Poore, 1988

Memoirs of the Museum of Victoria 49(1): 169-193 (1988) ISSN 0814-1827

A GENERIC REVIEW OF THE HYSSURIDAE (CRUSTACEA: ISOPODA) WITH A NEW GENUS AND NEW SPECIES FROM AUSTRALIA

By Gary C. B. Poore and Helen M. Lew Ton

Department of Crustacea, Museum of Victoria, Swanston Street, Melbourne, Victoria 3000, Australia

Abstract

Poore, G.C.B. and Lew Ton, H.M. 1988. A generic review of the Hyssuridae (Crustacea: Isopoda) with a new genus and new species from Australia. *Memoirs of the Museum of Victoria* 49: 169-193.

The isopod family Hyssuridae Wägele is confined to five genera: *Belura* gen. nov., *Hyssura* Barnard, *Kupellonura* Barnard, *Neohyssura* Amar and *Xenanthura* Barnard. *Ocsanthura* Kensley is synonymised with *Hyssura*, and *Kensleyanthura* and *Belizanthura* Kensley are synonymised with *Kupellonura*. The relationships between the genera are discussed.

Eight new species are described: *B. pillara, K. biriwa, K. currawan, K. gidgee, K. marrongie, K. werawera, N. bilara* and *X. ulawa;* and a key to separate the five genera and the Australian species is presented.

Introduction

The Hyssuridae is a family of primitive anthuridean Isopoda first separated from the Anthuridae and Paranthuridae, the other two families of the infraorder, by Wägele (1981a). Members of the family are distinguished from other anthurideans by the absence of a telsonic statocyst, free pleonites, non-operculiform first pleopods (all pleopods are similar) and small size. In this contribution Wägele's (1981a, b) original concept of the Hyssuridae is confined (only four of the original ten genera are recognised as being valid) and a new genus is added. The systematics of the Hyssuridae and the relationships of the genera are discussed. A key to the five genera and to the Australian species is presented. Each genus is diagnosed and eight new species in four genera from Australia are described.

Abbreviations used in figures are: A1, A2, antennae 1 and 2; E, pleonal epimera; MD, mandible; MP, maxilliped; MX1, maxilla 1; P1-P7, pereopods 1 to 7; PL1-PL5, pleopods 1 to 5; T, telson; UN, uropodal endopod (or endopod fused to peduncle); UX, uropodal exopod (flattened); l, left; r, right. On pleopods and male antennae 1 only representative setae or aesthetascs are drawn. Unless noted otherwise figures are of left limbs. The letters a, b, c, refer to separate figured individuals.

The Greek prefixes *hyssos* and *belos* mean javelin or spear and allude to the shape of the tail of species of the type genus. The specific epithets chosen for new species are Australian aboriginal words meaning spear and are nouns in apposition.

Material is lodged in the Museum of Victoria, Melbourne (NMV), Australian Museum, Sydney (AM), Queensland Museum, Brisbane (QM), and National Museum of Natural History, Washington (USNM). The station number prefixes for samples from Western Port, Bass Strait, and others from tropical Australia are taken from the Museum of Victoria's "station" data-base.

Systematics of the Hyssuridae

Wägele (1981a: fig. 30; 1981b) listed ten genera belonging to the Hyssuridae. The family was defined on the basis of two apomorphies: the body being very slender and the mouthparts of adult males being partly reduced. Our dissections of males show little evidence of mouthpart reduction. The genera were separated from the remaining two families of the Anthuridea (Anthuridae and Paranthuridae) whose synapomorphies were said to be the presence of telsonic statocysts and operculiform first pleopods.

Wägele's (1981a) cladistic analysis divided the genera into two groups, A and E. The four genera of genus-group E (*Rhiganthura* Kensley, *Stellanthura* Wägele, *Heptanthura* Kensley and *Eisothistos* Haswell) were defined on the basis of several synapomorphies. At least three of these characters clearly separate the genera from group A and align them with the non-hyssurid Anthuridea: long uropodal peduncle; sexually dimorphic pleon; and enlarged first pleopod. More importantly, these genera share shortened pleonites and the absence of a

produced carpus on pereopods 2 and 3 with the Anthuridae and Paranthuridae. The only synapomorphies of group E which are unique are a broadened tail fan and a strong projection on the uropodal exopod. For these reasons we exclude these genera from the Hyssuridae believing them to be more closely allied to the Anthuridae s.s.

The Hyssuridae, therefore, in the sense used in this contribution comprises only those genera included in Wägele's genus-group A.

The family is diagnosed largely on the basis of numerous plesiomorphies but there are undisputed apomorphies of which small size and slender form are two. Wägele defined genus-group A on characters M.1 and M.2 (1981a, fig. 30) as follows:

Pereopods 2 and 3 are subchelate. This is a probable apomorphy if a similar condition in the Paranthuridae is independantly derived.

The carpus of pereopods 2 and 3 is posterodistally produced. Similar structures are not seen elsewhere in other anthuridean families.

The flagellum of antenna 1 has at most four articles with one aesthetasc on the terminal article and primitively one on the second. This condition is not seen elsewhere and is a unique apomorphic state derived from a longer flagellum with at least one aesthetasc on every article except the first and the last (Wägele, 1981, 1983). In other Anthuridea the terminal aesthetasc-free article may also be lost and the last of the remaining articles may carry more than one aesthetasc.

The apomorphies of the family are summarised in Fig. 1.

Two of the six genera of genus-group A listed by Wägele, *Ocsanthura* Kensley and *Kensleyanthura* Wägele, are reduced to junior synonyms. The family now includes *Hyssura* Barnard, *Kupellonura* Barnard, *Neohyssura* Amar, *Xenanthura* Barnard and the new genus *Belura*.

Our intuitive interpretation of the phylogeny of the five genera differs from that hypothesised by Wägele (1981a: 69-72, fig. 30). The relationships be-

Key to World genera and Australian species of Hyssuridae

1. Uropodal exopod as broad or broader than long, endopod fused to peduncle; pleopodal endopods with single apical seta; mandibular palp of 1 article with seta 2
– Uropodal exopod longer than wide, endopod free; pleopodal endopods with several marginal setae; mandibular palp of 3 articles 3
2. Pereopod 3 merus and carpus with tufts of long setae; telson short, excavate apically; eyes present ..... *Xenanthura* ..... one Australian species *X. ulawa*
– Pereopod 3 merus and carpus acutely produced posterodistally; telson with apical projection; eyes absent ..... *Belura* ..... one Australian species *B. pillara*
3. Uropodal exopod linear, its medial margin and lateral margins of telson with cuticular spines ..... *Neohyssura* ..... one Australian species *N. bilara*
– Uropodal exopod linear or with lateral lobe, unarmed; telson unarmed 4
4. Pereopod 2 propodus palm oblique; pereopods 4-7 with carpus quadrangular, with 2 marginal spines; molar acute ..... *Hyssura* ..... (not known from Australia)
– Pereopod 2 propodus palm axial; pereopods 4-7 with carpus triangular, with 1 marginal spine; molar blunt ..... *Kupellonura* . . . 5
5. Uropodal exopod linear (about 3 times as long as wide) ..... *K. marrongie*
– Uropodal exopod laterally lobed (little more than twice as long as wide) 6
6. Lateral margins near base of telson and uropodal endopod, and mesial margin of base of uropodal exopod each with 2 recurved hooks ..... *K. currawan*
– Margins not so armed, dentate at most 7
7. Uropodal exopod with lateral lobe proximal; apex of telson evenly tapering over distal third ..... *K. gidgee*
– Uropodal exopod with lateral lobe widest at midpoint; apex of telson broadly rounded 8
8. Telson apex rounded, apex weakly produced (temperate) ..... *K. birawa*
– Telson apex rounded-truncate with definite apical setiferous protuberance (tropical) ..... *K. werawera*

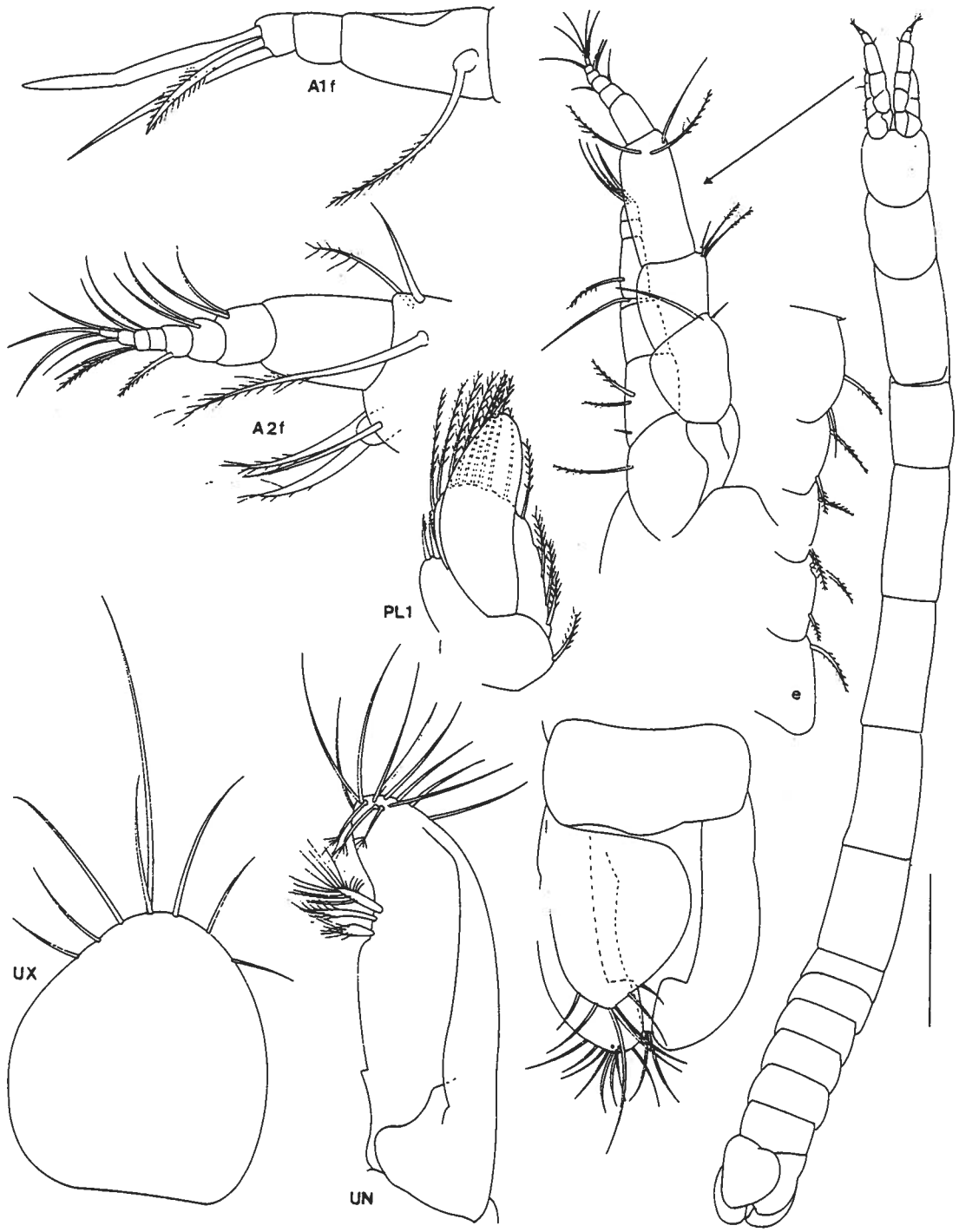

Figure 2. *Belura pillara,* holotype (f, flagellum in lateral view; scale = 0.5 mm).

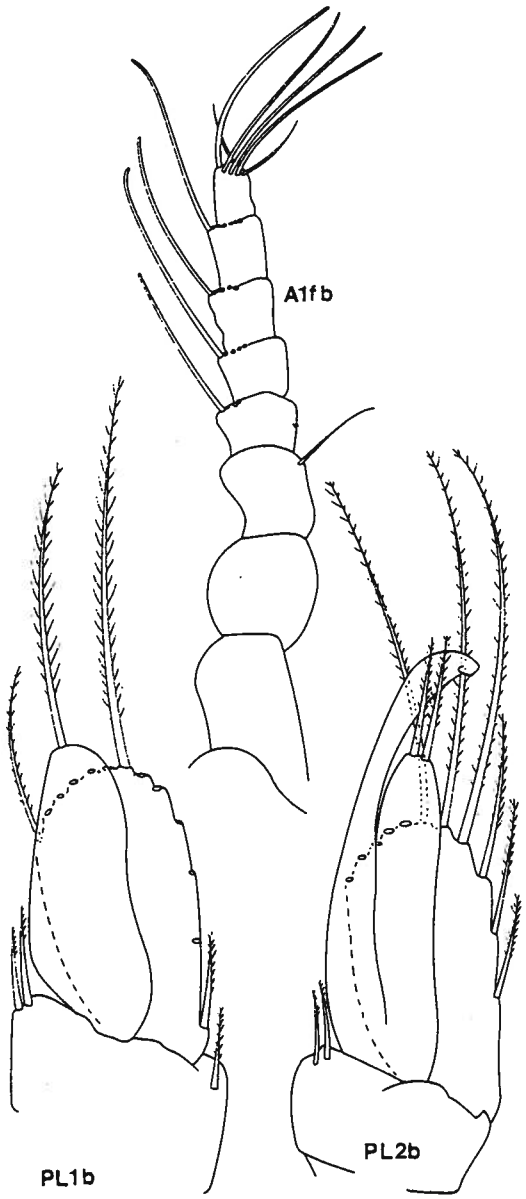

Figure 4. *Belura pillara,* holotype; b, paratype male, NMV J15002.

ple seta. Antenna 2 articles 4 and 5 with brush-setae, article 5 with ventral plumose setae of which base is swollen; flagellum of 8 articles.

Mandible with bluntly toothed incisor; lamina dentata of 3 finely denticulate plates, most distal with additional coarser teeth; molar process an articulating spine with row of fine denticles along its length and longer teeth at apex; palp a narrow article with long apical seta. Maxilla 1 with 7 apical setae. Maxilliped with short endite; palp a single plate with 1 mesial, 1 lateral and 4 distal setae.

Pereopod 1 carpus slightly produced posterodistally; propodus elongate, about 2.5 times as long as wide; palm axial with 2 proximal pectinate setae, 2 short simple setae, and 2 long and 1 short setae distally; 3 mesial setae. Pereopod 2 carpus slightly produced posterodistally; propodus almost twice as long as wide; palm oblique with pectinate setae, 2 short setae proximally, 1 short and 1 longer setae distally. Pereopod 3 merus and carpus acutely produced posterodistally; propodus almost twice as long as wide; palm oblique with pectinate setae, 2 short setae proximally, 1 short and 1 longer setae distally. Pereopod 3 merus and carpus acutely produced posterodistally; propodus 1.4 times as long as wide, palm straight. Pereopods 4-7 with few posterior setae; merus with digitiform denticles posteriorly; palm sinuous, unarmed; propodus of pereopods 5-7 with 2 distomesial spines.

Pleopod 1 peduncle with 2 setae on mesial lobe; endopod with 1 distal seta; exopod half length of endopod, with 13 marginal plumose setae. Pleopods 2-5 similar to first. Pleonal epimera 1-4 with 2 and epimeron 5 with 1 marginal plumose setae.

Uropodal peduncle and endopod fused, with broad ventromesial shelf bearing 3 large brush-setae in distal concavity; apex rounded, with 3 finer brush-setae and 10 simple setae; exopods overlapping, roughly semicircular, little longer than wide, with 8 setae distally. Telson not reaching to uropodal apices, widest proximally, narrowing gradually to 0.8 length, then abruptly narrower to apical spike, 2 apical setae.

Male. Antenna 1 flagellum of 5 articles each bearing about 6 aesthetascs. Pereopod 1 similar to juvenile except mesial propodal setae. Pereopod 2 carpus strongly produced posterodistally, with apical setae; palm more transverse. Pleopod 1 peduncle more rectangular; exopod almost as long as endopod. Pleopod 2 with narrow endopod with 2 apical spines; appendix masculina exceeding endopod, broad, apically curved. Pleopods 2-5 exopods of a single article.

Uropodal rami and the telson are narrower than in juveniles.

Species of *Kupellonura* are unusual in the possession of a tessellated cuticle on the dorsal surface of the antennal peduncles, head and pereonite 1. A mosaic of small tessae is visible under Nomarski illumunation at 400 times (Fig. 10). The fact that it has not been reported elsewhere in the Anthuridea may reflect the techniques used for examination more than reality.

Kupellonura biriwa sp. nov.

Figures 5–8

Material examined. 9 juveniles, 1 manca, 2 males; to 4.5 mm.

Holotype: Victoria, Western Port, exact locality not recorded (38°S, 145°E), Marine Studies Group, early 1970s, NMV J15019, juvenile, 4.5 mm (with 2 slides).

Paratypes: Vic., type locality, NMV J15020 (3 juveniles). Western Port, 38°29.78'S, 145°06.28'E) sand, 24 m, 25 Nov 1974 (stn WBES-1746), NMV J15021 (male, 3.1 mm, with 2 slides); J15022 (1 juvenile); off Sandy Point, French Is. (38°21.6'S, 145°30.6'E), sand, 9 m, 26 Nov 1973 (stn WBES-1735), J15023 (manca, 2.3 mm); Crib Point (38°21'S, 145S°14'E), sand, 9-13 m, 1964-1965–stn CPBS-A4, J15024 (1 juvenile); stn CPBS-23S, J15025 (1 juvenile); stn CPBS-33S, J15026 (1 male).

Other material examined. NSW, Hawkesbury River, A. Jones, 1978, AM P29754 (with 2 slides), P29756, P29757 (3 specimens).

Description. Body 20 times as long as wide, colourless. Head longer than wide, acute rostrum, lateral eyes. Antenna 1 peduncle with few fine brush-setae; flagellum with short first article, second longer, plus 2 shorter, with terminal aesthetasc. Antenna 2 flagellum of 9 articles.

Mandible incisor bluntly toothed; lamina dentata finely denticulate proximally, with coarser teeth distally; molar process rounded; palp articles 1 and 2 each with 1 seta, last article recurved, with 3 setae. Maxilla 1 inner lobe with 1 terminal seta, outer lobe strongly curved, with 1 strong plus 3 finer apical teeth. Maxillipedal endite narrow, with 1-2 terminal setae; palps asymmetrical, articles 1-5 with 0, 1, 1 or 2, 1 or 2, and 4 setae respectively.

Pereopod 1 carpus slightly produced posterodistally, with marginal and subterminal spines; propodus 1.8 times as long as wide, palm with 2 marginal spines and blade-like setae on cutting edge, 3 mesial setae. Pereopod 2 carpus strongly produced posterodistally, with marginal and subterminal spines; propodus with 2 spines with accessory flagella and blade-like seta on cutting edge, 1 submarginal seta distally. Pereopod 3 similar to pereopod 2 but propodus smaller. Pereopods 4-7 carpus triangular, with short anterior margin, carpus and propodus each with posterodistal spine. Pleopod 1 peduncle short, rectangular; endopod longer than exopod, with 5 plumose setae; exopod with 11 plumose setae. Pleopods 2-5 similar to first. Pleonal epimera 1-4 with 5 submarginal plumose setae and 1 smaller simple seta; epimeron 5 with 1 plumose plus 2 simple setae.

Uropodal endopod about twice as long as peduncle, 1.8 times as long as wide, apex broadly rounded, with about 16 long setae. Exopods overlapping, as long as endopod and telson, 1.8 times as long as wide, widest at midpoint; mesial margin gently convex, dentate; lateral margin strongly convex; apex acute, with 10 setae. Telson basally narrow, 2.1 times as long as wide, concave dorsally and with broad ventral longitudinal ridge; lateral margins straight, denticulate distally; apex rounded over last third, with 12 apical setae.

Male. Head narrower than in juvenile, eyes large. Antenna 1 flagellum with 5 aesthetasc-bearing articles plus basal and terminal articles. Maxilliped similar but endite absent. Pereopod 1 propodus narrower, palm with 4 mesial and 5 marginal setae. Pleopods more elongate; pleopods 2-5 with 2-articulate exopods. Pleopod 2 with hooked appendix masculina.

Distribution. Victoria (Western Port) and New South Wales (Hawkesbury River), 9-24 m.

Remarks. Three specimens from the Hawkesbury River, NSW, differ slightly from the type material (fig. 8). The pereopods and uropods are narrower than in the Victorian material but the details of setation are identical. In view of the small number of specimens available these are not recognised as a separate species.

The species is confined to marine bays of south-eastern Australia. A single specimen of *Kupellonura* from nearby Bass Strait (*Kupellonura* sp. herein) is considered a separate species.

The dentate margins of the telson and uropodal exopod are similar to those seen in *K. serritelson* Wägele.

Kupellonura currawan sp. nov.

Figure 9

Material examined. Unique.

Holotype: NSW, off Nowra (34°51.9'S, 151°12.6'E), crinoid dominated community, 777 m, G.C.B. Poore and C.C. Lu on RV "Franklin", 15 Jul 1986, epibenthic sled (stn SLOPE-6), NMV J14477, juvenile, 6.5 mm (with 2 slides).

Diagnosis. Antenna 1 with 1 aesthetasc. Uropodal endopod 2.5 times as long as wide, dorsolateral

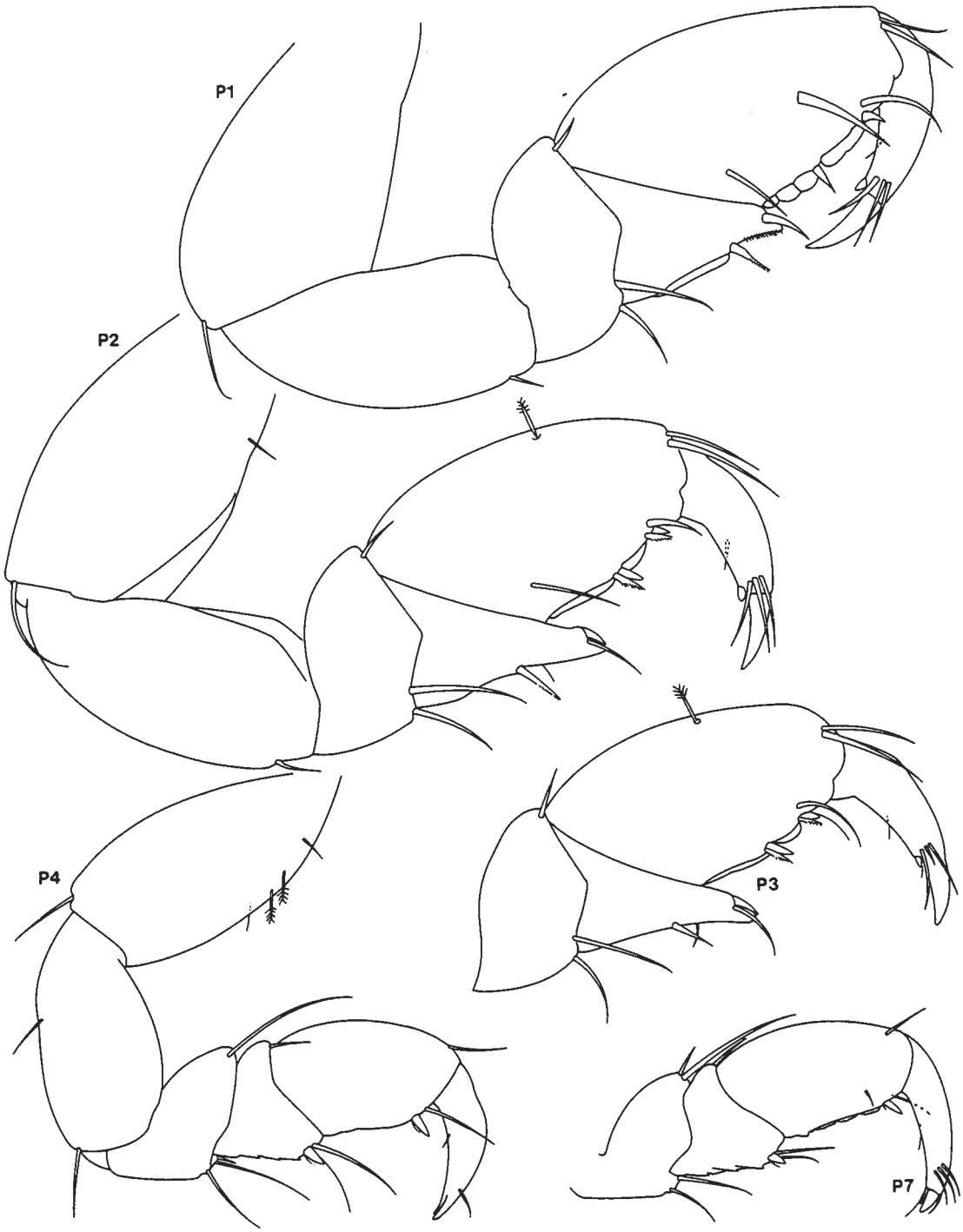

Figure 6. *Kupellonura biriwa,* holotype.

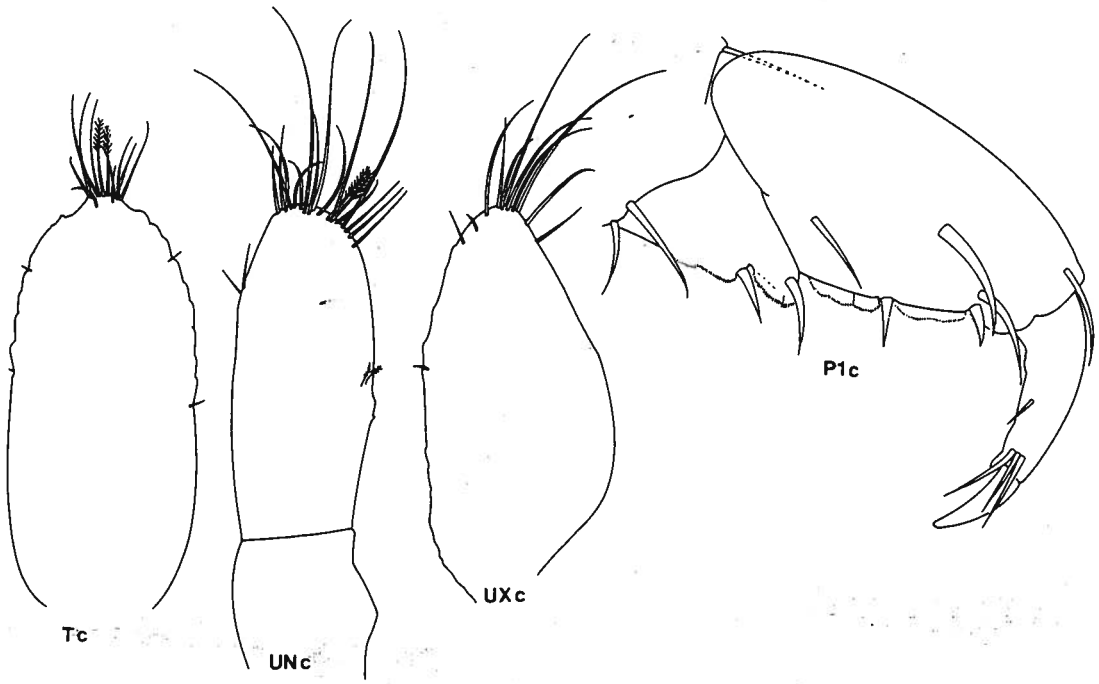

Figure 8. *Kupellonura biriwa*: c, juvenile, Hawkesbury River, AM P29754.

margin with proximal ridge bearing 2 recurved hooks; exopod not reaching as far as endopod or telson, 2.3 times as long as wide, laterally convex, medial margin with 2 recurved hooks proximally, dentate distally. Telson 3.2 times as long as wide, more or less parallel-sided, with narrowly rounded apex, with 2 pairs of recurved hooks proximally, dentate distally.

Distribution. New South Wales slope (known only from type locality).

Remarks. Kupellonura currawan differs from all other species in the genus in the presence of hooks on the margins of the telson and uropodal rami.

The pereopods are narrower than in *K. biriwa,* pereopods 1-3 have three marginal propodal spines rather than 2, and the endopod of the pleopods is more rectangular. The figure of maxilla 1 is drawn more flat than that shown for *K. biriwa.*

Kupellonura gidgee sp. nov.

Figure 10

Material examined. 10 juveniles, 2 males, 4 mancas; to 3.4 mm.

Holotype: Qld, Great Barrier Reef, Lizard Island (14°40′S, 145°28′E), B. Kensley, Jan 1982 (stn BK-113), NMV J15027, juvenile, 3.4 mm (with 2 slides).

Paratypes: Type locality, NMV J15028, male, 2.8 mm; J15029, 5 juveniles, 1 manca. Lizard Island, B. Kensley, Jan 1982 (stns BK-117, BK-127, BK-130), NMV J15030 (1 submale), J15031 (1), J15032 (1); (stn K-L5), USNM 211447 (2); (stn BK-129), QM colln(2). Lizard Is., Granite Head, 100 m offshore, coralline and other algae, 10 m, G.C.B. Poore, 11 Dec 1987 (stn NQ-125), NMV J14751(1 male).

Other material. Qld. Lizard Island, B. Kensley, Jan 1982 (stn BK-115) NMV J15033 (1 manca).

NT. West side of Oxley Island (11°00′S, 132°49′E), 14 m, J.K. Lowry, 21 Oct 1982 (stn NT-82), NTM colln.

Diagnosis. Antenna 1 with 1 aesthetasc. Uropodal endopod 2.1 times as long as wide; exopod not reaching as far as endopod or telson, 2.1 times as long as wide, widest at proximal third, mesial margin gently convex, lateral margin strongly convex proximally. Telson basally narrow, 2.5 times as long as wide, lateral margins convex, dentate distally, apex subacute.

Male. Pereopod 1 propodus with 4 marginal setae.

Distribution. Queensland, northern Great Barrier Reef, Northern Territory coral cays.

Remarks. Kupellonura gidgee differs from *K. biriwa* in having slightly broader pereopodal propodi but setation is identical. The shorter and proximally

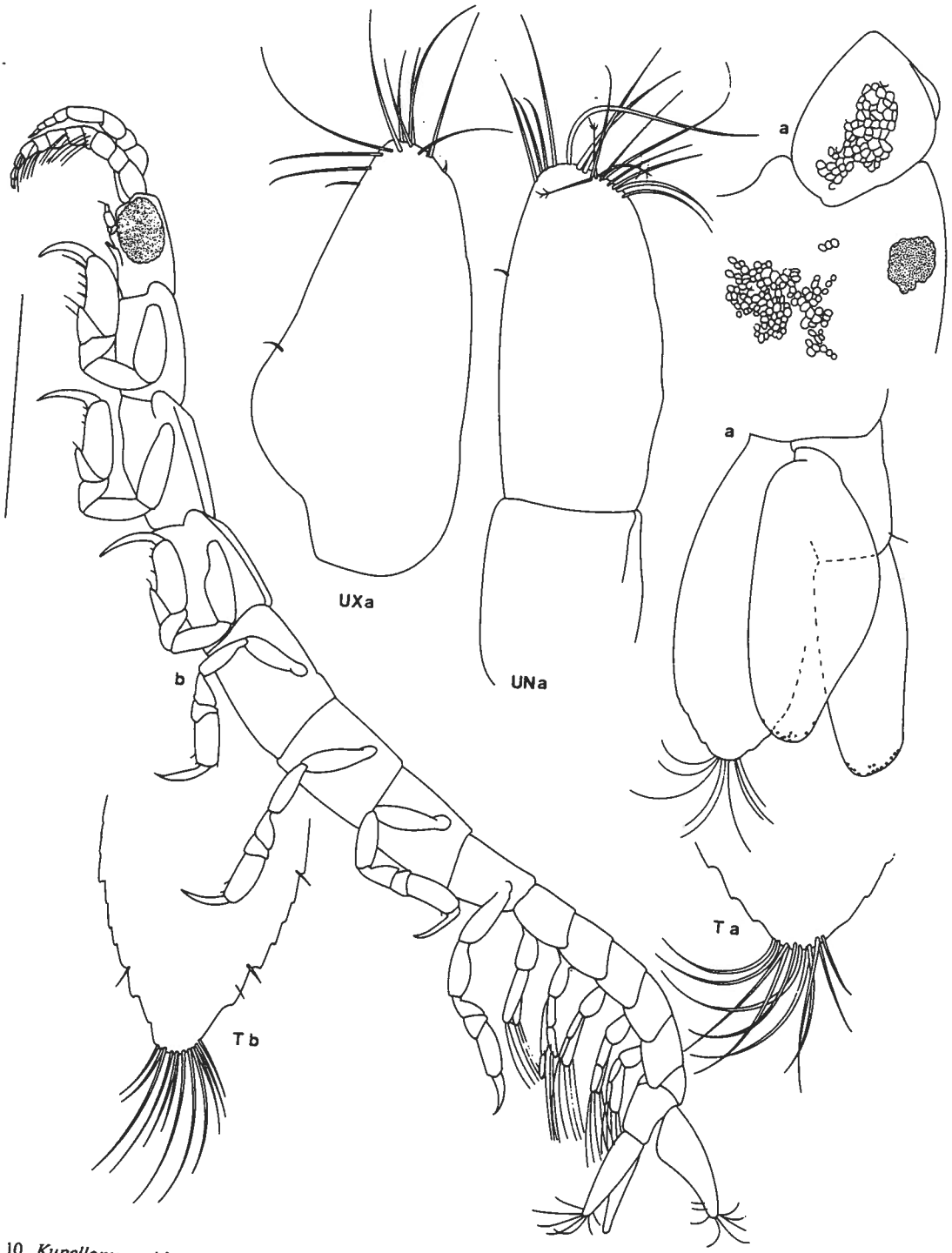

Figure 10. *Kupellonura gidgee*: a, holotype; b, paratype male, NMV J15029 (scale = 0.5 mm).

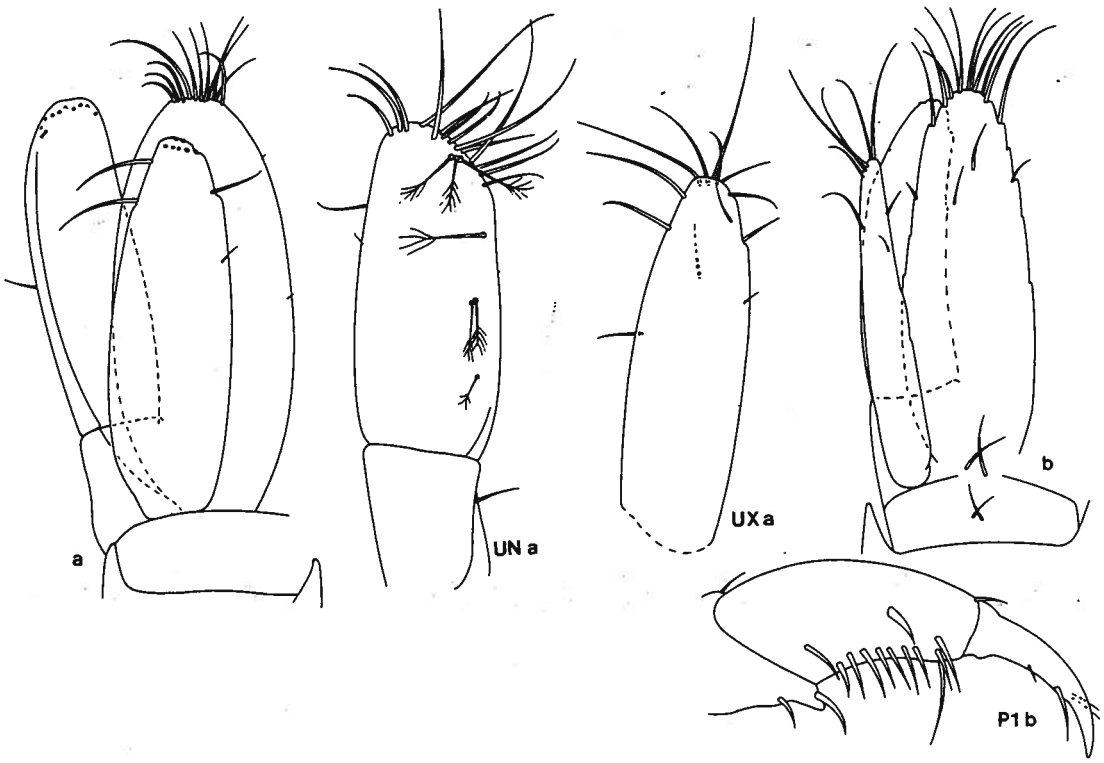

Figure 11. *Kupellonura marrongie*: a, holotype; b, paratype male, NMV J15035.

dal endopod free, longer than peduncle; exopod linear with cuticular spines on mesial margin. Telson as long as uropod, triangular, with cuticular spines on lateral margins.

Type species. Hyssura spinicauda Walker, 1901 (monotypy).

Remarks. Neohyssura is most similar to *Kupellonura* with which it shares undifferentiated pereopods, uropods, pleopods and mandibular and maxillipedal palps. The evenly tapering telson, and uropodal and telsonic spines are the apomorphies defining the genus. Negoescu and Wägele (1984) listed three species from the Atlantic Ocean, Indian Ocean and Mediterranean, and Wägele (1987) added a fourth from interstitial habitats in the Cape Verde Islands.

Neohyssura bilara sp. nov.

Figures 13, 14

Material examined. 2 juveniles, 1 female, 1 sub-male; to 4.2 mm.

Holotype: Qld, Shoalwater Bay, 140 m off Little Bank Beach, Triangular Island (22°30'S, 150°31'E), intertidal mudflat, J. Lewis, 13-16 Sep 1981, NMV J15037, gravid female, 4.2 mm (with 2 slides).

Paratypes: Type locality, QM colln, juvenile; NMV J15038, submale. Shoalwater Bay, Triangular Island, 50 m offshore, intertidal mudflat, J. Lewis, 3-6 Nov 1982, NMV J13039, juvenile.

Description. Head wider than long, rounded rostrum, without eyes. Antenna 1 peduncle, articles 1 and 2 with 1 and 3 fine brush-setae respectively; flagellum of 4 articles, last minute, with terminal aesthetasc. Antenna 2 flagellum of 8 articles.

Mandible with bluntly toothed incisor; lamina dentata coarsely toothed distally, finely toothed proximally; molar process a fixed, acute tooth, finely denticulate distally; palp of 3 articles, last with short terminal seta. Maxilla 1 inner lobe with 1 seta; outer lobe strongly curved, with 7 fixed teeth. Maxilliped with short broad endite bearing 1 seta; palp of 5 articles bearing 0, 1, 2, 2, 3 setae.

Pereopod 1 carpus produced as seta-bearing tooth; propodus triangular, palm oblique, with 2

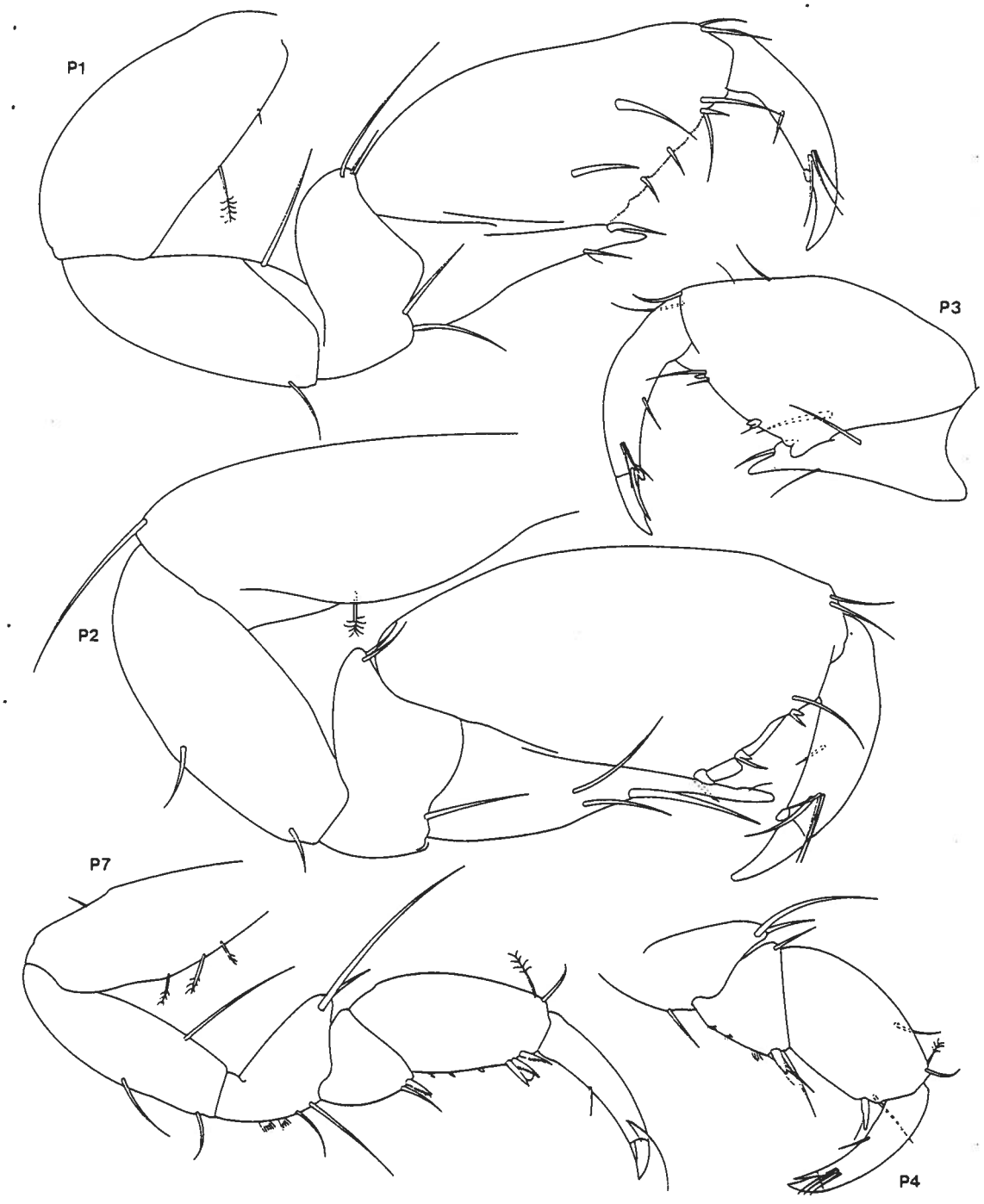

Figure 13. *Neohyssura bilara*, holotype.

ticulating spine; palp a single article with terminal setae. Maxillipedal endite short; palp of 5 fused or partially fused articles.

Pereopod 2 palm transverse, carpus strongly produced. Pereopod 3 broad distally, merus and carpus with long posterior setae. Pereopods 4-7 carpus triangular, without free anterior margin, without carpal and propodal spines. Pleopodal endopods triangular, with terminal seta; exopods ovoid, setose. Uropodal endopod fused to peduncle; exopod ovoid. Telson much shorter than uropods, tapering to excavate apex.

Type species. Xenanthura brevitelson Barnard, 1925 (monotypy).

Remarks. The presence of a molar spine, mandibular palp article and maxillipedal endite are noted for the first time for *Xenanthura.* These features were confirmed on the type species, *X. brevitelson* (material from Gulf of Mexico, NMV J11657). Similarities between this genus and *Belura* gen. nov. were noted earlier. George and Negoescu (1985) listed and mapped the distribution of the five species of *Xenanthura* then known (their species *X. acuticauda* is herein removed to *Belura* gen. nov). All are tropical or warm-temperate as is the new species described there.

Xenanthura ulawa sp. nov.

Figures 15–17

Material examined. 84 juveniles, to 5.2 mm; 1 female, 4.4 mm; 48 males, to 4.3 mm; 10 mancas.

Holotype: Qld, One Tree Island (23°30'S, 152°05'E), One Tree Island lagoon, "Shark Alley", 1.5 m, coarse sediment, C. Short and J. Young, 17 Oct 1979 (AM stn OTI 3.2), AM P29685, juvenile, 5.2 mm.

Paratypes: Type locality AM P29653 (4 juveniles), P29654 (1 male), P29655 (2 juveniles), P29656 (female in tube, male, manca), P29657 (2 juveniles), P29681 (1 manca), P29682 (1 juvenile, 2 males), P29684 (1 manca), P29686 (1 manca), P29689 (1 juvenile), P29690 (1 male), P29691 (1 manca), P29994 (1 juvenile), P30061 (1 manca), NMV J15040 (8 juveniles, 2 males).

Other material. Qld, bays and shelf off Townsville (19°16'S, 146°49'E), various collections: NMV J15041 (33 juveniles, 23 males), J15042 (1 manca, 1 male), J15043 (3 juveniles, 3 males), J15044 (1 juvenile, 1 male), J15045 (1 juvenile), AM P37927 (10 juveniles, 5 males), QM colln (10 juveniles), 5 males). Fantome Island (18°40'S, 146°31'E), NMV J15044 (1 male, 1 juvenile). Shoalwater Bay (22°30'S, 150°31'E), J. Lewis, 1982, NMV J15047 (1 male).

NT. New Year Island (10°54'S, 133°02'E), 10-14 m, J.K. Lowry and G.C.B. Poore, 14 Oct 1982, NMV J15048 (1 juvenile), J15049 (1 juvenile) J15050 (1 manca). Oxley Island (11°00'S, 132°49'E), 14 m, muddy sand, J.K. Lowry, 21 Oct 1982, ~~NTM colln~~ (1 juvenile, 3 males). East Point, Fannie Bay (11°24'S, 130°48'E), 8-10 m, J.K. Lowry, 26 Oct 1982, ~~NMV J15051~~ (1 juvenile).

WA. North-west Shelf, between Port Hedland and Dampier (18°41'S, 118°39'E), 134 m, G.C.B. Poore and H.M. Lew Ton, 4 Jun 1983 (stn NWA-21), NMV J15052 (1 juvenile); (19°38'S, 118°06'E), 49 m, 13 Jun 1983 (stn NWA-56), J15053 (1 juvenile).

Description. Body 20 times as long as wide, colourless. Head wider than long, truncate rostrum, dorsolateral eyes. Antenna 1 with fine brush-setae and stout tufted seta on article 2 of peduncle; flagellum of 3 articles, first with brush-seta, third with 1 aesthetasc, 2 plumose and 1 simple setae. Antenna 2 article 5 with fine brush-setae dorsally and stout tufted-setae ventrally; flagellum of 5 articles.

Mandible with blunt incisor; lamina dentata of 3 finely denticulate flattened plates; molar process an articulating spine with fine denticles along length; palp a single article with apical seta. Maxilla 1 inner ramus a broad lobe; outer ramus strongly curved, with 1 fixed spine, 3 articulating setae, plus 1 finer seta innermost. Maxilliped with short endite bearing 1 apical seta; palp a single plate with 3-4 mesial, 1 lateral and 3 distal setae.

Pereopod 1 carpus slightly produced posterodistally, with pectinate and stout setae on margin; propodus triangular; palm slightly oblique, with consistent pattern of pectinate and blade-like setae and stout setae, 4 mesial setae. Pereopod 2 carpus strongly produced to end of propodus, with 9 posterior and 2 anterior teeth; propodal palm oblique, with consistent pattern of 7 teeth and marginal setae. Pereopod 3 merus as broad as greatest length, posterior margin convex, with 11 triangular denticles and 9 long posterodistal setae; carpus posterodistally lobed, 1-2 cuticular denticles proximally, 20 long setae distally; propodus ovate, palm obscured; dactylus constricted near base. Pereopods 4-7 with few setae; merus, carpus and propodus with posterior marginal and submarginal digitiform denticles, dactylus with anterior and posterior denticles; propodus of pereopods 4-7 with 1, 2, 3, and 3 strong mesiodistal setae respectively. Pleopod 1 peduncle with 2 setae on narrow mesial lobe; both rami of 1 article; endopod triangular, with 1 distal seta; exopod narrow, with 12 plumose setae. Pleopods 2-5 similar to first. Pleonal epimera 1-4 with 2 marginal setae, epimeron 5 with none.

Uropodal peduncle and endopod fused, with broad ventromesial shelf bearing 4 large brush-setae in shallow distal concavity; apex rounded-acute, with 3 finer brush-setae, distolateral margin with 11 setae; exopods overlapping, 1.5 times as broad as long, 6 setae posteriorly. Telson widest proximally, apex about half basal width, concave, with 2 brush-setae near midpoint and short seta laterally.

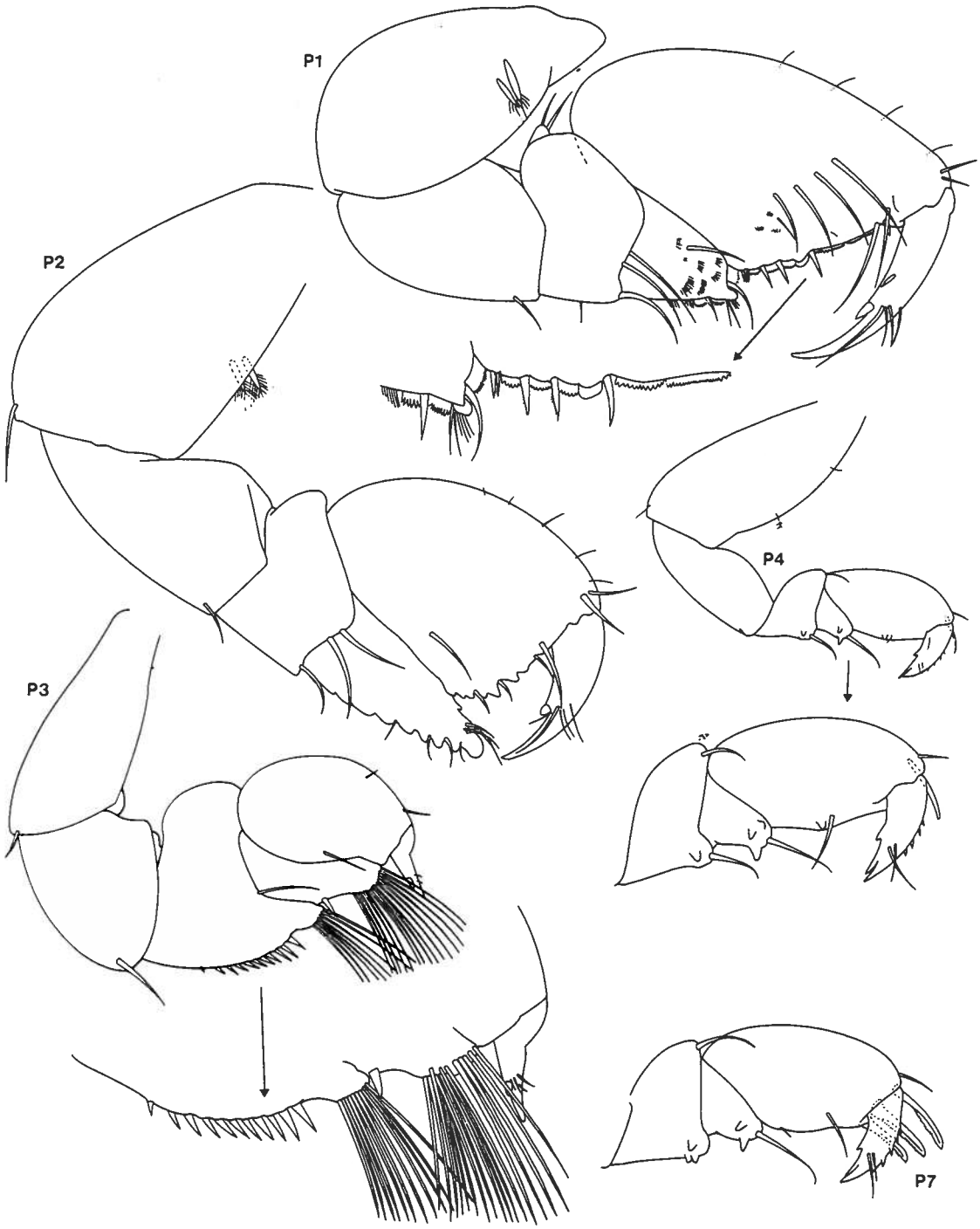

Figure 16. *Xenanthura ulawa,* holotype.

son. *X. orientalis* and *X. linearis* Pillai have a toothed carpus on pereopod 3.

A single female (gravid but without oostegites) was found in a thick mucilaginous tube.

Acknowledgements

This contribution was made possible through a grant from the Australian Biological Resources Study. We are especially grateful to Graham Milledge who inked the figures. For the loan or gift of material we thank Jim Lowry and Alan Jones (Australian Museum), John Lewis (Materials Research Laboratory, Melbourne), and Brian Kensley (U.S. National Museum of Natural History). Field work to collect this material was supported by Australian Biological Resources Study and Marine Science and Technologies grants. We appreciate the co-operation of CSIRO Division of Fisheries, the Northern Territory Museum of Arts and Sciences (especially A.J. Bruce), and the Australian Institute of Marine Sciences (especially Paul Sammarco).

References

Amar, R., 1953. Isopodes marins du littoral Corse. *Bulletin de la Société Zoologique de France* 77: 345-355.

Barnard, K.H., 1925. A revision of the family Anthuridae (Crustacea, Isopoda), with remarks on certain morphological peculiarities. *Journal of the Linnean Society* 36: 109-160.

George, R.Y. and Negoescu, I., 1985. Anthuridean isopods (Crustacea, Isopoda, Anthuridea) from the subantarctic islands—South Georgia, Elephant, South Orkney and Falkland. *Travaux du Museum d'Histoire Naturelle Grigore Antipa* 27: 19-47.

Kensley, B., 1975. Marine Isopoda from the continental shelf of South Africa. *Annals of the South African Museum* 67: 35-89.

Kensley, B., 1978. A new genus and species of anthurid isopod from deep water off the east coast of the United States. *Proceedings of the Biological Society of Washington* 91: 558-562.

Kensley, B., 1982a. Revision of the southern African Anthuridea (Crustacea, Isopoda). *Annals of the South African Museum* 90: 95-200.

Kensley, B., 1982b. Anthuridea (Crustacea: Isopoda) of Carrie Bow Cay, Belize. *Smithsonian Contributions to the Marine Sciences* 12: 321-353.

Menzies, R.J. and Frankenberg, D., 1966. *Handbook on the Common Marine Isopod Crustacea of Georgia.* University of Georgia Press: Athens.

Negoescu, I. and Wägele, J.W., 1984. World list of the anthuridean isopods (Crustacea, Isopoda, Anthuridea). *Travaux du Museum d'Histoire Naturelle Grigore Antipa* 25: 99-146.

Norman, A.M. and Stebbing, T.R.R., 1886. On the Crustacea Isopoda of the "Lightning", "Porcupine", and "Valorous" expeditions. *Transactions of the Zoological Society of London* 12: 77-141.

Wägele, J.W., 1981a. Zur Phylogenie der Anthuridea (Crustacea, Isopoda) mit Beitragen zur Lebenweise, Morphologie, Anatomie und Taxonomie. *Zoologica, Stuttgart* 132: 1-127.

Wägele, J.W., 1981b. Study of the Hyssuridae (Crustacea: Isopoda: Anthuridea) from the Mediterranean and the Red Sea. *Israel Journal of Zoology* 30: 47-87.

Wägele, J.W., 1983. On the homology of antennal articles in Isopoda. *Crustaceana* 45: 31-37.

Wägele, J.W., 1985. Two new genera and twelve new species of Anthuridea (Crustacea: Isopoda) from off the West Coast of New Zealand. *New Zealand Journal of Zoology* 12: 363-423.

Wägele, J.W., 1987. *Neohyssura atlantica* n. sp. from the Cape Verde Islands (Crustacea: Isopoda: Anthuridea). *Bulletin, Zoölogisch Museum, Universiteit van Amsterdam* 11: 13-19.

0·4× body length; flagellum of 12 articles, 0·8× length of peduncle. Frontal lamina bifid. Maxillipedal palp articles 4+5 fused.

Pereopod 1 merus with dense band of mesiodistal setae; carpus with dense setae and 1 stout seta posterodistally; propodus with setae in transverse bands across palm, 2 setae stronger, mesial face with 40 pectinate setae. Pereopods 2–7 carpus with excavate distal margin fringed by setae, 1 stronger, posteriorly; propodus with 4 or 5 transverse bands of setae and 2 stronger setae. Coxal plates 2–7 clearly visible dorsally; plates 2–4 on anterior half of margin of pereonites; plates 5 and 6 in dorsal aspect extending further posteriorly along lateral margin of pereonites, rounded posteriorly; plate 7 extending beyond posterior margin of pereonite 7, rounded-angular in outline.

Pleopods 1 and 2 rami with setose margins; pleopods 3–5 rami without long marginal setae; appendix masculina tapering to digitiform apex, shorter than endopod. Uropods and pleopodal cavity reaching near apex of pleotelson.

Female

Essentially the same as the male; slightly broader, 4·1× as long as wide.

Size

Males to 32 mm; females to 23 mm.

Distribution

Southern Australia from Sydney, N.S.W (34°S.), Victoria, northern Tasmania, South Australia, to Perth, W.A. (32°S.).

Remarks

Dana's species name has been used in keys, now out of date, to idoteids from Australia (Hale 1929) and New Zealand (Hurley 1961) and even assigned to a species from British Columbia (Bate 1866). Morton and Miller's (1968) figure of a New Zealand species probably follows Hurley's misidentification and, although it resembles Dana's figure, its source is unknown. It is essential, therefore, that the name be established among the known Australian species or declared *nomen dubium*. Although type material does not exist, Dana's habitus figure is clear and can be reconciled with the material described here. This species is the only Australian idoteid in which the pleotelson is elongate and slightly wider posteriorly than anteriorly, just as figured and described by Dana. Dana drew only one partially complete pleonite and we must assume that this is an error; no similar known Australian idoteid has this pleotelsonic formula. A neotype is selected from New South Wales, the type locality.

Bate's (1866) Canadian material has not been reidentified although it is recognised as an erroneous identification (Rafi and Laubitz 1990).

The distinctive shape of the pleotelson identifies the species.

Genus *Idotea* Fabricius

Idotea Fabricius, 1798: 302.

Type species: *Cymothoa emarginata* Fabricius, 1798, designated under plenary powers (ICZN 1963: Opinion 643).

Diagnosis

Body semi-cylindrical, deeply vaulted, smooth, head narrower than pereonite 1, body widest at pereonite 4. Pleon with 2 articulating pleonites, pleonite 3 indicated by suture ventrolaterally only; pleotelson apically rounded, excavate or pointed. Antenna 2 multi-articulate. Mandible with well-developed truncate molar process, spine row, lacinia, and toothed incisor. Maxilla 1 inner lobe with apical setae; outer lobe with 12 apical spiniform setae. Maxilla 2 inner lobe with complex setation, middle and outer lobes with distal rows of numerous denticulate setae. Maxillipedal endite with apical setation; palp digitiform,

Remarks

The presence of this species in Australia is based only on a record from the early nineteenth century. *Idotea brevicorna* was described by Milne Edwards (1840) from material collected by Baudin and Péron from 'les côtes de la Nouvelle-Hollande'. Milne Edwards' (1840: 130) description is consistent with the four supposed syntypes which were labelled 'type' only by Miers who saw the specimens 41 years after their description. Miers (1881) referred to the species as a junior synonym of *Idotea marina*, the species now referred to *I. balthica*. We cannot distinguish the syntypes from the individual from Irian Jaya labelled *I. balthica* by Nierstrasz or from the holotype of *I. duplicata* Nierstrasz, 1941, both specimens taken from the same station by the Siboga Expedition. *I. duplicata* is therefore a junior synonym.

The species is very close to the Atlantic and Scandinavian *I. balthica* but differs in not having the posterolateral corners of the pleotelson as produced, in the whole pleon being relatively broader (62% as wide as long *v.* 68%), and in the posterior coxae and epimera of pleonites 1 and 2 being more rectangular.

The wide geographic separation of these species supports continued recognition of Milne Edwards' species but the existence of a single, variable, widespread but very rare species may be possible. Miers (1881: 30) and Hurley (1961) recorded *Idotea marina* from New Zealand on the basis of a male collected by M. Petit and deposited in the museum in Paris. This specimen was examined by GCBP in 1992 and could be referable to *I. balthica*. This name is now suppressed (ICZN 1963) and the species to which the name refers is usually *Idotea balthica*. No species like this has since been recorded from New Zealand.

We include only figures of the pleotelsons of two of the syntypes of *I. brevicorna*. None of the syntypes is in good enough condition to illustrate fully. The species' absence from modern collections is curious but there have been no recent investigations for small crustaceans in Shark Bay.

Idotea metallica Bosc

(Figs 25–28)

Idotea metallica Bosc, 1802: 179, pl. 15, fig. 6.—Miers, 1881: 35–8; Thomson, 1883: 332; Thomson and Chilton, 1886: 155; Hansen, 1887: 188; Chilton, 1890: 193–4; Dollfus, 1895: 8, fig. 24; Richardson, 1900: 226; Richardson, 1901: 541; Norman, 1904: 443; Barnard, 1914: 203; Vanhöffen, 1914: 526–7; Gurjanova, 1936: 135; Naylor, 1955: 486; Hurley, 1961: 265; Kensley, 1978: 38, fig. 17*B*; Poore, 1981: 335.

Idotea (*Idotea*) *metallica*.—Kussakin, 1982: 125–6, fig. 90.

Idotea peloponesiaca Roux, 1830: pl. 30, figs 10, 12.

Idotea atrata Costa, 1838: pl. 11, fig. 3.

Idotea rugosa Milne Edwards, 1840: 131.

Idotea robusta Krøyer, 1846: 108.—Krøyer, 1849: pl. 26, fig. 3; Reinhardt, 1857: 35; Stimpson, 1863: 133; Verrill, 1871: 360; Harger and Verrill, 1873: 439, 569, pl. 5, fig. 24; Lütken, 1875: 150, footnote; Harger, 1879: 160; Harger, 1880: 349, pl. 6, figs 30–2.

Idotea algirica Lucas, 1849: 61, pl. 6, fig. 2.—Heller, 1866: 727–8; Stalio, 1877: 1353.

Idotea annulata Dana, 1849: 426.—Dana, 1853: 701, pl. 46, fig. 3; Cunningham, 1871: 499; Miers, 1881: 76.

Idotea argentea Dana, 1849: 426.—Dana, 1853: 698, pl. 46, fig. 1; Miers, 1876*b*: 92.

Idotea margaritacea Dana, 1853: 700, pl. 46, fig. 2.—Miers, 1876*b*: 92; Miers, 1881: 38–39; Thomson, 1883: 332; Haswell, 1885: 1001.

Idothea margaritacea.—Miers, 1876*b*: 92; Nierstrasz, 1941: 272.

Idothea metallica.—Richardson, 1905: 362, figs 392, 393; Richardson, 1909: 107–8; Nierstrasz, 1917: 112; Nordenstam, 1933: 94; Nierstrasz, 1941: 272.

Material Examined

Illustrated specimen. Port Jackson, in Wooloomooloo Bay (33°53'S.,151°13'E.), from floating cork, F. A. McNeill, AM P41325 (♂, 20 mm); P41326 (♀, 11 mm).

Other material. New South Wales: off Wollongong, stn NSW-436 (34°26'S.,150°53'E.), floats at surface, among lepadid barnacles, J. K. Lowry on MV Robin E, 25.xi.1990, AM P40527 (many specimens); NMV J23686 (20); from buoy approx. 6 km off Crescent Heads (31°11'S.,152°59'E.),

Description

Male

Body about 3·9× as long as wide, strongly vaulted. Head 2·2× as wide as long, front concave, with sharply defined curved posterior groove; eyes prominent. Pereonites 1–7 and pleotelson often slightly rugose. Pleotelson 0·4× body length, 2 pleonites free and articulating with pleotelson; pleonite 3 indicated by lateral sutures. Pleotelson broadest anteriorly, tapering to a truncate deep apex.

Antenna 1 peduncles separated. Antenna 1 peduncle article 3 almost $\frac{3}{4}$ length of first 2 combined; flagellum as long as peduncle article 3, with 12 pairs of aesthetascs. Antenna 2 0·4× body length; flagellum of 7–10 articles, half length of peduncle. Frontal lamina simple, clypeus produced. Mandibles asymmetrical; incisor 4-toothed, broad; left lacinia mobilis 3-toothed broad; right lacinia mobilis narrower, irregularly 3-toothed; spine row of 11 multifid curved spines; molar process truncate, rimmed by sharp teeth anterodistally and posteriorly, with anterior proximal cluster of long complex spines plus ring of simple spines. Maxilla 1 inner lobe with 3 distal plumose setae, outer lobe with 12 apical spiniform setae.

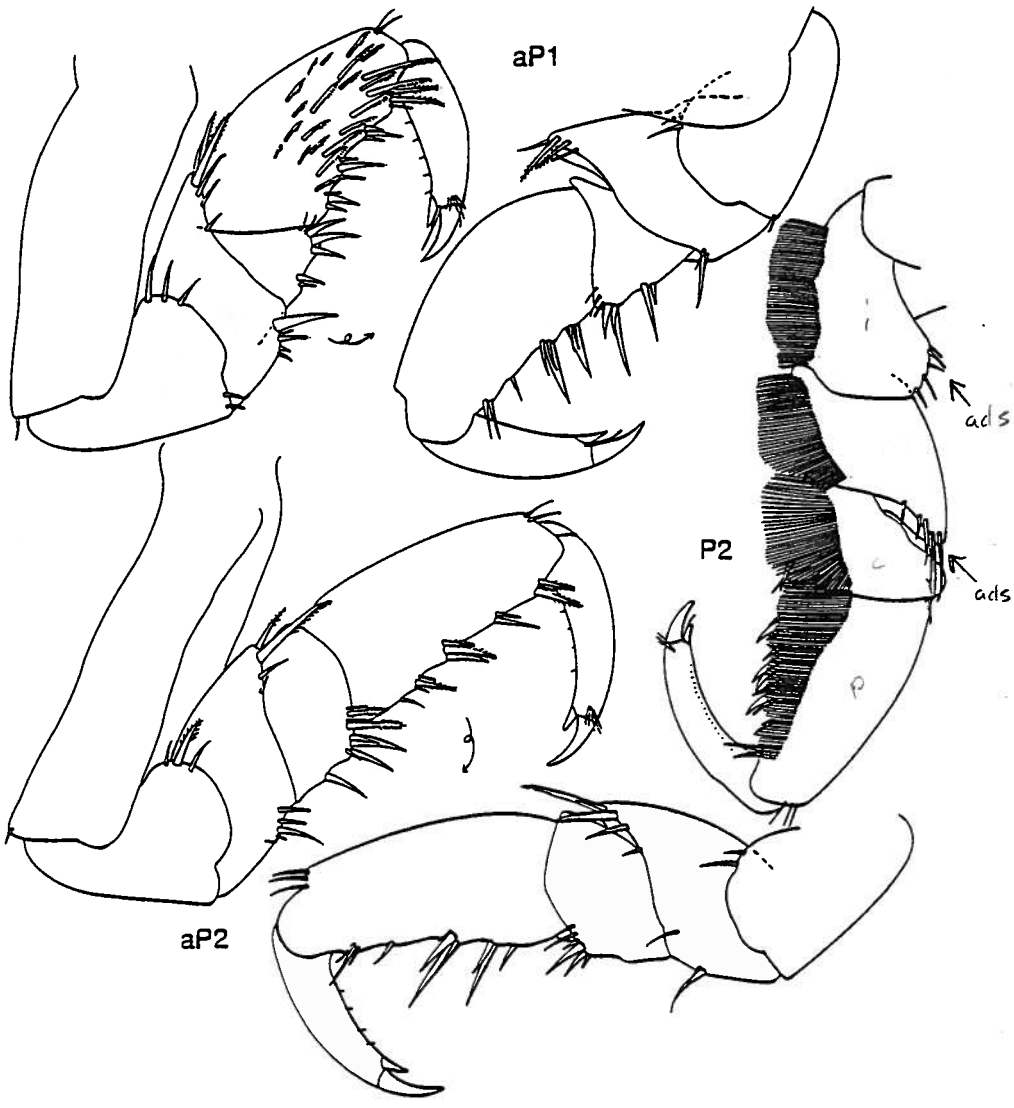

Fig. 26. *Idotea metallica.* Male, AM P41325.

with 3, 3, 4, 5 transverse rows of spiniform setae respectively, palms sinuous, less so on posterior limbs. Coxal plates 2–7 clearly visible dorsally, all concave dorsally and splayed; occupying all of lateral margin of pereonites.

Pleopods 1–3 rami with setose margins; pleopods 4, 5 rami without long marginal setae; appendix masculina tapering to rounded apex, shorter than endopod. Uropods and pleopodal cavity reaching to apex of pleotelson. Uropodal peduncle with strong longitudinal crest; endopod subrectangular. Penes close but separated by medial sternal keel.

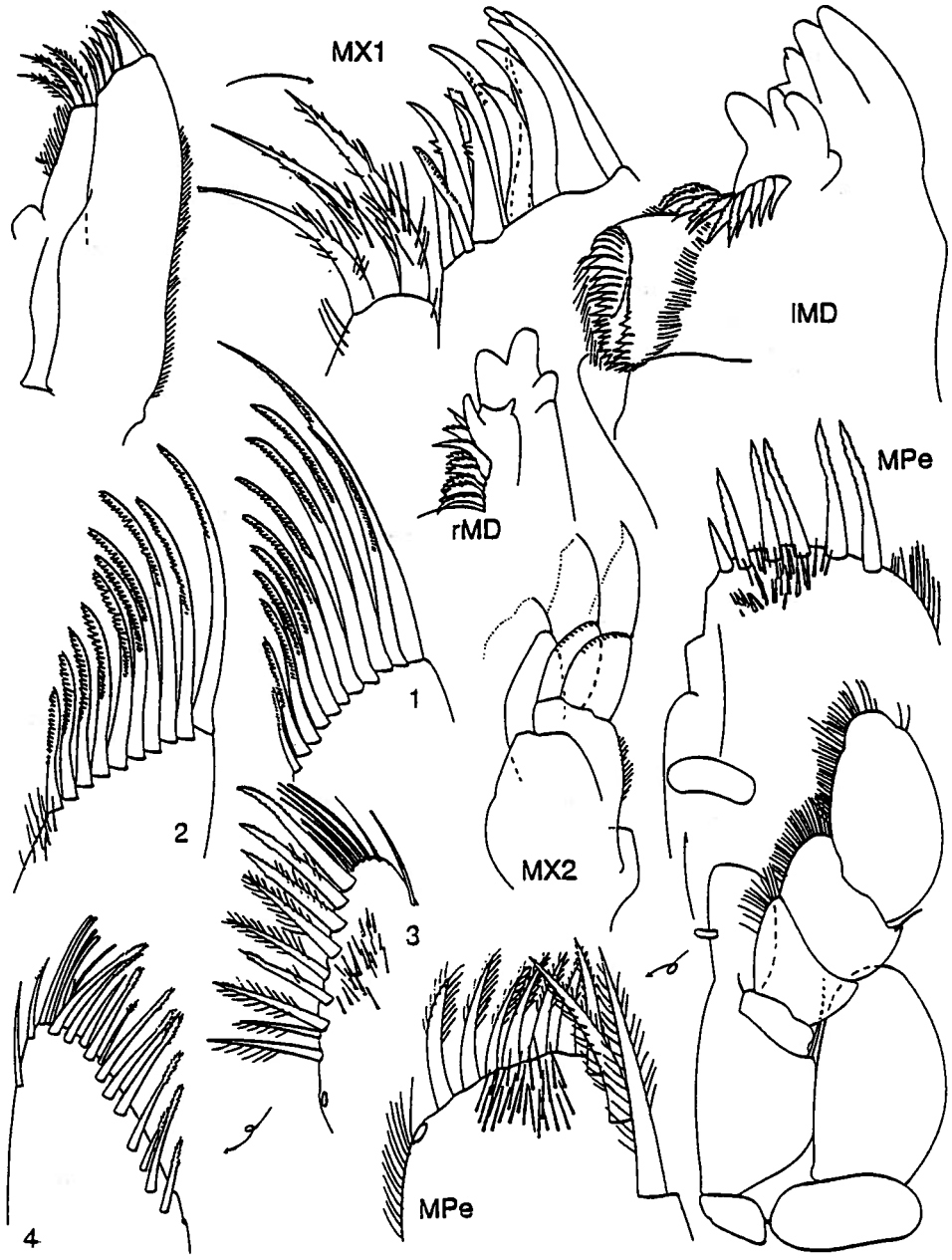

Fig. 28. *Idotea metallica*. Male, AM P41325 (rMD, incisor and lacinia mobilis only; MX2: *1*, outer lobe; *2*, middle lobe; *3*, inner lobe, posterior view; *4*, inner lobe, anterior view; MPe, anterior and posterior views).

In terms of pleonal structure, the genus cannot be differentiated from *Euidotea* but both are variable and *Euidotea* has much stronger setation on the pereopods and a broader maxillipedal palp with fused articles.

The type species, *Paridotea ungulata*, is described first in detail and other Australian species are diagnosed more briefly. In fact, the type species differs from the others in overall habitus, being much more vaulted and with better developed dorsal coxal plates. It also has more setae on the maxilliped and pereopods and the most plesiomorphic pleotelsonic condition. This species is the only one found on all southern continents.

Paridotea ungulata (Pallas)

(Figs 29–31)

Oniscus ungulatus Pallas, 1772: 62–4, pl. 4, fig. 11.
Idotea ungulata.—Lamarck, 1818: 160; Miers, 1881: 52–4; Thomson, 1883: 332–3; Filhol, 1885: 436; Thomson and Chilton, 1886: 156; Chilton, 1890: 196–8; Nierstrasz, 1918: 133.
Idotea affinis Milne Edwards, 1840: 133.—Krauss, 1843: 61; Heller, 1865: 130–1; Miers, 1876*b*: 93; Thomson, 1879: 232.
Idotea lalandii Milne Edwards, 1840: 132, pl. 31, fig. 7.—Krauss, 1843: 61.
Idotea edwardsii Guérin-Méneville, 1843: 33.
Idotaea nitida Heller, 1861: 497.
Idotea nitida.—Heller, 1865: 131–2, pl. 12, fig. 1.
Idotea excavata Haswell, 1881: 182–3; Haswell, 1882: 277–8.
Paridotea ungulata.—Chilton, 1890: 196–8; Stebbing, 1900: 53–5; Stebbing, 1902: 56; Chilton, 1905: 272; Chilton, 1909: 660; Stebbing, 1910: 433; Vanhöffen, 1914: 527; Collinge, 1917*b*: 81–2; Hale, 1924: 221, fig. 9*e*, *f*; Hale, 1927: 317; Hale, 1929: 320–1, fig. 325*b*; Sheppard, 1957: 151–3, fig. 4; Hurley, 1961: 265; Morton and Miller, 1968: 219, not fig. 73.2; Kensley, 1978: 40, fig. 17*I*.
Paridothea ungulata.—Nierstrasz, 1917: 113–14, figs 43–48; Nierstrasz, 1941: 267.
Paridotea ungulata var. *atrovirens* Collinge, 1917*b*: 82.
Idothea excavata.—Nierstrasz, 1941: 272.

Material Examined

Possible syntypes of Idotea excavata. Tasmania, AM G5325 (3 specimens).

Illustrated specimens. South Australia: Laura Bay, mangrove area (32°15'S.,133°49'E.), 20.ix.1981, SAM C4116 (1♀, 34 mm, 2 slides); Davenport Ck, Ceduna (32°8'S.,133°41'E.), S. Doyle, Apr. 1982, SAM C4117 (♂, 37 mm, 2 slides).

Other material. **Tasmania:** Southport, rock platforms SE. of pier (43°26·00'S.,146°56·50'E.), epifauna from *Zostera*, R. S. Wilson, 27.iv.1985 (stn TAS 34), NMV J14393 (2); Coles Bay, nr boatramp (42°7'S.,148°17'E.), *Zostera*, R. S. Wilson, 21.iv.1985 (stn TAS 14), NMV J14366 (1); Georges Bay (41°19'S.,148°17'E.), amongst oysters, G. E. Nicholls, Feb. 1927, WAM 640-86 (1). **New South Wales:** Wally Newtons beach, Nadgee Reserve, in pools, 27.iv.1967, AM P16138 (4). **Victoria:** numerous specimens from several localities including Wilsons Promontory, Western Port, San Remo, Flinders, Sorrento, Portsea, Port Phillip Bay, intertidal and shallow subtidal, NMV collections. **South Australia:** Port Willunga, intertidal limestone reef platform (35°16'S.,138°28'E.), under rocks, 22.i.1965, WAM 659-86 (1). **Western Australia:** Torrens I., Barker Inlet (33°48'S., 121°20'E.), mudflats, Oct. 1983, NMV J14367 (1).

New Zealand: Otago Harbour, on seawall outside Portobello Marine Laboratory, G. F. R. Hicks, June 1980, NMNZ Cr5679 (14).

Solomon Is: questionable locality (08°N.,159°E.), G. Officer, Sept. 1901, NMV J3424 (2).

South Africa: no locality, SAMCT 14906 (1), SAMCT 14907 (2).

Description

Male

Body about 4·6× as long as wide, deeply vaulted, half as deep as wide. Head 1·7× as wide as long, front with a median notch, rostrum absent. Pereonite 1 shorter than head in midline; pereonites 2–7 shorter posteriorly. Pleotelson 0·37× body length, pleonites 1 and 2 indicated by completely dorsal sutures, pleonite 3 with ventrolateral sutures only,

pectinate, plus seta on distal anterior face. Maxilla 2 with 3 subequal lobes; outer and middle lobes with 9 and 12 + 3 setae respectively; inner lobe as long as others, distal margin with 2 rows of 15 and 8 setae, some complex. Maxilliped with coxal plate and basal portion of epipod distinct; endite with 2 coupling hooks, apically with 8 spiniform setae and 6 plumose setae arranged in 2 rows; 4 plumose setae on anterior face; without setae at lateral base of palp. Maxillipedal palp 2·7× as long as proximal portion of basis; article 3 mediodistally lobed; article 4 ovoid, with mesial setae only; article 5 free, subtriangular. Epipod with rounded-truncate apex.

Pereopods 1–6 merus-propodus with a dense fur of fine setae on posterior margin; pereopod 7 without fine setae; pereopods 5–7 with ischium and merus anterodistally produced; pereopod 1 propodus with 3 strong palmar spiniform setae, pereopod 2 with 2 and pereopods 3–7 with 1 each; pereopod 1 propodus with about 80 pectinate setae on mesial face. Coxal plates 2–7 visible dorsally, more so posteriorly, with sharp ventral ridge enclosing socket of pereopods. Coxal plates 2 and 3 on anterior half of pereonites; coxal plates 4–7 occupying all of ventral margin of pereonites; coxal plate 7 extending beyond posterior margin of pereonite 7.

Pleopods 1 and 2 rami with setose margins; pleopods 3–5 rami without long marginal setae; appendix masculina a simple rod, as long as endopod. Uropods and pleopodal cavity reaching to apex of pleotelson. Uropodal endopod with straight distal margin.

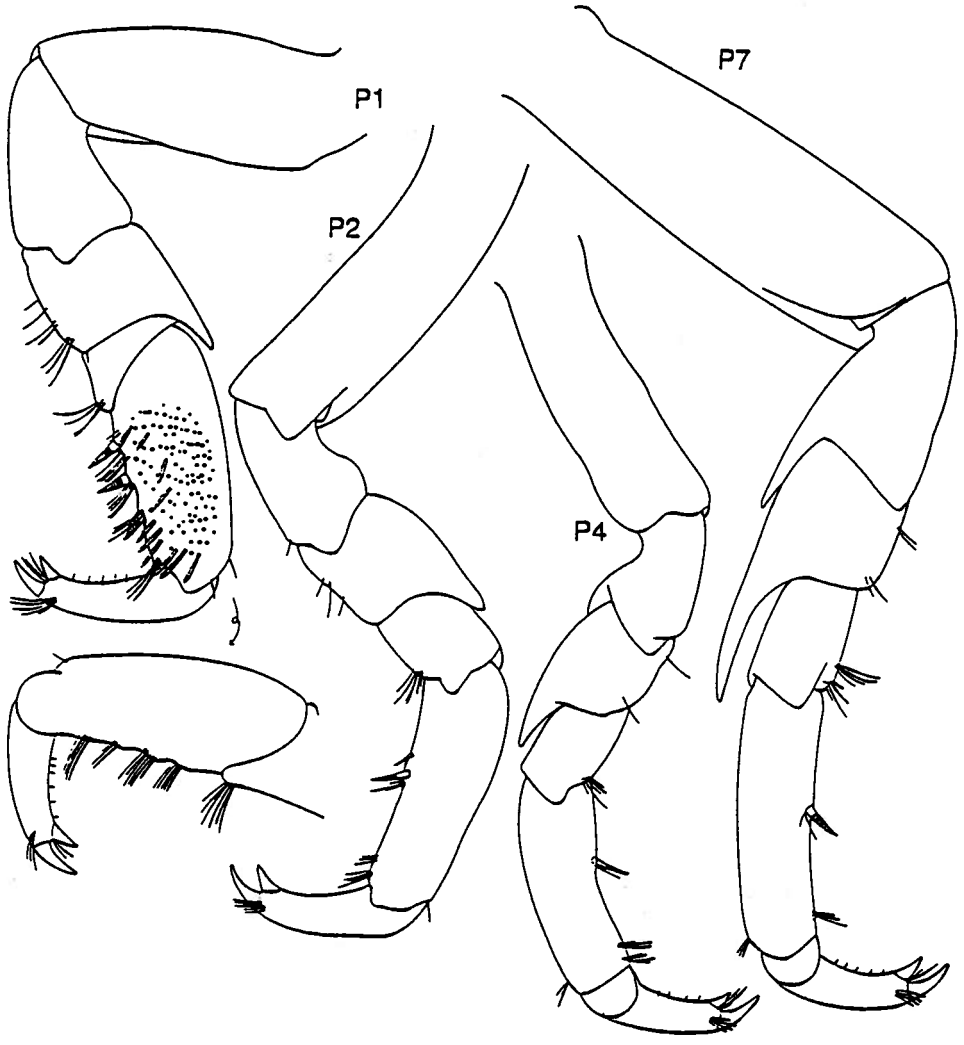

Fig. 30. *Paridotea ungulata.* Female, SAM C4116.

synonymising Collinge's (1917*b*) subspecies, *P. ungulata atrovirens*, from Port Phillip Bay although the types of this cannot be found.

Morton and Miller's (1968) figure 73.2 of a New Zealand idoteid looks more like a female specimen of *Batedotea elongata*.

Sheppard (1957) figured the mouthparts and first oostegite.

The collections of the Museum of Victoria have a specimen allegedly taken in 1901 in the tropical Solomon Is; given the southern distribution of all other records, this locality seems improbable.

Paridotea aquarii, sp. nov.

(Figs 32, 37*a*)

Material Examined

Holotype. Western Australia: Watermans Bay, Perth (31°51'S.,115°45'E.), *Sargassum* sp., J. Keesing, 13.xii.1984, WAM 117-86 (♂, 24·5 mm).

Paratypes. Western Australia: type locality, WAM 679-92 (1♂, 3♀, 1 juv.); Rottnest I., Thompson Bay (32°1'S.,115°30'E.), reef, 27.xi.1945, SAM C4135 (4 juv.); Rottnest I., North Point (32°1'S., 115°30'E.), reef, 28.xi.1945, SAM C4134 (1 juv.); Rottnest I., Green I., limestone reef platform (32°1'S.,115°30'E.), amongst weed and rock, L. M. Joll, 25.iv.1972, WAM 657-86 (3 juv.); same locality, 8.vi.1972, WAM 646-86 (1 juv.); Rottnest I., Clune Point (32°1'S.,115°30'E.), 29.xi.1945, SAM C4136 (18 juv.); SAM C4133 (1♂); Cottesloe Reef (31°59'S.,115°45'E.), *Sargassum* sp., 20.vii. 1984, WAM 108-86 (1 juv.); NMV J15712 (1♂, 2♀, 2 juv.); Watermans Bay, Perth (31°51'S.,115°45'E.), *Sargassum* sp., 20.vii.1984, WAM 118-86 (5 juv.).

Diagnosis

Male

Very similar to *Paridotea munda* except: pleotelson tapering to a shallow excavate apex defined by broadly rounded distolateral projections. Antenna 2 0·4× body length; flagellum of 20 articles, twice as long as peduncle. Pereopod 7 propodus without fur of fine hairs on palm. Coxal plate 4 on anterior $\frac{2}{3}$ of ventral margin of pereonite; coxal plates 5 and 6 occupying $\frac{3}{4}$ of margin, posteriorly subacute; coxal plate 7 occupying all of ventral margin of pereonites, not extending beyond posterior margin of pereonite 7, rounded posteriorly.

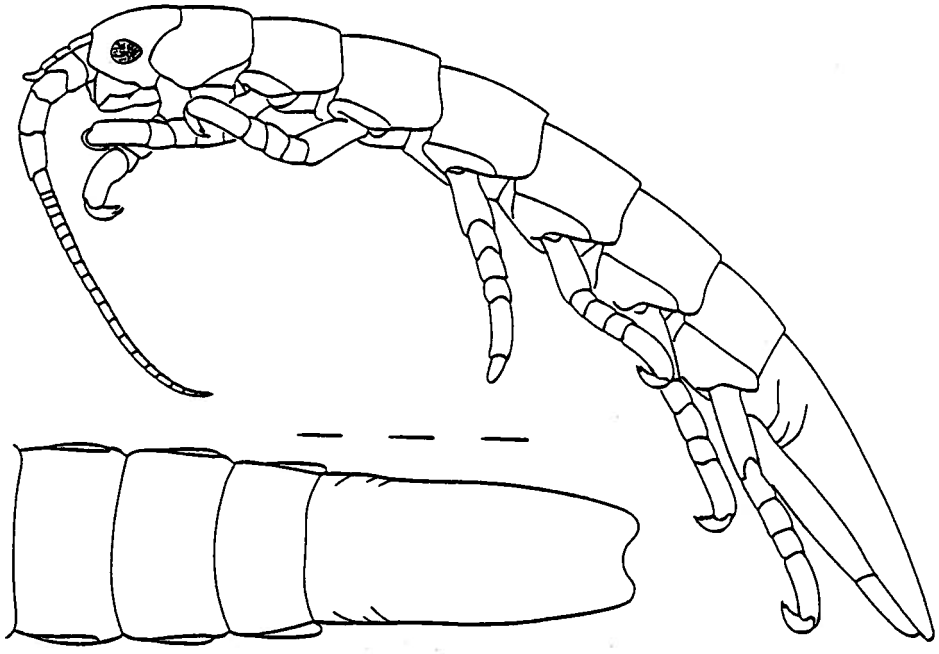

Fig. 32. *Paridotea aquarii*. Male, WAM 117-86, holotype.

palp. Maxillipedal palp 1·7× as long as proximal portion of basis; article 3 mediodistally lobed; article 4 ovoid, with long mesial setae only; article 5 free, as long as wide. Epipod with oblique apex twisted behind palp.

Pereopods sparsely setose; pereopods 1–3 propodus with 2 palmar spiniform setae; pereopods 4–7 with 1 palmar spiniform seta; pereopod 1 propodus with about 40 pectinate setae on mesial face; pereopods 5–7 carpus and propodus with narrow fur of fine hairs on palm; on merus also on pereopod 7. Coxal plates 2–7 barely visible dorsally, without ventral ridge, pereopod sockets visible laterally. Coxal plates 2 and 3 poorly defined; coxal plates 4–6 on anterior $\frac{2}{3}$ to $\frac{3}{4}$ of pereonites; coxal plate 7 occupying all of ventral margin of pereonites; all acute-rounded posteriorly.

Female

Essentially as male except pereonites 3 and 4 broader, body 7× as long as wide; antenna 2 flagellum of about 30 articles; pereopods without palmar fur.

Size

To 43 mm.

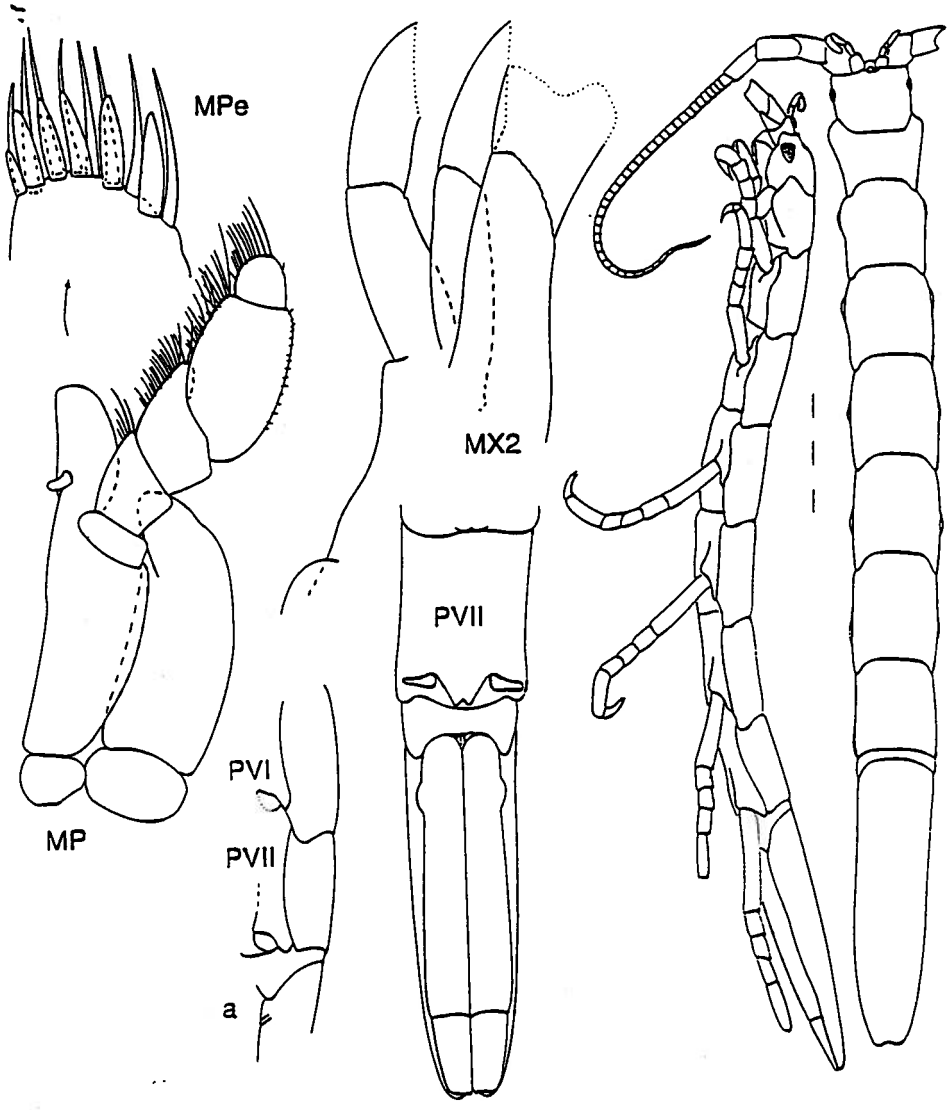

Fig. 33. *Paridotea collingei.* Male, C4106, holotype; a, female, SAM C4109, paratype.

Paridotea miersi, sp. nov.

(Figs 35, 36)

Material Examined

Holotype. South Australia: Investigator Strait (35°27'S.,136°50'E.), J. E. Watson, 20.i.1971, NMV J14334 (♂, 30 mm).

Paratypes. **Western Australia:** 14 km W. of Seal I. (32°16·8'S.,115°31·3'E.), 37 m, dredge, R. W. George and N. Sarti on FV Flinders, 29.vi.1971, WAM 655-86 (1♂, 31 mm); Shark Bay (24°54'S.,113°20'E.), intertidal reef, P. Barrett-Lennard on FV Flinders, Sept. 1960, WAM 534-73 (1 juv., 27 mm).

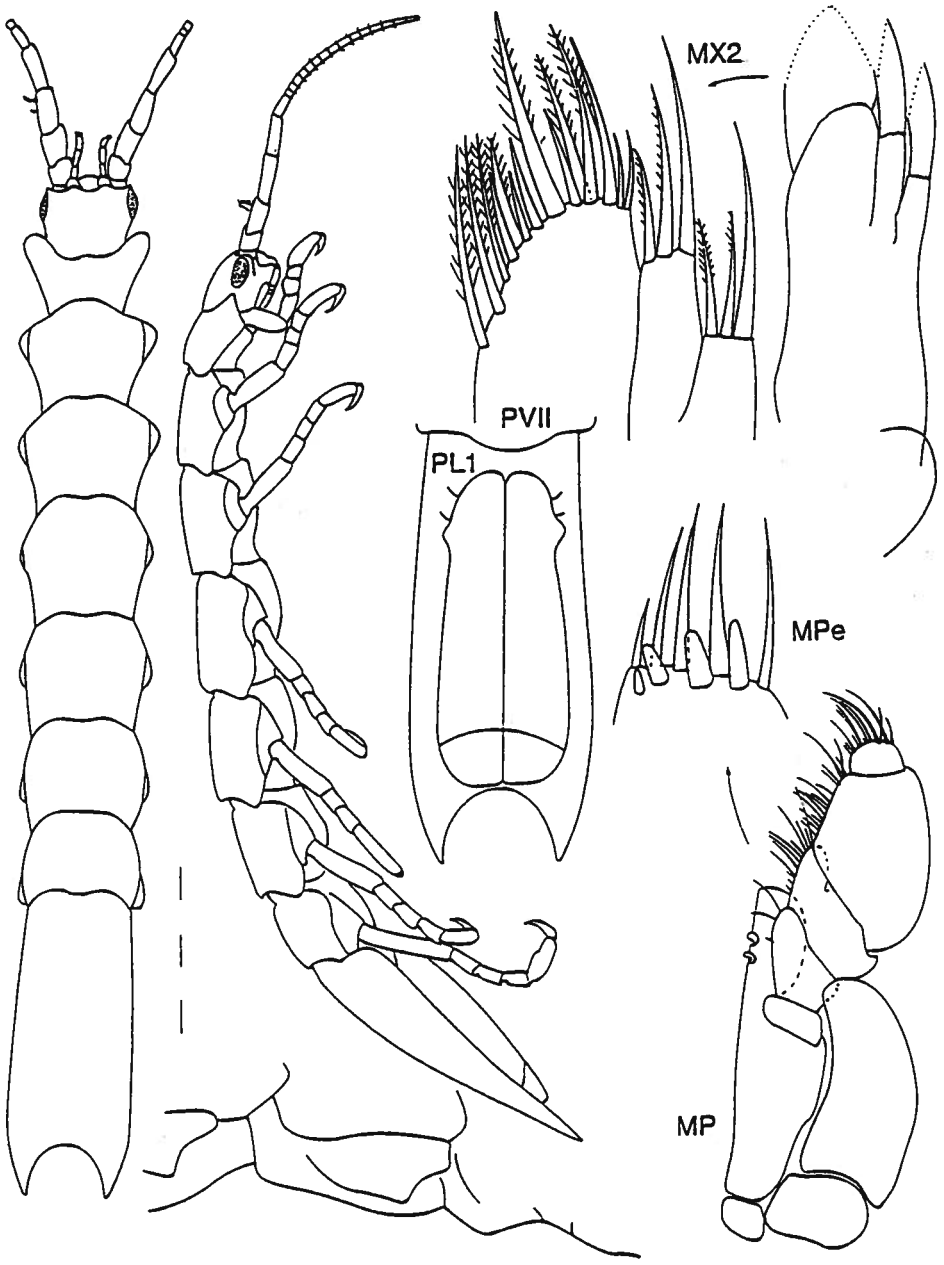

Fig. 35. *Paridotea miersii.* Male, NMV J14334, holotype.

of pereonite; coxal plates 5 and 6 on anterior $\frac{1}{4}$ of pereonites; coxal plate 7 occupying all of ventral margin of pereonites, truncate posteriorly.

Female

Not known.

Size

To 31 mm.

Distribution

Known only from three localities in central South Australia and central and south-western Western Australia; subtidal.

Remarks

Paridotea miersi is unusual is some respects. The acute posterolateral angles of the pleotelson are similar to those of *P. ungulata* but its reduced coxal plates are more similar to those of all other species. The lateral lobes of maxilla 2 are shortened, unlike those of other species.

Etymology

For Edward J. Miers, carcinologist at the British Museum, whose detailed 1881 revision of the Idoteidae is still an important source for valviferan taxonomy.

Paridotea munda Hale

(Figs 37, 38)

Paridotea munda Hale, 1924: 221–3, fig. 9.—Hale, 1929: 319–20, fig. 324, 325*a*.
Paridothea munda.—Nierstrasz, 1941: 267.
Not *Paridotea munda* Nunomura, 1988 (junior homonym).

Material Examined

Holotype. South Australia: Marino Reef, H. M. Hale, SAM C249 (♂).

Paratypes. **South Australia:** Port Willunga Reef, S. Stokes, 18.iv.1924, SAM C250 (allotype ♀); C251 (♂, ♀); Marino Reef, H. M. Hale, C252 (4 specimens and 3 slides from a fifth specimen). **Tasmania:** locality unspecified, A. M. Lea, SAM C253 (3).

Illustrated specimen. South Australia: Cape Northumberland, 1·3 km offshore (38°04'S.,140°40'E.), 15 m, red algae, S. A. Shepherd, 1976, SAM C4119 (♂, 29 mm, 2 slides).

Other material. **Tasmania:** 20 km SSW. of Babel I. (40°06·8'S.,148°24·3'E.), 22 m, coarse shell, R. S. Wilson on RV Tangaroa, 14.xi.1981 (stn BSS 166), NMV J8710 (1); Ninepin Point (43°17'S., 147°15'E.), NMV J15714 (1); E. of Rocky Cape lighthouse, below Rocky Cape cave (40°51'S.,145°31'E.), 2 m, sponge, *Caulerpa* and coralline algae, NMV J23706 (3); 2 m, red algae, J23705 (4). **New South Wales:** specimens from Collaroy, Shellharbour and Bermagui, AM collections. **Victoria:** numerous specimens from several localities including Mallacoota, Venus Bay, Bunurong Coast, Flinders, Port Phillip Bay, Aireys Inlet, Wye R., Apollo Bay, Lady Julia Percy I., Portland, intertidal and subtidal, NMV and AM collections. **South Australia:** numerous specimens from several localities including Cape Northumberland, Topgallant I., Flinders I., down to 15 m depth, algal communities, SAM, AM and NMV collections. **Western Australia:** Thistle Cove, eastern end (34°0'S.,122°12'E.), 10 m, sponges, brown algae, SCUBA, G. C. B. Poore and H. M. Lew Ton, 11.iv.1984 (stn SWA 34), NMV J14397 (16).

Diagnosis

Male

Body about 5·3× as long as wide. Head 1·8× as wide as long, front slightly excavate medially. Pleotelson 0·34× body length, 3 pleonites indicated by ventrolateral sutures, second not reaching as far dorsally as other 2, none defined dorsally. Pleotelson broadest

setae on mesial face; pereopod 7 propodus with narrow fur of fine hairs on palm. Coxal plates 2–7 visible dorsally, more so posteriorly, without well-defined ventral edge, pereopod sockets visible laterally. Coxal plates 2 and 3 on anterior half of pereonites; coxal plate 4 on anterior $\frac{3}{4}$; coxal plates 5–7 occupying all of ventral margin of pereonites, all rounded-truncate posteriorly; coxal plate 7 extending well beyond posterior margin of pereonite 7, with an acute angle ventrally.

Female

Essentially as male except pereonites 3 and 4 broader, body 4·1× as long as wide; pereopod 7 fur less obvious than in male.

Size

To 29 mm.

Distribution

Southern Australia from central New South Wales (Sydney) to south-eastern Western Australia (Cape Legrand), including Tasmania; widely distributed in Victoria and South Australia only.

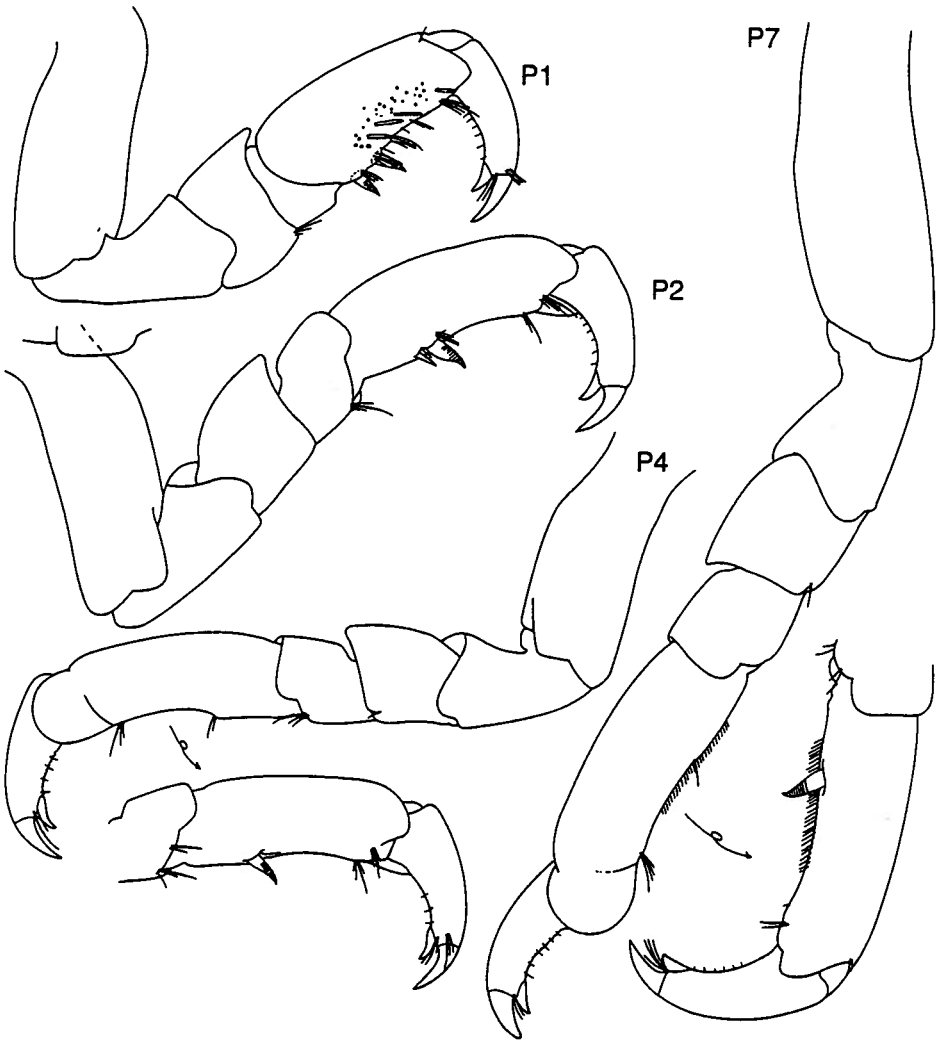

Fig. 38. *Paridotea munda.* Male, SAM C4119.

Etymology

Simplex (L.), simple, alluding to the reduction of the pleotelson and pereopods.

Genus *Pentidotea* Richardson

Pentidotea Richardson, 1905: 368.

Idotea (*Pentidotea*). —*sensu* Menzies, 1950: 170; Brusca and Wallerstein, 1979: 266; Rafi and Laubitz, 1990: 2655–65.

Type species: *Idotea resecata* Stimpson, 1857 (subsequent designation by Hale 1924).

Diagnosis

Body moderately broad (about 5× as long as wide), strongly vaulted, smooth, head narrower than pereonite 1, body only slightly wider at middle. Pleon without articulating pleonites, pleonites 1 and 2 indicated by suture dorsally, 3 ventrolaterally only; pleotelson apically acute. Antenna 2 multiarticulate. Mandible, maxillae 1 and 2 typical. Maxillipedal endite with apical setation; palp digitiform, all articles free. Coxae 2–7 with contiguous articulating, dorsal coxal plates shielding coxal-basal articulation from lateral view. Pereopods with transverse rows of spiniform setae on palm of carpus and propodus. Penes fused at base, on posterior margin of pleonite 1. Oostegites lamellar on pereopods 1–5.

Remarks

Some authors (Menzies 1950; Brusca 1984; Rafi and Laubitz 1990) considered *Pentidotea* a subgenus of *Idotea* on the grounds that the presence of a suture between maxillipedal palp articles 4 and 5 is an insufficient generic criterion. Menzies noted that juvenile *P. resecata* have only four articles, indicating that the character was unreliable. We agree with this assessment of the maxilliped, but note other more significant differences: complete pleonal fusion, absence of anterior spiniform setae on pereopods, and partially fused penes. We have examined specimens of the type species and *P. wosnesenskii*. Part of the problem facing these western American authors is the fact that many of the species from the North Pacific assigned to *Idotea* are not true species of this genus. That is, they have fused pleonites,

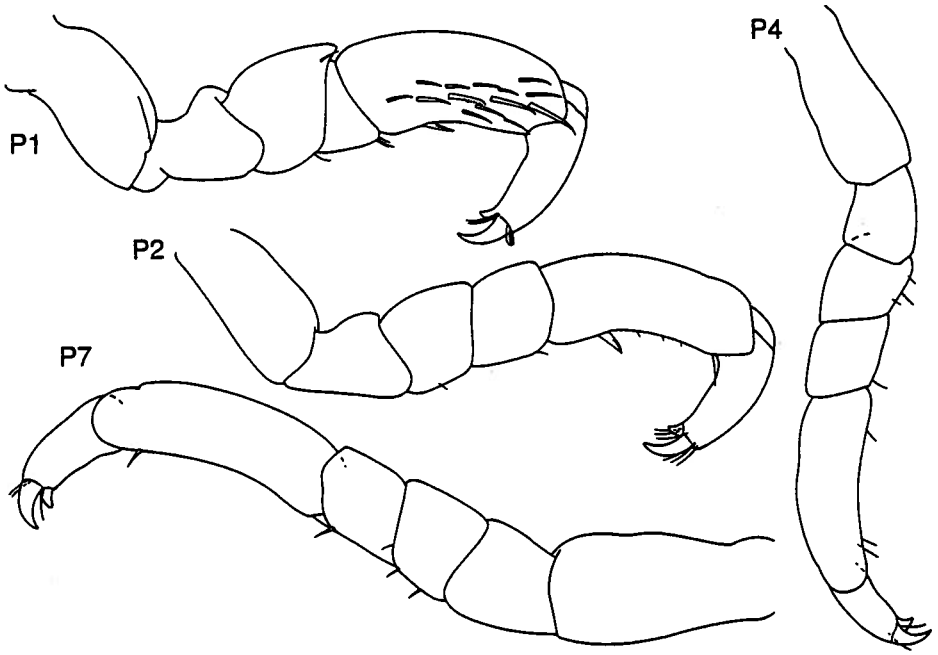

Fig. 40. *Paridotea simplex*. Male, SAM C4138, holotype.

partially fused penes and reduced coxae. Our diagnosis of *Idotea* (see above) is more restrictive and allows only species with free pleonites, anterior spiniform setae on pereopods, and free penes.

We have been unable to find a type species designation prior to that of Hale (1924).

Pentidotea australis Hale

(Figs 41–43)

Pentidotea australis Hale, 1924: 220–1, fig. 8.—Hale, 1927: 318, fig. 5; Hale, 1929: 319, fig. 323.
Pentidothea australis.—Nierstrasz, 1941: 265.

Material Examined

Holotype. South Australia: Kangaroo I. (35°50'S.,138°3'E.), SAM C234 (♂, 3 slides).

Illustrated specimen. South Australia: Eight Mile Ck Beach (33°06'S.,137°31'E.), J. Jamieson, Aug. 1981, SAM C4132 (♂, 64 mm).

Other material. **South Australia:** Beachport (37°29'S.,140°0'E.), 6.xii.1971, SAM C4131 (1♀, 44 mm); Cape Northumberland (38°04'S.,140°40'E.), off Middle Point, 5 m, S. A. Shepherd, 19.iii. 1974, SAM unregistered (1). **Victoria:** Port Phillip Bay (38°09'S.,144°52'E.), from fish gut, Feb. 1959, NMV J3419 (7); Warrnambool (38°23'S.,142°31'E.), AM P38550 (16).

Description

Male

Body about 4·7× as long as wide, deeply vaulted, half as deep as wide. Head 1·7× as wide as long, front convex, rostrum absent. Pereonite 1 as long as head; pereonites 2–7 subequal, longer than dorsal length of pereonite 1. Pleotelson 0·4× body length, pleonites 1 and 2 indicated by complete dorsal sutures, pleonite 3 by ventrolateral sutures only, pleotelson rigid (pleotelsonic formula 2+1). Pleotelson broadest anteriorly, lateral margins evenly tapering to an acute apex.

Antenna 1 peduncles contiguous, article 3 about as long as second; flagellum as long as peduncle article 3, with 15 pairs and 1 terminal aesthetascs. Antenna 2 $\frac{1}{4}$ body length; flagellum of 16 articles, half length of peduncle.

Frontal lamina acute, simple, clypeus produced, upper lip symmetrical. Mandibles asymmetrical; incisor 4- or 5-toothed, broad; left lacinia mobilis 3-toothed, $\frac{2}{3}$ width of incisor; right lacinia mobilis irregularly 4-toothed; spine row of about 18 multifid curved spines fused basally to lacinia mobilis; molar process truncate, oval flat surface with a simple sharp rim, with anteriolateral cluster of long setae plus shorter setae on anterior and proximal surface. Maxilla 1 inner lobe with 4 distal plumose setae plus 1 simple short seta, outer lobe with 12 apical spiniform setae. Maxilla 2 outer and middle lobes with 16 and 13 setae respectively; inner lobe longer than others, distal margin with about 50 setae, some complex. Maxilliped with coxal plate and basal portion of epipod distinct; endite with a single coupling hook, apically with 10 plumose setae arranged in 2 rows; 3 plumose setae on anterior face; 2 plumose setae at lateral base of palp. Maxillipedal palp 2·4× as long as proximal portion of basis; article 3 mediodistally lobed; article 4 ovoid, with lateral and mesial setae; article 5 free, quarter length of article 4. Epipod with rounded-truncate apex.

Pereopod 1 shortest, merus with oblique row of distal setae, carpus with dense cluster of about 50 setae, propodus with setae in 4 transverse clusters across palm; mesial face with 16 pectinate setae. Pereopods 2–7 prehensile, increasing in length posteriorly, articles more or less cylindrical. Pereopods 2 and 3 merus with 1 small spiniform seta, carpus with excavate distal margin fringed by clusters of about 15 setae posteriorly, propodus with transverse bands of setae, densest on proximal heel. Pereopods 4–7 merus with small posterior spiniform seta, carpus with distal marginal row of setae, propodus with 4 weekly defined transverse bands of setae, 2 central ones longer. Coxal plates 2–7 visible dorsally, more so posteriorly. Coxal plates 2–4 on anterior half of pereonites; coxal plates 5–7 reaching further posteriorly, coxal plate 7 reaching posterior margin of pereonite 7, truncate in lateral view.

Distribution

Central and western Victoria and south-eastern South Australia; subtidal algae.

Remarks

This is the largest idoteid known from Australia, reaching 64 mm in length. Its deeply vaulted habitus with acute pleotelson differentiate it from other species. The species has a very limited distribution.

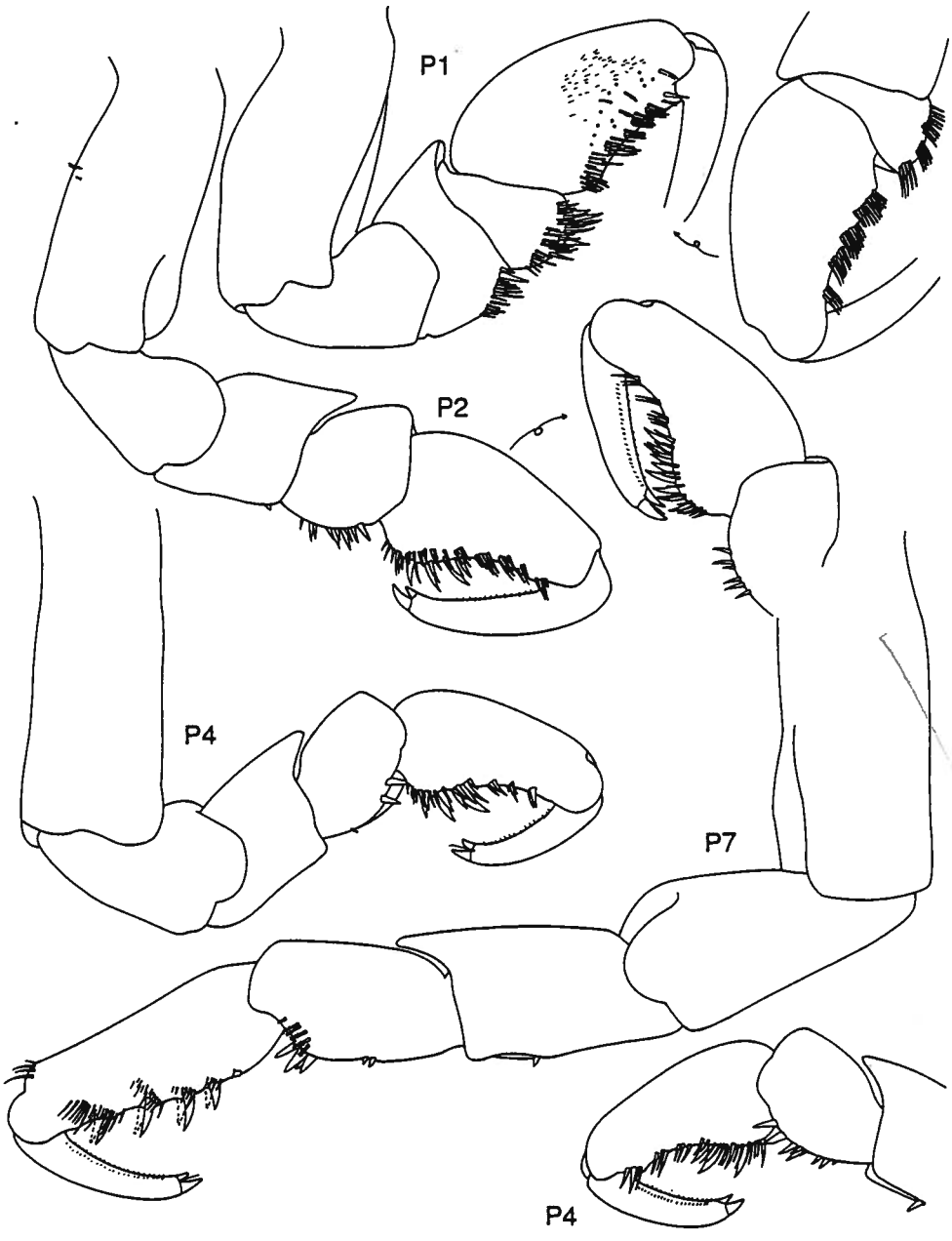

Fig. 42. *Pentidotea australis.* Male, SAM C4132.

pleonite 1 indicated by suture ventrolaterally only; apically acute, rounded or excavate. Antenna 2 multiarticulate. Mandible typical except for secondary tooth on lacinia mobilis. Maxillae 1 typical. Maxilla 2 outer lobe of male sometimes expanded and with long plumose setae. Maxillipedal endite with apical setation; palp broad, articles 2 and 3 fused, 4 and 5 fused. Coxae 2–4 without dorsal coxal plates, pereonal margin defined by tergites; coxae 5–7 with expanded dorsal coxal plates defining pereonal margin, plate-tergal suture not, weakly or obviously marked. Pereopods richly setose, especially along and near posterior margin. Penes fused along length and swollen distally, attached to posterior margin of pleonite 1. Oostegites lamellar on pereonites 1–4.

Remarks

Diagnoses of *Synidotea* vary in the extent to which the coxal plates are said to be visible on pereonites 5–7; Richardson (1905) admitted that sutures are sometimes weakly visible dorsally but Rafi and Laubitz (1990) stated that none is visible. In most specimens of the Australian species these sutures are quite clear. It seems that the degree of fusion varies with species and growth stage. However, the basic pattern is constant, as Sheppard (1957) suggested. On pereonites 2–4 there are no dorsal coxal plates, and sutures separating the tergites from the coxae can be seen around the sockets in which the bases of pereopods 2–4 articulate. No sutures are seen in this place on pereonites 5–7 but *may* be present dorsally, where the broad dorsal coxal plates meet the tergites. We have confirmed our observation on five North American and Japanese species.

Our observation that the females of *Synidotea* lack oostegites on pereopods 5 seems never to have been made before and distinguishes the genus from most other idoteid genera.

Rafi and Laubitz (1990) noted that lateral expansion of the outer lobe of maxilla 2 is a feature of males, and illustrations of many species in the literature show this. They treated it as a generic character but the only adult males in our collection (of *S. keablei*) are not modified in this way. This dimorphism may not be universal. An apparent unique diagnostic feature of the genus not noted previously is the presence of a secondary tooth on the lacinia mobilis (Fig. 46).

In Australia, species of *Synidotea* are rare although the genus is by far the biggest in the Idoteidae, with more than 50 species mostly in the Northern Hemisphere. They are recognised by their overall oval shape and the pattern of dorsal coxal plates described above.

The species described below are the first recorded from Australia and are diagnosed using, in part, the characters of Rafi and Laubitz (1990).

Synidotea grisea, sp. nov.

(Figs 44–46)

Material Examined

Holotype. New South Wales: Twofold Bay, East Boyd Bay, NE. of Whale Beach (37°05′S., 149°56′E.), 7·6 m, dredge, S. J. Keable *et al.*, 22.ii.1985, AM P36069 (ovigerous ♀, 7·5 mm).

Paratype. **Victoria:** Woodside Beach, 1·1 km offshore (38°33′S.,146°59′E.), 10 m, SCUBA, J. E. Watson, 1981, NMV J3435 (1 juv.).

Diagnosis

Body twice as long as wide, with obscure dorsolateral sculpture, dark grey, finely setose. Head with concave anterior margin, anterior and posterior transverse grooves, longitudinal lateral grooves, prominent eyes. Margins of pereonites convex, weakly flared upwards in cross-section; pleotelson 0·35× body length, tapering with convex lateral margins to narrow excavate apex. Dorsal coxal plates 5–7 well defined. Pereopod 1 propodus with sinuate palm, dactylus closing on carpus; all other pereopods simply linear, with simple and pectinate setae.

Fig. 45. *Synidotea grisea*. Female, AM P36069, holotype.

Diagnosis

Body 2·6× as long as wide, pereonites with transverse curved grooves, finely setose. Head with concave anterior margin, anterior and posterior transverse grooves, longitudinal lateral grooves, prominent eyes. Margins of pereonites convex, flared upwards in cross-section; pleotelson 0·32× body length, tapering gradually proximally, more abruptly on posterior quarter to narrow excavate apex. Dorsal coxal plates 5–7 well defined or not visible. Pereopod 1 propodus with deeply concave palm, dactylus closing on merus; all other pereopods simply linear, with few simple setae.

Distribution

Central and southern New South Wales; shallow algal communities.

Remarks

This species bears a superficial resemblance to *Synidotea laevidorsalis* (Miers), the presence of which in Australia was predicted by Chapman and Carlton (1991) on the basis of its supposed widespread artificial distribution from Japan to western North America and eastern South America. In terms of the allometric criteria adopted by these authors (ratios of widths of pereonite 4 and pleotelson, lengths of body and pleotelson, and length of article 5 of antenna 2), our specimens are indistinguishable from *S. laevidorsalis* and from north-western American specimens originally described as *S. laticauda* Benedict.

However, we have compared our specimens with Japanese material that we have identified as *S. laevidorsalis* from Kussakin's (1982: figs 186, 187) figures, with specimens of the similar South African species, *S. hirtipes* (Milne Edwards, 1840), from the Natural History Museum, London (1928:12.1.1329.38), and with specimens of *S. laticauda* from San Francisco (NMV collections). In *S. hirtipes*, the pleon is relatively narrower than in

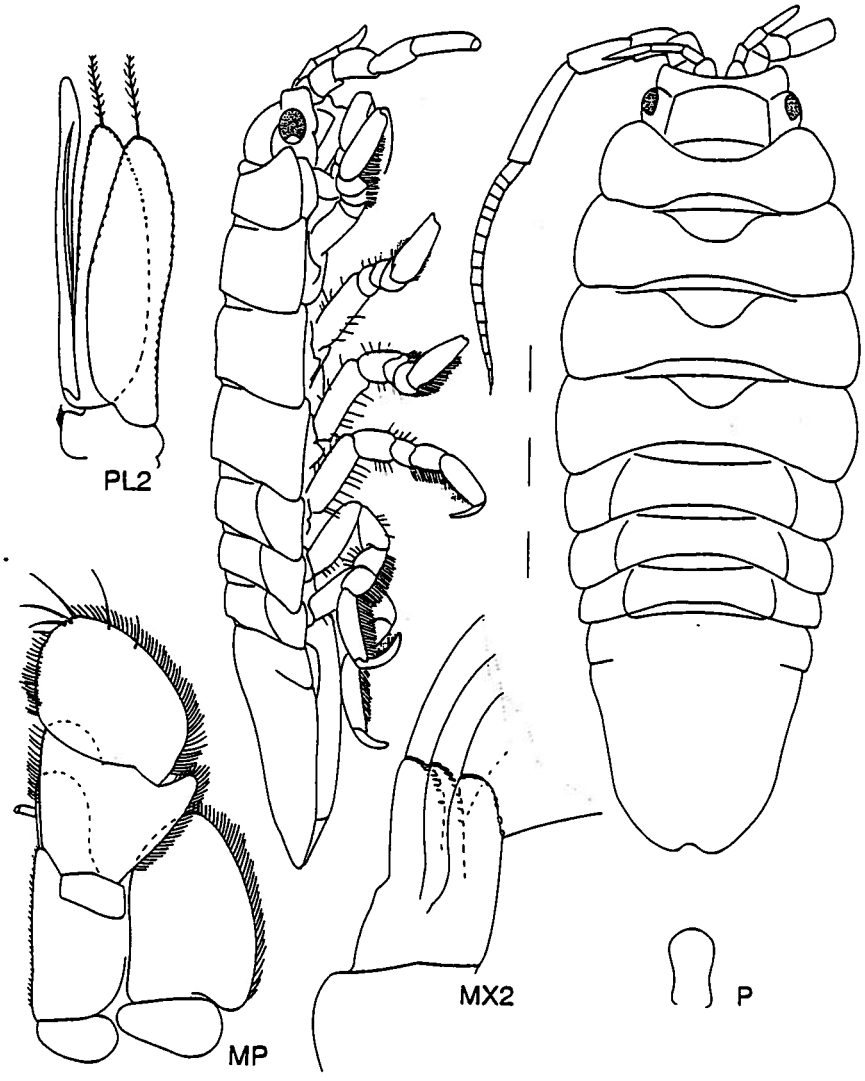

Fig. 47. *Synidotea keablei*. Male, AM P41329, holotype.

Etymology

For Steven J. Keable, student of Crustacea, who collected the holotype.

Synidotea watsonae, sp. nov.

(Figs 49–51)

Material Examined

Holotype. Western Australia: Thistle Cove, eastern end (34°0'S.,122°12'E.), 7 m, red algae, SCUBA, G. C. B. Poore and H. M. Lew Ton, 11.iv.1984 (stn SWA 27), NMV J15801 (♀, 11·9 mm).

Paratype. **Victoria:** 4 km outside Port Phillip Heads (38°18'S.,144°39'E.), 35 m, J. E. Watson, 28.iii.1976, NMV J14342 (1♀, 14 mm).

Diagnosis

Body 2·1× as long as wide, with strong mid-dorsal protuberances on head and pereonites, weaker dorsolateral sculpture on pereonites 2 and 3. Head with concave anterior margin, anterolateral corners produced, prominent eyes. Margin of pereonite 1 squarely lobed anterolaterally; margins of pereonites 2–4 angular, following ones less marked; coxal

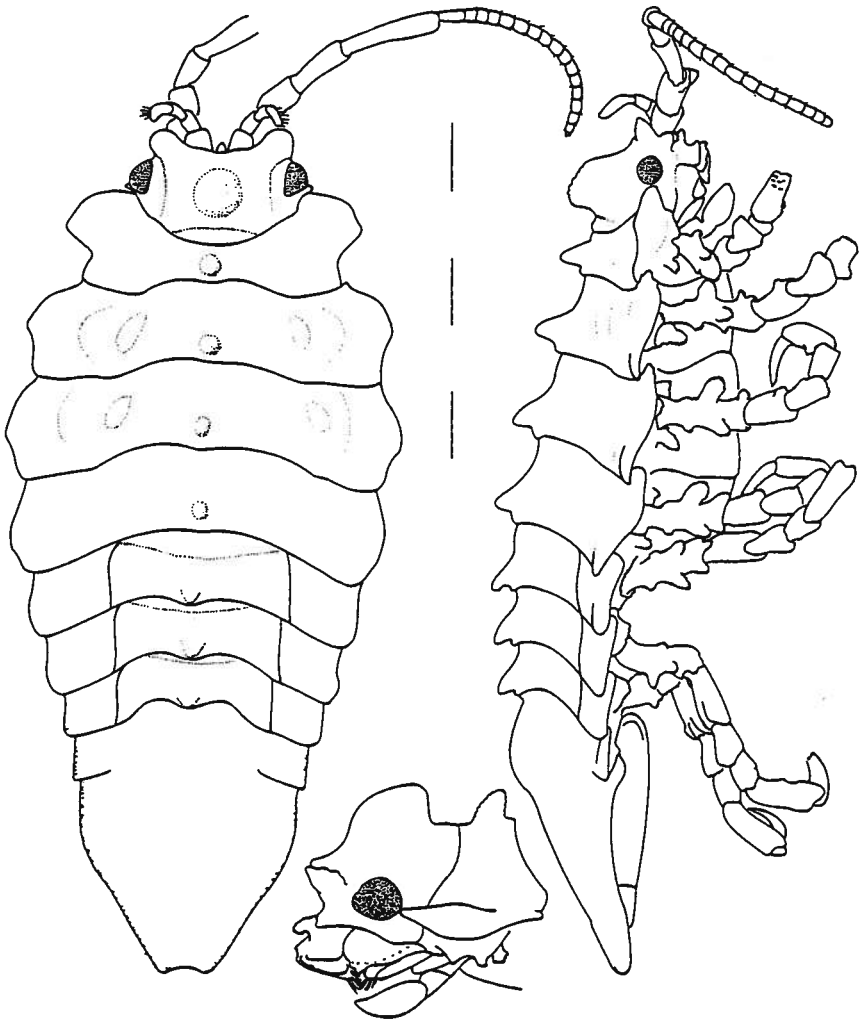

Fig. 49. *Synidotea watsonae.* Female, NMV J15801, holotype (head with antennae 1 and 2 removed).

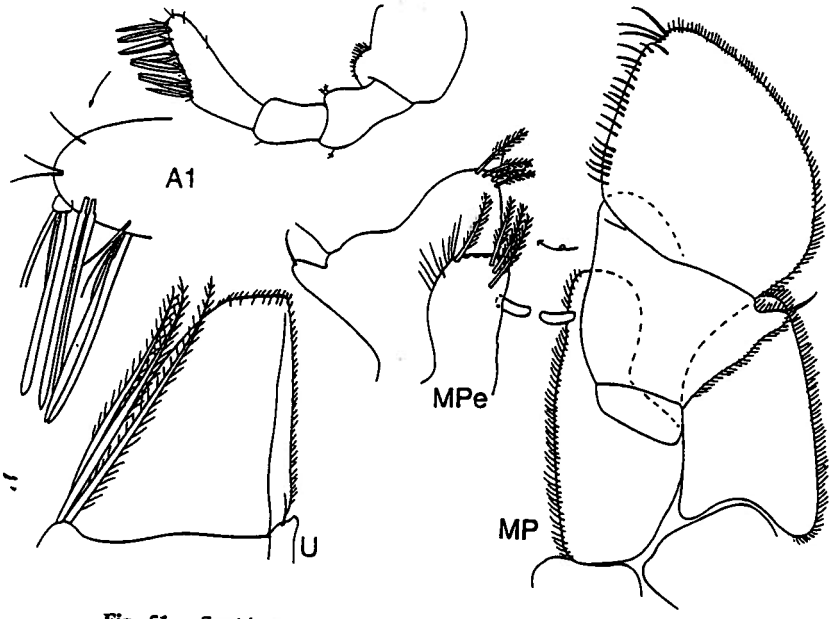

Fig. 51. *Synidotea watsonae.* Female, NMV J15801, holotype.

Distribution

Central coastal Victoria and southern Western Australia; shallow algal communities.

Remarks

The extraordinary sculpture on the head, pereon and pereopods of this species instantly identify this species which is unlike any other species of *Synidotea.*

Etymology

For Jeanette E. Watson, whose knowledge and collections of marine invertebrates in southern Australia have contributed so much to the marine biology of this part of the world.

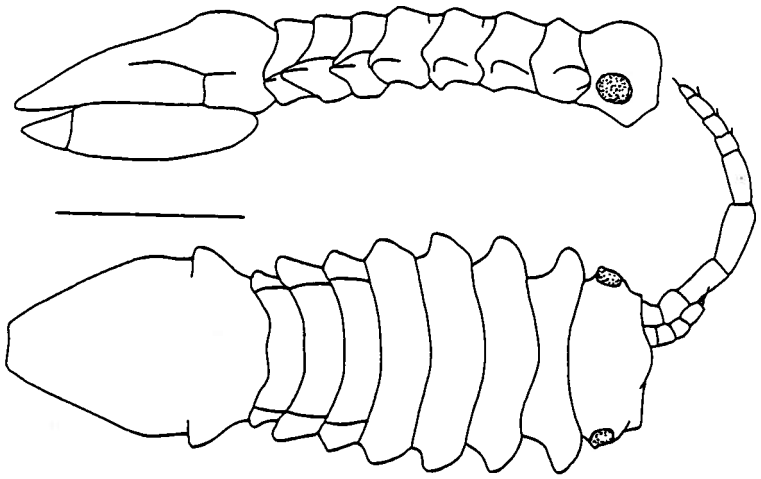

Fig. 52. *Synidotea* sp. Manca, NMV J23689.

Description

Male

Body about 6× as long as wide, with obtusely angled mid-dorsal ridge. Head 1·6× as wide as long, front concave. Pereonite 1 shorter than head; pereonites 2–7 subequal, longer than head. Pleotelson 0·3× body length, 3 pleonites indicated by ventrolateral sutures. Pleotelson broadest anteriorly, tapering gradually over anterior $\frac{3}{4}$ to acute apex.

Antenna 1 peduncles contiguous; article 3 longer than second; flagellum as long as peduncle article 3, with 7 pairs and 1 terminal aesthetascs. Antenna 2 0·4× body length; flagellum of 16 articles, longer than peduncle. Frontal lamina simple, clypeus produced, upper lip symmetrical. Mandibles asymmetrical; incisor 4-toothed, broad; left lacinia mobilis

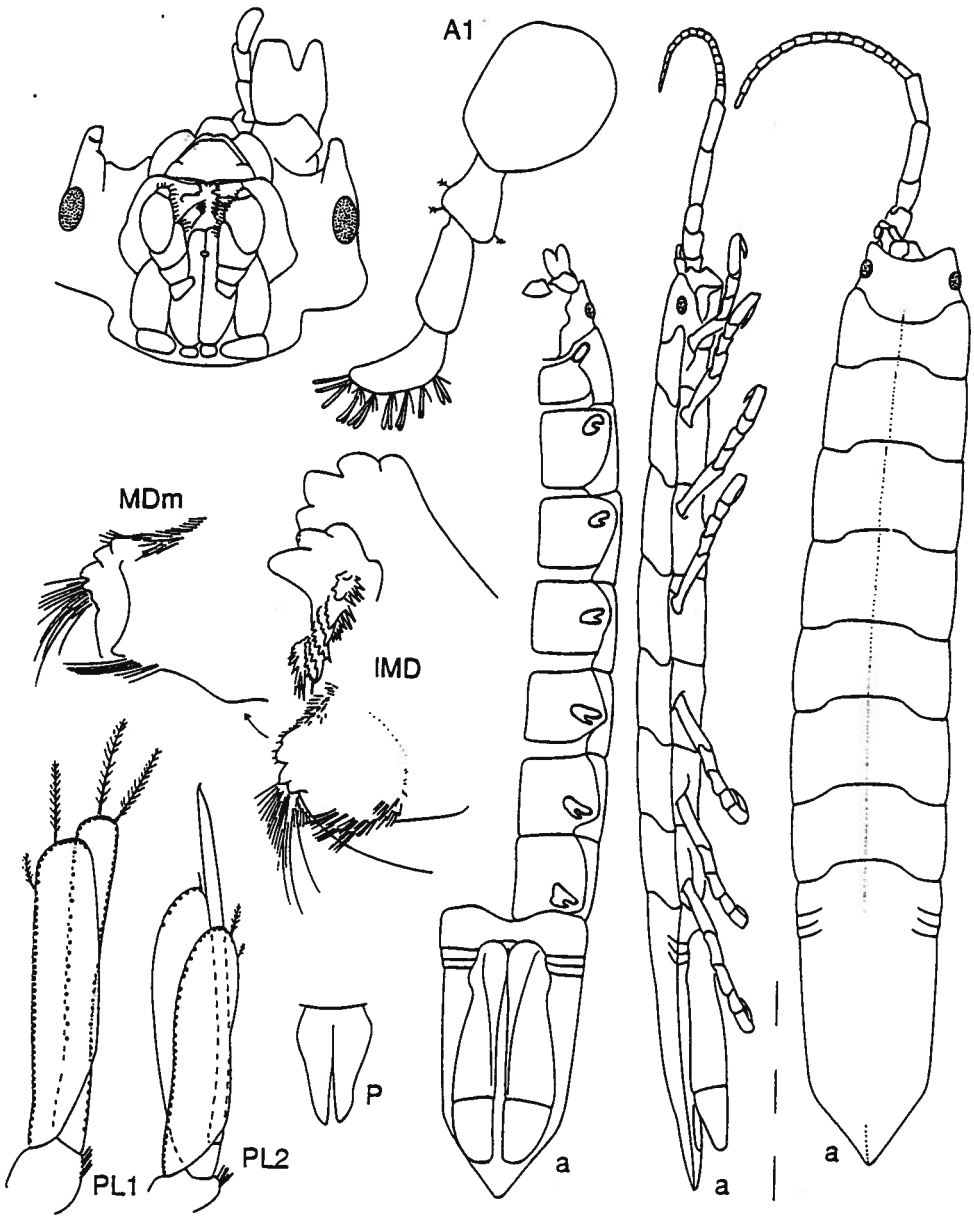

Fig. 53. *Synischia levidensis*. Male, NMV J14354; a, SAM C242, holotype.

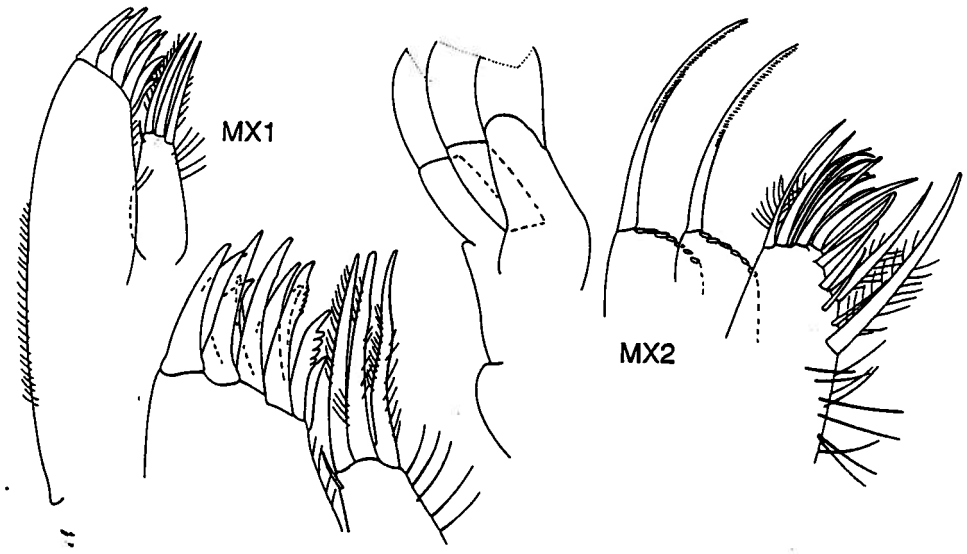

Fig. 55. *Synischia levidensis.* Male, NMV J14354.

about 18 pectinate setae. Pereopod 2 basis with ornamented anterior margin, merus and carpus with few posterior setae, propodus with strong proximal spine on palm plus weaker spiniform setae. Pereopods 3–7 similar to pereopod 2. Coxal plates 2–7 visible only ventrally, not defining lateral margin of pereon.

Pleopods 1 and 2 rami with setose margins; pleopods 3–5 rami without long marginal setae; appendix masculina tapering to acute apex, 1·3× as long as endopod. Uropods and pleopodal cavity reaching near apex of pleotelson. Uropodal endopod shape of quarter-circle. Penes fused proximally, attached to posterior margin of pleonite 1.

Female

Broader than male at midpoint, 5× as long as wide.

Size

To 24 mm.

Distribution

Southern Australia from Gulf St Vincent (S.A.) to Marmion (W.A.).

Remarks

The easiest way to identify this species is from its acute apex on the pleotelson and the complete absence of dorsal coxal plates such that the lateral sutures of the coxae are all ventral.

Acknowledgments

This study was made possible with the aid of a grant from the Australian Biological Resources Study, Canberra. We thank Graham Milledge who inked all the figures, and Tania Bardsley who assisted with cataloguing the specimens and participated in many useful discussions. Rick Brusca, San Diego, made valuable comments on the manuscript.

We thank staff of the South Australian Fisheries Division, in particular Scoresby Shepherd and his team, and Les Bail from Albany, for assistance in the field.

We are grateful to the many who lent material described in this contribution and used for comparison: Rick Brusca (Los Angeles), John Chapman (Newport), Joan Ellis (London),

Gurjanova, E. (1936). Fauna de l'URRS. Crustacées. Isopodes des Mers Orientales. *Institute Zoologique de l'Academie des Sciences de l'URRS. Nouvelle Série 6* 7, xii, 278.

Hale, H. M. (1924). Notes on Australian Crustacea. No. 3. *Transactions of the Royal Society of South Australia* 48, 209–25.

Hale, H. M. (1927). The fauna of Kangaroo Island, South Australia. No. 1. The Crustacea. *Transactions of the Royal Society of South Australia* 51, 307–22.

Hale, H. M. (1929). 'The Crustaceans of South Australia.' Vol. 2, pp. 201–380. (Harrison Weir, Government Printer: Adelaide.)

Hansen, H. J. (1887). Oversigt over det vestlige Gronlands fauna af malakostrake Havkrebsdyr. *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjøbenhavn* 1887, 1–226.

Harger, O. (1878). Descriptions of new genera and species of Isopoda, from New England and adjacent regions. *American Journal of Sciences and Arts (series 3)* 15, 373–9.

Harger, O. (1879). Notes on New England Isopoda. *Proceedings of the United States National Museum* 2, 157–65.

Harger, O. (1880). Report on the marine Isopoda from New England and adjacent waters. *Report of the United States Commissioner of Fish and Fisheries* 6, 297–462, pls 1–13.

Harger, O., and Verrill, A. E. (1873). Report upon the invertebrate animals of Vineyard Sound and the adjacent waters, with an account of the physical characters of the region. *Report of the United States Commissioner of Fish and Fisheries for 1871–1872* 1873, 295–778 (1–478), pls 1–38.

Haswell, W. A. (1881). On some new Australian marine Isopoda—Part II. *Proceedings of the Linnean Society of New South Wales* 6, 181–96, pls 3, 4.

Haswell, W. A. (1882). 'Catalogue of the Australian Stalk- and Sessile-eyed Crustacea.' xxiv + 324 pp. (Australian Museum: Sydney.)

Haswell, W. A. (1885). A revision of the Australian Isopoda. *Proceedings of the Linnean Society of New South Wales* 9, 1001–15, pls 50–3.

Heller, C. (1861). Vorläufiger bericht über die während der Weltumseglung der k.k. Fregatte Novara gesammelten Crustaceen. *Verhandlungen der k.k. Zoologisch-Botanischen Gesellschaft in Wein* 11, 495–8.

Heller, C. (1865). Crustaceen. *Reise der Osterreichischen Fregatte 'Novara' um die Erde in 1857–1859, Zoologische* 2, 1–280, pls 1–5.

Heller, C. (1866). Carcinologische Beiträge zur Fauna des adriatischen Meeres. *Verhandlungen der k.k. Zoologisch-botanischen Gessellschaft in Wien* 16, 723–60.

Hurley, D. E. (1961). A checklist and key to the Crustacea Isopoda of New Zealand and Subantartic Islands. *Transactions of the Royal Society of New Zealand (Zoology)* 1, 259–92.

ICZN (1963). Opinion 643 *Idotea* Fabricius, 1798, and *Mesidotea* Richardson 1905 (Crustacea, Decapoda) [sic]; validation under the plenary powers. *Bulletin of Zoological Nomenclature* 20, 18–25.

Kensley, B. (1978). 'Guide to the Marine Isopods of Southern Africa.' 173 pp. (Trustees of the South African Museum: Cape Town.)

Krauss, F. (1843). 'Die Südafrikanischen Crustaceen. Eine Zusammenstellung aller bekannten Malacostraca, Bemerkungen über deren Lebensweise und geographische Verbreitung, nebst Beschreibung und Abbildung mehrer neuen Arten.' 68 pp., 4 pls. (Schweizerbartsche: Stuttgart.)

Krøyer, H. (1846). Karcinologiste Bidrag. *Naturhistorisk Tidsskrift (Series 2)* 2, 1–123.

Krøyer, H. (1849). 'Voyages en Scandinavie, en Laponie, au Spitzberg et aux Féröe. Zoologie, Crustacea. (Published under the direction of M. Paul Gaimard.).' Atlas, pl. 28, figs 1–2; pl. 29, fig. 1. (Paris.)

Kussakin, O. G. (1982). Marine and brackish-water Crustacea (Isopoda) of cold and temperate waters of the Northern Hemisphere. Suborders Anthuridea, Microcereberidea, Valvifera, Tyloidea. *Opredeliteli po Faune SSR, Izdavaemye Zoologicheskim Muzeem Akademii Nauk* 131, 1–461. [In Russian.]

Lamarck, J. (1818). 'Histoire Natrelle des Animaux sans Vertèbres.' Vol. 5. (Verdière: Paris.)

Lucas, H. (1849). Histoire naturelle des animaux articulés. Premier partie. Crustacés, Arachnides, Myriapodes et Hexapodes. *Exploration scientifique de l'Algerie pendant les années 1840, 1841, 1842, Sciences physiques. Zoologie* 1, xxxv, 88, 8 pls.

Lütken, C. F. (1875). 'The Crustacea of Greenland. Manual of the Natural History, Geology and Physics of Greenland and the Neighbouring Regions; Prepared for the Use of the Arctic Expedition of 1875 by T. Ruppert Jones.' (London.)

Menzies, R. J. (1950). The taxonomy, ecology and distribution of northern California isopods of the genus *Idothea* with the description of a new species. *Wasmann Journal of Biology* 8, 155–95.

Menzies, R. J., and Miller, M. A. (1956). A new genus of idotheid isopod from South Africa. *Annals and Magazine of Natural History (series 12)* 9, 358–60.

Sheppard, E. M. (1957). Isopod Crustacea Part II. The sub-order Valvifera. Families: Idoteidae, Pseudidotheidae and Xenarcturidae fam. n. With a supplement to isopod Crustacea, Part 1. The family Serolidae. *Discovery Reports* **29**, 141–97, pls 8, 9.

Stalio, L. (1877). Catalogo metodico e descrittivo dei Crostacei dell'Adriatico. *Atti del Reale Istituto Veneto di Scienze, Lettere ed Arti (5)* **3**, 1345–87.

Stebbing, T. R. R. (1900). On Crustacea brought by Dr Willey from the South Seas. In 'Zoological Results Based on Material from New Guinea, New Britain, Loyalty Islands and Elsewhere ... 1895, 1896 and 1897'. (Ed. A. Willey.) Vol. 5, pp. 609–90. (Cambridge.)

Stebbing, T. R. R. (1902). South African Crustacea. Part 2. *Marine Investigations in South Africa. Department of Agriculture, Cape Town* 1–92, pls 5–16.

Stebbing, T. R. R. (1910). General catalogue of South African Crustacea (Part V. of S.A. Crustacea, for the Marine Investigations in South Africa). *Annals of the South African Museum* **6**, 281–593, pls 15–22.

Stephensen, K. (1927). Papers from Dr. Th. Mortensen's Pacific Expedition 1914–1916, XL. Crustacea from the Auckland and Campbell Islands. *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjøbenhavn* **83**, 289–390.

Stimpson, W. (1863). On an oceanic isopod found near the southwestern shores of Massachusetts. *Proceedings of the Academy of Natural Sciences, Philadelphia* **14**, 133–4.

Thomson, G. M. (1879). Description of a new species of isopodous crustacean (*Idotea*). *Transactions of the New Zealand Institute, Zoology* **1878**, 250–1.

Thomson, G. M. (1883). N.Z. Idoteidae. *New Zealand Journal of Science* **1**, 332–3.

Thomson, G. M. (1884). Descriptions of new crustaceans. *Transactions of the New Zealand Institute, Zoology* **16**, 234–40.

Thomson, G. M., and Chilton, C. (1886). Critical list of the Crustacea Malacostraca of New Zealand. *Transactions of the New Zealand Institute* **18**, 141–59.

Tinturier-Hamelin, E. (1962). Sur un caractère de l'*Idotea baltica* (Pallas) (Isopode Valvifère) considéré jusqu'alors comme caractère sexuel secondaire mâle. *Archives de Zoologie Expérimentale et Générale (Notes et Revue) (1)* **101**, 54–8.

Vanhöffen, E. (1914). Die Isopoden der Deutschen Südpolar-Expedition 1901–1903. *Deutsche Südpolar Expedition, 1901–03* **15**, 449–598.

Verrill, A. E. (1871). On the distribution of marine animals on the southern coast of New England. *American Journal of Sciences and Arts (series 3)* **2**, 357–62.

Manuscript received 9 April 1992; accepted 3 September 1992