Allocation of *Laophonte trispinosa* Sewell to *Xanthilaophonte* gen. nov. and the description of *X. carcinicola* spec. nov. (Harpacticoida: Laophontidae)

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Laophonte trispinosa Sewell is reported here from various localities in the Indian and the West Pacific Ocean, and is allocated to the herein erected genus *Xanthilaophonte* gen. nov. A second species, *X. carcinicola* spec. nov. is described from Indonesia. The genus *Xanthilaophonte* gen. nov. is most closely related with *Echinolaophonte* Nicholls. Both species of this genus live in association with decapods, mainly Xanthidae, and occur on the carapax of their hosts, between the bristles. Comparison of the copepodid development clearly shows that the advanced morphology of *Xanthilaophonte* gen. nov. resulted from heterochronic events.

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Introduction

Laophonte trispinosa, originally described by Sewell (1940) based on a single female specimen, has been an enigmatic species in the family Laophontidae ever since (Bodin, 1988). The rather concise description and the bizarre combination of characteristics made it impossible to designate this species to any of the laophontid genera. Noodt (1958) and Lang (1965) suggested that *L. trispinosa* showed affinities with the genera *Onychocamptus* Daday or *Klieonychocamptus* Noodt, although Sewell (1940) repeatedly pointed to the resemblances between his specimen and those actually assembled in the genus *Echinolaophonte* Nicholls.

The sole specimen Sewell had at hand was found between weeds collected off Addu Atoll, southernmost atoll of the Maldive Archipelago. Within the scope of a thorough revision of the family Laophontidae, an intensive survey on decapod associated harpacticoids from various parts of the world was conducted. *Laophonte trispinosa* was found a very common and abundant associate of diverse marine Decapoda collected in the Indian and west Pacific Ocean.

In the present paper, the adults as well as the copepodids of *L. trispinosa* are described. Based on this new information, the close relationships of this species to the genus *Echinolaophonte* are demonstrated. However, *L. trispinosa* and a closely related species, *X. carcinicola* spec. nov. possess such marked differences that both are domiciled in the here erected genus *Xanthilaophonte* gen. nov.

The observed developmental pattern of the successive copepodid stages is not discussed at length, but some features of it are added in the generic diagnosis. In future contributions dealing with related genera, the importance of such features will become clear.

Material and methods

Xanthid decapods stored in the collections of the "Rijksmuseum van Natuurlijke Historie" (RMNH, Leiden; at present Nationaal Natuurhistorisch Museum), and the "Koninklijk Belgisch Instituut voor Natuurwetenschappen" (KBIN, Brussels) were thoroughly rinsed under a strong water current. The copepods were picked out from the residue gathered on a 38 µm sieve and preserved in 75% neutralized and denatured ethylalcohol.

Dissections were mounted in lactophenol, the cover glass sealed with nail polish. Drawings were made using a camera lucida.

Terminology and abbreviations used in the descriptions are according to Lang (1948, 1965). Copepods are deposited in the collections of both musea and labeled RMNH F for those in the Leiden collection and KBIN Cop. for the copepods deposited in the invertebrate collection at Brussels.

The localities are abbreviated in the text, but a full description of the information found on the labels in the vials of the decapods is added at the end of the paper.

Systematics

Genus **Xanthilaophonte** gen. nov.

Type-species.— *Laophonte trispinosa* Sewell (here designated).

Diagnosis.— Cephalothorax without lateral extensions or posterodorsal hook-shaped processes; thoracic and abdominal segments spinulose with strongly sclerified margins but without dorsal projections; rostrum with a rounded anterior margin; furcal rami cylindrical, at the most twice as long as wide; antennule six-segmented with the first segment slightly longer than wide; second antennular segment with a blunt small process; antenna with a one-segmented exopodite, bearing four setae; maxilliped robust; coxa and basis of P1 largely extended; chaetotaxy of the legs in table I; articulation of the outer seta on the basis in P3 - P5 quadrate; baseoendopodite P5 with four setae, exopodite with three; P6 with or without setae.

Sexual dimorphism: antennule sub-chirocer; smaller legs; P5 variable but always without inner baseoendopodal setae.

Juveniles: rami of P2 - P4 one-segmented throughout the copepodid development; exopodite P4 of the female copepodids CIV and CV strongly transformed.

Etymology.— The generic name is a conjunction of Xanthidae, a family of decapod crustaceans and Laophonte. The generic name alludes to the association of the species with Xanthid crabs. The gender is feminine.

Discussion.— The main reason Noodt (1958) and Lang (1965) supposed strong affinities of *Laophonte trispinosa* with the genera *Onychocamptus* or *Klieonychocamptus* is undoubtedly the chaetotaxy of the exopodite of the female P5, bearing only three setae. Designation of this species to the genus *Echinolaopohonte* was never discussed because of the absence of dorsal rigid structures in *L. trispinosa* which are typical for the species of the genus *Echinolaophonte*.

However, one important characteristic has been overlooked. Besides the dorsal

structures on the cephalothorax and pleurotergites, the genus *Echinolaophonte* is characterized by a remarkably long basis in the P1. Such modification of the protopodites is uncommon among the Laophontidae and appears to be an important generic diagnostic feature. *Onychocamptus* and *Klieonychocamptus* have protopodal components in the first leg which are only slightly longer than wide. Sewell's (1940; fig. 76e) illustration of the P1 is rather rudimentary but the elongated nature of the basis is obvious and shows clearly that *L. trispinosa* cannot be assigned either to *Onychocamptus* or to *Klieonychocamptus*.

The rediscovery of the species provides interesting new evidences of the affinities of it with *Echinolaophonte*. The cepahlothorax of *L. trispinosa* exhibits a mediodorsal rounded process exactly on the same place in the dorsal cephalic thorn in the species of *Echinolaophonte*. Comparing only the adult morphology of this structure, the cephalic plate of *L. trispinosa* hardly resembles the powerful cephalic thorn of the species in *Echinolaophonte*. The juvenile morphology of this structure however, shows a remarkable similarity with the adult posterodorsal margin of the cephalothorax in *L. trispinosa*.

The development of the cephalic processus in the species of the genus *Echinolaophonte* (*E. armiger, E. mirabilis* and *E. tropica*, pers. obs.) starts from the fourth copepodid. In this stage the posteromedian margin of the cephalothorax exhibits a short curved sclerified ridge. In the fifth copepodid, the dorsomedian apart of the cephalothorax bears exactly the same structure as is found in the adult of *L. trispinosa*: slightly protruded posteriad and furnished with spinules on the ventral side of this extension. As illustrated below, copepodids of *L. trispinosa* never show a differentiation of the mediodorsal margin of the cephalothorax. The peculiar rounded plate appears only in the adults. Thus the adult form of the cephalothorax of *L. trispinosa* represents a juvenile morphology, known from its sister-taxa.

Based on other adult features such as the reduced chaetotaxy and the absence of sexual dimorphic structures in the male, *L. trispinosa* is distinctly more advanced than its congeners. Thus the facies of the cephalic plate can be considered as paedomorphic. The onset of this characteristic is clearly delayed since it appears only in the adult stage. According to the terminology of McNamara (1986), the morphology of the head - and the body in general - in *L. trispinosa* is postdisplaced.

Having, I believe, justified the close affinities of *L. trispinosa* to *Echinolaophonte*, the question still remains if this species should be assigned to the latter.

The so typical thorns on the dorsal surface of the segments in *Echinolaophonte* are important functional attributes. As will be discussed in a following paper (Fiers, in prep.) these peculiar thorns and hairs are anchorages for foreign materials which are stuck to the dorsal surface of the segments. This behaviour seems to be unique within the family Laophontidae but has been shown for species in the related family Ancorabolidae (Fiers, 1988).

All the members of *Echinolaophonte* are free living marine harpacticoids and must have developed this strange behaviour in response to certain needs. At the other hand, *Laophonte trispinosa* and its congener *X. carcinicola* spec. nov. are clearly true decapod associated harpacticoids. Living as both species do, between the hairs on the carapaces and thus sheltered from various external forces, covering of the dorsal sides of the epimerae probably lost its original meaning. Moreover, climbing between the hairs would be rather disadvantageous for animals furnished with large

and rigid projections on the body.

The adaptation to the new life style of both crab associated harpacticoids represents undoubtedly an evolutionary novelty. Therefore, both species are unified together in the separate genus *Xanthilaophonte* gen. nov.

Xanthilaoponte trispinosa (Sewell, 1940)
(figs. 1-10)

Laophonte trispinosa Sewell, 1940: 326-328, fig. 76; Noodt, 1958: 109; Vervoort, 1964: 372; Lang, 1965: 447; Wells, 1976: 173; 1940; Bodin, 1988: 141.

Type-material.— The catalogue of harpacticoid species deposited in the collections of the British Museum (Natural History) does not mention the presence of the specimen Sewell (1940) described (Marcotte, unpublished). Type-locality: Republic of Maldives; Addu Atoll (Sewell, 1940).

Additional material.— (When the number of specimens is not indicated, the sample contained more than 30 individuals; for abbreviations in bold, see list of stations); **Aus** 67 - 1: KBIN Cop 1620; **Aus** 82 - 1: KBIN Cop 1624; **Red** 00 - 1: RMNH F 912; **Eth** 62 - 1: RMNH F 913; **Ind** 00 - 1: RMNH F 914; **Ind** 29 - 1: RMNH F 915 (6♀, 3♂, 1 CV and 1 CIV); **Ind** 29 - 2: RMNH F 916 (6♀, 2♂, 4 CV); **Ind** 30 - 1: RMNH F 917 (1♀, 1♂, 1 CIII); **Irj** 55 - 1: RMNH F 918 (1♀); **Jap** 58 - 1: RMNH F 919; **Jap** 68 - 1: RMNH F 920 (1♀, 2♂); **Mad** 59 - 1: KBIN Cop 1644; **Mad** 59 - 2: KBIN Cop 1645; **Mal** 84 - 89: KBIN Cop 1617; **Nec** 66 - 7: KBIN Cop 1618, 1621; **Nec** 66 - 8: KBIN Cop 1622, Cop 1623, Cop 1627-1639, Cop 1622 and Cop 1623 (2♀ and 3♂); **NZl** 83 - 1: KBIN Cop 1625 (copepodids and adults), Cop 1626 (nauplii in residue); **NZl** 96 - 1: RMNH F 921 (1♀ CV); **Phi** 81 - 1: RMNH F 922; **Phi** 00 - 1: RMNH F 923; **PNG** 80 - 64: KBIN Cop 1619; **Tha** 29 - 1: KBIN Cop 1616; **Tha** 83 - 1: RMNH F 924.

Redescription.— Based on the specimens from Nec 66 - 8.

Female; habitus (fig. 1a and b); length, including rostrum and furcal rami, 590 µm (n = 10); body prehensile fusiform, somewhat compressed; cephalothorax with a strongly convex lateroventral margin; dorso-median line of the cephalothorax sclerified, forming a median keel; posterodorsal margin extended in posterior direction, forming a rounded plate, reaching beyond the margin of the cephalothorax; thoracic and abdominal segments tapering towards the anal segement; genital segments fused; margins of genital segments and second abdominal segment laterally extended; dorsal fusion-line interrupted between the dorsalmost sensillae; anal segment rather small and convex in the anterior half.

Integumental structures; posterior margin of the cephalic plate with strong spinules, implanted on the underside of the protruded part; cephalothorax with cuticular lines, arranged in an irregular pattern; integument of the somites smooth; posterior and pleural margins of the segments rigid and spinulose; posterodorsal margin of the prae-anal segment with a hyaline frill, incised and forming four lobed extensions.

Rostrum (fig. 3b); prominent with concave margins and a wide, rounded rostral tip.

Furcal rami; 1.5 times as long as wide and slightly convergent; outer and inner margins slightly loose; inner margin and dorsal surface with spinules; outer apical seta not fused with the principal one and about twice as long as the rami; principal furcal setae thickened over a distance equal to the length of the ramus; distal part more slender and spinulose.

Antennule (fig. 2a); six-segmented bearing an aesthetasc on the fourth segment;

first and second segments furnished with long spinules; third and fourth segments with a spinulose posterior margin; second segment with a blunt process on the middle of the dorsal surface (fig. 2a figures the ventral side); surface of the four first segments dorsally clothed with small spinules.

Antenna (fig. 3c); inner margin of the allobasis spinulose and having a seta, implanted in the distal half; exopodite well-developed, bearing four spinulose setae; apical margin of the endopodite with six appendages: two geniculated setae; two strongly armed spines, one smooth spine and a minute seta.

Mandible (fig. 2b-d); gnathobasis having four articulating teeth, one fused tooth and a sensilla; mandibular palp one-segmented, bearing a plumose apical seta and furnished with long hairs along one side; exopodite represented as a single seta; endopodite fused with the basis and bearing three smooth setae.

Maxillule (fig. 2e); arthrite with six spines, two setae and a row of long spinules; prae-coxa, coxa and basis with spinules on their surface; coxa and basis with one apical seta; exopodite cylindrical, having two apical setae and set with hairs along the margins; endopodite obsolete, represented as two setae.

Maxille (fig. 2f); surface of syncoxa spinulose; three endites: proximal one represented as a single seta; median and distal one cylindrical and bearing each three setae; claw armed in distal half and bearing two setae; endopodite vestigial, represented as two setae.

Maxilliped (fig. 3a); coxa with two long setae and several rows of spinules; basis robust, strongly sclerified and furnished with spinules along the inner and outer margin; claw stongly developed, armed with small teeth and bearing a slender seta near the articulation with the basis.

P1 (fig. 3d); coxa and basis furnished with spinules; basis 3.5 times as long as wide; exopodite one-segmented and bearing six smooth setae; second endopodal segment with a small smooth seta and a strongly armed claw; teeth of the claw increasing in length towards the distal end of the claw.

P2-P4 (fig. 3e, f and fig. 4e, respectively); prae-coxae smooth; coxae and basis with spinules; expodites three-segmented, endopodites two-segmented; chaetotaxy in table I; ultimate segment of the exopodite P4 only twice as long as wide.

P5 (fig. 3g); baseoendopodite with a large endopodal process, reaching beyond the middle of the exopodite; four baseoendopodal and three exopodal setae; surface entirely covered with hairs; outer and inner margins of both rami spinulose.

Male; much smaller than the female, about 450 μm (400-480 μm, n=10); habitus as in the female except for the free genital segments; second genital segment with a curved transversal row of spinules.

Antennule (fig. 2g); six-segmented, sub-chirocer; first and second segment nearly as in the female, only slightly shorter; ultimate segments forming a strong claw with three hyaline structures on the margin of the penultimate segment.

Antenna and mouthparts as in the female.

P1 as in the female, with the same proportional lengths of the segments; P2 and P4 (figs. 4b, c and d) without sexual dimorphic characteristics but much smaller than those of the female.

P5 (fig. 4d); baseoendopodite entirely incorporated in the supporting segment except for the outer baseoendopodal seta; exopodite slightly longer than wide, bearing three setae.

P6 (fig. 4a); situtated in the middle of the first genital segment; right leg on a

plate, left one fused with the segment; area between both rami with cuticular lines.

Variability (adults).— Specimens without an inner seta on the third exopodal segment of the P4 were found. One female specimen with two setae on the endopodite P4 instead of one has been found in NEC 66-8 (fig. 4f).

Copepodid development (based on specimens from NEC 66).

Copepodid I: (fig. 5a) with segments; length 240 μm; cephalothorax half as long as the entire body length; in lateral view, P1 and maxilliped obvious and strongly prehensile; integument smooth except for the hairy ventral margin of the cephalothorax and a spinulose row parallel with the posterodorsal margin of the fourth segment; anal segment with a convex anal operculum, furnished with a transverse row of stout spinules (fig. 5b); furcal rami twice as long as wide, slightly tapering posteriad; dorsal seta articulating on two basal parts and implanted in the middle of the surface of the ramus; two lateral setae; inner and outer apical setae fused with one another over a distance nearly as long as in the length of the supporting ramus; posterior dorsal margin bearing a long spinulose seta, half as long as the outer apical one; outer distal edge perforated and bearing a distinct tubular hyaline cone; spinules on the rami stout.

Rostrum small, represented as a rounded plate, bearing two sensillae.

Antennule (fig. 5g); three-segmented, aesthetasc implanted on the second segment; first segment with two rows of spinules; integument of the other segments smooth.

Antenna (fig. 5d); allobasis with a one-segmented exopodite and a plumose seta implanted in the distal half of the inner margin; exopodite, slightly longer than wide and bearing five setae; endopodal segment with eight appendages, the apicalmost armed.

Mouthparts as in the adult.

P1 (fig. 5e); coxa less high than wide, furnished with single row of long spinules; basis robust, about twice as long as wide, bearing an outer plumose seta, but no inner one; exopodite one-segmented with five setae; endopodite one-segmented, robust and constricted in the apical fourth; endopodal claw armed and accompanied with a small smooth seta.

P2 (fig. 5f); coxa and basis distinct, the latter bearing an outer seta; exo- and endopodite one-segmented; chaetotaxy in table II.

P3 (fig. 5c); represented by two smooth setae, implanted on the edges of the ventral surface of the third segment.

Copepodid II: habitus (fig. 6a) resembling copepodid I closely but being 290 μm long and composed of six segments, cephalothorax only slightly shorter than half of the body length; prae-anal segment with a dorsal row of spinules; other segments with smooth epimerae; anal segment as in the preceding stage; furcal rami nearly as in the adult, differing from the latter by the long outer apical seta and the stouter spinules.

Antennule (fig. 6f); four-segmented; first segment with spinules; aesthetasc implanted on the second segment.

Antenna and mouthparts as in the adult.

P1 (fig. 6b); coxa and basis long, at least twice as long as wide and furnished with

longitudinal rows of stout spinules; basis with a inner and an outer plumose seta; exopodite as in the adult, bearing six setae; two apical ones and four lateral setae; endopodite two-segmented; first endopodal segment 2.5 times as long as wide and with a smooth surface; second segment with spinules and bearing the strong and armed claw and a smooth seta.

P2 (fig. 6d); smaller than in the preceding stage and with more angular segments; chaetotaxy in table II.

P3 (fig. 6c); coxa and basis distinct; endopodite fused with the basis; exopodite robust, articulating with the basis and bearing five strongly armed spines.

P4 (fig. 6e); represented as two setae on the ventral edges of the fourth segment.

Copepodid III (female): body with seven segments, integument as in the preceding stage; length 370 μm.

Antennule (fig. 7b); four-segmented; second segment considerably longer than in the copepodid II, having a rigid transverse ridge in the middle of the dorsal surface; first and ultimate segments as in copepodid II.

P1 (fig. 7f); resembling the P1 of the former stage closely, except for a slightly longer first endopodal segment (3 times as long as wide).

P2 (fig. 7d); protopodal components distinct; outer seta of the basis armed; endopodite and exopodite one-segmented; setae and spines markedly longer than in copepodid II; chaetotaxy in table II.

P3 (fig. 7e); protopodal components as in P2 but outer seta of the basis smooth and much longer; exopodite and endopodite one-segmented; endopodite with a large hyaline tubular pore near the implantation of the apical setae.

P4 (fig. 7g); protopodite as in the preceding legs; rami one-segmented; setae and spines of the exopodite spinulose.

P5 (fig. 7h); represented as a small socle, bearing an outer spinulose seta and an inner smooth seta.

Copepodid III (male) differs from the female copepodite in the following aspects:

Body length smaller, ranging between 300 and 315 μm (fig. 7a); antennule (fig. 7c) smaller and exhibiting a small but distinct blunt process on the apical edge of the terminal segment; P2-P4 with longer setae and spines but with the same arrangement and the same number of segments in each ramus.

Copepodid IV (female): habitus as in the preceding stage but with eight segments; length 500 (495-525) μm; cephalothorax with a smooth posterior margin; integument of the segments smooth.

Antennule (fig. 8b) five-segmented with the aesthetasc implanted on the third segment; first, fourth and last segment as in the preceding stages; integument smooth except for the rows of spinules on the distal segment.

P2 (fig. 8c); as in the former stage; endopodite P2 (fig. 9a) with an additional seta and constricted in the middle; P3 (fig. 9b) robust and equipped with strongly armed setae and spines; endopodite P3 slightly constricted in the middle; P4 (fig. 9c) with undifferentiated protopodal components; exopodite and endopodite one-segmented; exopodite robust bearing two outer spines and four spines implanted on the straight apical margin.

P5 (fig. 8d); not differentiated from the supporting segment; outer seta of the vestigial baseoendopodite long and smooth; exopodal lobe with three setae and endopodal lobe with two setae.

P6 (fig. 8i); both legs represented as a small spinulose elevation of the posteroventral edges of the sixth segment, having a single smooth seta.

Copepodid IV (male): length, 475-495 μm, habitus and integumental structures of the epimerae as in the female.

Antennule (fig. 8f); five-segmented as in the female but with distinctly different proportional lengths of the segments; aesthetasc implanted on segment four; ultimate segment (fig. 8g) with an apical blunt thorn.

Antenna, mouthparts and P1 as in the female.

P2 as in the female;

P3 (fig. 9e); with slender rami and a plumose seta; exopodal spines less long.

P4 (fig. 9f); with distinct protopodal components; exopodite and endopodite one-segmented, markedly less robustly constructed than athe P4 of the female; ornamentation of the exopodite with four outer spines, one apical spine and one apical seta; endopodite rather small.

P5 (fig. 8e); still fused with the segment; outer seta smooth; obsolete exopodite with two plumose setae and a small smooth seta.

P6 (fig. 8h); as in the female but with two setae instead of one.

Copepodid V (female): habitus as in the preceding stage, without transformation of the posterior margin of the cephalothorax; length 550-575 μm.

Antennule, antenna, mouthparts and P1 as in the adult.

P2-P3 (fig. 10a and 10c); rami one-segmented; number of setae on each ramus as in the adult; outer spines rather strong and ornamented with stout spinules; chaetotaxy in table II.

P4 (fig. 10e); protopodite large, set with a few spinules; endopodite and exopodite one-segmented; exopodite large, irregular shape and strongly sclerified bearing one outer armed spine and apical smooth seta, implanted on a distinct extension of the outer apical edge, four smooth setae inplanted on the inner straight apical margin and a smooth seta arising on the posterior surface; number of setae/spine equally with that of the adult.

P5 (fig. 9k); with a distinct exopodal and endopodal region; the former bearing three setae, the latter four; setae robust and spinulose; surface covered with spinules.

P6; as in the preceding stage.

Copepodid V (male); habitus as in the female; body-length: 400-430 μm.

Antennule (fig. 10g); five-segmented with the aesthetasc on segment three; proportional lengths of the segments differing from these of the female; second segment and fifth segment with a blunt process.

P2-P4 (figs. 10b, d and f, respectively); with one-segmented rami as in the female but with a different chaetotaxy in the endopodites (all bearing one seta less) and with a slender, less robust appearance.

P5 (fig. 9h); situated near the posteroventral edges of the supporting segment and represented as a small sockle bearing three spines (exopodal) and a smooth outer seta.

P6 (fig. 9j); represented as a small spinulose sockle, bearing one inner spine and one outer smooth seta.

Variability in the copepodids.— Legs may appear to be less strongly build. Length and rigidity of setae and spines was found to be very variable. Some examples of aberrant legs are given in fig. 9d (copepodid IV) and fig. 10h and i (copepodid V). Some male copepodids exhibit a more elevated exopodal sockle of the P5 (fig. 9l) or have three setae in the P6 instead of two (fig. 10g).

Xanthilaophonte carcinicola spec. nov.
(figs. 11-12)

Type-material.— Holotype: one female dissected and mounted on a slide; allotype: one male dissected and mounted; one female paratype, preserved in alcohol. Type-material deposited in the "Rijksmuseum van Natuurlijke Historie", Leiden, labelled RMNH F 925, F 926, F 927, respectively. Type-locality: **Ind** 00 - 1: **Indonesia**: Sula Archipelago, Sula Besi. Washed from a specimen of *Pilumnus vespertilio* Fabricius (Crustacea, Decapoda). Figures: holotype: figs. 11a, b, e and f; figs. 12a-c, e, f, g. Allotype: figs. 11c, d; fig. 12d.

Etymology.— The specific name is a conjunction of *carcinus* (Latin for crab) and *cola* (Latin, living on) and refers to the association of this animal with decapods.

Description.— Female (holotype); habitus (fig. 11a and b): prehensile fusiform; body stongly tapering towards the anal segment; length, including rostrum and furcal rami, 600 μm; cephalothorax with convex lateral margins, in dorsla view; largest width of the animal near the posterior half of the cepholothorax; genital segments fused, fusion-line indicated by a fine dorsal line in the middle of the genital complex; anal operculum strongly convex.

Integumental structures; cephalothorax without a dorsal hook-shaped process but with a fine line running from the lateral margin towards the posterior margin; integument of the cephalothorax and the other somites smooth; posterior margins of the somites smooth; only some spinules along the pleural margins of the thoracic segments, on the lateral surface of the abdominal and along the distalmost margin of the anal segment; posterodorsal margin of the prae-anal segment with a slender, uninsiced hyaline frill.

Rostrum; strongly tapering in anterior direction; rostral tip rounded; integument smooth.

Furcal rami; twice as long as wide and cylindrical; inner and outer margins furnished with long spinules; outer apical seta not fused with the principal one; principal furcal seta thickened over a distance of twice the length of the supporting ramus.

Antennule (fig. 11f); six-segmented with a small blunt thorn on the second segment; first segment with a row of spinules along the inner distal edge, second one with spinules along the inner margin; aesthetasc implanted on the fourth segment.

Antenna (fig. 11e); exopodite somewhat oblong, bearing four armed setae. Mouthparts as in *X. trispinosa*.

P1 (fig. 12a); prae-coxa with a smooth integument; coxa and basis furnished with

rows of spinules; coxa twice as long as wide; basis slender and about four times as long as wide; exopodite two-segmented, bearing a spinulose seta on the first segment and five smooth setae on the second one; endopodite with a strongly armed claw.

P2 (fig. 12b); prae-coxa, coxa and basis with spinules; exopodite two-segmented and spinulose along the outer margins of the segments; endopodite two-segmented and reaching towards the apicalmost margin of the exopodite.

P3 and P4 (figs. 12c and f, respectively); prae-coxae smooth; coxae and basis furnished with spinules; exopodites three-segmented; ultimate exopodal segment P4 quadrate; margins of the segments set with spinules of hairs; chaetotaxy of the legs in table I.

P5 (fig. 12g); baseoendopodite with a distinct endopodal process, bearing four setae; proximal setae armed along one side, distal setae feathered; surface and margins with rows of sharp spinules; exopodite somewhat globulous having a straight distal margin with three feathered setae implanted on it; exopodal surface and margins spinulose.

Male (allotype); habitus (fig. 11c); body more slender than the female; length 475 µm; integumental structures as in the female. Antennule (fig. 11d): seven-segmented; first and second segment as in the female except for the lack of spinules on the second one; fifth segment with a hyaline process; seventh segment extended into a curved blunt hook.

Mouthparts and legs as in the female.

P5 (fig. 12d); baseoendopodite and exopodite entirely absent; exopodite represented as three feathered setae, the innermost three times longer than the outer ones; outer baseoendopodal seta absent.

Discussion.— *X. carcinicola* spec. nov. is easily distinguishable from *X. trispinosa* by the more reduced chaetotaxy of the exopodal rami of P2-P4, the two-segmented exopodite P2 and the strongly reduced fifth leg of the male. *X. carcinicola* spec. nov. has been found with *X. trispinosa* on the same decapod specimen but the more slender body facies makes it easy to find this species among the specimens of its congener.

Distribution

As illustrated in fig. 13, the genus *Xanthilaophonte* gen. nov. appears to be widely distributed in the Indian Ocean, including the Red Sea, and along the coasts of the West Pacific Region. To which extent this genus occurs in the central parts of the Pacific Ocean is unknown yet, but the presence of *X. trispinosa* on decapods in New Caledonia and the northern part of New Zealand leads us to suppose a rather distinct distribution in eastward direction. However, *Xanthilaophonte* gen. nov. is a real Indo-West Pacific fauna element. Several decapods from the East Pacific Region were rinsed, but representatives of *Xanthilaophonte* gen. nov. were never found. Decapods from this part of the Pacific Ocean have laophontid associates belonging to the genus *Coullia* Hamond which has no direct affinities with the present genus.

A single sample from Kenya excepted, all the decapods investigated from the In-

dian Ocean and the West Pacific Region hosted specimens of *Xanthilaophonte* gen. nov. The harpacticoid species found on the Kenyan decapods is closely related with the genus *Coullia* which shows thus a disjunct distribution with representatives in the Atlantic Ocean, the eastern Pacific and with a single member along the western coast of the Indian Ocean.

Xanthilaophonte gen. nov. clearly prefers decapod species with a dense covering of hairs on the carapax but can be found, although less abundant, on crabs with an almost nude body. Most interesting is the presence of *X. trispinosa* on the decapod species of the genus *Mictyrus*. These peculiar decapods, living on sand beaches have a smooth carapax except for a short row of rigid bristles near the articulation between carapax and abdomen. Their mouthparts are markedly large and densely furnished with long hairs. Nicholls (1957) found two laophontid species, *Mictyricola typica* and *M. proxima*, on these crabs, collected on the beaches of Tasmania and Queensland. Washings of *Mictyrus* specimens from several other localities (Indonesia, China, Japan) outside the type-region of *Mictyricola*, revealed only specimens of *X. trispinosa*. It appears that the harpacticoid genus *Mictyricola* has a quite limited distribution area restricted to the south-eastern coasts of Australia. *Mictyricola* is not related either with *Xanthilaophonte* gen. nov. or *Coullia* and has developed this life style independently.

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Appendix

List of stations

AUS 67 - 1: Australia, Great Barrier Reef, Yonge Reef. Washings of unidentified Xanthidae. Leg. Th. Jaques, 26.ix.1967, IG. 24046.

AUS 82 - 1: Australia, Port Jackson. Washing of *Pilumnus tormentosus* Latreille. Leg. Haswell, 1882, IG. 9302.

RED 00 - 1: Red Sea. Washings of *Pilumnus vespertilio* (Fabricius). Leg. E.F. Hassemann (exact locality and date unknown), RMNH D 521.

ETH 62 - 1: Ethiopia, Entedibir, Dahlak Archipelago, Goliath bay. Washings of *Pilumnus vespertilio* (Fabricius). Leg. ZSRS expedition, 30.iii.1962, RMNH D 24958.

IND 00 - 1: Indonesia, Sula Archipelago, Sula Besi. Washing of *Pilumnus vespertilio* (Fabricius). Leg. and date unknown, RMNH D 518.

IND 29 - 1: Indonesia, Postilyon Isles, Sepoeka Besar. Washing of *Phymodius monticulosus* (Dana). Leg. Snellius expedition 1929-1930, 21-23.xii.1929, RMNH D 7152.

IND 29 - 2: Indonesia, Aru Islands, Manoembrai beach. Washing of *Mictyris* spec. Leg. Snellius expedition 1929-1930, RMNH.

IND 30 - 1: Indonesia, Seram, Ambon. Washing of *Mictyris* spec. Leg. Snellius expedition 1929-1930, 11-17.ix.1930, RMNH.

IND 55 - 1: Indonesia, Irian Jaya, beach of Boeti nea Mezauke. Washing of *Mictyrus longicarpus* Latreille. Leg. L.B. Holthuis, Brongersma Expedition, 25.iii.1955, RMNH.

JAP 58 - 1: Japan, Hunshu, Wakayama Prefecture, Shirahama. Washing of *Pilumnus vespertilo* (Fabricius). Leg. S.M. Shiino, viii.1958, RMNH D 12471.

JAP 68 - 1: Japan, Kyushu, beach of Ariake Wan (kai) near Mizuho (NW of Simbara. Washing of *Pilumnopeus makianus* (Rathbun). Leg. T. Sakai & L.B. Holthuis, 8.ix.1968, RMNH D 25132.

MAD 59 - 1: Madagascar, Nosi Bé. Washing of *Parthenope horrida* (L.). Leg. Cherbonnier, 20.viii.1959, IG. 22044.

MAD 59 - 2: Madagascar, Nosi Bé, Poine Luboké. Washing of *Pilumnus hirtellus* (L.). Leg. Cherbonnier, 3.xii.1959, IG. 22044.

MAL 84 - 89: Republic of Maldives, South Malé Atoll, Biyadoo. Washings of several xanthid decapods, collected between boulders of a fossil reef, in the intertidal zone, at the NE side of the island. Leg. F. Fiers, 6.xii.1984, IG. 26862.

NEC 66 - 7: New Caledonia, Nouméa. Washings of several species of Xanthid decapods, collected in the lagoon. Leg. De Fierlant, 18.v.1966, IG. 23713.

NEC 66 - 8: New Caledonia, Nouméa. Washings of several species of Xanthid decapods, collected in the aquaria of the Biological station. Leg. De Fierlant, 25.i.1966, IG. 23713.

NZL 83 - 1: New Zealand, Auckland, beach of Omana. Washings of four specimens of Xanthid decapods. leg. KBIN, 9.iv.1983, IG. 26650.

NZL 96 - 1: New Zealand, Auckland. Washing of *Pilumnus tormentosus* Latreille. Leg. H. Suter, 1896, RMNH D 1511.

PHI 00 - 1: Philippines, Semper. Washing of *Pilumnus ursuli* As & White. Leg. and date unknown, RMNH D 520.

PHI 81 - 1: Philippines, Pasacao, Camarines province, Luzon. Washings of *Pilumnus vespertilio* (Fabricius). Leg. B. Gindelberger, 6.vi.1981, RMNH D 35281.

PNG 80 - 64: Papua New Guinea, Madang Province. Xanthidae collected under corals, at 0-10 m. Leg. J. Pierret, 25.x.1980, IG. 26253.

THA 29 - 1: Thailand: Lampsing, Lampong. Washings of *Pilumnus vespertilio* (Fabricius). Leg. Duc de Brabant, Leopold III, 12.iv.1929, IG. 9223.

THA 83 - 1: Thailand, south coast of Phuket Island. Coast near the Phuket Marine Biological Station. Washings of *Pilumnus vespertilio* (Fabricius). Leg. L.B. Holthuis, 8.i.1983, RMNH D 35896.

Table 1. Chaetotaxy of the species of *Xanthilaophonte* gen. nov.

	P2		P3		P4	
	exo	end	exo	end	exo	end
X. trispinosa (Sewell)	0-0-022	0-120	0-0-122	0-220	0-0-122	0-1, 220
X. carcinicola spec. nov.	0-021	0-120	0-0-022	0-220	0-0-022	0-120

Table 2. Chaetotaxy of the copepodids of *Xanthilaophonte trispinosa* (Sewell) (females).

		COP I	COP II	COP III	COP IV	COP V	ADULT
P2	exo	0,2,II	0,2,III	0,2,III	0,2,III	0,2,III	0,2,III
	end	0,1I,0	0,0-0,1I,0	0,0-0,1I,0	0,0-0,1I,0	0,0-0,1I,0	0,0-0,1I,0
P2	exo	0,1I,III	0,1I,III	0,1I,IV	0,1I,IV	0,1I,IV	0,I-0,I-0,1I,II
	end	0,2,0	0,2,0	0,2,0	1,2,0	1,2,0	0,0-1,2,0
P3	exo	2	0,1I,III	0,1I,III	0,1I,IV	0,1I,IV	0,I-0,I-1,1I,II
	end		0,2,0	0,2,0	0,2,0	2,2,0	0,0-2,2,0
P4	exo		2	0,1I,III	0,4,1I	1,4,1I	0,I-0,I-1,1I,II
	end			0,2,0	0,2,0	1,2,0	0,0-1,2,0
P5	exo			2	3/3	3/3	3/3
	bas				2/0	3/0	4/0
P6					1/2	1/2	1/2

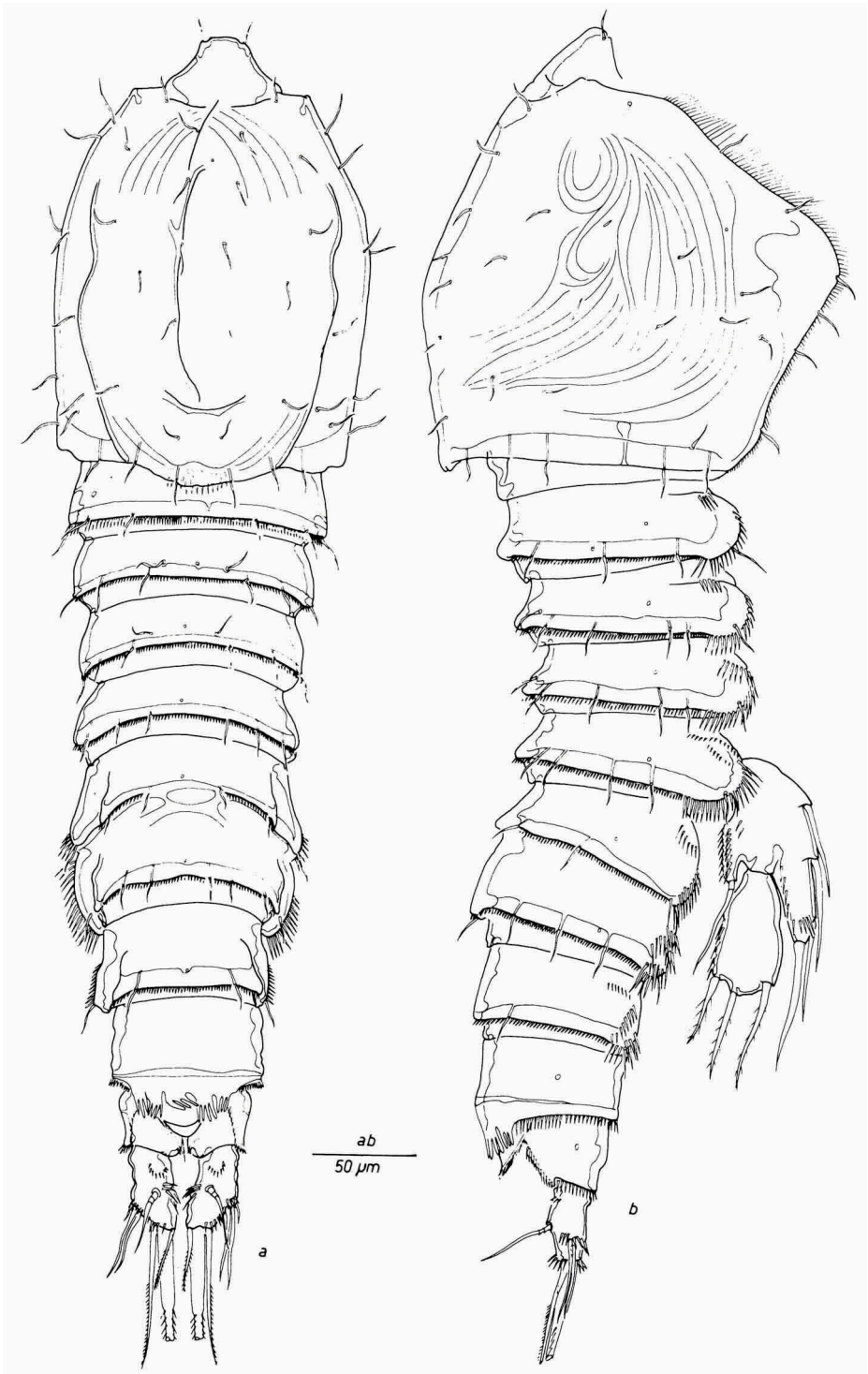

Fig. 1. *Xanthilaophonte trispinosa* (Sewell); a, habitus of the female in dorsal view; b, habitus of the female in lateral view.

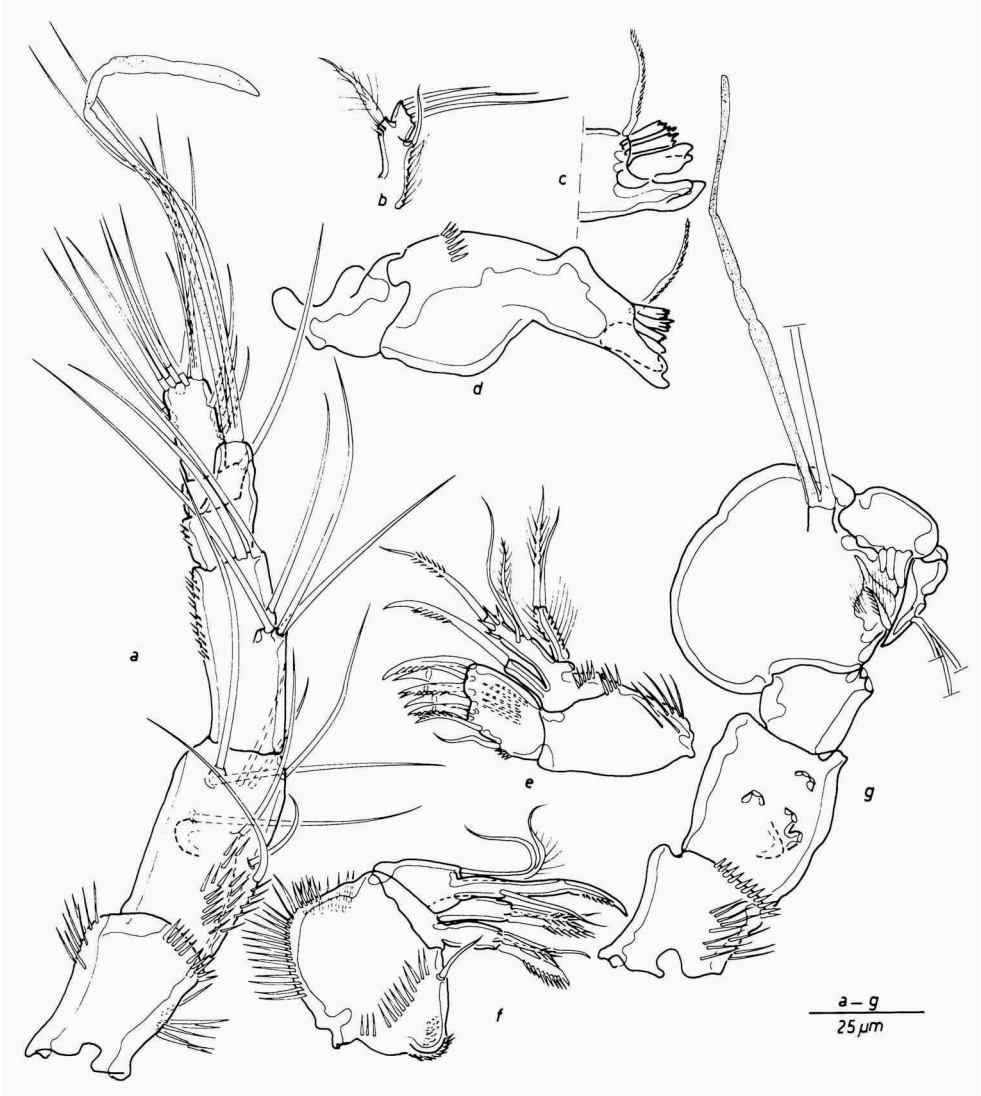

Fig. 2. *Xanthilaophonte trispinosa* (Sewell); a, female antennule; b, mandibular palp; c, biting edge of mandibular gnathobasis; d, gnathobasis; e, maxillule; f, maxille; g, male antennule.

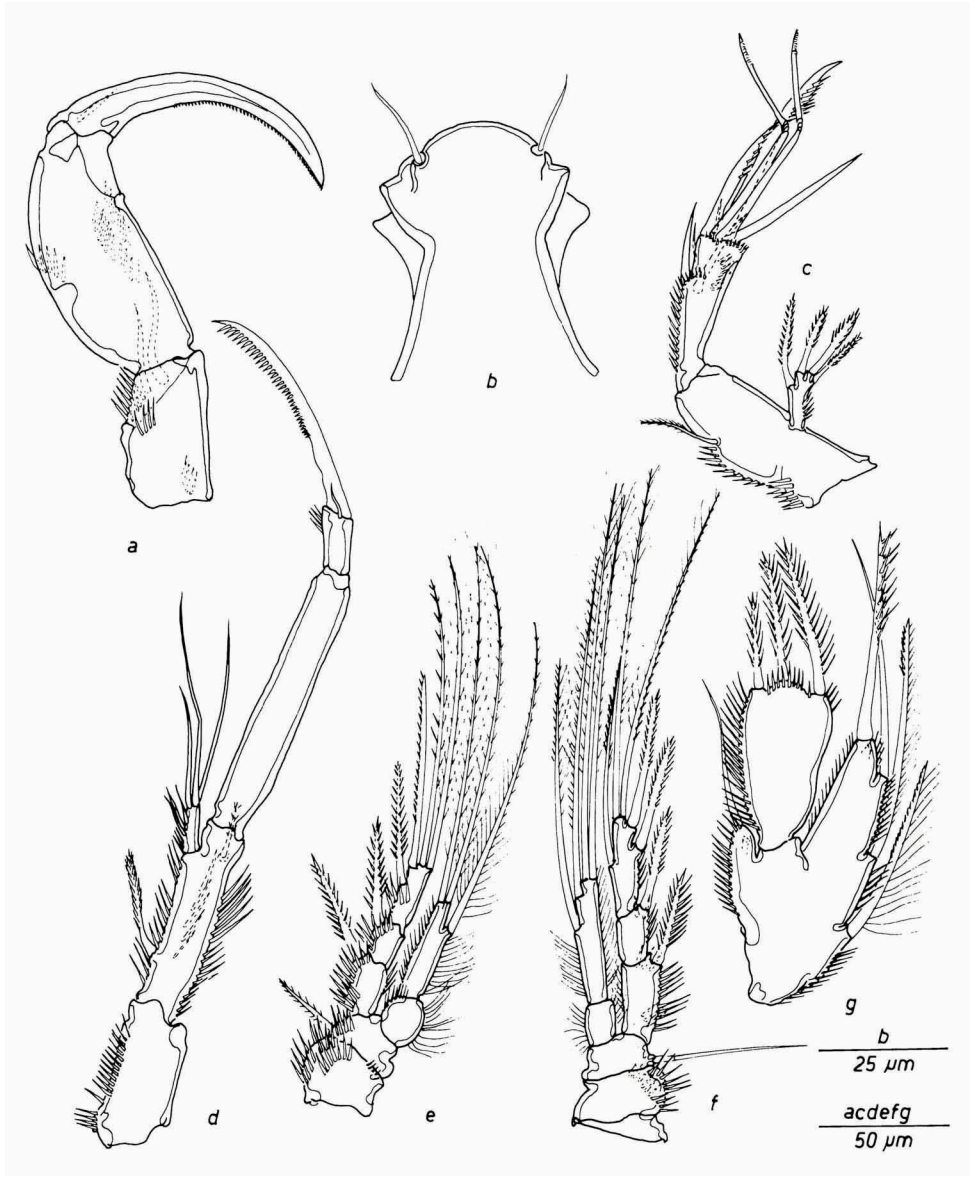

Fig. 3. *Xanthilaophonte trispinosa* (Sewell); a, maxilliped; b, rostrum in dorsal view; c, antenna; d, P1; e, P2; f, P3, g, P5 (a-g of the female).

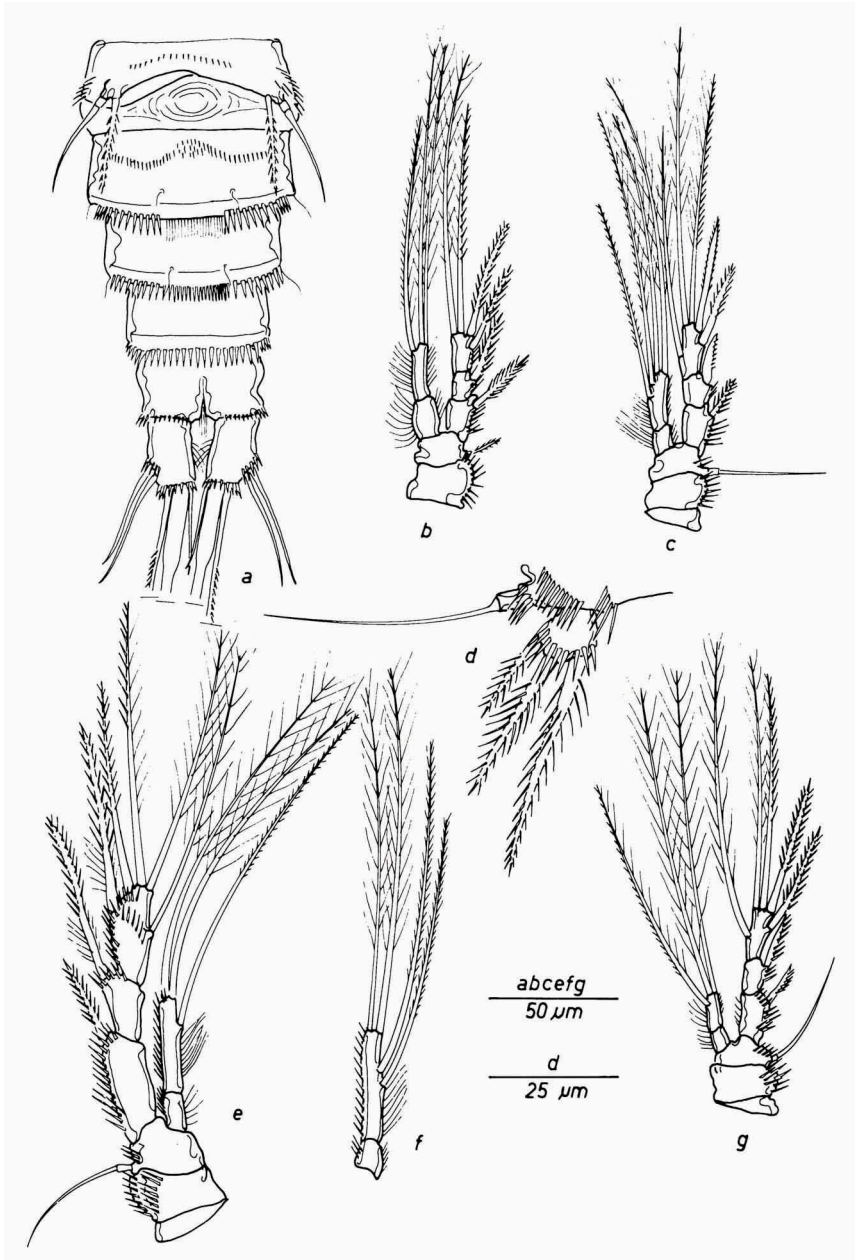

Fig. 4. *Xanthilaophonte trispinosa* (Sewell); a, male abdomen in ventral view; b, P2; c, P3, d, P5; e, P4; f, endopodite P4 of another specimen; g, P4 (a-d, g of the male; e-f of the female).

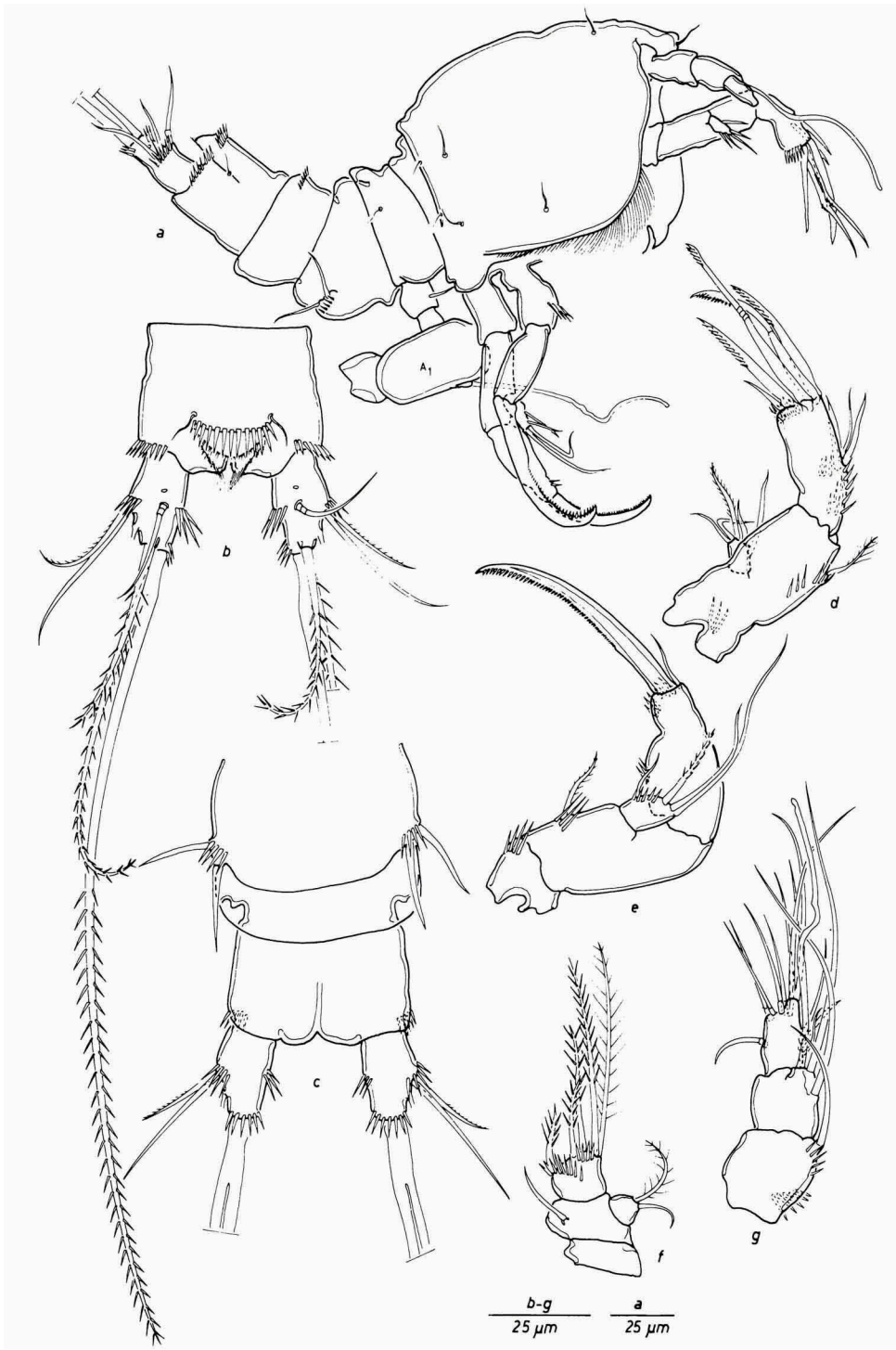

Fig. 5. *Xanthilaophonte trispinosa* (Sewell); copepodid I; a, habitus in lateral view; b, anal segment and furcal rami in dorsal view; c, third, fourth and anal segment in ventral view; d, antenna; e, P1; f, P2; g, antennule (A1 represents the claw of the male antennule, clasping the second leg).

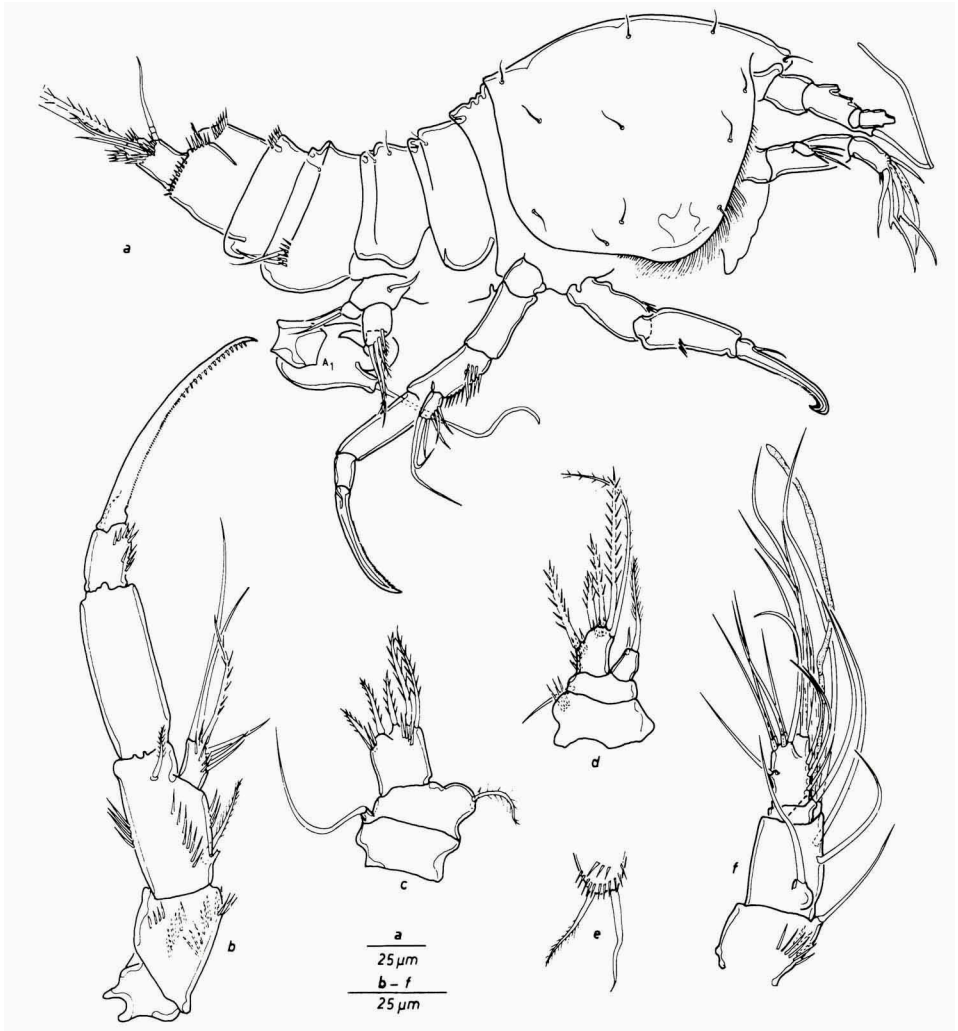

Fig. 6. *Xanthilaophonte trispinosa* (Sewell); copepodid II: a, habitus in lateral view; b, P1; c, P3; d, P2; e, P4; f, antennule (A1 represents the claw of the male antennule, clasping the third leg).

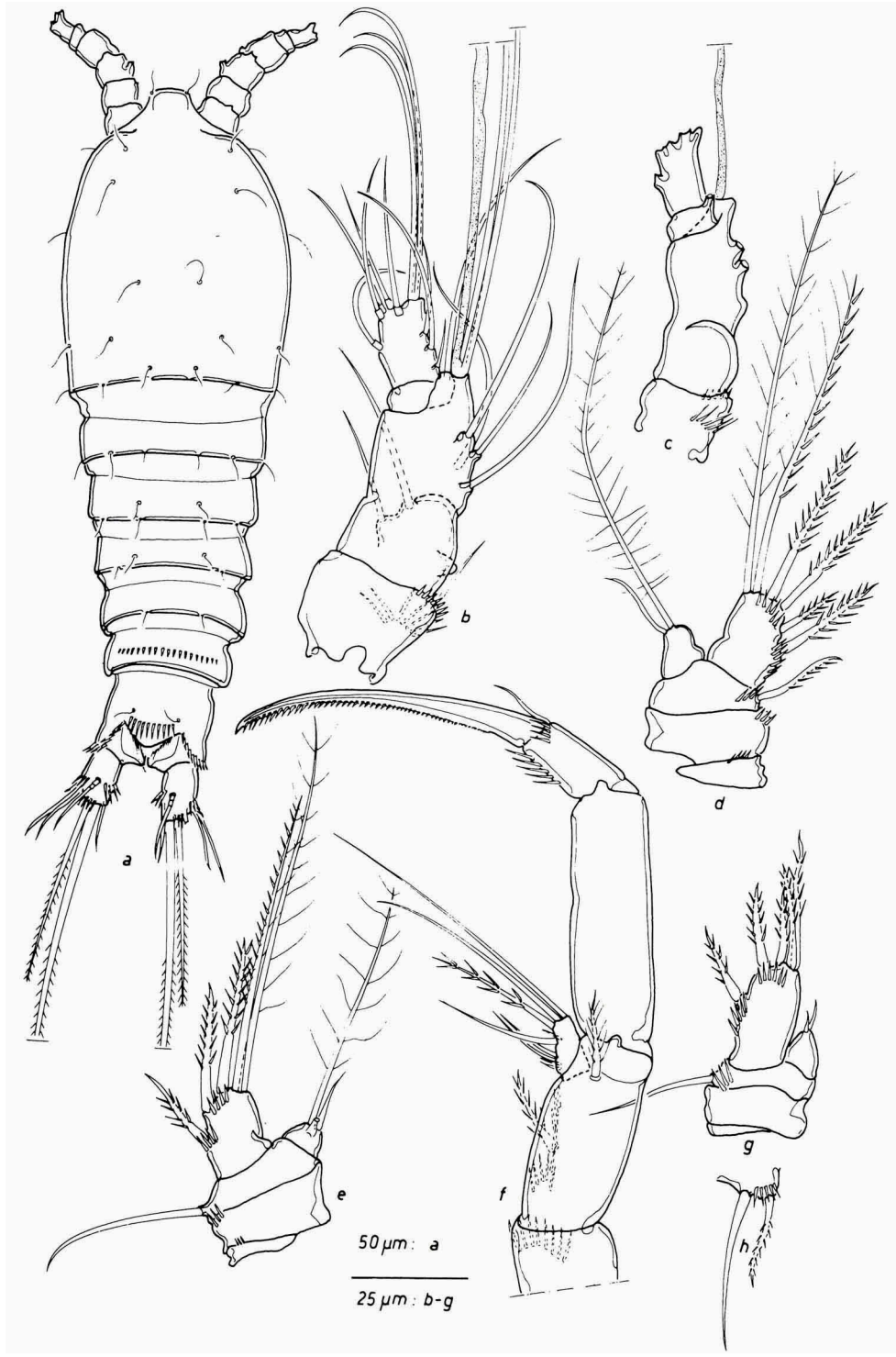

Fig. 7. *Xanthilaophonte trispinosa* (Sewell); copepodid III: a, habitus of the male copepodid, in dorsal view; b, female antennule; c, male antennule; d, P2; e, P3; f, P1; g, P4; h, P5.

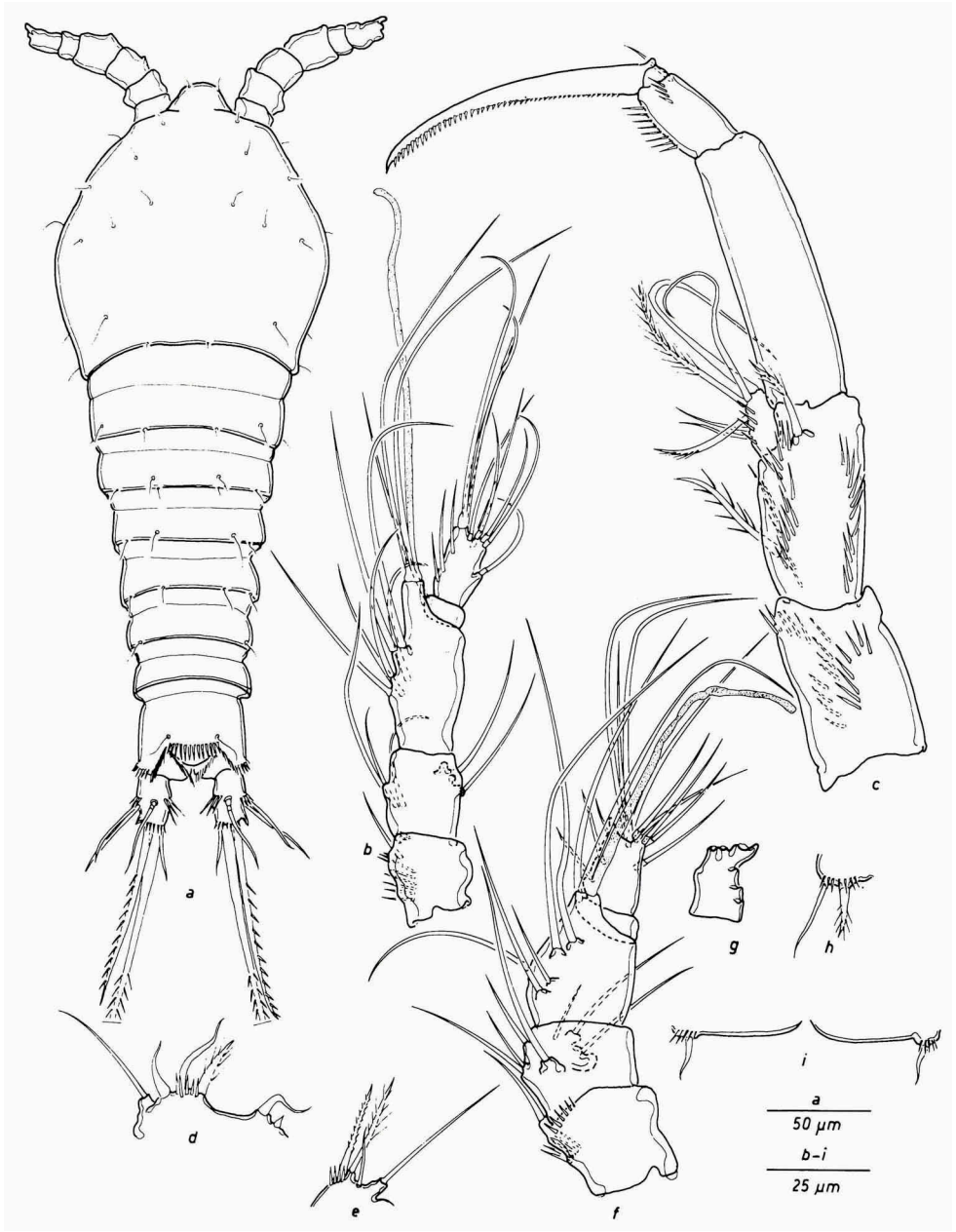

Fig. 8. *Xanthilaophonte trispinosa* (Sewell); copepoddid IV: a, habitus of the male copepodid, in dorsal view; b, female antennule; c, P1; d, female P5; e, male P5; f, male antennule; g, ultimate segment of the male antennule; h, male P6; i, posterior margin of the P6-bearing segment, female copepodid.

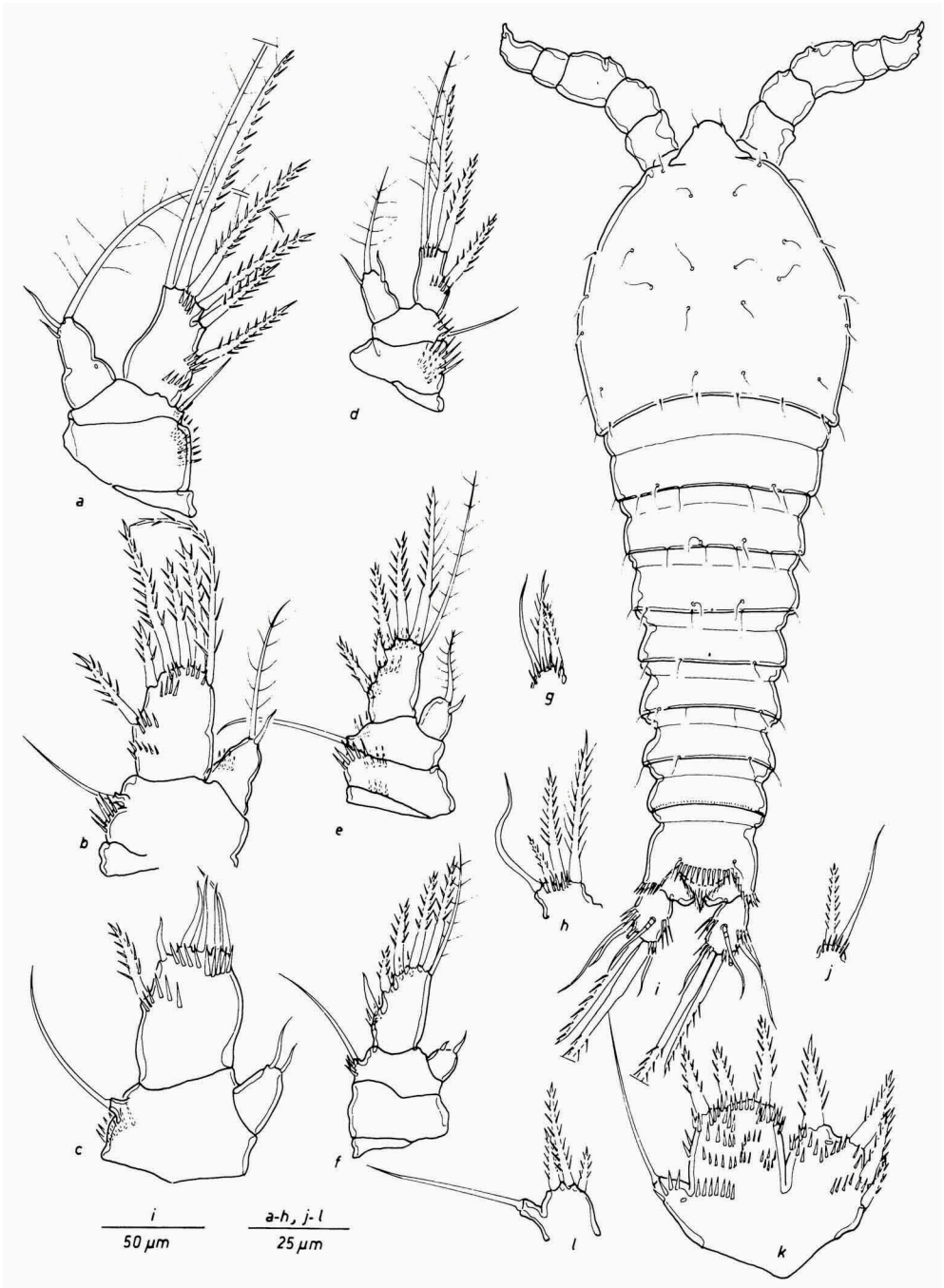

Fig. 9. *Xanthilaophonte trispinosa* (Sewell); copepodid IV: a, female P2; b, female P3; c, female P4; d, male P2; e, male P3; f, male P4; copepodid V: g, male P6; h, male P5; i, habitus of male in dorsal view; j, aberrant male P6; k, female P5; l, aberrant male P5.

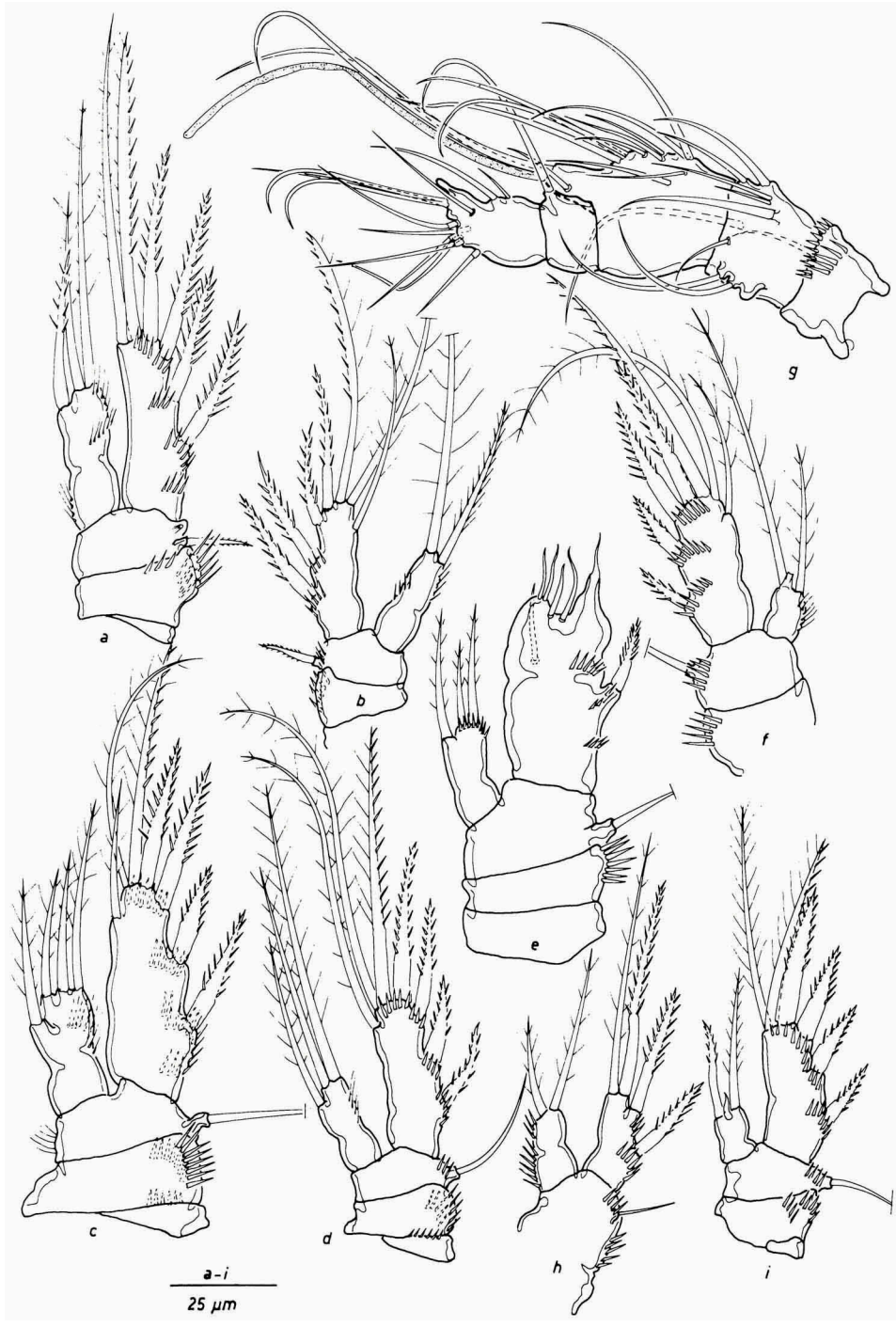

Fig. 10. *Xanthilaophonte trispinosa* (Sewell); copepodid V: a, female P2; b, male 2; c, female P3; d, male P3; e, female P4; f, male P4; g, male antennule; h, male P4, aberrant; i, male P3, aberrant.

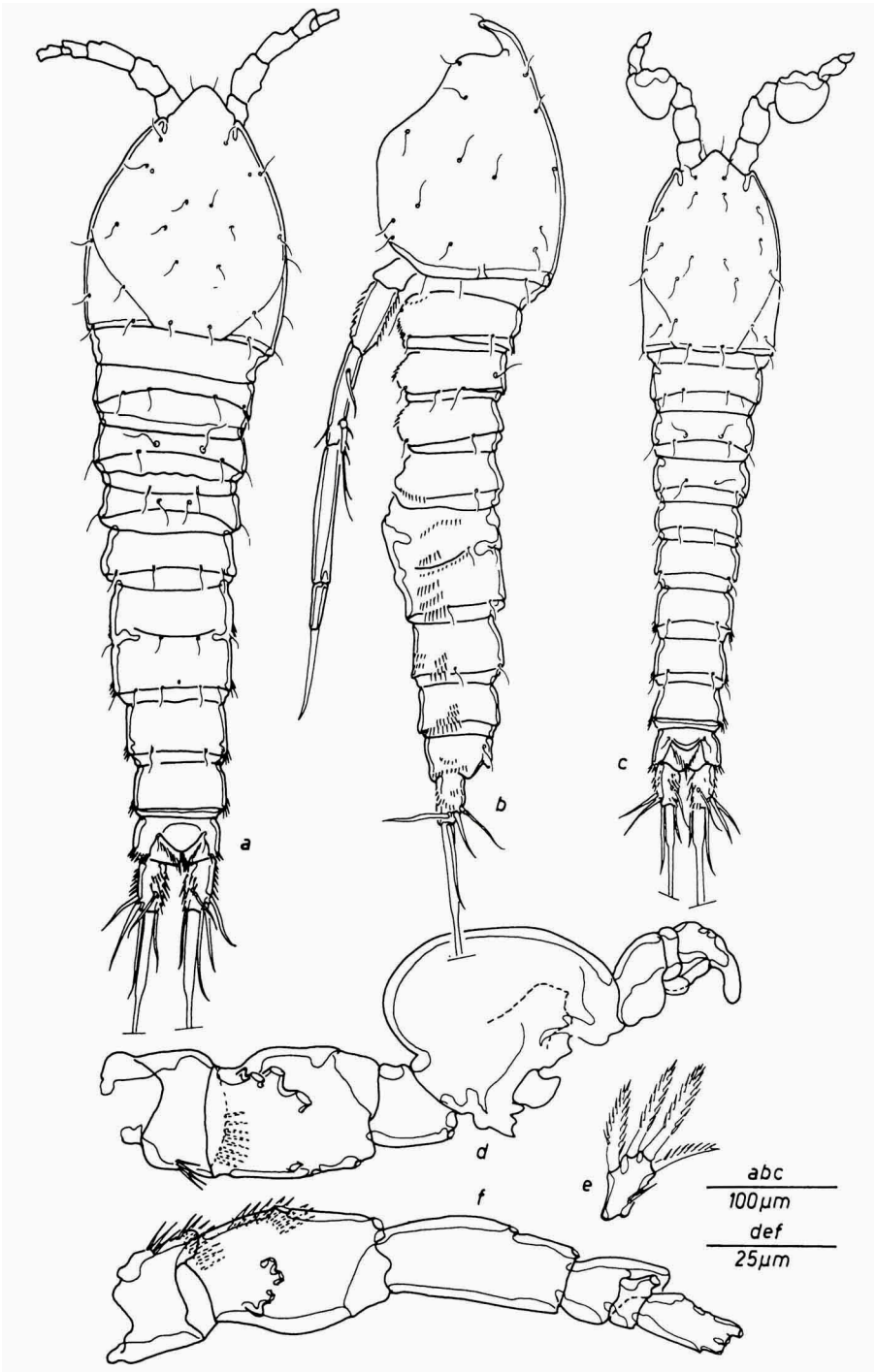

Fig. 11. *Xanthilaophonte carcinicola* spec. nov.; a, habitus of the female in dorsal view; b, habitus of the female in lateral view; c, habitus of the male in dorsal view; d, male antennule; e, exopodite of the antenna; f, female antennule.

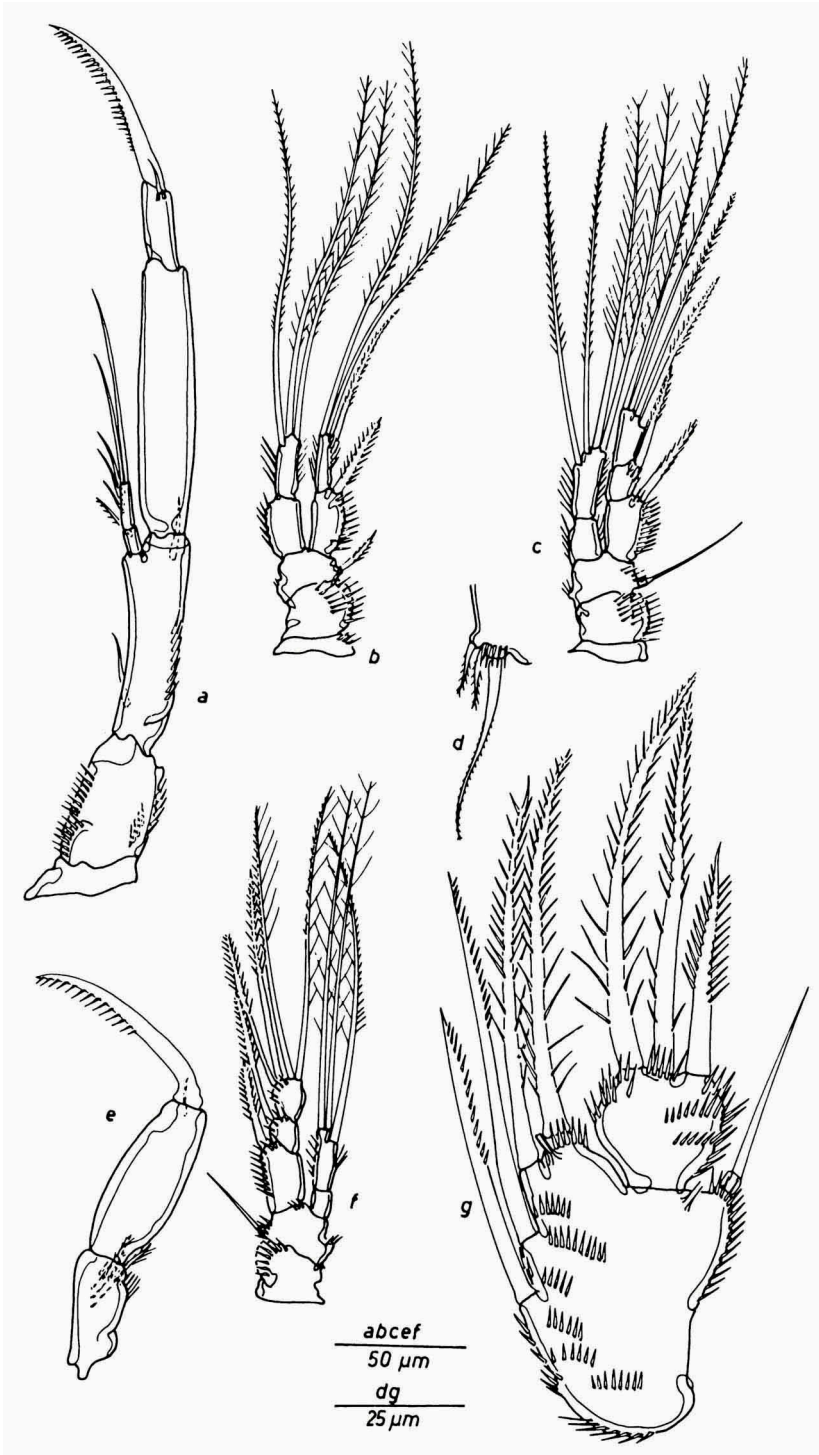

Fig. 12. *Xanthilaophonte carcinicola* spec. nov.; a, P1; b, P2; c, P3; d, male P5; e, maxilliped; f, P4; g, female P5 (a-c, e-g of the female; d of the male).

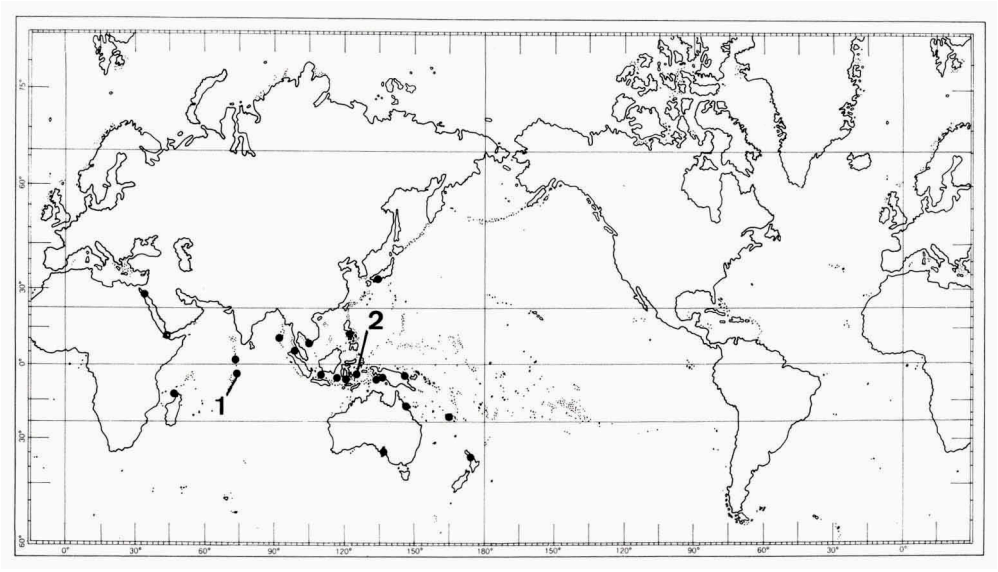

Fig. 13. Distribution of the genus *Xanthilaophonte* nov. Each dot represents a locality were *X. trispinosa* (Sewell) was found, except number 2, the type-locality of *X. cancinicola* spec. nov. Number 1 indicates the type-locality of *X. trispinosa* (Sewell).