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NEW SPECIES OF *AENIGMATHURA* AND *PSEUDANTHURA* (CRUSTACEA: ISOPODA: PARANTHURIDAE) FROM EASTERN AUSTRALIA

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Abstract

Poore, G.C.B. and Lew Ton, H.M., 1986. New species of *Aenigmathura* and *Pseudanthura* (Crustacea: Isopoda: Paranthuridae) from eastern Australia. *Mem. Mus. Vict.* 47:59-73.

Aenigmathura calliandra and *A. helicia* from coral reefs in north-eastern Australia and *Pseudanthura baeckea* from the central New South Wales shelf are described. A key to species of *Pseudanthura* is presented and some comments on generic relationships within the Paranthuridae are given.

Introduction

In previous papers (Poore, 1978, 1981, 1984a) species of eight paranthurid genera from eastern Australia were described. These are *Accalathura* Barnard, *Aenigmathura* Thomson, *Bullowanthura* Poore, *Colanthura* Richardson, *Cruranthura* Thomson, *Leptanthura* Sars, *Paranthura* Bate & Westwood and *Ulakanthura* Poore. Here, new species of *Aenigmathura* and one of *Pseudanthura* Richardson are considered. Examination of new species of these previously poorly known genera provides an opportunity for discussion of their relationships to each other and to other paranthurid genera.

Following a pattern established by Poore (1984a) specific epithets are taken from genera of the Australian flora and reflect the floral implication of the anthurid genus names. The following abbreviations are used in the figures: MD, mandible; MP, maxilliped; P1-P7, pereopods 1-7; PL1-PL5, pleopods 1-5; U, uropod; UN, uropodal endopod; UX, uropodal exopod; T, telson. Figured specimens of each species are individually labelled a (the holotype), b, c and d. Figures not so labelled are from the holotype. Scale lines are 1 mm and refer to the habitus figures only.

Material for this study is lodged in the Australian Museum, Sydney (AM), the Queensland Museum, Brisbane (QM) and the Museum of Victoria, Melbourne (NMV).

Comments on relationships of some genera of the Paranthuridae

In a revision of the Paranthuridae Poore (1980) treated *Pseudanthura* and *Aenigmathura*, together with *Paranthura* and *Calathura*, as a group of probably unrelated genera. In the light of this study and other recent work (Poore, 1984b) their relationships can now be explored more profitably.

Wägele (1981) regarded *Paranthura* as the genus most closely related to *Colanthura* and *Cruregens*. This view was supported by Poore (1984b) who used *Paranthura* as an outgroup for a cladistic analysis of *Colanthura, Cruranthura, Califanthura* and *Cruregens*, genera with only six pairs of pereopods. *Paranthura* shares with the *Colanthura* group of genera four apomorphies:

1. Pereopod 1 article 6 palm lacking marginal spines;
2. Pereopod 1 with a closely-packed row of mesial setae;
3. Pereopod 1 article 6 cutting edge mesial to thumb; and
4. Antenna 2, flagellum of a single (or short fused) articles.

Accalathura (together with its junior synonym *Zulanthura*) (Kensley, 1982a) can be placed with *Aenigmathura, Calathura* and *Pseudanthura* in a group of genera which differ from other clearly defined groups of genera and

themselves share several features. All possess an elongate tapering maxillipedal endite and an elongate comb of setae on a long third mandibular palp article. The mandibular setal comb is an apomorphic character (few apical setae such as are seen in *Leptanthura*, for example, is the plesiomorphic state). The state of the endite is less clear. While the presence of an endite must be considered more plesiomorphic than its loss (e.g., in *Leptanthura*) the peculiar form seen in these genera might be considered an apomorphy linking them. The actual state of the primitive anthuridean maxilliped remains unresolved. If the primitive state is such as found in *Austranthura* Kussakin the *Accalathura* form is apomorphic and links the four genera.

Accalathura, with more than 20 species, is the largest and most widely distributed genus. Species are found in the Indo-west Pacific from Japan to Australia and Antarctica and west to the Maldive Islands, and on the Atlantic coast of North America. *Pseudanthura* is a deep-water genus, occurring on the outer continental shelf and upper slope of the Atlantic Ocean, and also in the Indo-west Pacific. *Calathura* and *Aenigmathura* are more restricted, the former being found in the North Atlantic and Arctic Oceans, and the latter around Australia only.

Relationships between the four genera are not clear because both *Aenigmathura* and *Pseudanthura* are so highly specialised. *Accalathura* and *Calathura* are similar, differing primarily in the number of articles in the maxillipedal palp. *Aenigmathura* shares with these two (and differs from *Pseudanthura)*: a clear suture between the fourth and fifth articles of the maxillipedal palp (the first palp article, article 3, may not be separate); a prominent proximal thumb on pereopods 1-3; and a short uropodal endopod.

Pseudanthura shares with *Accalathura* and *Calathura* a multiarticulate antenna 1 flagellum, an apomorphic feature. *Aenigmathura* and *Pseudanthura* themselves share fused pleonites 1-5 and fused telson and pleonite 6 but the similarity here could well be superficial and convergent.

Aenigmathura Thomson, 1950

Type species. Aenigmathura lactanea Thomson.

Remarks. Poore's (1981) generic description requires little expansion to accommodate the two new species described here.

Antenna 1 has a flagellum of 4-6 articles. (Poore (1981) figured 4 articles, not 3 as stated). Antenna 2 has a flagellum of 2-5 articles. Pereopods 1-3 are subchelate, article 6 swollen and with a well developed proximal thumb bearing 2 complex spines. Its palm is complexly grooved and rolled mesially and bears lateral and mesial rows of submarginal setae. Scanning-electron-micrographs of the palm of pereopod 1 of a specimen of *A. lactanea* from Western Port, Victoria, illustrate these features, the fused telson and the statocyst pore (Plate 1).

Aenigmathura calliandra sp. nov.

Figures 1-4

Material examined. 3 males, 1 female, 12 juveniles; 4.5-10.8 mm.

Holotype: juvenile, 10.8 mm, QM W8108 (with one slide). Coral Sea, Long Island, Chesterfield Reefs (19°52.2'S., 158°19.2'E.), 15 m, SCUBA, N.L. Bruce, 6 May 1979.

Paratypes: Coral Sea, Long Island, Chesterfield Reefs: type locality, QM W11738 (1 specimen) (with one slide), QM W11740(1), QM W11739(5), NMV J10503(1), NMV J10504(1); reef edge, 2 m, QM W11741(1), QM W11742(1). Cay north of Long Island, Chesterfield Reefs (19°48'S., 158°17'E.), QM W8109(2).

Other material: Coral Sea, Long Island, Chesterfield Reefs, QM W8105(1), QM W11743(1).

Description. Juvenile. Head as wide as long, rostrum about half length of lateral lobes. Pleon a little longer than wide, pleonites with a few long setae on posterior margins. Combined length of pleonite 6 and telson about 1.6 times as long as greatest width, lateral margins of telson parallel over most of its length, apex gently rounded, with long marginal and submarginal setae, a few scattered setae dorsally.

Antenna 1 article 2 with a row of about 6 long setae, article 3 with 2 groups of long setae, flagellum of 5 articles. Antenna 2 flagellum short, of 4 articles. Mandibular palp of 3 articles, article 2 the longest and with single distal seta, article 3 with comb of 7 setae. Maxillipedal palp of 2 articles; article 1 with 2 mesial setae; article 2 with lateral and mesial setae

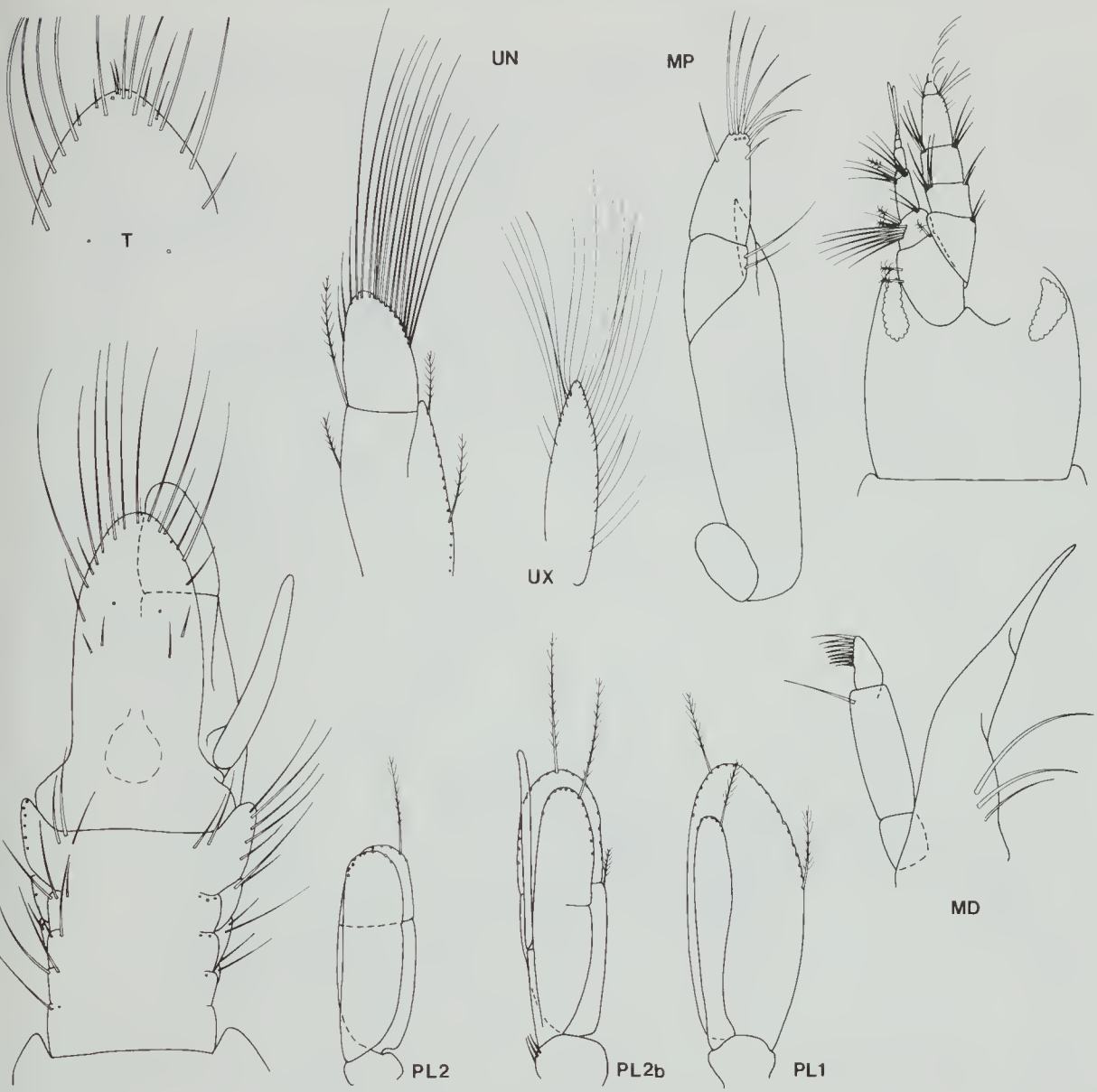

Figure 1. *Aenigmathura calliandra*. Holotype juvenile; b, paratype male, 6.4 mm, QM W11738.

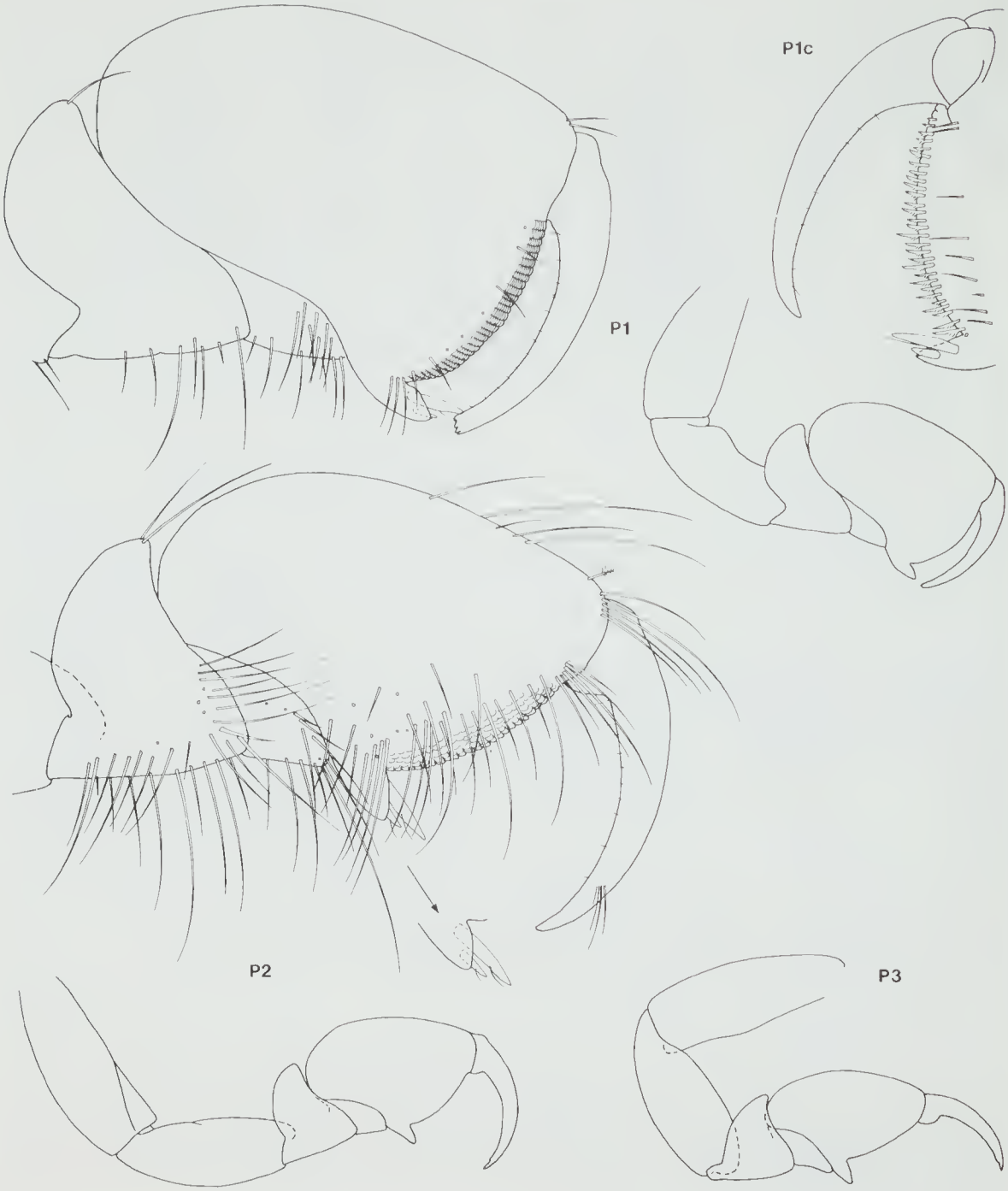

Figure 2. *Aenigmathura calliandra*. Holotype juvenile; c, pereopod 1 palm, lateral view.

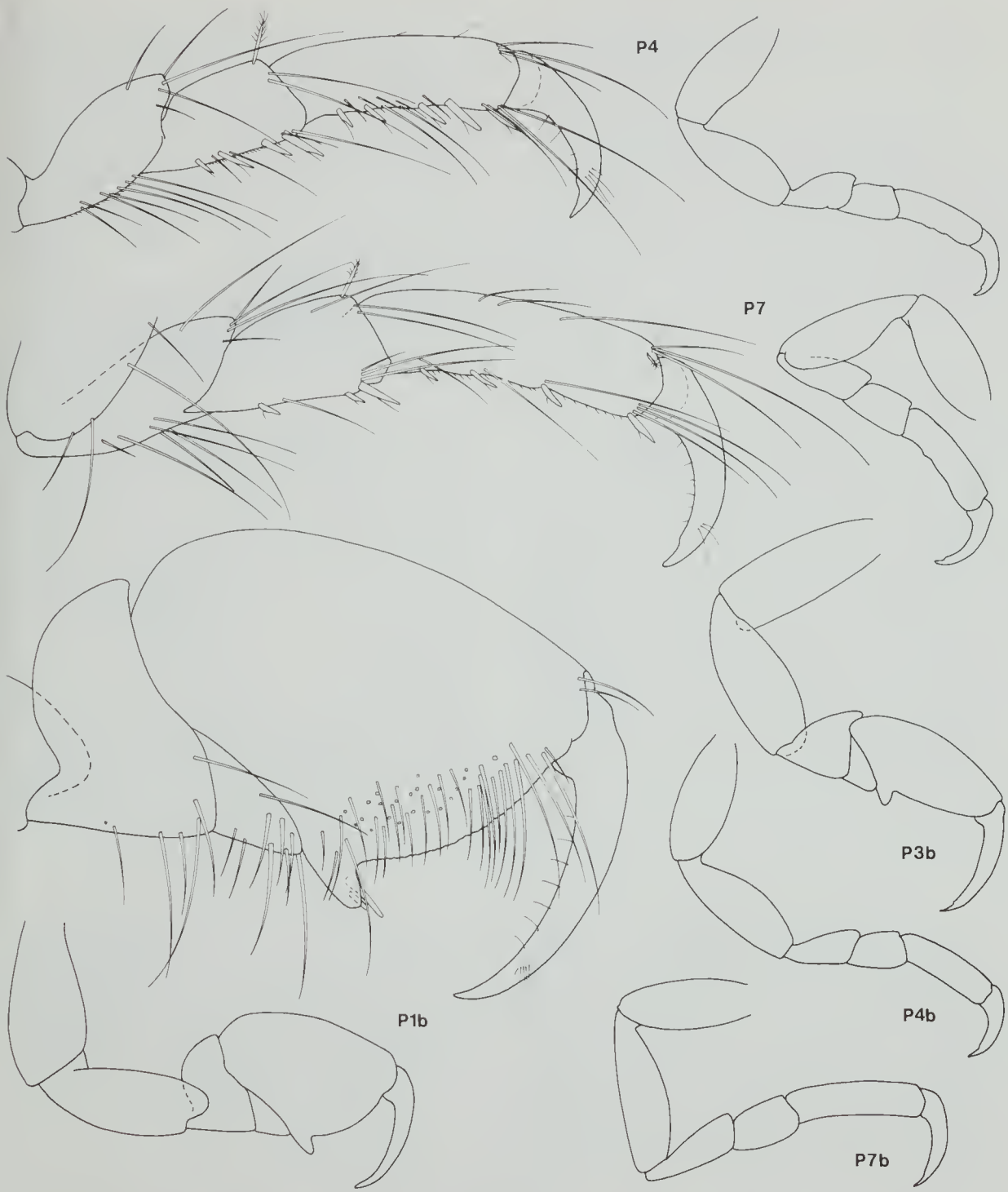

Figure 3. *Aenigmathura calliandra.* Holotype juvenile; b, paratype male, 6.4 mm, QM W11738.

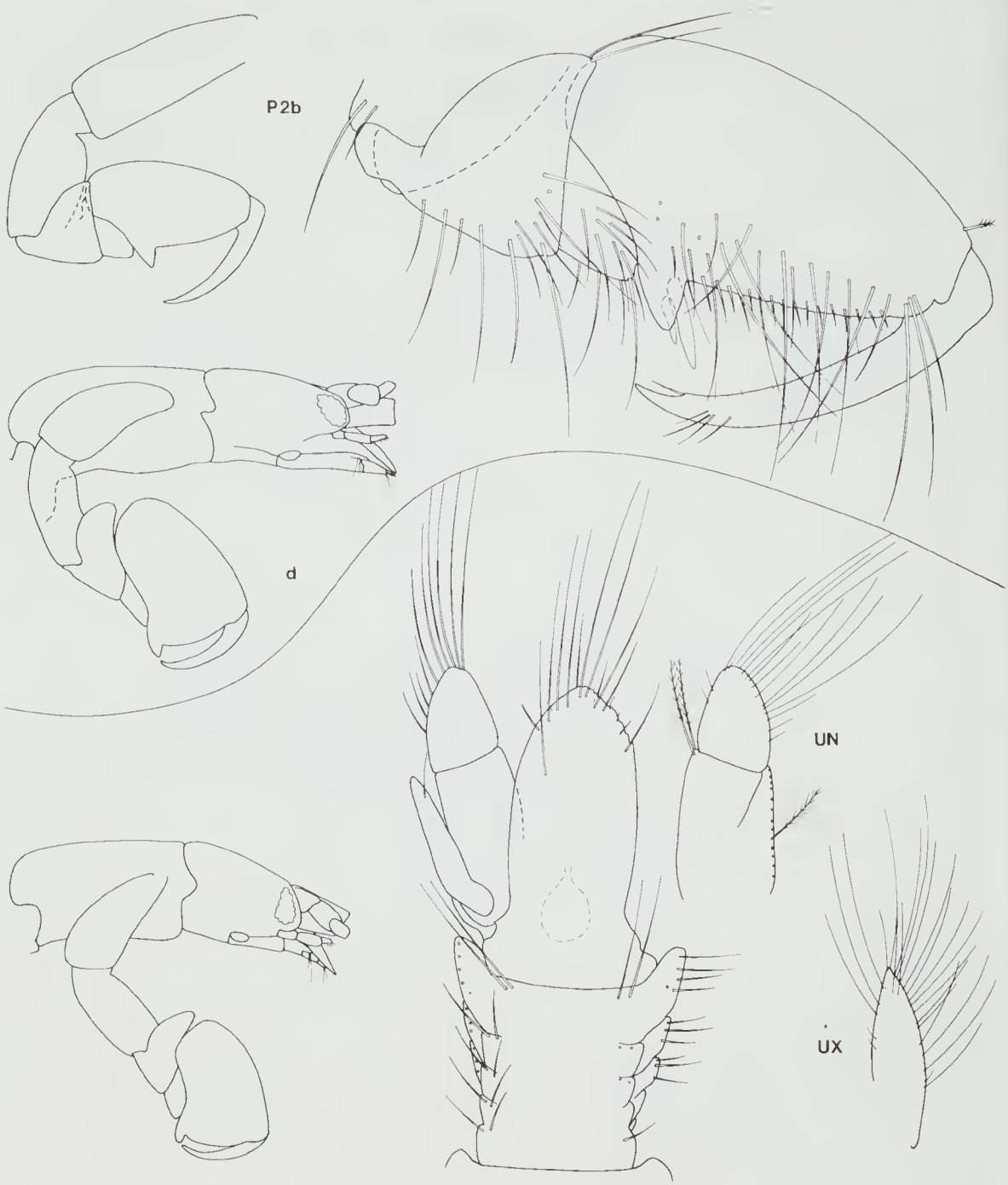

Figure 4. Top half: *Aenigmathura calliandra*. Holotype juvenile; b, paratype male, 6.4 mm, QM W11738. d, female 8.2 mm, QM W11741. Bottom half: *Aenigmathura helica*. Holotype juvenile.

distally, long terminal setae; endite reaching to half way along article 2.

Pereopod 1 article 5 with distal setae on mesial face; article 6 longer than article 2, palm oblique (60°). Pereopods 2 and 3 smaller than pereopod 1; articles 4 and 5 with setae on posterior and distal margins; article 6 palm oblique (35°-45°). Pereopods 4-7 article 5 with 3-4 spines on posterior margin; article 6 with 4-5 spines. Pereopod 4 article 6 length 3 times width.

Uropodal endopod reaching beyond apex of telson, 1.7 times as long as base width, distally with long marginal setae; exopod lanceolate, 4 times as long as greatest width, with long marginal setae.

Male. Antenna 1 flagellum of about 12 articles, all with whorls of aesthetases. Pereopod 1 palm oblique (45°) with dense setae mesially. Pereopods 2, 3 similar to juvenile but palm oblique (5°-10°) and with many mesial setae on article 6. Pereopods 4-7 more elongate. Appendix masculina a simple rod, exceeding apex of exopod of pleopod 2.

Colour. White

Distribution. Coral Sea Territory, Chesterfield Reefs, 2-15 m.

Remarks. Aenigmathura calliandra closely resembles *A. helicia.* Characters useful in the separation of the two species and *A. lactanea* are given after the description of *A. helicia.*

Aenigmathura helicia sp. nov.

Figures 4-7

Material examined. 1 male, 5 juveniles; 5.7-8.5 mm.

Holotype: juvenile, 8.6 mm, NMV J10505 (with one slide). Qld, Lizard Island (14°40'S., 145°28'E.), 8 m, B. Kensley, 11 Jan 1982, (stn BK-126).

Paratypes: Qld, Lizard Island, type locality, QM W11755(2 specimens); Lizard Island, other B. Kensley collections: BK-122, NMV J10506(1 male) (with one slide), NMV J10507(1 male); BK-130, NMV J10508(1); BK-115, NMV J10509(1); BK-125, NMV J10510(1).

Description. Juvenile. As described for *A. calliandra* except: head a little wider than long; antenna 1 article 2 with a row of 4 long setae; antenna 2 flagellum of 5 articles; maxillipedal endite reaching one-quarter way along article 2; pereopods 2 and 3, article 6 palm oblique (25-45°); pereopod 4 article 6 2.5 times as long as wide; uropodal endopod 1.5 times as long as basal width.

Male. Antenna 1 flagellum of about 12 articles, each bearing whorls of aesthetases. Pereopod 1 article 6 palm oblique (45°), with many mesial setae. Pereopod 2, 3 article 5 produced posteriorly, forming a thumb; article 6 palm axial, slightly sinuous with a pronounced 'step' proximally, complex spines absent. Pereopods 4-7 more elongate. Appendix masculina a simple rod, exceeding endopod but not reaching apex of exopod of pleopod 2.

Colour. White.

Distribution. Queensland, Lizard Island, 1-8 m.

Remarks. Aenigmathura helicia and *A. calliandra* differ from *A. lactanea* in the shapes of pereopods 1-3 and male pereopods 2 and 3. The most obvious differences between *A. helicia* and *A. calliandra* are in males. Males of *A. helicia* have modified pereopods 2 and 3, whereas in *A. calliandra* the juvenile shape is retained. The appendix masculina of *A. helicia* does not reach the apex of the pleopodal endopod, whereas in *A. calliandra* it exceeds it. Juveniles are difficult to tell apart and can be most easily separated by differences in relative size of pereopod 1. Figure 4 has comparative lateral views of similarly sized animals drawn to the same scale. The proportions of articles of pereopod 4 also differ slightly.

The species do not overlap geographically.

Pseudanthura Richardson, 1911

Description. Paranthuridae without eyes. Head with small upturned rostrum, strong transverse dorsal groove and distinct ocular bulges. Pereon with dorsolateral grooves. Pereonite 7 no more than one-third length of pereonite 6. Pleonites and telson fused, pleonites 1-5 distinguished by shallow grooves. Telson triangular, slightly domed and without long terminal setae; statocyst absent. Peduncle of uropod inserting on ventral surface of pleonite 6; endopod lying beneath telson, exopod only visible dorsally reduced, lanceolate, no longer than peduncle. Antenna 1 flagellum shorter than peduncle, of

Key to species of *Pseudanthura*

1. Pereonite 6 as long as wide; pereonite 7 less than one-third as long as wide; pleon swollen anteriorly. Pleopod 1 endopod almost as long as exopod and with many marginal setae 2
– Pereonite 6 greater than 1.5 times as long as wide; pereonite 7 more than half as long as wide; pleon narrowest anteriorly. Pleopod 1 endopod at most half as long as exopod and with no more than 2 terminal setae . 3

2. Pereonite 1 with a strong midventral crest; pereopod 1 palm concave. Uropodal exopod reaching to base of endopod; telson margins straight . . . . . *P. recifensis*
– Pereonite 1 without midventral crest; pereopod 1 palm slightly convex or straight. Uropodal exopod not reaching to base of endopod; telson margins sinuous . . . . . *P. albatrossae*

3. Suture between uropodal endopod and peduncle distinct; pleopod 1 endopod half as long as exopod . . . . . *P. baeckea*
– Suture between uropodal endopod and peduncle indistinct or absent; pleopod 1 endopod at most one-third as long as exopod 4

4. Body 18 times as long as wide; pleopod 1 endopod with 1 terminal seta, uropodal exopod one-quarter total length of uropod . . . . . *P. tenuis*
– Body 11 times as long as wide; pleopod 1 endopod with 2 terminal setae; uropodal endopod one-sixth total length of uropod . . . . *P. lateralis*

7-9 articles. Antenna 2 flagellum shorter than last 2 peduncular articles, tapering, of about 10 articles. Mandible with an acute incisor, its palp of 3 articles, the last bearing a comb of 10-15 setae. Maxilla a sharp, barely serrate spine. Maxilliped elongate, with an endite; palp of 2-4 articles. Pereopod 1 subchelate, palm oblique with shallow grooves along its length; dactyl with shallow grooves along its posterior margin. Pereopods 2 and 3 article 6 barely more swollen than in posterior pereopods. Pereopods 4-7 with article 5 rectangular; pleopod 1 exopod operculiform, apex acute; endopod reduced.

Adult male. Flagellum of antenna 1 of 8-12 articles, proximal articles only with whorls of aesthetases. Pereopod 1 with dense setae on mesial face of articles 4, 5 and 6. Pereopods 2-7 more slender than in juvenile. Pleopod 2, appendix masculina, extending well beyond endopod, curved.

Type species. Pseudanthura lateralis Richardson.

Remarks. Pseudanthura is a clearly defined genus of five species. Kensley (1978) described the genus as having 4 segments in the maxilliped but figured *P. tenuis* and *P. albatrossae* with 5 articles (Kensley, 1978) and *P. recifensis* with 6 articles (Kensley, 1982b).

The species do in fact differ in the degree of fusion of maxillipedal palp articles. In *P. baeckea* sp. nov. the first two articles of the primitive palp are fused as are the last three, that is, there are two palp articles. In *P. recifensis* only the last two palp articles are fused, that is, four are visible. Poore (1978) noted variation in the number of visible maxillipedal articles in *Leptanthura* and suggested that in the Paranthuridae over-reliance on this character was perhaps not warranted. *Pseudanthura*, like *Leptanthura*, is otherwise fairly homogeneous despite this variation in the number of maxilliped articles.

Within *Pseudanthura* it is possible to discern two groups of species, which are clearly sepa-

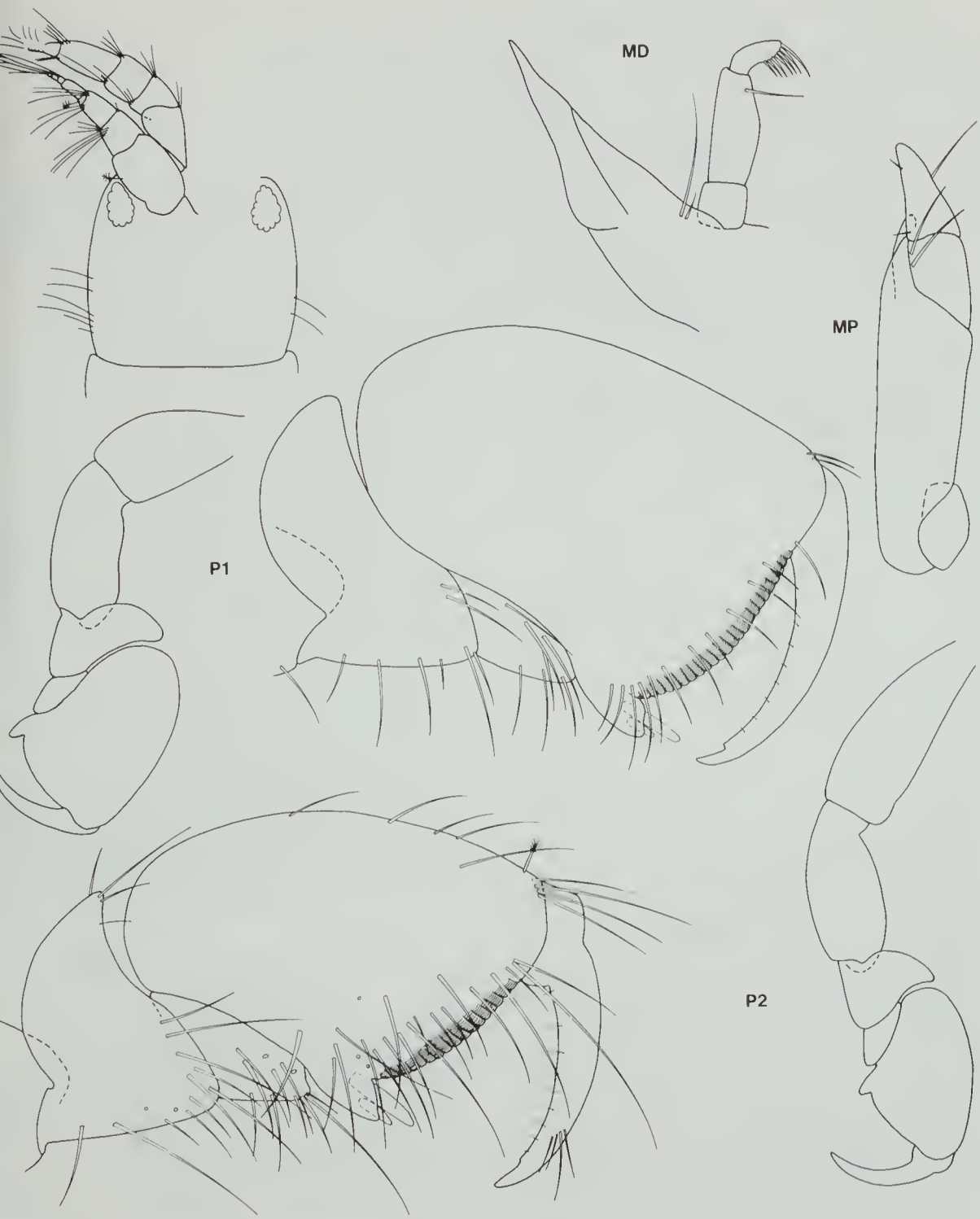

Figure 5. *Aenigmathura helica*. Holotype juvenile.

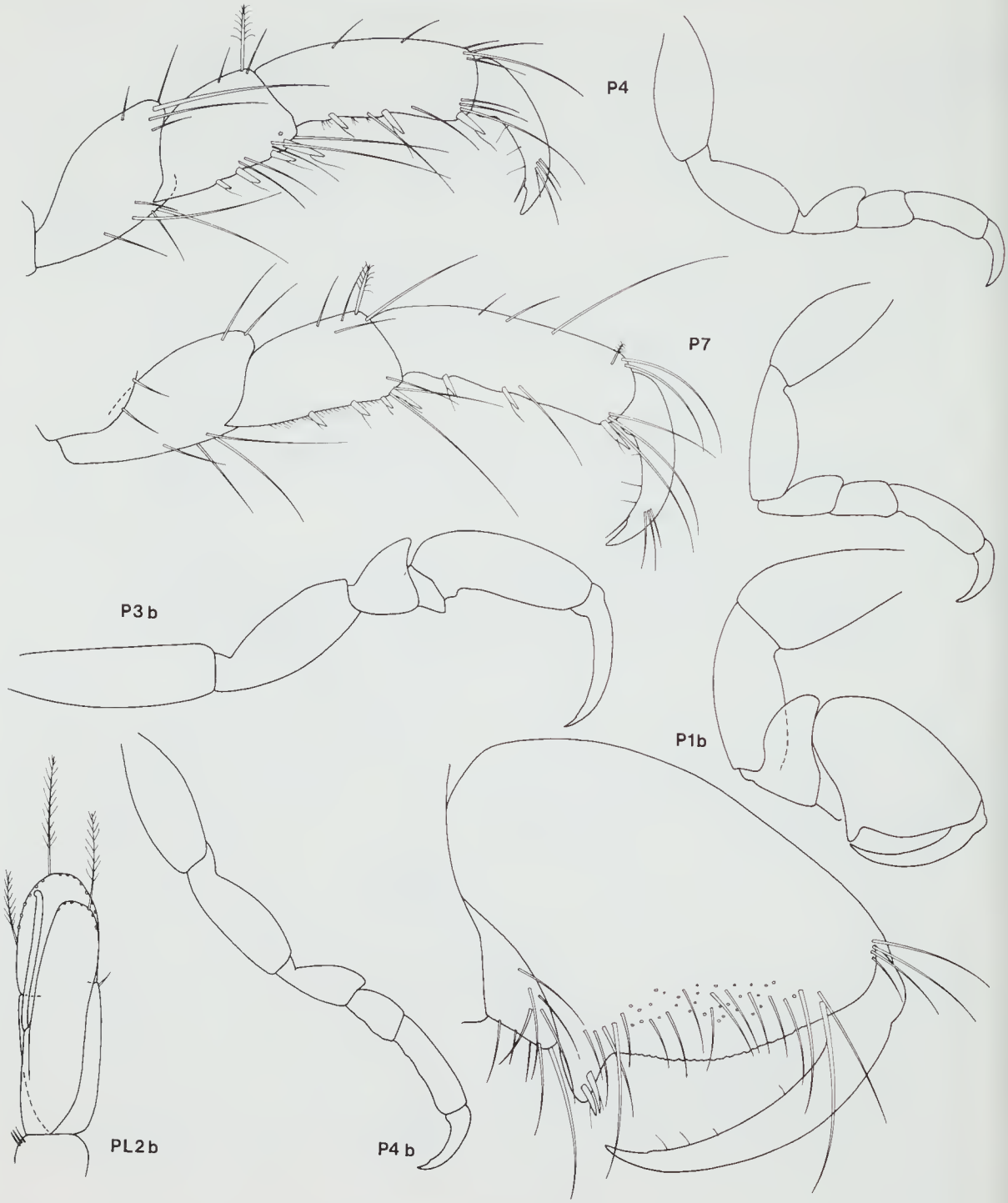

Figure 6. *Aenigmathura helica.* Holotype juvenile; b, male, 8.0 mm, NMV J10506.

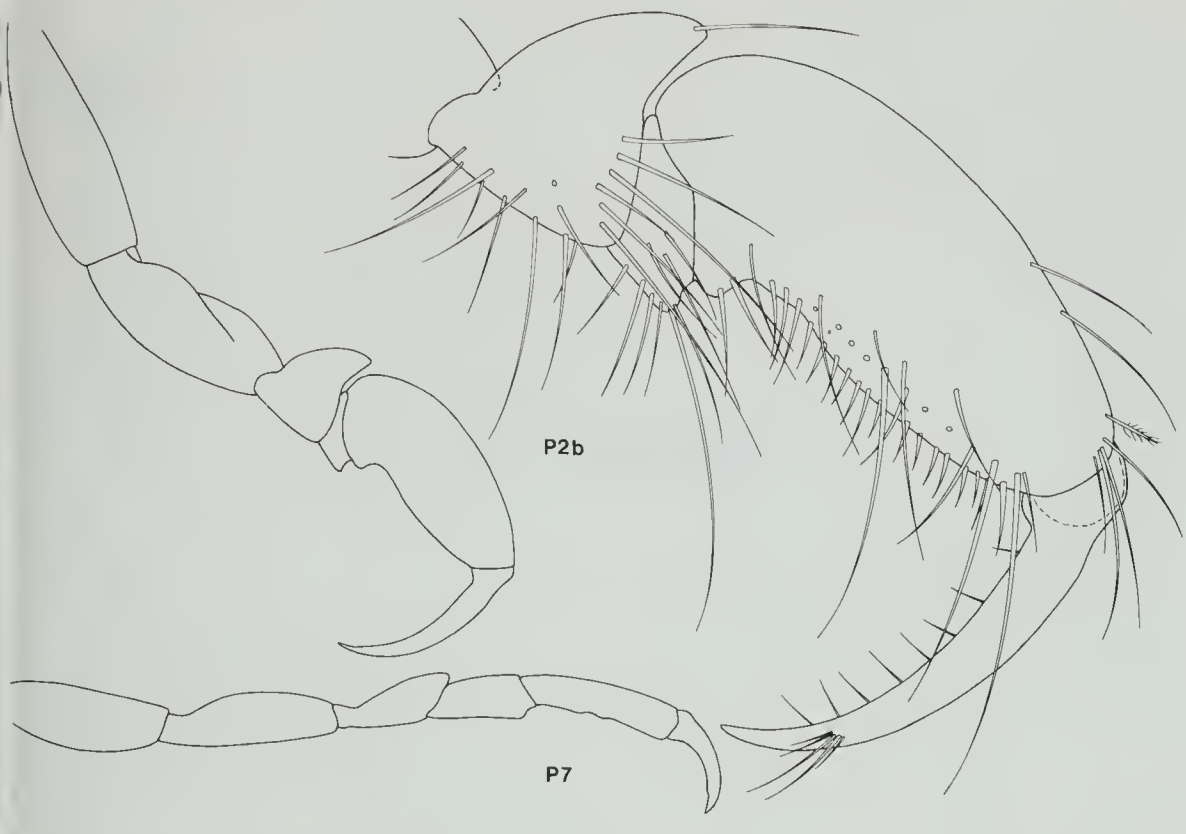

Figure 7. *Aenigmathura helica.* Holotype juvenile; b, male, 8.0 mm, NMV J10506.

rated by the characters used in the first couplet of the key. However, there is no biogeographic evidence to support the idea of two centres of speciation within the genus.

Pseudanthura baeckea sp. nov.

Figures 8-10

Material examined. 2 males, 3 juveniles, 8.0-10.1 mm.

Holotype: juvenile, 10.1 mm, AM P35248 (with one slide). NSW, off Broken Bay, 910 m, (33°31′S., 152°08′E.), NSW State Fisheries on FV 'Kapala', 10 Dec 1980 (stn K80-20-08).

Paratypes: N.S.W.; type locality, NMV J10501(1 specimen); off Broken Bay, 900-920 m, (stn K80-20-09), AM P35249(1 male) (with one slide), NMV J10502(1); off Port Jackson, 79 m, (stn K80-20-11), AM P32651(1).

Description. Juvenile. Body 11 times as long as wide; pereonite 7 half as long as wide; pleotelson longer than pereonite 6. Head as long as wide. Antenna 1 flagellum of 7 articles, shorter than combined length of last 2 articles of peduncle. Antenna 2 flagellum of about 10 articles, as long as fifth article of peduncle.

Mandibular palp articles 2 and 3 subequal; articles 1 and 2 each with distal seta, article 3 with comb of about 14 setae. Maxilliped palp of 2 articles; article 1 with mesial setae distally, article 2 with terminal setae; endite reaching half-way along first palp article.

Pereopod 1 article 5 with small group of setae on both mesial and lateral faces; article 6 palm convex with mesial row of submarginal setae, lateral face with proximal submarginal row of stout setae. Pereopod 2 article 6 with 6 posterior spines; pereopod 3 similar. Pereopods 4-6 of similar size, article 5 with 2 and article 6 with 3-4 spines on posterior margin. Pereopod 7 shorter

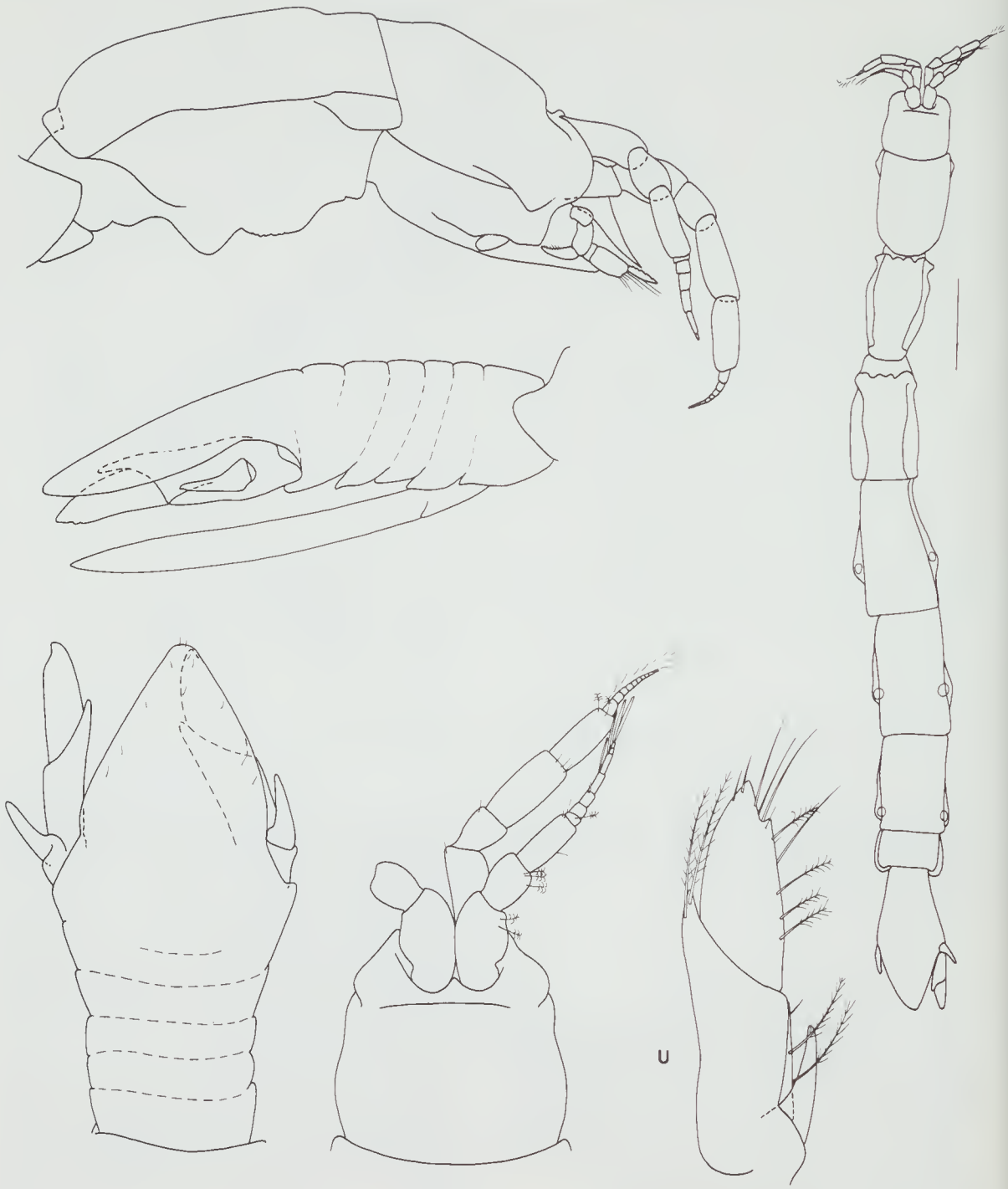

Figure 8. *Pseudanthura baeckea.* Holotype juvenile.

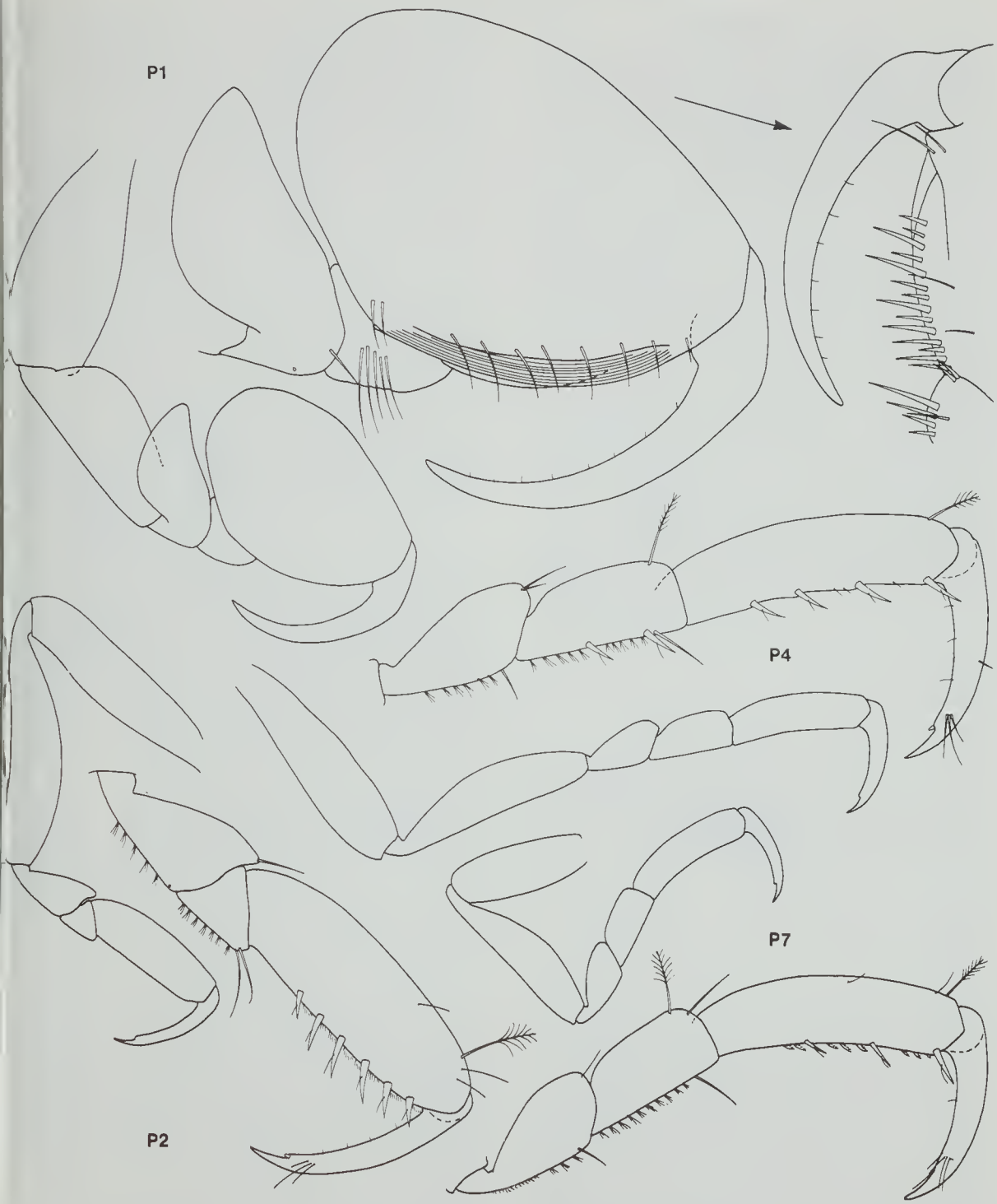

Figure 9. *Pseudanthura baeckea*. Holotype juvenile. Pereopod 1 in mesial view, detail of palm in lateral view.

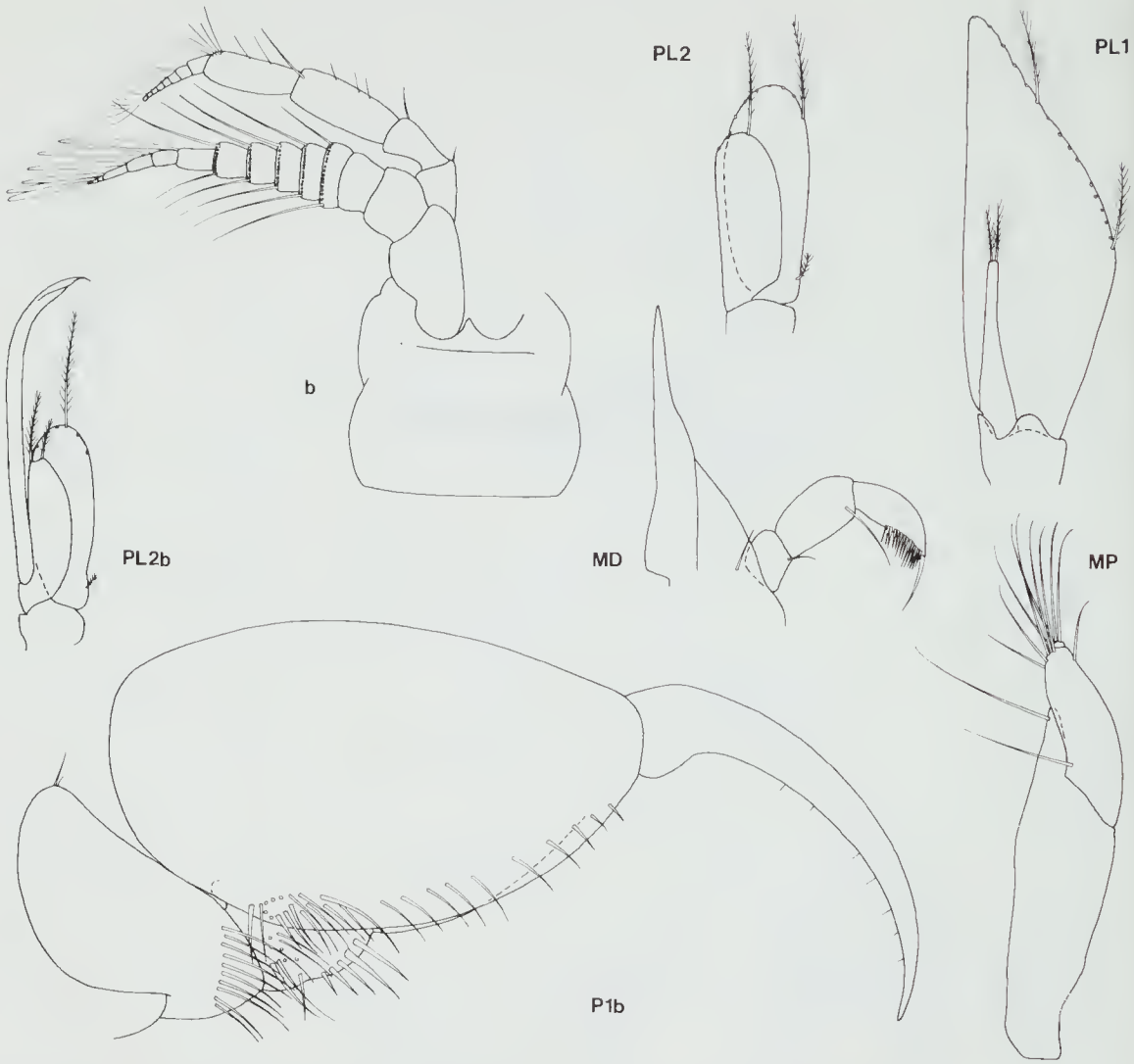

Figure 10. *Pseudanthura baeckea*. Holotype juvenile; b, paratype male, 10.1 mm, AM P35249.

than pereopod 6, article 5 without spines and article 6 with 3 spines on posterior margin.

Pleopod 1 exopod operculiform, apex subacute, with about 16 marginal setae; endopod slender, less than half length of exopod, with 2 terminal setae. Pleopod 2 endopod two-thirds length of exopod, with 3 terminal setae; exopod with proximal lateral seta and 8 marginal setae. Pleopods 3-5 rami subequal, with sparse marginal setae; exopod with proximal lateral seta.

Pleotelson twice as long as greatest width; pleonites 1-5 indicated by shallow, indistinct grooves; uropods inserting half-way along pleotelson. Telson triangular, lateral margins straight, apex subacute; with scattered submarginal setae. Uropodal peduncle and endopod subequal, suture oblique; endopod lateral margin irregular, sparsely setose, apex subacute; exopod shorter than peduncle, lanceolate.

Male. Differing from juveniles in antenna 1

flagellum, swollen proximally and tapering distally, of about 12 artieles, proximal artieles only with whorls of aesthetases. Pereopods more slender, pereopod 1 with dense mesial setae on artieles 4 and 5 and proximally on artiele 6. Pleopod 2 with eurved appendix maseulina reaching well beyond exopod.

Colour. White.

Distribution. Central New South Wales, shelf and upper slope, 72-910 m.

Remarks. Pseudanthura baeckea is the only speeies of the genus known from Australia. It mostly elosely resembles *P. lateralis* from whieh it ean be readily distinguished by its long uropodal exopod and the presence of a suture between the uropodal pedunele and the endopod. *Pseudanthura baeckea* is the only speeies to be recorded from a depth of less than 500 metres.

Acknowledgements

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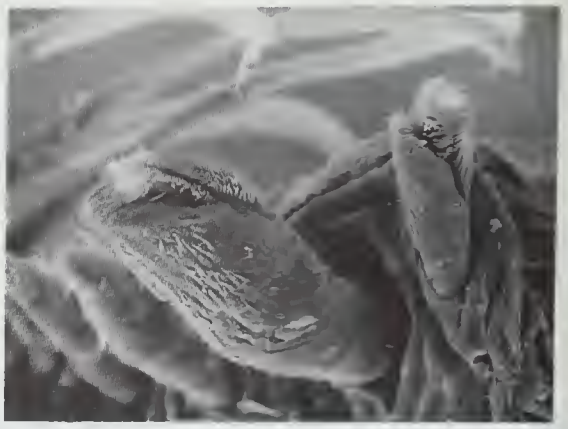
Explanation of plate

Plate 1. *Aenigmathura lactanea*, juvenile from Western Port, Vietoria. a, pereopod 1, distomesial view of palm. b, Pereopod 1, distomesial view of proximal thumb of palm. c, Pereopod 1, detail of mesial aspect of palm. d, pereopod 1, detail of lateral aspect of palm. e, Telson and tailfan. f, detail of statocyst pore.

a



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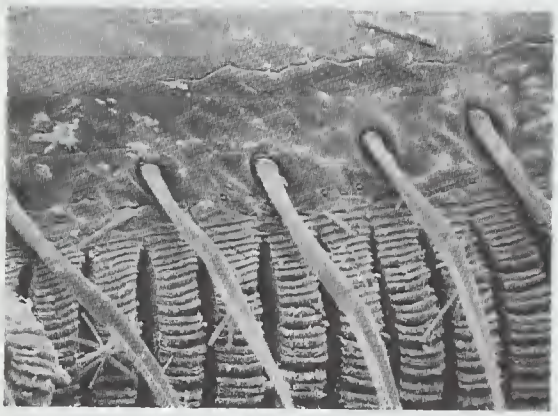

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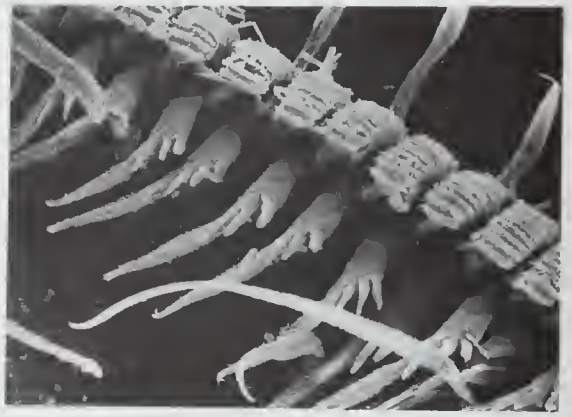

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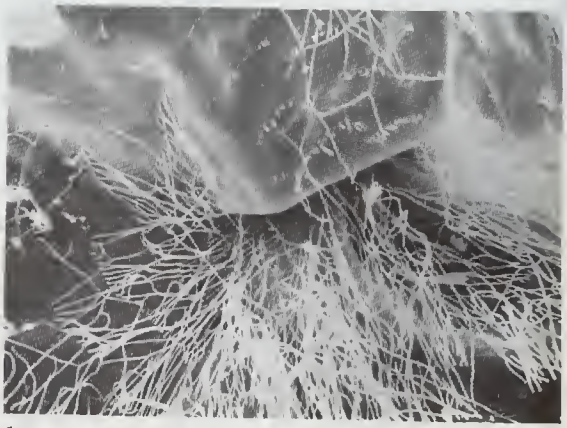

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