. C. Lévi, Paris, for the identification of the sponge host.

Apodomyzon n. gen.

Cyclopoida siphonostoma. Body (♀,♂) gherkin-shaped, unsegmented. Cephalosome demarcated by a slight constriction, but not articulated with the metasome + urosome, which are fused and transformed into a sac containing the reproductive organs. Siphon pear-shaped, large. Anterior antenna 10-segmented (♀) or 9-segmented (♂), carrying a very robust aesthete on segment 10 (♀) or 7 (♂), shortened and transformed into a subchelate structure in ♂. Posterior antenna 4-segmented, distal segment with prehensile function; slightly sexually dimorph. Mandible (♀,♂) consisting of a simple stylet; no palp. Anterior maxilla (♀, ♂) with two unequal lobes, larger lobe with 4, smaller lobe with 1 or 2 terminal setae. Posterior maxilla (♀, ♂) with an unarmed basal segment, and a curved, indistinctly subdivided, claw-like distal segment. Maxilliped (♀, ♂) consisting of a 2-segmented "hand" and a 3-segmented "claw". No legs (♀, ♂). Genital apertures reinforced by a convex sclerotized rod (♀) or a nearly straight rod (♂). Caudal ramus (♀, ♂) represented by an indistinct terminal lobe at each side, armed with two minute setae.

Parasitic in marine sponges.

Type species. — *A. brevicorne* n. sp.

Other species. — *A. longicorne* n. sp.

Etymology. — *Apodomyzon*, gender neuter, from *α-πους* = without feet, and *μυζω* = to suck, thus feetless sucker; *brevicorne* and *longicorne*, Latin, with short and long horns, respectively; the "horns" in this case being the anterior and posterior antennae.

Apodomyzon brevicorne n. sp. Figs. 1—4.

Material examined. — All from *Haliclona indistincta* (Bowerbank). Chenal de l'Ile

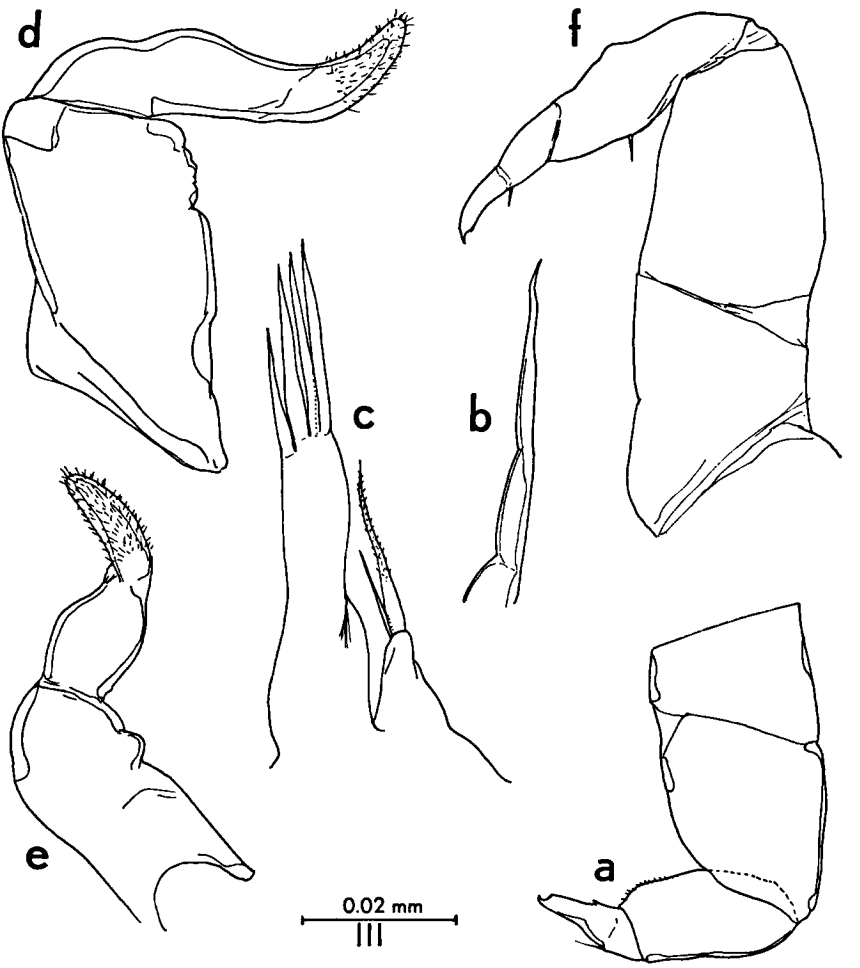

Fig. 2. *Apodomyzon brevicorne* n. gen., n. sp., ♀.
a, posterior antenna (scale II); b, mandible (III); c. anterior maxilla (III); d, e, different views of posterior maxilla (III); f, maxilliped (II).

Verte, Roscoff, intertidal, under stones, different samples taken from 28 May to 4 June 1965. In total, 28 ♀♀ and 1 ♂ of the parasite were obtained from a pail-full of sponges. A female is made the holotype, the male is the allotype, and the remaining specimens are paratypes (ZMA Co. 102.282a-b).

Description. — Female. The entire body is as illustrated in figs. 1a and 1b. The length is 773—886 μ (mean, based on 10 specimens, 837 μ), the greatest width in dorsal view is 290—354 μ (mean 322 μ). The cephalosome occupies about 1/4 of the total body length.

The oral siphon is, in lateral view, shorter than the diameter of the cephalosome; it is shortened pear-shaped (fig. 1b).

The anterior antenna (fig. 1c) consists of 10 segments. Segment 9, though short, is fully individualized and provided with marginal sclerotizations. Segments 1, 3, 7, and 9 are devoid of setae; segments 2, 4, and 5 each bear one seta; segments 6 and 8 each bear 3 setae; and segment 10 bears 9 setae and a very robust aesthete.

The posterior antenna (fig. 2a) is short and robust. It consists of 3 basal segments (all unarmed, but the 3rd ornamented with a medial row of fine setules), and a claw-like 4th segment, laterally provided with a seta, medially with a denticle.

The mandible (fig. 2b) is a slender stylet, tapering into a sharp point. Palp absent.

The anterior maxilla (fig. 2c) has two very unequal lobes, the larger with 4 flat setae, the smaller with 1 long and 1 short seta.

The posterior maxilla (shown from under slightly different angles in figs. 2d and 2e) has a strong, unarmed basal segment and an indistinctly subdivided, curved claw with an obtuse tip; the distal half of the claw is pubescent.

The maxilliped (fig. 2f) consists of a 2-segmented, unarmed basal portion (the "hand") and a 3-segmented distal portion (the "claw"). The claw is armed with 2 short spines.

Other characters as in the generic diagnosis.

Male. — Only a single male was observed (fig. 3a). It is slightly larger than the females, viz., 998 × 345 μ. Two oval spermathecae are visible in the posterior part of the body, by transparency; two straight sclerotized rods on the ventral body surface mark the place of the male sexual pores (fig. 3b). The oral siphon, the mandible, anterior and posterior maxillae, and the maxilliped do not show sexual dimorphism.

The anterior antenna is much more abbreviated than in female, and moreover, the left and right appendages are very asymmetric (figs. 4a,b). The following interpretation on the segmentation and armature of the A 1 ♂ is given on the basis of the single available specimen; most probably, this interpretation has to be emended as soon as new material is found. The right A 1 (fig. 4b) has 5 very wide and short basal segments, of which the first two segments are unarmed, whereas segments 3 and 5 each bear 1 seta, and segment 4 bears 2 setae. Segment 6 is produced into a lateral projection, armed with 2 short spines and 1 setule; near its articulation with the next segment, segment 6 bears 2 longer setae. Segment 7 is triangular and carries a very robust aesthete. Segment 8 is also triangular, but much smaller than 7, and armed with 2 setae. Segment 9 assumes the shape of a pointed claw, armed with 3 setae.

The left anterior antenna is probably also made up of 9 segments (fig. 4a), but no setae have been found on segments 1 to 5. Segment 6 is not laterally prolonged; it bears 5 setiform elements. Segment 7 is trapezoidal and carries a robust aesthete. Segment 8 is much narrower than segment 7; it partly overlaps with the membranaceous, dagger-shaped segment 9. Segments 8 and 9 each bear 3 setae.

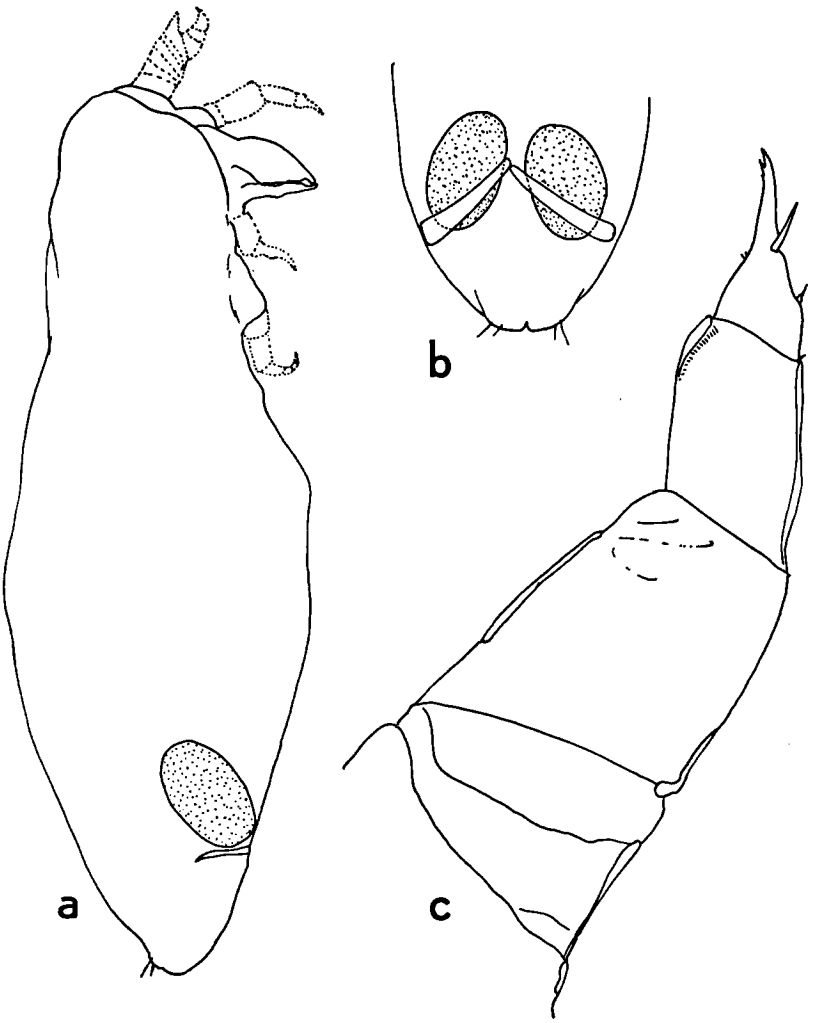

Fig. 3. *Apodomyzon brevicorne* n. gen., n. sp., ♂.
a, entire body, from the right (scale I); b, posterior body end, ventral (I); c posterior antenna (II).

The posterior antenna (fig. 3c) differs from that of the female in the slightly more slender terminal, claw-like segment.

Colouration. — The body is semi-transparent, gray; the intestine is slightly greenish.

Apodomyzon longicorne n. sp. Figs. 5—6.

Material examined. — From *Haliclona indistincta* (Bowerbank). Chenal de l'Ile Verte, Roscoff, intertidal, under stones, different samples taken from 28 May to 4

June 1965. In total, 3 ♀ ♀ were obtained, one of which is the holotype, whereas the others are paratypes (ZMA Co. 102.283 and 102.284).

Description. — Female. The body length of two specimens measured is 676 and 708 μ, the greatest width in dorsal view is 240 and 242 μ, respectively. The specimens are at once recognizable from *A. brevicorne* in: (a) the greater cephalosome, occupying about 1/3 of the total body length (fig. 5b); (b) the much longer appendages (especially A 1, A 2, and mxp); (c) the length of the oral cone, which is, in lateral view, longer than the diameter of the cephalosome and which has a more pointed, elongated pear-shape (fig. 5a).

In the appendages, also clear differences with *A. brevicorne* can be seen, apart from the greater length of each appendage.

The anterior antenna (fig. 6a) is built in a very similar way to that of *brevicorne*, but segment 9 is devoid of sclerotizations.

The posterior antenna (fig. 5c) is much more slender, especially so on the level of segments 2, 3, and 4. The 4th segment assumes the shape of a very slender claw, and shows traces of subdivision, especially in the arrangement of its sclerotizations.

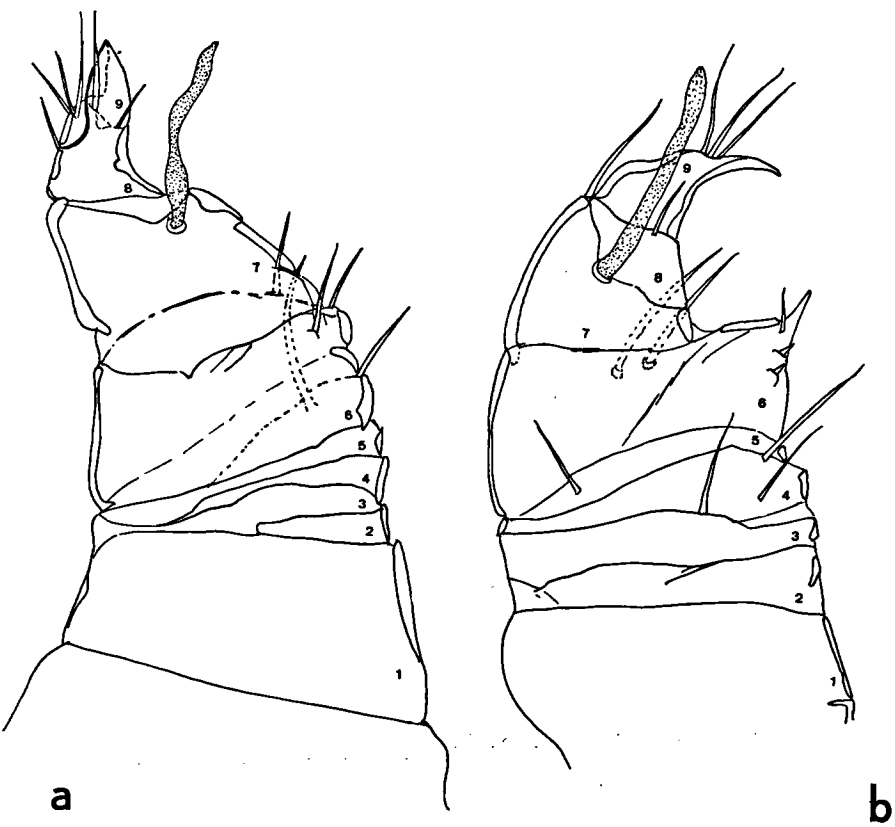

Fig. 4. *Apodomyzon brevicorne* n. gen., n. sp., ♂.
a, left anterior antenna (scale II); b, right anterior antenna (II)

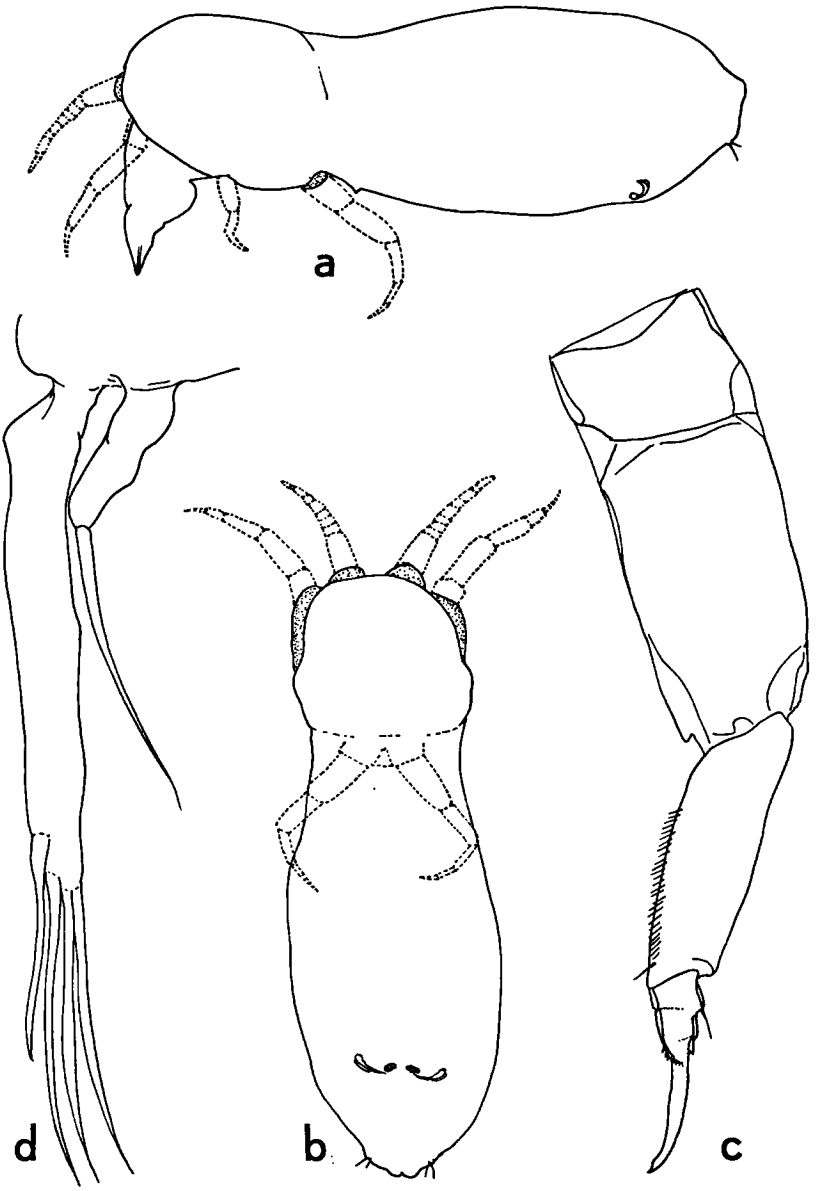

Fig. 5. *Apodomyzon longicorne* n. sp., ♀.
a, entire body, from the left (scale I); b, entire body, ventral (I); c, posterior antenna (II); d, anterior maxilla (III).

The mandible is as in *A. brevicorne.*

The anterior maxilla (fig. 5d) is more slender than in *A. brevicorne.* On the shorter lobe only one seta was observed.

The posterior maxilla (fig. 6b) has a more slender claw, but is otherwise similar to that of the other species.

The maxilliped (fig. 6c) looks quite distinctive since it is much more slender, especially in its 2nd segment and in its claw.

Male. — Unknown.

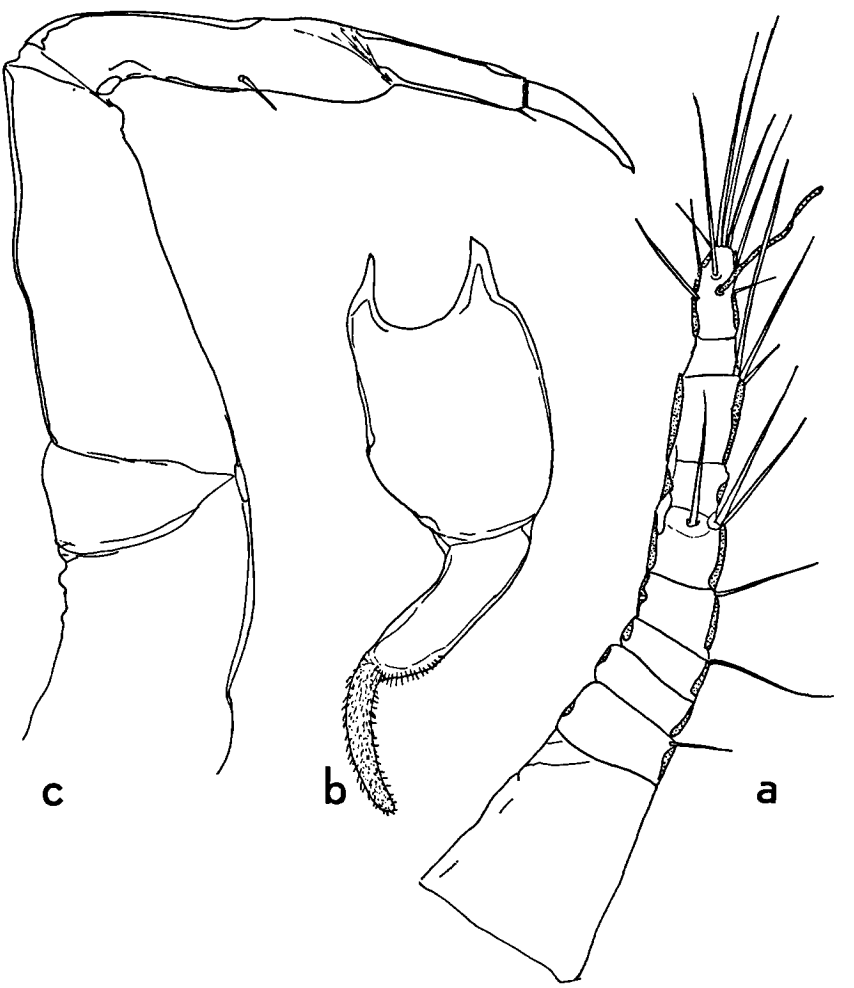

Fig. 6. *Apodomyzon longicorne* n. sp., ♀.
a, left anterior antenna (scale II); b, right anterior antenna (II); c, maxilliped (II).

Discussion

From the point of view of speciation, it seems unlikely that two apparently closely related species of most curiously modified copepods evolved in the same host. I have no solution to offer for this difficulty, but it should be borne in mind that — though great care was taken to avoid contamination of the host material — it might be possible that small pieces of different sponge species slipped into the samples of *Haliclona indistincta* collected for our purpose. In animals that are so difficult to recognize in the field as sponges, this possibility can never totally be excluded.

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