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New and Little-known Podoceridae (Peracarida: Amphipoda) of Southern Australia

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ABSTRACT. Thirteen taxa in the family Podoceridae are documented for southern Australia, including five new species, three new records and five redescriptions. The redescription of *Cyrtophium minutum* Dana, 1852; *Podocerus dentatus* (Haswell, 1879); *Podocerus hystrix* Stebbing, 1910; *Podocerus inconspicuus* (Stebbing, 1888) and *Podocerus lobatus* (Haswell, 1885) helps clarify existing knowledge of these old taxa.

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Prior to this study, nine species of podocericid were known from southern Australia; *Cyrtophium minutum* Haswell, 1879; *Laetmatophilus dabberi* Barnard & Drummond, 1981; *L. hystrix* (Haswell, 1880); *Leipsuropus parasiticus* (Haswell, 1879); *Podocerus dentatus* (Haswell, 1879); *P. hystrix* Stebbing, 1910; *P. inconspicuus* (Stebbing, 1888); *P. laevis* (Haswell, 1885) and *P. lobatus* (Haswell, 1885). With the exception of *Laetmatophilus dabberi*, the Australian fauna is described in the literature before 1911. *Podocerus laevis*, is considered an unidentifiable taxon (Kilgallen, 2009). The following work clarifies the taxonomy of taxa recognized more than a century ago and describes a further five new species. Extensive material housed in state museum collections has provided a valuable resource to investigate variation in podocericid morphology. During this study, material of one historic podocericid taxon was unfortunately not encountered: *Laetmatophilus hystrix* (Haswell, 1880), with the type locality of Port Jackson, Sydney. Based on the original descriptions *L. hystrix* is still considered valid and identifiable.

Podocerids are sexually dimorphic as with most corophiideans, however female podocerids have clearly recognizable species level characters. This is somewhat unusual in the corophiideans where such groups as amphithoid

and ischyrocerids show strong sexual dimorphism but little variation in the female form between species (Barnard, 1965).

Characters most useful for species level identification include: pereonite and pleonite carination; gnathopod 1 propodus shape; gnathopod 2 propodus shape, palm sculpting and setal ornamentation. Dorsal carination although highly useful for identification, is not always a species level character and this has contributed to confusion within the family (Pirlot, 1938; Rabindranath, 1972; Ledoyer, 1984).

Species level characters which alter with growth stage include: the relative size of dorsal carination; gnathopod 1 propodus palm number of robust setae and dactylus posterior margin serrations; and gnathopod 2 propodus palm tooth size (see K. H. Barnard, 1937; Pirlot, 1938; Ledoyer, 1986). All these characters increase in size/number with development. For *P. akanthius* sp. nov. specimens between 3.3–4.5 mm, showed no variation in the number of robust setae on the gnathopod 1 propodus palm. However in *P. dentatus* specimens between 5.0–7.0 mm had five or six palmar robust setae and one individual 5.1 mm with nine robust setae. Variation of gnathopod 2 propodus palm sculpting and tooth development, for the species studied here, did not vary to the degree reported for the well documented *P. chelonophilus* (Chevreux & de Guerne, 1888), (see Baldinger, 2001).

Variation in the maxilla 1 palp robust setae, which can vary between 4 and 6, appears to be stable within the species studied here, and may be useful in future phylogenetic studies. Another interesting phenomenon among species of podocerids is the size relation of pereopod 5–7, which can be either increasing or decreasing in length from pereopods 5 to 7, or have all pereopods subequal in length. This character is usually stable within families for the Amphipoda (Lowry, pers. comm.). Though extremely useful and easily observed, pereopod characters are not always assessable due to the fragile nature of the legs in podocerids, which most often break at death. This variation in pereopods 5–7 length, along with the flexion in the pereonites (particularly the spacing of the pereonite 2), relates to feeding strategy, as described by Barnard *et al.*, 1988, where individuals grasp the substrate with the pereopods and rear the front of the body into oncoming current to filter feed.

Materials and methods

Material examined for this study was an assessment of amphipod holdings predominantly from shallow-water (0–50 m) samples in various collections of the Australian Museum (AM), Museums Victoria (NMV), and South Australian Museum (SAMA). Algae from Batemans Bay 2003 collections were identified by Dr A. Millar, Botanic Gardens, Sydney. Material was dissected in 80% ethanol. Permanent slides were made using Aquatex™ mounting media. Specimens were prepared for electron microscopy as follows: preserving solution was sequentially advanced in 5% increments from 80% to 100% ethanol; critical point dried; mounted individually on pins; gold sputter coated and images were captured using on a Zeiss EVO LS15 Scanning Electron Microscope with Robinson Backscatter Detector (SEM). Abbreviations for parts are as follows: *A*—antenna; *F*—accessory flagellum; *G*—gnathopod; *LL*—lower lip; *Md*—mandible; *Mx1*—maxilla 1; *P*—pereopod; *p*—palp; *T*—telson; *U*—uropod and *Ur*—urosome. A map of Australia (Fig. 1) shows locations of places mentioned in the text. Descriptions were generated from a DELTA database of the Podoceridae containing all species in the genera *Cyrtophium*, *Leipsuropus*, *Laetmatophilus* and Indo-Pacific species of *Podocerus*.

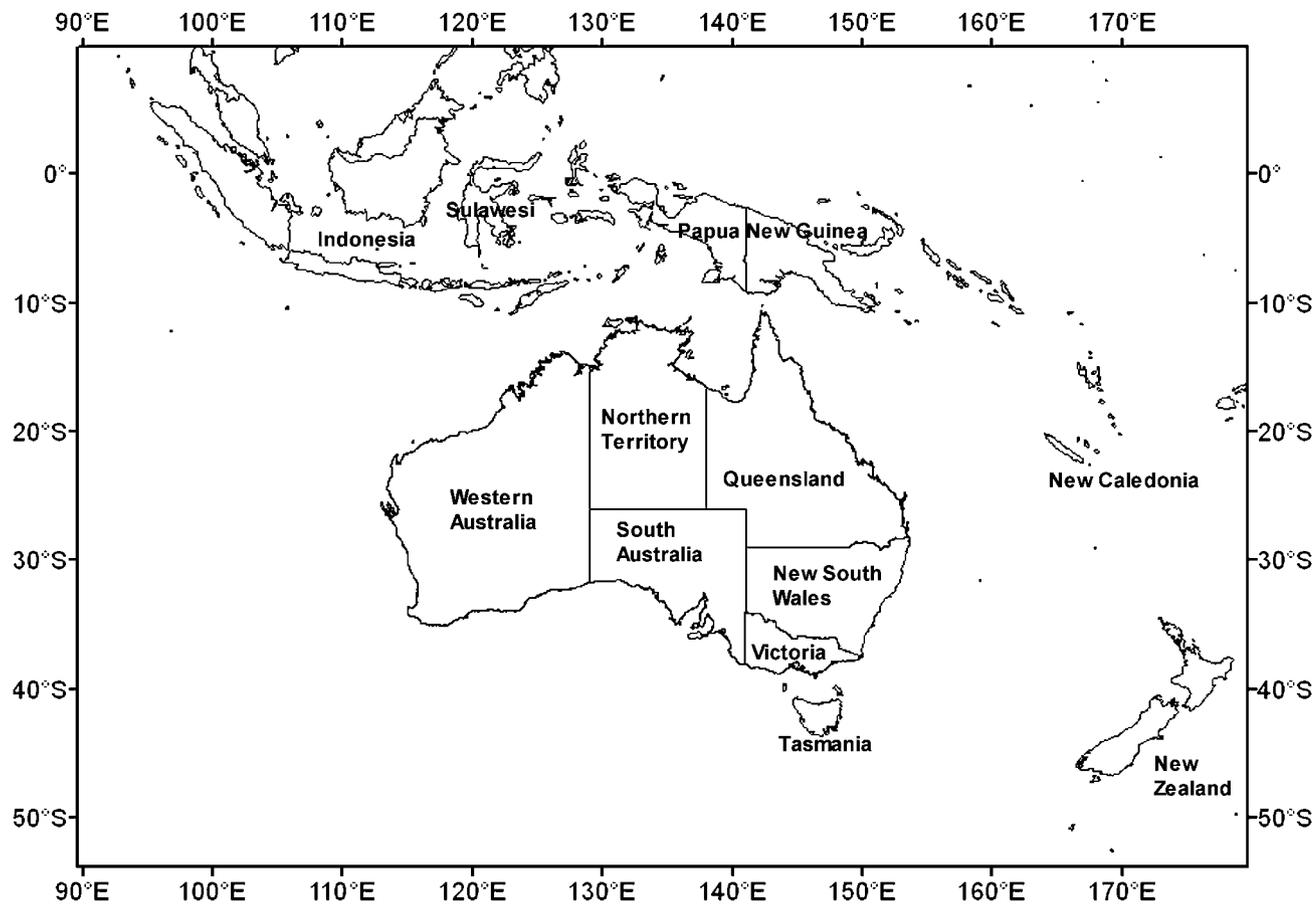


Figure 1. Map of Australian states and territories of the region.

Systematic section

Corophiidea Leach, 1814

Caprelloidea Leach, 1814

Podoceridae Leach, 1814

Podocerinae Leach, 1814

Cyrtophium Dana, 1852

Cyrtophium Dana, 1852: 309.—Dana, 1853: 839.—Stebbing, 1906: 697–698.—J. L. Barnard, 1969: 427.—Laubitz, 1984: 79.—Barnard & Karaman, 1991: 656.

Diagnosis. Amended after Laubitz, 1984: Pereon depressed, with 7 segments; urosome of 3 segments. Antennae 1 accessory flagellum vestigial, scale-like or absent; epistome produced; maxilla 1 inner plate absent, outer plate with 9 spines; maxilla 2 without facial setae; maxilliped palp 4 blunt; gnathopod 2 of female nearly as large as that of male; brood plates on pereopods 2–4; uropod 2 biramus, uropod 3 without rami.

Remarks. Assessment of *C. minutum* has verified the presence of a small scale like accessory flagellum. The generic concept for *Cyrtophium* is therefore expanded to include antenna 1 accessory flagellum vestigial, scale-like or absent. The two remaining species in the genus, *C. laeve* (Heller, 1867) and *C. orientale* (Dana, 1853) are poorly known (Barnard & Karaman, 1991). Further information on these species is required for the genus to be formally reassessed against other genera in the Podoceridae.

Cyrtophium minutum Haswell, 1879

Figs 2–4

Cyrtophium minutum Haswell, 1879: 343, pl. 22 fig. 6f, g.—Haswell, 1885: 109, pl. 18, figs 1–5, 9.—Stebbing, 1906: 698.—Stebbing, 1910: 650.—Springthorpe & Lowry, 1994: 25.—Lowry & Stoddart, 2003: 245 (catalogue).

Type material. Possible syntypes, 13 specimens, AM P.3425, Port Jackson, New South Wales (33°51'S 151°16'E).

Type locality. Port Jackson, Sydney, New South Wales, Australia.

Material examined. *New South Wales.* 1 SEM pin mounted specimen, 3.5 mm, AM P.78208, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 19 m, on surface of sponges, 1 May 1997, coll. P. B. Berents, K. B. Attwood and A. Murray (NSW 1278); 1 SEM pin mounted specimen, AM P.78209, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 19 m, on surface of sponges, 1 May 1997, coll. P. B. Berents, K. B. Attwood and A. Murray (NSW 1278); 1 male, 3.0 mm, dissected, 2 slides, AM P.86148, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 16 m, bryozoans *Scuticella plagiostoma* and *Orthoscuticella* sp., 1 May 1997, coll. P. B. Berents (NSW 1284); 1 female specimen, 3.6 mm, dissected, 2 slides, AMP.86216, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 19 m, on surface of sponges, 1 May 1997, coll. P. B. Berents, K. B. Attwood and A. Murray (NSW 1278); 9 specimens, AM P.77153, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 16 m, bryozoans *Scuticella plagiostoma* and *Orthoscuticella* sp., 1 May 1997, coll. P. B. Berents (NSW 1284); many specimens, AM P.77144, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 19 m, on surface of sponges, 1 May 1997, coll. P. B. Berents, K. B. Attwood and A. Murray

(NSW 1278); many specimens, AM P.77147, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 17 m, bryozoan *Margaretta barbata* on wall, 1 May 1997, coll. P. B. Berents (NSW 1280); many specimens, AM P.77149, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 18 m, hydrozoan and bryozoan, 1 May 1997, coll. P. B. Berents (NSW 1281); many specimens, AM P.77156, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 18 m, sponge and gorgonacean, 1 May 1997, coll. K. B. Attwood (NSW 1286); 1 specimen, AM P.77162, Golf Course Bommie, 500 m northeast of Ulladulla Head (35°20'28"S 150°29'12"E), 10 m, algal turf, 2 May 1997, coll. P. B. Berents and K. B. Attwood (NSW 1293); 1 specimen, AM P.77163, Golf Course Bommie, 500 m northeast of Ulladulla Head (35°20'28"S 150°29'12"E), 14 m, clump of dead *Filograna* sp. polychaete tubes on vertical face of large boulder, 2 May 1997, coll. P. B. Berents (NSW 1299); 1 specimen, AM P.77168, Halfway Reef, 200 m south of Sullivan Reef, Ulladulla (35°21'25"S 150°29'18"E), 15 m, airlift over wall of sponges, Bryozoa, Hydrozoa, 3 May 1997, coll. P. B. Berents, K. B. Attwood and A. Murray (NSW 1307); 1 specimen, AM P.77175, 50 m east of Sullivan's Reef, Ulladulla (35°21'19"S 150°29'22"E), 24 m, gorgonacean, 5 May 1997, coll. P. B. Berents (NSW 1326); 1 specimen, AM P.77179, northern side of Bannister Head, north of Batemans Bay (35°19'9"S 150°29'7"E), 18 m, 6 May 1997, coll. K. B. Attwood (NSW 1344); 4 specimens, AM P.77183, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 21 m, low tufting brown and coralline algae, 7 May 1997, coll. A. Murray (NSW 1351); 3 specimens, AM P.77187, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 22 m, red alga, 7 May 1997, coll. A. Murray (NSW 1356); 1 specimen, AM P.86146, sewerage pipeline, Nelson Bay, Port Stephens (32.71968 152.14122), 10 m, branched green sponge, ascidians, pennatulacean, 15 March 2006, coll. K. B. Attwood (NSW 3041); 1 specimen, AM P.86147, sewerage pipeline, Nelson Bay, Port Stephens (32°43'10"S 152°8'28"E), 10 m, mass of intertwined dead algae, 15 March 2006, coll. K. B. Attwood (NSW 3042).—*Victoria.* Many specimens, AM P.86154, Gabo Island (37°33'S 149°54'E), 30 m, rocky bottom kelp bed, 4 June 1981, coll. V. Harriet and L. Vail (G2).

Diagnosis. *Coxa* 1–7 contiguous. *Gnathopod* 1 propodus subrectangular, without robust seta at corner of palm. *Gnathopod* 2 basis as long as broad; palm with one distal subtriangular tooth, palm defining corner with tooth and without robust setae.

Female *Gnathopod* 1 propodus rectilinear, palm margin smooth, without palm defining margin or robust setae. *Gnathopod* 2 propodus spherical, palm defined by corner with 3 robust setae.

Description. Based on male, 3.0 mm, AM P.86148. *Body* cuticle dorsally smooth. *Head* dorsally smooth; *eyes* greatly bulging; lateral cephalic lobe subquadrate. *Antennae* 1 0.6 times body length; subequal to antennae 2; primary flagellum 0.5 times peduncle length, with 3 articles; accessory flagellum, minute, scale-like, 1-articulate. *Antennae* 2 peduncle article 4 subequal in length to article 5; flagellum 0.4 times peduncle length, posterior margin with robust setae (based on female AM P.86216). *Mandible* accessory setal row with 3 setae. *Maxilla* 1 palp distal margin with 4 robust setae.

Coxa 1–7 contiguous. *Gnathopod* 1 coxa smaller than coxa 2, broader than long, distoventral corner not produced; basis 3 times as long as broad, without anterodistal setae; carpus rectilinear, 1.8 times as long as broad; propodus subrectangular, 2.1 times as long as broad, anterior margin with sparse long slender setae, palm margin smooth, without robust seta at corner of palm; dactylus posterior margin with 3 serrate teeth, cuticle surface smooth, closing along palm. *Gnathopod* 2 basis as long as broad, anterodistal corner subquadrate, without setae; merus posterior margin with broad produced lobe, twice as broad as long, apically rounded, without short robust setae; propodus subovate, 1.8 times as long as broad, anterior margin with clusters of short slender setae, palm $\frac{2}{3}$ length of propodus, with broad, well developed distal shelf, shelf margin crenulated, palm with

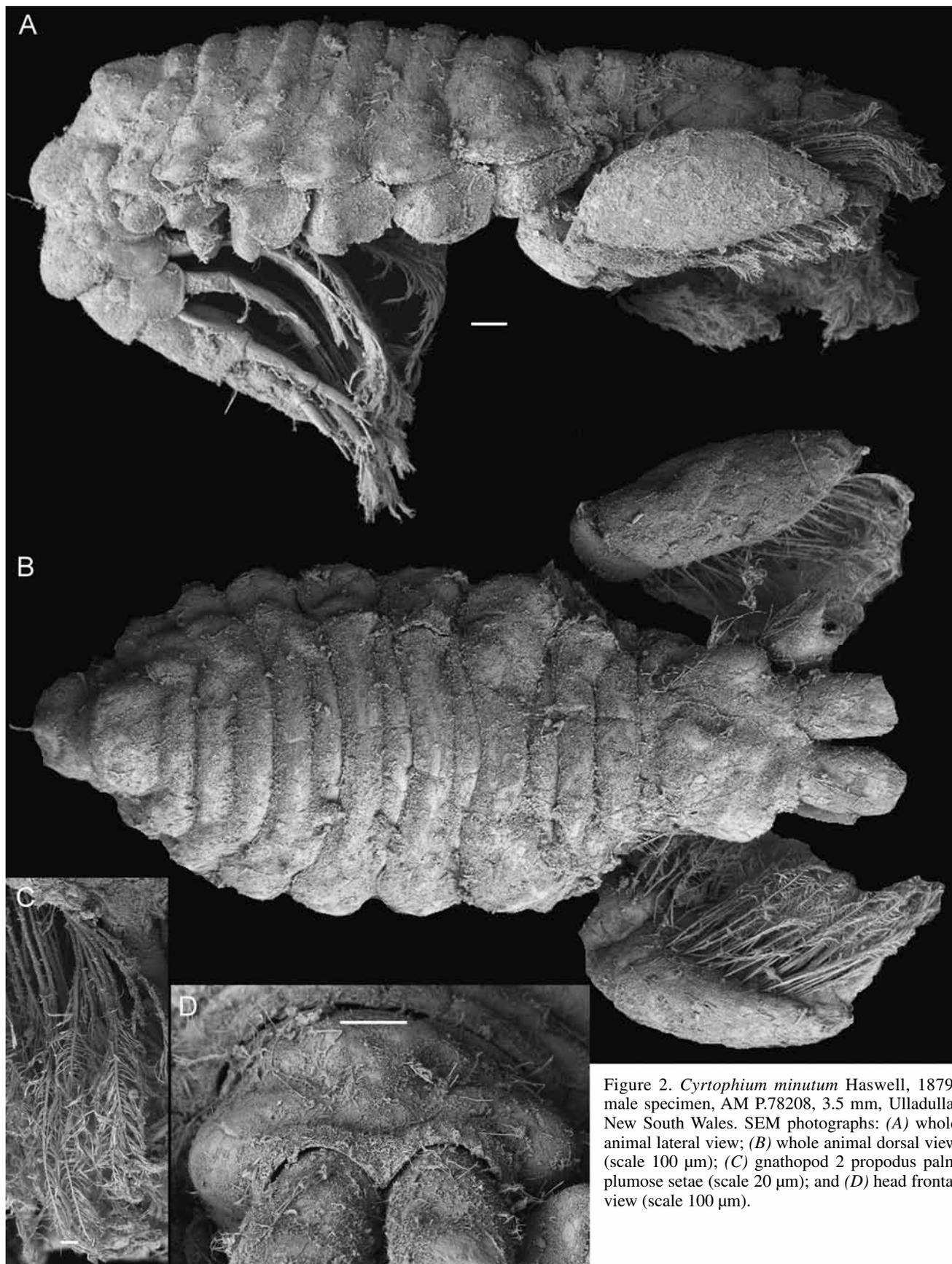


Figure 2. *Cyrtophium minutum* Haswell, 1879, male specimen, AM P.78208, 3.5 mm, Ulladulla, New South Wales. SEM photographs: (A) whole animal lateral view; (B) whole animal dorsal view (scale 100 μ m); (C) gnathopod 2 propodus palm plumose setae (scale 20 μ m); and (D) head frontal view (scale 100 μ m).

one distal subtriangular tooth, palm defining corner with tooth, without robust setae; dactylus closing short of palm.

Epimera 1–3 posteroventral corner rounded. *Urosome* with 3 pairs of uropods. *Urosomite* 1 short, 1.5 times as

long as broad. *Uropod* 1 peduncle 2.8 times as long as broad, without ventromedial spine; inner ramus 1.1 times peduncle length, outer ramus about half the length of inner ramus. *Uropod* 2 well developed, biramus, without

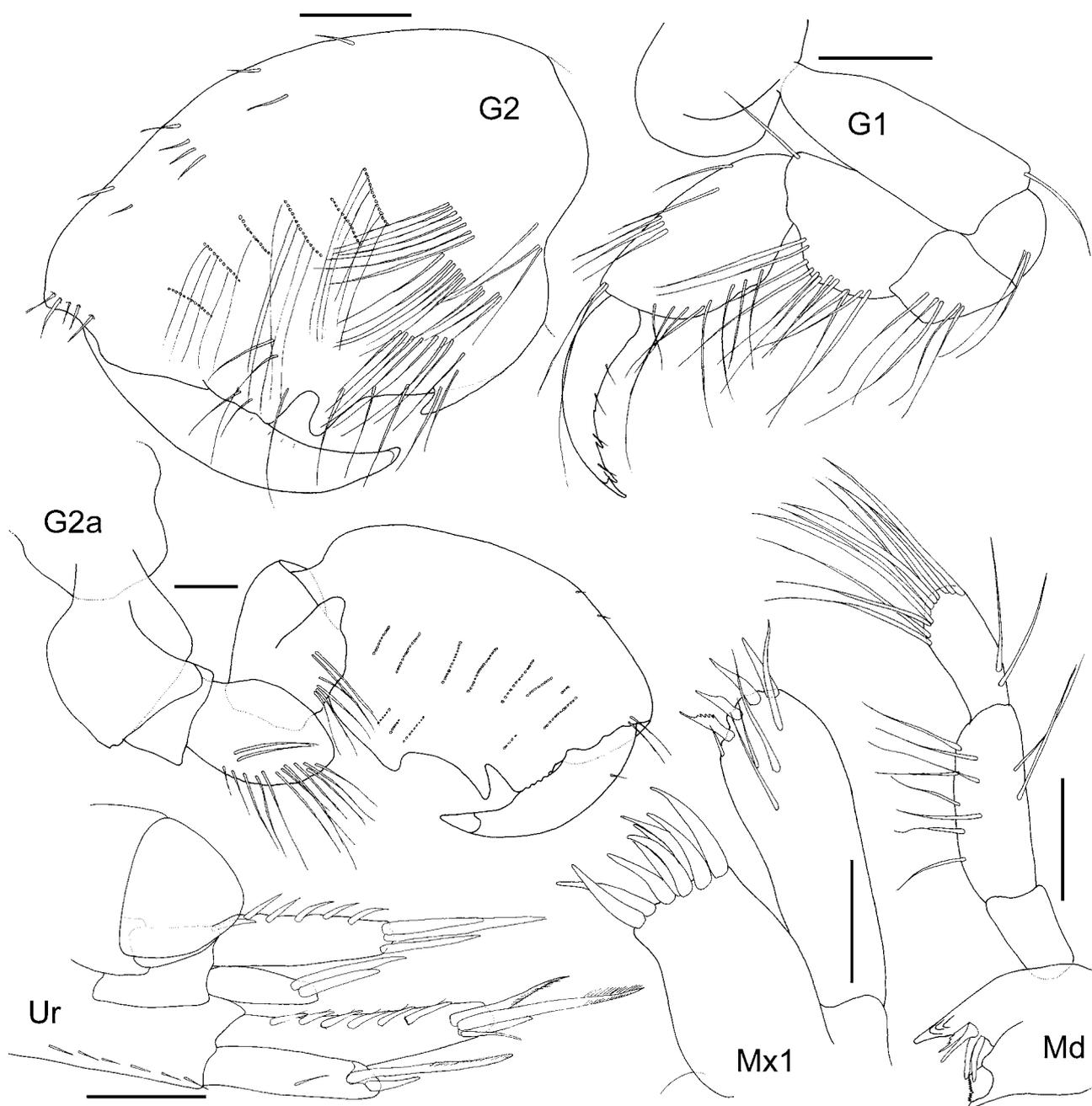


Figure 3. *Cyrtophium minutum* Haswell, 1879, male AM P.86148, 3.0 mm, Ulladulla, New South Wales (scales represent 0.1 mm).

ventromedial spine; outer ramus about half the length of inner ramus. *Uropod 3* uniramus, rami without apical setae. *Telson* apically rounded, dorsal lobe absent, without lateral or apical setae.

Female (sexually dimorphic characters) based on female specimen, 3.6 mm, AM P.86216.

Gnathopod 1 basis without anterodistal robust setae; carpus rectilinear, twice as long as broad; propodus rectilinear, twice as long as broad, palm margin smooth, weakly convex, without palm defining margin or robust setae; dactylus posterior margin with 3 serrate teeth. *Gnathopod 2* basis anterior margin subquadrate, without robust setae; merus lobes 1.3 times as long as broad, anterior margin apically subacute, without robust setae; propodus spherical, 1.2 times as long as broad, anterior margin with clusters of

long slender setae, palm convex, smooth, about half length of propodus, without distal shelf, palm defined by corner with 3 robust setae.

Remarks. *Cyrtophium minutum* is superficially similar to another Australian species *Podocerus lobatus* in the male gnathopod 1 propodus palm without robust setae and gnathopod 2 propodus palm sculpting with distal and palm defining tooth. In *C. minutum* antenna 1 is subequal in length to antenna 2, while antenna 1 is shorter than antenna 2 in *P. lobatus*. *Cyrtophium minutum* has a body plan which is tending towards dorsoventrally flattened.

Distribution. Australia. *New South Wales*. Port Jackson (Haswell, 1879), Port Stephens, Ulladulla (current study). *Victoria*. Gabo Island (current study).

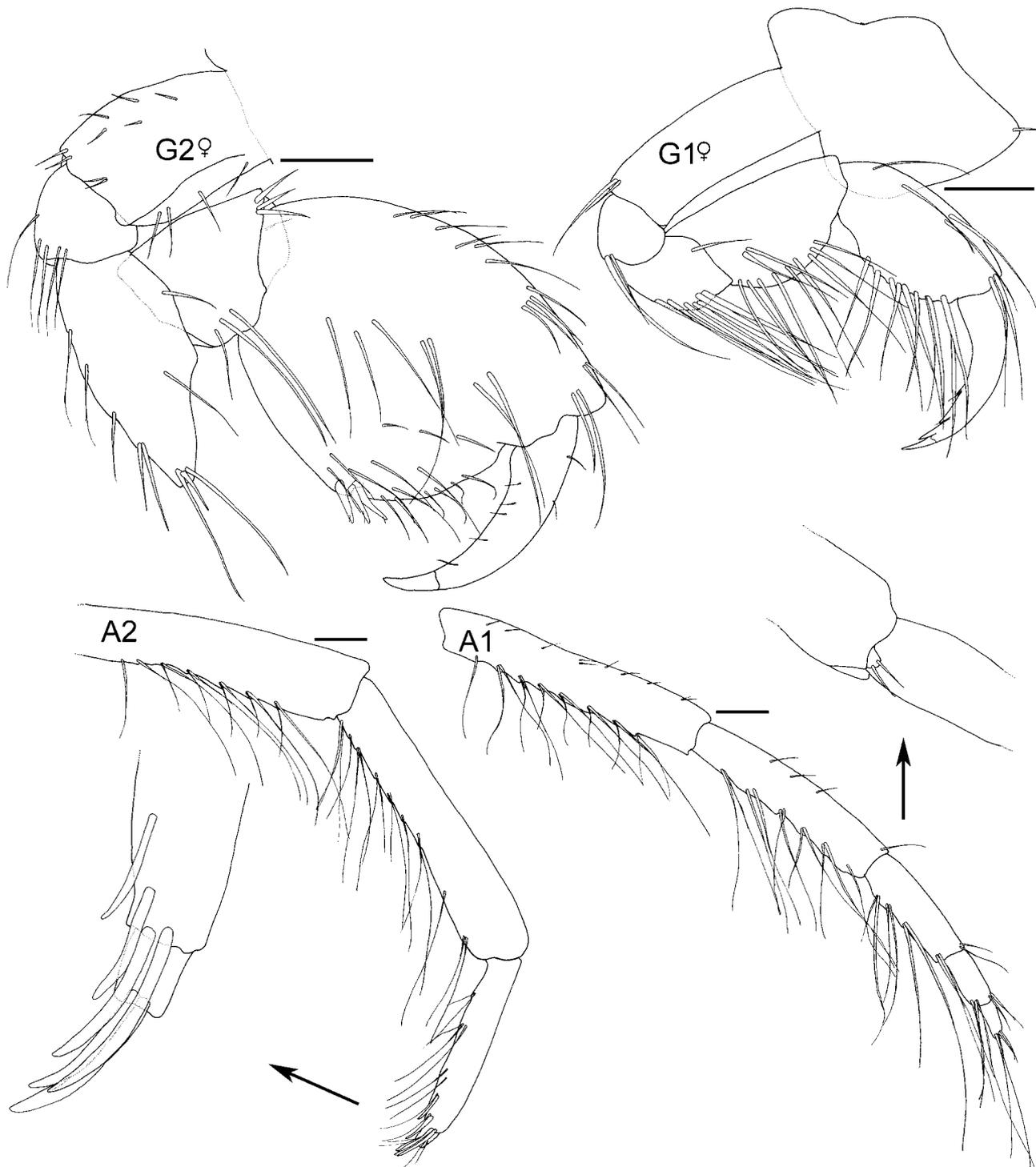


Figure 4. *Cyrtophium minutum* Haswell, 1879 female AM P.86216, 3.6 mm, Ulladulla, New South Wales (scales represent 0.1 mm).

Leipsuropus Stebbing, 1899

Leipsuropus Stebbing, 1899: 237–241.—Stebbing, 1906: 698.—J. L. Barnard, 1969: 430.—Laubitz, 1984: 79.

Diagnosis. Following Laubitz, 1984: Pereon depressed with segments 6 and 7 partially fused; urosome of 3 segments. Antennae 1 accessory flagellum absent; epistome produced; maxilla 1 inner plate absent, outer plate with 8 spines; maxilla 2 without facial setae; maxilliped palp 4 blunt; gnathopod 2 of female nearly as large as that of male; brood plates on pereopods 2–4; uropod 2 absent, uropod 3 without rami.

Leipsuropus parasiticus (Haswell, 1879)

Fig. 5

Cyrtophium parasiticum Haswell, 1879: 274.—Haswell, 1882: 271.—Haswell, 1885: 108, pl. 17 figs 1–7.
Leipsuropus parasiticus.—Stebbing, 1906: 339.—Stebbing, 1910: 650.—Barnard & Drummond, 1981: 38, figs 6, 7.—Barnard & Karaman, 1991: 662.—Springthorpe & Lowry, 1994: 28.—Lowry & Stoddart, 2003: 245 (catalogue).

Type material. Syntypes 3 specimens, AM G.5388; 14 specimens, AM P.3426, Port Jackson, New South Wales (33°51'S 151°16'E).



Figure 5. *Leipsuropus parasiticus* (Haswell, 1879) male specimen, AM P.78202, Botany Bay, New South Wales. SEM photographs: (A) whole animal lateral view; (B) whole animal dorsal view (scale 200 μm); (C) lateral view of head (scale 20 μm); and (D) gnathopod 2 propodus palm plumose setae (scale 20 μm).

Type locality. Port Jackson, Sydney, New South Wales, Australia (33°51'S 151°16'E).

Material examined. *New South Wales.* 1 SEM pin mounted specimen, AM P.78202, Bare Island (33°59'31"S 151°13'49"E), 12 m, on sponge, 13 August 1998, coll. M. J. Huggett and R. De Nys; 1 SEM pin mounted specimen, AM P.78203, Bare Island, Botany Bay (33°59'31"S 151°13'49"E), 12 m, on sponge, 13 August 1998, coll. M. J. Huggett and R. De Nys; 1 SEM pin mounted specimen, AM P.78204, Bare Island, Botany Bay (33°59'31"S 151°13'49"E), 12 m, on sponge, 13 August 1998, coll. M. J. Huggett and R. De Nys; many specimens (including 1 dissected male "A", 3 slides), AM P.77115, Bare Island, Botany Bay (33°59'31"S 151°13'49"E), 12 m, on sponge, 13 August 1998, coll. M. J. Huggett and R. De Nys; many specimens, AM P.77172, 50 m east of Sullivan's Reef, Ulladulla, (35°21'19"S 150°29'22"E), 23 m, orange/red finger sponge, 5 May 1997, coll. R. Springthorpe (NSW 1320); 9 specimens, AM P.77174, 50 m east of Sullivan's Reef, Ulladulla, New South Wales (35°21'19"S 150°29'22"E), 23 m, brown algae *Dictyota* sp., 5 May 1997, coll. A. Murray (NSW 1324); many specimens, AM P.83999, north east side of Cabbage Tree Island, north east of Port Stephens (32°41'6"S 152°13'36"E), 16.9 m, assorted compound ascidians from rocks in sand, steeply sloping boulder reef meeting flat sand bottom, 8 March 2006, coll. S. J. Keable, RV *Baragula* (NSW 2880).

Remarks. *Leipsuropus* is a monotypic genus recognizable by the coalesced pereonites 6–7. *Leipsuropus parasiticus* can be identified from other Australian podoceric species by the distinctive dorsoventrally flattened body, which when viewed dorsally appears subovoid.

Distribution. Australia. *New South Wales.* Port Jackson (Haswell, 1879); Botany Bay; Port Stephens; Ulladulla (current study). *Victoria.* Western Port (J. L. Barnard & Drummond, 1981).

Podocerus Leach, 1814

Podocerus Leach, 1814: 433.—Stebbing, 1906: 700.—J. L. Barnard, 1970: 237.—Lincoln, 1979: 570.—Barnard & Karaman, 1991: 664. (Type species *Podocerus variegatus* Leach, 1814 by monotypy).

Platophium Dana, 1852: 309.—Dana, 1853: 837 (Type species *Platophium brasiliense* Dana, 1853 by monotypy).

Dexiocerella Haswell, 1885: 107 (Type species *Cyrtophium dentatum* Haswell, 1879 subsequent selection of Barnard & Karaman, 1991).

Diagnosis. Amended after Laubitz, 1984: Pereon depressed, with 5–7 segments; urosome of 3 segments. Antennae 1 accessory flagellum present; maxilla 1 inner plate reduced and non-setose or absent, outer plate with 9 spines; maxilla 2 without facial setae; maxilliped palp 4 blunt; brood plates on pereopods 2–4 or 2–5; uropod 2 uniramus or biramus; uropod 3 without rami.

Remarks. The generic description of the uropod 2 is expanded to include a uniramus as well as biramus character state, based on the inclusion of *P. tamoshanta* sp. nov.

Podocerus akanthius sp. nov.

Figs 6–8

Type material. Holotype male, 4.4 mm, dissected, 2 slides, AM P.86150; paratype male, 4.4 mm, dissected, 2 slides, AM P.86152; paratype male, dissected, 3 slides, AM P.86153; paratype female, 4.1 mm, dissected, 1 slide, AM P.86151; paratypes 20+ specimens, AM P.77311, Murrumbulga Point, Twofold Bay (37°4'42"S 149°53'6"E), subtidal rocks algal washings, 9 October 1984, coll. S. J. Keable and J. T. van der Velde (Site Q4); paratype 1 SEM pin mounted specimen,

AM P.78212, Murrumbulga Point, Twofold Bay (37°4'42"S 149°53'6"E), subtidal rocks algal washings, 9 October 1984, coll. S. J. Keable and J. T. van der Velde (Site Q4); paratype 1 SEM pin mounted specimen, AM P.78213, Murrumbulga Point, Twofold Bay (37°4'42"S 149°53'6"E), subtidal rocks algal washings, 9 October 1984, coll. S. J. Keable and J. T. van der Velde (Site Q4); paratypes 18 specimens, AM P.35997, Murrumbulga Point, Twofold Bay (37°4'42"S 149°53'6"E), 1.5 m, subtidal rock platform, 9 October 1984, coll. S. J. Keable and J. T. van der Velde (Q1).

Type locality. Murrumbulga Point, Twofold Bay, New South Wales, Australia (37°4'42"S 149°53'6"E).

Etymology. From the Greek *akanthias*, meaning a prickly thing, a kind of shark. Applied in reference to the dorsal carina, which are reminiscent of shark fins.

Additional material examined. *New South Wales.* 3 specimens, AM P.77166, Halfway Reef, 200 m south of Sullivan Reef, Ulladulla (35°21'25"S 150°29'18"E), 13 m, brown alga on rock ledge, 3 May 1997, coll. A. Murray (NSW 1305); many specimens, AM P.77323, off Providential Head, Wattamola (34°8'S 151°8'30"E), 70 m, 29 October 1990, coll. The Ecology Lab for RMI/Pioneer Project (T3–95).—*Victoria.* 3 specimens, NMV J56908, east of Eagles Nest (38°40'46"S 145°39'14"E), 5–11 m, 1 April 1997, coll. T. O'Hara (BUN 4); 5 specimens, NMV J57227, off Cape Paterson Club House, Bunurong (38°40'39"S 145°37'13"E), 10–11 m, 1 April 1997, coll. T. O'Hara (BUN 1); 2 specimens, NMV J57228, off Honeysuckle Hill, Bunurong (38°40'32"S 145°37'47"E), 10–11 m, 1 April 1997, coll. T. O'Hara (BUN 2); 5 specimens, NMV J57229, off Honeysuckle Hill, Bunurong (38°40'32"S 145°37'47"E), 10–11 m, 1 April 1997, coll. T. O'Hara (BUN 2).—*Tasmania:* 3 specimens, AM P.83634, Joe's Bight, Freycinet Peninsula (42°16'42"S 148°18'42"E), 17 m, brown algae, 1 May 1991, coll. S. J. Keable and R. T. Springthorpe (Tas 334); 1 female specimen, SAMA C6553, north of boat ramp, Mason Cove, Port Arthur, Tasman Peninsula (43°8'52"S 147°51'6"E), 1–3 m, algae, 13 July 1991, coll. K. L. Gowlett-Holmes and G. Myers.—*South Australia:* 1 A male, 4.5 mm, dissected, 4 slides; 1 A female, dissected, 4 slides, 1 b male, 4.4 mm, dissected, 4 slides, 1 c male specimen, dissected, 4.0 mm, 1 slide, 1 d male specimen, dissected, 4.6 mm, 2 slides, 1 e male specimen, dissected, 4.1 mm, 1 slide, 1 f male specimen, dissected, 3.3 mm, 1 slide, 1 g female specimen, dissected, 3.2 mm, 1 slide, many specimens, SAMA C6593, Victor Harbour, Fleurieu Peninsula (35°30'36"S 138°36'17"E), 10 m, mixed brown fucoid macroalgae, February 2002, coll. A. Hirst, SARDI Encounter Expedition 2002; 6 specimens, SAMA C6595, Victor Harbour, Fleurieu Peninsula (35°30'36"S 138°36'17"E), 6 m, mixed brown fucoid macroalgae, February 2002, coll. A. Hirst, SARDI Encounter Expedition 2002; many specimens, SAMA C6591, Sellicks Beach, Fleurieu Peninsula (35°19'47"S 138°26'52"E), 16 January 1937, coll. H. M. Hale and K. Sheard; 6 specimens, SAMA C6598, western side of Cape D'Estaing, Kangaroo Island (35°34'S 137°29'E), 10–12 m, reef, crevices, rubble, 27 January 1989, coll. W. Zeidler and K. L. Gowlett-Holmes; 8 specimens, SAMA C6563, North Point, St Francis Island, Nuyts Archipelago (32°29'18"S 133°17'E), 9 m, kelp dominated habitat, February 2002, coll. A. Hirst, SARDI Encounter Expedition 2002; many specimens, SAMA C6564, northwest of Freeling Island, Nuyts Archipelago (33°27'53"S 133°20'30"E), 8 m, mixed brown fucoid macroalgae, February 2002, coll. A. Hirst, SARDI Encounter Expedition 2002; many specimens, SAMA C6565, northeast cove, West Island, Nuyts Archipelago (32°30'30"S, 133°14'48"S), 10 m, mixed brown fucoid macroalgae, February 2002, coll. A. Hirst, SARDI Encounter Expedition 2002; 1 specimen, SAMA C6734, Fowlers Bay Jetty, West of Ceduna (31°59'23"S 132°26'20"E), 4–5 m, 2 March 1993, coll. W. Zeidler, K. L. Gowlett-Holmes and B. McHenry; 10 specimens, NMV J57051, Flinders Island, "The Hotspot" reef, 5 nautical miles west of northern end of Flinders Island (33°40'30"S 134°22'00"E), 17 m, 19 April 1985 (SA 65); 50 specimens, NMV J62396, northeastern side of Topgallant Island, Investigator Island Group (33°43'00"S 134°36'36"E), 7 m, 22 April 1985 (SA 83); 1 specimen, NMV J57053, "The Hotspot" reef, 5 nautical miles west of northern end of Flinders Island (33°40'48"S 134°22'30"E), 21 m, 20 April 1985 (SA 70).—*Western Australia.* 2 specimens, AM P.79829, reef west of groyne, 2 km south of Cape Peron (32°16'S 115°41'E), 3 m, deep channels in limestone reef, tough red alga, 26 December 1983, coll. R. Springthorpe (WA 299); 7 specimens, AM P.79828, 2 km southeast of South Point, Two Peoples Bay (34°58'S 118°12'E), 5 m, brown algae with zigzag stem on rock shelf, 16 December 1983, coll. R. Springthorpe (WA 171); many specimens, AMP.79844, Vancouver Peninsula, near Mistaken Island, King George Sound

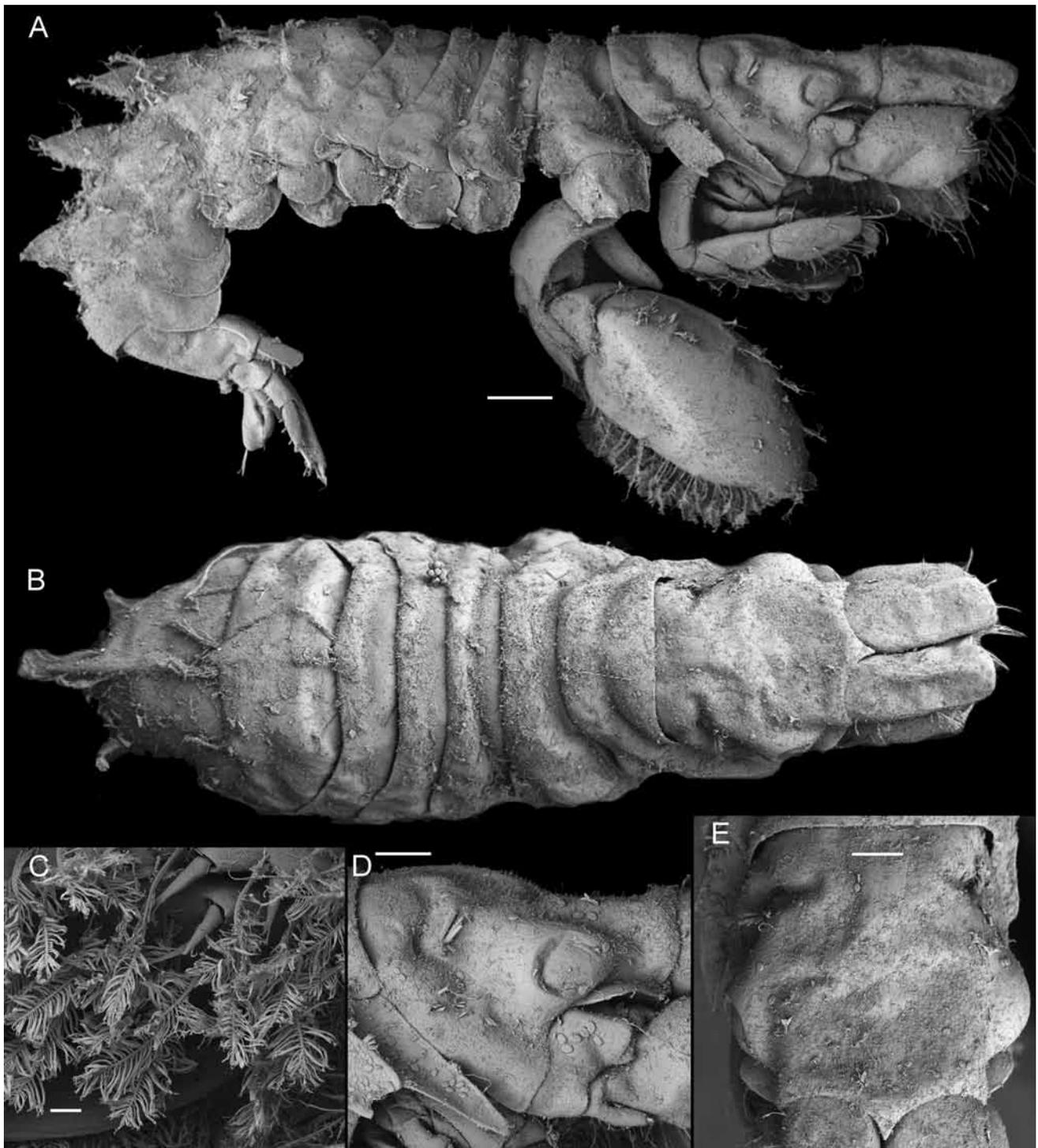


Figure 6. *Podocerus akanthius* sp. nov. male specimen, AM P.78213, Twofold Bay, New South Wales. SEM photographs: (A) whole animal lateral view; (B) whole animal dorsal view (scale 200 μ m); (C) gnathopod 2 propodus palm plumose setae (scale 30 μ m); (D) head lateral view (scale 100 μ m); and (E) head dorsal view (scale 100 μ m).

(35°4'S 117°56'E), 2 m, grey sponge with crinoids, 13 December 1983, coll. R. Springthorpe (WA 114); 11 specimens, AM P.79845, Vancouver Peninsula, Kalbarri, Albany (35°4'S 117°56'E), 2 m, soft corals, 13 December 1983, coll. J. K. Lowry (WA 105); 7 specimens, AM P.79488, near Shelley Beach, rocky shore, Bunker Bay, south of Busselton, near Cape Naturaliste (33°32'33"S 115°1'47"E), 0.5 m, on mixed brown algae *Cystophora* sp. and *Sargassum* sp., 4 December 2000, coll. R. A. Peart (WA 729); 1 specimen, NMV J56989, north side, Cape Riche (34°37'00"S 118°47'00"E), 7.0 m, 14 April 1984 (SWA 49).

Diagnosis. Head dorsally smooth; *Gnathopod 1* propodus subrectangular, palm margin minutely serrate, with 4 robust

setae near corner of palm. *Gnathopod 2* propodus elongate, subovoid, propodus palm acute, straight, smooth, without distal shelf. *Pereonite 7* dorsal carina produced posteriorly, subtriangular, apically acute. *Pleonite 1–2* dorsal carina produced posteriorly, subtriangular, apically acute.

Female *Gnathopod 1* carpus rectilinear, twice as long as broad; propodus subovate, twice as long as broad, palm convex, margin minutely serrate, defined by 2 robust setae, without palm defining corner. *Gnathopod 2* basis anterior margin subquadrate; merus lobe as broad as long, posterior

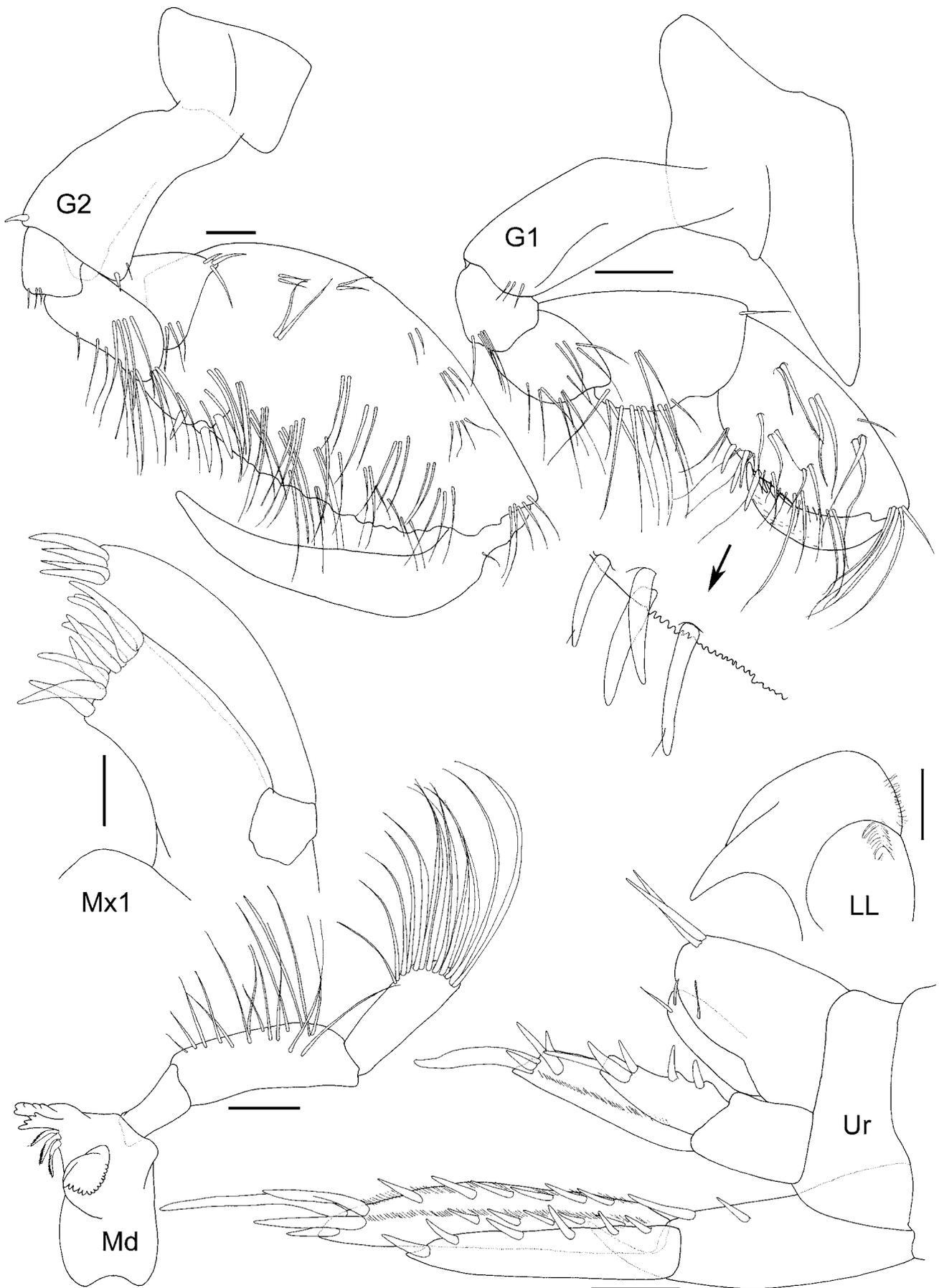


Figure 7. *Podocerus akanthius* sp. nov., holotype male AM P.86150, 4.4 mm, Twofold Bay, New South Wales (scales represent 0.1 mm).

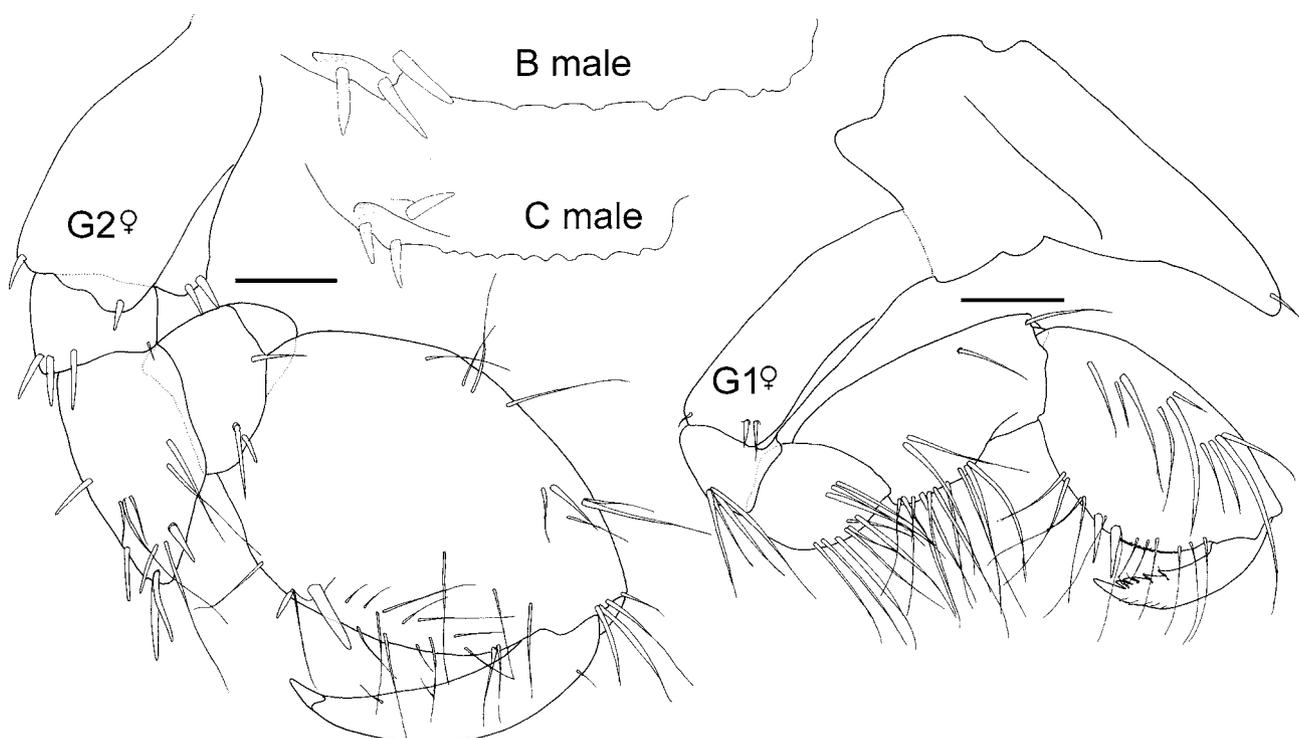


Figure 8. *Podocerus akanthius* sp. nov., paratype female, AM P.86153, 4.1 mm, Twofold Bay, New South Wales (scales represent 0.1 mm).

margin with 1 short and 2 long robust setae; propodus subovate, palm smooth, defined by 2 robust setae without palm defining corner.

Description. Based on holotype male, 4.4 mm, AM P.86150. *Body* cuticle dorsally processiferous, with mainly posterior dorsal carina, without lateral and ventral carina. *Head* dorsally smooth; *eyes* greatly bulging; lateral cephalic lobe subquadrate; anteroventral corner subquadrate. *Mandible* accessory setal row with 3 setae. *Maxilla 1* palp distal margin with 4 robust setae. *Pereonites 1–6* without dorsal carina. *Coxae 1–3* discontinuous, *coxae 4–7* contiguous. *Gnathopod 1* coxa subequal to coxa 2, broader than long, distoventral corner elongate produced ventrally; basis 2.5 times as long as broad, with a few slender anterodistal setae; carpus rectilinear, twice as long as broad; propodus subrectangular, 2.2 times as long as broad, anterior margin with sparse slender setae, palm margin minutely serrate, with 4 robust setae near corner of palm; dactylus posterior margin with 2 serrate teeth, cuticle surface with raised serrations, closing along palm. *Gnathopod 2* basis twice as long as broad, anterodistal corner produced into rounded lobes, with short robust setae; merus posterior margin with broad produced lobe, 1.1 times as broad as long, apically rounded, without short robust setae; propodus elongate, subovoid, 2.1 times as long as broad, anterior margin with clusters of short slender setae, propodus palm acute, straight, smooth, $\frac{3}{4}$ length of propodus, without distal shelf, palm defined by corner with 3 robust setae; dactylus closing along palm. *Pereonite 7* dorsal carina produced posteriorly, subtriangular, apically acute.

Pleonite 1 dorsal carina produced posteriorly, subtriangular, apically acute; *epimeron 1* posteroventral corner rounded. *Pleonite 2* dorsal carina produced posteriorly, subtriangular, apically acute; *epimeron 2* posteroventral corner rounded. *Epimeron 3* posteroventral corner subquadrate. *Urosome* with 3 pairs of uropods. *Urosomite 1* twice as long as broad.

Uropod 1 peduncle elongate, 3 times as long as broad, with well developed ventromedial spine 3 times as long as broad; inner ramus 1.3 times peduncle length, outer ramus about $\frac{3}{4}$ length of inner ramus. *Uropod 2* well developed, biramus, without ventromedial spine; outer ramus about half the length of inner ramus. *Uropod 3* uniramus; rami with apical setae. *Telson* dorsal lobe with 2 apical setae; lower margin with pair of long slender lateral setae, without apical setae.

Female (sexually dimorphic characters) based on paratype 1 female, 4.1 mm, AM P.86151. *Gnathopod 1* basis anterior margin with 2 robust setae; carpus rectilinear, twice as long as broad; propodus subovate, twice as long as broad, palm convex, margin minutely serrate, defined by 2 robust setae, without palm defining corner; dactylus posterior margin with 5 serrate teeth. *Gnathopod 2* basis anterior margin subquadrate, with several robust setae; merus lobe as broad as long, posterior margin with 1 short and 2 long robust setae; propodus subovate, 1.9 times as long as broad, anterior margin with a few long slender setae, palm convex, smooth, about half length of propodus, defined by 2 robust setae without palm defining corner.

Remarks. The three posterior dorsal carina (pereonite 7, pleonites 1–2), with acute apices distinguish *P. akanthius* sp. nov. from other *Podocerus* species. *Podocerus akanthius* sp. nov. is similar to *P. fulanus* Barnard, 1962 from California which has four acute dorsal carinae. The male gnathopod 2 propodus palm without a distal shelf defines *Podocerus akanthius* sp. nov., and three other Indo-Pacific species, *P. brasiliensis* (Dana, 1853), *P. walkeri* Rabindranath, 1972 and *P. walkeri pedonculata* Ledoyer, 1979. *Podocerus akanthius* sp. nov. has the male gnathopod 2 propodus palm lined with sparse plumose setae, separating it from *P. walkeri* and *P. walkeri pedonculata* which has short robust setae along the palm, while in *P. brasiliensis* the palm has a thick brush of plumose setae.

Distribution. Australia. *New South Wales.* Twofold Bay, Ulladulla, Wattamolla (current study). *Victoria.* Bunurong, Eagles Nest (current study). *Tasmania.* Freycinet Peninsula, Port Arthur (current study). *South Australia.* Flinders Island, Investigator Island Group, Fleurieu Peninsula, Kangaroo Island, Nuyts Archipelago, Ceduna (current study). *Western Australia.* Two Peoples Bay, Cape Peron, King George Sound, Albany, Cape Naturaliste, Cape Riche (current study).

Podocerus dentatus (Haswell, 1879)

Figs 9–12

Cyrtophium dentatum Haswell, 1879: 342, pl. 22, fig. 5.

Dexiocerella dentata.—Haswell, 1885: 109, pl. 17, figs 8–12.

Podocerus dentatus.—Springthorpe & Lowry, 1994: 14.—

Lowry & Stoddart, 2003: 246.

not *Podocerus cristatus*.—Stebbing, 1906: 706.—Stebbing, 1910: 651.

Type material. Syntypes 3 specimens, AM P3423, Clarke Island, Port Jackson.

Type locality. Clark Island, Port Jackson, New South Wales, Australia

Material examined. *New South Wales.* male, 6.6 mm, dissected, 4 slides, AM P.86162; male, dissected, 5.0 mm, 1 slide, AM P.86166; male, dissected, 5.1 mm, 1 slide, AM P.86165; male, 5.0 mm, 1 slide, AM P.86164; female, 6.6 mm, 1 slide, AM P. 86163, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'11"S 150°14'9"E), 25 m, from red macroalga *Corallina berterii*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1987); many specimens, AM P.77129, Mungarno Point, Twofold Bay (37°6'12"S 149°55'42"E), 9 m, subtidal wharf pile, 19 December 1985, coll. S. J. Keable and S. J. Perry (M 6–9); 12 specimens, AM P.77136, southern end of Lighthouse Reef, Ulladulla (35°22'8"S 150°29'18"E), 15 m, hydrozoan on underside of boulder, 30 April 1997, coll. P. B. Berents (NSW 1264); 3 specimens, AM P.77139, southern end of Lighthouse Reef, Ulladulla (35°22'8"S 150°29'18"E), 17.2 m, kelp *Ecklonia* sp. holdfast, 30 April 1997, coll. A. Murray (NSW 1268); 6 specimens, AM P.77167, Halfway Reef, 200 m south of Sullivan Reef, Ulladulla (35°21'25"S 150°29'18"E), 13 m, brown wiry alga on rock ledge, 3 May 1997, coll. A. Murray (NSW 1305); 9 specimens, AM P.77185, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 21 m, low tufting brown and coralline algae, 7 May 1997, coll. A. Murray (NSW 1351); 11 specimens, AM P.77189, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 22 m, red alga, 7 May 1997, coll. A. Murray (NSW 1356); 3 specimens, AM P.77180, northern side of Bannister Head, north of Batemans Bay (35°19'9"S 150°29'7"E), 18 m, algal turf with fine red algae on top of rock, 6 May 1997, coll. K. B. Attwood and R. Springthorpe (NSW 1345); 6 specimens, AM P.77233, north of Broulee Island, south of Batemans Bay (35°51'20"S 150°11'38"E), 16 m, red macroalga *Phacelocarpus pepperocarpus*, 30 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 2017); many specimens, AM P.77237, northwest side of Brush Island, north of Batemans Bay (35°31'39"S 150°24'57"E), 12 m, kelp *Ecklonia radiata* gutters, 9 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2026); 2 specimens, AM P.77248, west side of Wasp Island, north of Batemans Bay (35°40'2"S 150°18'29"E), 16 m, red macroalga *Curdiea crassa* gutters, date, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2043); 1 specimen, AM P.77239, northwest side of Brush Island, north of Batemans Bay (35°31'39"S 150°24'57"E), 16.9 m, green alga *Caulerpa flexilis* gutters, 9 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2027); 2 specimens, AM P.77254, west side of North Tollgate Island, Batemans Bay (35°44'55"S 150°15'27"E), 9 m, green alga *Caulerpa cactoides* gutters, 11 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2052); 2 specimens, AM P.77225, northwest side of Tollgate Islands, Batemans Bay (35°44'49"S 150°15'31"E), 7.9 m, brown macroalga *Colpomenia sinuosa*, 28 October 2002, coll. G. D. F. Wilson and A. J. Millar (NSW 2002); 1 specimen, AM P.77234, west side of North Tollgate Island, Batemans Bay (35°44'55"S 150°15'27"E), 11 m, mixed algae, 8 February 2003, coll. P. B. Berents, J. Eu and G. D. Wilson (NSW 2024); 9 specimens, AM P.77217, gutters north of Burrewarra Point, south of Batemans Bay (35°49'49"S 150°14'1"E), 24 m, branching hydroid, 27 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1995);

4 specimens, AM P.77212, south of Broulee Island, south of Batemans Bay (35°50'49"S 150°11'5"E), 8 m, from red macroalga branching corallines *Amphiora anceps* and *Jania natalensis*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1989); 2 specimens, AM P.77211, south of Broulee Island, south of Batemans Bay (35°50'49"S 150°11'5"E), 8 m, brown macroalga *Cladostephus spongiosus*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1988); many specimens, AM P.77222, gutters, north of Burrewarra Point, south of Batemans Bay (35°49'52"S 150°14'5"E), 23 m, from red macroalga *Martensia australis*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1999); 2 specimens, AM P.77229, north of Jimmies Island, Batemans Bay (35°48'56"S 150°14'6"E), 16 m, brown macroalga *Dictyota dichotoma*, 29 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 2010); 2 specimens, AM P.35996, Murrumbulga Point, Twofold Bay (37°44'2"S 149°53'6"E), 1.5 m, subtidal rock platform, 9 October 1984, coll. J. van der Velde (Q3); 1 specimen, AM P.53943, Jervis Bay (35°03'S 150°44'E), 17 m, sponge scallop beds, 13 August 1981, coll. P. B. Berents; many specimens, AM P.86565, west side of North Tollgate Island, Batemans Bay (35°44'50"S 150°15'28"E), 16.6 m, red calcareous alga *Dichotomaria marginata*, scattered low reefs, rocks and sand, 8 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson, RV *Baragula* (NSW 2023); 7 specimens, AM 86155, northwest side of Brush Island, north of Batemans Bay (35°31'39"S 150°24'57"E), 12 m, red alga *Pterocladia capillacea*, 8 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. Wilson (NSW 2025); 1 specimen, AM P.86156, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 18 m, sponge and gorgonacean, 1 May 1997, coll. K. B. Attwood (NSW 1286); many specimens, AM P.86157, gutters north of Burrewarra Point, south of Batemans Bay (35°49'49"S 150°14'1"E), 24 m, red macroalga *Pachymenia prostrata*, 27 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1996); many specimens, AM P.86158, south of Broulee Island, south of Batemans Bay (35°50'49"S 150°11'5"E), 8 m, brown macroalga *Zonaria diesingiana*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1991); 2 specimens, AM P.86159, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 17 m, bryozoan *Margaretta barbata* on wall, 1 May 1997, coll. P. B. Berents (NSW 1280); 3 specimens, AM P.86160, Jolong Reef, approximately 700 metres north east of Cape Banks (33°59'48.1"S 151°15'13.6"E) 20.5 m, mixed alga, 21 July 2009, coll. M. Capa, K. B. Attwood, P. Hutchings, R. Springthorpe, RV *Baragula* (MI NSW 3646); many specimens, AM P.86090, Bass Point (34°36'S 150°54'E), 35–40 m, 1 February 1990, coll. The Ecology Lab for RMI/Pioneer Project (SIR1).—*Tasmania:* 6 specimens, AM P.83749, Off Hannant's Bight, Cape Sorell (42°11'30"S 145°11'18"E), 16 m, red algae with epiphytic algae, Bryozoa and sponges, 27 April 1991, coll. R. T. Springthorpe and P. M. Berents RV *Flying Scud* (Tas 289); 1 specimen, AM P.83729, St Helens Rocks (41°17'30"S 148°22'E), 10 m, macroalgae *Ecklonia* sp. holdfasts, 13 April 1991, coll. R. Springthorpe and C. McCormick (Tas 113); many specimens, AM P.83730, St Helens Rocks (41°17'30"S 148°22'E), 15 m, bryozoan, 13 April 1991, coll. R. Springthorpe and C. McCormick (Tas 115); many specimens, AM P.83731, St Helens Rocks (41°17'30"S 148°22'E), 15 m, mixed algae and bryozoans, 13 April 1991, coll. R. Springthorpe and C. McCormick (Tas 121); 4 specimens, AM P.83732, Elephant Rock, north of St. Helens Point, (41°17'30"S 148°20'E), 20 m, encrusting sponges on rocks among brown macroalgae *Ecklonia* sp. and *Cystophora* sp. kelp, 14 April 1991, coll. R. Springthorpe and C. McCormick (Tas 129); many specimens, AM P.83733, Elephant Rock, north of St Helens Point (41°17'30"S 148°20'E), 20 m, bryozoans, 14 April 1991, coll. R. Springthorpe and C. McCormick (Tas 130); 3 specimens, AM P.83734, Elephant Rock, north of St Helens Point (41°17'30"S 148°20'E), 20 m, red algae, 14 April 1991, coll. R. Springthorpe and C. McCormick (Tas 132); 10 specimens, AM P.83736, Elephant Rock, north of St Helens Point (41°17'30"S 148°20'E), 20 m, 14 April 1991, coll. R. Springthorpe and C. McCormick (Tas 138); many specimens, AM P.83737, Sloop Reef, Bay of Fires (41°13'S 148°17'30"E), 23 m, yellow finger sponge and bryozoan *Idoctyum* sp. (ID: P. S. R. Nair), rocky bottom, 15 April 1991, coll. R. Springthorpe and C. McCormick (Tas 152); 2 specimens, AM P.83738, Sloop Reef, Bay of Fires (41°13'S 148°17'30"E), 23 m, sponges on rocky bottom, 15 April 1991, coll. R. Springthorpe and C. McCormick (Tas 153); 1 specimen, AM P.83739, Sloop Reef, Bay of Fires (41°13'S 148°17'30"E), 23 m, coarse shelly substrate, 15 April 1991, coll. R. Springthorpe and C. McCormick (Tas 154); 8 specimens, AM P.83740, Sloop Reef, Bay of Fires (41°13'S 148°17'30"E), 23 m, on gorgonian fan, 15 April 1991, coll. R. Springthorpe and C. McCormick (Tas 157); 6 specimens, AM P.83741, Sloop Reef, Bay of Fires (41°13'S 148°17'30"E), 23 m, flat orange sponge, 15 April 1991, coll. R. Springthorpe and C. McCormick (Tas 157); 2 specimens, AM P.83750, 100 m north of Fleurieu Point, Freycinet Peninsula (42°10'S 148°15'E), 9 m, boulders, airlift, 30 April 1991, coll. S. J. Keable and R. T. Springthorpe, MV *Flying Scud* (Tas 321); 6 specimens, AM

P.83751, 450 m off Weatherhead, Freycinet Peninsula (42°14'S 148°14'41"E), 15 m, overnight baited trap, 30 April to 1 May 1991, coll. J. K. Lowry and S. J. Keable, MV *Flying Scud* (Tas 341); 5 specimens, AM P.83742, north side of Esperance Point, D'Entrecasteaux Channel (43°19'30"S 147°05'30"E), 1.5 m, coralline alga, 18 April 1991, coll. P. B. Berents (Tas 177); 1 specimen, AM P.83743, north side of Esperance Point, D'Entrecasteaux Channel (43°19'30"S 147°05'30"E), 14 m, red algae, sponges and green algae *Caulerpa* sp., 18 April 1991, coll. Australian Museum Party (Tas 179); 6 specimens, AM P.83745, north side of Esperance Point, D'Entrecasteaux Channel (43°19'30"S 147°05'30"E), 12–14 m, mixed red algae, 18 April 1991, coll. S. J. Keable, J. K. Lowry and R. T. Springthorpe, MV *Flying Scud* (Tas 184); 5 specimens, AM P.83752, north side of Esperance Point, D'Entrecasteaux Channel (43°19'30"S 147°05'30"E), 14 m, mixed red algae, sponges and green algae *Caulerpa* sp., 18 April 1991, coll. S. J. Keable, J. K. Lowry and R. T. Springthorpe, MV *Flying Scud* (Tas 179); 6 specimens, AM P.83746, Cemetery Bluff, Adventure Bay, Bruny Island (43°20'S 147°19'30"E), 15 m, red algae with epiphytic Bryozoa, 23 April 1991, coll. R. T. Springthorpe and P. M. Berents, MV *Flying Scud* (Tas 250); 1 specimen, AM P.83747, Cemetery Bluff, Adventure Bay, Bruny Island (43°20'S 147°19'30"E), 15 m, Bryozoa, 23 April 1991, coll. R. T. Springthorpe and P. M. Berents, MV *Flying Scud* (Tas 251); 1 specimen, AM P.83748, Cemetery Bluff, Adventure Bay, Bruny Island (43°20'S 147°19'30"E), 15 m, red algae, 23 April 1991, coll. R. T. Springthorpe and P. M. Berents, MV *Flying Scud* (Tas 253); 1 "a" male specimen, dissected, 4 slides, 1 "b" male, dissected, 1 slide, 1 "c" female, dissected, 1 slide, SAMA C6556, first bay north of Cape Peron, Maria Island (42°44'35"S 147°00'53"E), 5–10 m, in bryozoan on rocks, in crevices, 5 August 1991, coll. K. L. Gowlett-Holmes and G. Myers; many specimens, SAMA C6556, first bay north of Cape Peron, Maria Island (42°44'35"S 147°00'53"E), 5–10 m, in bryozoan on rocks, in crevices, 5 August 1991, coll. K. L. Gowlett-Holmes and G. Myers; 8 specimens, SAMA C6554, north side of Lagoon Bay, Forestier Peninsula (42°52'12"S 147°55'48"E), 4–9 m, in bryozoan in crevices, 29 July 1991, coll. K. L. Gowlett-Holmes and G. Myers; 1 specimen, SAMA C6555, north side of Lagoon Bay, Forestier Peninsula (42°52'12"S 147°55'48"E), 4–9 m, in algae, 29 July 1991, coll. K. L. Gowlett-Holmes and G. Myers; 3 specimens, SAMA C6550, north side of Lagoon Bay, Forestier Peninsula (42°52'12"S 147°55'48"E), 4–9 m, in bryozoan, 29 July 1991, coll. K. L. Gowlett-Holmes and G. Myers; 1 specimen, SAMA C6549, Cathedral Cave, Waterfall Bay, Tasman Peninsula (43° 3'35"S 147° 56'59"E), 16–18 m, on red algae and hydroids, 21 March 2004, coll. W. Zeidler and K. L. Gowlett-Holmes.—*South Australia*. 1 a male, dissected, 7.0 mm, 1 slide, 2 female specimens, SAMA C6568, "Fred's", Snug Cove, Western River, Kangaroo Island (35°41'S 136°50'E), 8–10 m, tunicate *Pyura gibbosa* on reef, 17 February 2000, coll. K. L. Gowlett-Holmes; 1 specimen, SAMA C6599, western side of Cape D'Estaing, Kangaroo Island (35°34'S 137°29'E), 10–15 m, reef, crevices, rubble, 27 January 1989, coll. W. Zeidler and K. L. Gowlett-Holmes; 1 specimen, SAMA C6567, north side of Point Ellen reef, Vivonne Bay, Kangaroo Island (35°59'S 137°12'E), 3–8 m, boulders, sand, 26 January 1989, W. Zeidler and K. L. Gowlett-Holmes; 1 specimen, SAMA C6570, Rapid Bay, Fleurieu Peninsula (35°31'S 138°10'E), 9 m, pylons, 29 November 1977, coll. M. Keough; 1 specimen, SAMA C6566, north point of Tumby Island, Eyre Peninsula (34°24'23"S 136°08'18"E), 1–3 m, low reef, seagrass, 16 February 1988, coll. W. Zeidler and K. L. Gowlett-Holmes; 2 specimens, SAMA C6594, Victor Harbour, Fleurieu Peninsula (35°30'36"S 138°36'17"E), 6 m, mixed brown fucoid macroalgae, February 2002, coll. A. Hirst, SARDI Encounter Expedition 2002; 1 specimens, NMV J57131, northeastern side of Topgallant Island, Investigator Island Group (33°43'00"S 134°36'36"E), 12.0 m, 21 April 1985 (SA 78); 1 specimen, NMV J62397, northeastern side of Topgallant Island, Investigator Island Group (33°43'00"S 134°36'36"E), 16 m, 22 April 1985 (SA 84).—*Western Australia*. 4 specimens, AM P.79843, off Possession Point, near Mistaken Island, King George Sound (35°2'S 117°55'E), 7 m, mixed sponges and algae, 14 December 1983, coll. J. K. Lowry (WA 135); 1 male, dissected, 1 slide, NMV J62398, eastern end of Thistle Cove, Recherche Archipelago (34°00'00"S 122°12'00"E), 8 m, 11 April 1984 (SWA-28); 4 specimens, NMV J62399, eastern end of Thistle Cove, Recherche Archipelago (34°00'00"S 122°12'00"E), 8 m, 11 April 1984 (SWA-28).

Diagnosis. *Head* with weak hump. *Gnathopod 1* propodus with 8 robust setae near corner of palm. *Gnathopod 2* propodus elongate, propodus palm acute, straight, with broad, well developed distal shelf, shelf margin strongly crenulated, palm with 1 distal subtriangular tooth, without palm defining corner or robust setae. *Pereonites 3–5* dorsal carina produced posteriorly, subtriangular, apically subacute, lateral projections

present. *Pereonite 6* dorsal carina produced anteriorly, subtriangular, apically subacute, lateral projections present. *Pereonite 7* dorsal carina produced posteriorly, subtriangular, apically rounded, lateral projections present. *Pleonite 1* dorsal carina produced evenly, rounded, lateral projections present; *Uropod 2* ventromedial spine as long as broad. *Uropod 3* rami with row of slender setae.

Female. *Gnathopod 1* carpus rectilinear, 2.2 times as long as broad; propodus subtriangular, 1.9 times as long as broad, palm straight, defined by corner with 5 robust setae. *Gnathopod 2* merus with 4 robust setae; propodus subovate, 1.6 times as long as broad, palm convex, palm defining corner with tooth and 2 robust setae.

Description. Based on male, 6.6 mm, AM P.86162. *Body* cuticle dorsally processiferous, with mainly posterior dorsal carina. *Head* with weak hump; *eyes* greatly bulging; lateral cephalic lobe subquadrate; anteroventral corner subquadrate. *Antenna 1* between 0.8 times body length; peduncle article 2 longer than article 3; primary flagellum 0.7 times peduncle length, with 7 articles; accessory flagellum 1-articulate, 5 times as long as broad. *Antenna 2* subequal in length to antenna 1; article 4 shorter than article 5; flagellum 0.4 times peduncle length, posterior margin with robust setae, with 4 articles. *Mandible* accessory setal row with 3 setae. *Maxilla 1* palp distal margin with 5 robust setae.

Pereonites 1–3 without dorsal carina, lateral and ventral projections absent. *Coxae 1–3* discontinuous, *coxae 4–7* contiguous. *Gnathopod 1* coxa subequal to coxa 2, as broad as long, distoventral corner weakly produced ventrally, corner subacute; basis twice as long as broad, without anterodistal setae; carpus subtriangular, twice as long as broad; propodus subtriangular, twice as long as broad, anterior margin with clusters of long slender setae, palm margin smooth, with 8 robust setae near corner of palm; dactylus posterior margin with 7 serrate teeth, cuticle surface with raised serrations, closing along palm. *Gnathopod 2* basis 1.5 times as long as broad, anterodistal corner with rounded produced lobes, with a few plumose setae; merus posterior margin with narrow produced lobe, as long as broad, apically acute, margin without short robust setae; propodus elongate, subovoid, 1.8 times as long as broad, anterior margin with clusters of short robust setae, propodus palm acute, straight, with broad, well developed distal shelf, shelf margin strongly crenulated, palm with 1 distal subtriangular tooth, without palm defining corner or robust setae; dactylus closing along palm. *Pereonites 3–5* dorsal carina produced posteriorly, subtriangular, apically subacute, lateral projections present. *Pereonite 6* dorsal carina produced anteriorly, subtriangular, apically subacute, lateral projections present.

Pereonite 7 dorsal carina produced posteriorly, subtriangular, apically rounded, lateral projections present.

Pleonite 1 dorsal carina produced evenly, rounded, lateral projections present; *epimeron 1* posteroventral corner rounded. *Pleonite 2* dorsal carina produced evenly, broadly rounded, lateral projections present; *epimeron 2* posteroventral corner rounded to subquadrate. *Epimeron 3* posteroventral corner subquadrate. *Urosome* with 3 pairs of uropods. *Urosomite 1* short, twice as long as broad. *Uropod 1* peduncle 3.5 times as long as broad, with well developed ventromedial spine 4 times as long as broad; inner ramus subequal to peduncle length, outer ramus about ¾ length of inner ramus. *Uropod 2* well developed, biramus; ventromedial spine as long as broad; outer ramus about half

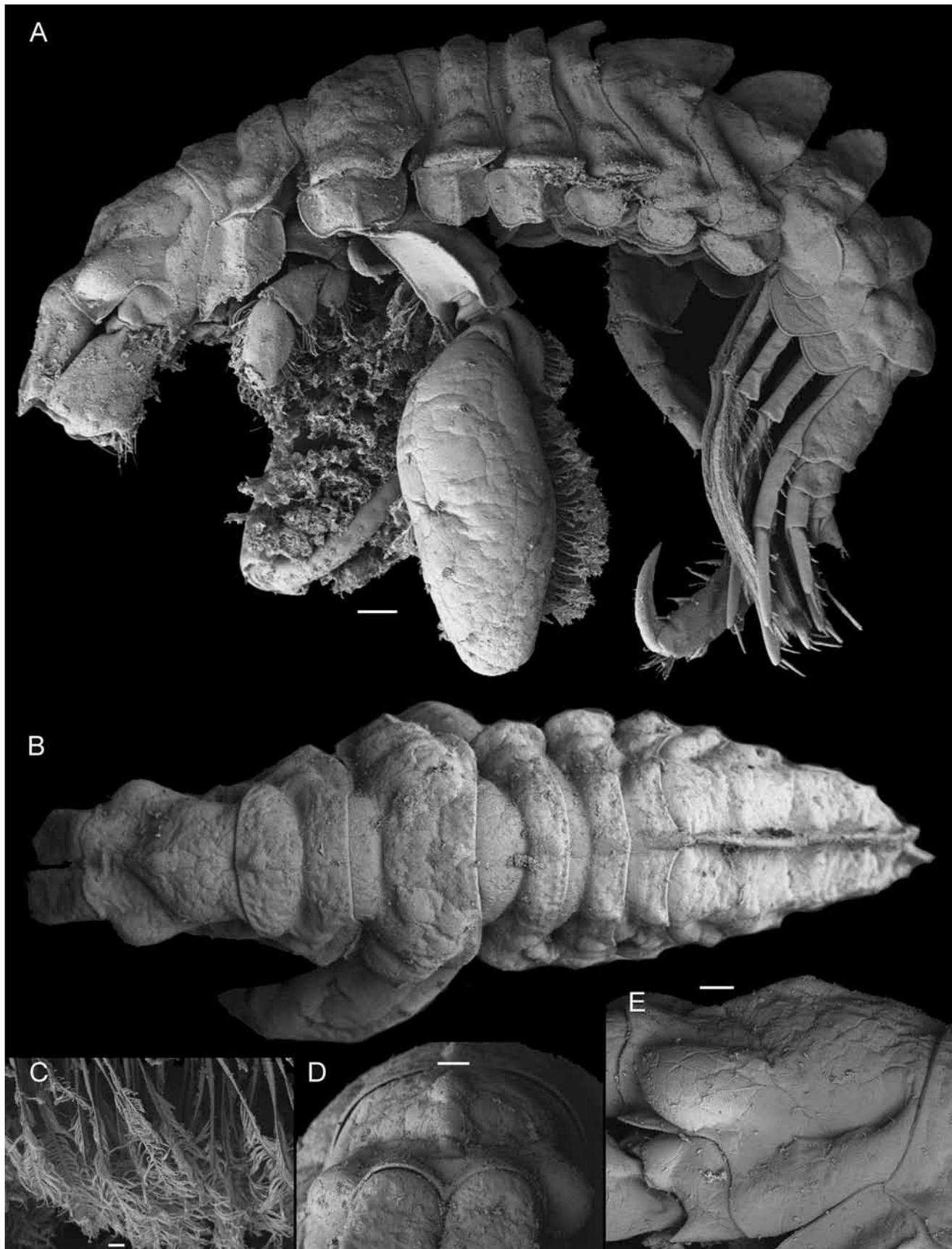


Figure 9. *Podocerus dentatus* (Haswell, 1879) male specimen, AM P.78205, Batemans Bay, New South Wales. SEM photographs: (A) whole animal lateral view; (B) whole animal dorsal view (scale 200 μm); (C) gnathopod 2 propodus palm plumose setae (scale 20 μm); (D) head frontal view (scale 100 μm); and (E) head lateral view (scale 100 μm).

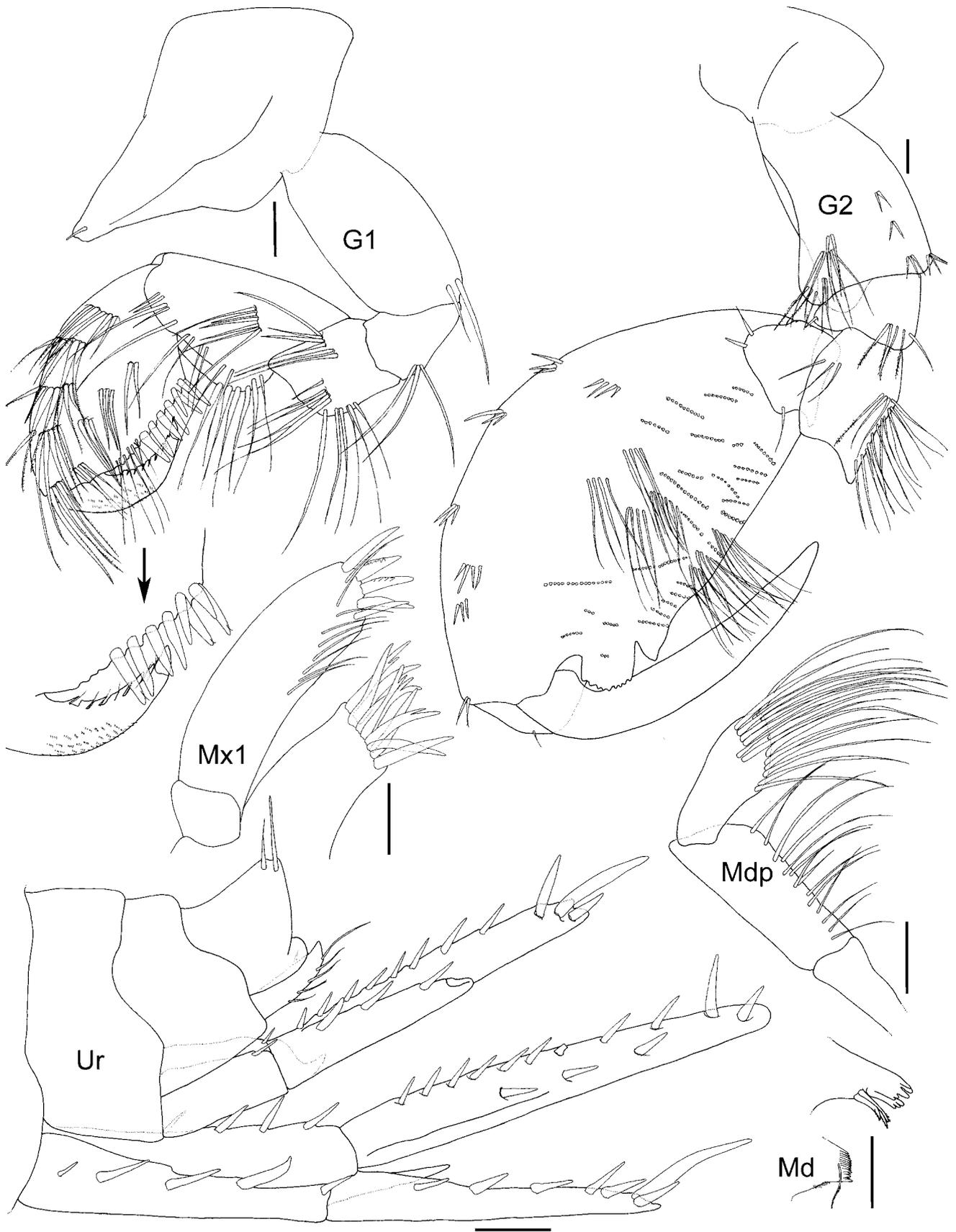


Figure 10. *Podocerus dentatus* (Haswell, 1879) male, AM P.86162, 6.6 mm, Batemans Bay, New South Wales (scales represent 0.1 mm).

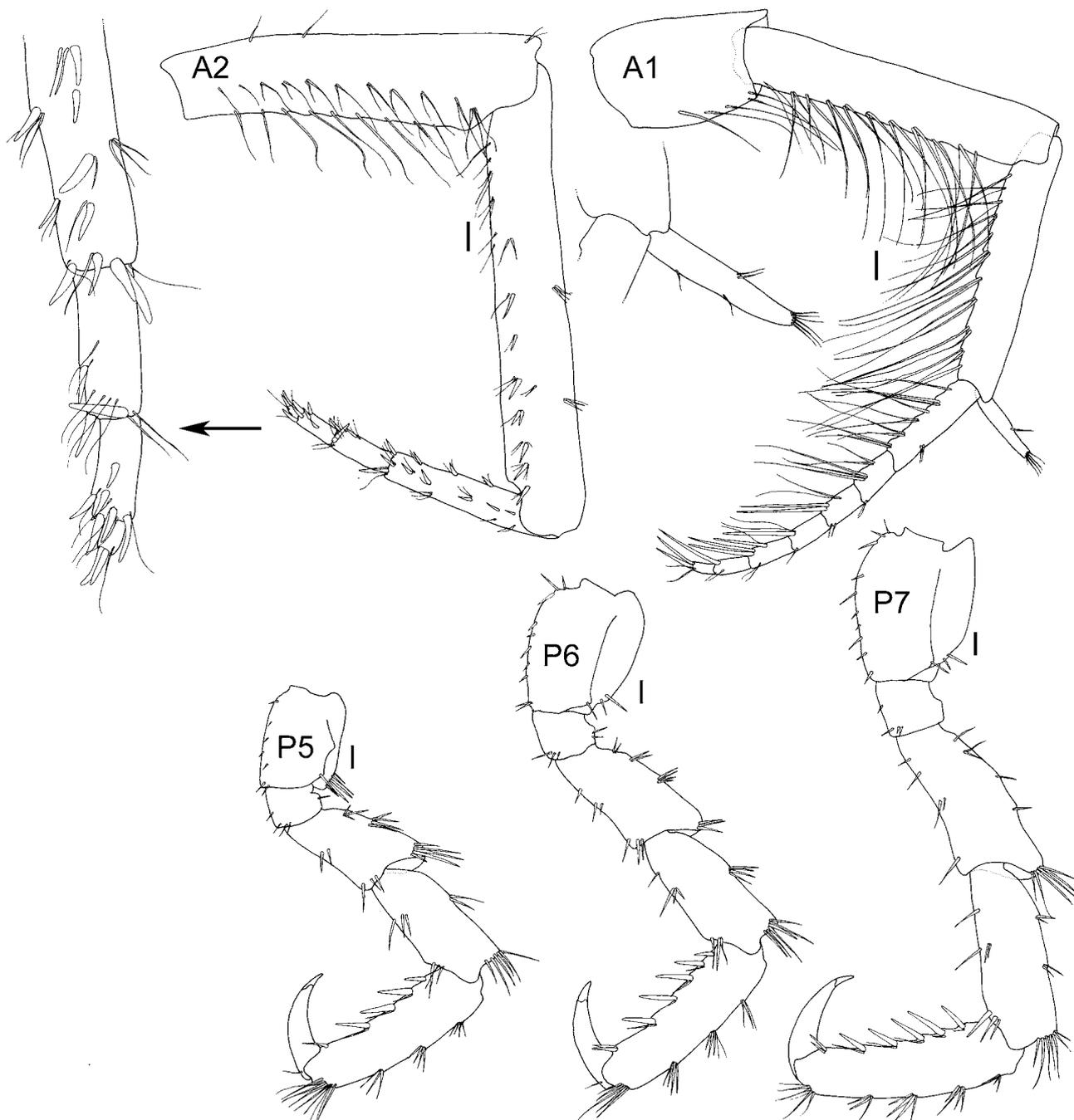


Figure 11. *Podocerus dentatus* (Haswell, 1879) male AM P.86162, 6.6 mm, Batemans Bay, New South Wales (scales represent 0.1 mm).

the length of inner ramus. *Uropod 3* uniramous; rami with row of slender setae. *Telson* dorsal lobe with 2 apical setae; lower margin without lateral or apical setae.

Female (sexually dimorphic characters) based on 1 ♀ female, AM P. 86163. *Gnathopod 1* basis anterior margin without robust setae; carpus rectilinear, 2.2 times as long as broad; propodus subtriangular, 1.9 times as long as broad, palm straight, defined by corner with 5 robust setae; dactylus with 4 serrate teeth. *Gnathopod 2* basis anterodistal corner rounded, with short robust seta; merus posterior margin lobe broad, 1.1 times as broad as long, apically rounded, with 4 robust setae; propodus subovate, 1.6 times as long as broad, anterior margin with clusters of long slender setae, palm convex, $\frac{2}{3}$ length of propodus, palm defining corner with tooth and 2 robust setae.

Variation. Male gnathopod 1 propodus palm robust setae: male 5.0 mm, AM P.86164, 6 robust setae; male 5.1 mm, AM P.86165, 5 robust setae; male 5.1 mm, AM P.86166, 9 robust setae.

Remarks. *Podocerus dentatus*, from Port Jackson, Sydney, was removed from the synonymy of *P. cristatus*, from New Zealand, by Lowry & Stoddart, 2003 based on the assessment of probable Haswell syntypes in the Australian Museum collection. Haswell's syntype series was assessed herein and confirmed as a distinct species. Syntype material is in a fragile condition and therefore specimens from a more recent collection are illustrated and described here.

The carination pattern along the dorsal margin of *P. dentatus* is shared by a group of four species, *P. crenulatus*

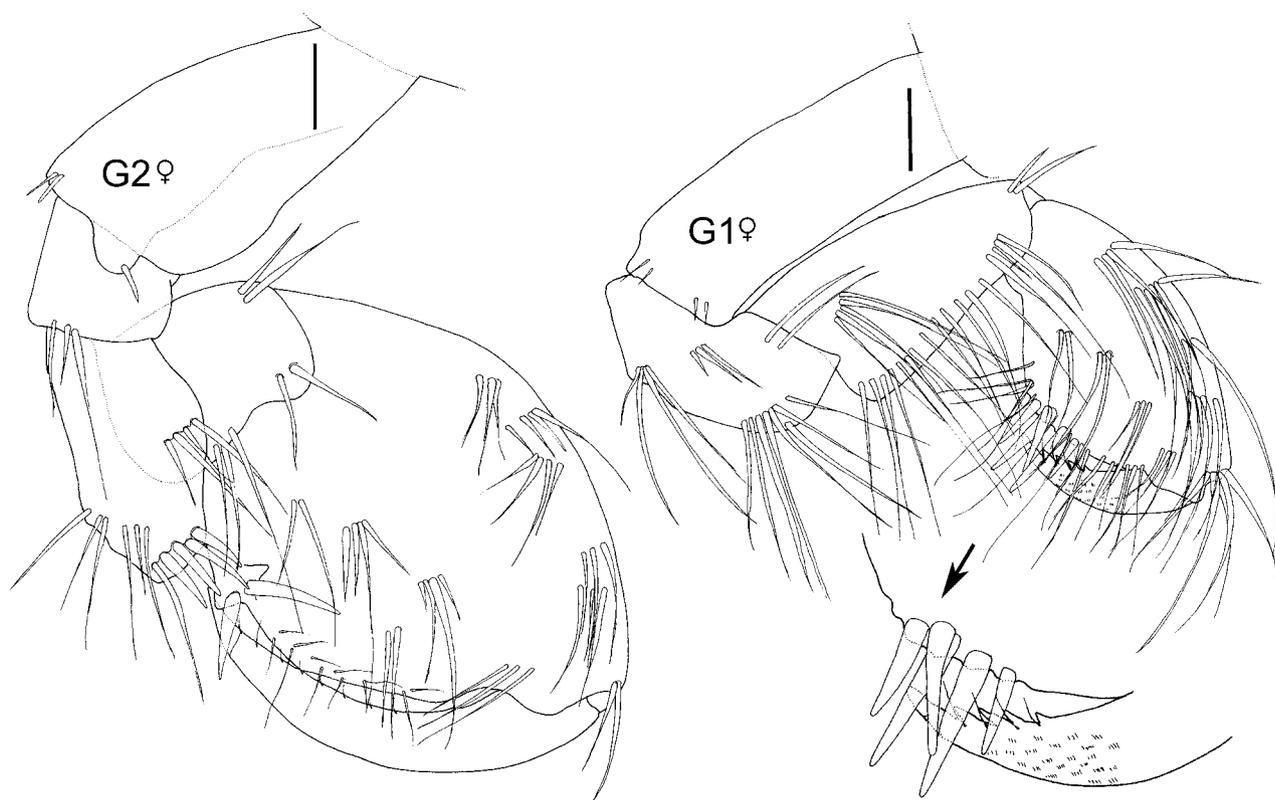


Figure 12. *Podocerus dentatus* (Haswell, 1879) female, AM P.86163, 6.6 mm, Batemans Bay, New South Wales (scales represent 0.1 mm).

Myers, 1985; *P. cristatus* (Thomson, 1879) *sensu stricto* and of Barnard, 1965 (from California); *P. kleidus* Thomas & Barnard, 1992 and *P. vulgaris* sp. nov.

Podocerus kleidus has a smooth head while other species in this group have a weak to well developed head bump. *Podocerus dentatus* can be separated from *P. crenulatus* by the uncrenulated male gnathopod 2 propodus palm margin.

Podocerus dentatus is most similar to, and sympatric with, *P. vulgaris* sp. nov. In *P. dentatus* the dorsal head bump is weakly developed, the male gnathopod 1 propodus palm has between 5–9 defining robust setae and gnathopod 2 propodus palm has 1 tooth, where *P. vulgaris* sp. nov. has a well developed head bump, gnathopod 1 and 2 propodus palm with no robust setae and 2 teeth, respectively.

It is difficult to assess the relationship of *P. dentatus* to *P. cristatus*. A recent search for the whereabouts of Thomson's types could not locate material (Portobello Marine Laboratory and Otago Museum, New Zealand). Material figured by Chilton 1926, fig. 2, from Cooks Strait, New Zealand, attributed to *P. cristatus* is clearly an undescribed species. New material of *P. cristatus* from New Zealand is required to better compare it to other species. Presently *P. cristatus* can be differentiated from *P. dentatus* by the male gnathopod 2 elongate basis and propodus.

Distribution. Australia. *New South Wales.* Clarke Island (Haswell, 1879), Bass Point, Ulladulla, Batemans Bay, Twofold Bay (current study). *Tasmania.* Cape Sorrel, St Helen's Rock, Bay of Fires, Freycinet Peninsula, Maria Island, Bruny Island, D'Entrecasteaux Channel, Forestier Peninsula, Tasman Peninsula (current study). *South Australia.* Fleurieu Peninsula, Kangaroo Island, Eyre Peninsula, Investigator Islands (current study). *Western Australia.* King George Sound, Recherche Archipelago (current study).

Podocerus hystrix Stebbing, 1910

Fig. 13–14

Podocerus hystrix Stebbing, 1910: 622, pl. 58.—Springthorpe & Lowry, 1994: 19–20.—Lowry & Stoddart, 2003: 246.—Griffiths, 1974: 322–323.

Type material. Syntypes 10 specimens, AM P.2535; 8 specimens, AM P.2536; 15 specimens, AM P.2537; 15 specimens, AM P.2538; 11 specimens, AM P.2539, various localities.

Type locality. 8 km east of Manning River (*Thetis* station 28); 2.5 km east of Port Hacking, (*Thetis* station 35); 3.5 km east of Botany Bay (*Thetis* station 37); 6 km east of Wattamolla (*Thetis* station 57), New South Wales, Australia.

Material examined. *New South Wales:* 1 SEM pin mounted specimen, AM P.78218; 1 female, 6.1 mm, dissected, 3 slides, AM P.86215, Wattamolla, east of Bate Bay (34°36'S 150°54'E), 35 m, 3 January 1991, coll. The Ecology Lab for RMI/Pioneer Project (BP 4-213); 1 SEM pin mounted specimen, AM P.78220, Wattamolla, east of Bate Bay (34°6'48"S 151°11'E), 45 m, 29 October 1990, coll. The Ecology Lab for RMI/Pioneer Project (T3-130); 1 specimen, AM P.77320, Cobblers, Bate Bay (34°7'S 151°10'E), 70 m, 29 October 1990, coll. The Ecology Lab for RMI/Pioneer Project (T3-135); 1 female specimen, AM P. 86167, off Providential Head, east of North Head, Port Jackson (34°8'S 151°8'30"E), 45 m, 29 October 1990, coll. The Ecology Lab for RMI/Pioneer Project (W3-79); many specimens, AM P.86083, Bass Point (34°36'S 150°54'E), 45–50 m, 1 February 1990, coll. The Ecology Lab for RMI/Pioneer Project (S1R1); 3 specimens, AM P.86084, Bass Point (34°36'S 150°54'E), 45–50 m, 1 February 1990, coll. The Ecology Lab for RMI/Pioneer Project (S1R1); 2 specimens, AM P.86085, Bass Point (34°36'S 150°54'E), 25–30 m, 1 February 1990, coll. The Ecology Lab for RMI/Pioneer Project (S1R5); 1 specimen, AM P.86086, off Providential Head, Wattamolla (34°08'S 151°08'30"E), 35–40 m, 11 January 1990, coll. The Ecology Lab for RMI/Pioneer Project (S2R1); 1 specimen, AM P.86087, off Providential Head, Wattamolla (34°08'S 151°08'30"E), 45–50 m, 11 January 1990, coll. The Ecology Lab for RMI/Pioneer Project (S1R2); 1 specimen, AM P.86088, off Providential Head,

Wattamolla (34°08'S 151°08'30"E), 45–50 m, January 1990, coll. The Ecology Lab for RMI/Pioneer Project (S2P2); 1 specimen, AM P.86089, off Providential Head, Wattamolla (34°08'S 151°08'30"E), 50 m, 11 January 1990, coll. The Ecology Lab for RMI/Pioneer Project (S2R2 D2A 0.5).—*Tasmania*: 2 specimens, AM P.83639, Cemetery Bluff, Adventure Bay, Bruny Island (43°20'S 147°19'30"E), 15 m, red algae with epiphytic Bryozoa, 23 April 1991, coll. R. Springthorpe and P. M. Berents (Tas 250).

Diagnosis. *Head* with single dorsal carina, apically rounded, recurved, produced anteriorly;

Pereonite 1 with dorsal two carina, first carina subtriangular, apically rounded produced anteriorly and second carina subtriangular, apically subacute, produced dorsally; with two pair of lateral projections, single pair of ventral projections. *Coxae 1–7* contiguous. *Pereonite 2* dorsal carina, produced evenly, subtriangular, apically rounded, with pair of lateral and ventral projections. *Pereonite 3* dorsal carina produced evenly, subtriangular, apically rounded, with lateral and ventral projections. *Pereonite 4* with lateral and ventral projections. *Pereonite 5* dorsal carina produced evenly, subtriangular, apically rounded, with lateral and ventral projections. *Pereonite 6–7* dorsal carina produced posteriorly, subtriangular, apically rounded, with lateral and ventral projection. *Pleonite 1–2* dorsal carina produced evenly, subtriangular, apically rounded, with lateral projections. *Uropod 2* ventromedial spine twice as long as broad. *Telson* dorsal lobe with six apical robust setae.

Description. Based on female, 6.1 mm, AM P.86215. *Body* cuticle processiferous, with dorsal and lateral carina along pereonites and pleonites. *Head* with single dorsal carina, apically rounded, recurved, produced anteriorly; *eyes* extremely bulging; anteroventral corner subquadrate. *Mandible* accessory setal row with 3 setae.

Pereonite 1 with dorsal two carina, first carina subtriangular, apically rounded produced anteriorly and second carina subtriangular, apically subacute, produced dorsally; with two pair of lateral projections, single pair of ventral projections. *Coxae 1–7* contiguous.

Gnathopod 1 coxa smaller than coxa 2, distoventral corner produced anteriorly, corner subacute; basis 2.5 times as long as broad, without anterodistal robust setae; carpus subrectangular, twice as long as broad; propodus subtriangular, twice as long as broad, anterior margin with clusters of long slender setae, palm smooth, without robust setae; dactylus posterior margin with 5 serrate teeth, cuticle surface with raised serrations, closing along palm. *Pereonite 2* dorsal carina, produced evenly, subtriangular, apically rounded, with pair of lateral and ventral projections. *Gnathopod 2* basis 2.2 times as long as broad, anterior distal corner with rounded lobe, with 1 robust seta; merus anterior lobe produced as broad as long, apically rounded with 1 robust seta; propodus subovate, 1.8 times as long as broad, palm smooth, $\frac{2}{3}$ length of propodus, slightly convex, without distal shelf, palm defined by corner with 2 robust setae. *Pereonite 3* dorsal carina produced evenly, subtriangular, apically rounded, with lateral and ventral projections. *Pereonite 4* without dorsal carina, with lateral and ventral projections. *Pereonite 5* dorsal carina produced evenly, subtriangular, apically rounded, with lateral and ventral projections. *Pereonite 6–7* dorsal carina produced posteriorly, subtriangular, apically rounded, with lateral and ventral projection.

Pleonite 1 dorsal carina produced evenly, subtriangular, apically rounded, with lateral projections; *epimeron 1* posteroventral corner rounded. *Pleonite 2* dorsal carina

produced evenly, subtriangular, apically rounded, with lateral projections; *epimera 2–3* posteroventral corner rounded. *Urosome* with three pairs of uropods. *Urosomite 1* elongate, 3 times as long as broad. *Uropod 1* peduncle 4 times as long as broad, with well developed ventromedial spine twice as long as broad; inner ramus 1.2 times peduncle length, outer ramus slightly shorter than inner ramus. *Uropod 2* well developed, biramus; ventromedial spine twice as long as broad; outer ramus $\frac{3}{4}$ length of inner ramus. *Uropod 3* uniramus, without apical setae. *Telson* dorsal lobe with six apical robust setae; lower lateral margin with 3 pair of short slender setae.

Remarks. The head with anterior recurved carina readily distinguishes *P. hystrix* from other *Podocerus*.

Distribution. Australia. *New South Wales*. Manning River, Port Hacking, Port Jackson, Bate Bay, Bass Point, Wattamolla (Stebbing, 1910; current study). *Tasmania*. Bruny Island (current study).

Podocerus inconspicuus (Stebbing, 1888)

Figs 15–17

Platophium inconspicuum Stebbing, 1888: 1194, pl. 131.
Podocerus inconspicuus Stebbing, 1906: 702.—Stebbing, 1910: 650.—Lowry & Stoddart, 2003: 246.
 not *Podocerus inconspicuus*.—Pirlot, 1938: 28, fig. 160.—Nagata, 1965: 322, fig. 43.

Type locality. Off Port Jackson, New South Wales, Australia.

Material examined. *New South Wales*. male, 5.0 mm, dissected, 2 slides, AM P.86557; female specimen, 5.4 mm, dissected, 1 slide, AM P.86558, off Providential Head, Wattamolla (34°8'S 151°8'30"E), 45 m, 29 October 1990, coll. The Ecology Lab for RMI/Pioneer Project (W3-79); 1 SEM pin mounted specimen, AM P.78216, off Providential Head, Wattamolla (34°8'S 151°8'30"E), 45 m, 29 October 1990, The Ecology Lab for RMI/Pioneer Project (W3-77); b female, 4.6 mm, dissected, 1 slide, AM P.86210, off Providential Head, Wattamolla (34°8'S 151°8'30"E), 45 m, 29 October 1990, The Ecology Lab for RMI/Pioneer Project (W3-77); 5 specimens, AM P.86559, off Providential Head, Wattamolla (34°8'S 151°8'30"E), 45 m, 29 October 1990, The Ecology Lab for RMI/Pioneer Project (W3-77); 1 specimen, AM P.86560, off Providential Head, Wattamolla (34°8'S 151°8'30"E), 45–50 m, 29 October 1990, coll. The Ecology Lab for RMI/Pioneer Project (W3-79); male, 4.9 mm, dissected, 2 slides, AM P.86561, 1 Z female specimen, dissected, 1 slide, AM P.86211, 6 female specimens, AM P.86562, off Providential Head, Wattamolla, Bate Bay (34°8'S 151°8'30"E), 45 m, 29 October 1990, The Ecology Lab for RMI/Pioneer Project (W3-77); 2 female specimens, AM P.86174, off Providential Head, Wattamolla, Bate Bay (34°8'S 151°8'30"E), 45 m, 29 October 1990, coll. The Ecology Lab for RMI/Pioneer Project (T3-79); 1 female specimen, AM P.86170, off Providential Head, Wattamolla, Bate Bay (34°8'S 151°8'30"E), 29 October 1990, coll. The Ecology Lab for RMI/Pioneer Project (T3-87); 1 female specimen, AM P.86173, off Providential Head, Wattamolla, Bate Bay (34°8'S 151°8'30"E), 29 October 1990, coll. The Ecology Lab for RMI/Pioneer Project (T3-83); 1 juv. male and 2 female specimens, AM P.86172, off Providential Head, Wattamolla, Bate Bay (34°8'S 151°8'30"E), 14 November 1990, coll. The Ecology Lab for RMI/Pioneer Project (T3-81); 1 specimen, AM P.77321, off Providential Head, Wattamolla, Bate Bay (34°8'S 151°8'30"E), 70 m, 29 October 1990, The Ecology Lab for RMI/Pioneer Project (T3-85); 1 specimen, AM P.86171, off Providential Head, Wattamolla, Bate Bay (34°8'S 151°8'30"E), 70 m, 29 October 1990, The Ecology Lab for RMI/Pioneer Project (T3-87); 2 specimens, AM P.86175, Off Providential Head, Wattamolla, (34°8'S 151°8'30"E), 45–50 m, Smith McIntyre grab, coll. The Ecology Lab for Ready Mixed Industries, 29 October to 14 November 1990 (3-83); 1 specimen, AM P.861690, Bass Point, (34°36'S 150°54'E) 35–40 m, Smith McIntyre grab, coll. The Ecology Lab for Ready Mixed Industries, 3 January to 18 January 1991 (BP4-213); 1 specimen, AM P.46600, off Providential Head, Wattamolla (34°08'S 151°08'30"E), 25–30 m, 11 January 1990, coll. The Ecology Lab for RMI/Pioneer Project (S2R3); 3 specimens, AM P.46689, off Providential Head, Wattamolla (34°08'S 151°08'30"E), 35–40 m, 11 January 1990, coll. The

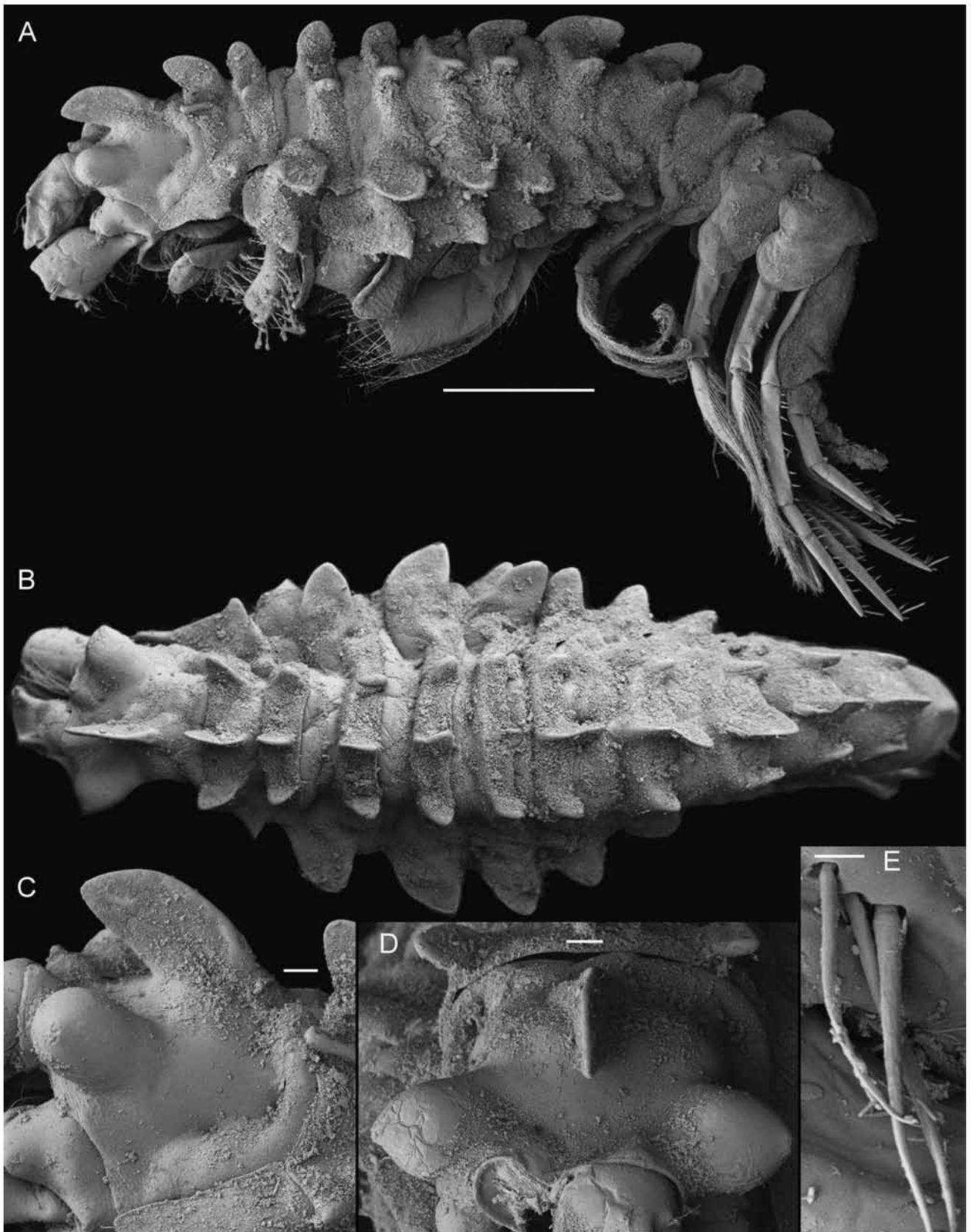


Figure 13. *Podocerus hystrix* Stebbing, 1910 female specimen, AM P.78218, Bate Bay, New South Wales. SEM photographs: (A) whole animal lateral view; (B) whole animal dorsal view (scale 1 mm); (C) head lateral view (scale 100 μ m); (D) head frontal view (scale 100 μ m); and (E) gnathopod 2 propodus palm plumose setae (scale 20 μ m).

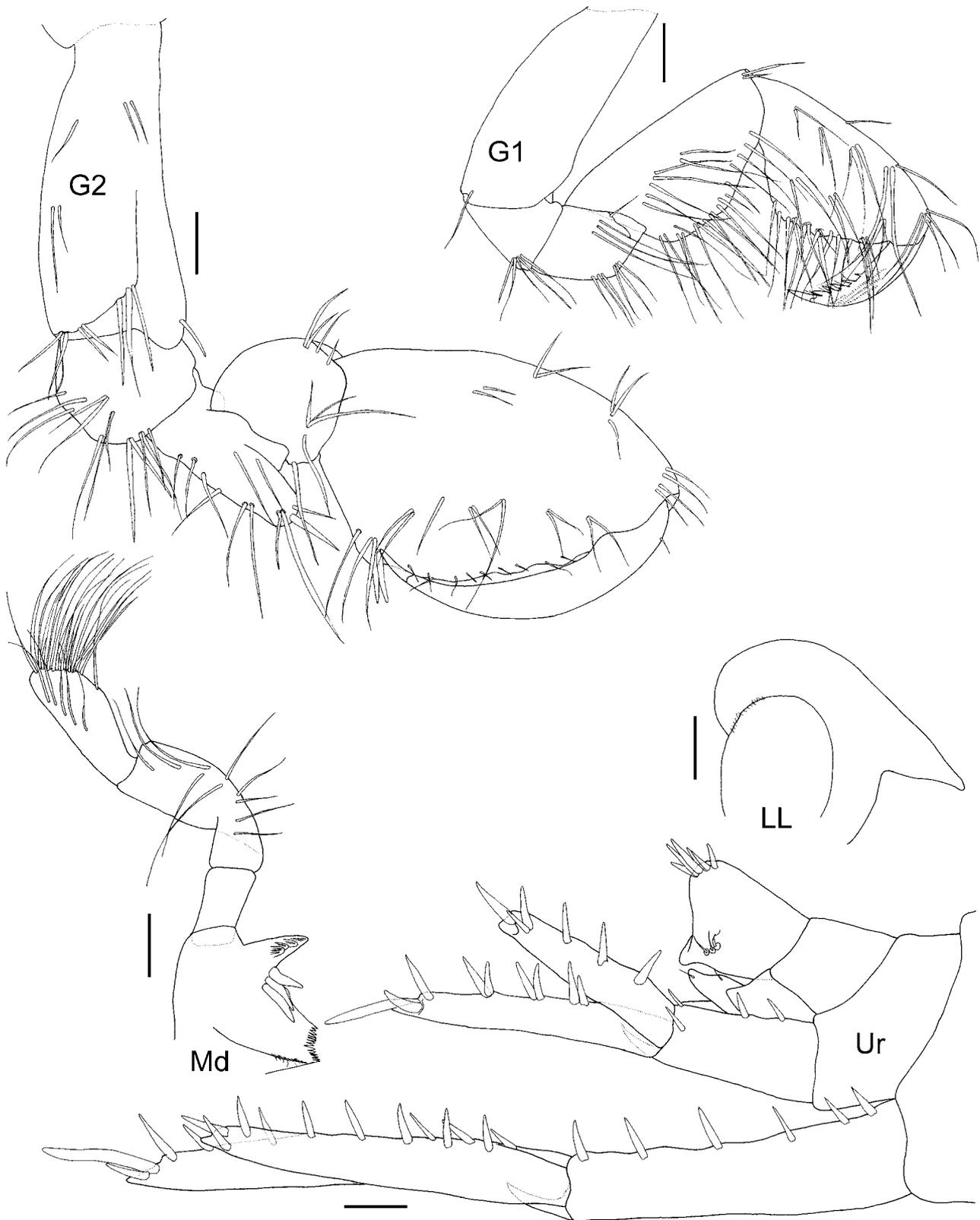


Figure 14. *Podocerus hystrix* Stebbing, 1910 female, AM P.86215, 6.1 mm, Bate Bay (scales represent 0.1 mm).

Ecology Lab for RMI/Pioneer Project (S2R1); 1 specimen, AM P.52931, Bass Point (34°36'S 150°54'E), 25–30 m, Jun 1990, coll. The Ecology Lab for RMI/Pioneer Project (S2R3); 2 specimens, AM P.86075, off Providential Head, Wattamolla (34°08'S 151°08'30"E), 50 m, 1990, coll. The Ecology Lab for RMI/Pioneer Project (S2R1 Deep); 2 specimens, AM P.86077, Bass Point (34°36'S 150°54'E), 45–50 m, 01 February 1990, coll. The Ecology Lab for RMI/Pioneer Project (S1R3); 2 specimens, AM P.86078, off Providential Head, Wattamolla (34°08'S 151°08'30"E),

45–50 m, 11 January 1990, coll. The Ecology Lab for RMI/Pioneer Project (S2R4); 1 specimen, AM P.86079, off Providential Head, Wattamolla (34°08'S 151°08'30"E), 35–40 m, 11 January 1990, coll. The Ecology Lab for RMI/Pioneer Project (S2P3); 2 specimens, AM P.86080, Bass Point (34°36'S 150°54'E), 35–40 m, 1 February 1990, coll. The Ecology Lab for RMI/Pioneer Project (S2R1); many, AM P.86081, off Providential Head, Wattamolla (34°08'S 151°08'30"E), 45–50 m, 11 January 1990, coll. The Ecology Lab for RMI/Pioneer Project (S1R2); many, AM P.86082, Bass

Point (34°36'S 150°54'E), 45–50 m, 1 February 1990, coll. The Ecology Lab for RMI/Pioneer Project (S1R1); 2 specimens, AM P.86076, off Providential Head, Wattamolla (34°08'S 151°08'30"E), 35–40 m, 11 January 1990, coll. The Ecology Lab for RMI/Pioneer Project; 1 specimen, AM P.86091, south east of Bermagui (36°26'S 150°14'06"E), 122 m, 5 Sep 1994, coll. FRV *Southern Surveyor* (SS05/94/155).

Diagnosis. *Pereonite 1* dorsal carina produced dorsally as two well developed humps, lateral and ventral projections absent. *Pereonite 2* dorsal carina produced evenly, subtriangular, apically rounded. *Gnathopod 1* propodus subtriangular with 5 robust setae near corner of palm. *Gnathopod 2* propodus subovoid elongate, palm acute, concave, with one distal subquadrate tooth and a small palm defining tooth, without palm defining setae. *Pereonite 3* dorsal carina produced posteriorly, subtriangular, apically rounded, lateral projections present. *Pereonites 4–7* dorsal carina produced posteriorly, subtriangular, apically subacute, lateral projections present.

Pleonites 1–2 dorsal carina subtriangular, produced posteriorly, apically rounded, lateral projections present. *Uropod 2* ventromedial spine as long as broad.

Female *Gnathopod 1* carpus rectilinear, 2.1 times as long as broad; propodus elongate, subtriangular, produced distally, 2.4 times as long as broad. *Gnathopod 2* defined by tooth and 5 robust setae.

Description. Based on male, 5.0 mm. AM P.86557. *Body* cuticle dorsally processiferous, with mainly posterior dorsal carina, without lateral and ventral carina. *Head* with well developed hump; *eyes* greatly bulging; lateral cephalic lobe subquadrate; anteroventral corner subquadrate. *Mandible* accessory setal row with 3 setae. *Maxilla 1* palp distal margin with 4 robust setae. *Pereonite 1* dorsal carina produced dorsally as two well developed humps, lateral and ventral projections absent. *Pereonite 2* dorsal carina produced evenly, subtriangular, apically rounded. *Coxae 1–3* discontinuous, *coxae 4–7* contiguous. *Gnathopod 1* coxa as broad as long, distoventral corner produced anteriorly, anteroventral corner subacute; basis 3 times as long as broad, with a few long slender anterodistal setae; carpus rectilinear, 2.3 times as long as broad; propodus subtriangular, twice as long as broad, anterior margin with clusters of long slender setae, palm margin smooth, with 5 robust setae near corner of palm; dactylus posterior margin with 5 serrate teeth, cuticle surface smooth, closing along palm. *Gnathopod 2* basis 2.2 times as long as broad, anterodistal corner rounded produced lobes, with short robust setae; merus posterior margin with narrow produced lobe, as long as broad, apically acute; propodus subovoid elongate, 3 times as long as broad, anterior margin with clusters of long slender robust setae, palm acute, concave, $\frac{2}{3}$ length of propodus, with broad, well developed distal shelf, shelf margin crenulated, with one distal subquadrate tooth and a small palm defining tooth, without palm defining setae; dactylus closing along palm.

Pereonite 3 dorsal carina produced posteriorly, subtriangular, apically rounded, lateral projections present. *Pereonites 4–7* dorsal carina produced posteriorly, subtriangular, apically subacute, lateral projections present.

Pleonites 1–2 dorsal carina subtriangular, produced posteriorly, apically rounded, lateral projections present; *Epimera 1–3* rounded. *Urosome* with 3 pair of uropods. *Urosomite 1* short, twice as long as broad. *Uropod 1* peduncle elongate, 4 times as long as broad, with well developed ventromedial spine twice as long as broad; inner ramus 1.1 times peduncle length; outer ramus about $\frac{3}{4}$ length of inner

ramus. *Uropod 2* well developed, biramus; ventromedial spine as long as broad; outer ramus about half the length of inner ramus. *Uropod 3* uniramus; rami with 2 apical setae. *Telson* dorsal lobe with 2 apical setae, lower margin without lateral or apical setae.

Female (sexually dimorphic characters) based on female specimen, 5.4 mm, AM P.86558. *Gnathopod 1* basis anterior margin with 3 robust setae; carpus rectilinear, 2.1 times as long as broad; propodus elongate, subtriangular, produced distally, 2.4 times as long as broad, palm with 5 robust setae; dactylus posterior margin with 3 serrate teeth. *Gnathopod 2* basis anterodistal corner rounded, with short robust setae; merus posterior margin broad, as broad as long, apically rounded, with 3 short robust setae; propodus subovate, twice as long as broad, anterior margin with a few long slender setae, palm straight, without distal shelf, defined by tooth and 5 robust setae.

Remarks. This is the first description of a male specimen from near the type locality. The original description of *P. inconspicuus* from a single female specimen has led to much confusion.

Pirlot 1938 figured male and female specimens attributed to *P. inconspicuus* from Sulawesi. However when compared to the material illustrated here from closer to the type locality, Pirlot's male specimen is less setose along the gnathopod 2 propodus palm and does not have the small posterior proximal tooth. Therefore it appears that the Pirlot material is not *P. inconspicuus*, although a closely related fauna. Pirlot 1938 also placed *P. palinuri* K. H. Barnard 1916 into synonymy with *P. inconspicuus*, however *P. palinuri* is reinstated here as a valid species, due to the variation in the male gnathopod 2 propodus sculpting as outlined in growth stages in K. H. Barnard 1937. Material of *P. inconspicuus* illustrated by Nagata 1965 from Japan does not have sufficient sculpting along the male gnathopod 2 palm and is also removed from synonymy.

Podocerus inconspicuus is similar to *P. oliphant* sp. nov. in the sculpting of the male gnathopod 2 propodus, however the later species has less pronounced lateral carinations and a more developed head bump.

Distribution. Australia. *New South Wales*. Port Jackson, Bate Bay, Bass Point, Wattamolla, Bermagui (Stebbing, 1888; current study).

Podocerus lobatus (Haswell, 1885)

Figs 18–21

Dexiocerella lobata Haswell, 1885: 110, pl. 18, figs 6–8.

Cyrtophium lobatum.—Chevreux and Guerne, 1888: 627.

Platophium l.—Stebbing, 1888: 1184.

Platophium orientale.—Della Valle, 1893: 333.

Podocerus lobatus.—Stebbing, 1899: 239.—Pirlot, 1938:

358, fig. 161.—Springthorpe & Lowry, 1994: 128.—

Lowry & Stoddart, 2003: 246.

Type material. Whereabouts unknown, presumed lost (Springthorpe and Lowry, 1994). Neotype, male, 4.2 mm, dissected, 4 slides, AM P.86212, east of South Head, Port Jackson, New South Wales (33°50'S 151°18'E), 23 m, host sponge: *Holopsamma flavus*, February 1973, coll. Australian Museum Shelf Benthic Survey.

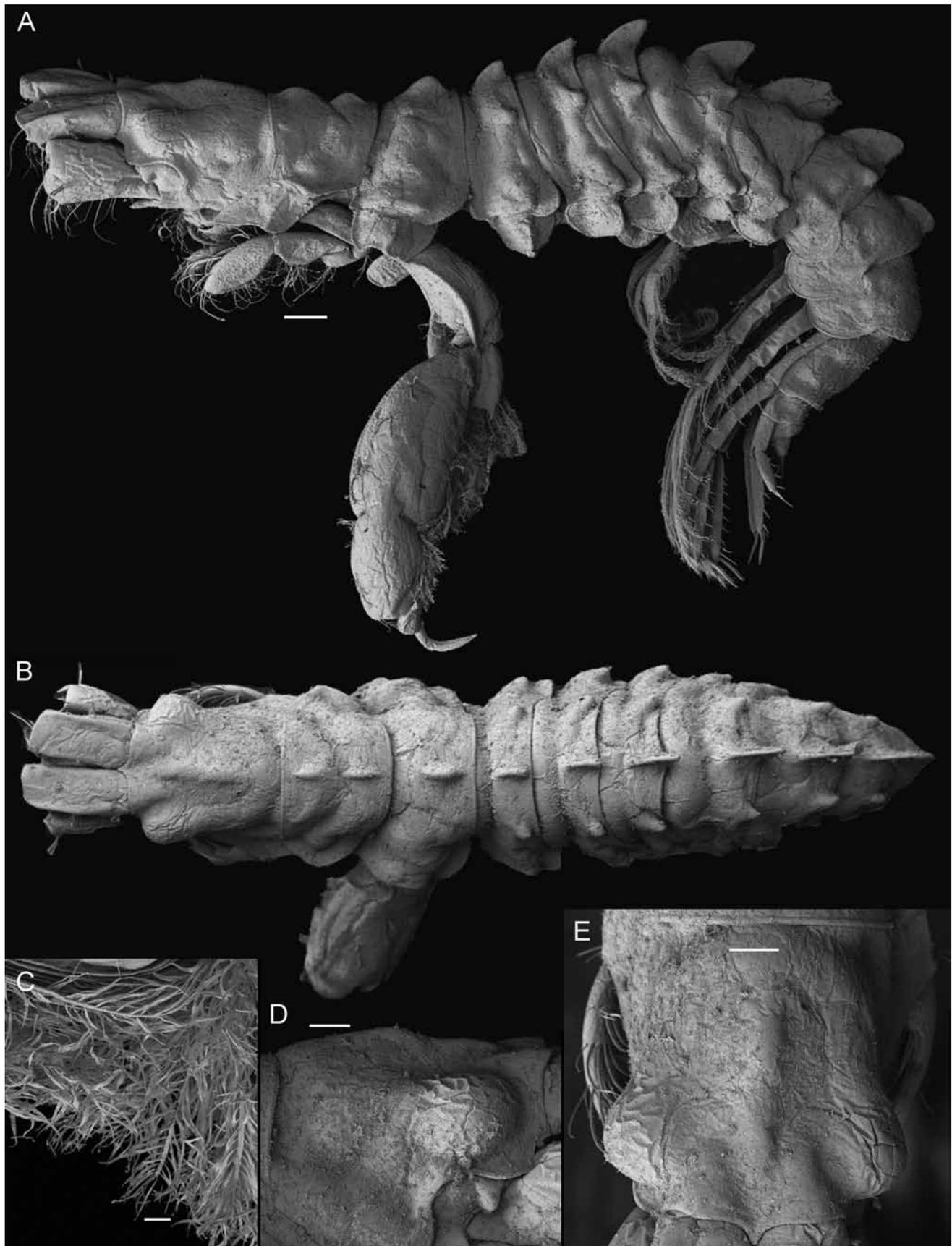


Figure 15. *Podocerus inconspicuus* (Stebbing, 1888) male specimen, AM P.78216, Bate Bay, New South Wales. SEM photographs: (A) whole animal lateral view; (B) whole animal dorsal view (scale 200 μm); (C) gnathopod 2 propodus palm plumose setae (scale 20 μm); (D) head lateral view (scale 100 μm); (E) head dorsal view (scale 100 μm).

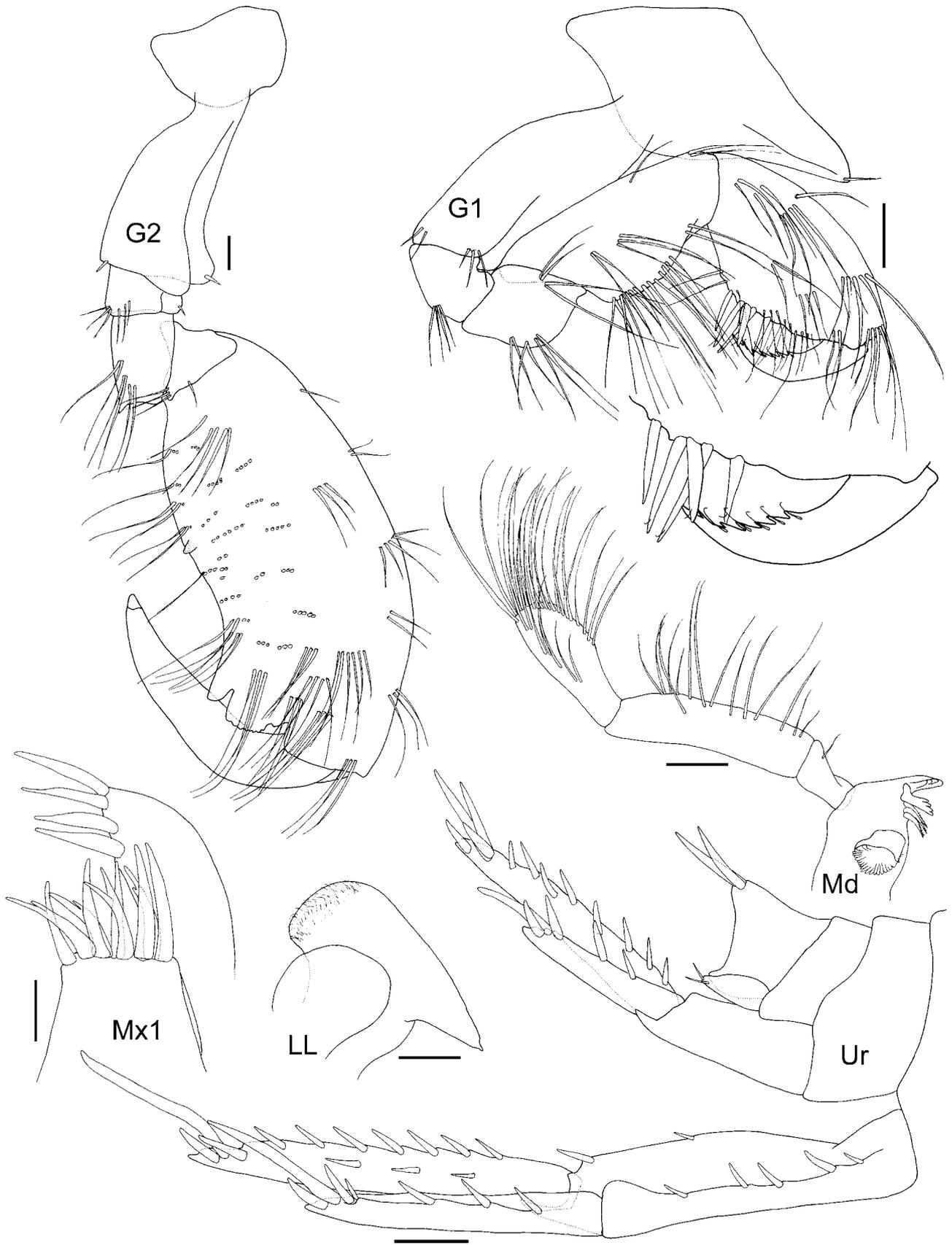


Figure 16. *Podocerus inconspicuus* (Stebbing, 1888) male, AM P.86557, 5.0 mm, Bate Bay, New South Wales (scales represent 0.1 mm).



Figure 17. *Podocerus inconspicuus* (Stebbing, 1888) female, AM P.86558, 5.4 mm, Bate Bay, New South Wales (scales represent 0.1 mm).

Type locality. East of South Head, Port Jackson, New South Wales, Australia (33°50'S 151°18'E).

Additional material examined. *New South Wales.* Male, 3.5 mm, dissected, 1 slide, AM P.86564; 1 female specimen, 4.9 mm, dissected, 1 slide, AM P.86176; 20 specimens, AM P.22276, east of South Head, Port Jackson (33°50'S 151°18'E), 23 m, host sponge: *Holopsamma flavus*, February 1973, coll. Australian Museum Shelf Benthic Survey; 1 SEM pin mounted specimen, AM P.78214, Port Jackson (33°49'S 151°20'E), 25 m, host sponge: *Holopsamma flavus*, February 1973, coll. Australian Museum Shelf Benthic Survey; 1 SEM pin mounted specimen, AM P.78215, Port Jackson (33°49'S 151°20'E), 25 m, host sponge: *Holopsamma flavus*, February 1973, coll. Australian Museum Shelf Benthic Survey; 20 specimens, AM P.22277, east of South Head, Port Jackson (33°50'S 151°18'E), 23 m, host sponge: *Holopsamma flavus*, February 1973, coll. Australian Museum Shelf Benthic Survey; 25 specimens, AM P.22280, east of North Head, Port Jackson (33°49'S 151°20'E), 25 m, host sponge: *Holopsamma flavus*, February 1973, coll. Australian Museum Shelf Benthic Survey; 4 specimens, AM P.77138, southern end of Lighthouse Reef, Ulladulla (35°22'8"S 150°29'18"E), 16 m, bryozoan, 30 April 1997, coll. P. B. Berents and K. B. Attwood (NSW 1267); many specimens, AM P.77152, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 17 m, airlift over rock wall, 1 May 1997, coll. P. B. Berents, K. B. Attwood and A. Murray (NSW 1282); 1 a male specimen, 3.5 mm, dissected, 4 slides AM P.86177, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 16 m, bryozoans *Catenicella plagiostoma* and *Orthoscuticella* sp., 1 May 1997, coll. P. B. Berents (NSW 1284); 1 b female specimen, 3.1 mm, dissected, 1 slide, AM P.86178, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 16 m, bryozoans *Catenicella plagiostoma* and *Orthoscuticella* sp., 1 May 1997, coll. P. B. Berents (NSW 1284); many specimens, AM P.77154, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 16 m, bryozoans *Catenicella plagiostoma* and *Orthoscuticella* sp., 1 May 1997, coll. P. B. Berents (NSW 1284); many specimens, AM P.77158, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 18 m, sponge and gorgonacean, 1 May 1997, coll. K. B. Attwood (NSW 1286); many specimens, AM P.77170, Halfway Reef, 200 m south of Sullivan Reef, Ulladulla (35°21'25"S 150°29'18"E), 12 m, bryozoan under ledge, 3 May 1997, coll. P. B. Berents (NSW 1311); many specimens, AM P.77171, Halfway Reef, 200 m south of Sullivan Reef, Ulladulla (35°21'25"S 150°29'18"E), 12 m, bryozoan under ledge *Margaretta barbata*, 3 May 1997, coll. P. B. Berents (NSW 1315); 7 specimens, AM P.86179, Clovelly Bay, Sydney (33°55.01'S 151°15.98'E), 6 m, brown alga *Sargassum* sp., 16 December 1999, coll. R. Peart and K.

Dempsey (syd-13, NSW 1692); 2 specimens, AM P.84129, Clovelly Bay, Sydney (33°55.01'S 151°15.98'E), 6 m, brown alga *Sargassum* sp., 16 December 1999, coll. R. Peart and K. Dempsey (syd-14, NSW 1693); 1 specimen, AM P.86180, Clovelly Bay, Sydney (33°55.01'S 151°15.98'E), 6 m, *Sargassum* sp., 16 December 1999, coll. R. Peart and K. Dempsey (syd-15, NSW 1694); 3 specimens, AM P.86181, Clovelly Bay, Sydney (33°55.01'S 151°15.98'E), 6 m, brown alga, *Sargassum* sp., 16 December 1999, coll. R. Peart and K. Dempsey (syd-17, NSW 1696); 5 specimens, AM P.86182, Clovelly Bay, Sydney (33°55.01'S 151°15.98'E), 6 m, brown alga *Sargassum* sp., 16 December 1999, coll. R. Peart and K. Dempsey (syd-20, NSW 1699); 1 specimen, AM P.86186, Clovelly Bay, Sydney (33°55.01'S 151°15.98'E), 6 m, brown alga *Padina* sp., 16 December 1999, coll. R. Peart and K. Dempsey (syd-22, NSW 1701); 1 specimen, AM P.86183, Clovelly Bay, Sydney (33°55.01'S 151°15.98'E), 6 m, fine brown weed., coll. R. Peart and K. Dempsey, 19 January 2000 (syd-35, NSW 1714); 2 specimens, AM P.86184, off Harbord Baths, Sydney (33°46.99'S, 151°17.61'E), 5 m, mixed browns and *Dictyota* sp., coll. R. Peart and K. Dempsey, 18 January 2000 (syd-26, NSW 1705); 2 specimens, AM P.86185, off Harbord Baths, Sydney (33°46.99'S, 151°17.61'E), 5 m, mixed browns and *Sargassum* sp., coll. R. Peart and K. Dempsey, 18 January 2000 (syd-27; NSW 1706).—*Western Australia.* male, 4.0 mm, dissected, 1 slide, AM P.86187, Arthur Head, off end of South Mole, Fremantle (32°3'S 115°44'E), 6 m, orange gorgonacean, 25 December 1983, coll. R. Springthorpe (WA 286); 50+ specimens, AM P.79827 many specimens, Arthur Head, off end of South Mole, Fremantle (32°3'S 115°44'E), 6 m, orange gorgonacean, 25 December 1983, coll. R. Springthorpe (WA 286); 2 specimens, South Mole, Port Harding Torbay, Fremantle (32°3'S 115°44'E), 6 m, spirorbid polychaete tubes, 25 December 1983, coll. J. K. Lowry (WA 283); 1 specimens, NMV J57055, 1 km offshore of Seven Mile Beach, north of Dongara (29°12'00"S 114°53'00"E), 8 m, 27 April 1986 (SWA 100).

Diagnosis. *Head* with weak hump. *Gnathopod 1* propodus subrectangular, without robust setae. *Gnathopod 2* basis 1.1 times as long as broad; propodus subovate, palm subequal in length to propodus, shelf margin strongly crenulate, with one proximal and one distal palm defining tooth, without robust setae. *Pereonites 3–4* dorsal carina narrow, produced evenly. *Pereonite 5* dorsal carina narrow, produced posteriorly. *Pereonites 6–7* dorsal carina broad, produced posteriorly. *Pleonite 1* dorsal carina broad, produced evenly.

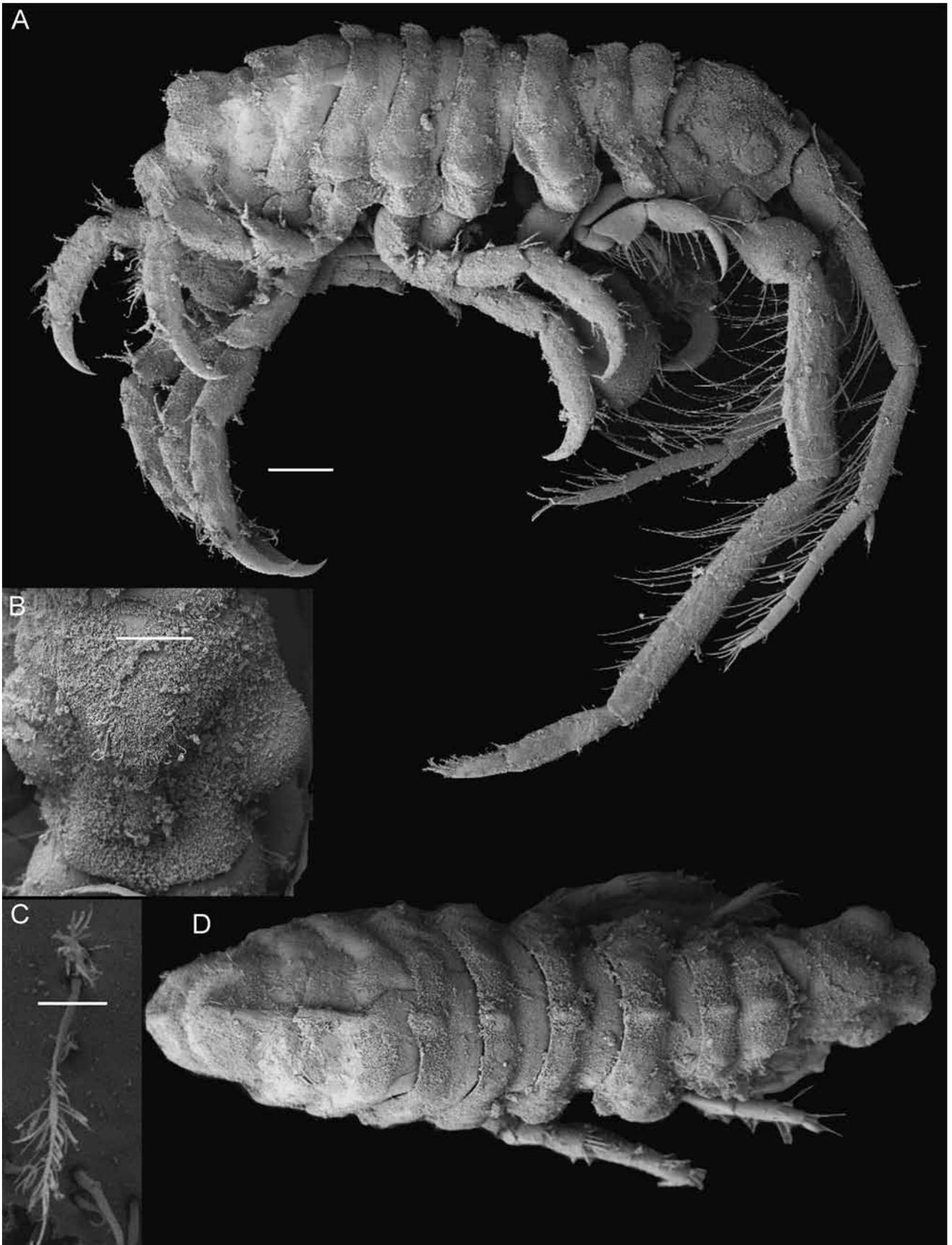


Figure 18. *Podocerus lobatus* (Haswell, 1885) male specimen, AM P.78214, Port Jackson, New South Wales. SEM photographs: (A) whole animal lateral view (scale 200 μ m); (B) head dorsal view (scale 100 μ m); (C) gnathopod 2 propodus palm plumose setae (scale 20 μ m); and (D) whole animal dorsal view (scale 200 μ m).

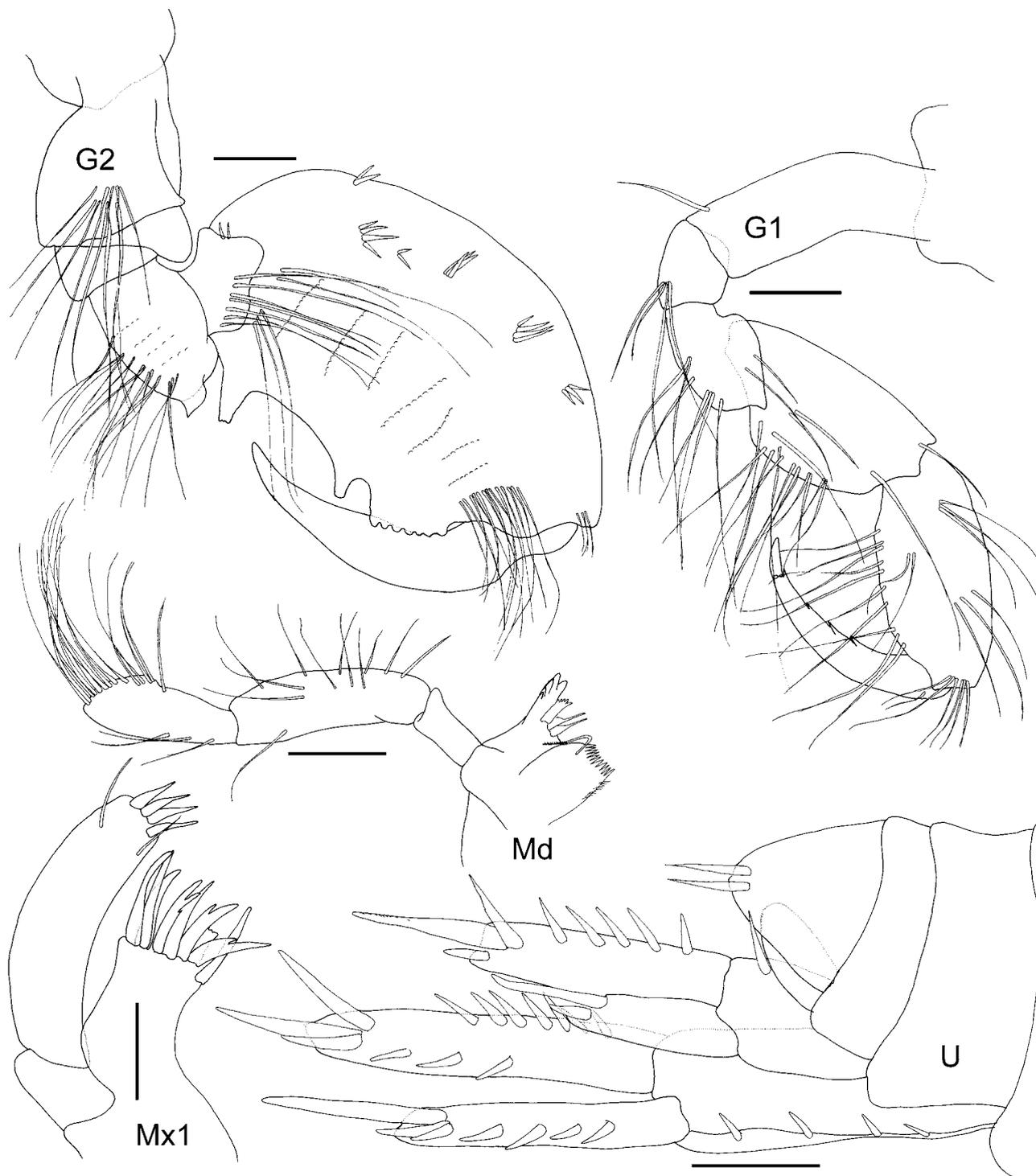


Figure 19. *Podocerus lobatus* (Haswell, 1885) neotype male, AM P.86212, 4.2 mm, Port Jackson, New South Wales (scales 0.1 mm).

Female. *Gnathopod 1* carpus rectilinear, twice as long as broad; propodus rectilinear, 2.1 times as long as broad. *Gnathopod 2* propodus spherical, as broad as long, palm convex, margin lined with humps, defined by tooth and 2 robust setae.

Description. Based on neotype, male, 4.2 mm, AM P.86212. *Body* cuticle dorsally rugose, with mainly posterior dorsal carina, laterally smooth. *Head* with weak hump; eyes greatly bulging; lateral cephalic lobe subquadrate; anteroventral corner subquadrate. *Antenna 1* between 0.8 times body

length; peduncle article 2 longer than article 3, primary flagellum 0.6 times peduncle length, with 4 articles; accessory flagellum 1-articulate, twice as long as broad. *Antenna 2* distinctly longer than antenna 1; flagellum about 0.2 times peduncle length; article 4 shorter than article 5; flagellum with 3 articles, posterior margin with line of short robust setae. *Mandible* accessory setal row with 2 setae. *Maxilla 1* palp distal margin with 4 robust setae.

Coxae 1–3 discontinuous, *coxae 4–7* contiguous. *Gnathopod 1* coxa subequal to coxa 2, as broad as long, distoventral corner not produced, anteroventral corner

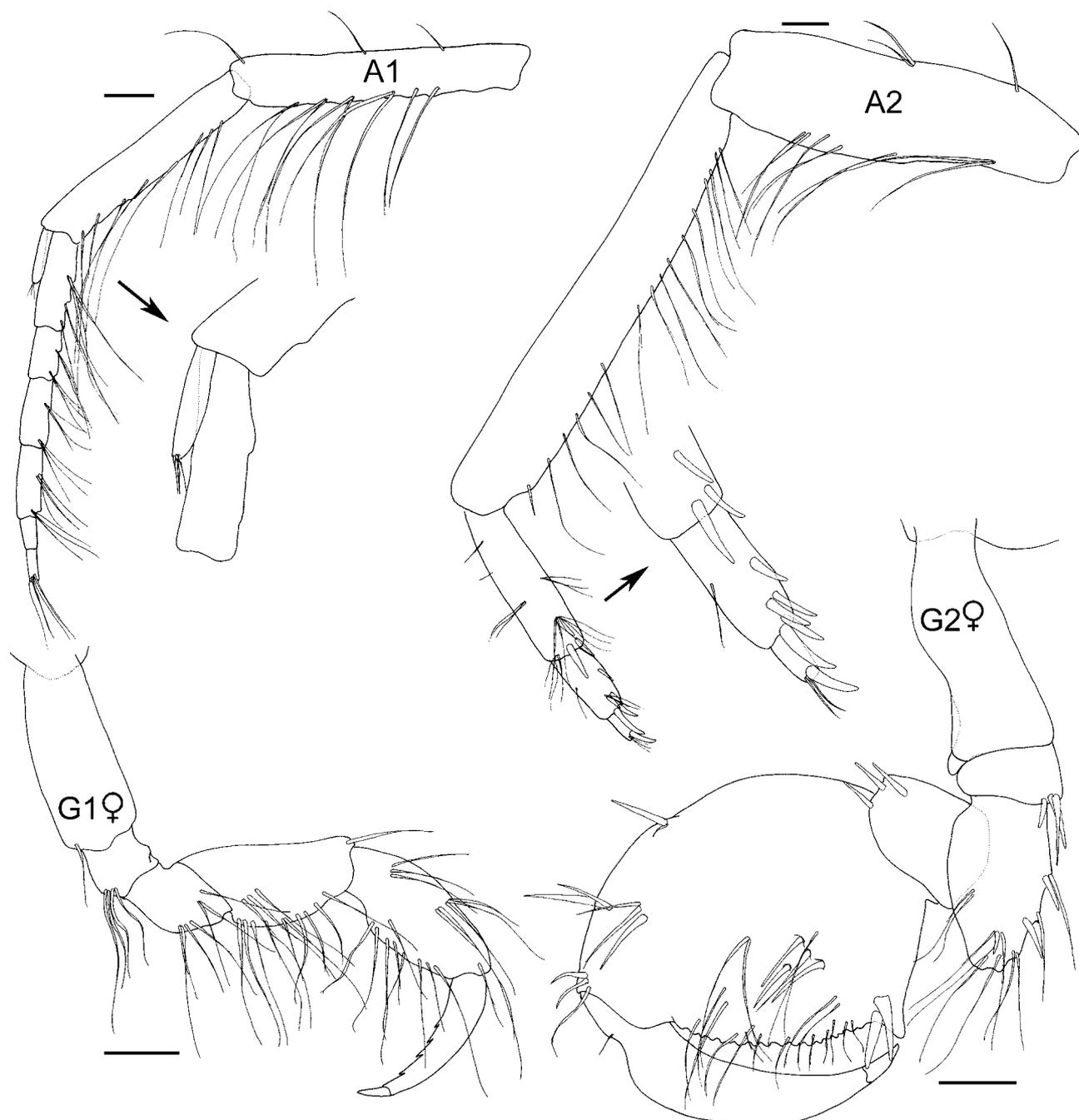


Figure 20. *Podocerus lobatus* (Haswell, 1885) female, AM P.86176, 4.9 mm, Port Jackson, New South Wales (scales represent 0.1 mm).

subacute; basis 3.1 times as long as broad, without anterodistal setae; carpus rectilinear, twice as long as broad; propodus subrectangular, 2.6 times as long as broad, anterior margin with clusters of long slender setae, palm margin smooth, without robust setae; dactylus posterior margin with 3 serrate teeth, cuticle surface smooth, closing along palm. *Pereonite 2* dorsal carina broad, produced evenly. *Gnathopod 2* basis 1.1 times as long as broad, anterodistal corner produced into rounded lobes, with clusters of plumose setae; merus posterior margin with narrow produced lobe, as long as broad, apically acute, without short robust setae; propodus subovate, 2.4 times as long as broad, anterior margin with clusters of long robust setae, propodus palm subacute, straight, palm subequal in length to propodus, with broad, well developed distal shelf, shelf margin strongly

crenulate, palm with one proximal and one distal palm defining tooth, without robust setae; dactylus closing short of palm. *Pereonites 3–4* dorsal carina narrow, produced evenly. *Pereonite 5* dorsal carina narrow, produced posteriorly. *Pereonites 6–7* dorsal carina broad, produced posteriorly.

Pleonite 1 dorsal carina broad, produced evenly. *Epimera 1–3* rounded. *Urosome* with 3 pairs uropods. *Urosomite 1* short, twice as long as broad. *Uropod 1* peduncle 3 times as long as broad, without ventromedial spine; inner ramus subequal in lengths to peduncle; outer ramus about $\frac{3}{4}$ length of inner ramus. *Uropod 2* well developed; biramus, without ventromedial spine; outer ramus about half the length of inner ramus. *Uropod 3* uniramus; rami without setae. *Telson* dorsal lobe with 2 apical setae; lower margin without lateral setae or apical setae.

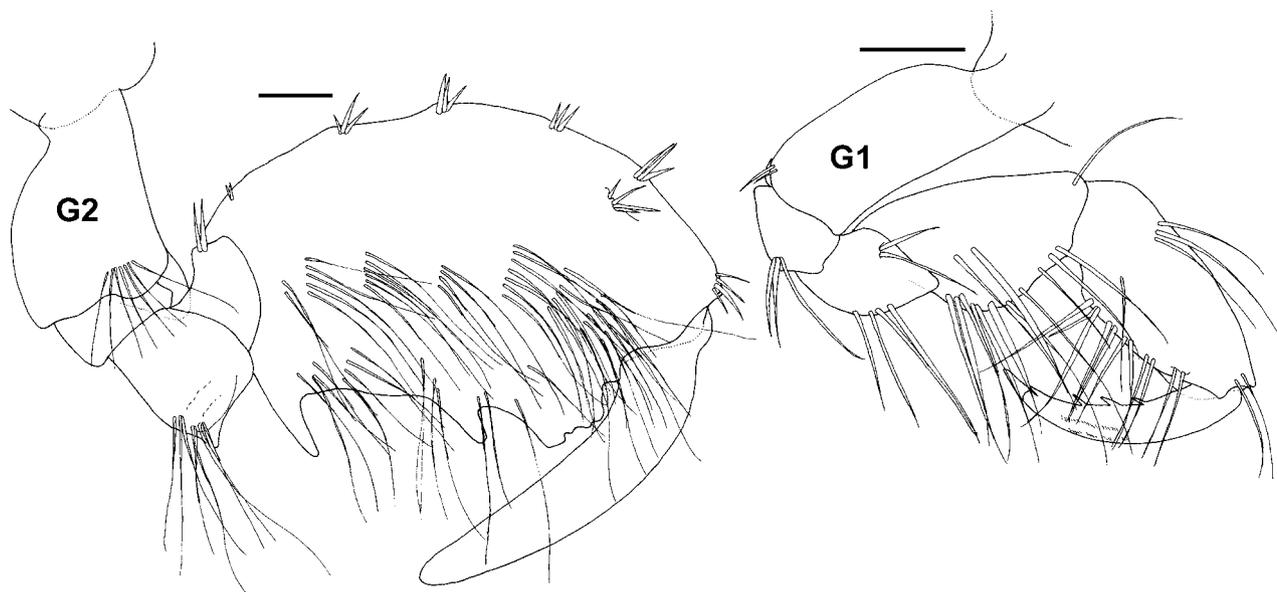


Figure 21. *Podocerus lobatus* (Haswell, 1885) male, AM P.86187, 4.0 mm, Fremantle, Western Australia (scales represent 0.1 mm).

Female (sexually dimorphic characters) based on female specimen, 4.9 mm, dissected, 1 slide, AM P.86176. *Gnathopod 1* basis anterior margin without robust setae; carpus rectilinear, twice as long as broad; propodus rectilinear, 2.1 times as long as broad, palm straight, defined by corner, without robust setae; dactylus with 4 serrate teeth. *Gnathopod 2* basis anterodistal corner rounded; merus posterior margin with broad lobe, as long as broad, posterior margin apically rounded; propodus spherical, as broad as long, palm convex, about half length of propodus, without distal shelf, palm margin lined with humps, palm defined by tooth and 2 robust setae.

Remarks. See also remarks for *C. minutum*. Neotype material is from the type locality, Port Jackson. Material examined here provides a large range extension for this species across the southern coast of Australia. *Podocerus lobatus* has also been reported from the Aru Islands in Sulawesi, Indonesia (Pirlot, 1938). The limited illustrations of a male specimen from Sulawesi agree with the neotype drawn here. However, the Sulawesi material requires further consideration with *Podocerus cuspiclunus* Horton, 2008 from Hong Kong, which clearly represents a species very similar to *P. lobatus*. *Podocerus lobatus* can be differentiated from *P. cuspiclunus* by only two characters. In *P. lobatus* the maxilla palp has 4 robust setae while *P. cuspiclunus* has 6 robust setae. In females the gnathopod 2 propodus palm is crenulated in *P. lobatus*, as opposed to smooth in *P. cuspiclunus*. Further collections of both species, particularly from areas between tropical Hong Kong, Sulawesi and temperate southern Australia are needed to better understand this relationship.

Distribution. *New South Wales.* Port Stephens (Haswell, 1885); Port Jackson; Clovelly (current study). *Western Australia.* Fremantle; Dongara (current study). *?Sulawesi:* Aru Islands (Pirlot, 1938).

Podocerus manawatu J. L. Barnard, 1972

Figs 22–24

Podocerus manawatu J. L. Barnard, 1972: 150–152, figs 811, 82–84.—Lowry, 1974: 127, fig. 11 (key).

Type locality. Eve Bay, Wellington, New Zealand.

Material examined. *Victoria.* 1 male specimen, 5.5 mm, dissected, 2 slides, NMV J62400, off Eagles Nest, Bunurong (38°40'40"S 145°38'46"E), small plastic artificial substrate, 10–11 m, 1 April 1997, coll. T. O'Hara (Bun 3); 1 male specimen, SEM pin mount, AM P.85675, off Eagles Nest, Bunurong (38°40'40"S 145°38'46"E), small plastic artificial substrate, 10–11 m, 1 April 1997, coll. T. O'Hara (Bun 3); 2 specimens, NMV J57230, off Eagles Nest, Bunurong (38°40'40"S 145°38'46"E), small plastic artificial substrate, 10–11 m, 1 April 1997, coll. T. O'Hara (Bun 3); 1 female, 4.2 mm, dissected, 1 slide, NMV J57233, off Eagles Nest, Bunurong (38°40'40"S 145°38'46"E), small plastic artificial substrate, 10–11 m, 1 April 1997, coll. T. O'Hara (Bun 3); 2 specimens, NMV J57232, off Eagles Nest, Bunurong (38°40'40"S 145°38'46"E), small plastic artificial substrate, 10–11 m, 1 April 1997, coll. T. O'Hara (Bun 3); 2 specimens, NMV J57234, off Eagles Nest, Bunurong (38°40'40"S 145°38'46"E), 5–11 m, 1 April 1997, coll. T. O'Hara (Bun 4); 1 specimen, NMV J57235, off Eagles Nest, Bunurong (38°40'40"S 145°38'46"E), 5–11 m, 1 April 1997, coll. T. O'Hara (Bun 4); 20 specimens, NMV J56859, Beware Reef, near Cape Conran (37°49'21"S 148°47'23"E), 5–6 m, 15 April 1998, coll. T. O'Hara (WV 11); 1 specimen, NMV J56860, Beware Reef, near Cape Conran (37°49'21"S 148°47'23"E), 5–6 m, 15 April 1998, coll. T. O'Hara (WV 11); 4 specimens, NMV J56861, Schomberg Reef, near Peterborough, (38°36'49"S 142°53'19"E), 3.5–5 m, 19 May 1998, coll. T. O'Hara (WV 2).

Diagnosis. *Head* dorsally smooth; *eyes* not bulging from head. *Gnathopod 1* propodus subrectangular, with 5 robust setae near corner of palm. *Gnathopod 2* basis 1.2 times as long as broad; propodus subovate, palm without distal shelf, lined with 8 humps, defined by 3 robust setae.

Female. *Gnathopod 1* carpus rectilinear, 1.5 times as long as broad; propodus subovoid, twice as long as broad. *Gnathopod 2* propodus 1.2 times as long as broad.

Description. Based on 1 male specimen, 5.5 mm, dissected, 2 slides, NMV J62400. *Body* cuticle dorsally smooth, without lateral and ventral carina. *Head* dorsally smooth; *eyes* not bulging from head; lateral cephalic lobe subquadrate; anteroventral corner subquadrate. *Mandible* accessory setal row with 4 setae. *Maxilla 1* palp distal margin broken.

Coxae 1–3 discontinuous, *coxae 4–7* contiguous.

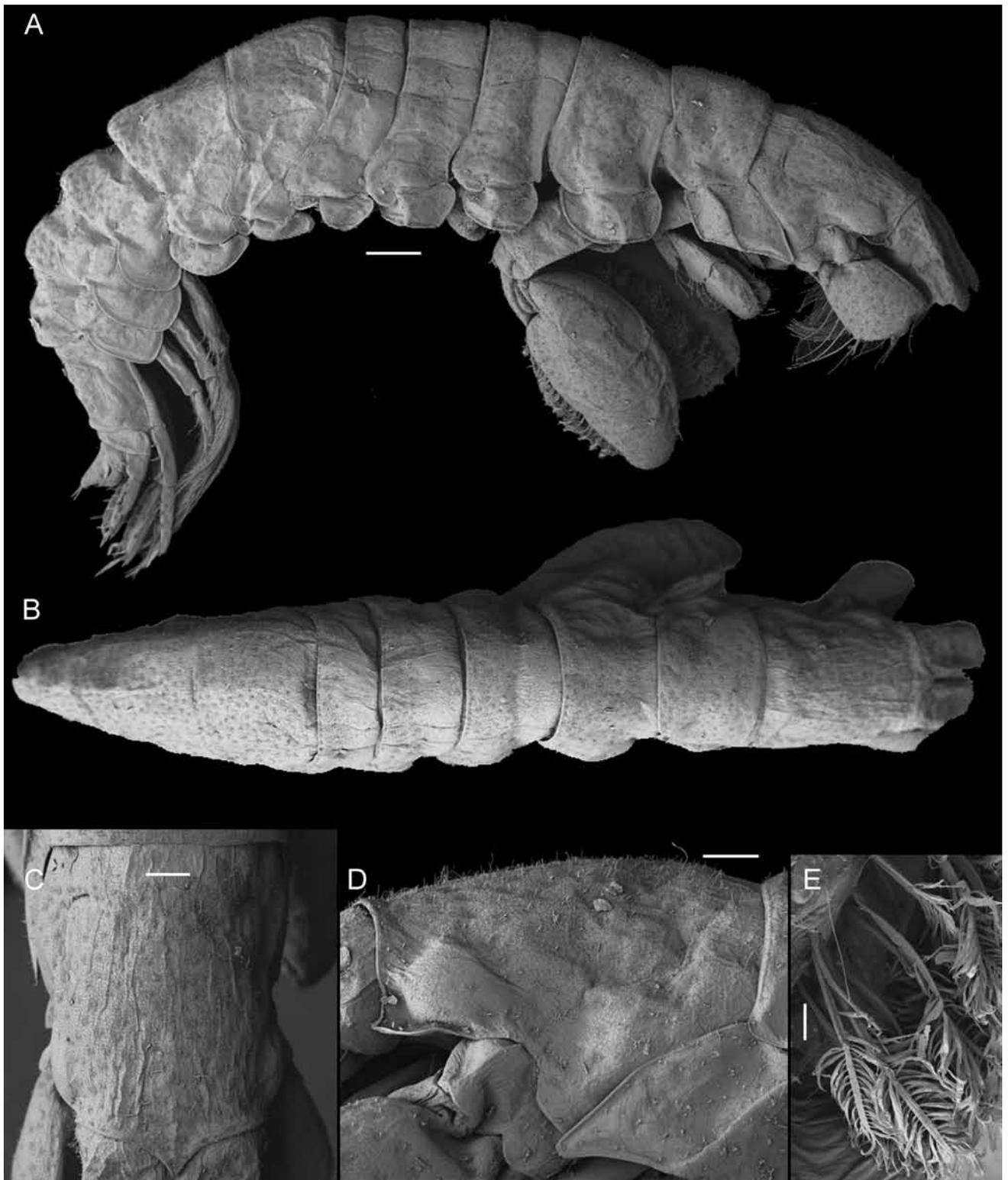


Figure 22. *Podocerus manawatu* J. L. Barnard, 1972 male specimen, AM P.85675, Bunurong, Victoria. SEM photographs: (A) whole animal lateral view; (B) whole animal dorsal view (scale 200 μm); (C) head dorsal view (scale 100 μm); (D) head lateral view (scale 100 μm); and (E) gnathopod 2 propodus palm plumose setae (scale 20 μm).

Gnathopod 1 coxa as broad as long, distoventral corner weakly produced anteriorly, corner subacute; basis twice as long as broad, with a few long slender anterodistal setae; carpus subtriangular, 1.1 times as long as broad; propodus subrectangular, 2.2 times as long as broad, anterior margin with clusters of long slender setae, palm margin smooth, with

5 robust setae near corner of palm; dactylus posterior margin with 6 serrate teeth, cuticle surface with raised serrations, closing along palm. *Gnathopod 2* basis 1.2 times as broad, anterodistal corner subquadrate, with long slender setae; merus posterior margin with narrow produced lobe, as long as broad, apically acute; propodus subovate, 1.8 times

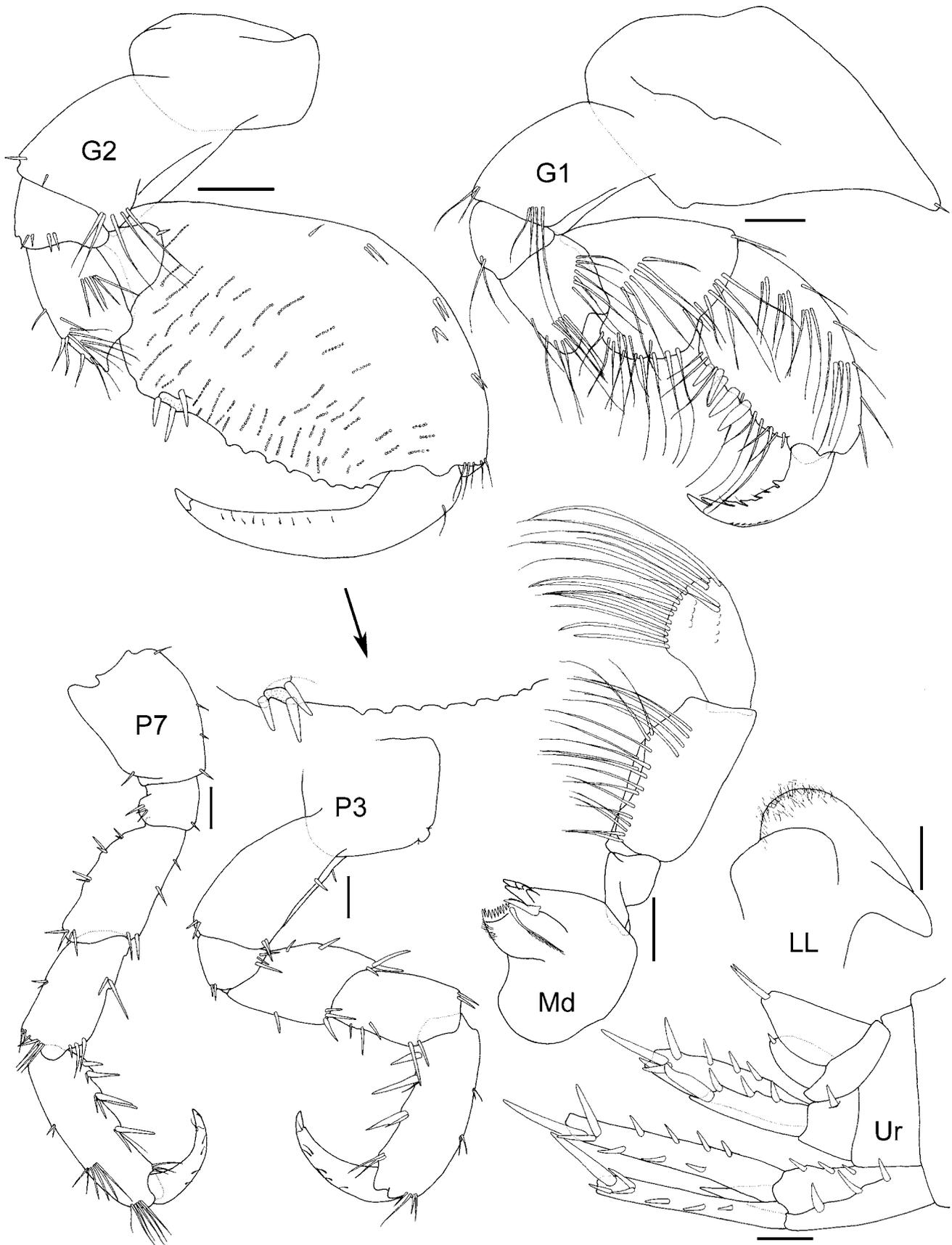


Figure 23. *Podocerus manawatu* J. L. Barnard, 1972 male, NMV J62400, 5.5 mm, Bunurong, Victoria (scales represent 0.1 mm).

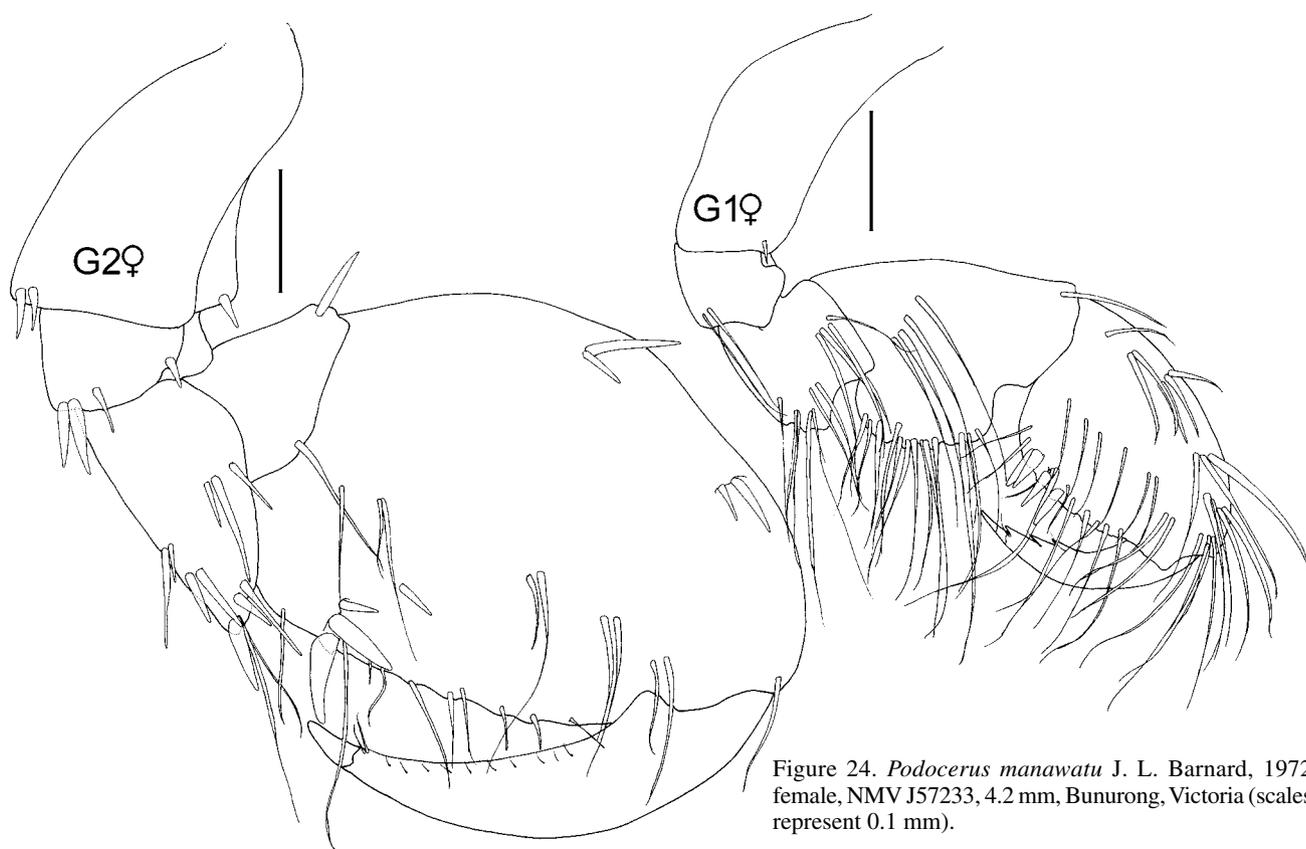


Figure 24. *Podocerus manawatu* J. L. Barnard, 1972 female, NMV J57233, 4.2 mm, Bunurong, Victoria (scales represent 0.1 mm).

as long as broad, anterior margin with clusters of short robust setae, palm acute, straight, $\frac{3}{4}$ length of propodus, without distal shelf, palm lined with 8 humps, defined by 3 robust setae; dactylus closing along palm.

Epimeron 1 rounded, *epimera 2–3* subquadrate. *Urosome* with 3 pairs of uropods. *Urosomite 1* short, twice as long as broad. *Uropod 1* peduncle 3 times as long as broad, with well developed ventromedial spine 2.5 times as long as broad; inner ramus longer than peduncle; outer ramus about $\frac{3}{4}$ length of inner ramus. *Uropod 2* well developed, biramus, without ventromedial spine; outer ramus about half the length of inner ramus. *Uropod 3* uniramus; rami with apical setae. *Telson* dorsal lobe with 2 apical setae; lower margin without lateral or apical setae.

Female (sexually dimorphic characters) based on female specimen, 4.2 mm, NMV J57233. *Gnathopod 1* basis anterior margin with robust seta; carpus rectilinear, 1.5 times as long as broad; propodus subovoid, twice as long as broad, palm straight, defined by corner with 4 robust setae; dactylus posterior margin with 4 serrate teeth. *Gnathopod 2* basis anterodistal corner subquadrate with 1 robust seta; merus posterior margin lobe broadly rounded, as broad as long, with 3 short robust setae; propodus subovoid, 1.2 times as long as broad, anterior margin with long robust setae, palm smooth, $\frac{3}{4}$ length of propodus, defined by 3 robust setae.

Remarks. This is the first record of *P. manawatu* outside of New Zealand. No gravid females were present in the small number of specimens available.

Distribution. New Zealand. Wellington, Dunedin, Kaikoura, Gisborne, Whangaparaoa peninsula, Leigh (Lowry, 1974). Australia. *Victoria*: Cape Conran, Peterborough, Bunurong (current study)

Podocerus oliphant sp. nov.

Figs 25–27

Type material. Holotype male, 5.1 mm, dissected, 3 slides, AM P.86188, Elephant Rock, north of St Helens Point (41°17'30"S 148°20'E), 20 m, sponges on rocky substrate, 14 April 1991, coll. R. Springthorpe & C. McCormick (Tas 136); paratype female, 3.7 mm, dissected, 1 slide, AM P.86189, St Helens Rocks (41°17'30"S 148°22'E) 10 m, encrusting sponges on rocks among kelp *Ecklonia* sp and *Cystophora* sp., coll. R. T. Springthorpe and C. J. McCormick, 13 April 1991 (Tas 123); paratype male specimen, SEM pin mount, AM P.84117, Elephant Rock, north of St Helens Point (41°17'30"S 148°20'E), 20 m, sponges on rocky substrate, 14 April 1991, coll. R. Springthorpe & C. McCormick (Tas 136); paratypes, 5 specimens, AM P.83636, St Helens Rocks (41°17'30"S 148°22'E) 10 m, encrusting sponges on rocks among kelp *Ecklonia* sp and *Cystophora* sp., coll. R. T. Springthorpe and C. J. McCormick, 13 April 1991 (Tas 123); paratype, 1 specimen, AM P.83637, Elephant Rock, north of St Helens Point (41°17'30"S 148°20'E), 20 m, sponges on rocky substrate, 14 April 1991, coll. R. Springthorpe & C. McCormick (Tas 136); paratypes 9 specimens, AM P.83635, St Helens Rocks (41°17'30"S 148°22'E), 10 m, macroalgae *Ecklonia* sp. holdfasts, 13 April 1991, coll. R. Springthorpe & C. McCormick (Tas 113); paratypes 2 specimens, AM P.83638, St Helens Rocks (41°17'30"S 148°22'E), 15 m, bryozoan, 13 April 1991, coll. R. Springthorpe & C. McCormick (Tas 115).

Type locality. Elephant Rock, north of St Helens Point, Tasmania, Australia (41°17'30"S 148°20'E).

Etymology. Named from the type locality Elephant Rock, using the old english spelling for elephant = oliphant, applied as a noun in apposition.

Additional material examined. *Victoria*. 6 specimens, NMV J56864, Sailor's Grave, off East Cape Conran (37°48'13"S 148°44'41"E), 4–5 m, 10 April 1998 (WV 12); 9 specimens, NMV J56862, Sailor's Grave, off East Cape Conran (37°48'13"S 148°44'41"E), 4–5 m, 10 June 1998, coll. T. O'Hara (WV 12).—*Tasmania*. 2 specimens, SAMA C6552, Frying Pan Point northern side, Port Arthur, Tasman Peninsula (43°8'31"S 147°51'34"E), 6–12 m in bryozoans, 30 July 1991, coll. K. L. Gowlett-Holmes and G. Myers.

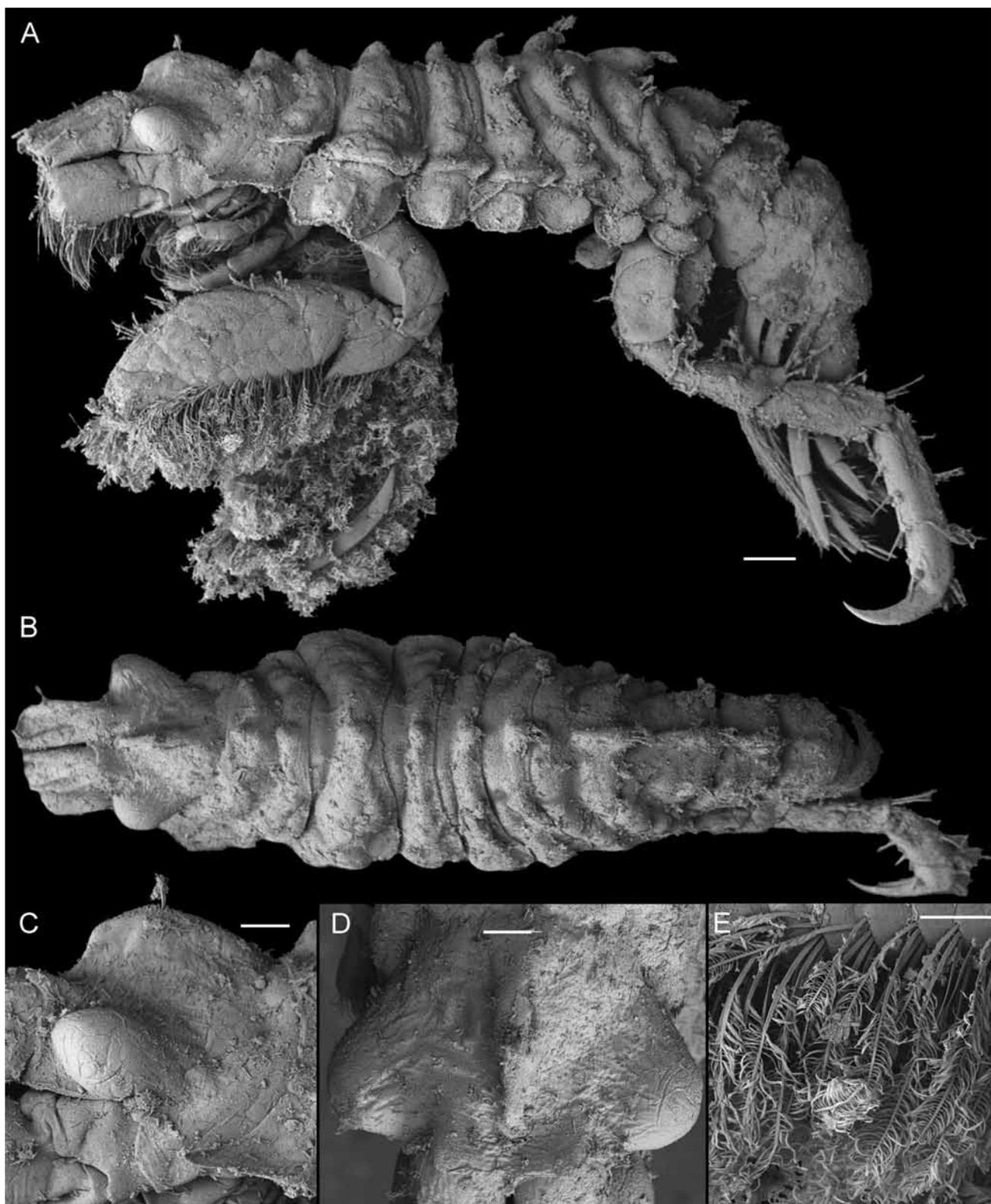


Figure 25. *Podocerus oliphant* sp. nov. male specimen, AM P.84117, St Helens Point, Tasmania. SEM photographs: (A) whole animal lateral view; (B) whole animal dorsal view (scale 100 μ m); (C) head lateral view (scale 100 μ m); (D) head dorsal view (scale 100 μ m); and (E) gnathopod 2 propodus palm plumose setae (scale 100 μ m).

Diagnosis. Head with well developed hump. *Pereonite 1* with two dorsal carina, subtriangular, produced dorsally, apically rounded. *Coxae 1–7* contiguous. *Gnathopod 1* propodus with 5 robust setae near corner of palm. *Pereonite 2* dorsal carina produced evenly, subtriangular, apically rounded. *Pereonites 5–6* dorsal carina produced evenly, subtriangular, apically rounded. *Gnathopod*

2 propodus elongate subovoid, with one rectangular and one subtriangular tooth, palm with small defining tooth and without robust setae. *Pereonites 3–4* dorsal carina produced evenly, subtriangular, apically rounded. *Pereonites 5–6* dorsal carina subtriangular, produced posteriorly, apically

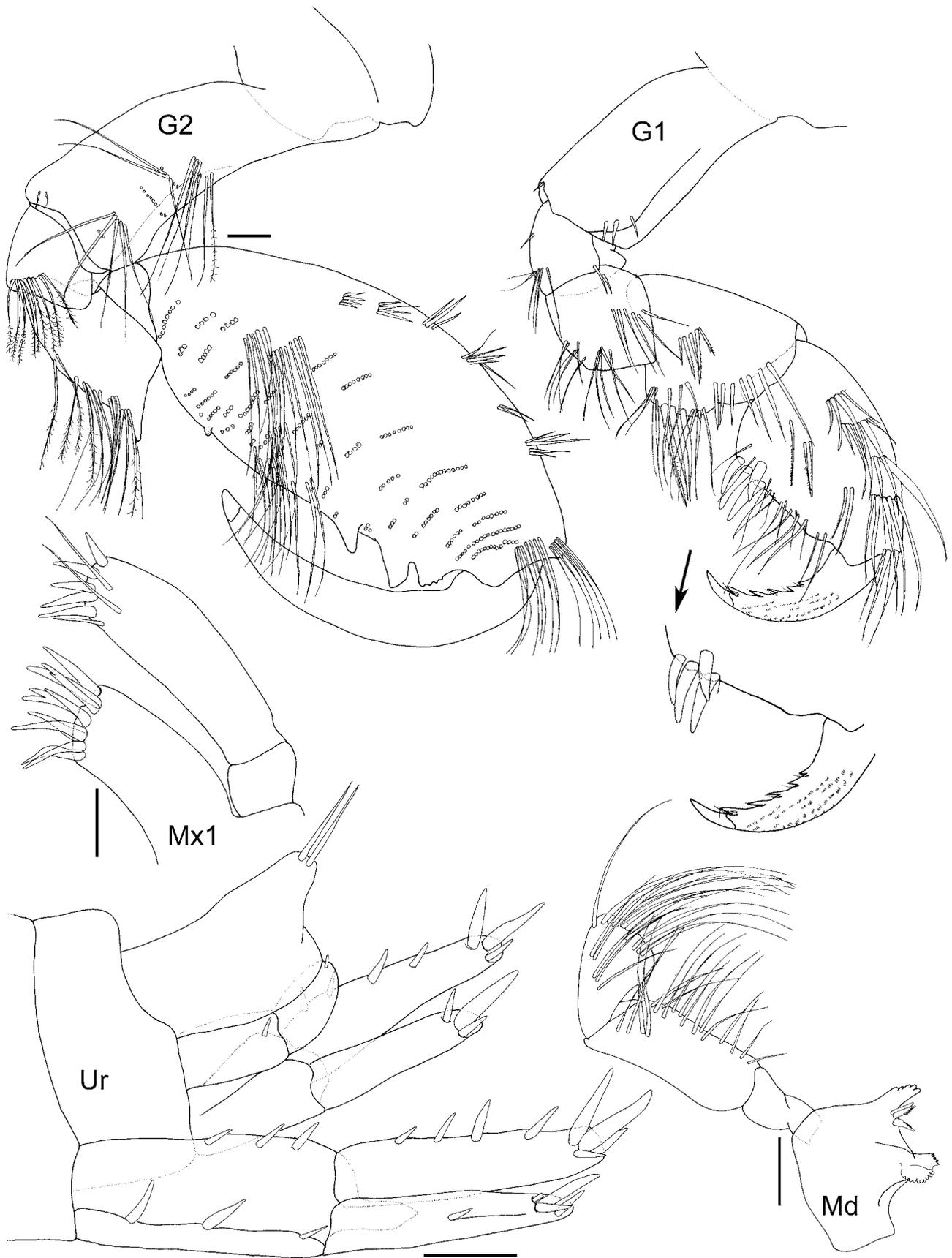


Figure 26. *Podocerus oliphant* sp. nov., holotype male, AM P.86188, 5.1 mm, St Helens Point, Tasmania (scales represent 0.1 mm).



Figure 27. *Podocerus oliphant* sp. nov., paratype female, AM P.86189, 3.7 mm, St Helens Point, Tasmania (scales represent 0.1 mm).

subacute. *Pereonite* 7 dorsal carina subtriangular, produced posteriorly, apically rounded. *Pleonites* 1–2 dorsal carina, produced evenly, with weak hump.

Female. *Gnathopod* 1 carpus rectilinear, 1.7 times as long as broad; propodus subtriangular, 1.6 times as long as broad. *Gnathopod* 2 basis anterodistal corner rounded, with many robust setae; propodus spherical, palm lined with 5 humps.

Description. Based on holotype male, 5.1 mm, AM P.86188. *Body* cuticle dorsally processiferous, with carina along entire dorsal surface, laterally smooth. *Head* with well developed hump; *eyes* greatly bulging; lateral cephalic lobe subquadrate; anteroventral corner subquadrate. *Mandible* accessory setal row with 3 setae. *Maxilla* 1 palp distal margin with 5 robust setae.

Pereonite 1 with two dorsal carina, subtriangular, produced dorsally, apically rounded. *Coxae* 1–7 contiguous. *Gnathopod* 1 coxa smaller than coxa 2, as broad as long, distoventral corner produced anteriorly, corner subacute; basis 2.1 times as long as broad, with anterodistal robust seta; carpus subtriangular, 1.5 times as long as broad; propodus subtriangular, twice as long as broad, anterior margin with clusters of long slender setae, palm margin smooth, with 5 robust setae near corner of palm; dactylus posterior margin with 5 serrate teeth, cuticle surface with raised serrations, closing along palm. *Pereonite* 2 dorsal carina produced evenly, subtriangular, apically rounded. *Gnathopod* 2 basis 2.2 times as long as broad, anterodistal corner rounded produced lobes, with rows of plumose setae; merus posterior margin with narrow produced lobe, as long as broad, apically acute, anterior margin without short robust setae; propodus elongate subovoid, 2.3 times as long as broad, anterior margin with clusters of short slender and robust setae, palm acute, straight, with broad, well developed distal shelf, shelf margin crenulate, with one rectangular and one subtriangular tooth, with small palm defining tooth, without robust setae; dactylus closing short of palm end. *Pereonites* 3–4 dorsal carina produced evenly, subtriangular, apically rounded. *Pereonites* 5–6 dorsal carina subtriangular, produced posteriorly, apically subacute. *Pereonite* 7 dorsal carina subtriangular, produced posteriorly, apically rounded.

Pleonites 1–2 dorsal carina, produced evenly, with weak hump. *Epimera* 1–3 posteroventral corner rounded. *Urosomite* 1 short, twice as long as broad. *Urosome* with 3 pairs of uropods. *Uropod* 1 peduncle 2.5 times as long as broad, with well developed ventromedial spine twice as long as broad; inner ramus subequal to peduncle length; outer ramus slightly shorter than inner ramus. *Uropod* 2 well developed, biramus, without ventromedial spine; outer ramus slightly shorter than inner ramus. *Uropod* 3 uniramus; rami with apical setae. *Telson* dorsal lobe with 2 apical setae, without lateral or apical setae.

Female (sexually dimorphic characters) based on paratype female, 3.7 mm, AM P.86189. *Gnathopod* 1 basis anterior margin without robust setae; carpus rectilinear, 1.7 times as long as broad; propodus subtriangular, 1.6 times as long as broad, palm convex with 3 robust setae near corner of palm; dactylus posterior margin with 4 serrate teeth. *Gnathopod* 2 basis anterodistal corner rounded, with many robust setae; merus posterior margin with broad produced lobe, apically subacute, without robust setae; propodus spherical, 1.2 times as long as broad, anterior margin with clusters of long robust setae, palm convex, $\frac{2}{3}$ length of propodus, palm lined with 5 humps, palm defining corner

with 3 robust setae; dactylus closing along palm.

Remarks. The carinae along the head and entire dorsal surface of *P. oliphant* sp. nov. aligns it with *P. danae* (Stebbing, 1888), *P. hystrix*, *P. hoonsooi* Kim & Kim, 1991, *P. palinuroides* Ledoyer, 1986 and *P. inconspicuus*. *Podocerus oliphant* sp. nov. and *P. palinuroides* are without lateral and ventral carina, separating them from the later group where these carina are present on some or all pereonites.

In *P. oliphant* sp. nov. the male gnathopod 2 propodus has a weak proximal and strong distal tooth and *P. palinuroides* has both proximal and distal teeth well developed.

Podocerus oliphantus sp. nov. also similar to *P. dentatus* and *P. lobatus*, see these species remarks for distinctions.

Distribution. Australia. *Tasmania*: St Helens Point; Tasman Peninsula (current study). *Victoria*: Cape Conran (current study).

Podocerus tamoshanta sp. nov.

Figs 28–30

Type material. Holotype male, 2.8 mm, dissected, 2 slides, AM P.77155, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 18 m, sponge and gorgonacean, 1 May 1997, coll. K. B. Attwood (NSW 1286); paratype female, 2.6 mm, dissected, 1 slide, AM P.77146, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 17 m, brown alga *Dictyota* sp. on rock ledge, 1 May 1997, coll. A. Murray (NSW 1279); paratype male 1 specimen, AM P.77155, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 18 m, sponge and gorgonacean, 1 May 1997, coll. K. B. Attwood (NSW 1286); paratype male SEM pin mounted specimen, AM P.78211, 150 m east of Burrill Rocks, southern end of Lighthouse Reef, Ulladulla (35°23'24"S 150°28'10"E), 19 m, on surface of sponges, 1 May 1997, coll. P. B. Berents, K. B. Attwood and A. Murray (NSW 1278); 1 specimen, AM P.77146, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 17 m, brown alga *Dictyota* sp. on rock ledge, 1 May 1997, coll. A. Murray (NSW 1279); 1 specimen, AM P.77142, 150 m east of Burrill Rock, Ulladulla (35°23'24"S 150°28'10"E), 10 m, kelp *Ecklonia* sp. holdfasts, 1 May 1997, coll. A. Murray (NSW 1277); 3 specimens, AM P.77143, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 19 m, on surface of sponges, 1 May 1997, coll. P. B. Berents, K. B. Attwood and A. Murray (NSW 1278).

Type locality. Burrill Rocks, Ulladulla, New South Wales, Australia (35°23'24"S 150°28'10"E).

Etymology. A tamoshanter is a round Scottish cap with a pompon of feathers on top. The name is applied here in reference to the dorsal surface of the head segment which has an apically setose round nodule resembling a tamoshanter.

Additional material examined. *New South Wales*. 1 SEM pin mounted specimen, AM P.78210, southern end of Lighthouse Reef, Ulladulla (35°22'8"S 150°29'18"E), 16 m, bryozoan, 30 April 1997, coll. P. B. Berents and K. B. Attwood (NSW 1267); 2 specimen, AM P.77137, southern end of Lighthouse Reef, Ulladulla (35°22'8"S 150°29'18"E), 16 m, bryozoan *Orthoscuticella* sp., 30 April 1997, coll. P. B. Berents and K. B. Attwood (NSW 1267); 1 specimen, AM P.77140, southern end of Lighthouse Reef, Ulladulla (35°22'8"S 150°29'18"E), 16 m, with

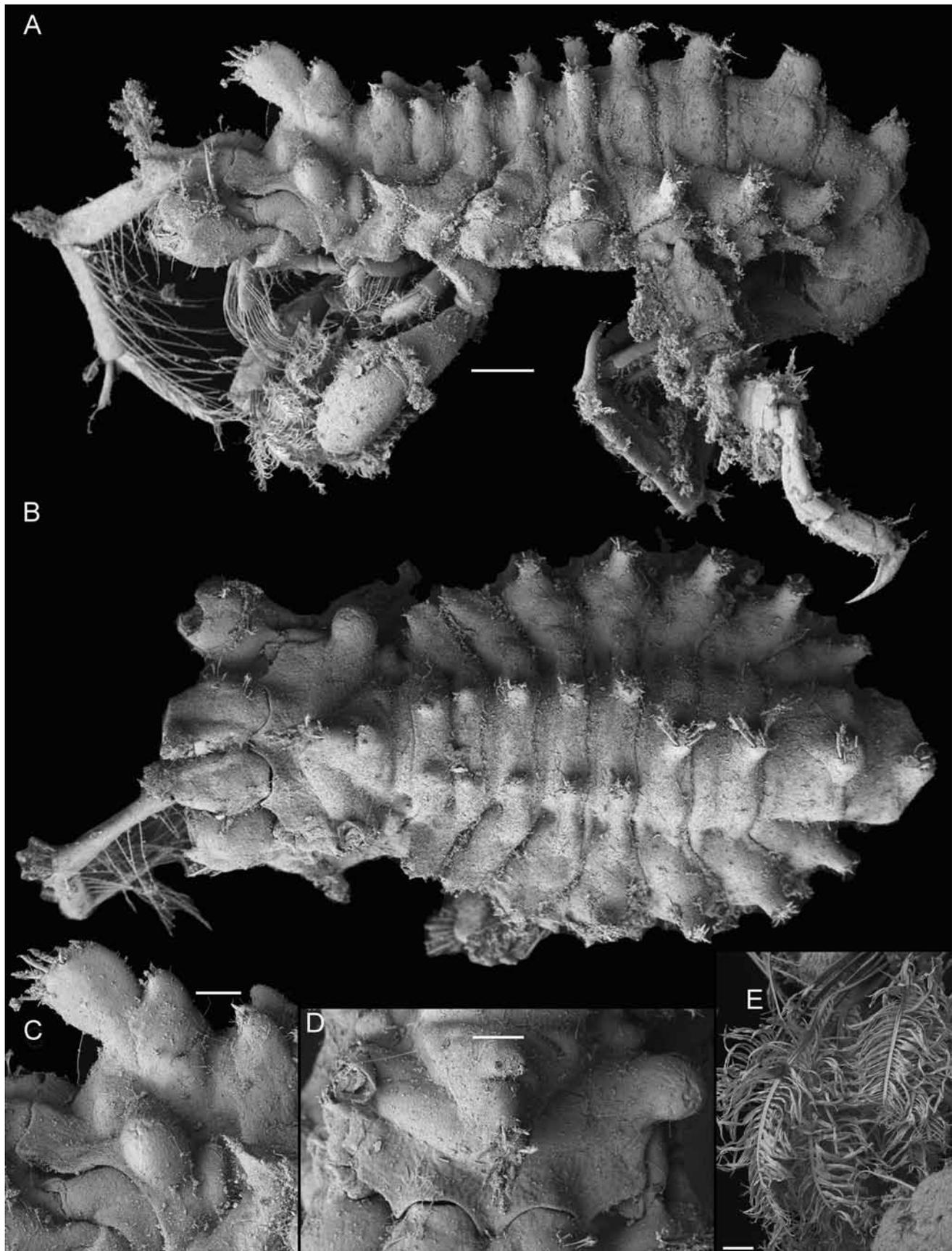


Figure 28. *Podocerus tamoshanta* sp. nov. male specimen, AM P.78211, Ulladulla, New South Wales. SEM photographs: (A) whole animal lateral view; (B) whole animal dorsal view (scale 200 μ m); (C) head lateral view (scale 100 μ m); (D) head dorsal view (scale 100 μ m); (E) gnathopod 2 propodus palm plumose setae (scale 30 μ m).

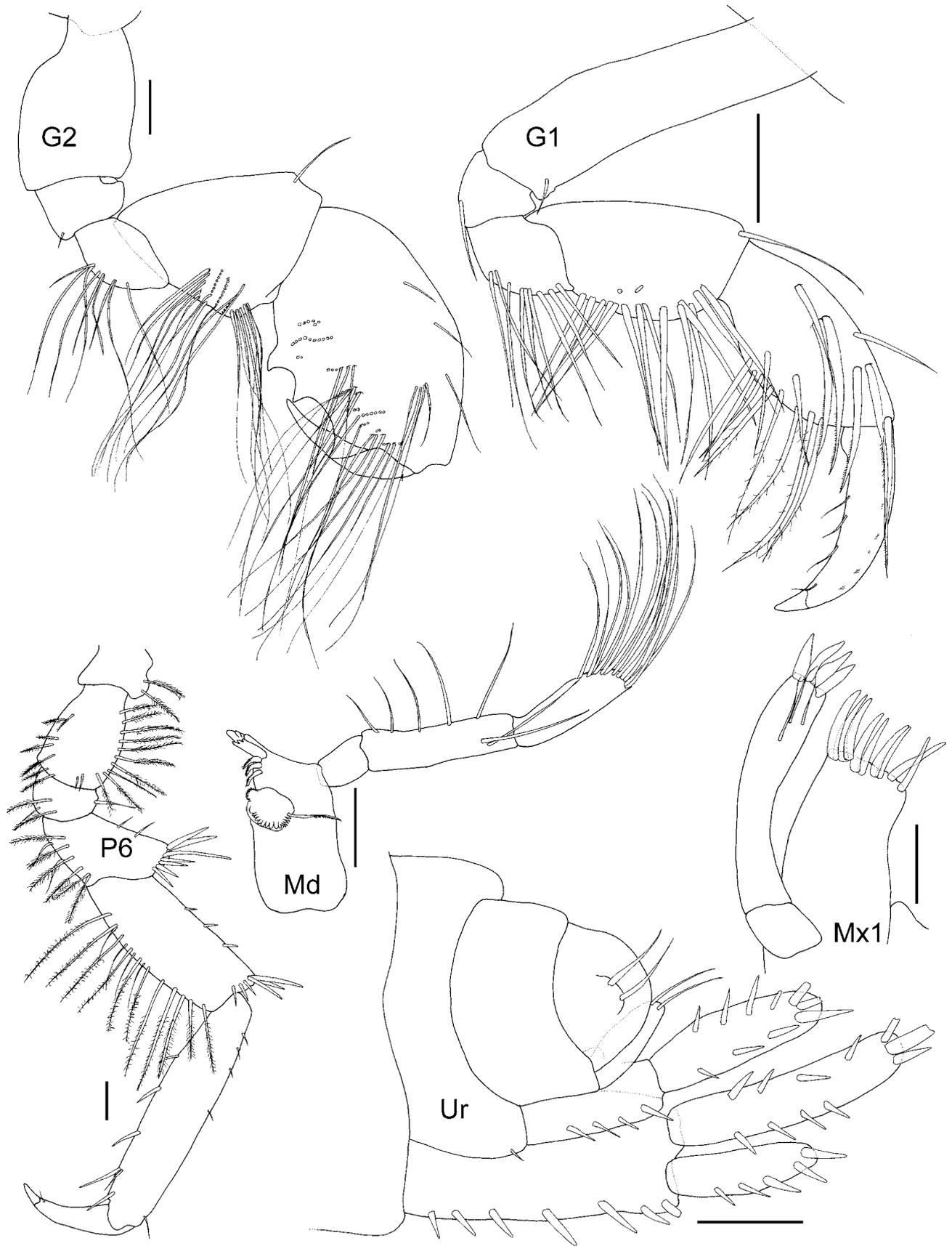


Figure 29. *Podocerus tamoshanta* sp. nov., holotype male, AM P.77155, 2.8 mm, Ulladulla, New South Wales (scales represent 0.1 mm).

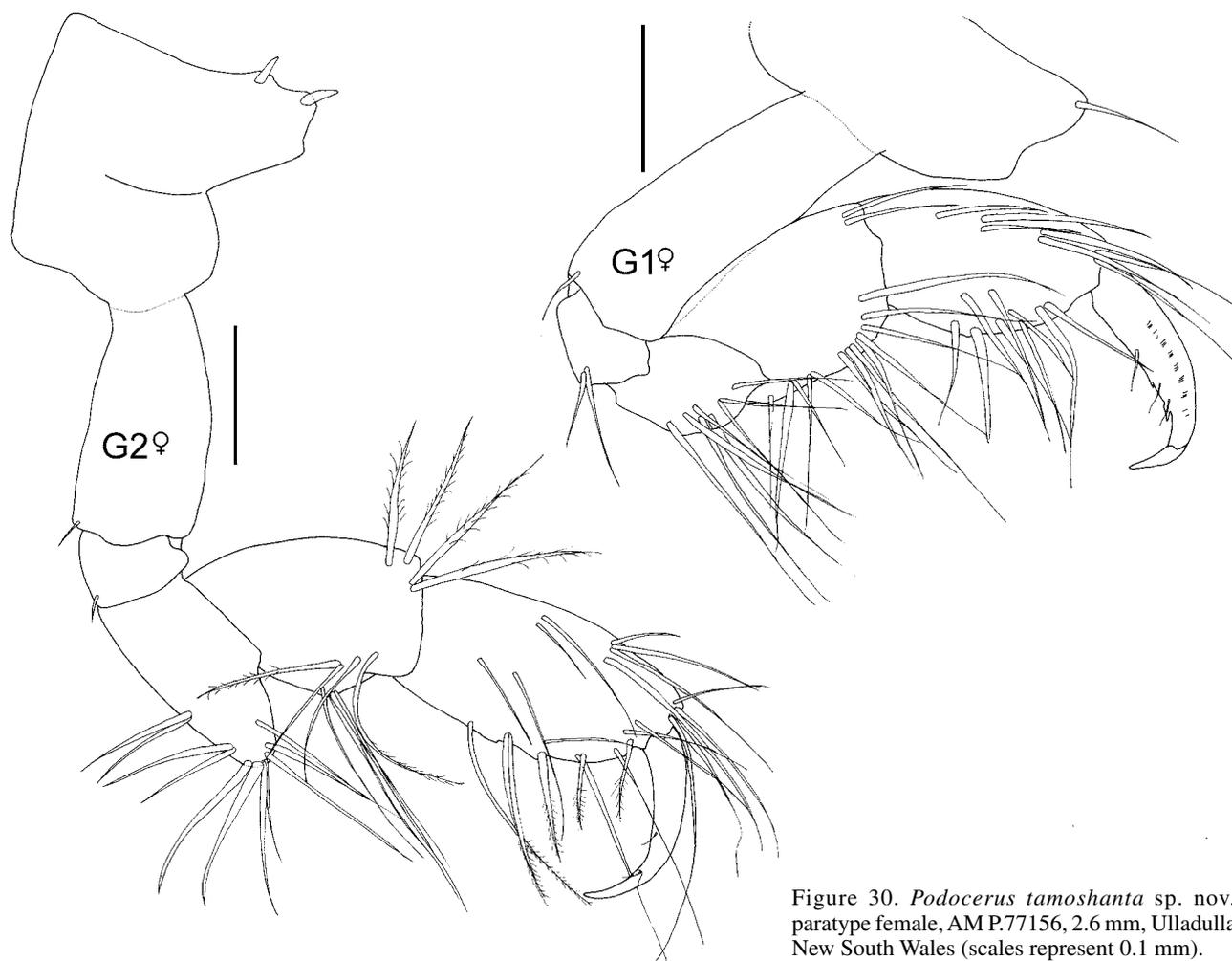


Figure 30. *Podocerus tamoshanta* sp. nov., paratype female, AM P.77156, 2.6 mm, Ulladulla, New South Wales (scales represent 0.1 mm).

polychaete tubes of *Filograna* sp. on top and under large boulder, 30 April 1997, coll. P. B. Berents and K. B. Attwood (NSW 1271); 1 specimen, AM P.86190, southern end of Lighthouse Reef, Ulladulla (35°22'8"S 150°29'18"E), 15 m, underside of large boulder, 30 April 1997, coll. P. Berents and K. Attwood (NSW 1265); 1 specimen, AM P.77165, Halfway Reef, 200 m south of Sullivan Reef, Ulladulla (35°21'25"S 150°29'18"E), 13 m, *Ecklonia* sp. holdfasts, 3 May 1997, coll. A. Murray (NSW 1304); 5 specimens, AM P.83996, west side of Box Head, Broken Bay (33°33'S 151°21'E), no depth, sponge, 22 November 1982, coll. J. K. Lowry and R. T. Springthorpe (NSW 171); 1 specimen, AM P.86191, northeast of Port Stephens, northeast side of Little Broughton Island, Port Stephens (32°37'05"S 152°20'06"E), 17.3 m, curly orange bryozoan, rock reef with gutters and sand patches, 11 March 2006, coll. S. J. Keable (NSW 2940); 1 specimen, AM P.86192, northeast of Port Stephens, northeast side of Little Broughton Island, Port Stephens (32°37'05"S 152°20'06"E), 17 m, alga *Ecklonia* sp. holdfasts, coll. R. T. Springthorpe (NSW 2933).—*South Australia*. 1 specimen, NMV J57132, northern side of West Island (35°37'00"S 138°36'00"E), 4 m, 21 March 1985 (SA 45).—*Western Australia*. 1 specimen, AM P.79492, southern side of Kendrew Island, Dampier Archipelago (20°28.987'S 116°32.549'E), 4.4 m, on brown alga *Sargassum* sp. in sand, 30 August 1999, coll. R. A. Peart (WA 692).

Diagnosis. *Head* with small nodule and apical setae; *eyes* practically stalked. *Pereonite 1* with two pair of carina, developed as a small nodule with apical setae, ventral projections present. *Gnathopod 1* basis 4 times as long as broad; propodus subrectangular to subovate, without robust seta at corner of palm. *Pereonite 2* dorsal carina developed as a pair of nodules with apical setae, ventral projections present. *Gnathopod 2* basis 1.9 times as long as broad; propodus, palm concave, with two subtriangular teeth,

without palm defining robust setae. *Pereonites 3–4* dorsal carina developed as a pair of nodules with apical setae, ventral projections present. *Pereonites 5–7* dorsal carina developed as a single nodule with apical setae, ventral projections present. *Pereopod 6* articles lined with long plumose setae. *Pleonites 1–2* dorsal carina developed as a single nodule with apical setae, lateral projections present. *Uropod 2* reduced, uniramous.

Female. *Gnathopod 1* carpus rectilinear, 1.5 times as long as broad; propodus subovate, 1.6 times as long as broad. *Gnathopod 2* merus posterior margin broad, without robust setae; propodus rectilinear, twice as long as broad, without palm defining corner or robust setae.

Description. Based on holotype male, 2.8 mm, AM P.77155. *Body* cuticle dorsally and ventrally rugose. *Head* with small nodule and apical setae; *eyes* practically stalked; lateral cephalic lobe subquadrate; anteroventral corner subquadrate. *Antenna 1* 0.5 times body length; peduncle article 2 subequal to article 3; primary flagellum 0.5 times peduncle length; accessory flagellum 1-articulate, long, three times as long as broad (based on AM P.78211). *Mandible* accessory setal row with 3 setae. *Maxilla 1* palp distal margin with 4 robust setae.

Pereonite 1 with two pair of carina, developed as a small nodule with apical setae, ventral projections present. *Coxae 1–3* discontinuous, *coxae 4–7* contiguous. *Gnathopod*

I coxa distoventral corner weakly produced anteriorly, apically subacute; basis 4 times as long as broad, with anterodistal robust seta; carpus rectilinear, twice as long as broad; propodus subrectangular to subovate, 2.2 times as long as broad, anterior margin with clusters of long slender setae, palm margin smooth, without robust seta at corner of palm; dactylus posterior margin smooth, cuticle surface with raised serrations, closing along palm. *Pereonite 2* dorsal carina developed as a pair of nodules with apical setae, ventral projections present. *Gnathopod 2* basis 1.9 times as long as broad, anterodistal corner without lobes, without setae; merus without posterior produced lobe, 1.8 times as long as broad; propodus subovoid, twice as long as broad, anterior margin with a few long slender setae, palm concave, about half length of propodus, with broad, well developed triangular distal shelf, shelf margin smooth, palm with two subtriangular teeth, without palm defining robust setae; dactylus articulating with midpalmar tooth. *Pereonites 3–4* dorsal carina developed as a pair of nodules with apical setae, ventral projections present. *Pereonites 5–7* dorsal carina developed as a single nodule with apical setae, ventral projections present. *Pereopod 6* articles lined with long plumose setae.

Pleonites 1–2 dorsal carina developed as a single nodule with apical setae, lateral projections present. *Epimera 1–3* posteroventral corner rounded. *Urosome* with 3 pairs of uropods. *Urosomite 1* short, 1.5 times as long as broad. Uropod 1 peduncle elongate, 2.5 times as long as broad, without ventromedial spine; inner ramus 1.1 times peduncle length; outer ramus about half the length of inner ramus. *Uropod 2* reduced, uniramous; peduncle without ventromedial spine; rami subequal in length to peduncle. *Uropod 3* uniramous; rami with apical setae. *Telson* dorsal lobe with 2 apical setae, lower margin without lateral or apical setae.

Female (sexually dimorphic characters) based on paratype female, 2.6 mm, AM P.77146. *Gnathopod 1* basis anterior margin without setae; carpus rectilinear, 1.5 times as long as broad; propodus subovate, 1.6 times as long as broad, palm weakly convex, without palm defining corner or robust setae; dactylus posterior margin with 2 serrate teeth. *Gnathopod 2* basis anterodistal corner subquadrate, without robust setae; merus posterior margin broad, lobes 1.1 times as broad as long, apically rounded, without robust setae; propodus rectilinear, twice as long as broad, anterior margin with clusters of long slender setae, palm acute, convex, smooth, without palm defining corner or robust setae; dactylus closing along palm.

Remarks. The nodule style carinations along the head and dorsal surface of *P. tamoshanta* sp. nov. is unique within the family. A further derived character is the pereopods 5 to 7 margins lined with plumose setae. *Podocerus tamoshanta* sp. nov. expands the generic description of the genus to include the uniramous uropod 2, however all other characters of this species agree with the genus *Podocerus*. A uniramous uropod 2 is not reported elsewhere in the Podocericidae though many genera have varying degrees of vestigial urosome articles.

Distribution. Australia. *New South Wales*: Ulladulla, Port Stephens (current study). *South Australia*: West Island (current study). *Western Australia*. Dampier Archipelago (current study).

Podocerus vulgaris sp. nov.

Figs 31–33

Type material. Holotype male, 6.2 mm, dissected, 2 slides, AM P.86193; paratype female specimen, 4.2 mm, dissected, 1 slide, AM P.86194, 20+ specimens, AM P.77188, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 22 m, red alga, 7 May 1997, coll. A. Murray (NSW 1356); paratype 1 SEM pin mounted specimen, AM P.78205, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 22 m, red alga, 7 May 1997, coll. A. Murray (NSW 1356); paratype 1 SEM pin mounted specimen, AM P.78206, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 22 m, red alga, 7 May 1997, coll. A. Murray (NSW 1356); paratypes 6 specimens, AM P.77190, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 20 m, dead lace bryozoan, 7 May 1997, coll. K. B. Attwood (NSW 1358); paratypes many specimens, AM P.77145, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 19 m, on surface of sponges, 1 May 1997, coll. P. B. Berents, K. B. Attwood and A. Murray (NSW 1278); paratypes 10 specimens, AM P.77148, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 17 m, bryozoan *Margaretta barbata* on wall, 1 May 1997, coll. P. B. Berents (NSW 1280); paratypes 6 specimens, AM P.77150, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 18 m, hydrozoan and bryozoan, 1 May 1997, coll. P. B. Berents (NSW 1281); paratypes many specimens, AM P.77151, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 17 m, airlift over rock wall, 1 May 1997, coll. P. B. Berents, K. B. Attwood and A. Murray (NSW 1282); paratypes 2 specimens, AM P.77157, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 18 m, sponge and gorgonacean, 1 May 1997, coll. K. B. Attwood (NSW 1286); paratypes 2 specimens, AM P.77159, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 16 m, orange compound ascidian growing on wall, 1 May 1997, coll. K. B. Attwood (NSW 1287); paratypes 3 specimens, AM P.77160, 150 m east of Burrill Rocks, Ulladulla (35°23'24"S 150°28'10"E), 17 m, dead bryozoan encrusted with algae, Bryozoa and hydroids, 1 May 1997, coll. K. B. Attwood (NSW 1288); paratypes 10 specimens, AM P.77182, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 24 m, gorgonacean, 7 May 1997, coll. R. Springthorpe (NSW 1349); paratypes many specimens, AM P.77184, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 21 m, low tufting brown and coralline algae, 7 May 1997, coll. A. Murray (NSW 1351); paratypes 2 specimens, AM P.77186, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 22 m, red alga with sponges attached, 7 May 1997, coll. K. B. Attwood (NSW 1352); paratypes many specimens, AM P.77188, Burrill Rocks, Ulladulla (35°23'23"S 150°28'14"E), 22 m, red alga, 7 May 1997, coll. A. Murray (NSW 1356).

Type locality. Burrill Rocks, Ulladulla, New South Wales, Australia (35°23'23"S 150°28'14"E).

Etymology. From the term “vulgar” meaning common.

Additional material examined. *New South Wales*. 1 specimen, AM P.77141, southern end of Lighthouse Reef, Ulladulla (35°22'8"S 150°29'18"E), 16 m, red algal turf, 30 April 1997, coll. A. Murray (NSW 1274); 2 specimens, AM P.77161, Golf Course Bommie, 500 m northeast of Ulladulla Head (35°20'28"S 150°29'12"E), 9 m, brown turf algae, 2 May 1997, coll. A. Murray (NSW 1289); 1 specimen, AM P.77164, Halfway Reef, 200 m south of Sullivan Reef, Ulladulla (35°21'25"S 150°29'18"E), 13 m, red algae on rock ledges at base of wall, 3 May 1997, coll. A. Murray (NSW 1300); 8 specimens, AM P.77169, Halfway Reef, 200 m south of Sullivan Reef, Ulladulla (35°21'25"S 150°29'18"E), 15 m, airlift over wall of sponges, Bryozoa, Hydrozoa, 3 May 1997, coll. P. B. Berents, K. B. Attwood and A. Murray (NSW 1307); many specimens, AM P.77173, 50 m east of Sullivan's Reef, Ulladulla (35°21'19"S 150°29'22"E), 23 m, airlift over rocks, 5 May 1997, coll. P. B. Berents and R. Springthorpe (NSW 1323); 11 specimens, AM P.77176, 50 m east of Sullivan's Reef, Ulladulla (35°21'19"S 150°29'22"E), 24 m, gorgonacean, 5 May 1997, coll. P. B. Berents (NSW 1326); 8 specimens, AM P.77177, 50 m east of Sullivan's Reef, Ulladulla (35°21'19"S 150°29'22"E), 24 m, gorgonacean, 5 May 1997, coll. P. B. Berents (NSW 1327); 2 specimens, AM P.77178, 50 m east of Sullivan's Reef, Ulladulla (35°21'20"S 150°29'22"E), 23 m, algal turf, 5 May 1997, coll. A. Murray (NSW 1329); 1 specimen, AM P.62733, Botany Bay (33°58'11"S 151°11'9"E), 16.5 m, sandy mud, 27 October 1994, coll. Australian Museum Party (FAC2 06Bot1/3b); 2 specimens, AM P.22292, east of Long Reef (33°44'S 151°22'E), 38 m, 24 August 1972, coll. Australian Museum Party; many specimens, AM P.77325, east of Long Reef, (33°44'S 151°22'E), 36 m, 11 May 1973, coll. Australian Museum Shelf Benthic Survey; 2 specimens, AM P.22279, east of North Head, Port Jackson (33°49'S 151°20'E), 25 m, 26

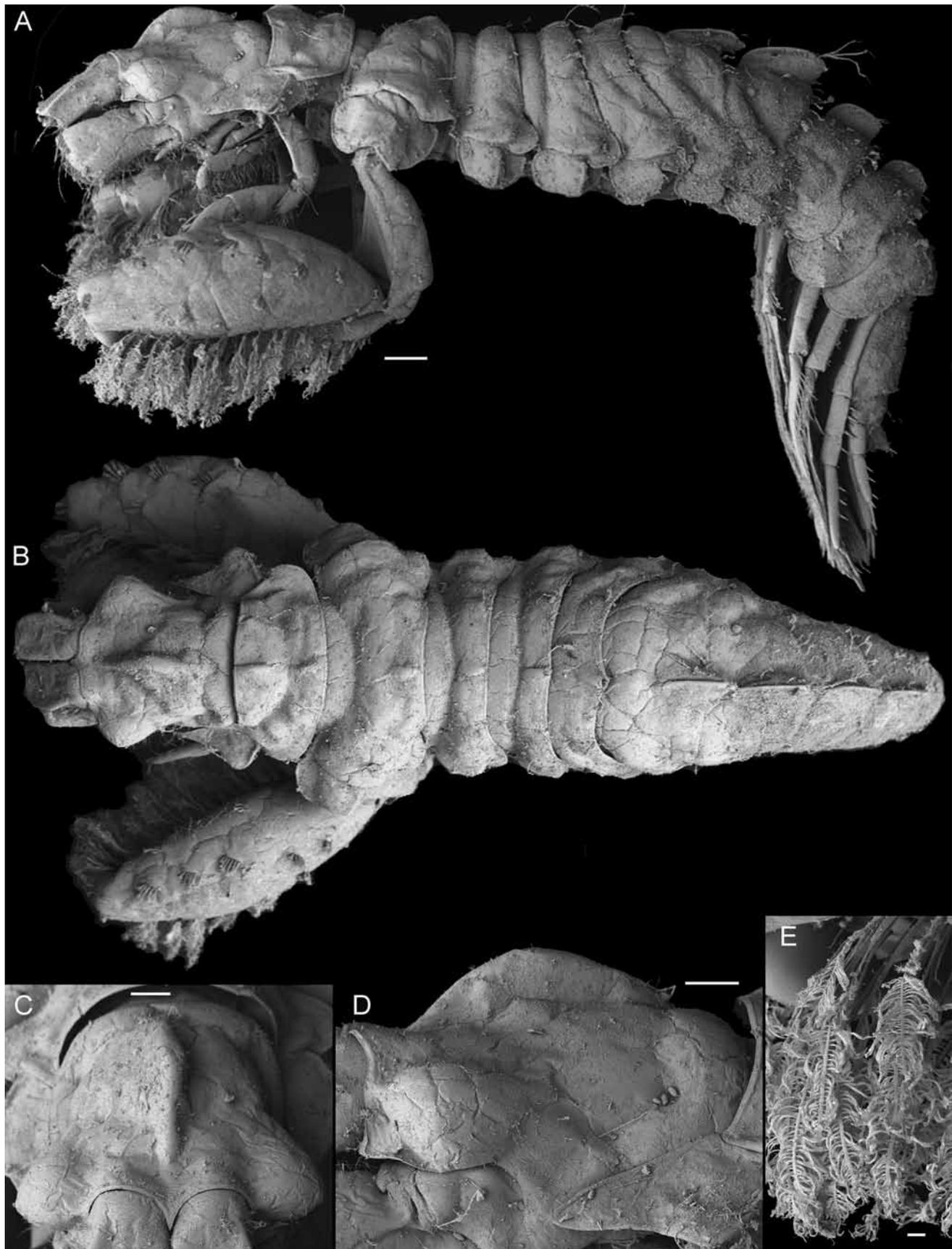


Figure 31. *Podocerus vulgaris* sp. nov. male specimen, AM P.84115, Ulladulla, New South Wales. SEM photographs: (A) whole animal lateral view; (B) whole animal dorsal view (scale 200 μ m); (C) head frontal view (scale 100 μ m); (D) head lateral view (scale 100 μ m) and (E) gnathopod 2 propodus palm plumose setae.

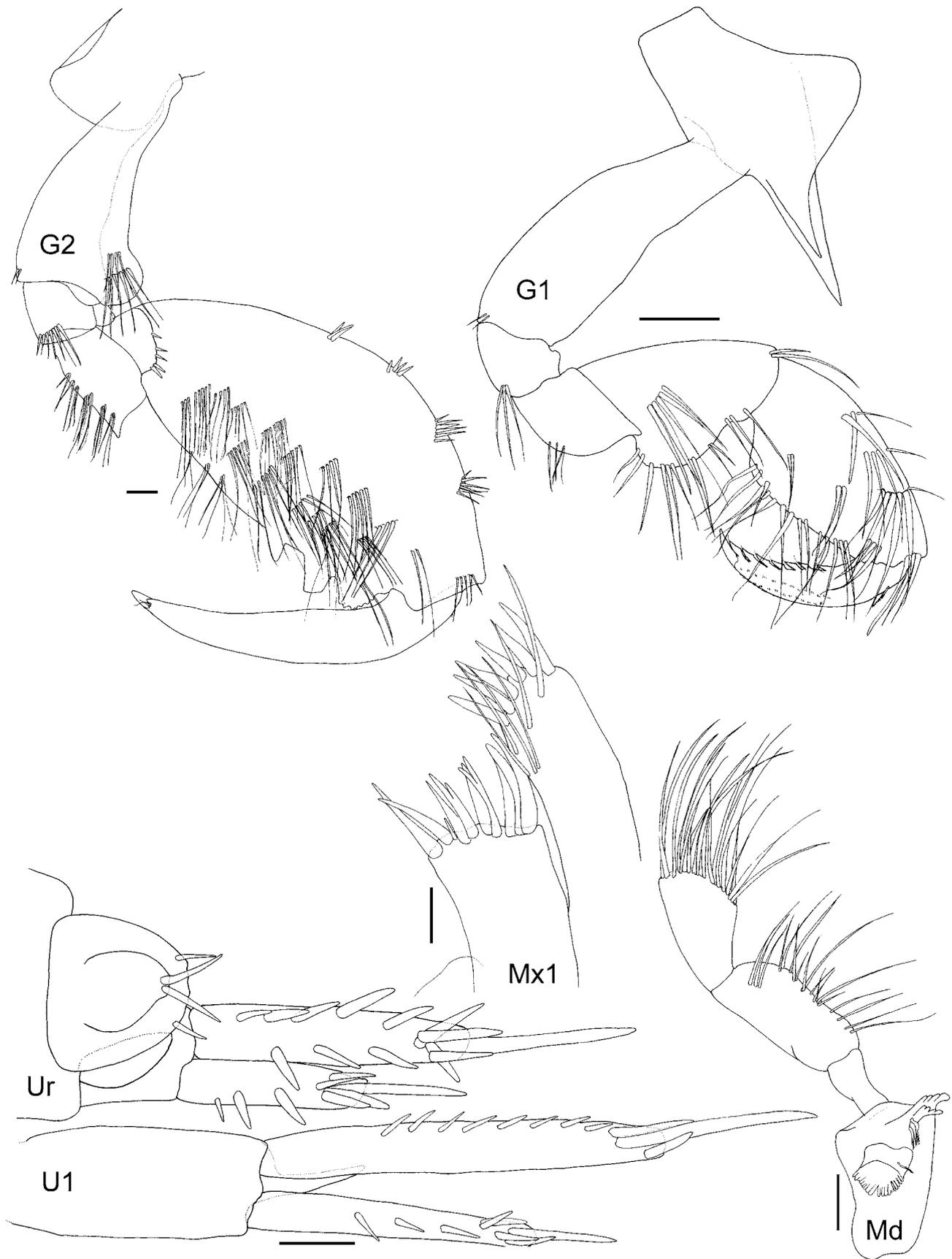


Figure 32. *Podocerus vulgaris* sp. nov., holotype male, AM P.86193, 6.2 mm, Ulladulla, New South Wales (scales represent 0.1 mm).

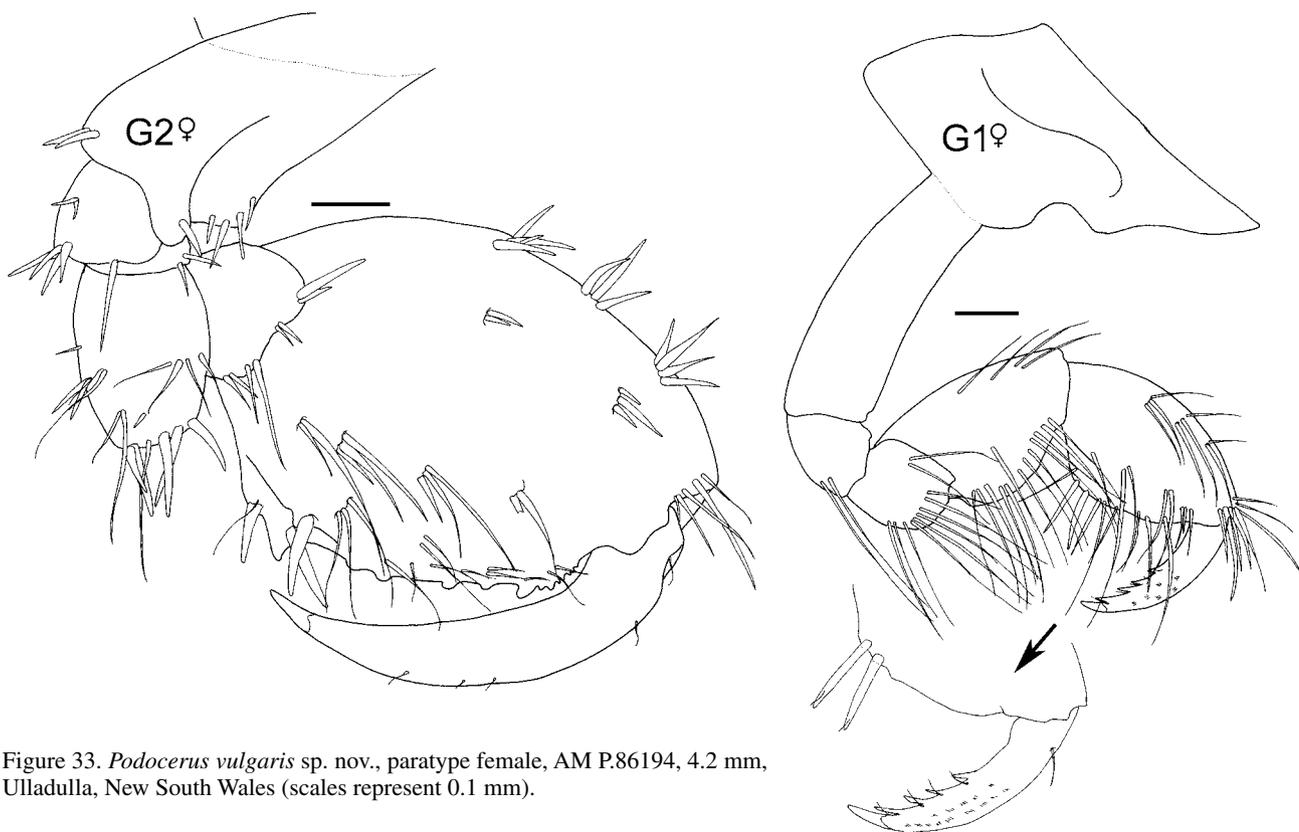


Figure 33. *Podocerus vulgaris* sp. nov., paratype female, AM P.86194, 4.2 mm, Ulladulla, New South Wales (scales represent 0.1 mm).

February 1973, coll. Australian Museum Shelf Benthic Survey; 4 specimens, AM P.22288, east of North Head, Port Jackson (33°49'S 151°20'E), 25 m, on host sponge: *Holopsamma flavus*, February 1973, coll. Australian Museum Shelf Benthic Survey; 19 specimens, AM P.36019, Quarantine Bay, Twofold Bay (37°4'42"S 149°53'E), 2 m, airlift in seagrass *Posidonia* sp., 9 October 1984, coll. S. J. Keable and J. T. van der Velde (Q8); 14 specimens, AM P.36231, Munganna Point, Twofold Bay (37°6'12"S 149°55'42"E), 3.5 m, subtidal rock platform, 10 October 1984, coll. P. A. Hutchings (M3); many specimens, AM P.77130, Munganna Point, Twofold Bay (37°6'12"S 149°55'42"E), subtidal wharf pile, 19 December 1983, coll. S. J. Keable and S. J. Perry (STN M7); 2 specimens, AM P.77181, northern side of Bannister Head, north of Batemans Bay (35°19'9"S 150°29'7"E), 18 m, airlift of sand from under and around stones, 6 May 1997, coll. K. B. Attwood and R. Springthorpe (NSW 1347); many, AM P.77202, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red macroalga *Peyssonnelia nova-hollandiae*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1985); many specimens, AM P.77204, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red macroalga *Curdiea crassa* with small amount of red alga *Martensia australis*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1986); many specimens, AM P.77205, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red macroalga *Curdiea crassa* with small amount of red alga *Martensia australis*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1986); many specimens, AM P.77206, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red macroalga *Curdiea crassa* with small amount of red alga *Martensia australis*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1986); many specimens, AM P.77209, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red macroalga *Corallina berteri*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1987); 1 specimen, AM P.77213, south of Broulee Island, south of Batemans Bay (35°50'49"S 150°11'5"E), 8 m, brown macroalga *Zonaria diesingiana*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1991); 2 specimens, AM P.77214, south of Broulee Island, south of Batemans Bay (35°50'49"S 150°11'5"E), 8 m, brown macroalga *Zonaria diesingiana*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1991); many specimens, AM P.77215, gutters north of Burrewarra Point, south of Batemans Bay (35°49'49"S 150°14'1"E), 24 m, brown macroalga *Styopodium flabelliforme*, 27 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1992); many specimens, AM

P.77216, gutters north of Burrewarra Point, south of Batemans Bay (35°49'49"S 150°14'1"E), 24 m, from red macroalga *Pachymenia prostrata*, 27 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1993); many specimens, AM P.77218, gutters north of Burrewarra Point, south of Batemans Bay (35°49'49"S 150°14'1"E), 24 m, branching hydroid, 27 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1995); many specimens, AM P.77219, gutters north of Burrewarra Point, south of Batemans Bay (35°49'49"S 150°14'1"E), 24 m, red macroalga *Pachymenia prostrata*, 27 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1996); many specimens, AM P.77220, gutters north of Burrewarra Point, south of Batemans Bay (35°49'51"S 150°14'4"E), 23 m, from green macroalga *Codium lucasii*, 27 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1997); 4 specimens, AM P.77221, gutters, Burrewarra Point, south of Batemans Bay (35°49'52"S 150°14'17"E), 23 m, from green macroalga *Caulerpa hodgkinsoniae*, 27 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1998); many specimens, AM P.77223, gutters north of Burrewarra Point, south of Batemans Bay (35°49'49"S 150°14'1"E), 23 m, from red macroalga *Thamnoclonium dichotomum* and sponge *Terpios symbioticus*, 27 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 2000); 2 specimens, AM P.77224, northwest side of Tollgate Islands, Batemans Bay (35°44'49"S 150°15'31"E), 7.9 m, brown macroalga *Colpomenia sinuosa*, 28 October 2002, coll. G. D. F. Wilson and A. J. Millar (NSW 2002); many specimens, AM P.77232, north of Broulee Island, south of Batemans Bay (35°51'20"S 150°11'38"E), 16 m, brown macroalga *Lobophora variegata*, 30 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 2016); 14 specimens, AM P.77235, northwest side of Brush Island, north of Batemans Bay (35°31'39"S 150°24'57"E), 12 m, red alga *Pterocladia capillacea*, 8 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. Wilson (NSW 2025); many specimens, AM P.77236, north west side of Brush Island, north of Batemans Bay (35°31'39"S 150°24'57"E), 12 m, kelp *Ecklonia radiata*, 9 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2026); 8 specimens, AM P.77238, north west side of Brush Island, north of Batemans Bay (35°31'39"S 150°24'57"E), 16.9 m, green alga *Caulerpa flexilis* gutters, 9 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2027); many specimens, AM P.77240, north west side of Brush Island, north of Batemans Bay (35°31'39"S 150°24'57"E), 16.2 m, brown macroalga *Zonaria diesingiana* in gutters, 9 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2029); many specimens, AM P.77241, north west side of Brush Island, north of Batemans Bay (35°31'39"S 150°24'57"E), 16.2 m, brown macroalga *Zonaria diesingiana* gutters, 9 February 2003, coll. P. B.

Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2029); many specimens, AM P.77242, northwest side of Brush Island, north of Batemans Bay (35°31'39"S 150°24'57"E), 14 m, brown alga *Padina* sp., 9 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2030); 7 specimens, AM P.77243, northwest side of Brush Island, north of Batemans Bay (35°31'39"S 150°24'57"E), 16 m, brown macroalga *Zonaria diesingiana* gutters, 9 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2033); 4 specimens, AM P.77244, southwest side of Grasshopper Island, northeast of Point Upright (35°38'1"S 150°19'51"E), 13 m, red macroalga *Peyssonnelia novae hollandiidae* gutters, 10 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2038); 14 specimens, AM P.77246, west side of Wasp Island, north of Batemans Bay (35°40'2"S 150°18'29"E), 16 m, red macroalga *Curdiea crassa* gutters, 10 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2043); 1 specimen, AM P.77247, west side of Wasp Island, north of Batemans Bay (35°40'2"S 150°18'29"E), 16 m, red macroalga *Curdiea crassa* gutters, 10 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2043); 1 specimen, AM P.77249, west side of Wasp Island, north of Batemans Bay (35°40'2"S 150°18'29"E), 16 m, red alga *Lomentaria catenata* gutters, low profile reefs, rocks and sand, 10 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2046); many specimens, AM P.77250, west side of Wasp Island, north of Batemans Bay (35°40'2"S 150°18'29"E), 16 m, red macroalgae *Peyssonnelia novae hollandiidae* gutters, 10 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2047); 1 specimen, AM P.77251, west side of Wasp Island, north of Batemans Bay (35°40'2"S 150°18'29"E), 10 m, green alga *Codium saccatum* gutters, 10 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2049); 1 specimen, AM P.77252, west side of Wasp Island north of Batemans Bay, north of Batemans Bay (35°40'5"S 150°18'29"E), 10–16 m, green alga *Codium harveyi* gutters low profile reefs, rocks and sand, 10 February 2003, coll. P. B. Berents, A. J. Millar, J. Eu and G. D. F. Wilson (NSW 2050); 11 specimens, AM P.77253, west side of North Tollgate Island, Batemans Bay (35°44'55"S 150°15'27"E), 9 m, green alga *Caulerpa cactoides* gutters, 11 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2052); 1 specimen, AM P.77305, 100 m north, west of Julian Rocks (28°36'48"S 153°37'48"E), 16 m, brown alga *Zonaria* sp., 3 March 1992, coll. G. D. F. Wilson, R. Springthorpe and L. Albertson (NSW 638); 5 specimens, AM P.77306, 100 m north, west of Split Solitary Island (30°14'S 153°10'48"E), 17 m, brown algae, 7 March 1992, coll. S. J. Keable (NSW 694); many specimens, AM P.77308, Quarantine Bay, Twofold Bay (37°4'42"S 149°53'E), 2 m, airlift in seagrass *Posidonia* sp., 28 March 1985, coll. S. J. Keable and A. C. Paul (site Q6); many specimens, AM P.77309, Murrumbulga Point, Twofold Bay (37°4'42"S 149°53'6"E), subtidal rock platform fauna, 11 December 1984, coll. S. J. Keable and E. A. Bamber (site Q2); 2 specimens, AM P.77310, Quarantine Bay, Twofold Bay (37°4'42"S 149°53'E), crevice and cryptic fauna in *Posidonia* sp. seagrass beds, 11 December 1984, coll. S. J. Keable and E. A. Bamber (site Q3); many specimens, AM P.77312, Murrumbulga Point, Twofold Bay (37°4'42"S 149°53'6"E), 3 m, subtidal cryptic fauna rocks, 9 October 1985, coll. S. J. Keable and J. T. van der Velde (site Q5); many specimens, AM P.77313, Quarantine Bay, Twofold Bay (37°4'42"S 149°53'E), 2 m, airlift in seagrass *Posidonia* sp., 25 March 1985, coll. S. J. Keable and A. C. Paul (site Q6); 12 specimens, AM P.77314, Quarantine Bay, Twofold Bay (37°4'42"S 149°53'E), 2 m, airlift in seagrass *Posidonia* sp., 9 October 1984, coll. S. J. Keable and J. T. van der Velde (site Q7); many specimens, AM P.77315, Quarantine Bay, Twofold Bay (37°4'42"S 149°53'E) airlift in seagrass *Posidonia* sp., 25 June 1985, coll. S. J. Keable and A. L. Reid (Q8); 3 specimens, AM P.77318, Murrumbulga Point, Twofold Bay (37°4'42"S 149°53'6"E), 3 m, subtidal breakwall, 17 September 1985, coll. P. A. Hutchings and S. J. Keable (Q9); 9 specimens, AM P.77207, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red macroalga *Curdiea crassa* with small amount of red alga *Martensia australis*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1986); 16 specimens, AM P.77226, northwest side of Tollgate Islands, Batemans Bay (35°44'49"S 150°15'31"E), 7.9 m, from red macroalga *Chondria succulenta*, 28 October 2002, coll. G. D. F. Wilson and A. J. Millar (NSW 2003); many specimens, AM P.77237, northwest side of Brush Island, north of Batemans Bay (35°31'39"S 150°24'57"E), 12 m, kelp *Ecklonia radiata* gutters, 9 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2026); many specimens, AM P.86195, gutters, north of Burrewarra Point (35°49'51"S 150°14'4"E), 23 m, from macroalga *Martensia australis*, 27 October 2002, coll. G. Wilson, A. Millar and N. Yee (NSW 1999); 2 specimens, AM P.86196, north of Jimmies Island, Batemans Bay (35°48'56"S 150°14'6"E), 16 m, brown macroalga *Dictyota dichotoma*, 29 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 2010); 2 specimens, AM P.86208, The Culvert, Back Creek, South West Rocks, (30°53.045'S 153 01.384'E), mud, sieved at low tide, 21 February 2003, coll.

P. Hutchings and K. Attwood, (ex NSW 2082; NSW 2083); 1 specimens, AM P.86197, southern end of Lighthouse Reef, Ulladulla (35°22.14'S 150°29.31'E), 15 m, underside of large boulder, 30 April 1997, coll. P. Berents and K. Attwood (NSW 1265); many specimens, Montague Island (36°15'S 150°14'E), 5 m, algal washings, December 1978, coll. A. Kuitert; 1 male specimen, dissected, 1 slide, AM P.86213, north west of Blue Fish Point, North Head, north of Port Jackson, (33°48'06.9"S 151°18'00.8"E), 15–18 m, red alga, 12 November 2010, coll. S. J. Keable, RV *Baragula* (NSW 4011); 5 specimens, AM P.86214, north west of Blue Fish Point, North Head, north of Port Jackson, (33°48'06.9"S 151°18'00.8"E), 15–18 m, red alga, 12 November 2010, coll. S. J. Keable, RV *Baragula* (MI NSW 4011).—*Tasmania*: 2 specimens, AM P.83744, north side of Esperance Point, D'Entrecasteaux Channel (43°19'30"S 147°05' 30"E), 12 m, sponges, 18 April 1991, coll. Australian Museum Party (Tas 183); 4 specimen, AM P.86198, Elephant Rock north of St Helens Point (41°17.5'S 148°20'E), 20 m, red algae, 14 April 1991, coll. R. T. Springthorpe and C. J. McCormick (Tas 132).—*South Australia*: 2 specimens, SAMA C6592, Sellicks Beach, Fleurieu Peninsula (35°19'47"S 138°26'52"E), 16 January 1937, coll. H. M. Hale and K. Sheard.—*Western Australia*: Many specimens, AM P.79834, South Mole, Port Harding Torbay, Fremantle (32°3'S 115°44'E), 6 m, spirorbid polychaete tubes, 25 December 1983, coll. J. K. Lowry (WA 283); 12 specimens, AM P.79836, off end of South Mole, 2 km south of Cape Peron, Fremantle (32°3'S 115°44'E), 6 m, red gorgonacean, 25 December 1983, coll. R. T. Springthorpe (WA 288); many specimens, AM P.79839, off end of South Mole, Exmouth Gulf, Fremantle (32°3'S 115°44'E), 6 m, sponges, 25 December 1983, coll. J. K. Lowry (WA 276); many specimens, AM P.79841, South Mole, Arthur Head, Fremantle (32°3'S 115°44'E), 6 m, spirorbid polychaete worms, 25 December 1983, coll. J. K. Lowry (WA 283); 11 specimens, AM P.79842, off end of South Mole, Arthur Head, Fremantle (32°3'S 115°44'E), 6 m, green algae *Caulerpa* sp., 25 December 1983, coll. J. K. Lowry (WA 281); 9 specimens, AM P.79838, South Mole, Arthur Head, Fremantle (32°3'S 115°44'E), 6 m, spirorbid polychaete tubes, 25 December 1983, coll. J. K. Lowry (WA 283); 2 specimens, AM P.79837, reef west of groyne, Arthur Head (32°16'S 115°41'E), 6 m, deep channels in limestone reef, sponges, gorgonaceans from cave in reef, 26 December 1983, coll. J. K. Lowry (WA 295); 1 specimen, AM P.79848, off end of South Mole, Arthur Head, Fremantle (32°3'S 115°44'E), 6 m, sponge, detritus, epizoic green algae *Caulerpa* sp., 25 December 1983, coll. J. K. Lowry (WA 287); 4 specimens, AM P.79840, Bundegi Reef near Point Murat, Arthur Head, Fremantle (21°49'S 113°11'E), 9 m, dead encrusted coral, 4 January 1984, coll. R. Springthorpe (WA 406); many specimens, AM P.79847, off end of South Mole, Arthur Head, Fremantle (32°3'S 115°44'E), 6 m, sponges, 25 December 1983, coll. J. K. Lowry (WA 276); 2 specimens, AM P.79835, Migo Island, Arthur Head, Fremantle (35°4'S 117°39'E), 7 m, molluscs on rocks, 15 December 1983, coll. J. K. Lowry (WA 141).

Diagnosis. Head with well developed hump. *Gnathopod 1* without robust setae. *Gnathopod 2* propodus elongate subovoid, palm with 2 teeth, one rectangular and one subtriangular, palm without defining corner or robust setae. *Pereonite 6* dorsal carina subtriangular, produced posteriorly, apically subacute. *Pereonite 7* dorsal carina subtriangular, produced posteriorly, apically subacute. *Pleonite 1* dorsal carina subrectangular, produced anteriorly. *Pleonite 2* dorsal carina produced evenly, broadly rounded.

Female. *Gnathopod 1* carpus rectilinear, 1.8 times as long as broad; propodus subtriangular, 1.8 times as long as broad. *Gnathopod 2* merus posterior margin produced lobe broad, twice as broad as long, apically truncate, with 5 robust setae; propodus spherical, with posterodistal shelf, shelf margin strongly crenulated, palm lined with 4 humps, defined by tooth and 3 robust setae.

Description. Based on holotype male, 6.2 mm, AM P.86193. *Body* cuticle dorsally processiferous, with mainly posterior dorsal carina, without lateral and ventral carina. *Head* with well developed hump; *eyes* greatly bulging; lateral cephalic lobe subquadrate; anteroventral corner subquadrate. *Mandible* accessory setal row with 3 setae. *Maxilla 1* palp distal margin with 6 robust setae.

Pereonites 1–5 without dorsal carina. *Coxae 1–3* discontinuous, *coxae 4–7* contiguous. *Gnathopod 1* coxa

larger than coxa 2, as broad as long, distoventral corner produced anteriorly, corner subacute; basis 3.1 times as long as broad, without anterodistal setae; carpus subtriangular, 2.1 times as long as broad; propodus subrectangular, 2.1 times as long as broad, anterior margin with clusters of long slender setae, palm acute, straight, margin smooth, without robust setae; dactylus posterior margin with 7 serrate teeth, cuticle surface with raised serrations, closing along palm. *Gnathopod 2* basis twice as long as broad, anterodistal corner produced lobes rounded, with a few plumose setae; merus anterior margin with narrow produced lobe, as long as broad, apically acute; propodus elongate subovoid, 2.1 times as long as broad, anterior margin with clusters of short robust setae, palm acute, straight, with broad, well developed distal shelf, shelf margin strongly crenulated, palm with 2 teeth, one rectangular and one subtriangular, palm without defining corner or robust setae; dactylus closing along palm margin. *Pereonite 6* dorsal carina subtriangular, produced posteriorly, apically subacute. *Pereonite 7* dorsal carina subtriangular, produced posteriorly, apically subacute.

Pleonite 1 dorsal carina subrectangular, produced anteriorly; *epimeron 1* posteroventral corner rounded. *Pleonite 2* dorsal carina produced evenly, broadly rounded. *Epimera 2–3* posteroventral corner rounded. *Urosome* with 3 pairs of uropods. *Urosomite 1* short, twice as long as broad. *Uropod 1* peduncle 3 times as long as broad, with well developed ventromedial spine, 4 times as long as broad; inner ramus 1.6 times peduncle length; outer ramus about half the length of inner ramus. *Uropod 2* well developed, biramus, without ventromedial spine; outer ramus about half the length of inner ramus. *Telson* dorsal lobe with 2 apical setae; lower margin with pair of slender apical setae.

Female (sexually dimorphic characters) based on paratype female specimen, 4.2 mm, AM P.86194. *Gnathopod 1* basis anterior margin without robust setae; carpus rectilinear, 1.8 times as long as broad; propodus subtriangular, 1.8 times as long as broad, palm straight defined by corner with 2 robust setae; dactylus posterior margin with 4 serrate teeth. *Gnathopod 2* basis anterodistal corner with many robust setae; merus posterior margin produced lobe broad, twice as broad as long, apically truncate, with 5 robust setae; propodus spherical, 1.3 times as long as broad, anterior margin with clusters of long robust setae, palm weakly convex, $\frac{2}{3}$ length of propodus, with posterodistal shelf, shelf margin strongly crenulated, palm lined with 4 humps, defined by tooth and 3 robust setae.

Remarks. *Podocerus vulgaris* sp. nov. is similar to *P. cristatus*, *P. dentatus* and *P. oliphant* sp. nov. in the dorsal carination pattern. *Podocerus vulgaris* sp. nov. and *P. oliphant* sp. nov. have the male gnathopod 2 propodus palm with two distal teeth, while *P. cristatus* and *P. dentatus* have one palmar tooth. The male gnathopod 2 propodus palm with small defining tooth separates *P. oliphant* sp. nov. from *P. vulgaris* sp. nov. which has a smooth unornamented gnathopod 2 posterior margin. *Podocerus vulgaris* sp. nov. is the most commonly collected *Podocerus* species for southern Australia.

Distribution. Australia. *New South Wales*. Long Reef, Port Jackson, Botany Bay, Ulladulla, Batemans Bay, Twofold Bay (current study). *Tasmania*. D'Entrecasteaux Channel (current study). *South Australia*. Fleurieu Peninsula (current study). *Western Australia*. Fremantle (current study).

Podocerus wanganui J. L. Barnard, 1972

Figs 34–37

Podocerus wanganui J. L. Barnard, 1972: 152–153, figs 85–86.

Type locality. St Clair, Dunedin, New Zealand.

Material examined. *New South Wales*. 1 male specimen, 8.8 mm, dissected, 3 slides, AM P.86199, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red coralline alga *Corallina berterii*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1987); 1 female specimen, 6.7 mm, dissected, 1 slide, AM P.86200, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red coralline alga *Corallina berterii*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1987); 19 specimens, AM P.77210, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red coralline alga *Corallina berterii*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1987); 1 SEM pin mounted specimen, AM P.78199, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from macroalga *Corallina berterii*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1987); 1 SEM pin mounted specimen, AM P.78200, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red coralline alga *Corallina berterii*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1987); 1 SEM pin mounted specimen, AM P.78201, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red coralline alga *Corallina berterii*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1987); 2 specimens, AM P.77203, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red macroalga *Peyssonnelia nova-hollandiae*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1985); 3 specimens, AM P.77208, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red macroalga *Curdiea crassa* with small amount of red alga *Martensia australis*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1986); 19 specimens, AM P.77210, East Wall, north of Burrewarra Point, south of Batemans Bay (35°50'1"S 150°14'9"E), 25 m, from red coralline alga *Corallina berterii*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1987); 1 specimen, AM P.77227, west side of North Tollgate Island, Batemans Bay (35°44'46"S 150°15'28"E), 12 m, from brown macroalga *Sporochnus radiceformis*, 28 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 2006); many specimens, AM P.77228, north of Jimmies Island (35°48'56"S 150°14'6"E), 16 m, macroalga *Solieria robusta*, 29 October 2002, coll. A. J. Millar, N. Yee and G. D. F. Wilson (NSW 2008); 1 specimen, AM P.77231, northwest side of Tollgate Islands, Batemans Bay (35°44'45"S 150°15'26"E), 12 m, from macroalga *Sargassum* sp. 2, 29 October 2002, coll. G. Wilson and N. Yee (NSW 2015); 1 specimen, AM P.77245, southwest side of Grasshopper Island, Batemans Bay (35°38'1"S 150°19'51"E), 11 m, brown alga *Halogetis platycena* gutters, 10 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2041); 1 specimen, AM P.77255, west side of North Tollgate Island, Batemans Bay (35°44'55"S 150°15'27"E), 9 m, red macroalga *Chondria succulenta* gutters, 11 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2053); 3 specimens, AM P.77256, North Kianinny Gutter, Tathra (36°44'3"S 149°59'12"E), 5 m, red alga *Pterocladia lucida* gutters, 10 February 2003, coll. P. B. Berents, J. Eu, A. J. Millar and G. D. F. Wilson (NSW 2060); 9 specimens, AM P.36232, Munganno Point, Twofold Bay (37°6'12"S 149°55'42"E), 3 m, subtidal wharf pile, 10 October 1984, coll. S. J. Keable and J. T. van der Velde (M2); 9 specimens, AM P.36233, Quarantine Bay, Twofold Bay (37°44'2"S 149°53'E), 2 m, airlift in seagrass *Posidonia* sp., 9 October 1984, coll. S. J. Keable and J. T. van der Velde (Q7); many specimens, AM P.77128, Munganno Point, Twofold Bay (37°6'12"S 149°55'42"E), subtidal rocks, crevice fauna and algal waxing, 10 October 1984, coll. P. A. Hutchings and S. J. Keable (M3); many specimens, AM P.77131, Munganno Point, Twofold Bay (37°6'12"S 149°55'42"E), 15 m, subtidal wharf pile, 27 June 1985, coll. S. J. Keable and A. L. Reid (M8); 1 specimen, AM P.77230, northwest side of Tollgate Islands, Batemans Bay (35°44'45"S 150°15'27"E), 12 m, brown alga *Padina australis*, 29 October 2002, coll. G. D. F. Wilson and N. Yee (NSW 2014); many specimens, AM P.77316, Quarantine Bay, Twofold Bay (37°44'2"S 149°53'E), airlift in seagrass *Posidonia* sp., 25 June 1985, coll. S. J. Keable and A. L. Reid (Q8); many specimens, AM P.77317, Murrumbulga Point, Twofold Bay (37°44'2"S 149°53'6"E), 2 m, subtidal rock, 29 March 1985, coll. S. J. Keable and J. T. van der Velde (Q9); 4 specimens, AM P.77123,

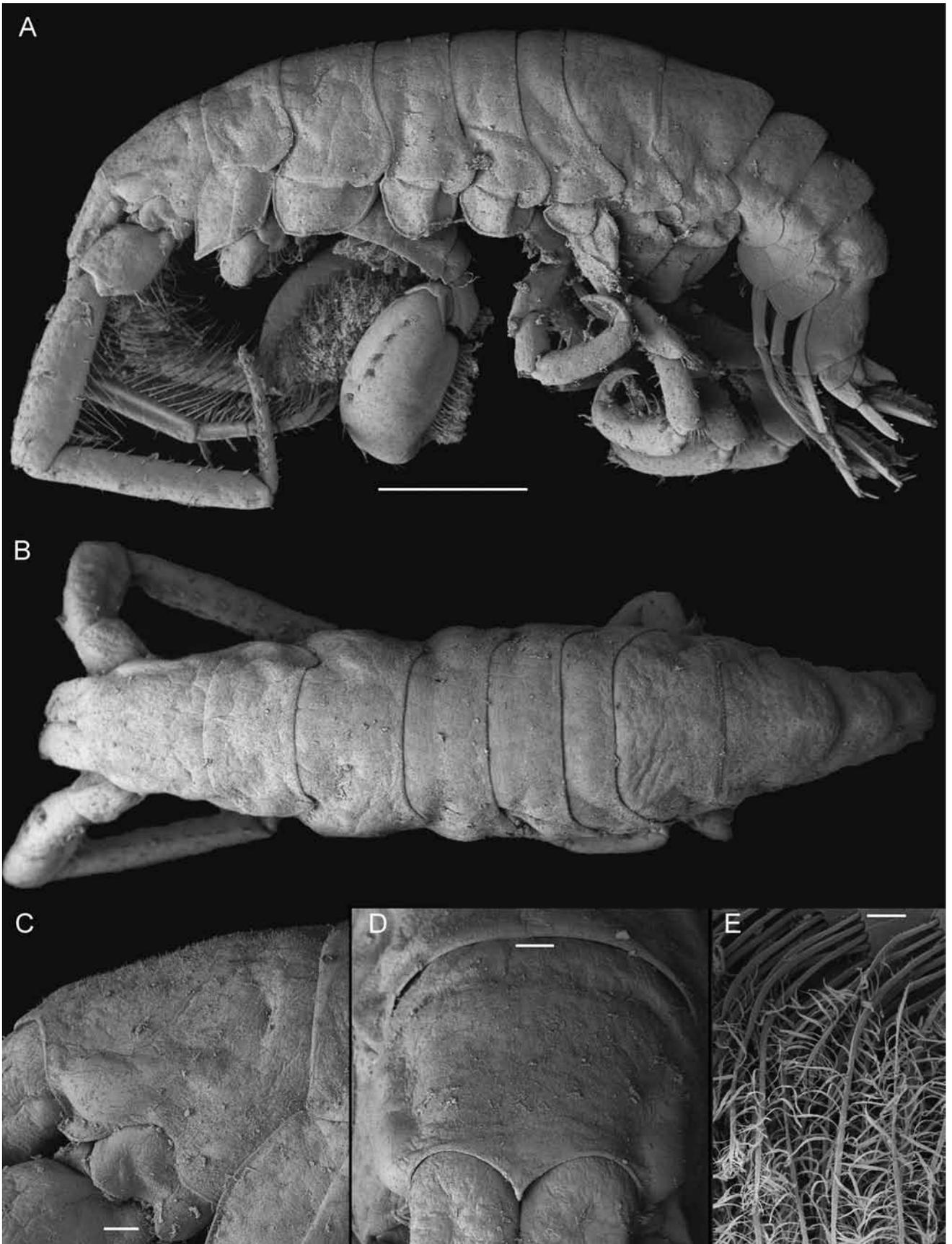


Figure 34. *Podocerus wanganui* J. L. Barnard, 1972 male specimen, AM P.78201, Batemans Bay, New South Wales. SEM photographs: (A) whole animal lateral view; (B) whole animal dorsal view (scale 100 μm); (C) head lateral view (scale 100 μm); (D) head frontal view (scale 100 μm); and (E) gnathopod 2 propodus palm plumose setae (scale 20 μm).

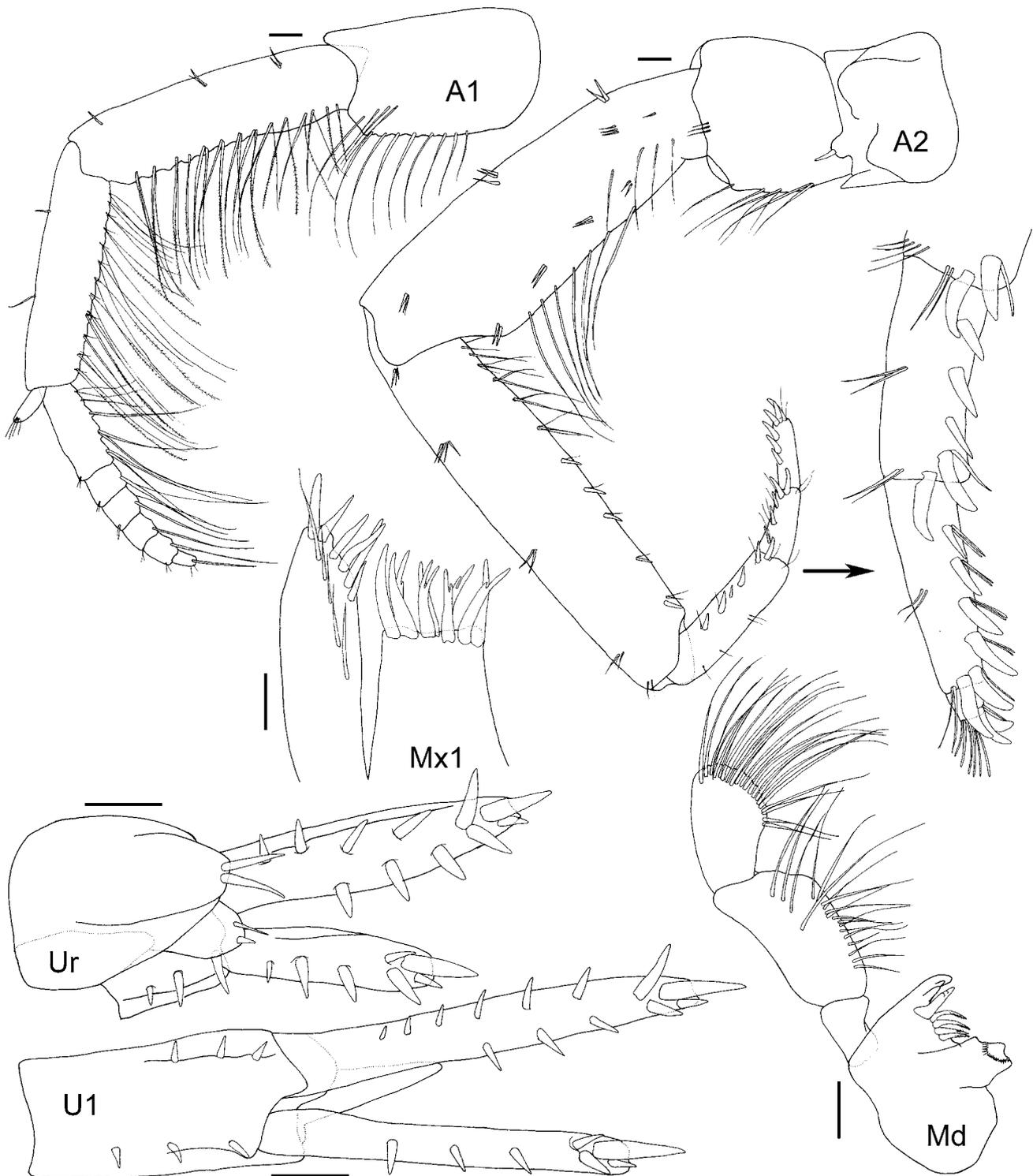


Figure 35. *Podocerus wanganui* J. L. Barnard, 1972 male, AM P.86199, 8.8 mm, Batemans Bay, New South Wales (scales represent 0.1 mm).

Cape Banks, Botany Bay (34°S 151°15'E), 1 February 1985; 4 specimens, AM P.77124, Cape Banks, Botany Bay (34°S 151°15'E), 1 February 1985; 7 specimens, AM P.86201, south of Broulee Island (35°50'49"S 150°11'5"E), 8 m, from red macroalga branching corallines: *Amphiora anceps* and *Jania natalensis*, 25 October 2002, coll. G. D. F. Wilson, A. J. Millar and N. Yee (NSW 1989); 2 specimens, AM P.86202, outer Latitude Rock, Forster (32°12'39"S 152°34'06"E), 12 m, hydroids, 18 March 2003, coll. P. B. Berents, and R. T. Johnson (NSW 2156); 1 male, dissected, 2 slides, AM P.86203, Montague Island (36°15'S 15014'E), 5 m, algal washings, December 1978, coll. A. Kuitert; 100+ specimens, AM P.86204, Montague Island (36°15'S 15014'E), 5 m, algal washings, December 1978,

coll. A. Kuitert.—*Tasmania*. 2 specimens, AM P.86205, Sloop Reef, Bay of Fires (41°13'S 148°17.5'E), 23 m, red alga, rocky bottom, 15 April 1991, coll. R. T. Springthorpe and C. J. McCormick (Tas 151); 5 specimens, AM P.86206, north side of Esperance Point, D'Entrecasteaux Channel (43°19'30"S 147°05' 30"E), 1.5 m, coralline alga, 18 April 1991, coll. P. B. Berents (Tas 177); 1 specimen, AM P.86207, St Helens Rocks (41°17.5'S 148°22'E), 3 m, clumps of a red alga, 13 April 1991, coll. P. B. Berents (Tas 117); 6 specimens, AM P.83641, Lighthouse Bay, south tip of Bruny Island, (43°31'S 147°21'E), 6 m, algal washings, 13 December 1977, coll. C. Short.—*South Australia*. 1 male specimen, dissected, 9.0 mm, 3 slides, NMV J62401, northeastern side of Topgallant Island, Investigator Island

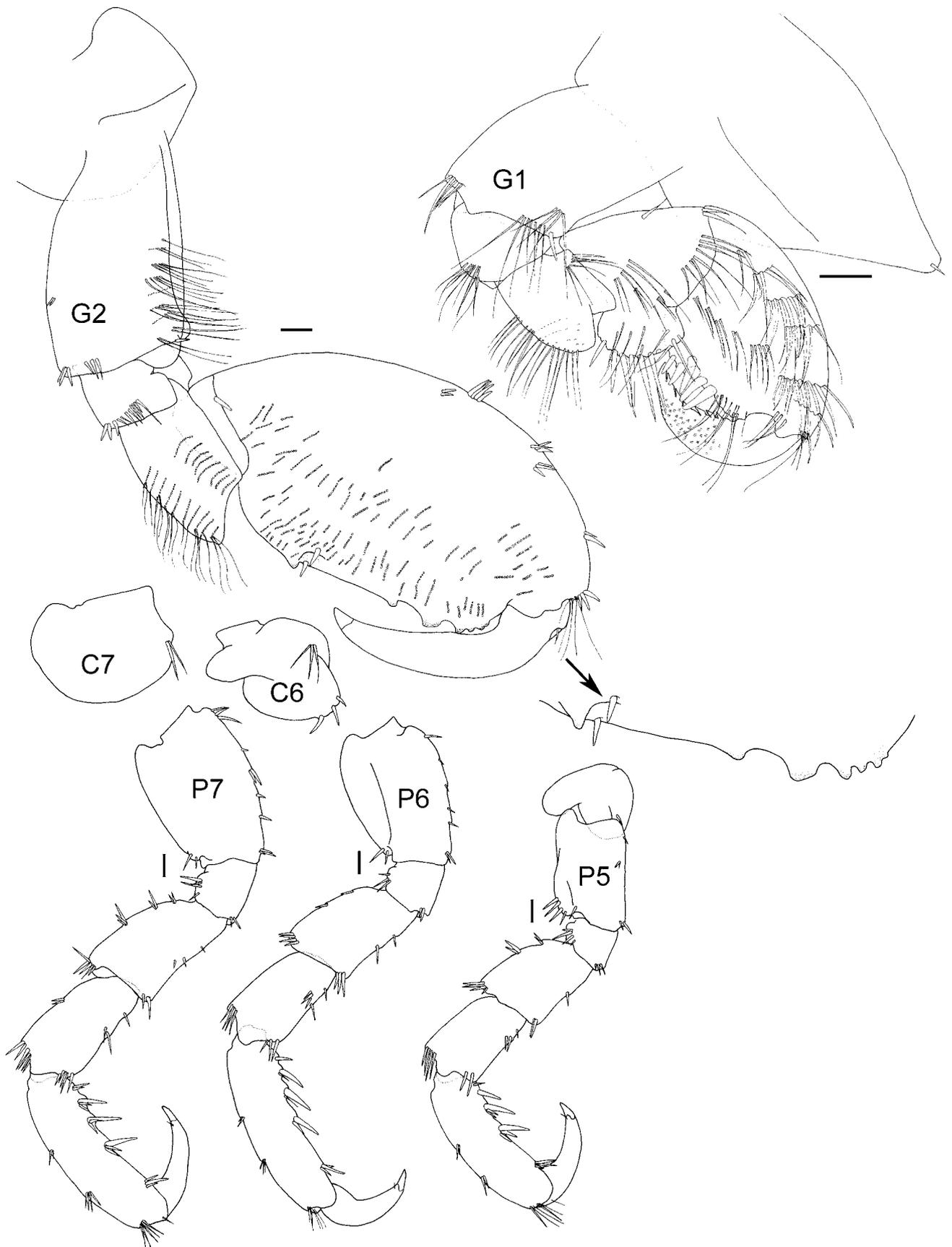


Figure 36. *Podocerus wanganui* J. L. Barnard, 1972 male, AMP.86199, 8.8 mm, Batemans Bay, New South Wales (scales represent 0.1 mm).



Figure 37. *Podocerus wanganui* J. L. Barnard, 1972 female, AM P.86200, 6.7 mm, Batemans Bay, New South Wales (scales represent 0.1 mm).

Group (33°4'00"S 134°36'36"E), 7 m, 22 April 1985 (SA 83); 1 male specimen, dissected, 5.5 mm, 3 slides, NMV J62402, northeastern side of Topgallant Island, Investigator Island Group (33°4'00"S 134°36'36"E), 7 m, 22 April 1985 (SA 83); many specimens, NMV J62403, northeastern side of Topgallant Island, Investigator Island Group (33°4'00"S 134°36'36"E), 7 m, 22 April 1985 (SA 83); 1 specimen, NMV J57130, northeastern side of Topgallant Island, Investigator Island Group (33°43'00"S 134°36'36"E), 16 m, 22 April 1985 (SA 84); 1 specimen, NMV J57050, northeast side of Topgallant Island, Investigator Group (33°43'00"S 134°36'36"E), 20 m, 21 April 1985, (SA 80); 2 specimens, NMV J57054, Venus Bay, southern side of Germein Island (33°13'12"S 134°40'06"E), 2 m, 23 April 1985 (SA 88).—*Western Australia*. Many specimens, AM P.79832, 30 km south of Carnarvon, Vancouver Peninsula, (35°4'S 117°56'E), high intertidal, weed mat, 13 December 1983, coll. H. E. Stoddart (WA 117).

Diagnosis. *Body* cuticle dorsally smooth. *Head* dorsally smooth; *eyes* not protruding from head. *Gnathopod 1* propodus subovate, with 5 robust setae near corner of palm. *Gnathopod 2* propodus subovate, palm with one rectangular and one subtriangular tooth, palm defining corner with tooth and 2 robust setae; dactylus closing short of palm end.

Female. *Gnathopod 1* carpus rectilinear, 1.2 times as long as broad; propodus subtriangular to subovoid, 1.8 times as long as broad, palm smooth weakly convex with 4 robust setae near corner of palm. *Gnathopod 2* merus posterior margin lobe broad produced, broader than long, propodus, palm defined by tooth with 3 robust setae.

Description. Based on male specimen, 8.8 mm, AM P.86199. *Body* cuticle dorsally smooth. *Head* dorsally smooth; *eyes* not protruding from head; lateral cephalic lobe subquadrate; anteroventral corner subquadrate. *Antenna 1* between 0.4 times body length; peduncle article 2 longer than article 3; primary flagellum 0.33 times peduncle length, with 6 articles; accessory flagellum 1-articulate, twice as long as

broad. *Antenna 2* distinctly longer than antenna 1; article 4 shorter than article 5; flagellum 0.25 times peduncle length, posterior margin with line of short robust setae, with 4 articles. *Mandible* accessory setal row with 4 setae. *Maxilla 1* palp distal margin with 6 robust setae.

Coxae 1–7 discontinuous. *Gnathopod 1* coxa subequal to coxa 2, longer than broad, distoventral corner weakly produced anteriorly, corner subacute; basis 1.2 times as long as broad, anterodistal margin with slender and robust setae; carpus subtriangular, 1.1 times as long as broad; propodus subovate, 1.9 times as long as broad, anterior margin with clusters of long slender setae, palm margin smooth, with 5 robust setae near corner of palm; dactylus posterior margin with 6 serrate teeth, cuticle surface with raised serrations, closing along palm. *Gnathopod 2* basis 2.1 times as long as broad, anterodistal corner rounded, with dense brush of plumose setae; merus posterior margin with broad produced lobe, as long as broad, apically subacute, without short robust setae; propodus subovate, 2.1 times as long as broad, anterior margin with clusters of short robust setae, palm acute, straight, palm $\frac{2}{3}$ length of propodus, with broad, well developed distal shelf, shelf margin crenulated, palm with one rectangular and one subtriangular tooth, palm defining corner, with tooth and 2 robust setae; dactylus closing short of palm end.

Epimeron 1 posteroventral corner rounded. *Epimera 2–3* posteroventral corner subquadrate. *Urosome* with 3 pairs of uropods. *Urosomite 1* short, 1.2 times as long as broad. *Uropod 1* peduncle 2.1 times as long as broad, with well developed ventromedial spine, 4 times as long as broad; inner ramus 1.2 times peduncle length; outer ramus about $\frac{3}{4}$ length of inner ramus. *Uropod 2* well developed, biramus, without

ventromedial spine; outer ramus about half the length of inner ramus. *Uropod 3* uniramous; rami with 2 apical setae. *Telson* dorsal lobe with 2 apical setae; lower margin without lateral or apical setae.

Female (sexually dimorphic characters) based on female specimen, 6.7 mm, AM P.86200.

Gnathopod 1 basis anterior margin without robust setae; carpus rectilinear, 1.2 times as long as broad; propodus subtriangular to subovoid, 1.8 times as long as broad, palm smooth weakly convex, with 4 robust setae near corner of palm; dactylus posterior margin with 5 serrate teeth. *Gnathopod 2* basis anterodistal corner with produced lobes, rounded, with 2 robust setae; merus posterior margin lobe broad produced, broader than long, apically rounded, with 3 robust setae; propodus subovoid, 1.5 times as long as broad, anterior margin with clusters of long slender setae, palm convex, smooth, without distal shelf, palm defined by tooth with 3 robust setae.

Remarks. The new distribution records extend along the southern coast of Australia (excluding Tasmania) and are a significant range expansion for this species previous known from New Zealand. Material dissected from New South Wales and South Australia show no significant morphological variation from the original description.

Distribution. New Zealand. *Dunedin* (J. L. Barnard, 1974). Australia. *New South Wales*: Forster, Botany Bay, Tathra, Batemans Bay, Twofold Bay, Montague Island (current study). *Tasmania*. St Helens Rock, Bay of Fires, D'Entrecasteaux Channel, Rocky Cape (current study). *South Australia*: Investigator Island Group (current study). *Western Australia*: Vancouver Peninsula (current study).

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