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MARINE BIOLOGICAL INVESTIGATIONS IN THE BAHAMAS

3. HARPACTICOID COPEPODS BELONGING TO THE FAMILY TETRAGONICIPITIDAE LANG¹

By

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ABSTRACT

Three new species of the genus *Phyllopodopsyllus* T. SCOTT (*P. bahamensis*, *P. opisthoceratus*, *P. parafurciger*) are described and figured from the Bahamas. *Laophontella armata* (WILLEY) is also recorded and figured.

INTRODUCTION

This paper is the first in a series dealing with the Harpacticoida collected in 1967 by members of the staff of the Biological Station, Espegrend, in collaboration with the Lerner Marine Laboratory, Bimini. The field work was carried out under contract no. ONR 552(07) with the U.S. Office of Naval Research.

The present paper deals with new and little known members of the family Tetragonicipitidae LANG.

MATERIAL AND METHODS

The forms considered here occurred in Ockelmann sledge samples taken at the following stations:

39–67. Eleuthera, 5 miles SW of Pelican Cay, 25°15'25"N, 76°20'55"W. C. 9 m, calcareous mud. Ockelmann sledge. 22 April 1967.

42–67. Eleuthera, off Tarpum Bay, 24°59'10"N, 76°11'15"W. C. 3 m, sand. Ockelmann sledge. 23 April 1967.

46–67. Eleuthera, NW of Poison Point, 24°51'08"N, 76°13'40"W. C. 3 m, sand, some *Thalassia*. Ockelmann sledge. 25 April 1967.

60–67. Little San Salvador, West Bay, 24°34'40"N, 75°57'30"W. C. 5–6 m, sand. Ockelmann sledge. 27 April 1967.

69–67. Exuma Cays, Great Guana Cay, 1.5 mile S of White Point, 24°01'30"N, 76°21'40"W. C. 3–4 m, sand. Ockelmann sledge. 29 April 1967.

72–67. Exuma Cays, Great Guana Cay, between White Point and Black Point. 24°04'25"N, 76°23'45"W. C. 3–4 m, sand. Ockelmann sledge. 30 April 1967.

75–67. Exuma Cays, Great Guana Cay, bay on northern side, 24°06'45"N, 76°24'20"W. C. 1–2 m, sand. Ockelmann sledge. 1 May 1967.

76–67. Exuma Cays, off Harvey Cay light, 24°09'20"N, 76°31'30"W. C. 6–7 m, sand and algae. Ockelmann sledge. 1 May 1967.

¹ Contribution from the Lerner Marine Laboratory, Bimini, Bahamas, and the Biological Station, Espegrend, Blomsterdalen, Norway.

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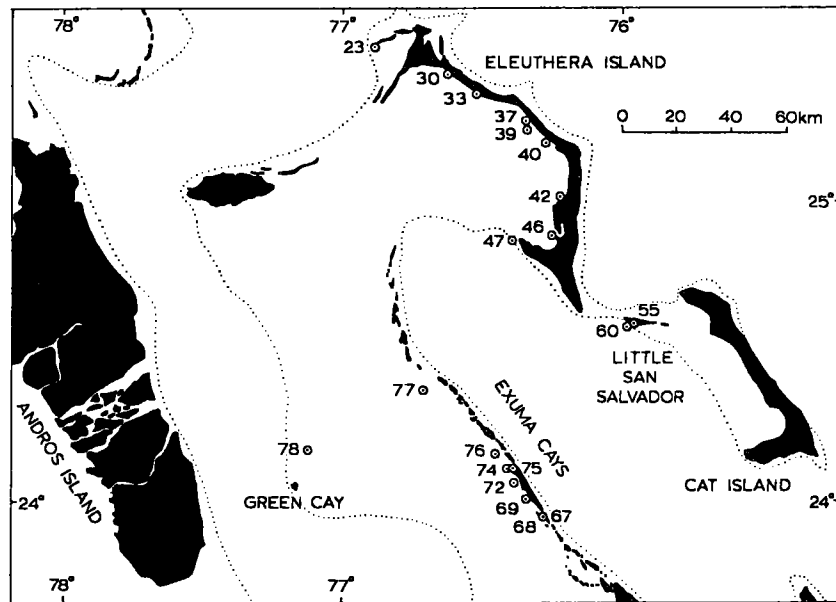


Fig. 1. Map of the Bahamas showing the stations from which harpacticoids have been examined.

77—67. Exuma Cays, SW of Warderick Wells Cay, $24^{\circ}21'00''\text{N}$, $76^{\circ}42'30''\text{W}$. C. 9—10 m, sand, algae and hard bottom. Ockelmann sledge. 1 May 1967.

78—67. 7 miles NNE of Green Cay (Andros), $24^{\circ}09'00''\text{N}$, $77^{\circ}07'30''\text{W}$. C. 7 m, fine sand. Ockelmann sledge. 2 May 1967.

In Fig. 1 the positions of these stations are mapped, together with all other stations from which harpacticoids are being examined.

The formalin preserved material was transferred to lactic acid for examination and dissection. Permanent preparations were made in polyvinyl lactophenol containing lignin pink as a stain.

Holotypes of the new species, and, where possible, other specimens have been deposited in the American Museum of Natural History, New York, and some specimens in the Zoological Museum, Bergen, Norway.

SYSTEMATIC SECTION

The nomenclature and descriptive terminology adopted is that of LANG (1948, 1965).

Family Tetragonicipitidae LANG, 1948

The name of this family has been amended by WELLS (1967) for grammatical reasons.

Genus *Phyllopodopsyllus* T. SCOTT, 1906

Since the review of this genus by LANG (1965) the following species have been described: *P. danielae* BODIN (1964, p. 161), *P. tristanensis* (WIBORG) (1964, p. 33), *P. biarticulatus* WELLS (1967, p. 313).

Three additional species are described in this paper.

Phyllopodopsyllus bahamensis sp. nov.

F e m a l e. Length 0.66 mm. Body form rather elongated, not tapering markedly (Fig. 2A-B). Rostrum almost square (Fig. 2C), defined at base. All body somites finely pubescent dorsally. Genital double-somite subdivided by a chitinous strip which is less well marked dorsally. Genital area as in Fig. 2D. Sixth leg with three setae arising from a small protuberance. Setae of approximately equal length, and reaching only as far as the chitinous subdivision of the genital double-somite. Antepenultimate segment of abdomen ventrally with a posterior fringe of hairs. Furcal ramus (Fig. 3A—C) about twice as long as wide, with a convex inner margin and a dorsal longitudinal ridge. Two setae, one much reduced, arise half way along its outer lateral surface. Terminal seta bulbous at base and accompanied by internal and external setae. Below the terminal seta is another bulbous structure from the inner surface of which a curved seta arises.

Antennule (Fig. 2F) nine-segmented. First segment about equal in length to the succeeding six segments combined. Second segment with a large unguiform process. Last segment about as long as the three preceding segments together. Aesthetascs on the fourth and last segments.

Antenna (Fig. 4E) with a one-segmented exopodite, bearing one lateral and two apical setae. The apical setae have divided tips. First endopodite segment bare. Anterior edge of second segment with two spines and a seta near its distal end. Five terminal geniculate setae, one of which has a common base with a more slender seta. Posterior edge with two spinulose projections.

Mandible (Fig. 4F). Coxa-basis with three terminal setae. Endopodite with two juxtaposed setae on inner edge, and seven apical setae. Endopodite nearly three times as long as the exopodite. Exopodite one-segmented with two lateral setae and ? two apical setae (one seta accidentally removed during dissection).

Maxillule (Fig. 4G). Arthrite of praecoxa with eight distal spines. Coxa with five terminal setae, and an epipodite represented by one seta. Basis with seven terminal setae. Exopodite and endopodite both one-segmented with three and four setae respectively.

Maxilla. A satisfactory preparation of the maxilla was not obtained.

Maxilliped (Fig. 4H). Basis with three characteristically shaped setae. First endopodite segment with a seta about half way along its inner edge, accompanied by some hairs. Second endopodite segment bearing two setae and a terminal claw.

P1 (Fig. 4A). Exopodite three-segmented, segments decreasing in length distally. First endopodite segment about five times as long as the second.

P2—P4 (Fig. 4B—D). Exopodites three-segmented, endopodites two-segmented. Exopodite of P4 much longer than those of P2 and P3. Endopodites decreasing in size from P2 to P4.

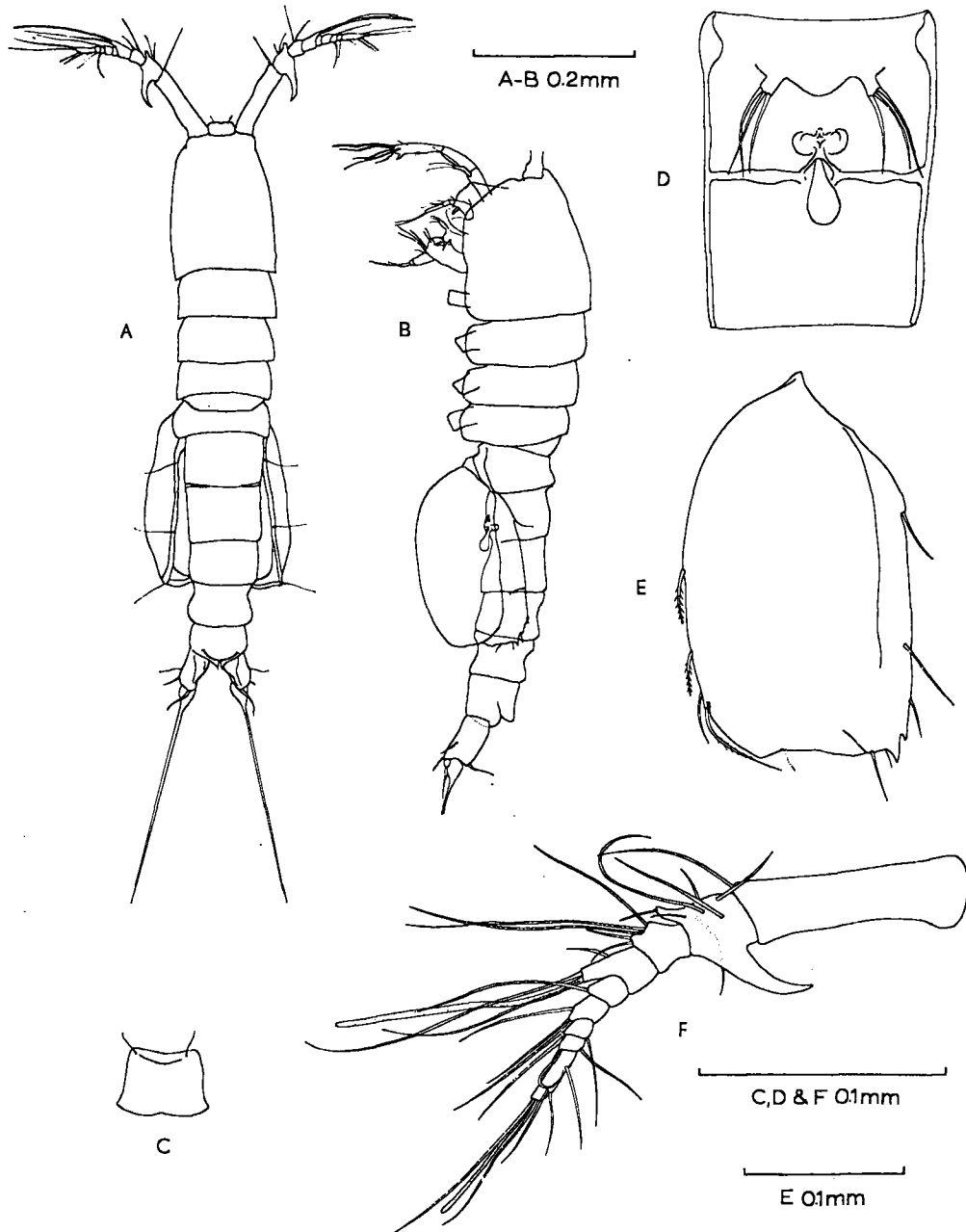


Fig. 2. *Phyllopodopsyllus bahamensis* sp. nov. ♀. A. Dorsal view. B. Lateral view. C. Rostrum. D. Genital area and P6. E. P5. F. Antennule.

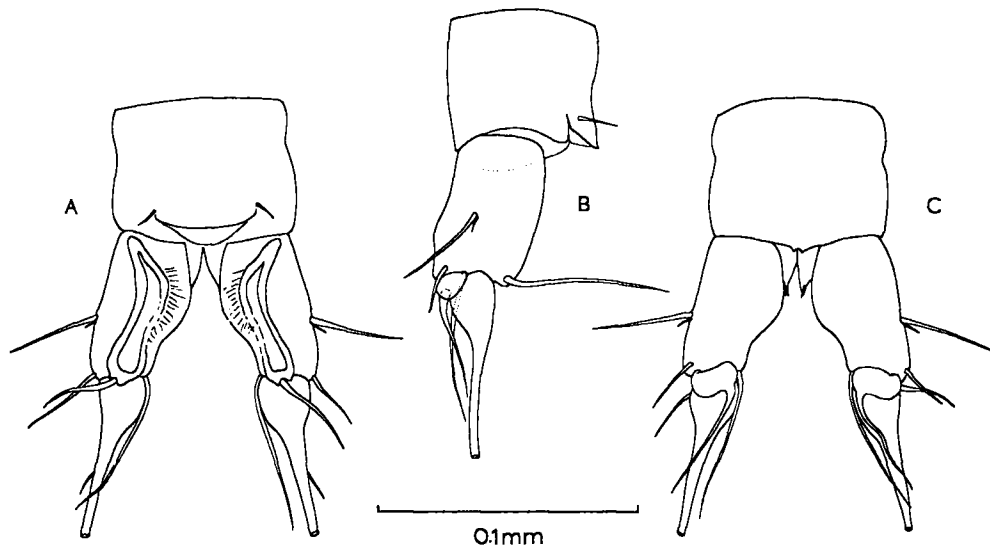


Fig. 3. *Phyllopodopsyllus bahamensis* sp. nov. ♀. Furcal rami. A. Dorsal view. B. Lateral view. C. Ventral view.

Spine and setal formula:

	Exp.			Enp.	
P2	1.	0.	0.2.2.	0.	3.
P3	1.	0.	0.2.2.	0.	3.
P4	1.	0.	2.2.2.	1.	2.

P5 (Fig. 2E). Having the foliaceous structure characteristic of the genus. Setation as figured.

Male. Unknown.

Material. Holotype: An adult female from Station 78-67. This single specimen has been dissected and mounted on 4 slides (A. M. N. H. No. 12,939).

Remarks. This species agrees with *P. borutskyi* LANG in the proportions of the P1 endopodite, and in the setation of the exopodites of P2-P4, but differs in the more reduced armature of the P3 and P4 endopodites. The structure of the furcal region is also quite distinct.

Phyllopodopsyllus opisthoceratus sp. nov.

Female. Length 0.54 mm. No marked tapering of body (Fig. 5A-B). Rostrum almost square (Fig. 7B), defined at base. Last thoracic somite and the two halves of the genital double-somite produced dorso-laterally into chitinous

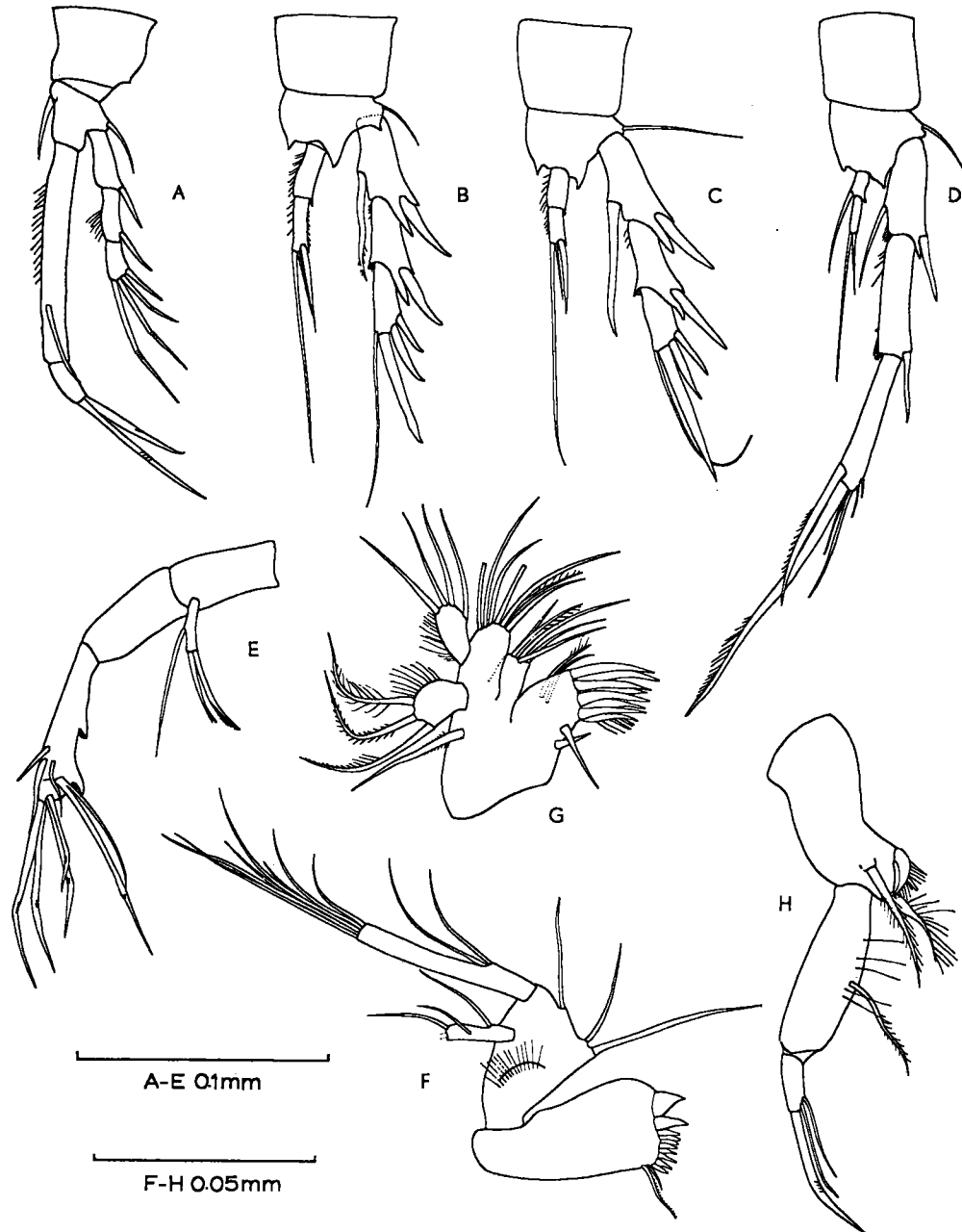


Fig. 4. *Phyllopoposyllus bahamensis* sp. nov. ♀. A. P1. B. P2. C. P3. D. P4. E. Antenna. F. Mandible. G. Maxillule. H. Maxilliped.

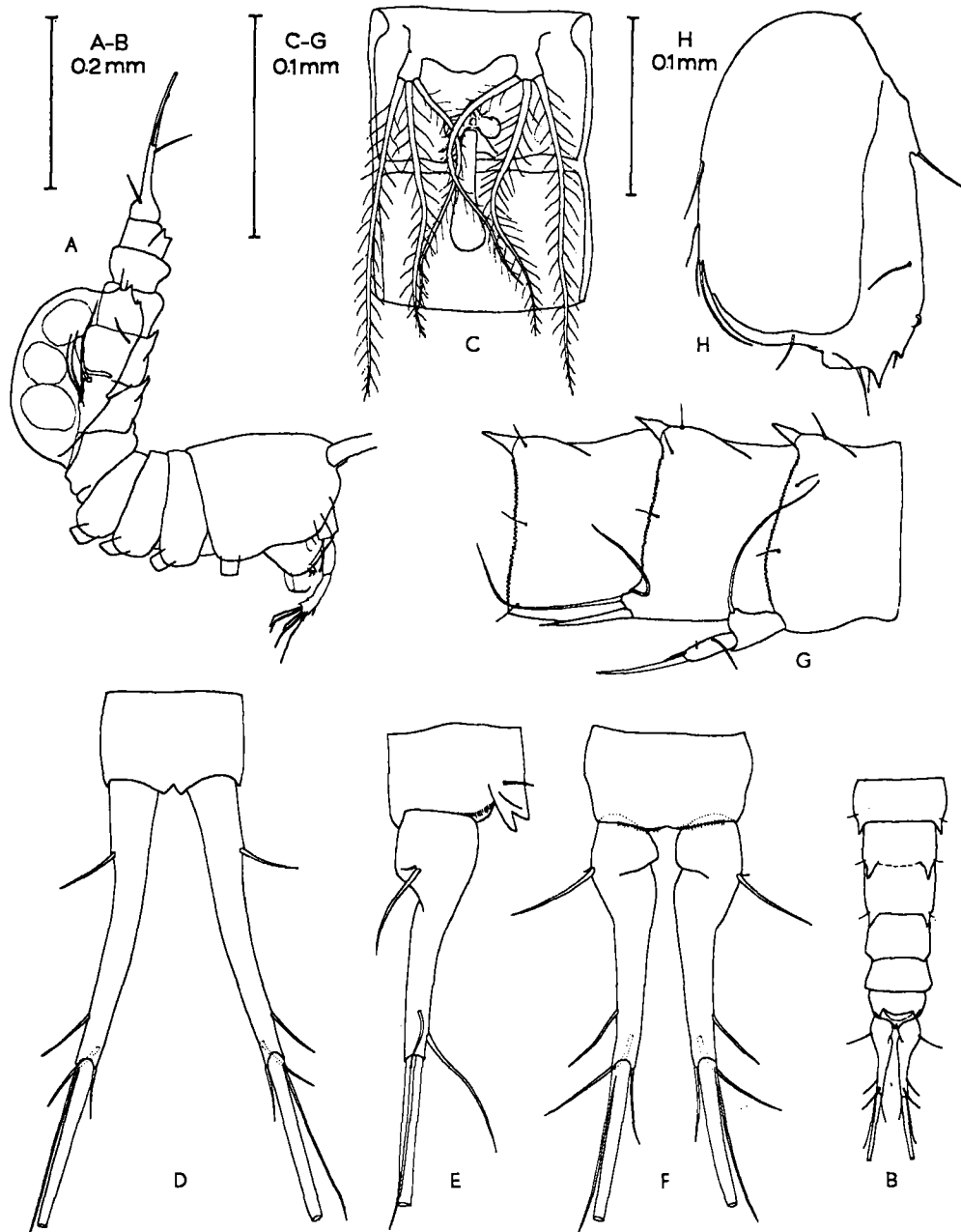


Fig. 5. *Phyllopodopsyllus opisthoceratus* sp. nov. A. ♀, lateral view. B. ♀, last thoracic segment and abdomen, dorsal view. C. ♀, genital area and P6. D. ♂, furcal rami, dorsal view. E. ♀, furcal ramus, lateral view. F. ♀, furcal rami, ventral view. G. ♂, last thoracic and first two abdominal segments, lateral view. H. ♀, P5.

spines. Genital double-somite subdivided by a chitinous strip which is most marked ventrally and laterally. Genital area as in Fig. 5C. Sixth leg with three well developed, highly plumose setae which extend beyond the posterior margin of the genital double-somite. Furcal rami (Fig. 5E—F) elongated, rather longer than the last two abdominal somites together, bulbous at base and narrowing sharply distally. A pair of setae, one much reduced, arise laterally from the swollen proximal part, and another lateral seta and one dorsal seta arise towards the end of the narrowed distal part. The terminal seta, which is not dilated at its base, is accompanied by internal and external setae.

Antennule (Fig. 6A) nine-segmented. First segment about as long as the six succeeding segments combined. Second segment with a large unguiform process. Last segment about as long as the three preceding segments together. Aesthetascs present on the fourth and last segments.

Antenna (Fig. 6B) with a one-segmented exopodite bearing one lateral and two apical setae. The apical setae have divided tips. First endopodite segment bare. Second endopodite segment with two spines and one seta on its anterior distal edge, and five geniculate terminal setae, one of which has its base in common with a more slender seta. Posterior edge with two spinulose projections.

Mandible (Fig. 6C). Coxa-basis with three terminal setae. Exopodite one-segmented, with two lateral and two apical setae. Endopodite about 2.5 times as long as the exopodite, with two juxtaposed setae on its inner edge, and seven apical setae.

Maxillule (Fig. 6D). Arthrite of praecoxa with eight distal spines. Coxa with five terminal setae and an epipodite represented by one seta. Basis with eight terminal setae. Exopodite and endopodite both one-segmented with three and four setae respectively.

Maxilla (Fig. 6E). Syncoxa with four endites, bearing two, one, three, and three setae respectively, counting distad. Basis with three terminal setae. Endopodite three-segmented with seven setae.

Maxilliped (Fig. 6F). Basis with three setae of characteristic form. First endopodite segment with a seta arising about half way along its inner edge, accompanied by a row of hairs. Second endopodite segment with two setae and a terminal claw.

P1 (Fig. 7C). Coxa bare. Basis with an inner spine and an outer seta. Exopodite three-segmented, the segments decreasing in length distally. First endopodite segment about four times as long as the second.

P2—P4 (Fig. 7D—F). Exopodites three-segmented, that of P4 being longer and narrower than those of P2 and P3. Endopodites of P2 and P3 two-segmented, that of P4 being one-segmented.

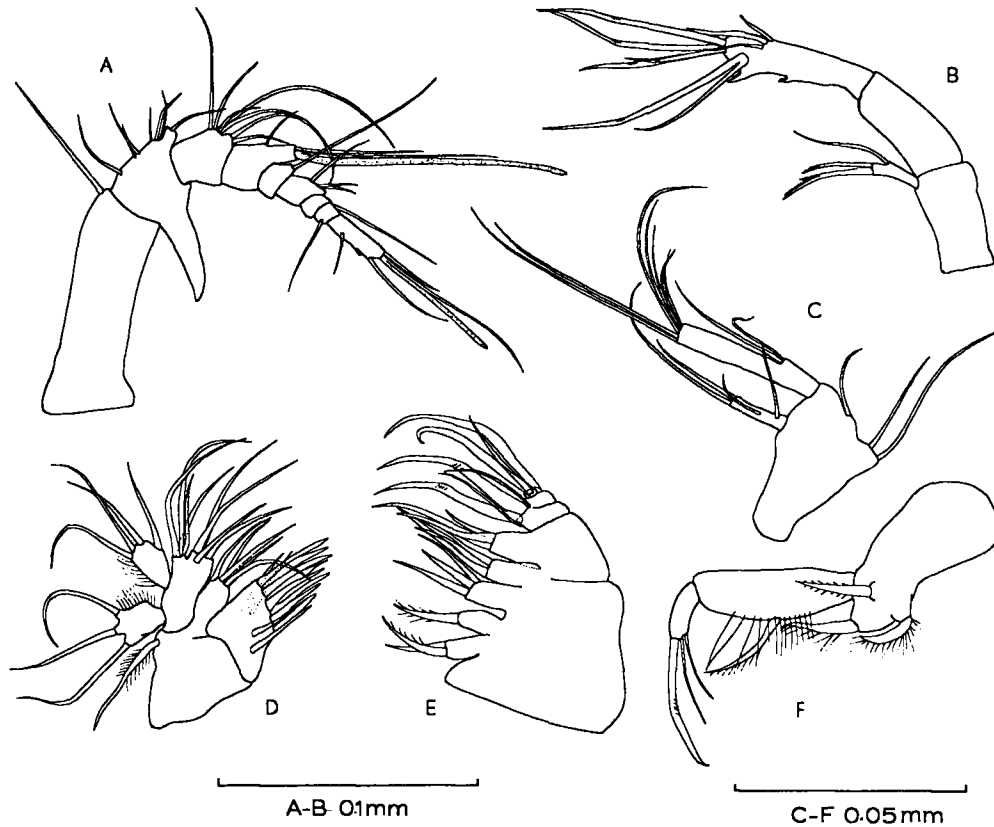


Fig. 6. *Phyllopodopsyllus opisthoceratus* sp. nov. ♀. A. Antennule. B. Antenna. C. Mandibular palp. D. Maxillule. E. Maxilla. F. Maxilliped.

Spine and setal formula:

	Exp.			Enp.	
P2	1.	0.	0.2.2.	0.	3.
P3	1.	0.	0.2.2.	0.	3.
P4	1.	0.	2.2.2.	3.	

P5 (Fig. 5H). Foliaceous. Setation as figured.

Male. Last thoracic and first two abdominal segments with dorso-lateral chitinous processes, as in the female (Fig. 5G).

Furcal rami slender and elongated, evenly tapering and without bulbous base. About six times as long as their basal width (Fig. 5D).

Antennule haplocerate (Fig. 7A). Aesthetasc on the fourth segment.

P2—P4 (Fig. 7G—I). Exopodites as in the female. Setation of P2 and P3 modified as figured, P4 endopodite bearing only two reduced setae.

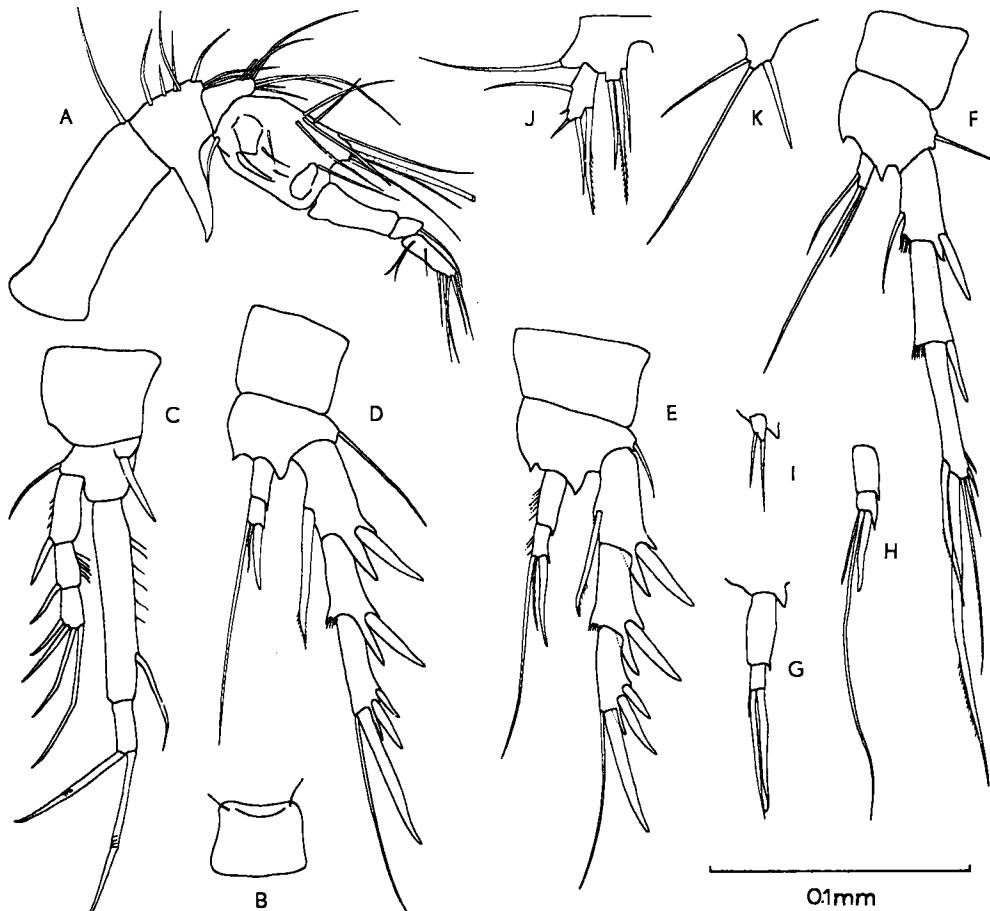


Fig. 7. *Phyllopodopsyllus opisthoceratus* sp. nov. A. ♂, antennule. B. ♀, rostrum. C. ♀, P1. D. ♀, P2. E. ♀, P3. F. ♀, P4. G. ♂, P2 endopodite. H. ♂, P3 endopodite. I. ♂, P4 endopodite. J. ♂, P5. K. ♂, P6.

P5 (Fig. 7J). Bascoendopodites confluent, inner expansion not extending to middle of exopodite, with one inner and two terminal setae. Exopodite with two inner, one terminal and two outer setae. The distal outer seta is much reduced.

P6 (Fig. 7K). Each leg consists of three setae, the innermost being the most strongly developed.

Material. Holotype: An adult female from Station 78-67. This specimen has been dissected and mounted on 5 slides (A. M. N. H., No. 12,940). — Paratypes: Stn. 60-67, 1 immature female, 2 males, Stn. 72-67, 1 female, and Stn. 78-67, 1 male (on 3 slides) (A. M. N. H., No. 12,941); Stn. 78-67, 1 female, 1 male (Zool. Mus. Bergen, No. 49,313).

R e m a r k s. The species is unique within the genus in having the P4 endopodite reduced to a single segment.

The dorso-lateral processes (on which the trivial name is based), and the well developed setae of the female P6 are other distinctive characters.

Phyllopodopsyllus parafurciger sp. nov.

F e m a l e. Length 0.45 mm. Body of less slender form than in the preceding species (Figs. 8A—B), approaching the form of *P. furciger* Sars as illustrated in Sars (1911). Rostrum short and broad. Genital double-somite subdivided by a chitinous strip ventrally and laterally. Not well defined dorsally. Genital area as in Fig. 8E. Sixth leg with two setae, the inner short, and the longer outer seta reaching only as far as the chitinous subdivision of the genital double-somite. Furcal rami (Fig. 8F—G) about three times as long as wide, bearing two lateral setae and one dorsal seta. The well developed terminal seta has a large swollen base of characteristic form, and is accompanied by internal and external setae.

Antennule (Fig. 8C) eight-segmented. First segment about as long as the five succeeding segments combined. Second segment with a large unguiform process. Last segment about as long as the two preceding segments together. Aesthetasc present on the fourth segment.

Antenna (Fig. 8D) with a one-segmented exopodite, bearing one lateral and two apical setae. First endopodite segment bare. Second endopodite segment with two spines on its anterior distal surface, and five geniculate terminal setae, one of which has its base in common with a slender seta. Posterior edge with only one spinulose process.

Mandible (Fig. 9F). Coxa-basis with three terminal setae. Exopodite well developed, being more than half the length of the endopodite. It bears one lateral and two apical setae. Endopodite with two juxtaposed lateral setae and seven terminal setae.

Maxillule (Fig. 9G). Arthrite of praecoxa with seven distal spines. Coxa with four terminal setae and an epipodite represented by one seta. Basis with seven terminal setae. Exopodite and endopodite both one-segmented with three and four setae respectively.

Maxilla (Fig. 9H). Syncoxa with four endites bearing two, one, three and three setae respectively, counting distad. Basis with three terminal setae. Endopodite of three segments with six setae.

Maxilliped (Fig. 9I). Basis with three setae. First endopodite segment bearing a seta half way along its inner edge, accompanied by some hairs. Second endopodite segment bearing one seta and one terminal claw.

P1 (Fig. 9A). Coxa bare. Basis with an inner spine and an outer seta. Exopodite three-segmented, the segments decreasing in length distally. Endopodite two-segmented, the first segment being about three times as long as the second.

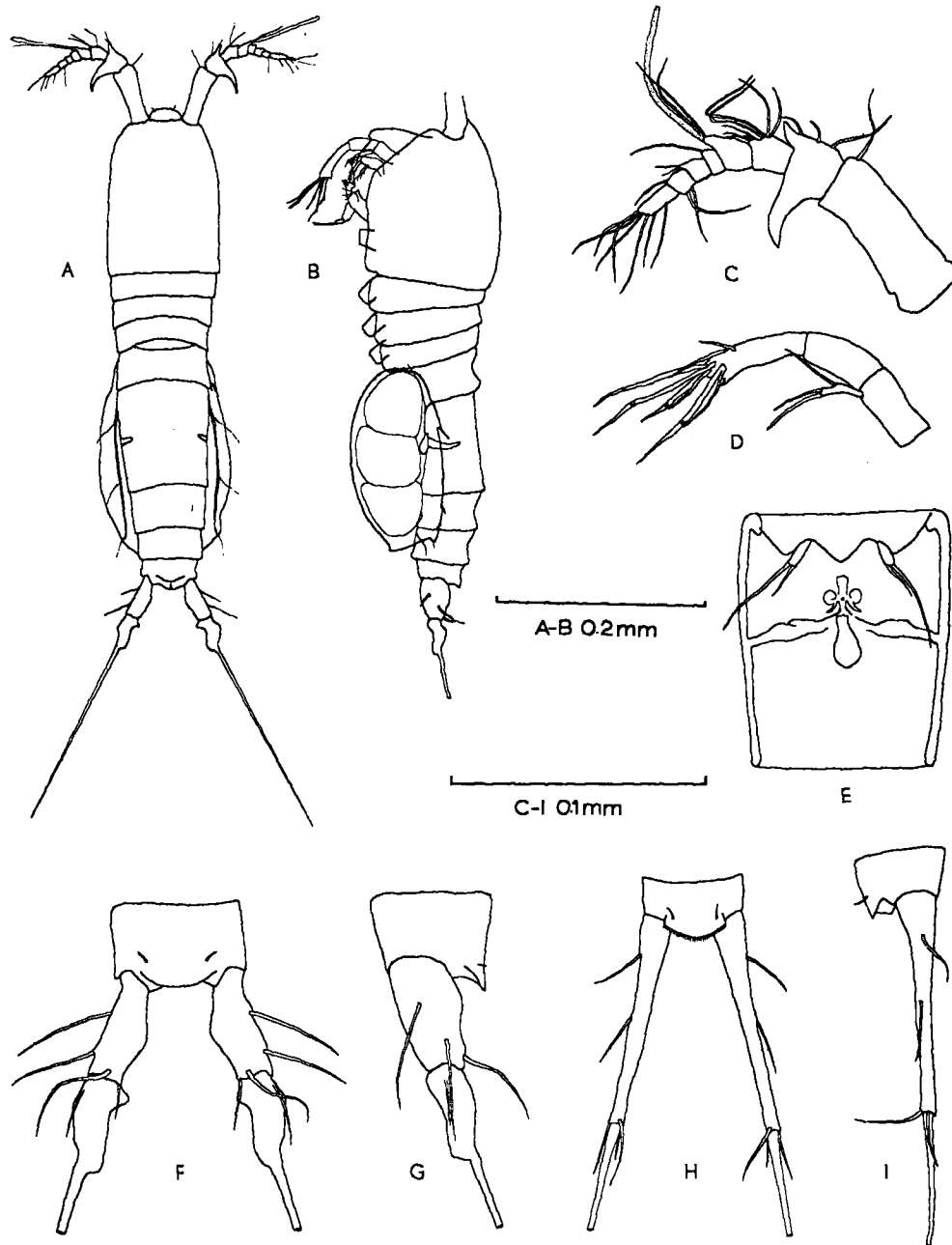


Fig. 8. *Phyllopodopsyllus parafurciger* sp. nov. A. ♀ dorsal view. B. ♀ lateral view. C. ♀, antennule. D. ♀, antenna. E. ♀, genital area and P6. F. ♀, furcal rami, dorsal view. G. ♀, furcal ramus, lateral view. H. ♂, furcal rami, dorsal view. I. ♂, furcal ramus, lateral view.

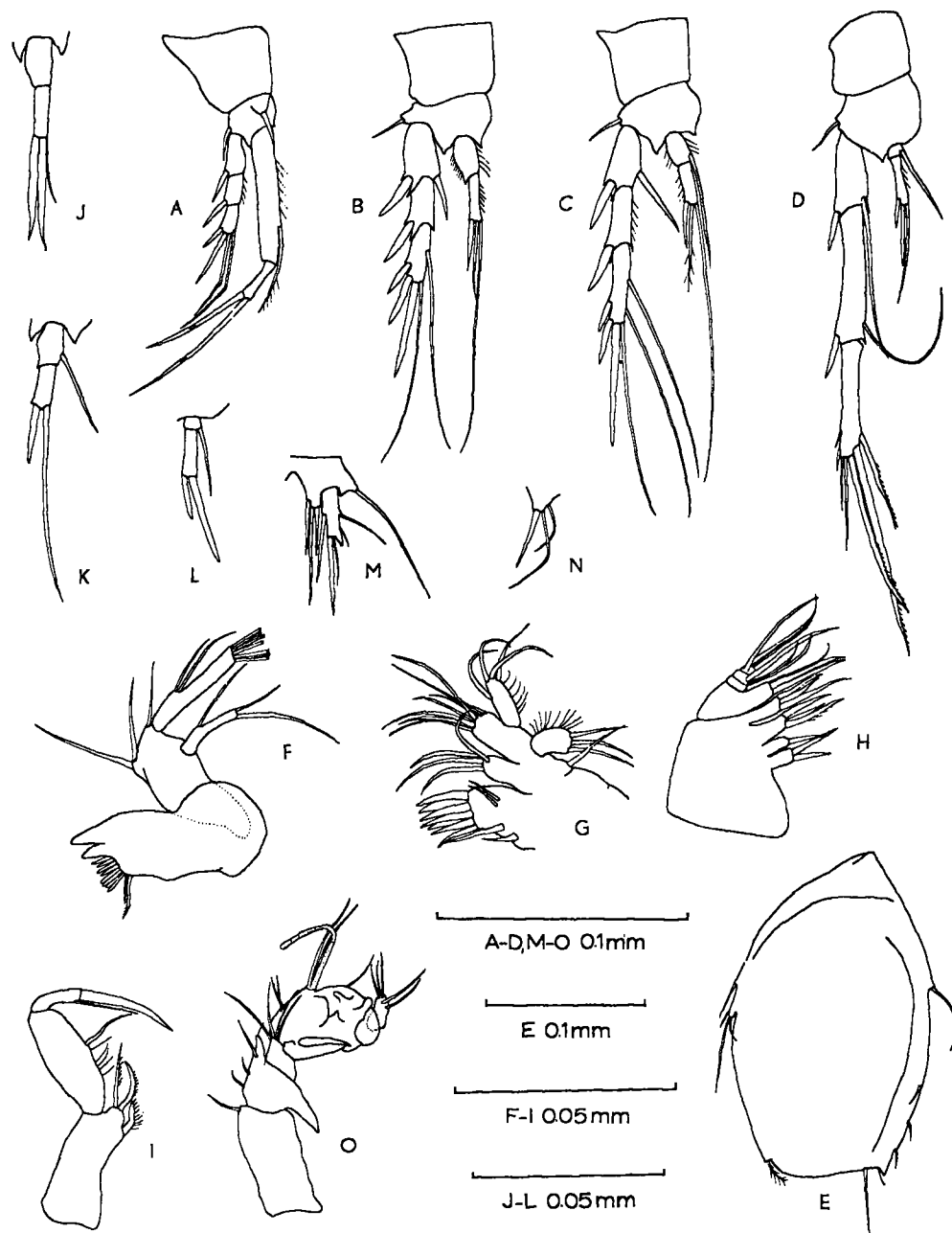


Fig. 9. *Phyllopodopsyllus parafurciger* sp. nov. A. ♀, P1. B. ♀, P2. C. ♀, P3. D. ♀, P4. E. ♀, P5. F. ♀, mandible. G. ♀, maxillule. H. ♀, maxilla. I. ♀, maxilliped. J. ♂, P2 endopodite. K. ♂, P3 endopodite. L. ♂, P4 endopodite. M. ♂, P5. N. ♂, P6. O. ♂, antennule.

P2—P4 (Fig. 9B—D). Exopodites three-segmented, that of P4 being much longer than those of P2 and P3. Endopodites two-segmented.

Spine and setal formula:

	Exp.			Enp.	
P2	1.	0.	1.2.2.	0.	3.
P3	1.	0.	2.2.2.	1.	3.
P4	1.	1.	3.2.2.	1.	3.

P5 (Fig. 9E). Foliaceous. Setation as figured.

M a l e. Differs from the female in the following respects. Furcal rami long and narrow, about seven times as long as their basal length (Fig. 8H—I). Terminal setae not dilated.

Antennule (Fig. 9O) haplocerate. Aesthetasc present on the fourth segment.

P2—P4 (Fig. 9J—L). Exopodites as in the female. Endopodites modified as figured.

P5 (Fig. 9M). Baseoendopodites confluent. Inner expansion not extending to the middle of the exopodite, with one inner and two terminal setae. Exopodite with one inner, two terminal and two external setae. Outer distal margin of the exopodite forming a dentiform process.

P6 (Fig. 9N). Each leg bears three setae, the innermost being the most strongly developed.

M a t e r i a l. Holotype: An adult ovigerous female from Station 78—67. This specimen has been dissected and mounted on 3 slides (A. M. N. H., No. 12,942). — Paratypes: Stn. 42—67, 3 ovigerous females, Stn. 60—67, 1 ovigerous female, and Stn. 78—67, parts of 3 females (mounted on 3 slides), 1 male (mounted on 2 slides) (A. M. N. H., 12,943); Stn. 78—67, 1 female, 2 males, 2 copepodites (Zool. Mus. Bergen, No. 49,314).

R e m a r k s. The species has evident affinities with *P. furciger* Sars, *P. bermudae* Lang, and *P. bradyi* (T. Scott), in the relatively complete armature of its legs. The spine and setal formula is identical with that given for *P. furciger* by Bodin (1964, p. 145), although Sewell (1940) gives a somewhat different formula for this species. The female P5 is similar in its setation to that figured by Sars (1911) and Sewell (1940) for *P. furciger*, differing only in having an additional seta on its inner edge. The male P5 agrees in structure with that figured by Sars (1911) for *P. bradyi* which, according to Bodin (1964) is also identical with that of *P. furciger*.

The present species is distinguished from *P. furciger* by the characteristic shape of the base of the terminal furcal seta. It may also be noted that Sars shows only two terminal setae on the coxa-basis of the mandible in *P. furciger*, although it is possible that a third seta may have been lost from Sars' single specimen.

The affinity which the present species has with *P. furciger* is alluded to in the trivial name.

Genus *Laophontella* THOMPSON and A. SCOTT, 1903

LANG (1965) has pointed out that *Willeyella* POR, 1964 is synonymous with *Laophontella*.

Laophontella armata (WILLEY, 1935)

The present material agrees well with the original description by WILLEY (1935). As WILLEY's figures are rather small, and some of the legs are illustrated in a fragmentary way, I have taken the opportunity of partially refiguring the species.

The following points may be noted:

F e m a l e. P1 as figured (Fig 10A).

P2—P4 (Fig. 10B—C). The outer edges of the coxae and the exopodite segments are strongly chitinous and areolated in a similar way to the general body surface.

P5 (Fig. 10D), foliaceous and with setation as illustrated. The surface of the limb is strongly areolated, but this patterning has been omitted from the figure. The form of P5, with a bifid lamella, described and figured for *L. armata* var. *indica* by SEWELL (1940, p. 338—339) is that of an immature female.

Genital area as figured (Fig. 10E). P6 with three equal setae.

M a l e. Endopodites of P2—P4 as figured (Fig. 10F—H). The exopodite of P4 shows a minor difference from WILLEY's figure, in having an inner seta present on the second exopodite segment. WILLEY's figure, however, shows a notch at this point, so presumably he has figured a defective specimen in which the seta had been lost.

P5 (Fig. 10I). Exopodite with five setae—three external, one terminal and one internal.

P6 (Fig. 10J). A lobe bearing three setae.

M a t e r i a l. Stn. 39—67, 4 ovigerous females, 2 non-ovigerous females; Stn. 46—67, 10 ovigerous females, 4 non-ovigerous females, 1 male; Stn. 60—67, 3 ovigerous females, 1 non-ovigerous female; Stn. 69—67, 1 ovigerous female, 2 males, 1 copepodite; Stn. 72—67, 3 ovigerous females, 1 non-ovigerous female, 3 males, 1 copepodite; Stn. 75—67, 2 non-ovigerous females; Stn. 76—67, 1 male; Stn. 77—67, 1 non-ovigerous female, 1 male; Stn. 78—67, 1 ovigerous female, 2 non-ovigerous females, 7 males; 5 copepodites.

R e m a r k s. *L. armata* has been previously recorded from Bermuda (WILLEY 1935) and Inhaca Island, Mozambique (WELLS 1967). SEWELL (1940) described *L. armata* var. *indica* from the Nicobar and Maldivé Archipelagos.

The genus contains a second species, *L. horrida* (POR) which is known from the coast of Israel (POR, 1964), the Marseilles area (BODIN 1964, as '*Phyllopodopsyllus* sp.?'), and from Banyuls-sur-Mer (GUILLE & SOYER 1966).

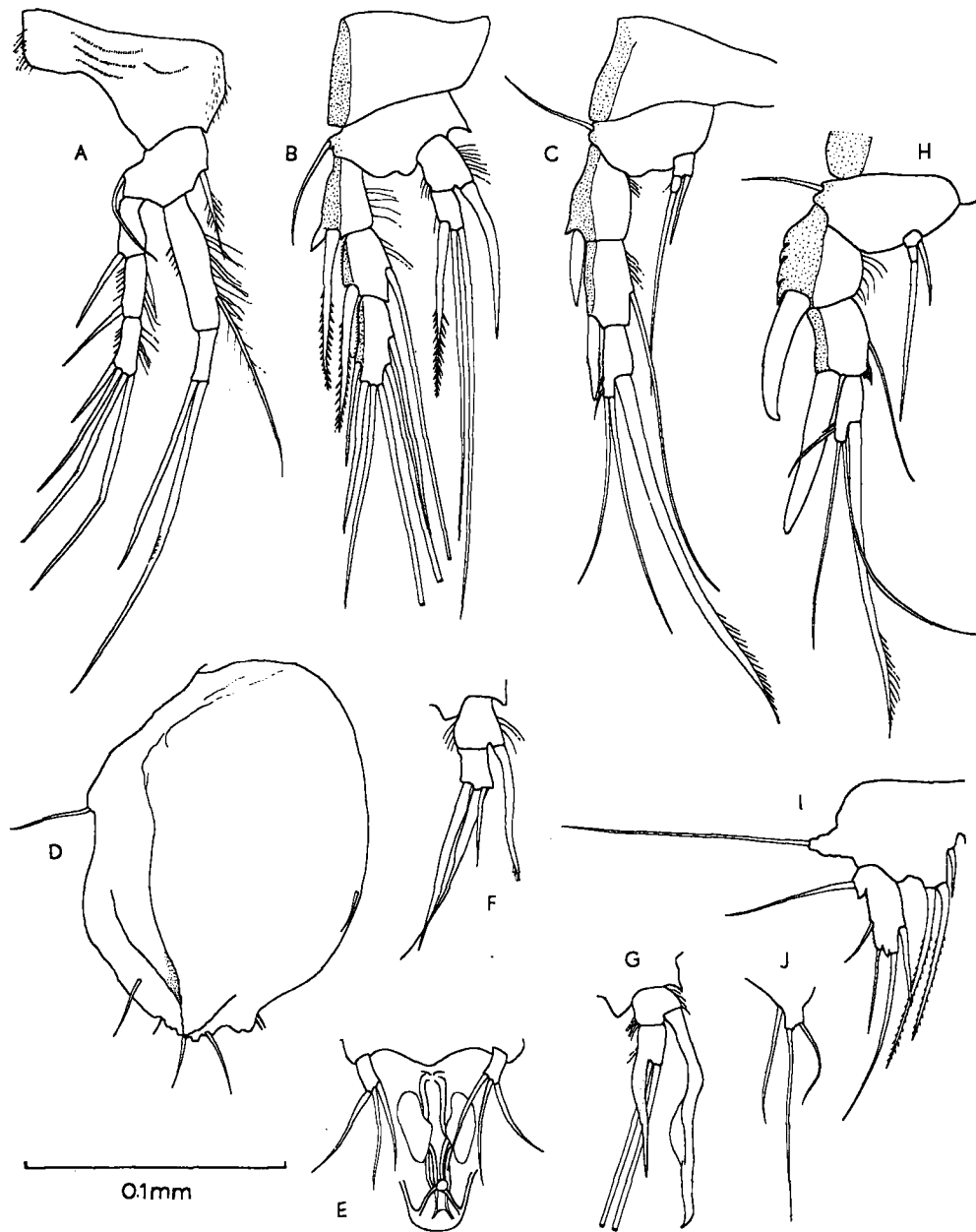


Fig. 10. *Laophontella armata* (WILLEY). A. ♀, P1. B. ♀, P3. C. ♀, P4. D. ♀, P5. E. ♀, genital area and P6. F. ♂, P2 endopodite. G. ♂, P3 endopodite. H. ♂, P4. I. ♂, P5. J. ♂, P6.

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