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On a small collection of harpacticoids from Easter Island: the family Laophontidae T. Scott (Crustacea: Copepoda: Harpacticoida)

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Abstract

The harpacticoid family Laophontidae T. Scott is reported from Easter Island for the first time. A provisional redescription of both sexes of the type species of *Laophonte* Philippi, *Laophonte cornuta* Philippi, is provided based on newly collected material from Motu Iti, Easter Island. A second species of the *cornuta*-group, *Laophonte similicornuta* **sp. nov.** is described based on a single female. Two other new species belonging to the subfamily Laophontinae T. Scott are described, *Phycolaophonte tongariki* **sp. nov.** (based on a single female) and *Loureirophonte minutum* **sp. nov.** (based on a male only). An updated generic diagnosis for *Phycolaophonte* is given, as well as an amendment to Fiers' (1993) key to the species of *Loureirophonte* Jakobi. A fourth species-group is recognised within the genus, the *minutum*-group, which is defined by the combination of: P4ENP being represented by a single seta, presence of 3 and 2 outer spines on the P2–P3EXP3 and P4EXP3, respectively, and presence of a normal outer spine on the male P3EXP2. Within the Esolinae Huys and Lee, *Corbulaseta pacifica* **sp. nov.** is described based on a single female. Reexamination of Vervoort's (1962) concept of *Corbulaseta* (=*Esola*) *bulligera* (Farran) from New Caledonia revealed a distinct species of the genus *Corbulaseta*, described herein as *C. tokiokai* **sp. nov.** Intrageneric relationships of the new species described and biogeographic affinities are discussed.

Key words: Copepoda, Harpacticoida, Laophontidae, Taxonomy, Easter Island

Introduction

Easter Island (27º08’S, 109º20’W) is an exceptionally isolated island located approximately 3800 km from the South American mainland to the east and over 2200 km from it’s nearest neighbour to the west, Pitcairn Island. Studies of the copepod fauna of Easter Island have only recently been undertaken and our knowledge of the species present on and around the island is still rudimentary (Boyko 2003). Only a single freshwater species has been identified (Dumont & Martens 1996), while the number of species reported from the marine environment clearly does not reflect the true species diversity of the island’s waters, despite its clear status as a relatively impoverished fauna. Prior to 2003, only 10 species of marine copepods had been identified from Easter Island waters (Villalba & Fernandez 1985; Fernández & Villalba 1986; Villalba 1987; Johnsson *et al.* 2002), primarily (8 species) from the parasitic caligid genera *Caligus* Müller and *Hatschekia* Poche. Goddard (2003) recorded 14 species of free-living copepods from tide pools on the island, including the first reported harpacticoids, but described no new species. Surprisingly, Goddard (2003) identified most of the specimens as species having either predominantly European/Mediterranean or cosmopolitan distributions. Although it is possible that these identifications are correct, reassessment of Goddard’s (2003) identifications appears warranted; but is beyond the scope of this paper. No species of laophontid copepod has been reported from Easter Island previously, except for *Bathylaophonte pacifica* Lee and Huys, 1999 reported from north of Easter Island at 2572 m depth. Based on the apomorphies isolated by Huys (1990b) for the Laophontidae T. Scott (see below) a provisional redescription of the type species of *Laophonte* Philippi, *L. cornuta* Philippi, as well as the description of 3 new species of Laophontinae T. Scott and 2 new species of Esolinae Huys and Lee is provided.

Material and methods

Copepod specimens were collected between August 16 and September 1, 1999, during the U. S. National Park Service Expedition to Easter Island. Some additional specimens were collected during a 1998 Expedition (August 19–24). Specimens collected at depth were obtained with SCUBA and were all found in association with dead corals (specimens washed from corals and rubble after collection). Morphological observations and drawings were made from whole and dissected specimens using a Leica DMLB compound microscope equipped with drawing tube at magnifications of 1000x. Examined specimens (including most type material) have been deposited in the American Museum of Natural History (AMNH). The holotype of 1 species is deposited in the Nationaal Natuurhistorisch Museum Naturalis (Rijksmuseum van Natuurlijke Historie), Leiden, The Netherlands (RMNH). The terminology proposed by Huys and Boxshall (1991) for morphological descriptions is adopted here. Abbreviations in text and tables: P1–P6, first to sixth swimming legs; EXP, exopod; ENP, endopod; P1(P2–P4)EXP(ENP)1(2, 3) denotes the proximal (middle, distal) exopodal(endopodal) segment of P1, P2, P3 or P4; acrothek, 2 setae basally fused to an aesthetasc.

Taxonomic account

Order Harpacticoida Sars

Superfamily Laophontoidea T. Scott *sensu* Huys 1990b

Family Laophontidae T. Scott

Subfamily Laophontinae T. Scott

Genus *Laophonte* Philippi

Laophonte cornuta Philippi
(Figs 1–10)

Material examined

1 dissected male (AMNH 18485) and 1 dissected female (AMNH 18486), 2 adult

females and 2 adult males, 1 female fifth copepodid and 1 fourth copepodid preserved in alcohol (AMNH 18487); dead *Pocillopora damicornis* (Linnaeus); 48.16 m (158 feet) depth, off Motu Iti, Easter Island; 28 August 1999; coll. H. Tonnemacher.

Redescription

FEMALE. Habitus (Fig. 1A, B) fusiform. Total body length measured from tip of rostrum to posterior margin of caudal rami ranging from 670 µm to 750 µm (mean, 721 µm; N= 3). Cephalic shield about 1/4 total body length, surface and posterior margin smooth. Rostrum (Figs 1B, 4A) fused to cephalic shield, with bilobed tip flanked by pair of sensillae and with midventral tube pore (Fig. 4A). All body somites (except anal somite) with crenulate posterior margins dorsally and laterally (Fig. 1A, B). First to third prosomite (P2–P4 bearing somites) with transverse row of minute spinules close to posterior margin (Figs 1A–B, 2A). First to fifth urosomite with transverse spinular rows (Figs 1A–B, 2A–D, F). Genital-double somite distinct dorsally and laterally (Figs 1A–B, 2B); fused ventrally, with subtle internal rib indicating former division; genital half with some spinules near original somite boundary ventrally (Fig. 3A); posterior genital half with small ventrolateral spinules, and with minute spinules along posterior margin ventrally (Fig. 3A). Ornamentation of fourth urosomite as in preceding somite (Figs 1B, 2D, F, 3A). Fifth urosomite (Figs 1A–B, 2F, 3A) ornamented as preceding somite dorsally; ventrally with long spinules along posterior margin. Anal somite (Figs 1A–B, 2E–F, 3A) with spinules around ventral hind margin and with several rows dorsally and laterally; with spinous projections in area between anal operculum and insertion of caudal rami; anal operculum rounded, with acute spinous projection medially, flanked by pair of sensillae. Caudal rami (Figs 2E–F, 3A) about 3 times longer than wide, without ornamentation, with 1 pore in proximal half and 2 tube pores in distal half ventrally (arrowed in Fig 3A); with 7 setae (labelled in Fig. 2E); seta I small and ventral to seta II, the latter about 5 times longer than the former; seta III arising in outer distal corner, slender and nearly as long as seta II; seta IV small, displaced dorsally and basally fused to seta V (arrowed in Fig 2E–F); seta VI also reduced; dorsal seta VII triarticulate, small and arising in distal third.

Antennule (Fig. 4A) 4-segmented; segments 1 and 2 with acute outer thorn (largest on segment 2); anterior margins of segments 1–3 with patches of small spinules; segments 3 and 4 with few spinules along posterior margin; all setae smooth; with aesthetasc on segments 3 and 4. Armature formula as follows: I-(1); II-(8); III-(11+(1+ae)); IV-(9+acrothek).

Antenna (Fig. 4B) robust. Allobasis with 1 seta and few small spinules along abexopodal margin. Exopod 1-segmented, with 4 pinnate setae. Endopod with 2 surface distal frills and spinule row along outer margin; with 2 spines and 1 long, slender seta laterally; apically with 2 spines, 3 pinnate geniculate setae (outermost one fused basally to small, slender seta).

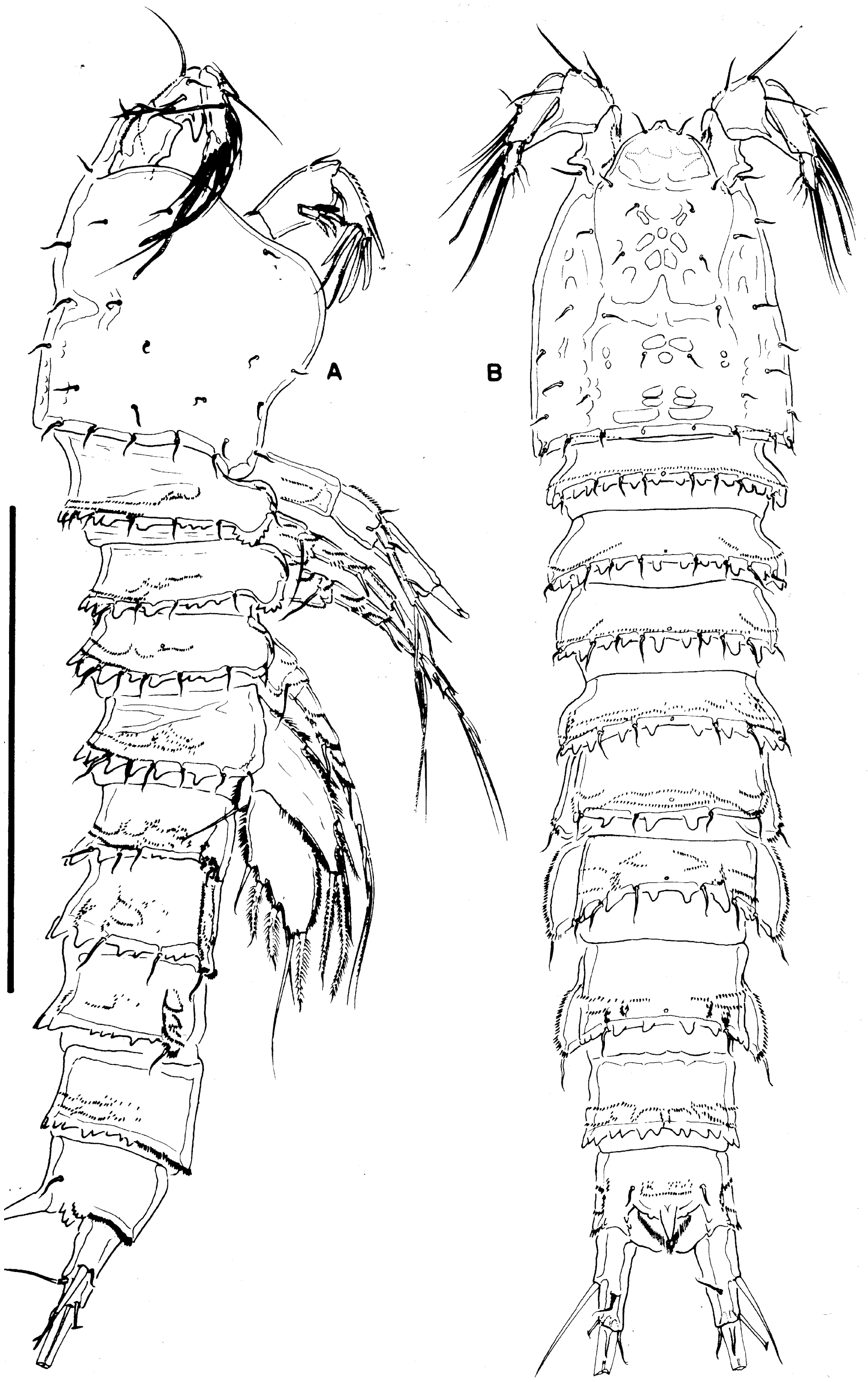

FIGURE 1. *Laophonte cornuta* Philippi, female (AMNH 18486): (A) habitus, lateral; (B) habitus, dorsal. (Scale=300 µm).

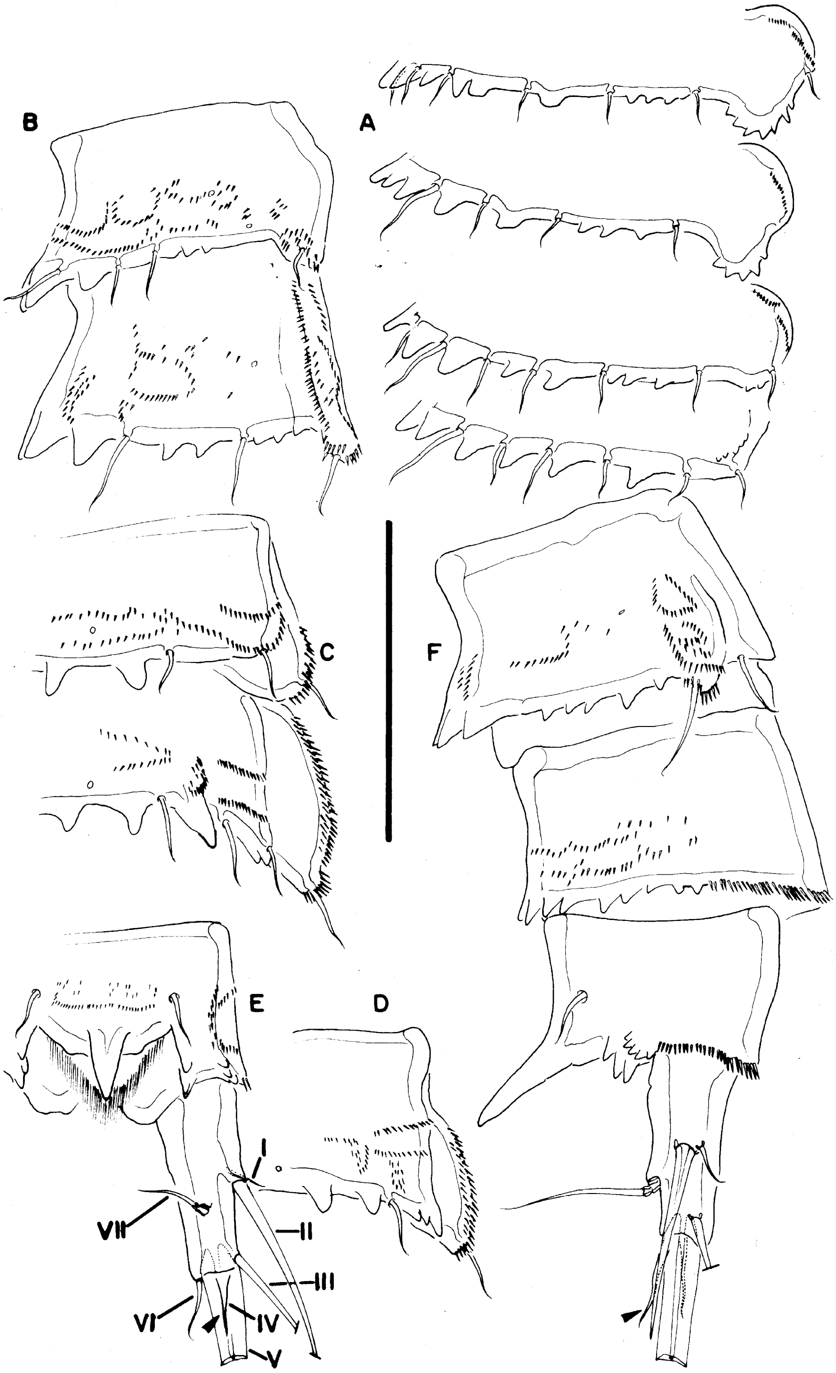

FIGURE 2. *Laophonte cornuta* Philippi, female (AMNH 18486): (A) crenulation along posterior margin of prosomites and first urosomite, lateral (spinular ornamentation omitted); (B) second and third urosomites, lateral; (C) genital double somite, dorsal; (D) fourth urosomite, dorsal; (E) anal somite and caudal rami, dorsal; (F) fourth, fifth, anal somite and caudal rami, lateral. (Scale=100 µm).

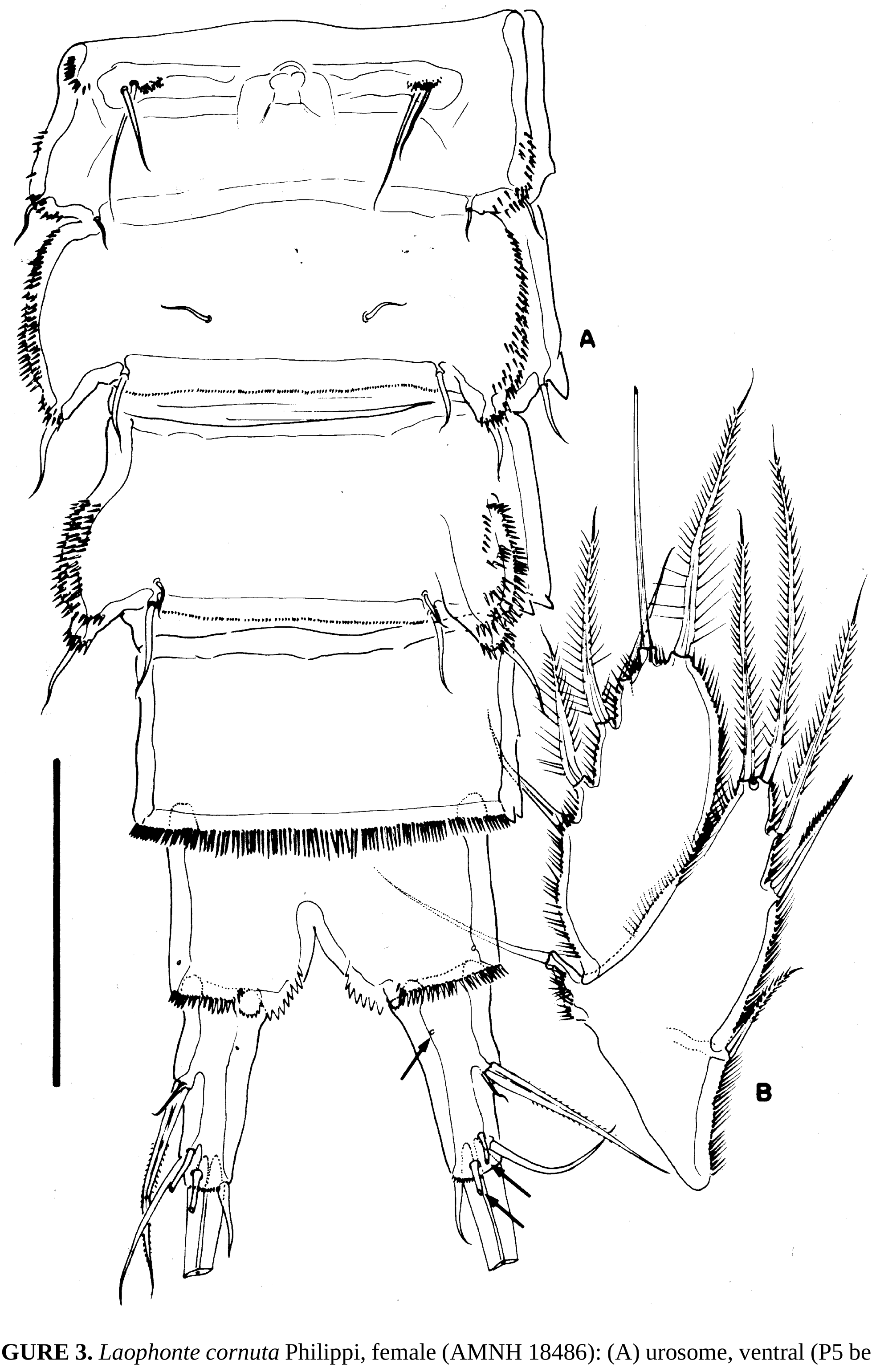

FIGURE 3. *Laophonte cornuta* Philippi, female (AMNH 18486): (A) urosome, ventral (P5 bearing somite omitted); (B) P5. (Scale=100 µm).

FIGURE 4. *Laophonte cornuta* Philippi, female (AMNH 18486): (A) rostrum and antennule; (B) antenna; (C) mandible; (D) maxillule. (Scale: A=100 µm; B=71 µm; C, D=50 µm).

Mandible (Fig. 4C) with bi- and multidentate teeth and 1 pinnate lateral seta. Palp 1-

segmented and well developed, with 5 setae (1 basal, 1 exopodal and 3 endopodal in origin). The strange position of the exopodal seta is due to rotation of the palp during mounting.

Maxillule (Fig. 4D). Arthrite without anterior surface seta; with 2 lateral elements (proximalmost longest and slender), and 5 spines apically and 2 reduced elements (spinules?). Coxal endite with 1 seta. Basis with 1 strong element and 2 slender setae. Endopod fused to basis and represented by 2 setae. Exopod small, 1-segmented, with 2 unequal setae.

Maxilla (Fig. 5B). Syncoxa with 4 spinule rows as figured; with 3 endites; proximal endite completely reduced and represented by small single seta; middle and distal endite each with 3 setae. Allobasis drawn into strong claw with 2 accessory setae. Endopod represented by 2 setae.

Maxilliped (Fig. 5A) slender. Syncoxa with 1 seta. Basis with spinules along palmar margin. Endopod drawn out into minutely pinnate claw with 1 accompanying seta.

P1 (Fig. 6A). Coxa with several spinule rows as figured. Basis with longitudinal rows of spinules, with naked outer and pinnate inner seta. Rami 2-segmented. Exopod reaching to middle of ENP1; EXP1 about 3 times longer than wide and about 1/3 total length of EXP2, the latter with 3 geniculate setae and 2 spines. Endopod robust and elongate; ENP1 long, about 3.8 times longer than wide, without ornamentation; ENP2 about 1.5 times longer than wide, with spinule row along outer margin, with 1 small apical seta and 1 strong claw.

P2 (Fig. 6B). Coxa with 3 anterior spinular rows as figured, distal outer corner produced, furnished with fine spinules (Fig. 6B). Basis with 2 spinule rows and tube pore (arrowed in Fig. 6B). Exopod 3-segmented; EXP1 without, EXP2 and EXP3 with well developed, plumose inner seta; EXP3 with 3 outer spines and 2 apical setae. Endopod 2-segmented; both segments with inner seta; ENP1 about 1.5 times longer than wide, reaching to middle of EXP1; ENP2 twice as long as ENP1, without outer seta.

P3–P4 (Fig. 7A–B) as in P2 except for armature formula of ENP2 and EXP3; additional tube pore present on ENP2 (arrowed in Fig. 7A–B).

P5 (Fig. 3B) large, with separate rami. Baseoendopodal lobe moderately developed, with spinules along inner and outer margins; with 5 setae; outer basal seta arising from short setophore. Exopod with spinules along inner and outer margins, with 6 setae.

Armature formula of P1–P5 as follows:

	EXP	ENP
P1	I-0;II1,2,0	0-0;0,I1,0
P2	I-0;I-1;III,2,1	0-1;0,2,2
P3	I-0;I-1;III,2,2	0-1;1,2,3
P4	I-0;I-1;III,2,2	0-1;1,2,2
P5	6	5+1(basal)

Genital field (Fig. 3A) located anteriorly; paired gonopores covered by genital operculum derived from P6, each armed with 2 unequal setae.

MALE. Habitus (not shown) as in female dorsally. Total body length ranging from 650 µm to 685 µm (mean, 666.6 µm; N= 3). Third, fourth and fifth urosomites with spinules along posterior margin ventrally (Fig. 8). Anal somite and caudal rami (ventral tube pores arrowed in Fig. 8) as in female.

Antennule (Fig. 9) subchirocer, 7-segmented; with 2 segments distal to geniculation; segment 1 with very small blunt projection and few spinules proximally and around base of seta; segment 2 with few spinules proximally and with large produced pointed thorn; segment 4 small sclerite with 2 setae; segment 5 with armature as figured (modified elements as in Fig. 9B, C); segment 6 with pointed distal part, with pair of sclerotized blunt projections and 2 small elements; boundary between segments 6 and 7 difficult to discern. Armature formula as follows: I-(1); II-(9); III-(7); IV-(2); V-(9+(1+ae)); VI-(1); VII-(7+acrothek). All elements smooth except for 1 pectinate element in segment 5 (Fig. 9B) and 2 cup-shaped elements (arrowed in Fig. 9C).

Antenna, mandible, maxillule, maxilla, maxilliped, P1, P2 and P4 (not figured) as in female.

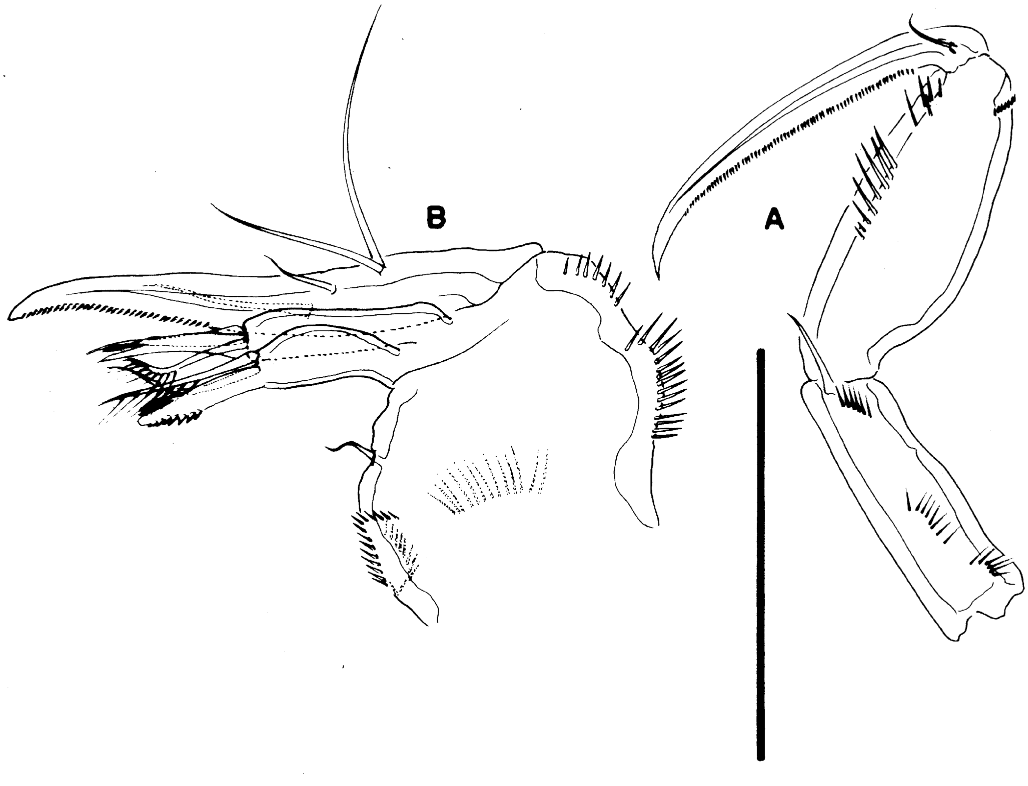

FIGURE 5. *Laophonte cornuta* Philippi, female (AMNH 18486): (A) maxilliped; (B) maxilla. (Scale: A=71 µm; B=50 µm).

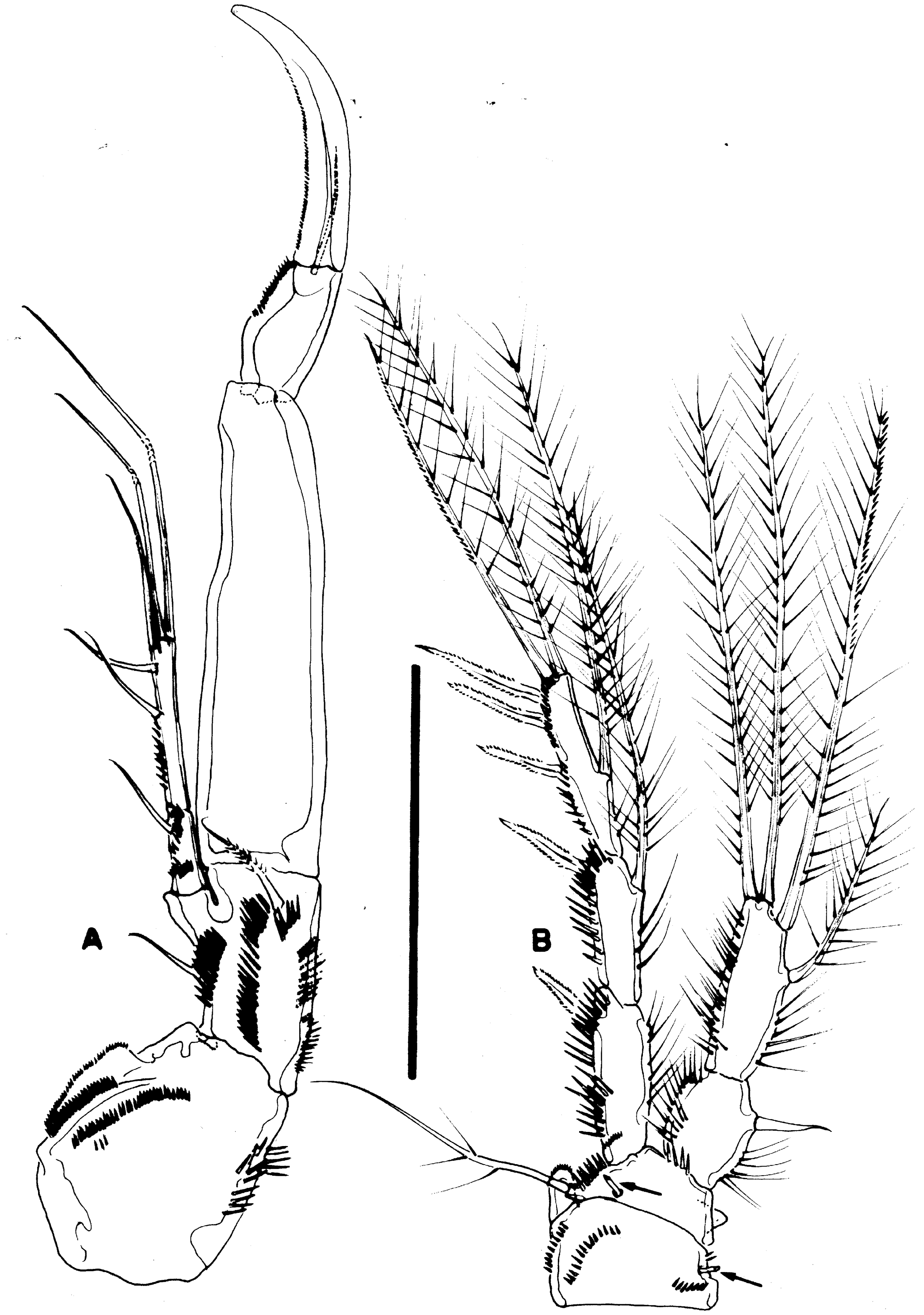

FIGURE 6. *Laophonte cornuta* Philippi, female (AMNH 18486): (A) P1; (B) P2. (Scale=100 µm).

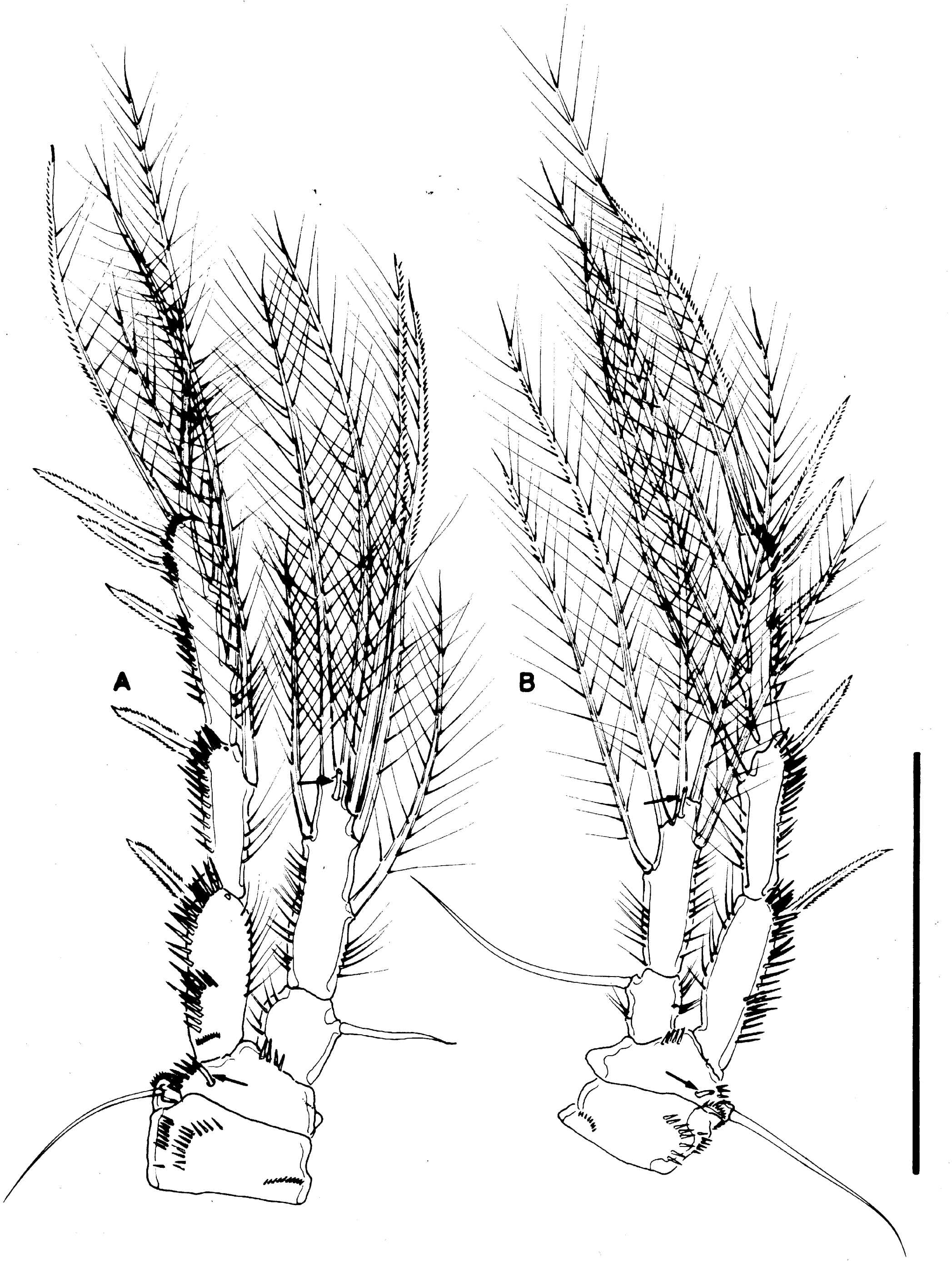

FIGURE 7. *Laophonte cornuta* Philippi, female (AMNH 18486): (A) P3; (B) P4. (Scale=100 µm).

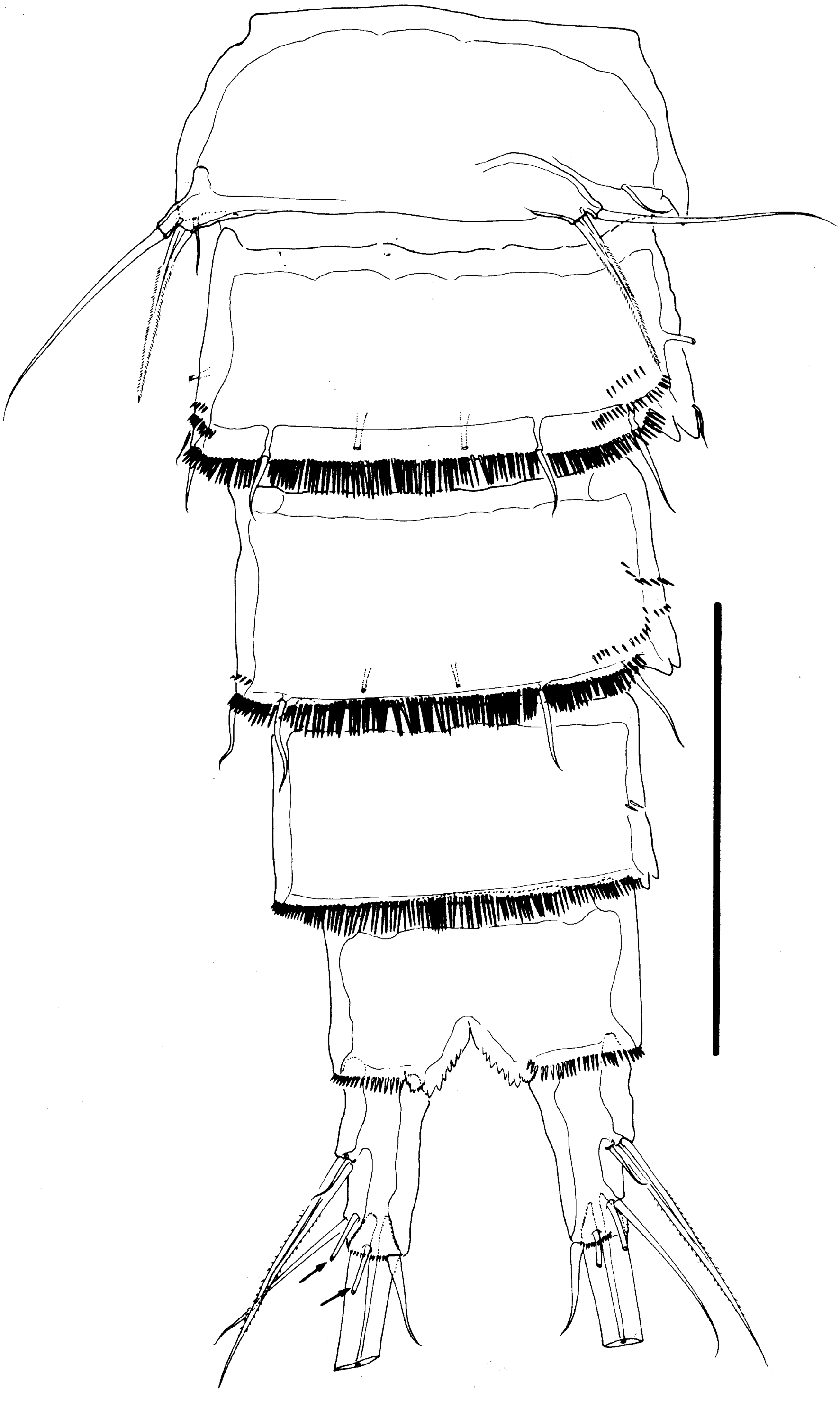

FIGURE 8. *Laophonte cornuta* Philippi, male (AMNH 18485): urosome, ventral (P5 bearing somite omitted). (Scale=100 µm).

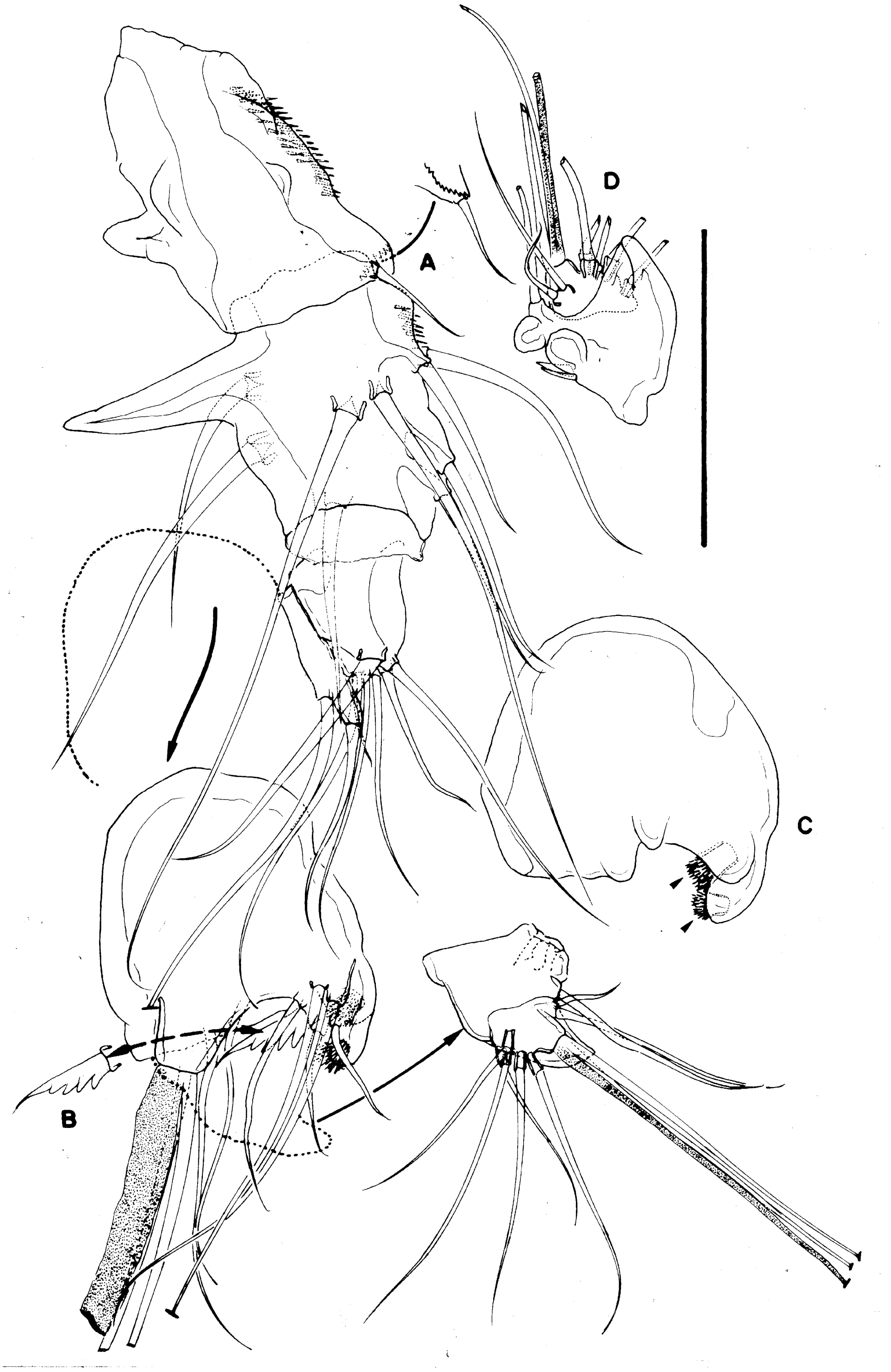

FIGURE 9. *Laophonte cornuta* Philippi, male (AMNH 18485): (A) antennule, ventral; (B) ventral pinnate spine of segment 5; (C) segment 5, dorsal, cup-shaped, spinous structures arrowed; (D) segment 6 and 7, dorsal. (Scale=50 µm).

FIGURE 10. *Laophonte cornuta* Philippi, male (AMNH 18485): (A) P3; (B) P5. (Scale: A=100 µm; B=70 µm).

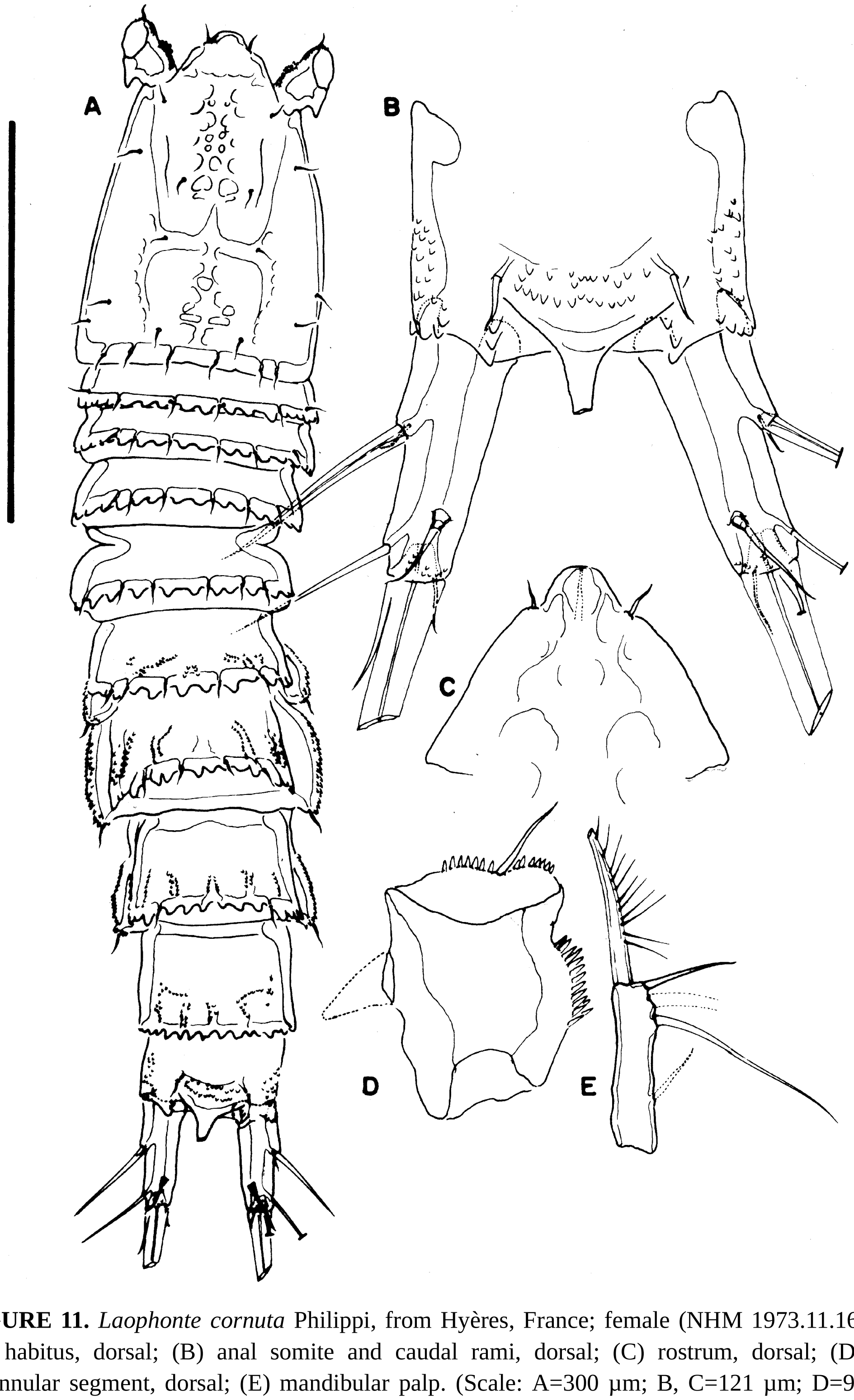

FIGURE 11. *Laophonte cornuta* Philippi, from Hyères, France; female (NHM 1973.11.16.838): (A) habitus, dorsal; (B) anal somite and caudal rami, dorsal; (C) rostrum, dorsal; (D) first antennular segment, dorsal; (E) mandibular palp. (Scale: A=300 µm; B, C=121 µm; D=90 µm; E=60 µm).

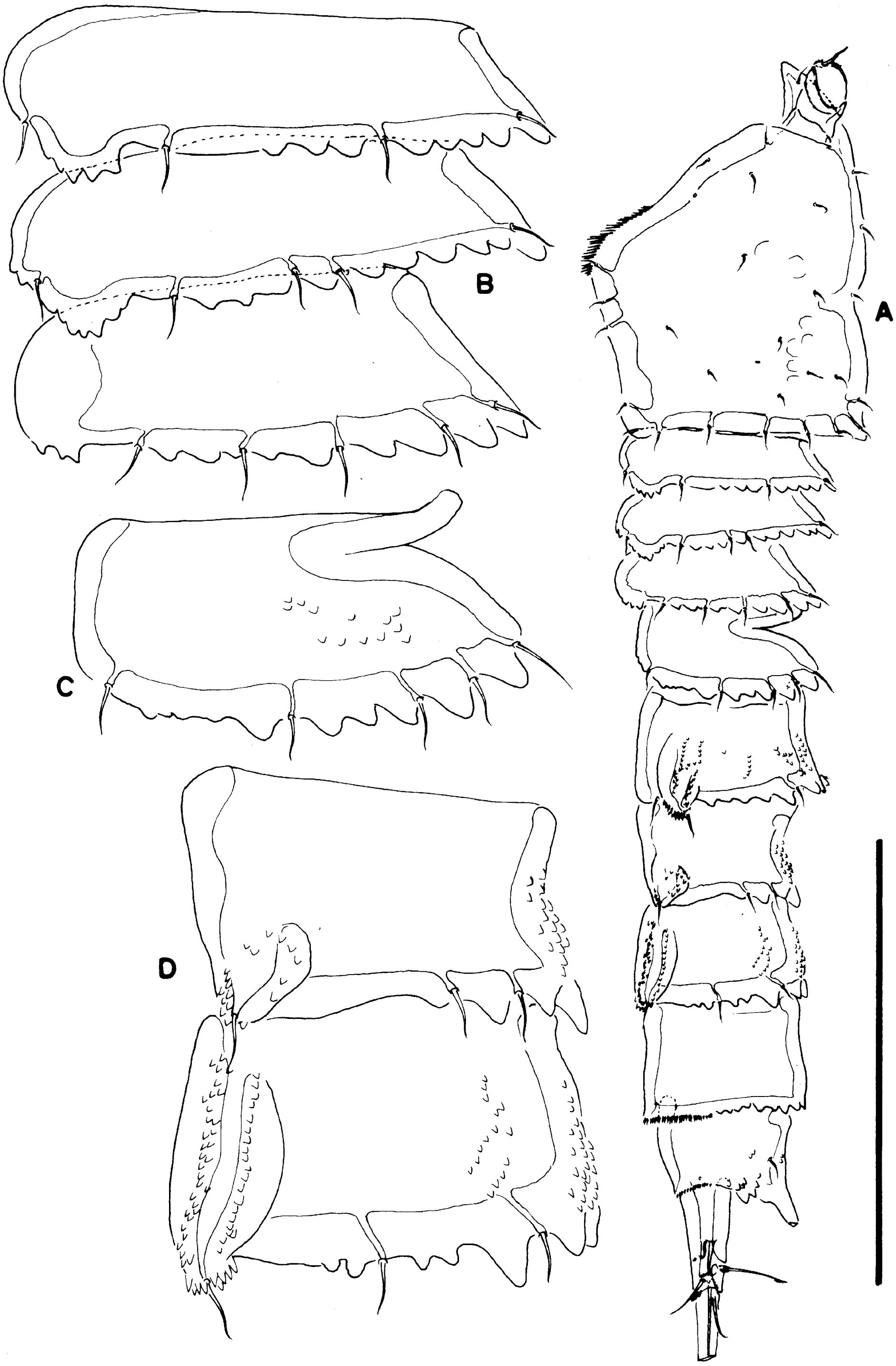

FIGURE 12. *Laophonte cornuta* Philippi, from Hyères, France; female (NHM 1973.11.16.838): (A) habitus, lateral; (B) crenulation along posterior margin of prosomites, lateral; (C) crenulation of first urosomite (P5-bearing somite); (D) crenulation and surface ornamentation of third and fourth urosomite, lateral. (Scale: A=300 µm; B, D=121 µm).

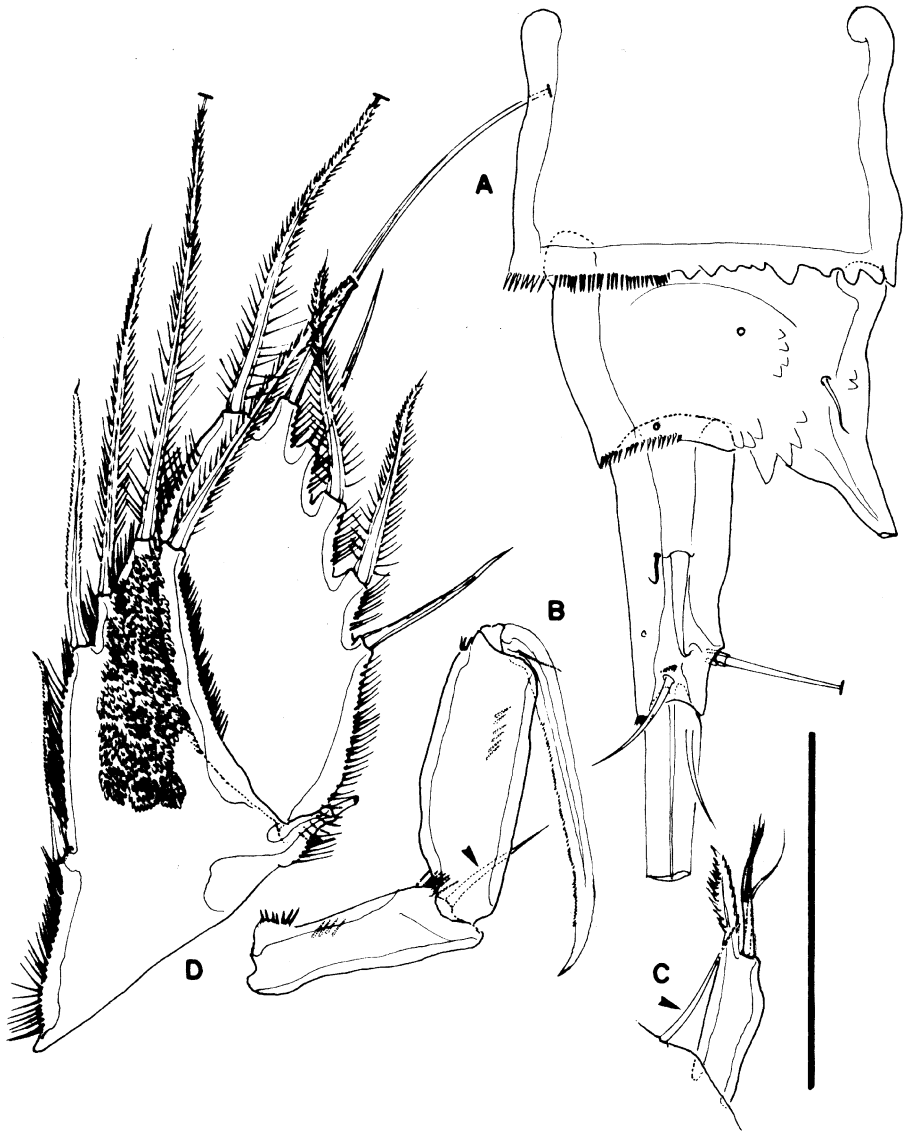

FIGURE 13. *Laophonte cornuta* Philippi, from Hyères, France; female (NHM 1973.11.16.838): (A) anal somite and left caudal ramus, lateral; (B) maxilliped; (C) proximal and medial maxillar endite; (D) P5. (Scale: A, D=100 µm; B, C=50 µm).

P3 (Fig. 10A) as in female except for endopod. Endopod dimorphic, 3-segmented; ENP1 as in female; ENP2 with outer seta and inner apophysis, the latter long, reaching far beyond ENP3; ENP3 with 2 inner and 2 apical setae, with tube pore subdistally (arrowed in Fig. 10A).

P5 (Fig. 10B) with separate rami. Exopod with longitudinal spinule row along outer margin; with 2 outer, 1 apical and 1 inner seta. Baseoendopod with moderately developed setophore bearing outer basal seta; baseoendopodal lobe with 2 pinnate setae and 1 inner tube pore (arrowed in Fig. 10B).

P6 (Fig. 8). Legs asymmetrical; 1 member fused to somite ventral wall, other member articulating at base; outer distal corners of each produced and bearing 1 pinnate inner and 1 naked outer seta.

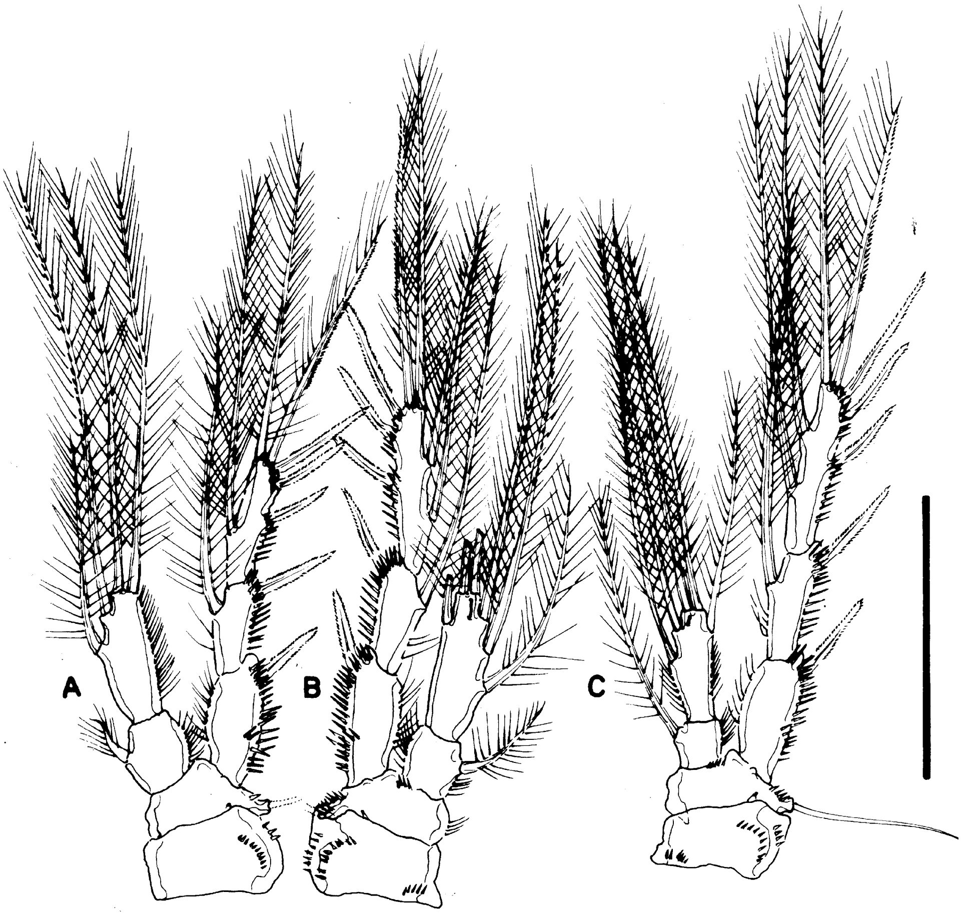

FIGURE 14. *Laophonte cornuta* Philippi, from Hyères, France; female (NHM 1973.11.16.838): (A) P2; (B) P3; (C) P4. (Scale: A–C=100 µm).

Laophonte similicornuta sp. nov.

(Figs 15–22)

Material examined

Holotype. 1 dissected female (AMNH 18488); dead *Pocillopora damicornis* (Linnaeus); 48.16 m (158 feet) depth, off Motu Iti, Easter Island; 28 August 1999; coll. H. Tonnemacher.

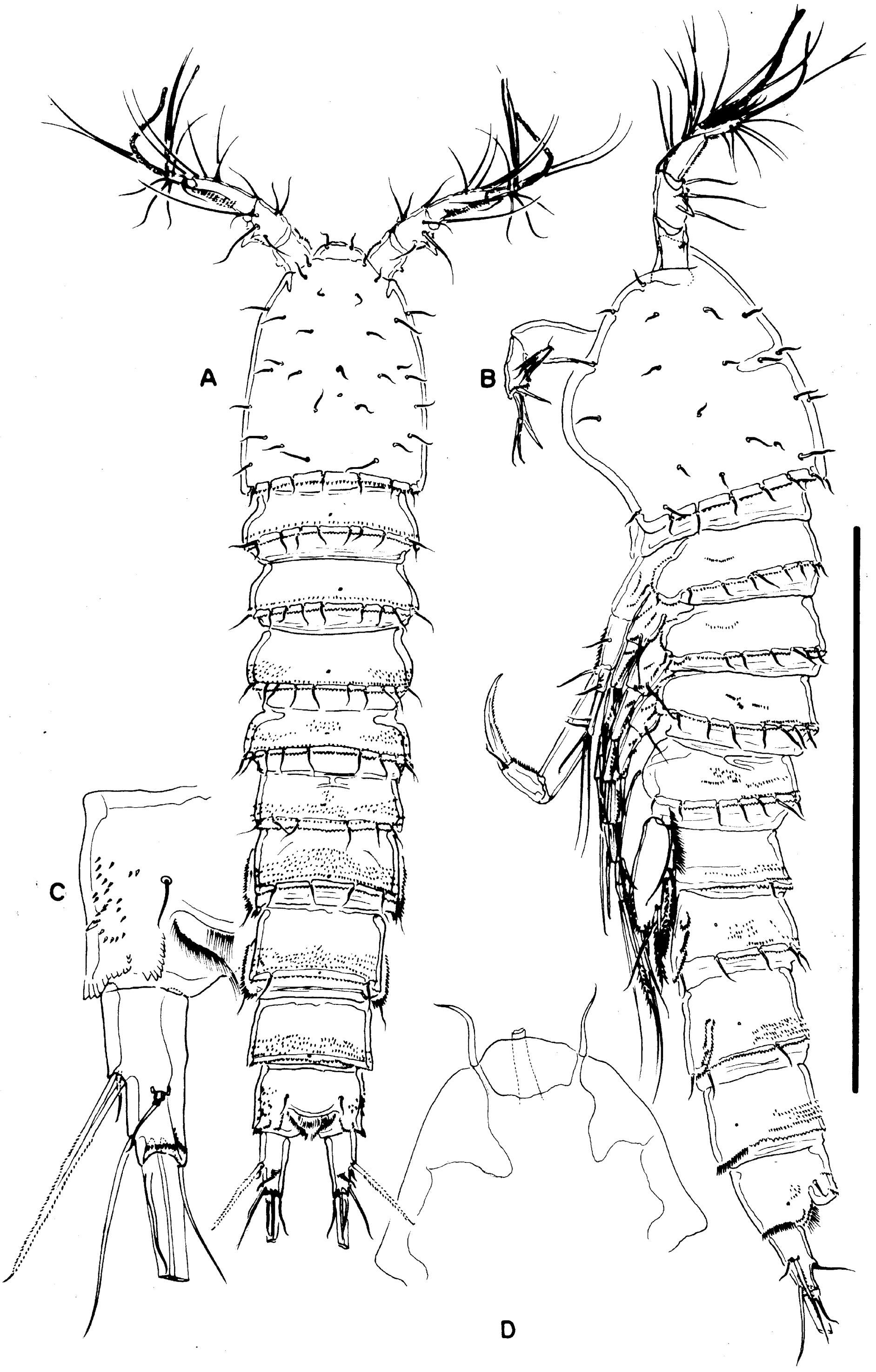

FIGURE 15. *Laophonte similicornuta* **sp. nov.**, female (AMNH 18488): (A) habitus, dorsal; (B) habitus, lateral; (C) anal somite and left caudal ramus, dorsal; (D) rostrum. (Scale: A, B=500 µm; C=176 µm; D=112 µm).

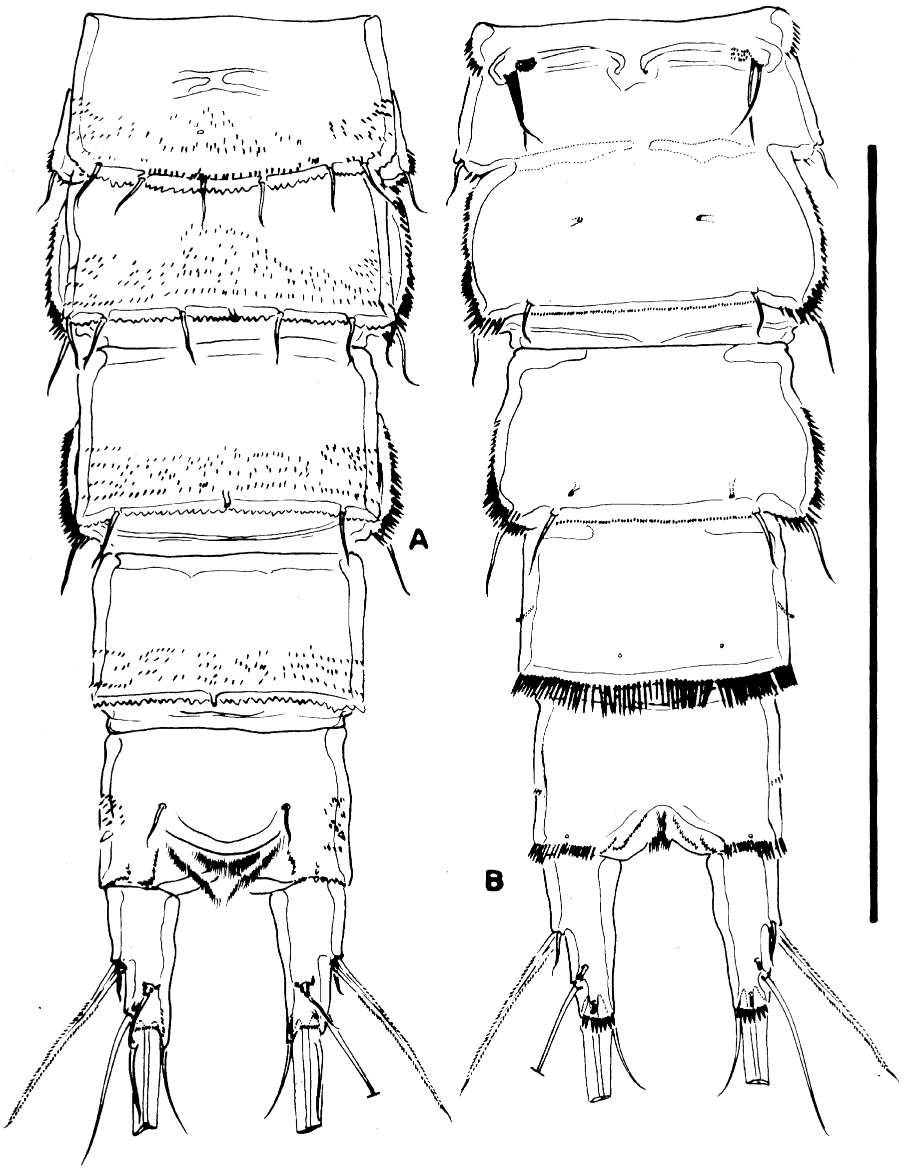

FIGURE 16. *Laophonte similicornuta* **sp. nov.**, female (AMNH 18488): (A) urosome, dorsal (P5 bearing somite omitted): (B) urosome, ventral (P5 bearing somite omitted). (Scale=300 µm).

Etymology

The specific name alludes its close resemblance to *L. cornuta*.

Description

FEMALE. Habitus (Fig. 15A–B) fusiform. Total body length measured from tip of rostrum to posterior margin of caudal rami, 850 µm. Cephalic shield about 1/5 total body length, surface smooth, posterior margin finely serrate. Rostrum (Figs 15A–B, D) fused

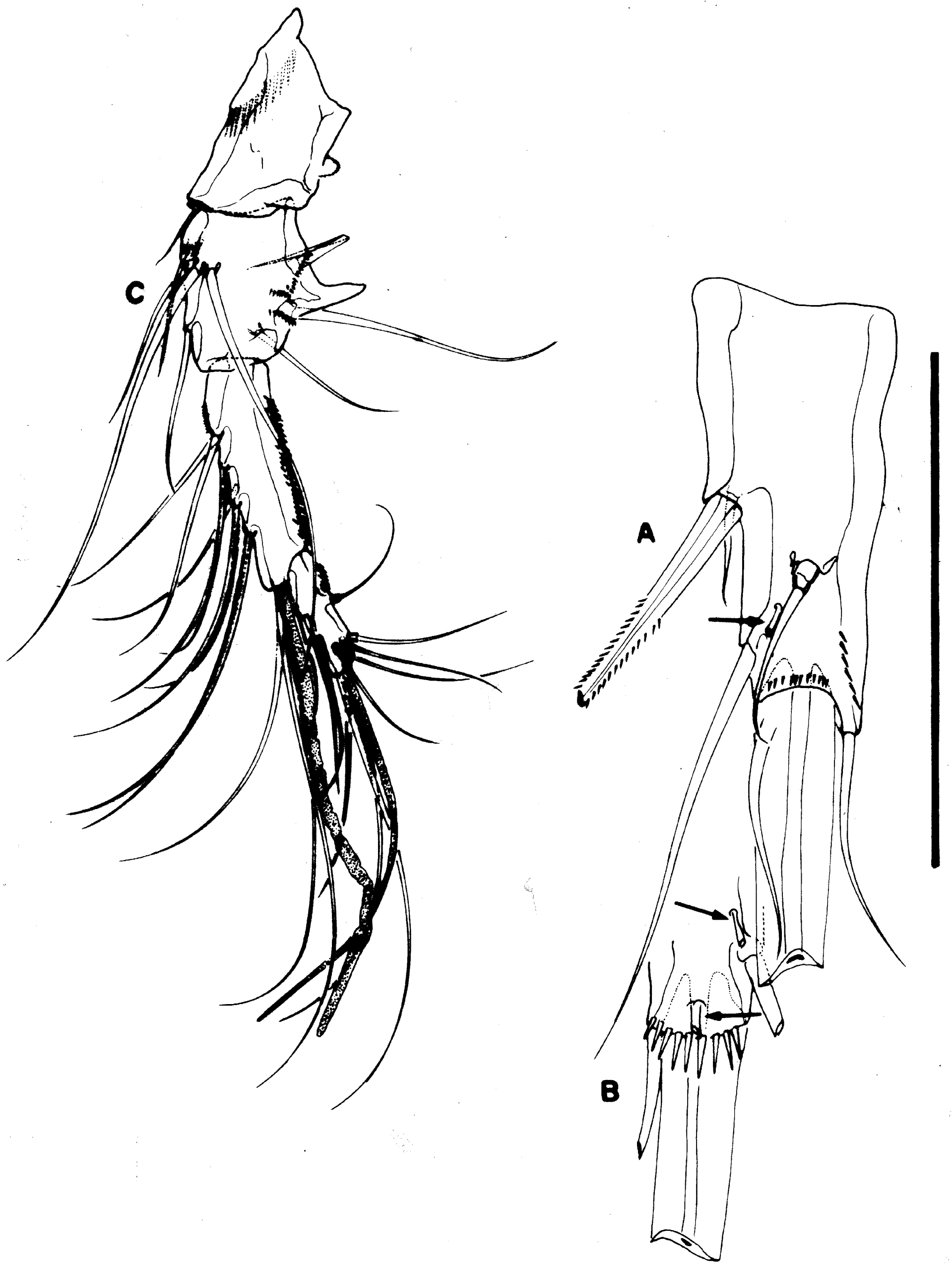

FIGURE 17. *Laophonte similicornuta* **sp. nov.**, female (AMNH 18488): (A) left caudal ramus, dorsal (tube pore arrowed); (B) distal part of left caudal ramus, ventral (tube pores arrowed); (C) antennule, ventral. (Scale: A, B=70 µm; C=147 µm).

to cephalic shield, with rounded tip flanked by pair of sensillae and with midventral tube pore. All body somites (except anal somite) with finely serrate posterior margins dorsally and laterally (Figs 15A–B, 16A). First to third prosomite (P2–P4 bearing somites) and first to fifth urosomite with spinular ornamentation as figured (Figs 15A, B, 16A). Genital-double somite distinct dorsally and laterally (Figs 15A–B, 16A), fused ventrally, with subtle internal rib indicating former division (Fig. 16B); genital half with few spinules near original somite boundary ventrally; posterior half with small ventrolateral spinules, and with minute spinules along posterior margin ventrally. Genital-double somite and urosomite with weakly developed lateral processes. Ornamentation of fourth urosomite as for preceding somite. Fifth urosomite ornamented as preceding somite dorsally (but without sensillae); ventrally with long spinules along posterior margin. Anal somite (Figs 15A–C, 16A–B) with spinules around ventral hind margin and with spinule patches laterodorsally; dorsally with small spinous projections in area between anal operculum and insertion of caudal rami; anal operculum rounded, flanked with pair of sensillae. Caudal rami (Figs 15C, 16A–B, 17A–B) about 3 times longer than wide; with dorsal tube pore

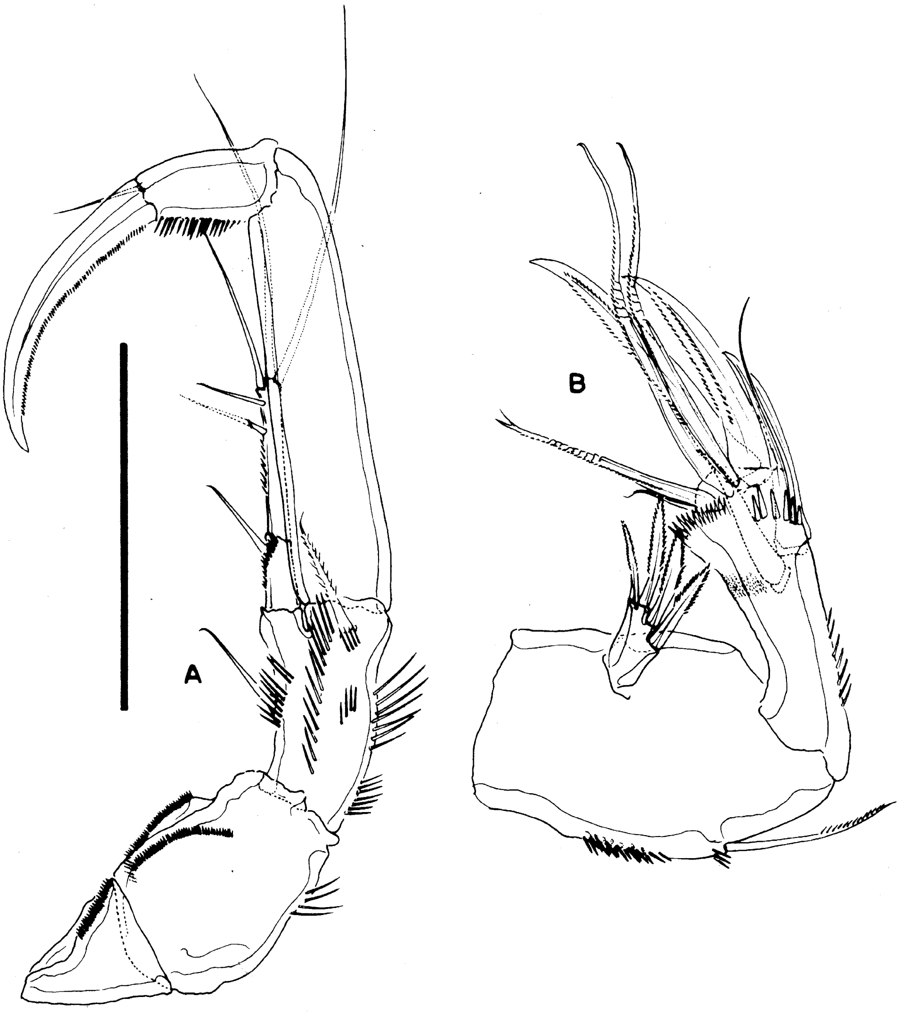

FIGURE 18. *Laophonte similicornuta* **sp. nov.**, female (AMNH 18488): (A) P1; (B) antenna. (Scale: A=71 µm; B=71 µm).

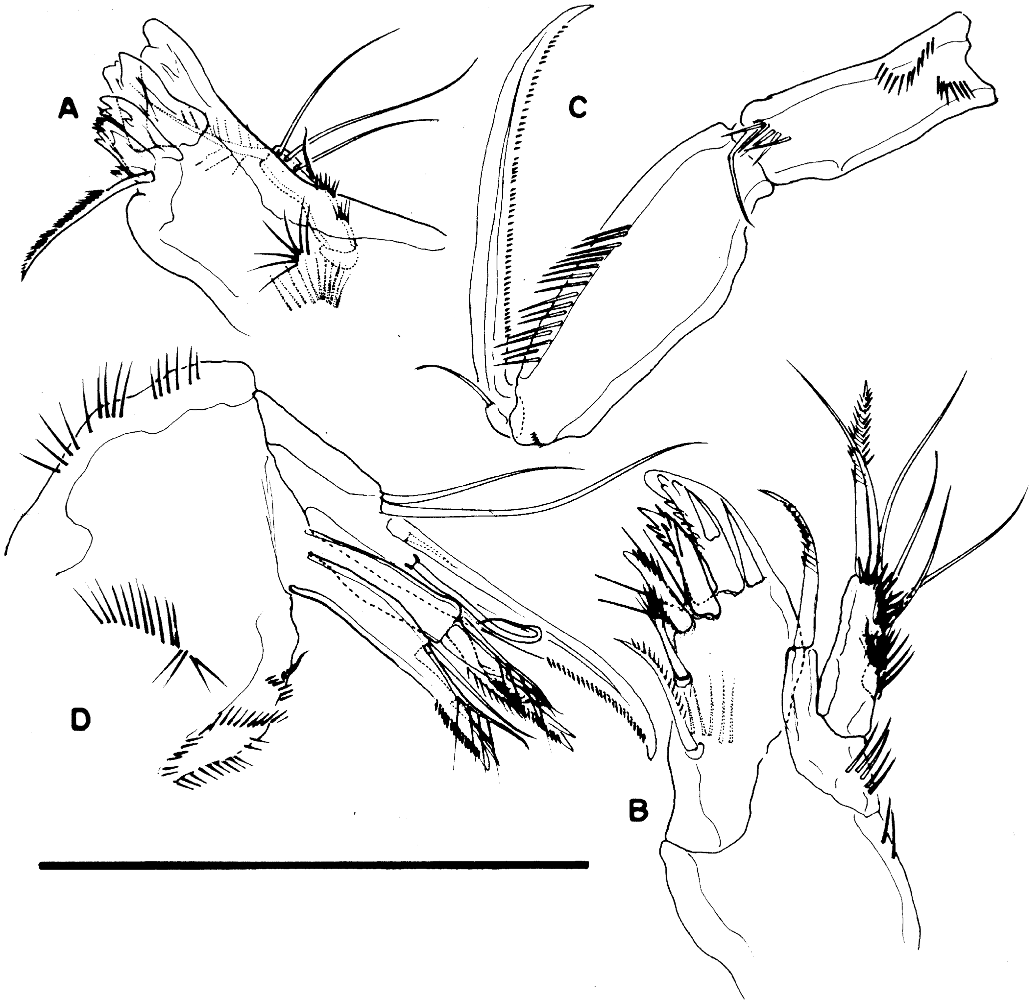

FIGURE 19. *Laophonte similicornuta* **sp. nov.**, female (AMNH 18488): (A) mandible; (B) maxillule; (C) maxilliped; (D) maxilla. (Scale: A, C=100 µm; B, D=70 µm).

between seta III and VII (arrowed in Fig. 17A); with minute spinules around insertion site of caudal seta V and VI dorsally and with 2 ventral tube pores near caudal seta III and V (arrowed in Fig. 17B), and with stronger spinules around insertion of seta V; with 7 setae; seta I small and ventral to seta II, the latter about 4 times longer than the former; seta III arising in outer distal corner, slender and slightly shorter than seta II; seta IV small (not dorsally displaced) and basally fused to seta V; seta VI as long as seta IV; triarticulate dorsal seta VII small, arising in distal third.

Antennule (Fig. 17C) 4-segmented; segment 1 with small, blunt and spinulose outer projection; segment 2 with acute outer thorn; all segments with spinule patches/rows as figured; all setae smooth; with aesthetasc on segments 3 and 4. Armature formula as follows: I-(1); II-(8); III-(11+(1+ae)); IV-(9+acrothek).

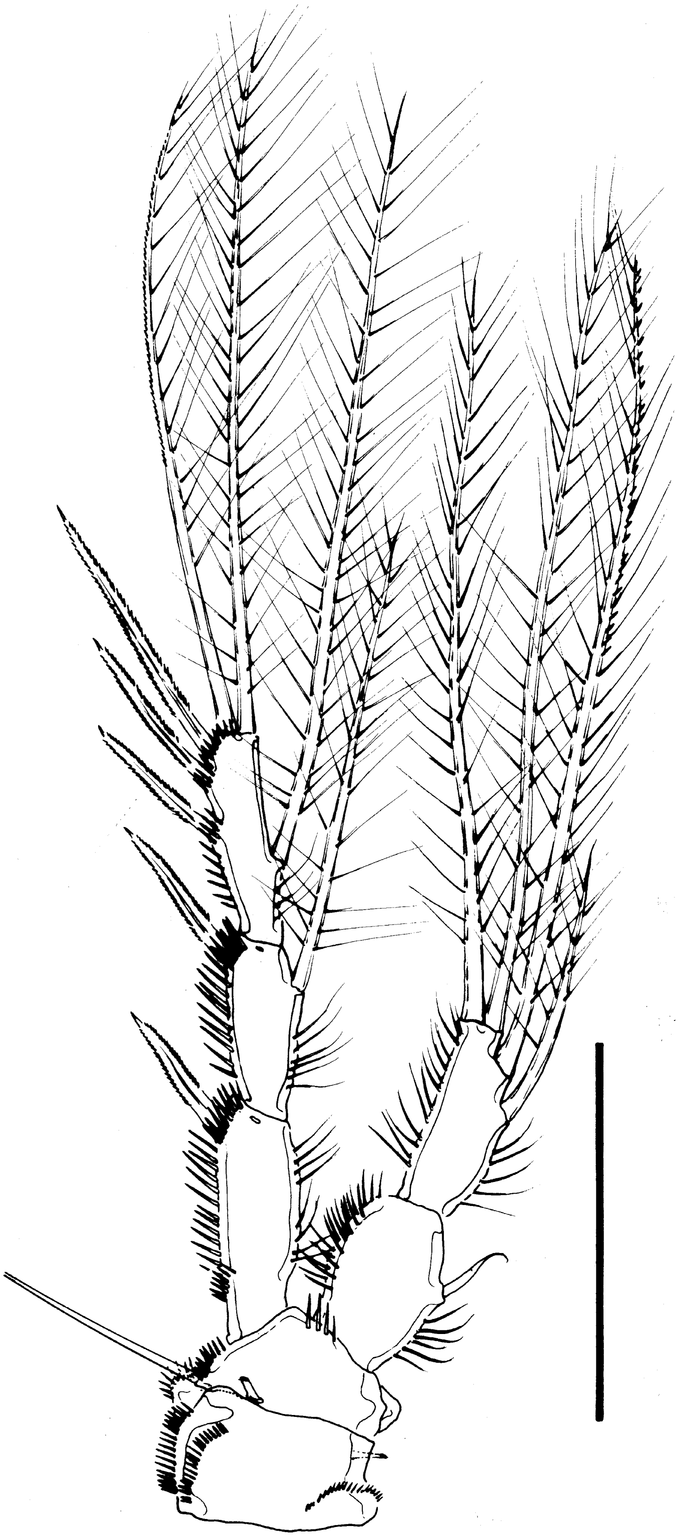

FIGURE 20. *Laophonte similicornuta* **sp. nov.**, female (AMNH 18488): P2. (Scale=71 µm).

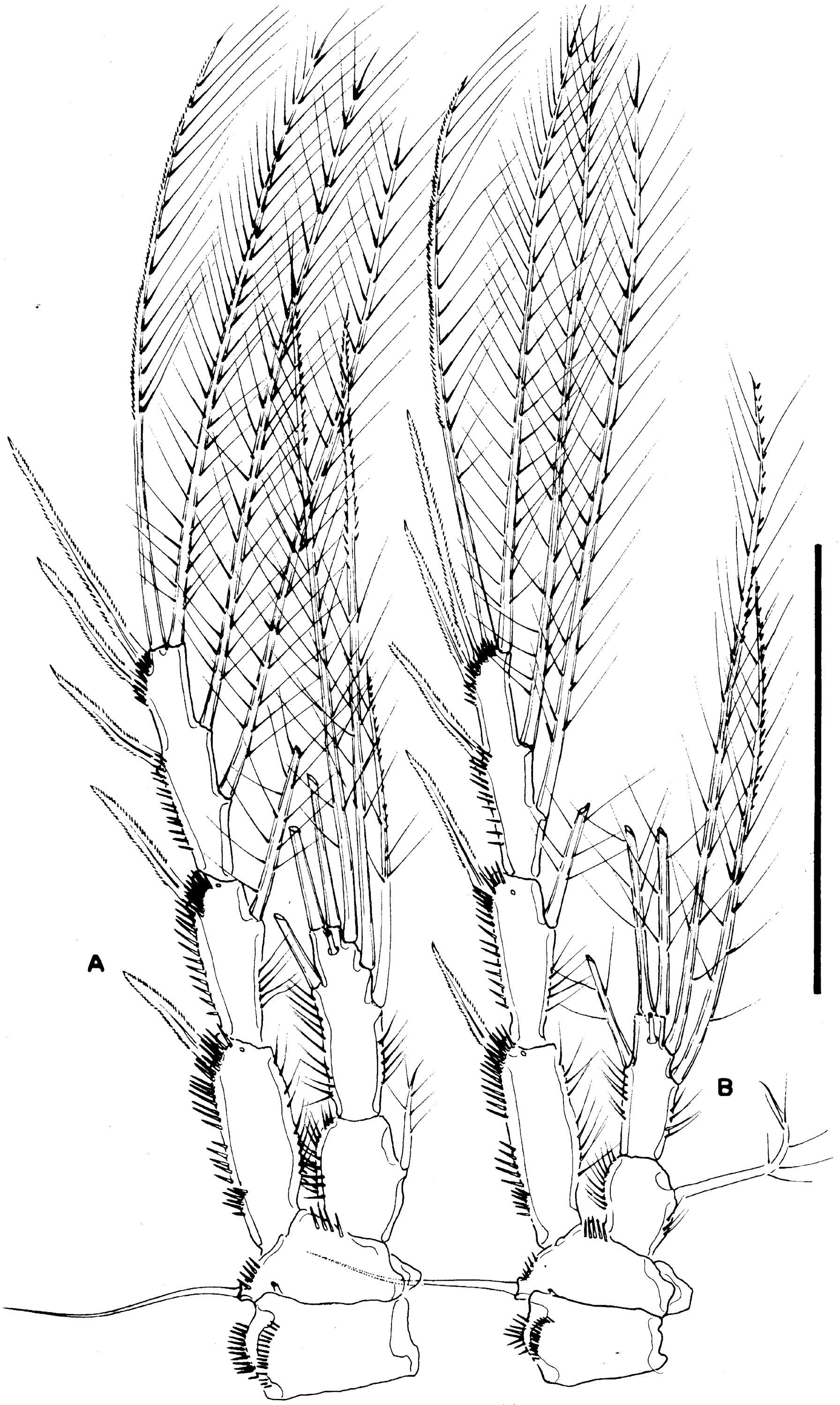

FIGURE 21. *Laophonte similicornuta* **sp. nov.**, female (AMNH 18488): (A) P3; (B) P4. (Scale=100 µm).

FIGURE 22. *Laophonte similicornuta* **sp. nov.**, female (AMNH 18488): P5. (Scale=100 µm).

Antenna (Fig. 18B) as in preceding species except for shorter spinule row along abexopodal margin, pinnate abexopodal seta, exopod somewhat more robust, and inner apical spines of endopod proportionally longer.

Mandible (Fig. 19A) as in preceding species except for spinules on coxa and palp.

Maxillule (Fig. 19B) as in preceding species except for comparatively stronger proximal lateral seta pinnate, and for 6 longer spinules on arthrite.

Maxilla (Fig. 19D) as in preceding species.

Maxilliped (Fig. 19C) as in preceding species except for longer spinule row along palmar margin; claw proportionally longer.

P1 (Fig. 18A) as in preceding species except for comparatively longer endopodal claw and spinules along inner margin of basis and along outer margin of ENP2.

P2 (Fig. 20), P3 (Fig. 21A) and P4 (Fig. 21B) as in preceding species except for ENP2 insertion site of proximal inner seta and proportional length of segment (shorter than in *L. cornuta*).

P5 (Fig. 22) as in preceding species except for reticulated area of endopodal lobe, proportional lengths of setae and for the baseoendopod reaching further down the exopod. Armature formula of P1–P5 as follows:

	EXP	ENP
P1	I-0;II1,2,0	0-0;0,I1,0
P2	I-0;I-1;III,2,1	0-1;0,2,2
P3	I-0;I-1;III,2,2	0-1;1,2,3
P4	I-0;I-1;III,2,2	0-1;1,2,2
P5	6	5

Genital field (Fig. 16B) located anteriorly; paired gonopores covered by genital operculum derived from P6, each armed with 2 naked setae of approximately equal length.

MALE. Unknown.

Genus *Phycolaophonte* Pallares

Phycolaophonte tongariki **sp. nov.**

(Figs 23–27)

Material examined

Holotype. 1 dissected female (AMNH 18489); brackish water pool (predominantly freshwater) in stone basin between moai statues and tide pool, Tongariki, Easter Island; 22 August 1999; coll. C.B. Boyko.

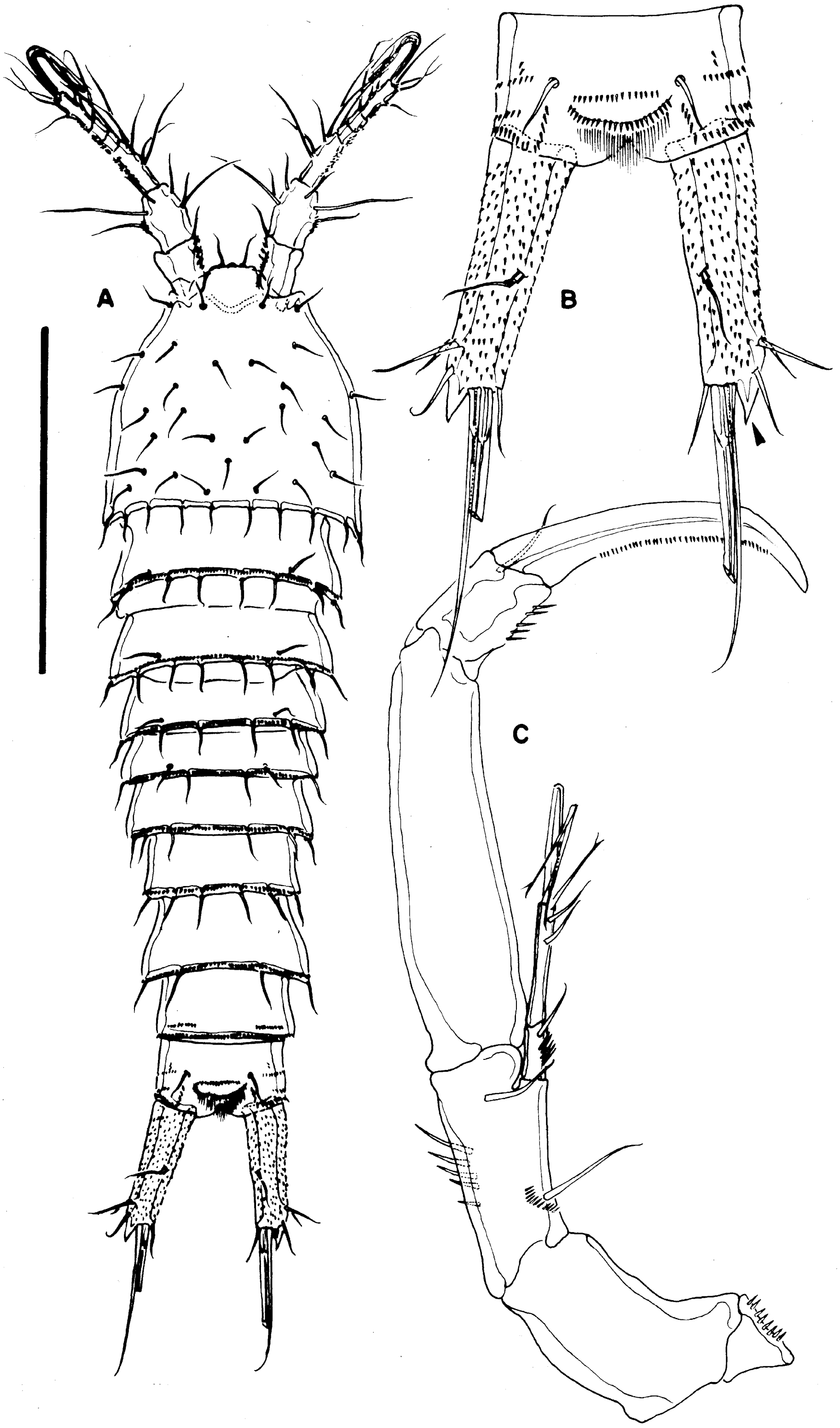

FIGURE 23. *Phycolaophonte tongariki* **sp. nov.**, female (AMNH 18489): (A) habitus, dorsal; (B) anal somite and caudal rami, dorsal; (C) P1. (Scale: A=200 µm; B=100 µm; C=72 µm).

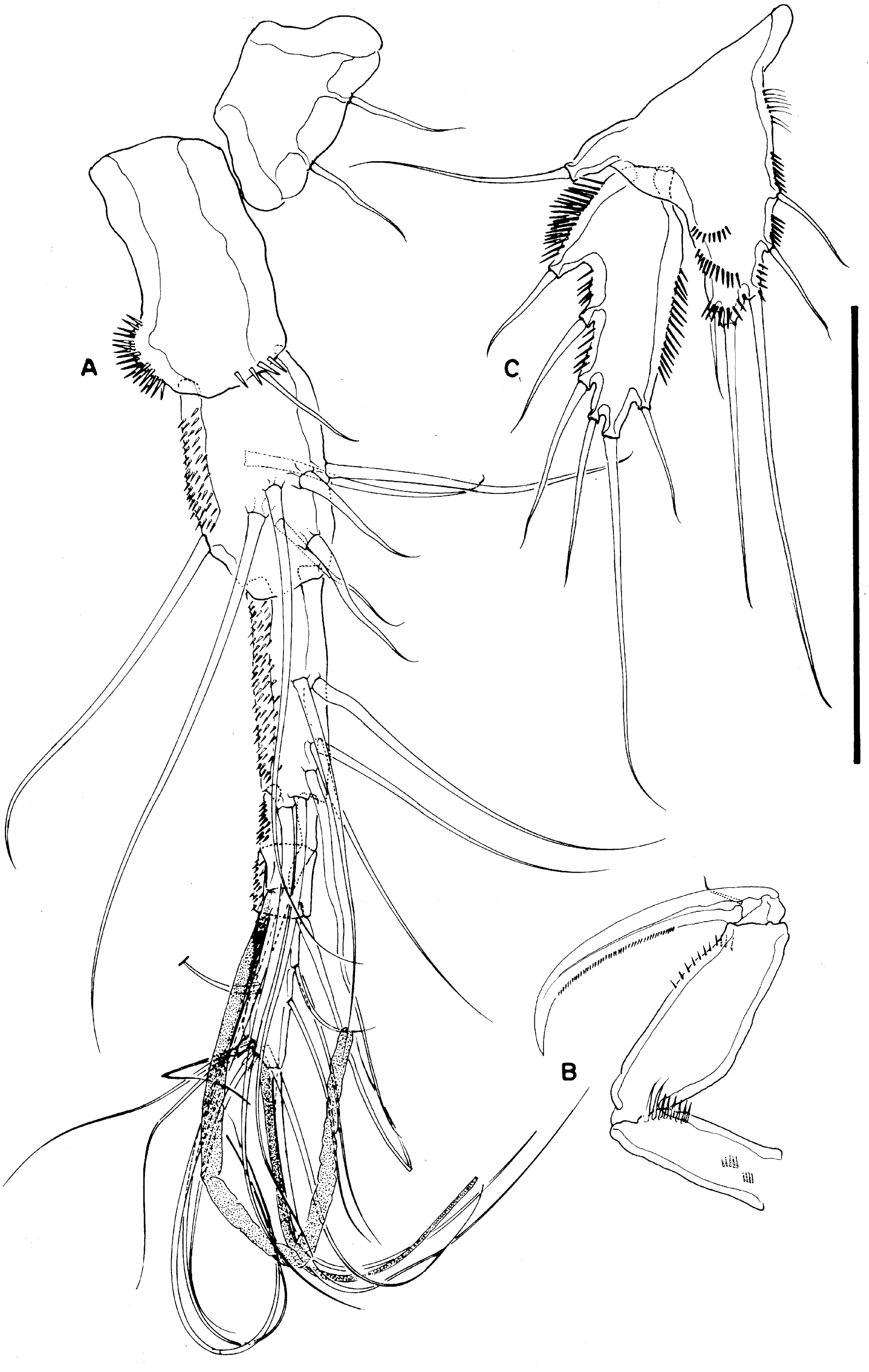

FIGURE 24. *Phycolaophonte tongariki* **sp. nov.**, female (AMNH 18489): (A) antennule; (B) maxilliped; (C) P5. (Scale: A=70 µm; B, C=100 µm).

Etymology

Named after the type locality, Tongariki, site of the most dramatic and imposing series of moai on Easter Island. The name is given as a noun in apposition.

Description

FEMALE. Habitus (Fig. 23A) fusiform. Total body length measured from tip of rostrum to posterior margin of caudal rami, 550 µm. Cephalic shield approximately 1/4 total body length, surface smooth. Rostrum (Fig. 24A) small, fused to cephalic shield, with pair of apical sensillae. First to third prosomites (P2–P4 bearing somites) with transverse row of minute spinules along posterior margin. First to fourth urosomite ornamented as prosomites dorsally; pleural extensions of urosomites small. Genital-double somite distinct dorsally (Fig. 23A), but fused ventrally (Fig. 26A), with subtle internal indication of former division; anterior genital half (second urosomite) with some spinules close to posterior corner ventrally; posterior genital half (third urosomite) with small ventrolateral spinules. Fourth urosomite with spinular rows laterally and along posterior margin. Fifth urosomite as for preceding somites dorsally except for additional short, dorsolateral spinular rows close to posterior margin, with longitudinal row of spinules along posterior margin ventrally (Fig. 26A) and additional transverse rows of minute spinules. Anal somite with some dorsolateral rows of minute spinules and with spinules close to joint with caudal rami dorsally (Fig. 23A–B) and ventrally (Fig. 26A); rounded anal operculum furnished with spinules and flanked by 2 sensillae (Fig. 23B). Caudal rami (Figs 23A–B, 26A) approximately twice as long as anal somite, and approximately 3 times longer than wide; covered by minute spinules (Figs 23B, 26A); outer distal corner produced into acute projection (arrowed in Fig. 26A); with 7 setae; setae I and II arising laterally in distal fifth, the former ventral to seta II and about half its total length; seta III arising subdistally, close to outer distal acute projection of ramus; seta IV and V inserted apically, seta V longest and with fracture plane; seta VI arising in inner distal corner, about same length as seta III; seta VII biarticulate at base and inserted midway ramus close to inner margin, as long as seta II.

Antennule (Fig. 24A) 6-segmented. First segment longest, about 2.5 times longer than wide, with few spinules around base of seta; outer distal corner slightly rounded and with spinules; segments 2–6 with small spinules along outer margin; segment 2 about twice as long as wide; segment 3 about 3.3 times as long as wide; segment 4 small, about 1.5 times longer than wide, bearing aesthetasc fused basally to seta; segment 5 small, about as long as wide; segment 6 about 4 times longer than wide. Armature formula as follows: I-(1); II-(8); III-(7); IV-(1+ae); V-(1); VI-(9+acrothek).

Antenna (Fig. 25A). Allobasis with few spinules medially along abexopodal margin and with 1 seta. Exopod 1-segmented, with 4 well developed pinnate setae. Endopod with 2 distal surface frills and 2 rows of strong spinules; laterally with 2 spines and 1 slender seta; apically with 2 pinnate spines, 2 geniculate elements, and 1 geniculate seta fused basally to slender, reduced element.

Mandible (Fig. 25B). Strong gnathobasis with bidentate teeth and 1 slender seta. Palp 1-segmented; with 5 setae (1 basal, 1 exopodal and 3 endopodal).

Maxillule (Fig. 25C). Arthrite with 1 anterior surface seta, with 2 lateral pectinate elements and 5 spines distally. Coxal endite with 2 elements. Basis with 1 strong element and 2 slender setae; endopod fused to basis and represented by 2 setae. Exopod distinct, 1-segmented, bearing 2 setae (outermost smaller).

FIGURE 25. *Phycolaophonte tongariki* **sp. nov.**, female (AMNH 18489): (A) antenna; (B) mandible; (C) maxillule; (D) maxilla. (Scale: A, B=50 µm; C, D=33 µm).

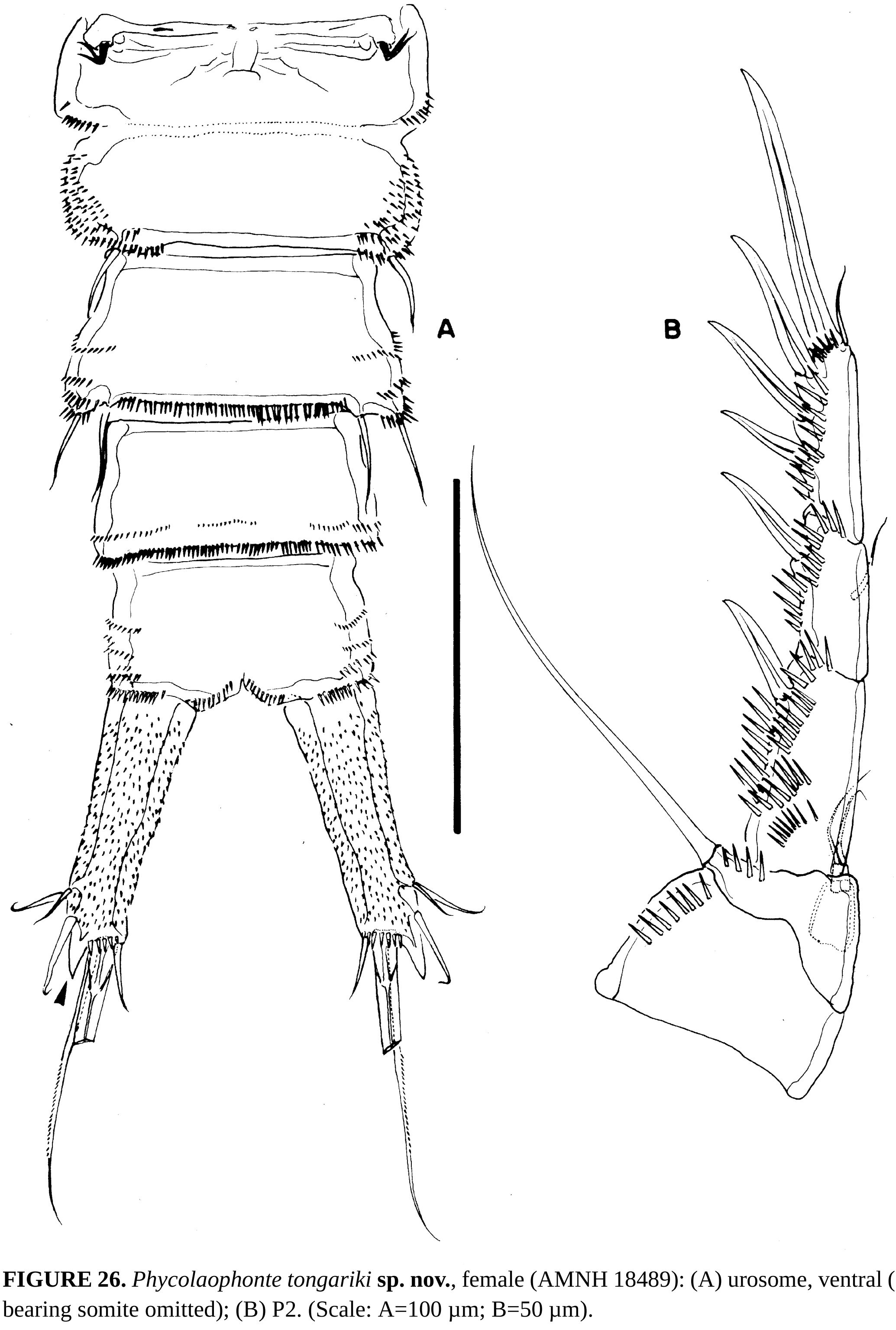

FIGURE 26. *Phycolaophonte tongariki* **sp. nov.**, female (AMNH 18489): (A) urosome, ventral (P5 bearing somite omitted); (B) P2. (Scale: A=100 µm; B=50 µm).

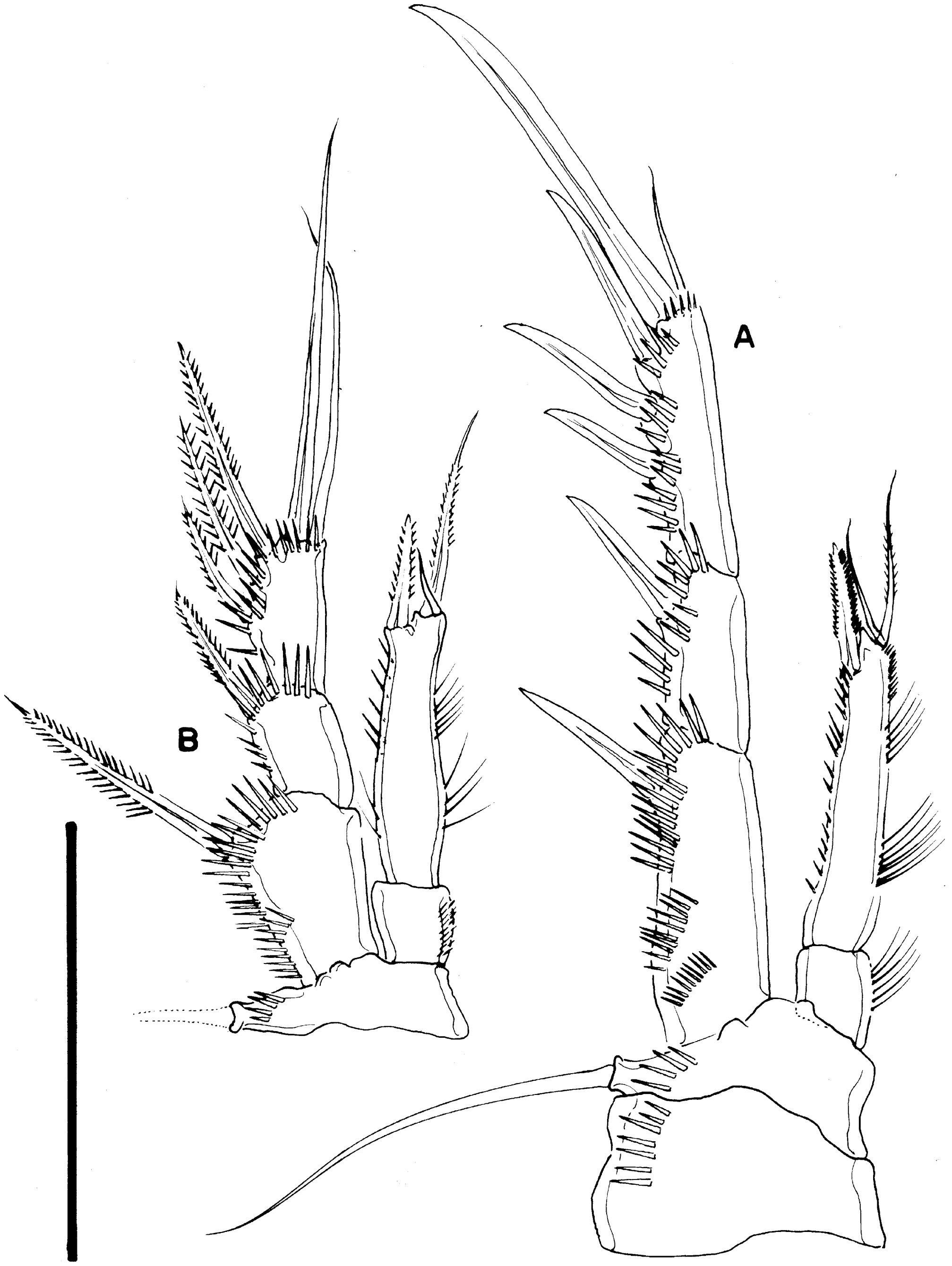

FIGURE 27. *Phycolaophonte tongariki* **sp. nov.**, female (AMNH 18489): (A) P3; (B) P4. (Scale=50 µm).

Maxilla (Fig. 25D). Syncoxa with 3 endites; proximal endite small, with 1 seta; middle and distal endite with 3 elements each. Allobasis drawn out into strong claw with 1 anterior and 1 posterior accessory seta. Endopod represented by 3 setae.

Maxilliped (Fig. 24B) elongate. Syncoxa with 2 apical setae and with spinules as figured. Basis with spinule row along distal palmar margin. Endopod drawn out into recurved, minutely pinnate claw with 1 accompanying seta at base.

P1 (Fig. 23C). Praecoxa small, triangular. Coxa large, without ornamentation. Inner margin of basis with longitudinal row of strong spinules posteriorly, with 1 inner and 1 outer seta. Rami 2-segmented. Exopod small, reaching proximal third of ENP1; EXP1 about 2.5 times longer than wide, and about 1/3 total length of EXP2, the latter with 5 elements. Endopod robust and long; ENP1 about 3.8 times longer than wide, without ornamentation; ENP2 about 1.5 times longer than wide, bearing 1 small apical seta and strong claw.

P2 (Fig. 26B). Robust coxa with strong spinules close to outer margin. Basis with spinules at base of long, outer seta. Exopod 3-segmented; EXP1 without inner seta; EXP2 with small inner seta; EXP3 with 3 outer spines and 2 apical elements, innermost one reduced; outer spines bare. Endopod small, 2-segmented; ENP1 unarmed, about twice as long as wide; ENP2 very small, with 2 apical setae.

Coxa and basis of P3 (Fig. 27A) as in P2, except for comparatively shorter outer basal seta. Exopod 3-segmented, without inner setae, outer spines bare. Endopod 2-segmented; ENP1 small, nearly as long as wide; ENP2 long, about 5.5 times longer than wide (and about 4.2 times longer than preceding segment); with 1 outer spine and 2 apical setae (innermost smaller).

P4 (Fig. 27B). Basis as in P3. Exopod 3-segmented, comparatively shorter than in P2 and P3; outer spines pinnate; EXP3 outer apical element more setiform than equivalent in P2 and P3, and inner apical seta longer than in P2 and P3. Endopod 2-segmented, reaching middle of EXP3; general morphology as in P3, except for relative size of apical elements.

P5 (Fig. 24C) large, with separate rami. Baseoendopodal lobe moderately developed, reaching to middle of exopod; with spinule rows as figured in Fig. 24C; with 5 setae and basal seta arising from short setophore. Exopod oval shaped, with spinules along inner and outer margins; with 4 outer, 1 apical, and 1 inner seta.

Armature formula of P1–P5 as follows:

	EXP	ENP
P1	I-0;II1,2,0	0-0;0,I1,0
P2	I-0;I-1;III,I1,0	0-0;0,2,0
P3	I-0;I-0;III,I1,0	0-0;I,2,0
P4	I-0;I-0;III,I1,0	0-0;I,2,0
P5	6	5

Genital field (Fig. 26A) located anteriorly; paired gonopores covered by genital operculum derived from P6, each with 2 setae; single copulatory pore located medially.

MALE. Unknown.

Genus *Loureirophonte* Jakobi

Loureirophonte minutum sp. nov.

(Figs 28–32)

Material examined

Holotype. 1 dissected male (AMNH 18490); Puu Kiri Ohio Point, Anakena Beach, Easter Island; 22 August 1998; coll. Virginia Killorin.

Etymology

The specific name refers to the extreme reduction of the P4 endopod, which is represented by a single seta.

Description

FEMALE. Unknown.

MALE. Habitus (Fig. 28A, B) fusiform, covered with minute spinules dorsally and laterally. Total body length, 305 µm measured from tip of rostrum to posterior margin of caudal rami. Cephalic shield about 1/4 total body length; posterior margin smooth except for minute spinules on posterolateral rounded corner. Free thoracic somites (P2–P4 bearing somites) and first and second urosomites (P5 and P6 bearing somites) with comparatively larger spinules along posterior margin. Third and fourth urosomites as in preceding somites dorsally, and with stronger spinules ventrally (Fig. 29A). Fifth urosomite as in preceding somite except for lack of strong spinules on distal outer corner. Anal somite (Figs 28A–D, 29A) as long as preceding somite; dorsal surface covered with small spinules, with comparatively stronger spinules as figured (Fig. 28C); without spinular ornamentation ventrally except for spinules close to joint with caudal rami (Fig. 29A); anal operculum (Fig. 28A–D) spinulose, with transverse spinular row. Caudal rami (Figs 28A–D, 29A) about 3 times as long as wide; with spinules as in Figs 28C–D and 29A; with 6 setae arising in distal quarter; seta I absent; seta II close to seta III, the latter slightly longer; seta VI slightly smaller than seta II; dorsal seta VII triarticulate and long.

Antennule (Fig. 30A) 8-segmented; subchirocer; geniculation between segments 5 and 6; segment 4 small and difficult to see; surface of segments smooth except for spinules on first one; all setae bare; with aesthetasc on fourth and last segment. Armature formula difficult to define.

Antenna (Fig. 30B). Allobasis with 1 small seta. Exopod 1-segmented, with 4 pinnate elements. Endopod with 2 spines and 1 slender seta laterally; distally with 6 elements (2 spines, 2 geniculate setae, and 1 geniculate seta fused basally to small, slender seta).

Mandible (Fig. 30C). Strong gnathobasis with bi- and multicuspidate teeth and 1 seta. Palp 1-segmented with 5 setae (1 basal, 1 exopodal, and 3 endopodal setae).

Maxillule (Fig. 30D). Praecoxal arthrite with 1 surface seta, 2 lateral elements, and 5 distal teeth. Coxal endite with 2 elements. Basis with 1 strong and 2 slender setae. Endopod fused to basis and represented by 3 setae; exopod 1-segmented, with 2 setae.

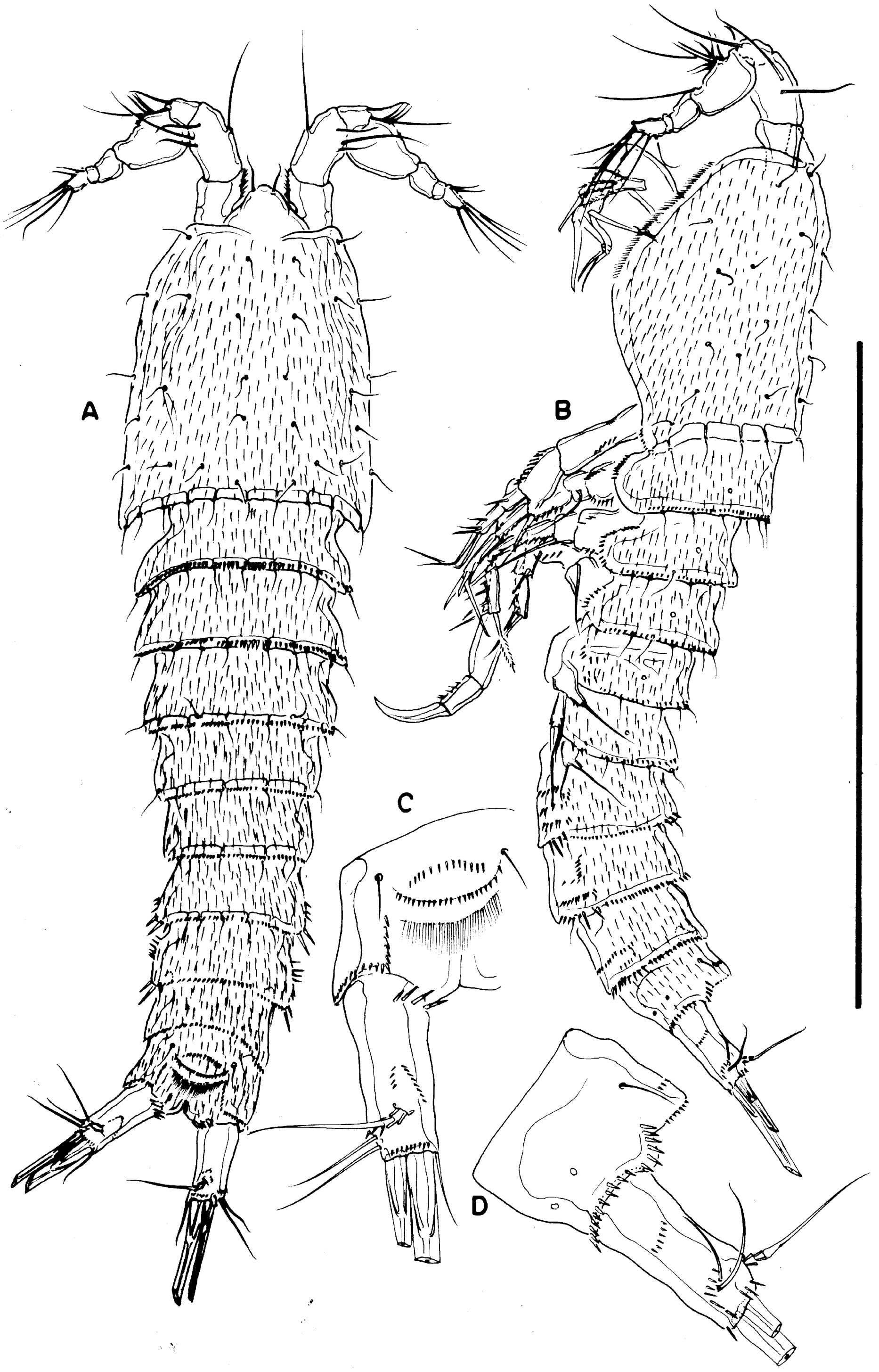

FIGURE 28. *Loureirophonte minutum* **sp. nov.**, male (AMNH 18490): (A) habitus, dorsal; (B) habitus, lateral; (C) anal somite and left caudal ramus, dorsal; (D) anal somite and left caudal ramus, lateral. (Scale: A, B=200 µm; C, D=100 µm).

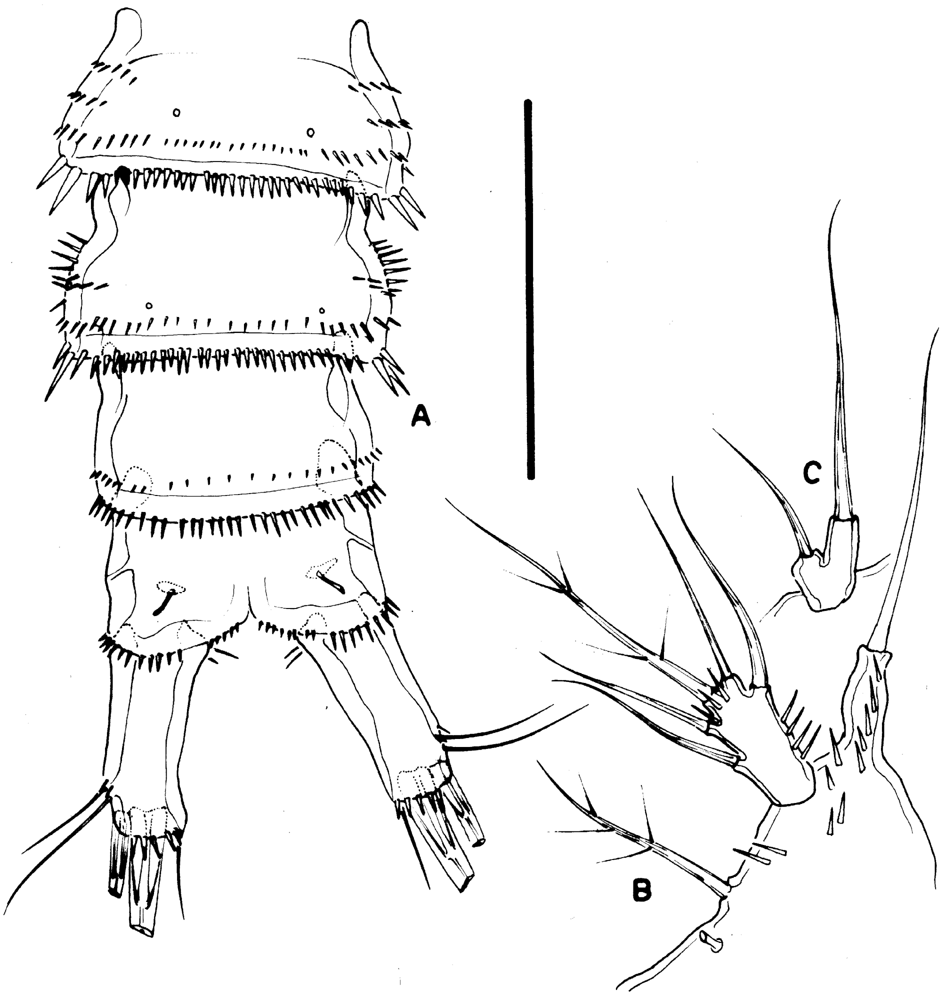

FIGURE 29. *Loureirophonte minutum* **sp. nov.**, male (AMNH 18490): (A) third, fourth, fifth and anal somite, ventral; (B) P5; (C) P6. (Scale: A=50 µm; B, C=25 µm).

Maxilla (Fig. 30E). Syncoxa with small spinules along inner margin proximally and with long spinules distally along outer margin; with 3 endites; proximal endite small with 1 seta; middle and distal endites with 3 setae each. Allobasis drawn out into strong claw with 1 anterior and 1 posterior seta. Endopod represented by 3 setae.

Maxilliped (Fig. 30F) subchelate. Syncoxa with 2 setae. Basis elongate and ornamented with spinules. Endopod drawn out into claw bearing 1 accessory seta.

P1 (Fig. 31A). Coxa and basis with spinules as figured. Basis with inner (migrated anteriorly) and outer seta. Exopod 2-segmented; EXP1 comparatively smaller; EXP2 about 3 times as long as wide. Endopod 2-segmented; ENP1 straight, about 6.3 times longer than wide, with slender spinules proximally along inner margin; ENP2 small, with outer and apical spinules, with strong claw and slender, small seta.

P2 (Fig. 31B) with setiform, outer basal element. Exopod 3-segmented; EXP1 without and EXP2 with inner seta; EXP3 with 5 setae (apical inner seta reduced). Endopod dimorphic; 2-segmented; ENP1 small, about as long as wide; ENP2 modified, with inner and outer seta proximally; distal part produced into long apophysis with few setules along inner margin, reaching far beyond exopod and with 1 slender seta apically.

FIGURE 30. *Loureirophonte minutum* **sp. nov.**, male (AMNH 18490): (A) antennule; (B) antenna; (C) mandible; (D) maxillule; (E) maxilla; (F) maxilliped. (Scale: A, B, F=50 µm; C–E=33 µm).

P3 (Fig. 32A, B). Coxa, basis and exopod as in P2. Endopod 2-segmented; ENP1 as in P2; ENP2 with 2 apical setae.

P4 (Fig. 32C–E). Coxa, basis and exopod as in P2 except for coarser spinules of outer and apical spines, and for armature of EXP3 (with 2 outer spines). Endopod represented by small seta.

P5 (Fig. 29B). Both legs medially fused, with spinules as figured. Baseoendopod represented by single seta. Exopod distinct, with 5 setae.

Armature formula of P1–P5 as follows:

	EXP	ENP
P1	I-0;III,2,0	0-0;0,I1,0
P2	I-0;I-1;III,I1,0	0;0;111(dimorphic)
P3	I-0;I-1;III,I1,0	0-0;0,2,0
P4	I-0;I-1;II,I1,0	1
P5	5	1

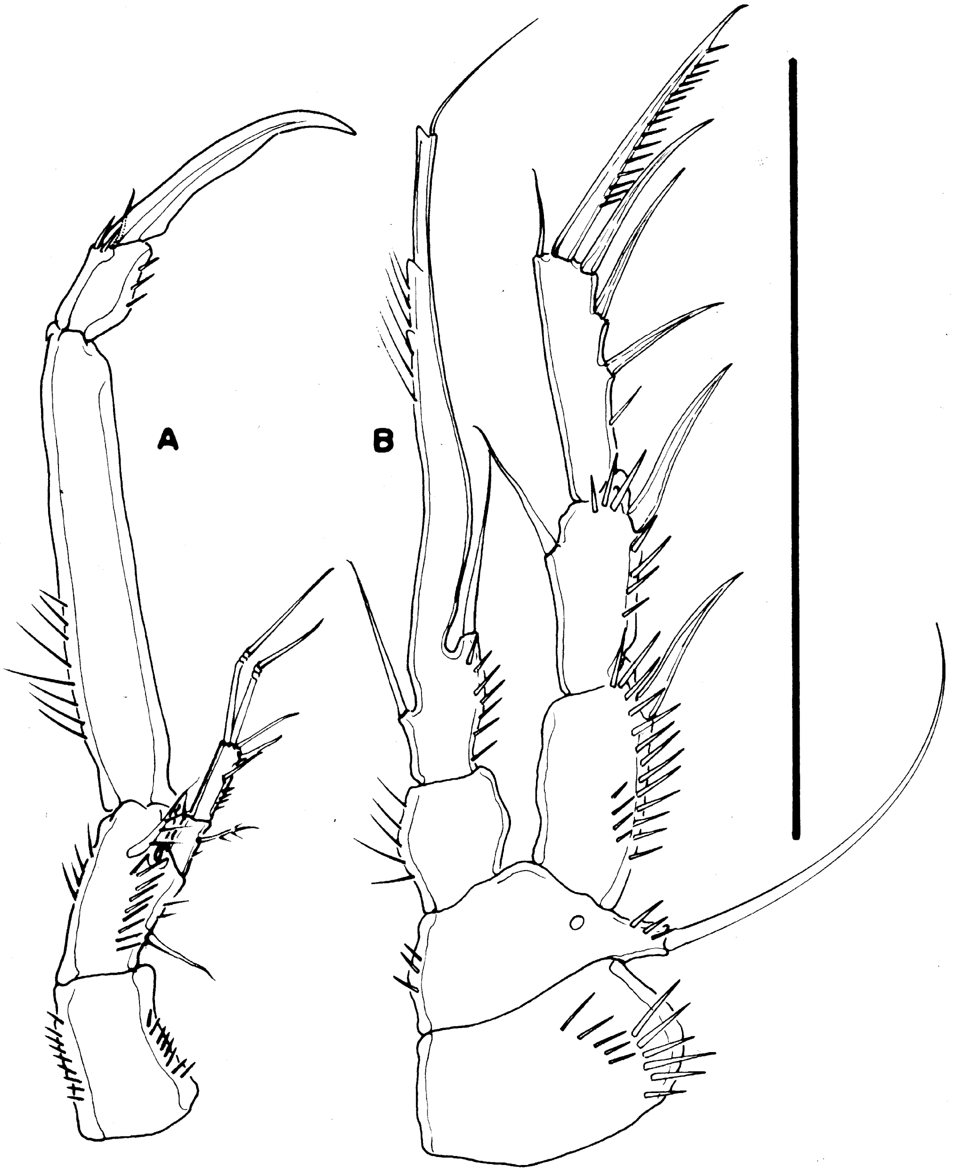

FIGURE 31. *Loureirophonte minutum* **sp. nov.**, male (AMNH 18490): (A) P1; (B) P2. (Scale: A=100 µm; B=50 µm).

P6 (Fig. 29C). Both legs symmetrical, each represented by small segment bearing 2 setae (innermost smaller).

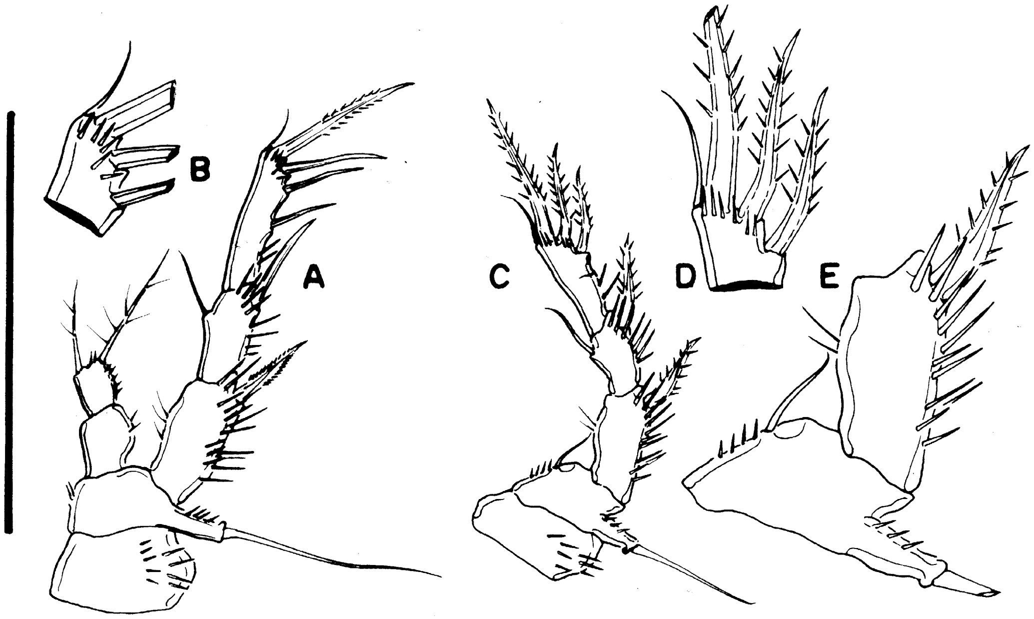

FIGURE 32. *Loureirophonte minutum* **sp. nov.**, male (AMNH 18490). (A) P3; (B) distal part of third exopodal segment of P3; (C) P4; (D) distal part of third exopodal segment of P4; (E) first exopodal segment, basis and endopodal seta. (Scale: A, C=50 µm; B, D, E=25 µm).

Subfamily Esolinae Huys and Lee

Genus *Corbulaseta* Huys and Lee

Corbulaseta pacifica sp. nov.
(Figs 33–37)

Material examined

Holotype. 1 dissected female (AMNH 18491); dead *Pocillopora damicornis* (Linnaeus); 48.16 m (158 feet) depth, off Motu Iti, Easter Island; 28 August 1999; coll. H. Tonnemacher.

Etymology

This species is named for its occurrence in the central Pacific Ocean.

Description

FEMALE. Habitus (Fig. 33A–B) cylindrical, surface covered with minute spinules.

Total body length measured from tip of rostrum to posterior margin of caudal rami, 350 µm. Cephalic shield about 1/4 total body length; with pair of large anterodorsal cup-shaped pores; posterior margin with fine setules dorsally, with small spinules around laterally produced posterior corner and posterior half of ventral margin. Rostrum trapezoid, delimited at base by incomplete surface suture, with pair of apical sensillae and ventral tube pore. Posterior margins of first to third prosomites (P2–P4 bearing somites) serrate and with fine setules. Posterior margin of first urosomite serrate but without setules. Genital-double somite slightly dorsoventrally depressed; original segmentation marked by bilateral ridge visible in dorsal and lateral aspect (Figs 33A–B, 34A); with spinules along posterior margin and on lateral expansions; ventrally without spinular ornamentation. Fourth urosomite ornamented as in preceding somite, with lateral expansions. Fifth somite as in preceding somite, additionally with transverse row of spinules close to posterior margin and strong spinules along posterior margin ventrally; without lateral expansion. Anal somite as long as preceding somite; dorsal surface with minute spinules; anal operculum slightly rounded, spinulose, flanked by pair of sensillae and 2 longitudinal spinule rows; without ornamentation ventrally, except for spinular row around hind margin. Caudal rami (Figs 33A–B, 34A–B) about 1.5 times longer than wide; with 6 setae arising in posterior quarter; seta I absent; setae IV and V well developed.

Antennule (Fig. 35A) 6-segmented; segment 1 with spinules medially and distally; outer corner with double projection; aesthetasc on segment 4 (basally fused to 1 setae) and on segment 6 (basally fused to 2 setae forming acrothek). All setae bare. Armature formula: I-(1); II-(8); III-(6); IV-(1+(1+ae)); V-(1); VI-(9+acrothek).

Antenna (Fig. 35B) with allobasis; with 1 abexopodal seta. Exopod with 1 strong pinnate outer spine and 3 pinnate setae. Endopod elongate; with 2 distal surface frills; with 2 spines and 1 slender seta laterally, and 6 distal elements (2 spines, 2 geniculate setae, and 1 geniculate seta fused basally to small seta).

Mandible (Fig. 35C) with strong gnathobasis. Palp indistinctly 2-segmented (endopodal boundary partially visible); with 2 basal setae, exopod represented by 1 seta and with 3 slender elements apically (endopod).

Maxillule (Fig. 35D). Praecoxal arthrite with 1 surface seta, and 7 elements around distal margin. Coxal endite with 2 elements. Basis with 1 strong and 2 slender setae. Endopod fused to basis, represented by 2 setae. Exopod 1-segmented, with 2 setae.

Maxilla (not shown) badly damaged during dissection. Presumably as in *Esola bulbifera* (Norman) and *Corbulaseta bulligera* (Farran) (see Huys & Lee 2000: 54, Fig. 2G; 89): with 3 syncoxal endites (armature 1:3:3 respectively) and endopod represented by 4 setae.

Maxilliped (Fig. 35E) subchelate. Syncoxa with 2 setae. Basis elongate, with several spinule rows, palmar ones long and fine. Endopod drawn out into pinnate claw with 1 accessory seta.

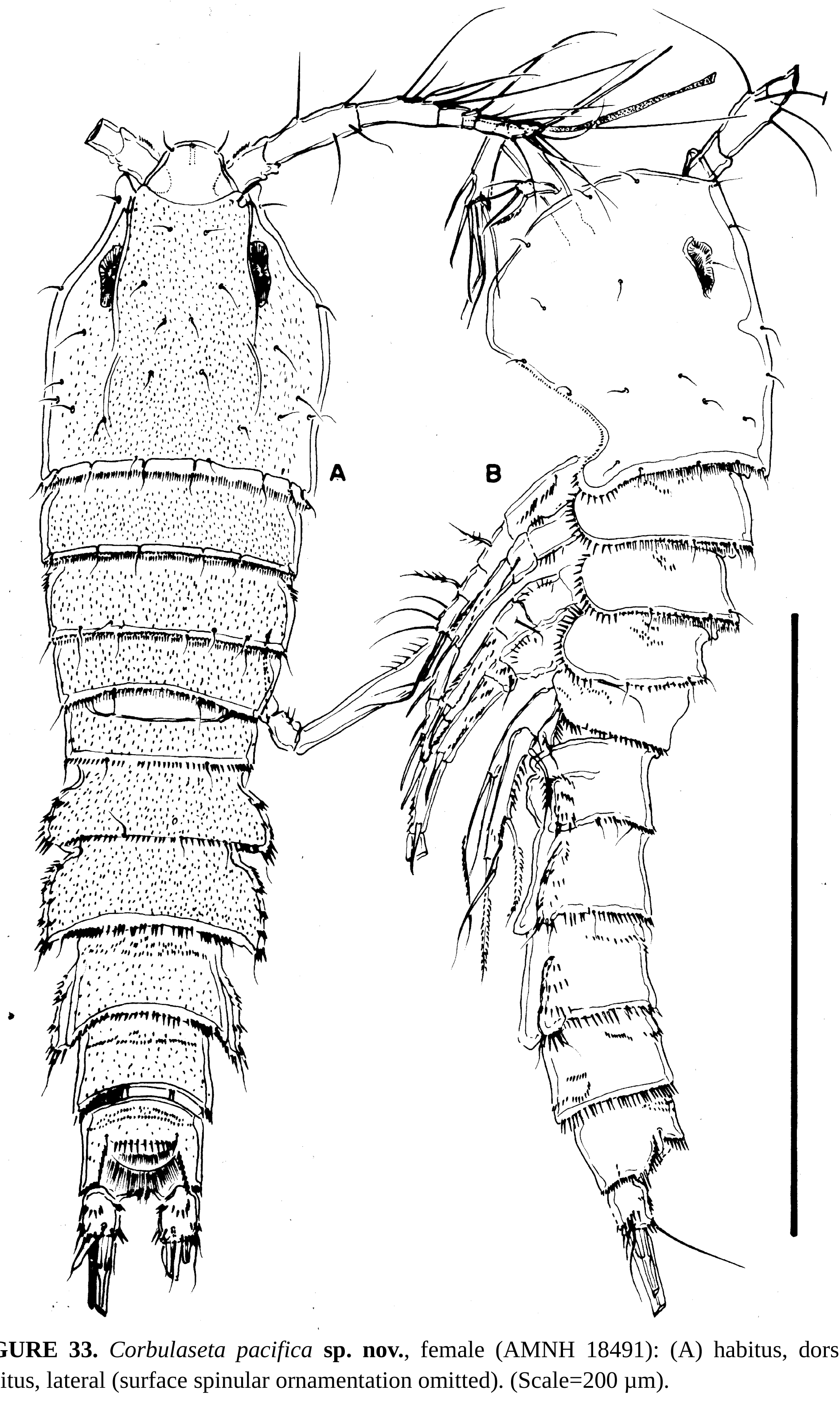

FIGURE 33. *Corbulaseta pacifica* **sp. nov.**, female (AMNH 18491): (A) habitus, dorsal; (B) habitus, lateral (surface spinular ornamentation omitted). (Scale=200 µm).

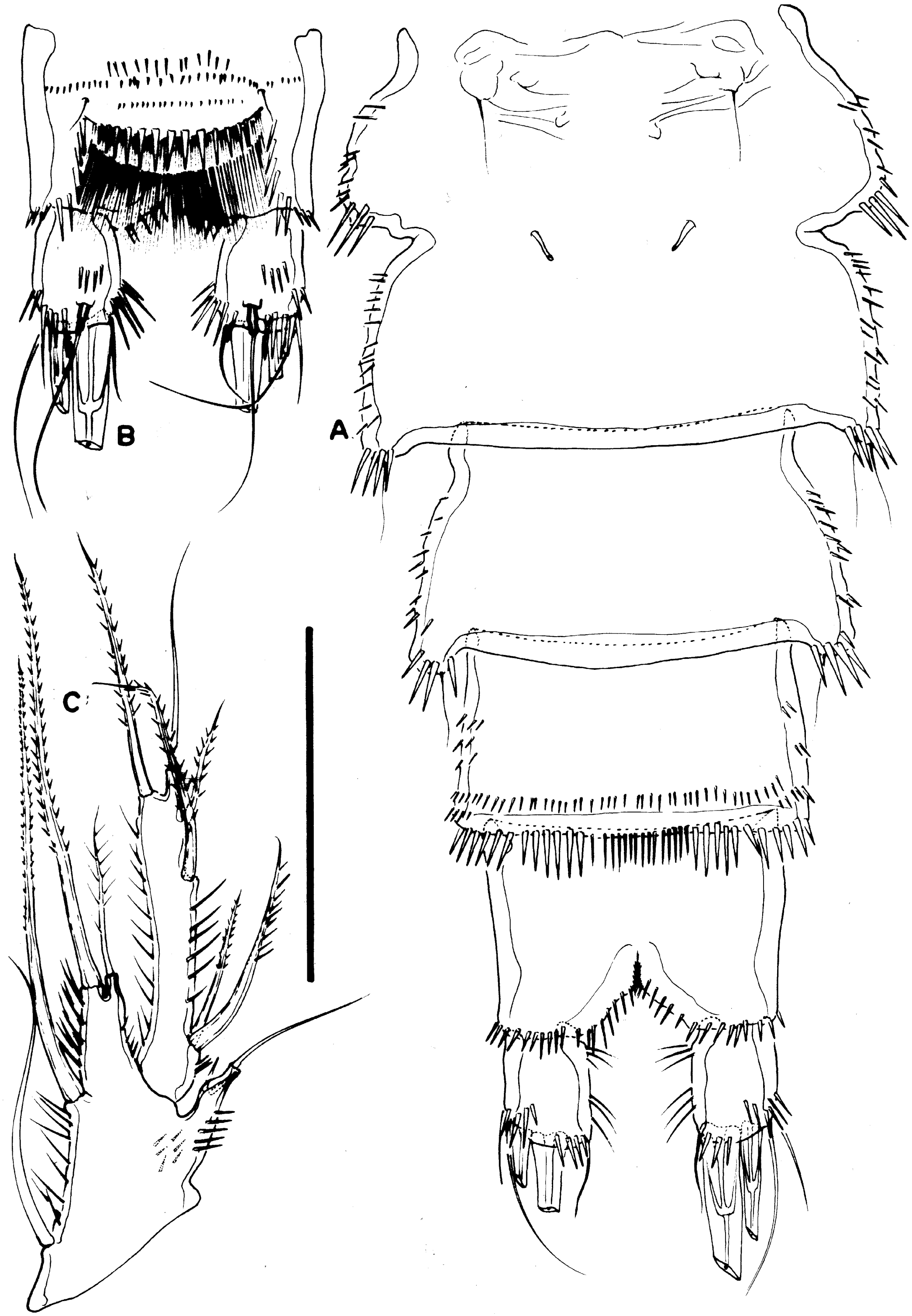

FIGURE 34. *Corbulaseta pacifica* **sp. nov.**, female (AMNH 18491): (A) urosome, ventral (P5 bearing somite omitted); (B) anal somite and caudal rami, dorsal; (C) P5. (Scale=50 µm).

FIGURE 35. *Corbulaseta pacifica* **sp. nov.**, female (AMNH 18491): (A) antennule; (B) antenna; (C) mandible; (D) maxillule; (E) maxilliped. (Scale=50 µm).

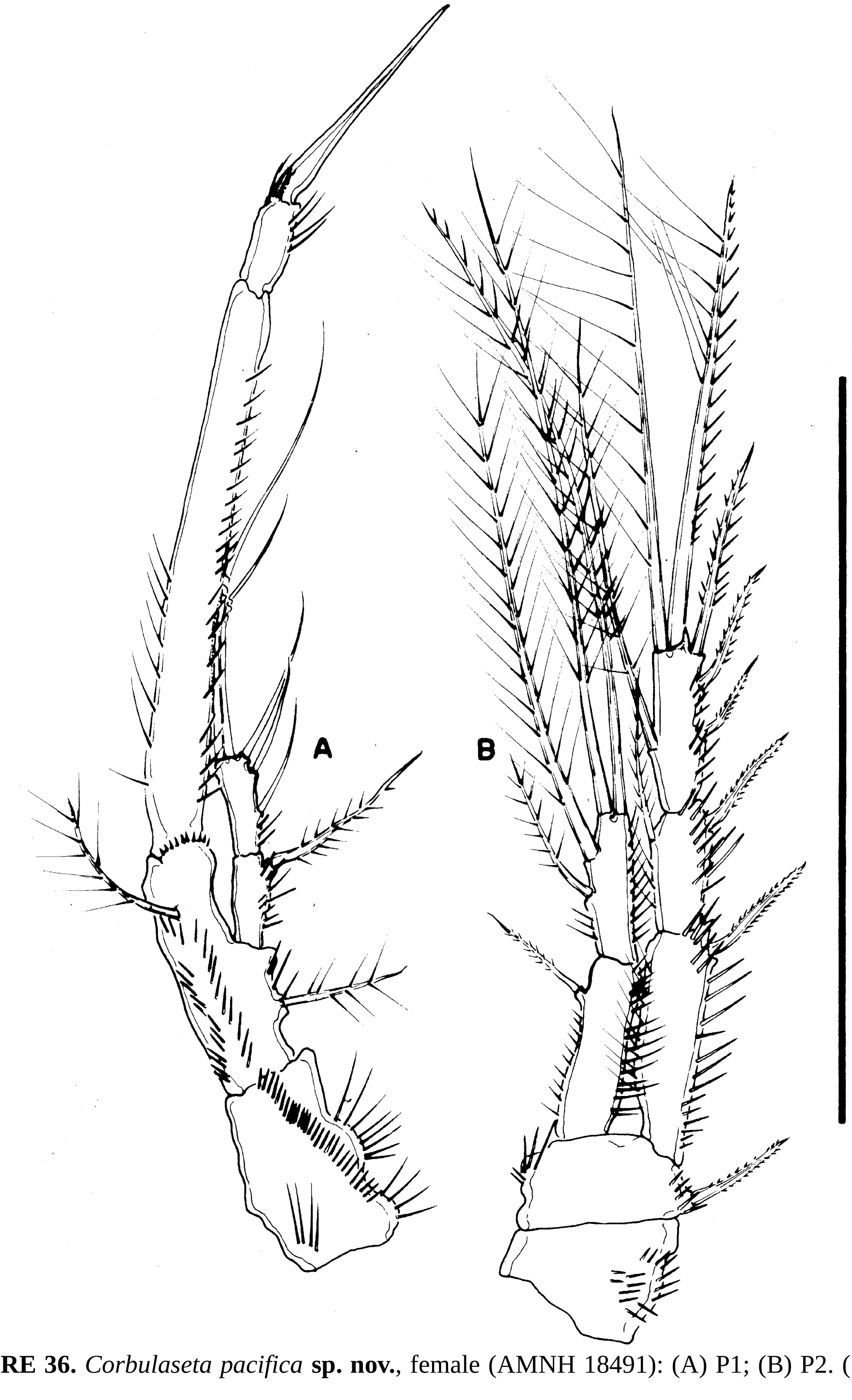

FIGURE 36. *Corbulaseta pacifica* **sp. nov.**, female (AMNH 18491): (A) P1; (B) P2. (Scale=100 µm).

P1 (Fig. 36A) long. Coxa and basis elongate, with spinule rows as figured. Basis with outer and inner seta, the latter displaced anteriorly. Rami 2-segmented. EXP1 with outer seta as long as exopodal segments combined; EXP2 with 3 outer, bare setae shorter than seta of EXP1, and 2 distal, geniculate elements (outermost longer and reaching tip of ENP2). ENP1 slender and very elongate, about 12 times as long as wide; second segment with strong spine and very small seta.

FIGURE 37. *Corbulaseta pacifica* **sp. nov.**, female (AMNH 18491): (A) P3; (B) P4. (Scale=100 µm).

P2 (Fig. 36B) with spinous outer basal element. Exopod 3-segmented; EXP1 elongate, about 4 times as long as wide, without inner seta; EXP2 about twice as long as wide, with inner seta; EXP3 with 3 outer spines, 2 apical and 1 inner element. Endopod 2-segmented; ENP1 elongate, slightly shorter than EXP1, with 1 inner seta; ENP2 reaching tip of EXP2, with 2 inner seta (proximal one shorter and as long as segment) and 2 apical elements.

P3 (Fig. 37A) with setiform outer basal element. Exopod 3-segmented; EXP1 elongate, about 5 times as long as wide, without inner seta; EXP2 about 3 times as long as wide with inner seta; EXP3 with 3 outer spines, 2 apical and 2 inner elements. Endopod 2-segmented; ENP1 reaching the middle of EXP1, with 1 inner seta; ENP2 longer than preceding segment, reaching distal third of EXP2, with 3 inner seta (proximal one nearly as long as segment), 2 apical and 1 outer element.

P4 (Fig. 37B) with setiform outer basal element. Exopod 3-segmented; EXP1 elongate, about 5.2 times longer than wide, without inner seta; EXP2 about 3 times as long as wide, with inner seta; EXP3 with 3 outer spines, 2 apical and 2 inner setae. Endopod 2-segmented; ENP1 small, without armature; ENP2 reaching beyond first exopodal segment, with 5 setae (2 inner elements: distalmost bulbous at base furnished with long curved setules forming a trapping basket enclosing secreted bolus) 2 apical and 1 outer seta) and with distal tube pore.

P5 (Fig. 34C) with well developed baseoendopodal lobe bearing 2 inner and 2 apical setae (innermost about 3 times longer than outermost). Exopod distinct, elongate, about 6.5 times as long as wide; with 2 outer proximal setae, 2 outer distal elements, and 2 subequal apical setae.

Armature formula of P1–P5 as follows:

	EXP	ENP
P1	I-0;III,2,0	00-0;0,I1,0
P2	I-0;I-1;III,I1,1	10-1;0,2,2
P3	I-0;I-1;III,I1,2	0-1;1,2,3
P4	I-0;I-1;III,I1,2	0-0;1,2,2
P5	6	4

Genital field (Fig. 34A) located anteriorly; paired gonopores covered by genital operculum derived from P6, each with 1 slender seta.

MALE. Unknown.

Corbulaseta tokiokai **sp. nov.**

Esola bulligera (Farran) *sensu* Vervoort (1962: 465–469, figs 31a–b, 32)

Material examined

None.

Diagnosis

Based on Vervoort's (1962) original description and figures. The holotype is dissected onto 7 microscope slides with original label reading *Esola bulligera* (RMNH F2250).

Type locality. Noumea, New Caledonia; coll. Osaka Museum Expedition.

Etymology

This species is named after Dr. Takasi Tokioka, who placed the material from New Caledonia at the disposal of Vervoort (Vervoort 1962).

Diagnosis

FEMALE. Laophontidae. Habitus fusiform, surface covered with short setules. Total body length 480 µm. Cephalic shield about 1/4 total body length, with pair of dorsolateral cup-shaped pores. Second and third urosomites (genital-double somite) distinct dorsally and laterally, but completely fused ventrally; with spinules on lateral expansions; posterior half of genital-double somite with small spinules along posterior margin dorsally. Fourth urosomite ornamented as in preceding somite, with lateral expansions. Fifth urosomite with setules along posterior margin dorsally. Anal operculum rounded, covered by setules. Caudal rami 1.5 times longer than wide; with 6 setae; seta I absent; setae II, III, VI and VII slender and bare.

Antennule 6-segmented; segment 1 with small outer projection; segment 2 and 3 elongate; segment 4 with aesthetasc fused basally to 1 seta.

Antenna with allobasis bearing 1 abexopodal seta; with 1-segmented exopod bearing 4 elements.

Mandible with strong gnathobasis. Palp seemingly 2-segmented, with 5 setae (2 basal, 1 exopodal, and 3 endopodal).

Maxillulary arthrite seemingly without anterior seta, with 5 distal teeth and 2 lateral setae. Coxal endite with 3 setae. Basis seemingly with 3 setae. Endopod represented by 1 element. Exopod, most likely with 3 setae (but only 2 illustrated in Vervoort's (1962) fig 32j).

Maxilla with 2 endites; proximal endite with 2, distal endite with 3 setae. Allobasis drawn out into strong claw with 2 setae; endopod represented by 2 setae.

Maxilliped subchelate. Syncoxa with 2 setae. Endopodal claw seemingly without accessory seta.

P1 with elongate coxa and basis. Basis with outer and inner seta. Rami 2-segmented. EXP1 with outer seta shorter than exopodal segments combined; EXP2 with 3 outer setae (all bare and shorter than seta of EXP1) and 2 distal, geniculate elements (outermost longer and barely reaching middle of ENP2). ENP1 elongate and slender, about 12 times as long as wide; ENP2 with strong spine and very small seta.

P2 with seemingly setiform outer basal element. Exopod 3-segmented; EXP1 elongate, about 4 times as long as wide, without inner seta; EXP2 about twice as long as wide, with inner seta; EXP3 with 3 outer spines, 2 apical and 1 inner element. Endopod 2-segmented; ENP1 elongate, slightly shorter than EXP1, with 1 inner seta; ENP2 reaching proximal quarter of EXP3, with 2 subequal inner setae (proximal one longer than segment) and 2 apical elements.

P3 with setiform outer basal element. Exopod 3-segmented; EXP1 elongate, about 5 times as long as wide, without inner seta; EXP2 about 3 times as long as wide, inner seta longer than supporting segment; EXP3 with 3 outer spines, 2 apical and 2 inner elements. Endopod 2-segmented; ENP1 reaching the middle of EXP1, with 1 long inner seta; ENP2 longer than preceding segment, reaching tip of EXP2, with 3 inner seta (proximal one longer than supporting segment), 2 apical and 1 outer element.

P4 with setiform outer basal element. Exopod 3-segmented; EXP1 elongate, about 5 times longer than wide, without inner seta; EXP2 about 3 times as long as wide, with inner seta; EXP3 with 3 outer spines, 2 apical and 2 inner setae. Endopod 2-segmented; ENP1 small, without armature; ENP2 reaching tip of EXP1, with 5 setae (2 inner elements, distalmost with bulbous base furnished with curved setules forming a trapping basket enclosing secreted bolus; 2 apical and 1 outer seta).

P5 with well developed baseoendopodal lobe bearing 2 inner and 2 apical setae (innermost slightly longer than outermost). Exopod distinct, elongate, about 6 times as long as wide; with 2 outer proximal setae, 2 outer distal elements, and 2 apical setae (innermost about twice longer than outermost).

Armature formula of P1–P5 as follows:

	EXP	ENP
P1	I-0;III,2,0	00-0;0,I1,0
P2	I-0;I-1;III,I1,1	0-1;0,2,2
P3	I-0;I-1;III,I1,2	0-1;1,2,3
P4	I-0;I-1;III,I1,2	0-0;1,2,2
P5	6	4

Genital field and P6 unknown.

MALE. Unknown.

Discussion

After concluding that Lang's (1944, 1948) superfamily Cletodoidea Lang had no right of existence, Por (1986) coined the superfamilial name Laophontoidea to accommodate the Laophontidae and the Ancorabolidae Sars, but did not diagnose the taxon. Por's (1986) superfamilial definition is now widely rejected and following Huys (1990b) the Laophontoidea currently includes the families Laophontidae, Adenopleurellidae Huys, Laophontopsidae Huys and Willems, Orthopsyllidae Huys and Cristacoxidae Huys. The Laophontoidea is defined (Huys, 1990b) by a) the presence of a thorn-like process at the outer margin of the second antennular segment in both sexes, b) antennary allobasis with 1 abexopodal seta, c) antennary exopod 1-segmented with 4 setae, d) the absence of inner seta in P1EXP1 and P1EXP2, e) P1EXP3 with 4 elements, f) 2-segmented P1ENP (proximal segment elongate, distal segment short and with 2 elements), g) 2-segmented P2–P4ENP, h) the sexually dimorphic male P3ENP2 (with an outer apophysis), and i) the male P6 with asymmetrical plate-like limbs. In the same paper, Huys (1990b) defined the Laophontidae based on the following apomorphies: a) the presence of a rostrum fused to the cephalosome, b) the presence of bare antennulary setae, c) maximum of 3 setae on (representing) the mandibular endopod, d) marginal setation of maxillular arthrite with 7 apical spines, 1 dorsal and 1 ventral seta, and anterior (not posterior as in Huys 1990b: 113) surface without or with only 1 seta (this constitutes an amendment to Huys' (1990b) apomorphy 12 since at the time of publication no species were known to possess 1 surface seta), e) shape of basis of P1, f) migration of the inner basal spine/seta of P1 to anterior surface, g) P1ENP1 without inner element, h) reduction of posterior geniculate seta of P1ENP2 into a tiny seta, i) anterior geniculate seta of P1ENP2 modified into large, non-geniculate claw, and j) the mode of precopulatory mate guarding. In his resulting phylogenetic analysis, Huys (1990b) considered the Laophontidae as the first offshoot in the evolution of the Laophontoidea. Later, Huys and Lee (2000) recognised 2 subfamilies within the Laophontidae, the Esolinae (comprising 8 genera) and Laophontinae T. Scott (with 55 genera). The Esolinae was considered by Huys and Lee (2000) as a relict of a formerly diverse group, differentiated from the Laophontinae mainly by 1) the male antennule (with only 2 segments distal to geniculation (up to 3 in Laophontinae), 2) proximal aesthetasc of male antennule typically fused to 2 setae (except *Archilaophonte* Willen) (fused to 1 seta in Laophontinae), 3) mandible typically biramous (except for *Applanola* Huys & Lee and *Mourephonte* Jakobi) (uniramous in Laophontinae), 4) maxilliped with 2 or 3 setae on syncoxa (maximum of 2 seta in Laophontinae), 5) P1ENP1 occasionally with inner seta (without inner seta in Laophontinae), 6) P2ENP2 with outer spine (except for *Applanola*) unless entire ramus is absent as in *Mourephonte* (without outer spine in Laophontinae), 7) male P3 endopod with proximal inner seta homologous to female's P3ENP2 (except for *Troglophonte* Huys & Lee) (without seta in Laophontinae (except for the *Laophonte cornuta*-group and *Onychocamptus* Daday), and 8) cephalothorax, genital double-somite and/or caudal rami with typical cup-shaped pores (without such pores in Laophontinae). Within the Laophontinae, Huys and Lee (2000) identified the *L. cornuta* species-group and *Onychocamptus* as early offshoots with the remaining Laophontinae comprising a separate lineage standing in apposition (see below for detailed discussion).

Genus *Laophonte* Philippi

Laophonte is by far the most speciose genus within the subfamily, currently containing 43 species (Boxshall & Halsey 2004), and historically many authors have attempted to delimit coherent species groups within it, but with limited success. Sewell (1940) subdivided the genus into 3 main species groups based on the segmentation of the P1 exopod (group I: with 3 segments, group II: with 2 segments, group III: with 1 segment), and further subdivided each group based on the number of antennulary segments and armature formula of the female P5. In group II(iv)(a), Sewell (1940) united *L. cornuta* and *L. adduensis* Sewell defining the group by the presence of a 2-segmented P1 exopod, with a 4-segmented antennule, and by 6 and 5 setae on the P5 exopod and baseoendopodal lobe, respectively. Later, Lang (1944, 1948) recognised 7 species-groups within the genus, the *cornuta*-, *serrata*, *depressa*-, *setosa*-, *inornata*-, *denticornis*-, and the *inopinata*-group, which are still more or less followed to date. He defined the *cornuta* species-group by a) the 4-segmented female antennule, b) antennulary segments 1 and 2 with acute outer thons, c) P1 exopod and P4 endopod 2-segmented, d) female P5 exopod and baseoendopod with 6 and 5 setae, respectively, and e) male P5 baseoendopod with 2 elements. To this group Lang (1948) allocated only 1 species, the type species *Laophonte cornuta*. Subsequently, Noodt (1964) described *L. ciliata* Noodt, which he allocated to the *cornuta*-group himself, along with *L. cornuta* and *L adduensis*. This number increased to 5 when Fiers (1986) described and added *L. expansa* Fiers and *L. plana* Fiers to the *cornuta* species-group. In that paper, Fiers (1986) provides a key for the 5 species within the *cornuta*-group and suggested that the group should be removed to a new genus. He however refrained from such action since the removal of the type species, *L. cornuta*, to a new genus, would require revaluation and updating diagnoses for all the remaining species (Fiers 1986). Huys and Lee's (2000, Table 2, Fig. 32) phylogenetic analysis also isolated the *cornuta*-group as a separate clade supported by: the presence of 2 segments distal to geniculation in the male antennule and the presence of only 2 setae on the maxillulary endopod (Huys & Lee's (2000) apomorphies 8 and 14, respectively). Their results support the widely accepted polyphyletic status of the genus *Laophonte*, and they recognised that restricting the genus to only the *cornuta*-group would require the remaining species of *Laophonte* to be reallocated to other existing or new genera. Huys and Lee (2000) suggested a sister-group relationship between the *cornuta*-group and *Onychocamptus*, which they emphasized should not be taken as absolute at this stage until other genera are included in the cladistic analyses.

In an attempt to compare material of *L. cornuta* from Easter Island with topotypic material, the senior author tried to trace specimens from Sorrento (Italy), the type locality of the species but to no avail. The only female traced is from Hyères (France) in the Mediterranean, collected by R. Gurney, probably some time during year 1925, and deposited in the Natural History Museum (London) under registration number 1937.11.16.838. The single female found in the vial was badly damaged (only the first antennular segment of both sides was found; P1 was missing and the spinous projection of the anal operculum was broken). However, some differences were observed between the French and the Easter Island material as well as between the latter and Sars' (1907), Lang's (1934), Carvalho's (1952), Lang's (1965), Itô's (1968), Pallares' (1968), Wells and Rao's (1987) and Huys' (1990a) illustrations, which are summarised in Table 1A–F. It has to be noted that Lang (1965) and Wells and Rao (1987) observed extreme and "almost infinite" variability in samples from California and Andaman Island, respectively, and since we feel that the material presented in the present study falls within the range of variability for the species, as previously documented by Lang (1965) and Wells and Rao (1987), there is little point trying to compare their material with the material described herein, which did not present any variability. Also the P1 presented by Huys (1990a), from material collected in Corsica, is identical to the P1 observed for the Easter Island material.

TABLE 1A. Differences observed between the French material of *L. cornuta* Philippi collected by R. Gurney during year 1925 from Hyères (France) and the material from Easter Island.

Ornamentation of body somites	Coarser in the French material (compare Figs 1A, B, 2A–F, and Figs. 11A, B, 12A–D)
Position of caudal setae III, VI and VII	Setae III and VII more distal, and seta VI more ventral in the French material (compare Fig. 4C and Fig.11E)
Relative length of the 2 inner most baseoendopodal setae of male P5	Comparatively shorter in the Easter Island material (compare Fig. 3B and Fig. 13D)
Reticulated area in the baseoendopodal lobe of female P5	Present in the French material, absent in the Easter Island specimens (compare Fig. 3B and Fig. 13D)
Relative length of the single seta representing the first syncoxal maxillary endite	Relatively longer in the French material (compare Fig. 5B and Fig. 13C)
Relative length of the syncoxal seta of maxilliped	Relatively longer in the French material (compare Fig. 5A and 13B)
Relative length of the claw of maxilliped	Relatively longer in the French material (compare Fig. 5A and 13B)
Relative length of the P2ENP	Relatively longer in the French material (compare Fig. 6B and Fig. 14A)
Ornamentation of inner seta of P2-P4ENP1	Bare in the Easter Island material (Figs. 6B, 7A, B), plumose in the French material (Fig. 14A–C)

TABLE 1B. Differences observed between Easter Island material and Sars' (1907) illustrations of *L. cornuta* from Norway.

Relative length of the inner seta on the female P5 baseoendopodal lobe	Medial inner seta shorter in the Easter Island material, as long as inner distal seta in Sars (1907) and in the French material examined in the present study
Maxillulary endopod	Fused to basis in the Easter Island material, seemingly distinct in Sars (1907)
Maxilla	Proximal endite represented by a very small seta in the Easter Island material, with a long seta in Sars (1907) and in the French material examined in the present study
Seta on maxillipedal syncoxa	Shorter in the Easter Island material, longer in Sars (1907) and in the French material examined in the present study
Insertion site of inner distal seta of P2ENP2	More distal in the Easter Island material
Shape of male 6th and 7th antennular segments	Compare Sars (1907, PL. CLVIII) and Fig. 9 (present study)
Ornamentation of the inner seta of P2-P4ENP1	Bare in the Easter Island material, plumose in Sars (1907) and in the French material examined in the present study
Relative size of the thorn on the male second antennular segment	Nearly as long as the width of supporting segment in the Easter Island material, shorter in Sars (1907)

TABLE 1C. Differences observed between Easter Island material and Lang's (1934) material from New Zealand and Tasmania.

Relative length of the female P5 baseoendopodal setae	Similar to the French material herein examined
Ornamentation of the anal operculum	With 2 to 3 small teeth in Lang's (1934), only 1 longe projection in the material from Easter Island

TABLE 1D. Differences observed between Easter Island material and Itô's (1968) material from Hokkaido (Japan).

Maxillule	Arthrite with 2 anterior setae in Itô (1968), without setae in the Easter Island material
Female P5 baseoendopodal inner medial seta	Longer in Itô (1968)
Inner seta of male P3ENP1	Longer in Itô (1968)

TABLE 1E. Differences observed between Easter Island material and Pallares' (1968) material from Santa Cruz (Argentina).

Shape of segments 5 to 7 of male antennule	Compare Pallares (1968: 82, Lám. XXIX-2) and Fig. 9 (present study)
Armature of maxillipedal syncoxa	With 2 setae in Pallares (1968), with 1 setae in the Easter Island material
Relative length of the 2 distalmost setae of female P5 exopod	Apicalmost seta longer in Pallares (1968), shorter in the Easter Island material
Relative length of setae on male P4ENP2	Shorter in Pallares (1968)
Male P6 armature	Setiform in Pallares (1968), innermost spine-like and outermost setiform in the Easter Island material
Relative length of setae of male P5 baseoendopod	Outermost longer in Pallares (1968), shorter in the Easter Island material

TABLE 1F. Differences between Easter Island material and Carvalho's (1952) material from Brazil.

Relative length of the female P5 baseoendopod and exopod	Compare Carvalho (1952, Estampa II-73) and Fig. 3B (present study)

Laophonte cornuta is considered a cosmopolitan species and has been reported from distinct and diverse localities (for a complete list see Sewell 1940: 314; Lang 1948: 1348; Vervoort 1964: 317–318; Lang 1965: 448; Fiers, 1986: 133–134, 1988a: 9–49 unpublished data, 1988b: 25–26 unpublished data). Both an alleged high degree of variability (Lang 1936, 1965; Fiers, 1986, 1988a unpublished, 1988b unpublished data; Wells & Rao 1987) and no variability (Sars, 1907; Lang, 1965; Itô, 1968; Fiers, 1986) has been documented for this species. Lang (1965) observed a high degree of intraspecific variability in the shape of the anal operculum and crenulation of the posterior margins of the cephalothorax, pro- and urosomites displayed in American material from Dillon Beach and Monterey Bay. Conversely, he (Lang 1965) noted the lack of variability of the anal operculum in material from Sweden and Norway, suggesting that the Pacific and Antarctic (see also Lang 1936) populations were undergoing an intense evolutionary process.

When comparing 2 specimens from Japan, Itô (1968) recorded no variability and found they agreed with Sars's (1907) figures as presented in Lang (1948) except for some slight discrepancies in the maxillule arthrite with 5 spines in the Japanese material (Lang's (1948) monograph shows 4); exopod with 1 seta (with 2 setae in Lang (1948)); and with a small endopod (well developed in Lang (1948)). However, when comparing against Sars' (1907) original drawings of the maxillule it can be seen that: i) there are 5 distal spines on the praecoxa arthrite instead of 4 as in Lang (1948), ii) the endopod is shown as a prominent bud with 1 seta only, and iii) the basis possesses 4 setae. Despite not finding any variability in the 2 Japanese specimens, Itô (1968) found that his specimens resembled Lang's (1965) material from Dillon Beach more than any other material. Later, Fiers (1986) documented the variability of the anal operculum displayed by material from Venezuela and the Cayman Islands. As part of the same study, he (Fiers 1986) also notes the lack of variability in populations from North and South Atlantic, the Mediterranean Sea, and the Indian and Pacific Oceans.

Wells and Rao (1987) reported on the variability of Andaman Island populations and confirmed the extreme variability of the anal operculum as reported earlier by Lang (1965). However they did not find any variability (except for 1 specimen) in the crenulation of the posterior margin of the cephalothorax and pro- and urosomites. Wells and Rao (1987) also observed some degree of variation in the relative length of the caudal rami and site of insertion of caudal seta II (they did not show seta I), the relative length of the P1 endopodal claw, and in the length and spinular ornamentation of the female third antennular segment. However, it has to be noted that no attempts have been made so far to redescribe and to assess the variability of Mediterranean material of *L. cornuta*. This, in combination with the numerous reports (detailed above) documenting on the variability and non-variability within populations, the alleged cosmopolitanism of *L. cornuta* should be viewed with caution. Few morphological characters were used by authors, which were not considered simultaneously, or with other characters. Morphological variability is not un-common in harpacticoid copepods and is most commonly observed as differences in relative lengths of segments, armature elements (setae and spines and ornamentation) and rarely as the complete loss and/or presence of structures or armature (setae/spines). Considering all the above, it is highly probable that where high degrees of variability were reported, more than a single species was being dealt with.

Wells and Rao (1987) noted that no correlation (i.e. constancy) was evident between the sources of variation in specimens of *L. cornuta* from Andaman Island, and that the range of variation of a given character included all manner of intermediates. The same seems to be the case for Lang's (1965) observations. Since there seems to be no constancy in the sources of variation in those studies where high degrees of variability were observed (e.g. Lang 1965; Wells & Rao 1987; Fiers 1986), and given the limited number of morphological characters investigated in each, it is clear that more detailed taxonomic studies are needed to clarify aspects of variability, aberration and species delineation. In this study, the 6 individuals of *L. cornuta* observed showed no gradual variation in the acute anal projection as documented by Lang (1965) and Wells and Rao (1987). However, we found 1 female that differed markedly from the rest of the Easter Island material, which fell beyond the questionable boundaries of "variability" as discussed above. It is therefore considered a distinct species, described herein as *L. similicornuta* **sp. nov.**, reinforcing the hypothesis that two closely related species of *Laophonte* can co-exist. *Laophonte similicornuta* **sp. nov.** can be differentiated from *L cornuta* as re-described above, based on the following: a) posterior margin of cephalothorax (smooth in *L. cornuta*, finely serrate in *L. similicornuta* **sp. nov.**), b) lateral incisions in the cephalothorax (present in *L. cornuta*, absent in *L. similicornuta* **sp. nov.**), c) posterior margin of pro- and urosomites (except anal somite) (crenulate in *L. cornuta*, finely serrate in *L. similicornuta* **sp. nov.**), d) lateral produced processes of both halves of double-genital somite and fourth urosomite (well developed in *L. cornuta*, weakly developed in *L. similicornuta* **sp. nov.**), e) anal operculum (with an acute projection in *L cornuta*, plain in *L. similicornuta* **sp. nov.**), f) insertion site of caudal seta III (distal in *L. cornuta*, more proximal in *L. similicornuta* **sp. nov.**), g) relative length of caudal setae IV and VI (comparatively longer in *L. similicornuta* **sp. nov.**), h) spinule ornamentation of caudal rami, i) crenulate ornamentation of anal somite ventrally in area between anal operculum and insertion of caudal rami (coarser in *L. cornuta*), j) female P6 relative length of setae, k) relative length of thorn-like processes on the female first and second antennular segments (considerably longer in *L. cornuta*), l) spinule ornamentation on the female antennular segment (more abundant in *L. similicornuta* **sp. nov.**), m) spinulation on the P1ENP2 (coarser in *L. similicornuta* **sp. nov.**), n) spinule ornamentation along abexopodal margin of allobasis and outer margin of endopodal segment of the antenna (coarser and more abundant in *L. cornuta*), o) distance between inner proximal and adjacent seta of P2–P4ENP2 (longer in *L. cornuta*), p) relative size of P4ENP (reaching beyond middle of P4EXP2 in *L. cornuta*, barely reaching beyond P4EXP1 in *L. similicornuta* **sp. nov.**), q) relative length of inner proximal and adjacent setae of the female P5 baseoendopod (comparatively shorter in *L. cornuta*), and r) reticulate area of female P5 baseoendopod (present in *L. similicornuta* **sp. nov.**, absent in *L. cornuta*). *Laophonte similicornuta* **sp. nov.** seems to be more closely related to *L. ciliata* by the combination of 1) female antennulary segments 1 and 2 with a small, blunt process and a strong, acute thorn, respectively, 2) relative size of setae on the antennary exopod, 3) slightly tapering caudal rami, 4) body fusiform, 5) presence of a reticulate area in the female P5 baseoendopod, and 6) body somites with finely serrate posterior margin. These two species can, however, be separated mainly by the a) armature formula of P2–P4EXP3 (with 2 outer spines in *L. ciliata*, but with 3 in *L. similicornuta* **sp. nov.**), b) relative size of female P5 baseoendopod and exopod (baseoendopod reaching almost apical margin of exopod in *L. ciliata*, but barely reaching distal quarter in *L. similicornuta* **sp. nov.**), c) length of caudal rami (longer than anal segment in *L. ciliata*, about as long as anal segment in *L. similicornuta* **sp. nov.**), d) relative length of the typically bare outer apical seta on female P5 exopod (longer than innermost seta in *L. similicornuta* **sp. nov.**, but shorter than innermost seta in *L. ciliata*), and e) cephalothorax with reticulate area and fine setules along posterior margin of the genital-double somite in *L ciliata* (both character states absent in *L. similicornuta* **sp. nov.**).

Genus *Phycolaophonte* Pallares

Jakubisiak (1932) suggested a close relationship between *Hemilaophonte* Jakubisiak and *Harrietella* T. Scott based only on the armature formula of the swimming legs, and noted that these two genera were different in many other aspects such as the body shape, the shape of the female P5 and the length of the setae of the caudal rami. Although Lang (1948) agreed that the female of *Hemilaophonte*, as described by Jakubisiak (1932), exhibited some similarities with *Harrietella*, he implicitly expressed his reservations about Jakubisiak's suggestions given the poor and probably erroneous description of the male *Hemilaophonte janinae* Jakubisiak.

Noodt (1958: 86–89, Figs 128–139) described *Laophonte platychelipusioides* from Tenerife, Canary Islands. Since the male was not found, he was not certain about its position within the Laophontidae. Although he suggested some relationships with Lang's (1948) *inopinata* species-group and with *Hemilaophonte*, he considered the species as *incertae sedis* within the family.

Hamond (1973: 53–54) created the genus *Coullia* Hamond for his new species *C. heteropus* Hamond from off North Carolina, U.S.A., to which he transferred Noodt's (1958) *L. platychelipusioides* becoming *Coullia platychelipusioides* (Noodt). Hamond (1973) defined his newly erected genus *Coullia* by the combination of i) lack of inner and apical setae on the P2–P4 exopod, and ii) very reduced P2–P4 endopods, the smallest being that of P2. Later, Pallares (1975) described the monospecific genus *Phycolaophonte* to accommodate *P. insularis* Pallares from Isla de los Estados, Tierra del Fuego. She suggested some relationships between her newly created genus and *Arenolaophonte stygia* Lang and *Coullia heteropus* based mainly on the morphology/structure of P1–P4, and with *Laophonte acutirostris* Lang by the general body shape and mouth appendages. Fiers (1992a) reallocated *Hemilaophonte clysmae* Por and Marcus to *Coullia* as *C. clysmae* (Por & Marcus) based on the presence of a 3-segmented P4 exopod. Fiers (1992a) also questioned Jakubisiak's (1932) views (see above) about the relationship between *Hemilaophonte* and the monotypic genus *Harrietella* because, even though the females of these two species resemble each other in their shared reduced segmentation of the P4 exopod, their remarkable depressed body shape and reduced chaetotaxy of the legs, "the ignorance of the -male- sexual characteristics strongly questions possible statements about relationships between the genera" (Fiers 1992a: 213). The relationships of *Hemilaophonte* to *Coullia*, *Phycolaophonte* (see also Mielke 1985: 233, Fig. 32) and *Robustunguis* Fiers (Fiers 1992b) were based on the P2 endopod being smaller than the P3 and P4 endopods (Fiers 1992a: 218–219, Fig. 3, probably interchanged P2 and P3 both in his illustration and written description), shape and armature formula of P5, and shape of the dimorphic male P3 endopod (Fiers 1992a, b). The males of species currently assigned to *Coullia* are unknown (males are only known for *Hemilaophonte* and *Phycolaophonte*), but upon analysis of several other undescribed species of *Coullia*, Fiers (1992a) observed that the morphology of the sexually dimorphic P3 and the chaetotaxy of the male P5 of *Coullia* was the same as for *Phycolaophonte* and *Hemilaophonte*. Subsequently, Lee and Huys (1999) again recognised the close relationship between *Hemilaophonte*, *Coullia*, *Phycolaophonte* and *Robustunguis* based on the shared male 2-segmented P3ENP with a slightly curved apical or subapical apophysis on the distal segment, which is associated to the 2 terminal setae. Lee and Huys (1999) also added the genus *Psammoplatypus* Lee and Huys to this clade based on the presence of: a reduced P2ENP, the absence of inner seta on P2–P4EXP3, the sexual dimorphism on the P2–P4EXP (involving the reduction of the inner distal seta of EXP3), the elongate-oval female P5EXP, the 6-segmented female antennule without distinct processes on the first 2 segments, and the remarkably constant male P5 baseoendopod with 2 setae.

There is little to separate *Coullia* and *Phycolaophonte*, but the species described herein is allocated to the latter, as *P. tongariki* **sp. nov.** based on the following: similar shape (slightly tapering posteriorly and with distal outer corner produced into acute projection) and size (about 3 times as long as wide) of the caudal rami, similar insertion sites of caudal setae I-VII, shape and armature of the female P5, 6-segmented female antennule with segment 1 with outer blunt projection ornamented with spinules, and armature formula and shape of the female P2EXP3, P2ENP, P3–P4EXP and ENP. The genus *Phycolaophonte* now comprises two species, *P. insularis and P. tongariki* **sp. nov.** These 2 species can be separated by the relative length of the 2 inner setae of the baseoendopod of the female P5 (subequal in *P. tongariki* **sp. nov.**, distalmost longer in *P. insularis*), relative size of P2ENP2 (as long as preceding segment in *P. insularis*, clearly smaller in *P. tongariki* **sp. nov.**), and armature of P2EXP2 (inner seta present in *P. tongariki* **sp. nov.**, absent in *P. insularis*). Pallares (1975: 1) diagnosed the genus *Phycolaophonte* based explicitly on the description of *P. insularis*. However, since there are some differences between *P. insularis* and *P. tongariki* **sp. nov.** an amended diagnosis for the genus is herein presented.

Genus *Phycolaophonte* Pallares, 1975

Diagnosis

Laophontidae, Laophontinae. Body fusiform. Rostrum fused to cephalic shield. First to third prosomites (P2–P4 bearing somites) and urosomites (except for anal somite) with posterior margin finely serrate; pleural extensions of urosomites small. Anal somite with rounded operculum ornamented with spinules along posterior margin. Caudal rami approximately twice as long as anal somite, and approximately 3 times longer than wide; covered by minute spinules dorsally and ventrally; outer distal corner produced into acute projection; with 7 setae. Female antennule 6-segmented; segment 1 without thorn, but outer distal corner rounded and furnished with relatively long spinules; segment 2 without outer thorn; segment 4 with aesthetasc fused basally to 1 seta; segment 6 with acrothek consisting of aesthetasc basally fused to 2 setae. Antenna with allobasis bearing 1 abexopodal seta; exopod 1-segmented with 4 setae; endopod with 9 setae/spines.

Mandibular palp 1-segmented, with 5 setae (1 basal, 1 exopodal and 3 endopodal). Maxillulary arthrite with 1 anterior seta; coxal endite with 2 setae; basis with 3 setae; endopod fused to basis, with 2 setae; exopod distinct, 1-segmented, with 2 setae. Maxillary syncoxa with 3 endites; proximal endite reduced, with 1 seta; remaining endites with 3 elements; claw of allobasis with 1 anterior and 1 posterior seta; endopod represented by 3 setae. Syncoxa of maxilliped with 2 setae. Male P2ENP1 with protruding hyaline structure (probably a tube pore); P3ENP 2-segmented, segment 2 with outer, apical, curved apophysis and 2 setae; P4EXP3 with 2 outer spines only.

Armature formula of P1–P5 as follows (M= male):

	EXP	ENP
P1	I-0;III,2,0	0-0;0,I1,0
P2	I-0;I-(0-1);III,I1,0	0-0;0,2,0
MP2	I-0;I-1;III,I1,0	0-0;0,2,0
P3	I-0;I-0;III,I1,0	0-0;0,2,I
MP3	I-0;I-1;III,I1,0	0-0;0,2,0
P4	I-0;I-0;(II-III),I1,0	0-0;0,2,I
MP4	I-0;I-0;II,I1,0	0-0;0,2,I
P5	6	5
MP5	5	2

Female and male P6 with 2 setae.

Type species

Phycolaophonte insularis Pallares.

Other species

Phycolaophonte tongariki **sp. nov.**

Distribution

Argentina: Isla de los Estados, Tierra del Fuego (Pallares 1975); Easter Island: Tongariki (present study).

Within the *Hemilaophonte-Coullia-Phycolaophonte-Robustunguis-Psammoplatypus* lineage, Lee and Huys (1999) regarded *Psammoplatypus* as the most primitive genus based on the swimming leg armature (P3–P4EXP2 with inner seta), the 3-segmented male P3ENP, and the P4ENP2 with an inner seta. *Psammoplatypus* is probably most closely related to *Phycolaophonte*, based on the presence of an inner seta on the male P3EXP2. *Phycolaophonte tongariki* **sp. nov.** seems to be more primitive than *P. insularis*, given the presence of an inner seta on the female P2EXP2. This seta is lost in the P2EXP2 of the female of *P. insularis* but primitively retained in the male specimens of *P. insularis* and *Robustunguis ungulatus* Fiers (although the armature formula of the male P2 of *R. ungulatus* is highly variable (see Fiers 1992b)).

Genus *Loureirophonte* Jakobi

Fiers (1993) revised the genus *Loureirophonte*, provided an updated generic diagnosis, a diagnosis of the type species *L. catharinensis* Jakobi, and a key to species. He also defined 3 species groups within the genus: the *catharinensis*, the *cesarea*e and the *subterranea*-species group. These groups are based mainly on the armature formula of the P2–P4EXP3 and P4ENP. At present, the *catharinensis* group consists of 6 species: *L. catharinensis* Jakobi, *L. paranaensis* Jakobi, *L. isabelensis* Mileke, *L. furcata* Fiers, *L. laingensis* Fiers and *L. majahualensis* Fiers. Following Fiers (1993), this species group is defined by a) P2–P3EXP3 with 3 outer spines and P4EXP3 with 2 outer spines, b) a 1-segmented P4ENP with 2 setae, and c) the presence of an outer spine on the male P3EXP2 similar to the outer spine on the other segments. This group is distributed in the Indo-Pacific with an extension into the Caribbean and the south-western Atlantic. The *subterranea* species group is currently composed of 2 species: *L. subterranea* (Lang) and *L. psammophila* Mielke. This species group is known from the Californian Pacific coast (Dillon Beach and Monterey Bay) (Lang 1965) and from La Paz (Baja California, Mexico) (Mielke 2001) and is defined by a) P2–P4EXP3 with 2 outer spines, b) 1-segmented P4ENP with 2 setae, and c) a normal outer spine on the male P3EXP2. This group probably evolved from the *catharinensis* group as evidenced by the armature formula of the P4ENP and shape of the outer spine of the male P3EXP2 (Fiers 1993; Mielke 2001). Following Fiers' (1993) division of the genus, *L. minutum* **sp. nov.** could be included in the *catharinensis* group given the armature formula of P2–P4 (with 3 outer spines on the P2–P3EXP3, but with 2 outer spines only in the same segment of P4), and a normal outer spine on the male P3EXP2. However, *L. minutum* **sp. nov.** is unique within the genus by the combination of a P4ENP represented by a single seta (see Fig. 32C–E), presence of 3 and 2 outer spines on the P2–P3EXP3 and P4EXP3, respectively, and presence of a normal outer spine on the male P3EXP2. As such, *L. minutum* **sp. nov.** is placed in a new species group, the *minutum*-group, defined by the characters listed above.

Amendment to Fiers' (1993) key to the species of Loureirophonte

Based on the description of *L. minutum* **sp. nov.** and the definition of the *minutum* group, couplet 1 in Fiers (1993) should read:

1. P2–P4EXP3 with 3 outer spines; P4ENP 1-segmented, with 1 seta .... *cesarea* group: 2
- P2–P3EXP3 with 3 outer spines, of P4EXP3 with 2 outer spines; P4ENP 1-segmented, with 2 setae .... *catharinensis* group: 4

- P2–P4EXP3 with 2 outer spines; P4ENP 1-segmented with 2 setae .... *subterranea* group: *L. subterranea* (Lang)
- P2–P3EXP3 with 3 outer spines, of P4EXP3 with 2 outer spines; P4ENP represented by a single seta .... *minutum* group: *L. minutum* **sp. nov.**

Biogeographical remarks on the genus Loureirophonte *Jakobi*

The *Loureirophonte catharinensis-subterranea-minutum* lineage seems to share the same trajectory as the *chilensis*-group in *Afrolaophonte* Chappuis (Fiers 1990: 63, Fig. 3), the genus *Scottolana* Por (S.G. pers. obs.) and the eumalacostracan genera *Chilibathynella* Noodt and *Atopobathynella* Schminke (Bathynellacea Chappuis: Parabathynellidae Noodt) (Schminke 1974). These taxa seem to have evolved somewhere in the Indo-Pacific and extended into the Eastern Pacific. To explain the presence of related taxa on both sides of the Pacific, researchers have proposed a variety of explanations. Fiers (1990) envisaged a scenario in which several eustatic sea level changes and their effects on the beaches could explain the distribution of *Afrolaophonte aequatorialis* Cottarelli and Mura (a member of the *chilensis*-group *sensu* Fiers 1990) from the Maldives to the southern coast of Papua New Guinea (Fiers 1990). Following Fiers (1990) and the references cited therein, such drastic changes could have created an almost continuous landmass, thus invoking short distance dispersal. The fact that the Papuan-Australian land mass has been always separated from the Indonesian arc by a deep seaway, which could not be bridged by benthic and relatively sessile animals like harpacticoid copepods, was also recognised (Fiers 1990). Alternatively, Boer and Duffels (1996) suggested that the active dispersal of animals in the area apparently played a minor role in distribution patterns, which is better understood by vicariance events caused either by the fragmentation of a west- and south-west Pacific island arc (Boer & Duffels 1996), or by continental terraines, which rifted away from Gondwanaland and eventually accreted to the Asian continent or became embedded in the Malaysian archipelago (Burrett *et al.* 1991). Their distribution could also be understood through a new continental assembly in which Southeast Asia formed part of eastern Gondwanaland during the Late Paleozoic, the Asian continental fragments separated from eastern Gondwanaland during the Jurassic creating the Tethys Ocean, and from the Late Cretaceous onwards an archipelago was formed between Asia and Australia-New Guinea (Audley-Charles 1983).

The presence of trans-Atlantic sister taxa of meiofauna is widely accepted to be the result of plate tectonics and birth of the Atlantic Ocean in the Middle Jurassic some 200 million years ago (see Sterrer 1973), as evidenced by the classical predrift reconstruction and scheme of Pangean break-up with Panthalassa (EoPacific) comprising one hemisphere and with the broad Tethys between Laurasia and Gondwana. However, under a vicariance paradigm, the classical scheme of Pangean break up does not explain the presence of related taxa on opposite sides of the Pacific and alternative paths have been proposed.

Schminke (1974) explained the presence of *Chilibathynella* and *Atopobathynella* in Australia, New Zealand and southern South America, by envisaging Mesozoic land connections between Asia and Australia/New Guinea that allowed the species to reach the New Zealand and the Australian islands to produce offshoots extending as far as South America via Antarctica. However, as pointed out by McCarthy (2003: 1549), the problem with this model is "that Australia, New Zealand and South America demonstrate connections between very narrow, latitudinal zones and include taxa confined to the tropics". In order to explain the presence of related taxa on both sides of the Pacific in terms of vicariance, researchers have either accepted the classical predrift reconstruction of the continents and have tried to explain trans-Pacific tracks through the existence of a lost continent Pacifica (Nur & Ben-Avraham 1977), island integration (Rotondo *et al.* 1981) and reliction (Newman 1991), or through the expanding earth theory (Shields 1976, 1979, 1983; Owen 1983; King 1983; Carey 1976, 1983) and the trans-Pacific zipper effect (McCarthy 2003). All these models have been criticized at one time or another and there is no consensus to explain the trans-Pacific tracks observed for a great variety of organisms, probably because different time scales are involved. As for harpacticoid copepods, additional constraints are posed given the fact that these animals rarely fossilize. Molecular phylogenetic systematics could shed some light on the historical biogeography of benthic copepods but this would be extremely difficult at the present time because historically collections have not been fixed in a suitable preservative for such studies and a great effort would be needed to find and properly fix samples for the groups of interest from both sides of the Pacific. In the meantime, harpacticoid biogeography relies on new geological finds and on the historical biogeography of other relatively sessile marine organisms and therefore remains conjectural at this time.

Genus *Corbulaseta* Huys and Lee, 2000

Huys and Lee (2000) created the monotypic genus *Corbulaseta* to accommodate *Laophonte bulligera* Farran (=*Esola bulligera* (Farran)). Following Huys and Lee (2000), the genera *Corbulaseta*, *Troglophonte* (whose position is tentative within Esolinae (Huys & Lee 2000)), and *Bathyesola* Huys and Lee are identified as 3 independent lineages successively splitted off between *Archesola* Huys and Lee and the *Mourephonte*-*Esola*-*Applanola* clade. They consider *Corbulaseta* more closely related to the latter clade based on the shared fusion of segments 6–7 in the female antennule and P1EXP, and consider the distal inner seta forming a trapping-basket in the P4 endopod as a unique autapomorphy for the genus (Huys & Lee 2000). These authors presented a diagnosis of *Corbulaseta* and a redescription of the type species (*C. bulligera* (Farran)) based on Vervoort's (1962) illustrations of *Esola bulligera*, on some of Wells' (1970) material from the Isles of Scilly and on some material collected from the Belgian North Sea coast. According to Huys and

Lee (2000), *C. bulligera* shows a boreo-mediterranean distribution and Alheit and Scheibel's (1982) record from Bermuda is unsupported. Huys and Lee (2000) did however question the identity of the single female described by Vervoort (1962) from New Caledonia considering it "difficult to interpret". Their reservations were based on two main differences between the New Caledonian and the European material: a) the absence of the outer spine on the P2ENP2, and b) the armature asymmetry of the P2 endopods. Huys and Lee (2000) questioned Vervoort's (1962) setal formula (P2ENP2 without outer spine) and thus the possibility of a second species in the western Pacific. However, the armature formula of P2ENP2 observed in *Corbulaseta pacifica* **sp. nov.** (without outer spine as in Vervoort's (1962)), supports Vervoort's (1962) setal formula, and suggests the presence of a species distinct from *C. bulligera* in New Caledonia, *Corbulaseta tokiokai* **sp. nov.** The second endopodal segment of right P2 (with 3 inner setae) shown in Vervoort (1962: 467, Fig. 32c) is interpreted here as aberrant, the normal condition being 0-1;0,2,2. Huys and Lee (2000) did note some other differences between *C. tokiokai* **sp. nov.** (=*C. bulligera sensu* Vervoort (1962)) and *C. bulligera* in the shape of the cephalic shield laterally, relative length of caudal rami and general shape of P2–P4 exopods.

Corbulaseta pacifica **sp. nov.** and *C. tokiokai* **sp. nov.** clearly deviate from the European *C. bulligera*, as stated by Huys and Lee (2000), mainly in the armature formula of the P2ENP2 (without outer spine). *Corbulaseta tokiokai* **sp. nov.** and *C. pacifica* **sp. nov.** can be separated by the shape of the cephalic shield laterally (the cephalic shield of *C. pacifica* **sp. nov.** closely resembles that of *C. bulligera* as depicted by Huys & Lee (2000)), the relative length of the caudal rami (the caudal rami of *C. pacifica* **sp. nov.** resembles more that of Farran's (1913) material), the relative length of the apical seta of P1EXP3 (clearly longer in *C. pacifica* **sp. nov.**), the relative length of the proximal inner seta of P2ENP2 (clearly longer than supporting segment in *C. tokiokai* **sp. nov.**, but as long as supporting segment in *C. pacifica* **sp. nov.**), relative length of P2ENP (reaching proximal quarter of EXP3 in *C. tokiokai* **sp. nov.**, but hardly reaching tip of EXP2 in *C. pacifica* **sp. nov.**), and P2ENP1 (shorter than but as long as EXP1 in *C. pacifica* **sp. nov.** and *C. tokiokai* **sp. nov.**, respectively), relative length of inner seta of P3ENP1 and proximal inner seta of P3ENP2 (longer than supporting segment in *C. tokiokai* **sp. nov.**, but as long as supporting segment in *C. pacifica* **sp. nov.**), relative length of the apical setae of female P5 baseoendopod (innermost seta about 3 times longer than outermost element in *C. pacifica* **sp. nov.**, but about 1.3 times longer in *C. tokiokai* **sp. nov.**), and relative length of the apical and inner setae of P5EXP (the former about 1/2 length of the latter in *C. tokiokai* **sp. nov.**, but both setae of about the same length in *C. pacifica* **sp. nov.**).

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