

SPINIFERAPHONTE, A NEW GENUS OF LAOPHONTIDAE (COPEPODA: HARPACTICOIDA), WITH NOTES ON THE OCCURRENCE OF PROCESSES ON THE CAUDAL RAMI

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A B S T R A C T

A new genus and species of Laophontidae, *Spiniferaphonte ornata* n. gen., n. sp., is described from the coast of Kenya. The new genus is closely related to *Laophontina* and *Wellsiphontina* as shown by the following synapomorphies: a denticulate operculum, a sexually dimorphic P4 exopod (reduced chaetotaxy of the ultimate segment in the male), and the absence of sexual dimorphism in the P2 and P3 endopods. The two-segmented exopod of P1 and the presence of a seta on the endopodal part of the male P5 are plesiomorphies indicating that the new genus represents a separate lineage within this group. The proposal of the new genus *Spiniferaphonte* is supported by the following autapomorphies: three smooth setae on the female P5 exopod and a robust, dorsally bent, and strongly sclerotised caudal seta V. Within the Laophontidae, it is striking that the presence of distinct, thorn-like processes on the caudal rami is limited to interstitial genera. Distinct processes on the proximal segments of the antennule and a proximally thickened caudal seta V also appear to be associated with this interstitiality. These structures may play a role in the movement and the anchoring of the animals in their interstitial habitat.

INTRODUCTION

As part of an extensive study of the copepod communities associated with the coral degradation zone, numerous qualitative samples of dead coral fragments, coral gravel, and coral sand were collected along the Kenyan coast. In terms of number of species, the family Laophontidae T. Scott, 1905 appears to be an important component of the copepod fauna associated with these substrates. Cottarelli and Puccetti (1988) also found this family to be a characteristic component of the interstitial fauna of coral beaches. It is noteworthy that 28 of the 44 species of Laophontidae until now determined from this study are new to science, including four species that have already been described (Gheerardyn et al., 2006a; Gheerardyn et al., 2006b). Only 13 of the new species can be assigned unequivocally to existing genera, a fact that further highlights the high diversity of Laophontidae in this particular habitat. Another factor in the high proportion of taxonomic novelties is the hitherto limited number of species-level harpacticoid copepod studies in the western Indian Ocean: e.g., Madagascar (Chappuis, 1954), Réunion (Bozic, 1969), Seychelles (Wells and McKenzie, 1973), Mozambique (Wells, 1967), and Kenya (Fiers and De Troch, 2000; De Troch, 2001).

In a previous paper (Gheerardyn et al., 2006a), a new genus of Laophontidae, *Peltidiphonte* Gheerardyn and Fiers, 2006, was established, containing three of the new Kenyan species. The most remarkable feature of this genus is the extremely depressed body shape, which was assumed to be an adaptation to live as epifauna on the surface of dead coral substrates.

Specimens of the present new genus were collected from coarse coral gravel and clearly show adaptations for living in interstitial spaces, including a cylindrical body shape and reduced segmentation and setation of swimming legs P2 to P4. Dead coral substrates seem to provide a variety of habitats that are exploited by different Laophontidae with

specialised morphologies. It is clear that the difficulties in unraveling the relationships within this family are mainly a consequence of a high degree of morphological plasticity.

MATERIAL AND METHODS

Meiofauna samples were collected from dead coral fragments along the Kenyan coast. Samples from coral gravel were obtained by decanting the coral gravel with filtered seawater (ten times) through a 32 µm sieve. Shortly after collecting, a buffered formaldehyde solution was added to a final concentration of 4%. In the laboratory, samples were centrifuged three times with Ludox HS40 (specific density 1.18) and finally stained with Rose Bengal. Harpacticoid copepods were sorted out and counted using a Wild M5 binocular microscope and were stored in 75% ethanol.

Observations and drawings were made from whole and dissected specimens mounted in glycerine, using a light microscope (Leica DM LS) equipped with a drawing tube. Preparations were sealed with insulating varnish. In toto specimens were stored in 75% ethanol. Type specimens are deposited in the Invertebrate Collections of the Royal Belgian Institute of Natural Sciences (KBIN) (Brussels, labelled COP). Scale bars in figures are indicated in µm.

The descriptive terminology is adopted from Huys et al. (1996). Abbreviations used in the text are: A1, antennule; A2, antenna; ae, aesthetasc; exp, exopod; enp, endopod; P1–P6, first to sixth swimming legs; exp(enp)-1(2,3) to denote the proximal (middle, distal) segment of an exopod (endopod).

SYSTEMATICS

Laophontidae T. Scott, 1905

Laophontinae T. Scott, 1905

sensu Huys and Lee, 2000

Spiniferaphonte Gheerardyn and Fiers, new genus

Diagnosis.—Body cylindrical. Caudal rami bearing large, hook-like process anteriorly to seta VII, distinct process medially of seta VII, and several distinct processes along outer distal corner; seta V robust, dorsally bent, and strongly sclerotised. Genital field with 1 seta each on P6 vestiges and copulatory pore situated distinctly posteriad the transverse ridge. Antennule 6-segmented; segment 1 with blunt process

proximally on dorsal surface, bump along inner margin, and process along outer margin. Segment 2 with large, posteriorly directed hook along outer margin. Antennary exopod bearing 4 sub-equal pinnate setae, lateral one being less densely pinnate. Exopod P1 2-segmented; exopod P2 1-segmented; exopods of P3 and P4 3-segmented. Endopods of P2 to P4 each represented as single seta. Female P5 with 4 setae on baseoendopod; exopod with 5 setae, 3 of them smooth. Male P5 baseoendopod rudimentary with 1 seta on endopodal part; exopod with 3 setae.

Type Species.—*Spiniferaphonte ornata* Gheerardyn and Fiers, new species, monotypy. The above diagnosis coincides with that of the only known and type species of the genus, and must, therefore, be considered tentative.

Etymology.—The generic name is derived from the Latin spina (meaning thorn), the Greek ferein (meaning to bear), and the suffix-phonte (gender feminine); and refers to the caudal rami bearing numerous thorn-like processes.

Spiniferaphonte ornata Gheerardyn and Fiers,
new species (Figs. 1-5)

Type Locality.—Western Indian Ocean, Kenyan coast, Msambweni (4°28'S, 39°29'E), coarse coral gravel, water depth 2-3 m.

Material Examined.—From type locality: holotype ♀ dissected on 3 slides (COP4723a-c); allotype ♂ preserved in 70% alcohol (COP4724); paratypes, 2 ♀♀ preserved in 70% alcohol (COP4725); all collected 20 February 2002 by M. Raes.

Description of Female.—Total body length 564-610 µm (measured from anterior margin of rostrum to posterior margin of caudal rami). Largest width measured at posterior margin of cephalothorax: 135 µm.

Rostrum (Fig. 2A) large and prominent, broadly triangular, continuous with cephalothorax, with pair of sensilla anteriorly, dorsal surface pitted.

Habitus (Fig. 1A, B). Body cylindrical. Cephalothorax with parallel margins. Free prosomites as wide as cephalothorax. Urosome scarcely tapering posteriorly. Second and third urosomites fused to form genital double-somite but with transverse ridge dorsally and laterally indicating original segmentation; fully fused ventrally.

Integument of cephalothorax pitted but with symmetrical pattern of smooth areas; regularly ornamented with small sensilla. Surface of pleurotergites heavily ornamented, with pits in anterior half of each and fine striae in posterior half, except for surface of third urosomite completely striated. Dorsal surface of anal somite with few striae. Posterodorsal margin of cephalothorax smooth, those of free prosomites and following urosomites serrate, and that of penultimate somite strongly incised, forming large, tooth-like processes. Posterodorsal margins of cephalothorax and free somites (except penultimate urosomite) bearing several small sensilla; free prosomites and first urosomite additionally bearing 1 pair of sensilla dorsally. Posterodorsal margins of free prosomites and first, third, and fourth urosomites clothed with slender hairs. Anal operculum distinctly

backwardly produced, crescentic, flanked by 2 sensilla, and with strongly incised margin forming large, tooth-like processes.

Ventral surface (Fig. 5A) of genital double-somite heavily ornamented with pattern of striae. Lateral edges of genital double-somite and following urosomite with large, posteriorly directed, triangular processes. Ventral surface of fourth and fifth urosomite with rows of striae followed posteriad by row of short, slender spinules. Ventral surface of anal somite densely ornamented with symmetrical pattern of striae, that of fifth urosomite with short row of long, slender spinules laterally. Posteroventral margins of genital double-somite and following urosomites each bearing row of slender spinules.

Caudal rami (Fig. 5A, C, D) twice as long as wide; bearing conspicuous processes on dorsal surface and along inner and outer distal corners: viz., large, hook-like process anteriorly to seta VII, distinct process medially from seta VII, small process on outer distal corner of ramus, and 3 processes near implantations of setae I, II, and III. Dorsal surface of rami somewhat flattened with striae. Outer margin and distal ventral surface furnished with small spinules. Long, slender spinules present ventrally, with striae medial to them. Seta I, II, and III inserted in distal fourth of outer margin; seta I rudimentary. Seta IV and V not fused; seta IV pinnate; seta V robust, dorsally bent, strongly sclerotised. Seta VI short and slender; seta VII inserted in distal fourth of ramus.

Antennule (Fig. 2A) 6-segmented; majority of setae long and slender; segments 1-4 striated dorsally, smooth ventrally; segments 5 and 6 smooth. Segment 1 with blunt process proximally on dorsal surface, bump furnished with small spinules along inner margin, and sharp, thorn-like process along outer margin. Segment 2 with large, posteriorly directed hook along outer margin. Armature formula: 1-[1], 2-[7 + 1 pinnate], 3-[7], 4-[1 + (1 + ae)], 5-[1], 6-[9 + acrothek]. Apical acrothek consisting of small aesthetasc fused basally to 2 setae.

Antenna (Fig. 2B). Coxa bearing 2 rows of spinules. Allobasis with short, unipinnate abexopodal seta inserted in distal third. Exp unisegmented and small, bearing 4 sub-equal bipinnate setae with most lateral one being less densely pinnate. Enp with few spinules, 2 sub-apical frills, and following armature: subapically, 2 unipinnate, long spines and 1 rudimentary seta, and apically, 2 robust spines (one of them armed), 3 geniculate setae (one being pinnate), and 1 small, slender seta.

Mandible (Fig. 2C) with well-developed, strongly sclerotised gnathobase bearing several blunt teeth and 1 unipinnate seta. Spinule row near insertion of palp. Palp uniramous, exopod represented as short seta, endopod with faint suture and bearing 3 setae. Basal armature represented by plumose seta.

Maxillule (Fig. 2D). Praecoxal arthrite well developed; bearing row of long spinules on posterior surface; medial margin furnished with 8 spines/setae; 1 seta on anterior surface. Coxal endite with 1 pinnate seta and 1 naked seta. Basal endite with 3 setae. Endopod obsolete, represented by 1 pinnate and 2 naked setae. Exopod 1-segmented with 2 apical setae.

Maxilla (Fig. 2E). Syncoxa with row of long spinules along outer edge, 2 short spinule rows on posterior surface, and row of short spinules along inner margin; with 3 endites.

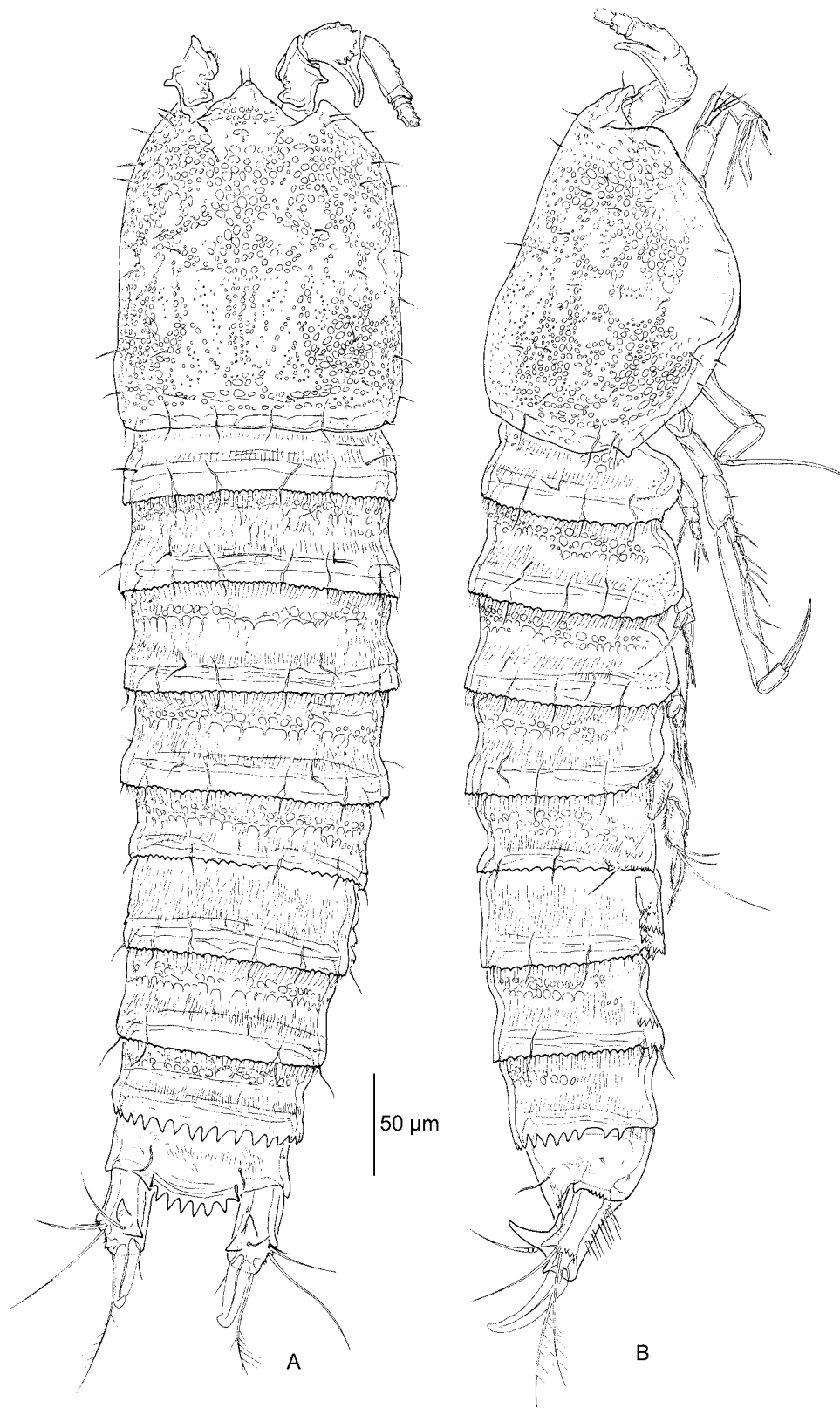


Fig. 1. *Spiniferaphonte ornata*, new genus, new species, holotype. A, female habitus, dorsal; B, female habitus (mandible, maxillule, and maxilla omitted), lateral.



Fig. 2. *Spiniferaphonte ornata*, new genus, new species, holotype. A, female antennule and rostrum, dorsal; B, female antenna; C, female mandible; D, female maxillule; E, female maxilla.

Praecoxal endite small, with 1 seta. Proximal coxal endite with strong pinnate spine and 2 slender setae. Distal coxal endite with strong pinnate spine, pinnate seta, and naked seta. Allobasis drawn out into strong, slightly curved, armed

claw bearing 2 setae. Endopod obsolete, represented by 3 naked setae.

Maxilliped (Fig. 3E). Syncoxa with a spinule row and 1 pinnate seta, latter inserted distally. Endopod long and

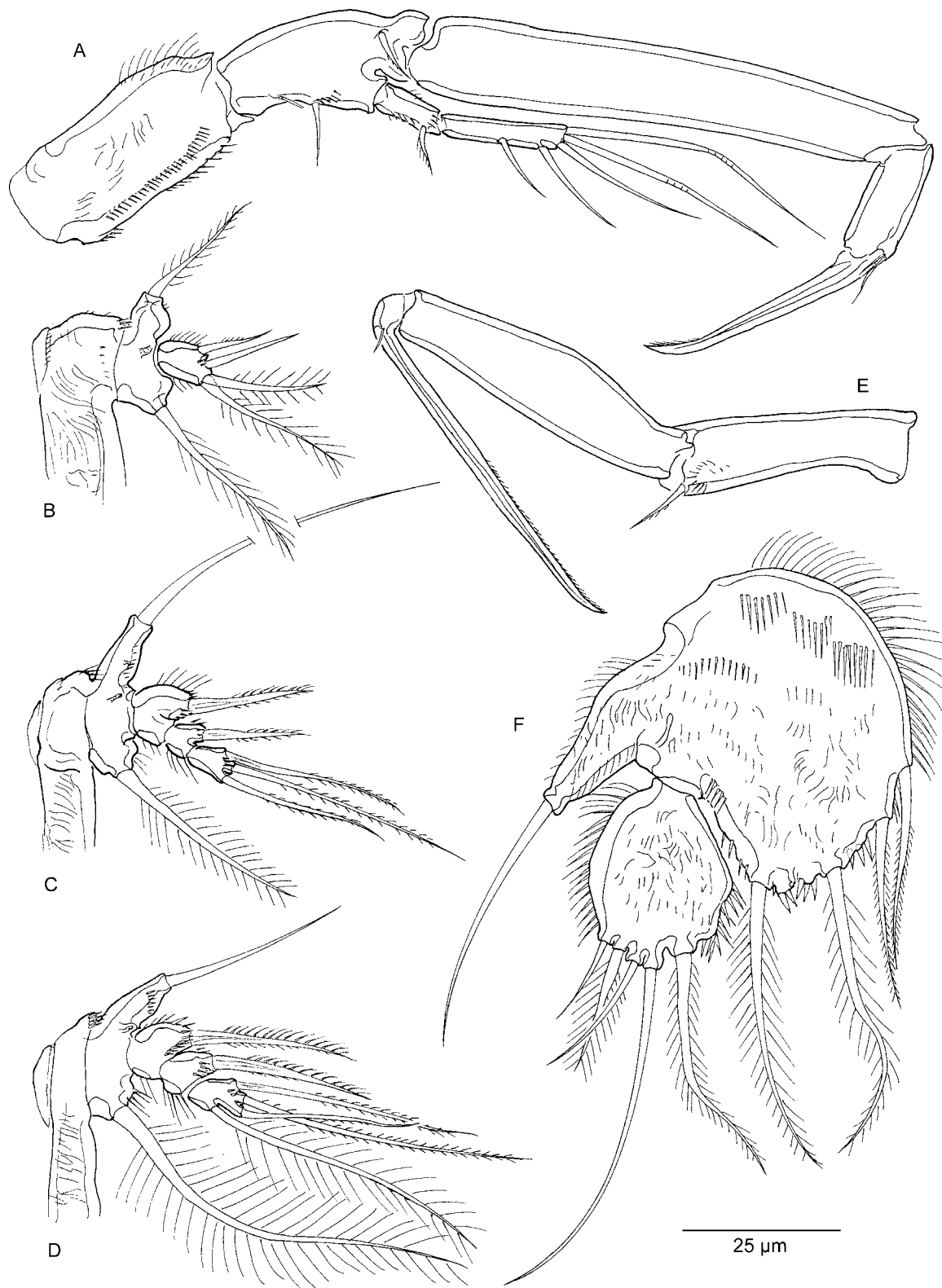


Fig. 3. *Spiniferaphonte ornata*, new genus, new species, holotype. A, female P1, anterior; B, female P2, anterior; C, female P3, anterior; D, female P4, anterior; E, female maxilliped; F, female P5, anterior.

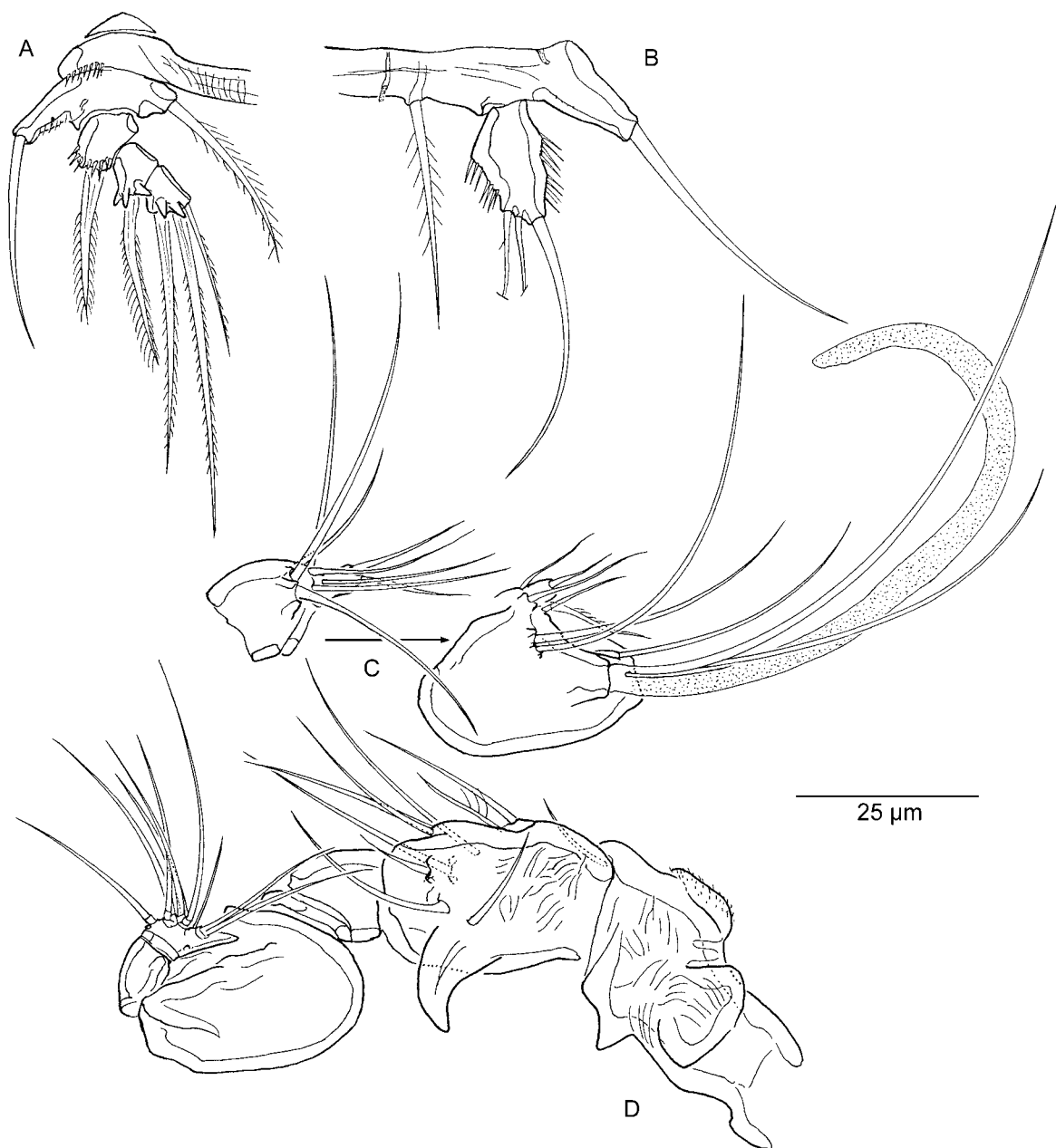


Fig. 4. *Spiniferaphonte ornata*, new genus, new species, allotype. A, male P4, anterior; B, male P5, anterior; C, male antennule (segments 3 to 5), ventral; D, male antennule (armature of segments 3 to 5 omitted), dorsal.

slender, slightly curved, armed with short, naked seta at base.

P1 (Fig. 3A). Coxa cylindrical with 2 rows of short spinules along outer margin and slender hairs along inner margin; anterior surface with striae. Basis with 1 seta on outer margin, medial seta arising on anterior surface, short spinule row near outer seta, and tube pore near articulation with coxa. Exp-1 furnished with spinules and unipinnate outer seta; exp-2 with 3 naked outer setae and 2 geniculate apical setae. Enp-1 without spinules; enp-2 with armed claw, minute, naked accessory seta, and few spinules. Enp-1 2.5 times as long as exopod.

P2-P4 (Fig. 3B, C, D). Prae-coxae small and triangular. Coxae completely fused to intercoxal sclerites, these being

striated. Short spinule row along outer distal margin of coxae. Bases with tube pore on anterior surface and a rather short, pinnate (P2) or long, naked (P3, P4) basal seta arising from distinct lateral setophore, latter bulbous in P2. Each endopod of P2-P4 represented as a single strong, plumose seta. Exopods of P2-P4 small, of compact appearance, that of P2 1-segmented, those of P3 and P4 3-segmented. Setal formula in Table 1. Segments with patterns of spinules as figured.

P5 (Fig. 3F) with separate exopod and baseoendopod, both covered anteriorly with fine striae; margins bearing long, slender spinules or stout, short spinules, and some spinule rows on anterior surface of baseoendopod. Basal seta arising from long setophore. Endopodal lobe extending almost to middle of exopod and bearing 4 plumose setae.

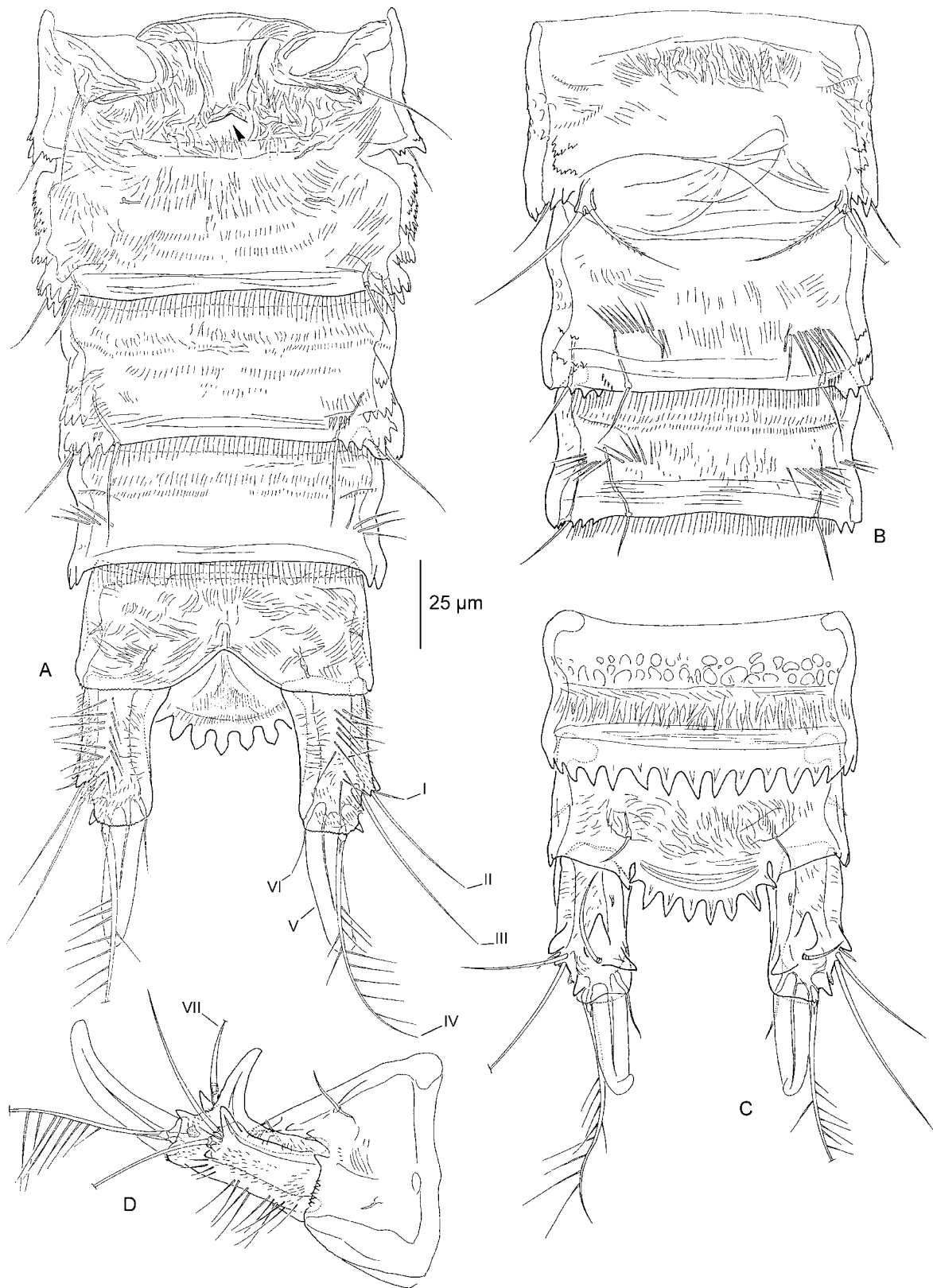


Fig. 5. *Spiniferaphonte ornata*, new genus, new species, holotype and allotype. A, female urosome (copulatory pore arrowed), ventral; B, male second to fourth urosomite, ventral; C, female anal somite and caudal rami, dorsal; D, female anal somite and caudal ramus, lateral.

Table 1. *Spiniferaphonte ornata* n. gen., n. sp. Swimming leg setal formula.

	Exopod	Endopod*
P2	022	1
P3	0.0.021	1
P4	0.0.121 [0.0.021 in ♂]	1

* The endopod of P2-P4 is only represented by a seta.

Exopod rounded, somewhat longer than wide with 2 bumps along inner margin, bearing 2 plumose (i.e., innermost and second outermost) and 3 slender, smooth setae, all closely set in distal region.

P6 vestiges (Fig. 5A) each bearing 1 naked seta, with 2 small processes set medially from it. Copulatory pore situated distinctly posteriad the transverse ridge connecting the pair of P6.

Description of Male.—Total body length 562 μ m (measured from anterior margin of rostrum to posterior margin of caudal rami). Greatest width measured at posterior margin of cephalothorax: 124 μ m.

Habitus as in female, except for the fully separated second and third urosomites and fewer posteriorly directed triangular processes along lateral edges of third and fourth urosomites (Fig. 5B). Ventral surface of second urosomite heavily ornamented with pattern of striae in anterior half; that of third and fourth urosomites with a row of long, slender spinules laterally.

Antennule (Fig. 4C, D) 8-segmented; sub-chirocer. Segments 1 and 2 as in female. Armature formula: 1-[1], 2-[8 + 1 pinnate], 3-[7], 4-[2], 5-[8 + 1 pinnate + (1 + ae)], 6-[0], 7-[0(?)], 8-[10(?)].

Antenna, mouthparts, and P1-P3 as in female.

P4 (Fig. 4A). Seta representing endopod shorter than in female. Exp-2 and exp-3 with 3 and 2 processes, respectively, along outer margin. Exp-3 lacking inner seta.

P5 (Fig. 4B). Endopodal lobe of baseoendopod obsolete; bearing 1 plumose seta with tube pore medially next to it. Basal part with outer naked seta arising from setophore (latter bearing a tube-pore proximally). Exopod convex along inner margin; almost twice as long as maximum width; bearing 3 setae closely set apically, outer seta long and 2 inner setae short and more slender; inner and outer margins set with spinules.

P6 vestiges (Fig. 5B) asymmetrical. One vestige functional, other fused to somite. Both produced into slender, cylindrical process bearing 1 inner pinnate seta and 1 outer smooth seta.

Variability.—One female paratype has a left P2 exopod bearing only 3 setae; the other female paratype has a left P3 exopod with an inner seta on the third segment.

Etymology.—The specific name *ornata* (Latin, meaning ornamented) refers to the highly ornamented dorsal body surface.

DISCUSSION

In the family Laophontidae, several genera (such as *Arenolaophonte* Lang, 1965, *Galapalaophonte* Mielke,

1981 sensu Fiers (1991), *Indolaophonte* Cottarelli, Saporito and Puccetti, 1985, *Laophontina* Norman and T. Scott, 1905 sensu Fiers (1991), and *Mexicolaophonte* Cottarelli, 1977) have similar adaptations to an interstitial life style, namely a cylindrical body shape and a reduced segmentation and/or setation of the swimming legs P2-P4. Even when three segments remain in a particular ramus, generally they are of small size or of peculiar shape (Wells and Rao, 1987). These similar adaptations, also present in *Spiniferaphonte* gen. n., are undoubtedly the result of convergent evolution in as much as certain of these genera belong to different lineages. Vermiform genera, e.g., *Afroloaophonte* Chappuis, 1960 and *Klieonychocamptoides* Noodt, 1958, are characterised by reduction of the posteriorly directed lateral processes of both somites of the genital double-somite (Huys, 1990). Together with the reduction of the swimming legs,

Fiers (1991) thoroughly revised the genus *Laophontina*, as it was then known, and divided it into four different genera: *Amerolaophontina* Fiers, 1991, *Galapalaophonte*, *Laophontina*, and *Wellsiphontina* Fiers, 1991. All of these genera show the typical modifications for an interstitial life style. Distinction between the different genera was mainly based on the genital field, sexual dimorphism of the swimming legs, integumental structures, ornamentation of the anal operculum, and P5 chaetotaxy. It was supposed that the *Galapalaophonte*-*Amerolaophontina* lineage branched off from a different stock than *Laophontina* and *Wellsiphontina*. *Galapalaophonte* is markedly characterised by peculiar, sexually dimorphic endopods of P2 and P3 and a median thorn on the anal operculum. The genus has an amphi-American distribution. Although *Amerolaophontina* lacks markedly sexually dimorphic endopods and has strongly reduced swimming legs, it is plausible to assume that it shares a common ancestor with *Galapalaophonte*. *Wellsiphontina* seems most closely related to *Laophontina*, as is shown by the denticulate operculum and the typically transformed male P4, both considered to be synapomorphic states. In both genera the male P4 is considerably smaller, bears much stronger exopodal spines, and has fewer elements on the ultimate segment than the female P4. While *Wellsiphontina* has a restricted distribution along East African shores, *Laophontina* occurs in the Mediterranean and the eastern Atlantic.

A single juvenile specimen from the Seychelles, classified as Laophontidae gen. spec. male copepodid V in Fiers (1991), appears to be closely related to *Spiniferaphonte ornata*. Although this specimen is a copepodid, its features indicate a close affinity to the present new species. The processes on the first and second segment of the A1 are similarly positioned. The P1 exopod will probably be organised into a two-segmented one in the adult stage. The endopods of P2-P4 are each represented by a single seta, and the respective exopods will most likely be at least two-segmented as indicated by the number of outer exopodal spines, by reference to the copepodid development of *Galapalaophonte biarticulata* Fiers, 1991 (see: fig. 21 Fiers, 1991). There are distinct, thorn-like processes at similar positions on the caudal rami, a strongly sclerotised seta V without a slender distal part, and long, slender spinules on the ventral surface of the caudal rami. Finally, the strong,

tooth-like, mediodorsal processes on the anal somite most likely will form a strongly incised posterior rim of the adult penultimate somite. Fiers (1991) already supposed this juvenile to be more closely related to *Wellsiphontina* than to the *Galapalaophonte*-*Amerolaophontina* lineage.

Although *Spiniferaphonte* shares certain characteristics with the *Galapalaophonte*-*Amerolaophontina* lineage (the pitted cephalothorax, P6 with one seta, copulatory pore posteriad the transverse ridge), it seems more plausible for *Spiniferaphonte* to have originated from the same stock as *Wellsiphontina* and *Laophontina*. This close relationship is supported by the following synapomorphies: a denticulate operculum, a sexually dimorphic P4 exopod (reduced chaetotaxy of the ultimate segment in the male), and the absence of sexual dimorphism in the P2 and P3 endopods. The proposal of the new genus *Spiniferaphonte*, for *S. ornata*, new species, is supported by the following autapomorphies: three smooth setae on the female P5 exopod and a robust, dorsally bent, and strongly sclerotised caudal seta V. In addition, the genus exhibits the following plesiomorphies: the two-segmented P1 exopod and the presence of a seta on the endopodal part of the male P5 that indicate the new species represents a separate lineage and, therefore, it is assigned to a new genus.

Within the Laophontidae, the variety in shape of the caudal rami is relatively large, compared to other families (personal observation). Mostly, the rami are short (one to two times as long as wide) and cylindrical, but they can be up to eight times as long as wide, e.g., *Archilaophonte* Willen, 1995, *Echinolaophonte mirabilis* (Gurney, 1927), *Laophonte elongata* Boeck, 1872. Lamelliform caudal rami that are flattened, broad, and oval are typical for the genera *Asellopsis* Brady and Robertson, 1873 and *Tapholeon* Wells, 1967 and also occur in two species of *Paralaophonte* Lang, 1944 (viz., *P. asellopsiformis* Lang, 1965 and *P. aenigmaticum* Wells, Hicks and Coull, 1982) (Huys, 1990).

Certain genera bear one or more upwardly directed processes on the dorsal surface of the caudal rami (*Amerolaophontina*, *Galapalaophonte*, *Indolaophonte*, *Langia* Wells and Rao, 1987, *Laophontina*, *Mexicolaophonte*, *Pseudolaophonte* A. Scott, 1896, *Spiniferaphonte*, and *Wellsiphontina*) (Bodin, 1977; Cottarelli, 1977; Cottarelli, Saporito and Puccetti, 1986; Fiers, 1991; Wells and Rao, 1987). At first sight, these genera appear to be related to each other on other grounds, such as similarities in A1, body shape, and reduction of the swimming legs. The position of the processes on the caudal rami can be taken as a criterion to define two groups among them. Lang (1948) already noted that the caudal rami offer useful systematic characters, and Huys (1988) stressed the importance of their morphology in helping to reveal relationships among paramesochrid genera. In *Indolaophonte* and *Langia*, a spinous process is developed and is derived from a posterior outgrowth of the posterolateral corner of each caudal ramus (see: fig. II,1 Cottarelli, Saporito and Puccetti, 1986; fig. 5C Mielke, 1997), while in the other genera a spinous process is developed medially of or anteriorly to seta VII (see: fig. 4 Bodin, 1977; fig. 2b Cottarelli, 1977; figs. 8b, 12a, 24a Fiers, 1991). These differently positioned processes are considered here as different derived conditions of the

normal cylindrical caudal rami which do not bear any processes. As in all Copepoda, the cylindrical caudal rami are the most generalised form, which is known as the ancestral one (Huys and Boxshall, 1991). Although the latter group of genera shares a derived characteristic (namely a similarly positioned novel structure), the exact relationships (apart from the above-mentioned affinities) between these genera remain difficult to assess.

The outer distal process on the caudal ramus is a distinct synapomorphy of *Indolaophonte* and *Langia* that demonstrates their shared and distinct path of descent. The close relationship between these two genera is furthermore shown by the similar A1, exopod of A2 (bearing 3 setae), and male and female P5.

Detailed study, e.g., of body surface and mouthparts, of the two species of *Indolaophonte* should reveal whether *Langia maculata* Wells and Rao, 1987 can also be included in *Indolaophonte* with an accordingly adjusted generic diagnosis. Mielke (1997) provided a redescription of *L. maculata* but did not discuss this possible relationship. At present, the monospecific *Langia* is mainly distinguished from *Indolaophonte* because of the presence of a two-segmented P2 exopod and a three-segmented P3 exopod (versus one-segmented and two-segmented, respectively, in *Indolaophonte*).

In certain genera, one of the apical caudal setae is modified. In *Pseudolaophonte*, the terminal accessory seta (seta VI) is modified into a strong, dorsally bent spine that is equal in length to the caudal ramus itself (see: fig. 4 Bodin, 1977; Klie, 1950). It is not unlikely that this modified seta is a functional analogue of the dorsal process on the apical margin of each caudal ramus in *Indolaophonte* and *Langia*, both of which are interstitial genera. In the genera *Laophontina*, *Wellsiphontina*, *Amerolaophontina*, *Galapalaophonte*, *Mexicolaophonte*, and *Maiquilaophonte* Mielke, 1985, and in certain species of *Klieonychocamptoides*, the inner terminal seta (seta V) is thickened proximally, with a thorn-like process dorsally at a certain point, posteriorly from which it continues as a slender seta (see: fig. 2b Cottarelli, 1977; figs. 3c, 5c, 10b, 24a Fiers, 1991; fig. 44 Mielke, 1981; fig. 49C Mielke, 1985). In *Spiniferaphonte*, caudal seta V is a strongly sclerotised, dorsally bent seta, apparently having lost the slender distal part.

It is striking that a modified seta V (which is present in both sexes) only occurs in interstitial species and is mostly associated with distinct processes on the caudal rami and/or the anal operculum. The members of these genera also bear strong, thorn-like processes on the proximal segments of the antennule (see: fig. 2a Cottarelli, 1977; figs. 2g, 6a, 11b, 23b Fiers, 1991; fig. 42C Mielke, 1981; fig. 45C Mielke, 1985). Kunz (1974) described *Kliopsyllus furcavaricatus* (Kunz, 1974) from coral sand. This paramesochrid is characterised by the ability to spread its caudal rami. As a consequence, the dorsally bent, thorn-like processes on the anal somite, which serve as antagonistic structures, are flexed upwardly. Kunz (1974) presented two explanations for this spreading behaviour. The mechanism might be useful in moving through the interstitial habitat; it might also function in anchoring the animal between sand grains when interstitial water moves due to wave action. These explanations may

well apply to the mentioned laophontids, in which the modified caudal seta and the strong, thorn-like processes on the antennules and caudal rami may play a role in the movement and anchoring of the animals in their interstitial habitat.

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