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Redescriptions and new species in the ‘*Austrosignum*–*Munnogonium*’ complex *sensu* Just & Wilson (2007), mainly from the Southern Hemisphere (Crustacea: Isopoda: Paramunnidae)

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Abstract

Type material is used to illustrate and redescribe the following species in the paramunnid *Austrosignum*–*Munnogonium* complex (classification *sensu* Just and Wilson 2007): *Cryosignum incisum* (Richardson, 1908), *Cryosignum latifrons* (Menzies, 1962) **comb. nov.**, *Meridiosignum kerguelensis* (Vanhöffen, 1914), *Munnogonium falklandicum* (Nordenstam, 1933), *Munnogonium globifrons* (Menzies, 1962), and *Munnogonium tillerae* (Menzies & Barnard, 1959,—topotypes). In addition, seven new species in the complex are described, *Austrosignum pilosum*, *Austrosignum latum*, *Cryosignum nordenstami*, *Meridiosignum convexum*, *Meridiosignum macquariensis*, *Munnogonium longicaudatum*, and *Tethygonium monocuspis*. *Boreosignum* Just and Wilson, 2007 is reported from Australia for the first time as *Boreosignum* specimens.

Keys to species in *Austrosignum*, *Cryosignum*, *Meridiosignum*, *Munnogonium* and *Tethygonium* are given. A summary of distribution with a list of all species in the complex including occurrence is presented.

Key words: Isopoda, Paramunnidae, *Austrosignum*–*Munnogonium* complex, redescrptions, new species, keys to species, distribution

Introduction

The *Austrosignum*–*Munnogonium* complex of the janiroidean isopod family Paramunnidae once had a confusing variety of similar species with definable differences but were inadequately described in the literature. Just & Wilson (2007) partially revised this complex of 27 species by re-diagnosing *Austrosignum* Hodgson, 1910 and *Munnogonium* George & Strömberg, 1968, restricting the former to two and the latter to five described species. The remaining 20 species in those two genera were redistributed to eight additional new genera. Since 2007, Doti & Roccatagliata (2009, 2013) have added two new species each to the genera *Meridiosignum* Just & Wilson, 2007 and *Munnogonium*. Selden *et al.* (2016) extended the known geological age of the Asellota and this family to the Upper Triassic in describing *Fornicaris calligarisi* Wilson and Selden, 2016, a fossil species possibly related to *Cryosignum* Just & Wilson, 2007.

Our aim in this paper is to further illuminate the known diversity of the group by treating poorly documented species mentioned in Just & Wilson (2007) from type material (and topotypes in one case) and describing seven new species. *Austrosignum* is enlarged with descriptions of the new species *A. pilosum* and *A. latum* and the presence of another informal species is noted based on a specimen found with the type material of *Cryosignum incisum* (Richardson, 1908), for which a new description is given. Paramunnidae incertae sedis [*latifrons*] (Menzies, 1962), mentioned in our 2007 paper, is here transferred to *Cryosignum*. *Cryosignum nordenstami* **sp. nov.** is described along with another possible species originally mentioned by Menzies (1962) as a record of *Austrosignum grande*. *Meridiosignum kerguelensis* (Vanhöffen, 1914) is fully illustrated from type material and two new species are added to the genus: *M. convexum* and *M. macquariensis*. A possible third species of *Meridiosignum* was found in Nordenstam's collection from the Swedish South Polar Expedition 1901–03 but is not given formal taxonomic status owing to limited material. Redescrptions of *Munnogonium globifrons* (Menzies, 1962), *M. falklandicum* (Nordenstam, 1933), and *M. tillerae* (Menzies & Barnard, 1959) are presented along with *M. longicaudatum* **sp. nov.** Finally, *Tethygonium monocuspis* **sp. nov.** is described, increasing that genus complement to five species. Keys to the species of *Austrosignum*, *Cryosignum*, *Meridiosignum*, *Munnogonium* and *Tethygonium* are provided.

Methods

Taxonomic data. Terminology and measurements are those explained and illustrated in Just & Wilson (2004 and 2006). The descriptions were generated from a DELTA database (Dallwitz 1980, Dallwitz *et al.* 2000a, 2000b) and subsequently edited for clarity of language. In the 'Materials' section for some species, the term 'Other material' denotes specimens that are not from the type locality; in some instances, we cannot be certain they should be referred to the taxon described; topotypic specimens from the type locality and referable to the relevant species may be included in this heading. For diagnoses of the genera treated here see Just & Wilson (2007).

Implicit Attributes. The descriptions are short because we use the DELTA method of listing and removing features that are common in most species and would add considerably to the length of descriptions. The implicit attributes used here as well as a few 'Characters not treated' are those listed in Just & Wilson (2007). Implicit attributes are commented on only where a character is different or not applicable.

Abbreviations: *Text of descriptions.* T♂—terminal male. *Institutions.* **AHF**—Allan Hancock Foundation, California, USA (all collections now at LACM). **AM**—Australian Museum, Sydney, Australia. **LACM**—Los Angeles County Museum, California, USA. **MNHN**—Muséum National d’Histoire Naturelle, Paris, France. **NMV**—Museum Victoria, Melbourne, Australia. **SMNH**—Swedish Museum of Natural History, Stockholm, Sweden. **ZMB**—Zoological Museum (Museum für Naturkunde), Humbolt University, Berlin, Germany

Taxonomy

Austrosignum Hodgson, 1910

Key to species of *Austrosignum*

1. Pereionite 1–7 dorsal surface smooth, without ornamentation; eyestalks shaft before apex approximately parallel 2
- Pereionite 1–4 dorsal surface with transverse bumps (wrinkled appearance in dorsal view), with pair of low broad lobes or convexities; pereionite 5–7 dorsal surface with transverse ridges; eyestalks shaft before apex constricted proximally
. *Austrosignum escandellae* Castelló, 2004
2. Pleotelson posterior projection evenly curving into lateral margin; antennula article 1 shorter than article 2; antenna article 5 only slightly longer than article 4; pereiopod I merus posterior margin with only fine setae
. *Austrosignum glaciale* Hodgson, 1910
- Pleotelson posterior projection set apart from lateral margins by concavity at level of uropods; antennula article 1 length subequal to, or longer than article 2; antenna article 5 distinctly longer than article 4; pereiopod I merus posterior margin with one robust seta on distal margin 3
3. Body dorsally with scattered fine simple setae; body widest in male at pereionite 2; pleotelson lateral margin with proximal neck before convex margins *Austrosignum latum* sp. nov.
- Body dorsal surface with scattered long simple setae; body widest in male at pereionite 3; pleotelson lateral margin convex, without proximal neck *Austrosignum pilosum* sp. nov.

Austrosignum pilosum sp. nov.

(Fig. 1)

Type fixation. Holotype, T♂, AM P60883. —Here designated.

Etymology. The epithet is from the Latin *pilosus* (= hairy), which alludes to many long setae on the dorsal surface.

Type Locality. Macquarie Island, Australia.

Material examined. Holotype. T♂, 1.8 mm. Aerial Cove, Macquarie Island, Australia, 54°29’S, 158°57’E, coll. R. Ricker, 12 Dec 1977, from algae in *Durvillea* zone, MA–111, AM P60883.

Paratype. Nearly T♂, 1.3 mm, Caroline Cove, Macquarie Island, Australia, inner cove north of hut, 54°46’S, 158°48’E, 13 m, *Codium* flat adjacent to *Macrocystis* bed, 17 January 1978, J.K. Lowry (SCUBA), stn MA-311, NMV J52113.

Description (terminal male). *Body* tapering posteriorly, width 0.52 length, widest at pereionite 2 and 3. *Head* length 0.44 width; length posterior to eyestalks 1.4 anterior length. *Frontal margin* broadly rounded. *Eyestalks* length 4 times width, apex rounded, long axis angling forward at 35–40°.

Pereionites lateral margin 1–7 rounded. *Pereionites* 1–3 coxae barely visible in dorsal view except on pereionite 2; coxae visible on pereionites 4–7, rounded, each with single simple seta. *Pereionite* 1 sagittal length in male 1.9 pereionite midline length.

Pleon length 1.4 width. *Pleonite* 1 width 0.8 distance between uropods, length 0.3 width. *Pleotelson* lacking inflection (‘neck’) between lateral and proximal margins; lateral margins convex, smooth; posterior margin apex narrowly rounded; posterior margin forming 80° angle, set apart from lateral margins by concavity distal to uropods.

Antennula articles 1–2 combined extending beyond eyestalk apex; article 1 tubular, length and width subequal to 2; articles 4–6 of subequal length, all shorter than 3, (left side of holotype aberrant with 2 short terminal articles only). *Antenna* article 3 tubular, width 0.43 length, article 5 distinctly longer than article 4; flagellum with 7 articles, proximal article subequal to article 2, distal articles shorter.

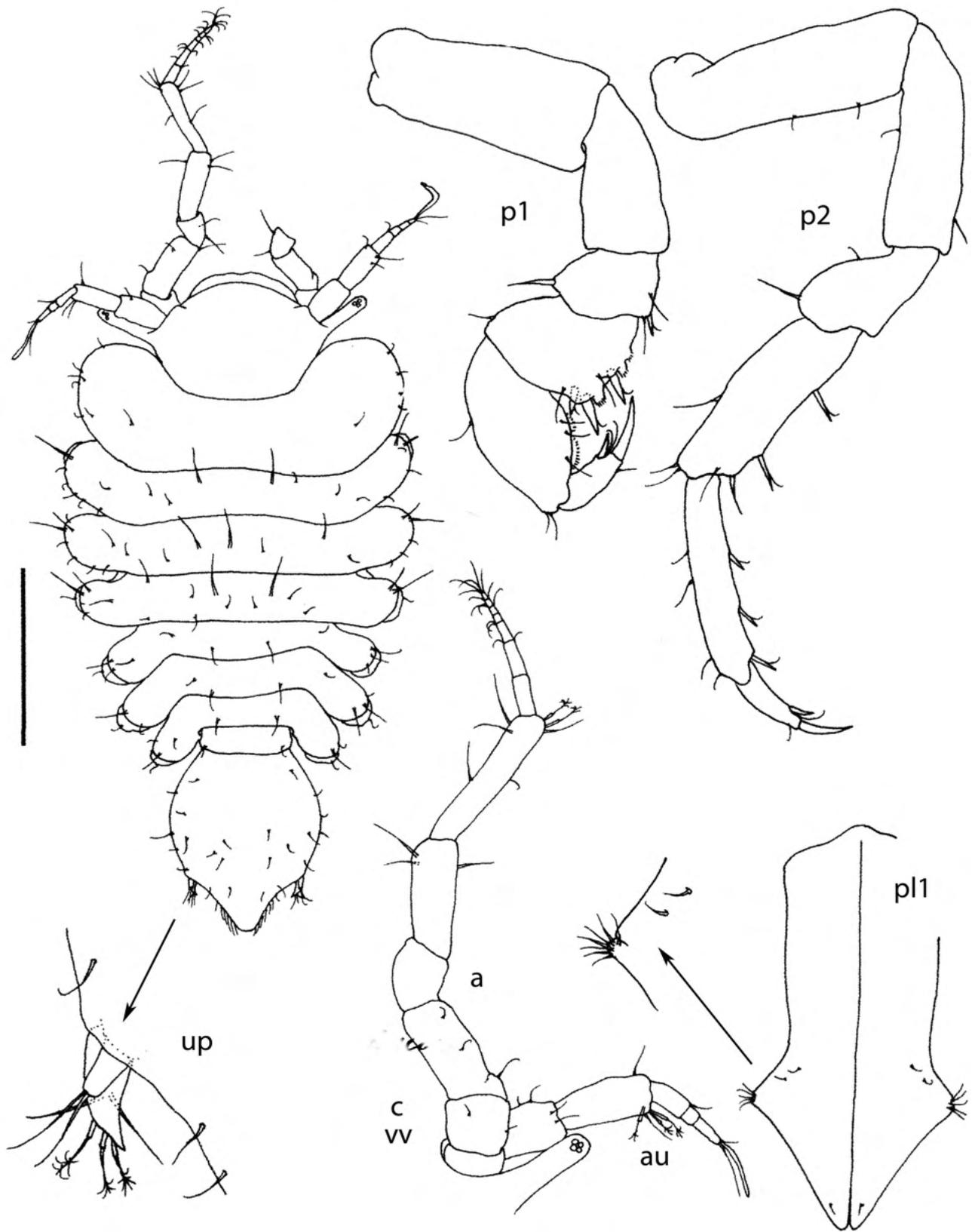


FIGURE 1. *Austrosignum pilosum* sp. nov. Holotype, T♂. a, antenna; au, antennula; cvv, head ventral view; p1–2, pereopod I and II; pl1, pleopod I; up, uropod. Scale for habitus, 0.5 mm.

Pereiopod I basis anterior margin smooth, length 2.1 width; merus posterior margin with one robust seta on distal margin; carpus triangular, distal width 1.1 posterior margin length, posterior margin with 2 large robust setae and 1 distal short robust seta, with crenate projection proximal to each large robust setae; propodus narrowing distally to insertion of dactylus, with crenate ridge on opposing margin.

Pleopod I lateral lobes distinctly projecting from lateral margin, width 0.35 distance to midline, distal sublobe with tuft of simple setae; distal projection length 0.30 pleopod total length, forming acute angle of 70°, with pointed apices.

Uropods inserted on lateral margin of pleotelson; protopod absent.

Size. Largest male 1.8 mm.

Distribution. Macquarie Island, Australia, 13 m.

Remarks. Terminal males of *Austrosignum pilosum* **sp. nov.** differ from those of the type species *A. glaciale* Hodgson, 1910 (Just & Wilson, 2007, figs 2–3) as follows: the body is wider relative to length with long setae dorsally; the pleotelson lacks a neck, and pleopod I is in a position close to pleonite 1 (ventral view); and the lateral margins distal to the uropods are distinctly concave. *Austrosignum latum* **sp. nov.** (below) is even broader (both sexes) than the above mentioned species, and has a short pleotelson neck with pleopod I set back from pleonite 1; dorsally it has short setae only. *Austrosignum escandellae* Castelló, 2004 differs from all three species by an irregularly sculpted dorsal surface, and by apparently lacking the small distal third robust seta on the carpus (see Just & Wilson, 2007: 9).

Austrosignum latum **sp. nov.**

(Figs 2–3)

Type fixation. *Holotype*, T♂, AM P72158.—Here designated.

Etymology. The Latin adjective *latum* means broad, alluding to the wide body of the species.

Type Locality. Off La Jolla, California, U.S.A.

Material examined. *Holotype*. T♂, 2.0 mm. La Jolla, California, off Scripps Institute of Oceanography, 32°52.09'N, 117°15.69'W, 20 m [65 ft], coll. E. Vetter, on SCUBA, 7 December 1990, stn 65–E, AM P72158.

Paratypes. Same data as holotype, (1 ♀ with embryos, 1.94 mm, 2 juvenile ♀), AM 76851.

Description. *Body* ovate, width 0.63 length in female, 0.62 length in male, widest in female at pereionite 3, in male at pereionite 2. *Head* slightly longer in male than female, length 0.39 width in male, 0.38 in female; length posterior to eyestalks 1.5 anterior length in female, 2.0 in male. *Frontal margin* shallow convex, with angular lateral margins adjacent to antennae. *Eyestalks* length 4.0 width, apex rounded, long axis angling forward at approximately 20° in female, 30° in male.

Pereionites 1–7 lateral margins rounded; coxae not visible in dorsal view on 1–4, coxae visible on 5–7, rounded with single simple seta. *Pereionite* 1 of terminal male greatly enlarged; sagittal length in male 2.2 pereionite midline length, in female 2.0.

Pleon length 1.8 width in female, 1.7 in male. *Pleonite 1* width 0.8 distance between uropods, length 0.3 width. *Pleotelson* with moderate inflection between lateral and proximal margins, and short proximal neck; posterior margin of apex pointed; posterior margins straight, in female forming 75° angle, 80° in male, set apart from lateral margins by slight concavity at level of uropods.

Antennula articles 1–2 combined extending beyond eyestalk apex; article 1 shorter than 2, tubular; articles 4–6 shorter than 3, article 5 longer than 4 and 6.

Antenna article 3 tubular, width 0.37 length, article 5 distinctly longer than article 4; flagellum with 7 articles, proximal article 0.75 length of second article, article 3–7 short, subequal.

Pereiopod I basis anterior margin smooth, length 2.0–2.6 width (♂, ♀); merus posterior margin with one robust seta distally in female, (absent in terminal male illustrated); carpus triangular, distal width 0.97–1.2 posterior margin length (♀, ♂), posterior margin with 2 large robust setae and 1 distal short robust seta (♀) or simple seta (♂), posterior margin with small crenate projection proximal to each of the two large robust setae; propodus narrowing distally to insertion of dactylus, with crenate ridge on opposing margin.

Male pleopods I covering distal 3–4 length of pleotelson ventral surface; lateral lobes distinctly projecting from lateral margin, width 0.4 distance to midline, distal sublobe with tuft of simple setae; distal projection length 0.32 pleopod total length, forming acute angle, with pointed apices. *Female operculum* ovoid, width 0.70 length, distal margins slightly concave, apex rounded.

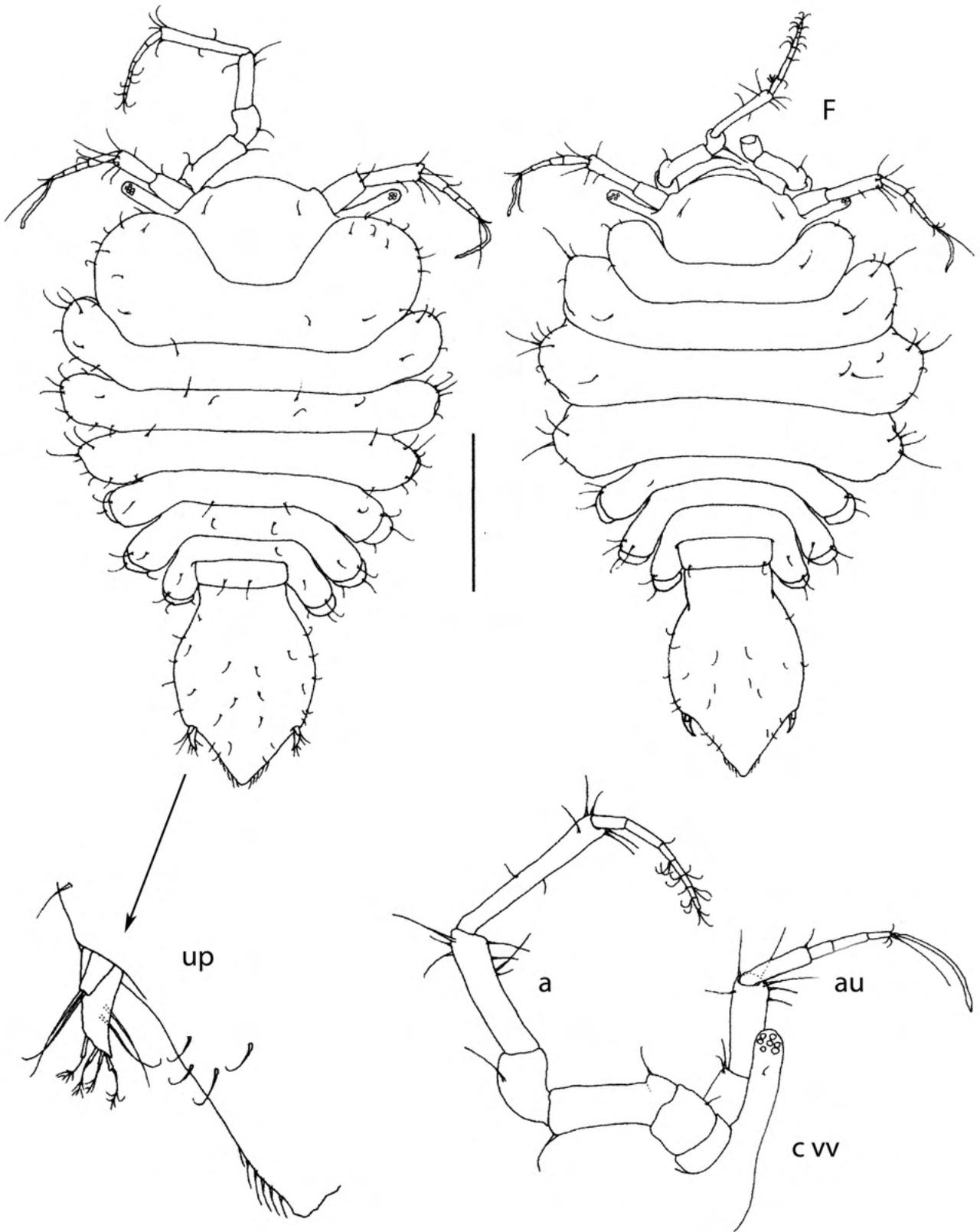


FIGURE 2. *Austrosignum latum* sp. nov. H, holotype, T♂; F, paratype ♀. a, antenna; au, antennula; cvv, head ventral view; up, uropod. Scale for habitus (both specimens), 0.5 mm.

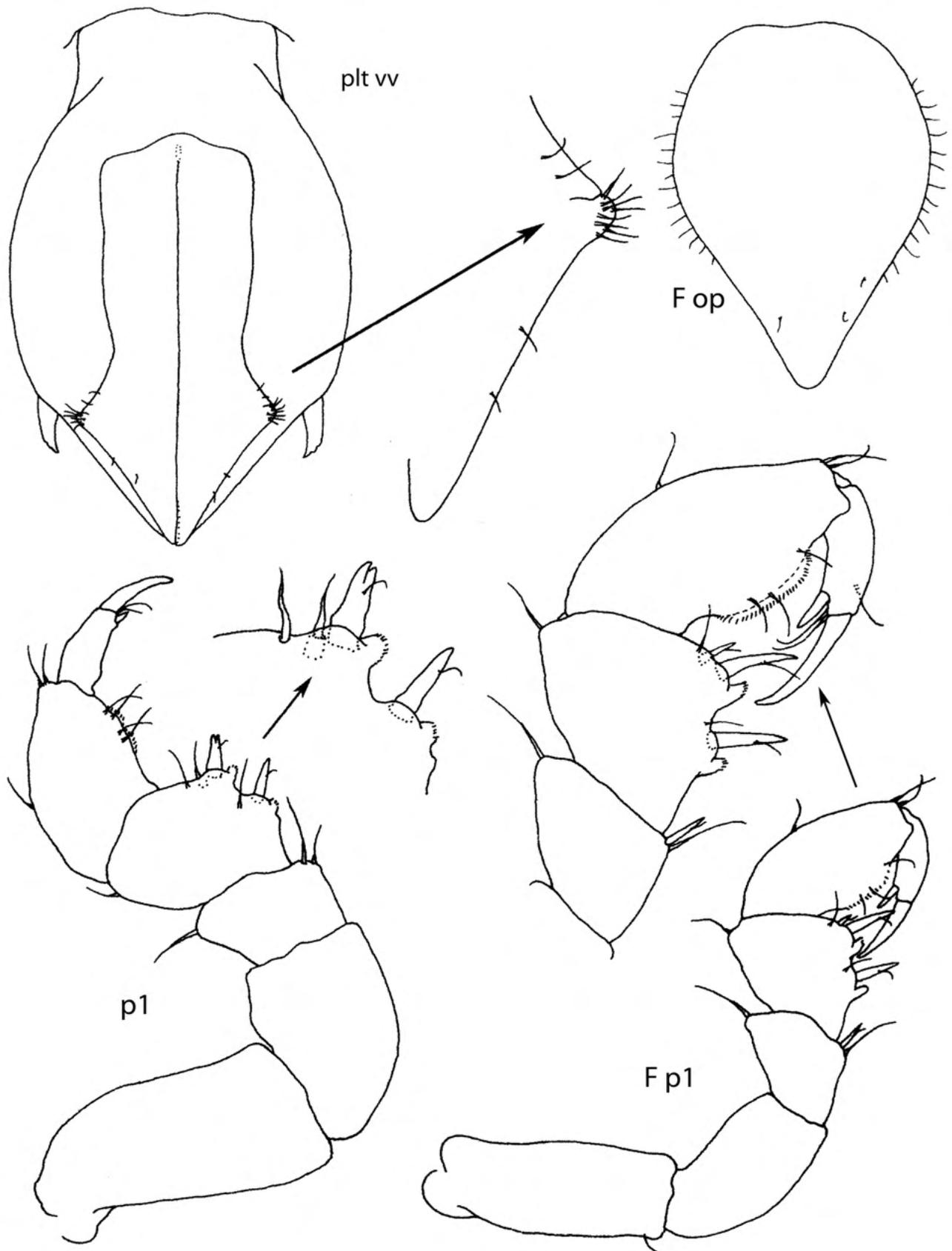


FIGURE 3. *Austrosignum latum* **sp. nov.** H, holotype, T♂; F, paratype ♀. op, operculum; p1, pereiopod I; plt vv, pleotelson ventral view.

Uropods inserted on lateral margin of pleotelson; protopod absent.

Size. Largest male 2.0 mm. Largest female 1.9 mm.

Distribution. La Jolla Canyon, Southern California, 20 m.

Remarks. For comparison with other species in *Austrosignum* see Remarks under *A. pilosum* **sp. nov.** above.

Austrosignum sp.

(Fig. 4)

Material examined. Oviparous ♀, 2.2 mm, Antarctica, Palmer Peninsula, Wiencke Island, 64°48.0'S, 63°22.4' W, 25 m; label data: "*Austrimunna incisa* Richardson; Type!; 11° 822—Drague, 25m; (2–5–05); Museum Paris; Ile Wiencke; Mission Charcot; 1906", MNHN-IU-2019-3352.

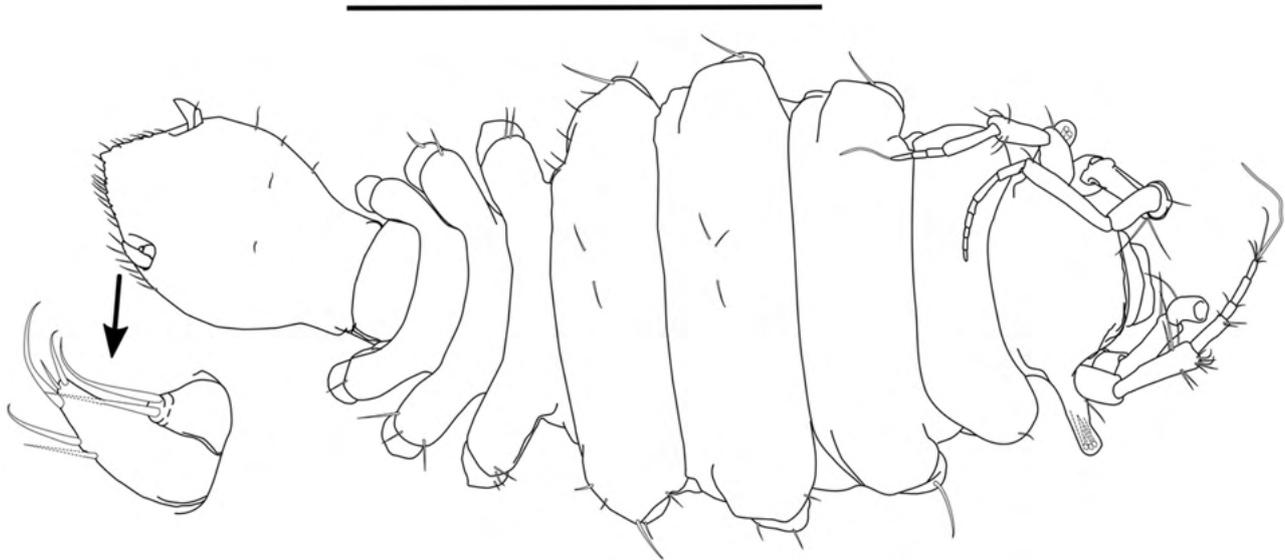


FIGURE 4. *Austrosignum* sp. Oviparous ♀, MNHN IS 3057, habitus dorsal view, scale for habitus 1.0 mm.

Remarks. This female specimen was in the same vial as the lectotype of *Cryosignum incisum* (Richardson, 1908), but it is clearly not that species. It has the defining characters of *Austrosignum*, including an unelaborated head frontal margin, prominent to elongate eyestalks and a distally angular, pointed uropodal endopod. Without a male, we are unable to describe this species, although it is unlike females of the other four species in the genus, in having eyestalks that are longer and thinner than the other known species. Compared to the other species with a distally pointed pleotelson, *A. latum* **sp. nov.**, this species has a narrower body.

Boreosignum Just & Wilson, 2007

Boreosignum specimens

(Fig. 5)

Material examined. ♂, 0.85 mm, (lacking all pereopods), Jervis Bay, New South Wales, Australia, AM P68211; ♀, 1.1 mm, Maston Point, American River, Kangaroo Island, South Australia, 35°46.30'S, 137°46.50'E, 4–5 m, clumps of sponge in channel below wharf, P. Hutchings, 2 March 1979, AM P68210.

Remarks. The male from Jervis Bay could be referred to *Boreosignum orientale* (Shimomura & Mawatari, 2000) on account of the unique double-bump dorsoanteriorly on the head. The Australian and Japanese males, however, show subtle differences, in particular the shape of the lateral lobes of pleopod I. The lack of all pereopods makes definitive identification impossible. The female from Kangaroo Island lacks head ornamentation, but Shimomura & Mawatari (2000: 223) in their description of *Boreosignum orientale* state only 'Female: Similar to male in morphology of all pereionial appendages'. Hence, we do not know if head morphology is sexually dimorphic in

Boreosignum orientale, and cannot, therefore, refer the two Australian specimens to the same species. This is the first report of the genus from Australia.

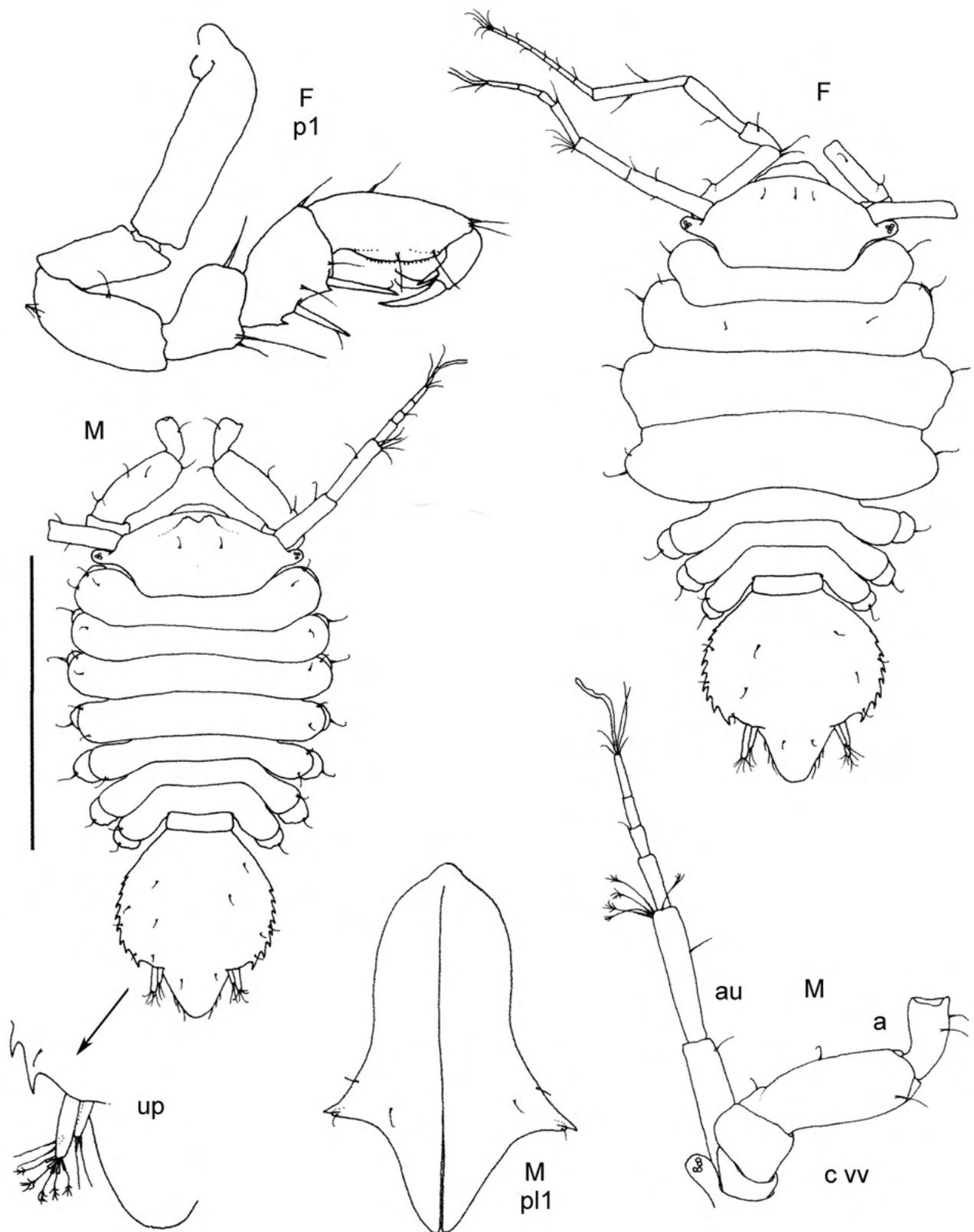


FIGURE 5. *Boreosignum* specimens. M, ♂ from Jervis Bay; F, ♀ from Kangaroo Island. a, antenna; au, antennula; cvv, head ventral view; p1, pereiopod I; pl1, pleopod I; up, uropod. Scale for habitus (both), 0.5 mm.

Key to species of *Cryosignum*

1. Pereionite 1–7 dorsal surface smooth; antennula article 1 length subequal to article 2, or longer than article 2 2
- Pereionite 1–7 dorsal surface with transverse ridges; antennula article 1 shorter than article 2 3
2. Head frontal margin nearly straight with angular corners; pereionites 1–7 lateral margin rounded, smooth; pleotelson lateral margin with proximal neck before convex margin; antennula articles 3 and 5–6 of subequal length, longer than article 4
. *Cryosignum nordenstami* sp. nov.
- Head front margin broadly convex, without angular corners; pereionite 1 lateral margin broadly rounded with small concavity; pereionite 1–4 lateral margins denticulate; pleotelson lateral margin convex; antennula articles 5–6 of subequal length, longer than articles 3–4 *Cryosignum latifrons* (Menzies, 1962)
3. Head frontal margin nearly straight laterally, with angular lateral corners adjacent to antennae; eyestalks shaft constricted proximally; pleotelson laterally rounded, with inflection between proximal and lateral margins
. *Cryosignum incisum* (Richardson, 1908)
- Head frontal margin broadly rounded, without angular lateral corners adjacent to antennae; eyestalks shaft before apex approximately parallel; pleotelson laterally rounded with inflection and distinct neck between lateral and proximal margins
. *Cryosignum lunatum* (Hale, 1937)

***Cryosignum incisum* (Richardson, 1908)**

(Fig. 6)

Austrimunna incisa Richardson, 1908: 152, Fig. 9.

Austrosignum incisa.—Menzies, 1962: 50; Wolff, 1962: 252, 287.

Paramunna incisa.—Vanhöffen, 1914: 450; Stephensen, 1927: 358; Nierstrasz, 1941: 291.

Cryosignum incisum.—Just & Wilson, 2007: 3, tab.1.

Type fixation. Lectotype, ♂, MNHN IS 3057.—Here designated.

Type Locality. Wiencke Island, Antarctica.

Material examined. Lectotype, subterminal ♂, 2.7 mm. Antarctica, Palmer Peninsula, Wiencke Island, 64°30'S, 63°25'W, “*Austrimunna incisa* Richardson; Type!; 11° 822-Drague 25m; (2-5-05); Museum Paris; Ile Wiencke; Mission Charcot; 1906”, MNHN-IU-2019-3351.

Other material (all AM). Antarctica, Palmer Peninsula, Anvers Island, Arthur Harbor (less than 25 nautical miles from type locality): R/V Alpha Helix stations [Rich] by M.D. Richardson, Van Veen Grab (0.067m²) in silty sand, 7-9 Feb 1971. West of Palmer Station, 64°46.43'S 64°04.37'W, depth 15 m: Rich 10-2, ♀, P.84808; Rich 10-3-1, ♀, P.84809; Rich 10-4, ovigerous ♀, P.84810; Rich 10-5, preparatory ♀, P.84811. Northwest of Amsler Island, 64°45.75'S 64°05.83'W, depth 18 m: Rich 12-3-1, T♂, P.75060. South of Amsler Island, 64°46.05'S 64°04.92'W, depth 23 m: Rich 13-1, juv ♂, illustrated, P.84812; Rich 13-1, juv ♂, P.84813; Rich 13-2, 5 inds, P.84814; Rich 13-3, 22 inds, P.84815; Rich 13-3-1, ovigerous ♀, dissected, illustrated, measured, P.84816; Rich 13-3-1, T♂ “A”, illustrated, P.84817; Rich 13-3-1, T♂ “B”, illustrated, measured, P.84818; Rich 13-3-1, subterminal ♂, P.75058; Rich 13-3-1, 1 ind, P.75065; Rich 13-3-1, 2 inds, P.75373; Rich 13-5, subterminal ♂, P.84819. South of Amsler Island, 64°46.07'S 64°04.92'W, depth 30 m: Rich 14-5-1, subterminal ♂, P.84820. Hero Inlet, 64°46.55'S 64°03.53'W, depth 5-7 m: Rich 7-1-1, T♂, 2 ovigerous ♀♀, P.75061; Rich 7-2, 7 inds, P.75059; Rich 7-2-1, 2 inds, P.75062; Rich 7-4, 2 ♀♀, juv ♂, P.75063. Hero Inlet, 64°46.55'S 64°03.53'W, depth 5-7 m; Rich 7-4, 31 inds; Rich 7-5-1, subterminal ♂, illustrated, P.84821; Rich 7-5-1, 11 inds, P.75057

Description. *Body* ovate (except in terminal males); width 0.62 length in ovigerous ♀, width 0.41–0.47 length in male (lectotype, T♂ AM P.84818), widest in male and in female at pereionite 3, (enlarged pereionite 1 of terminal males wider).

Head longer in male than female, length in male 0.46 and 0.49 width (T♂, lectotype ♂), length in females 0.33 width (ovigerous ♀); length posterior to eyestalks in female 0.44 anterior length (ovigerous ♀), length posterior to eyestalks in male 0.65–1.1 anterior length (lectotype ♂, T♂ AM P.84818). *Frontal margin* slightly convex in middle, straight laterally, with angular lateral margins adjacent to antennae. *Eyestalks* prominent, in female length 2.5 width (ovigerous ♀), in male length 3.0 width (lectotype ♂, T♂), apex rounded, shaft before apex constricted proximally, long axis angling forward at approximately 30° in female (ovigerous ♀), long axis angling forward 40–45° in male (lectotype ♂, T♂), becoming sinuous in terminal males.

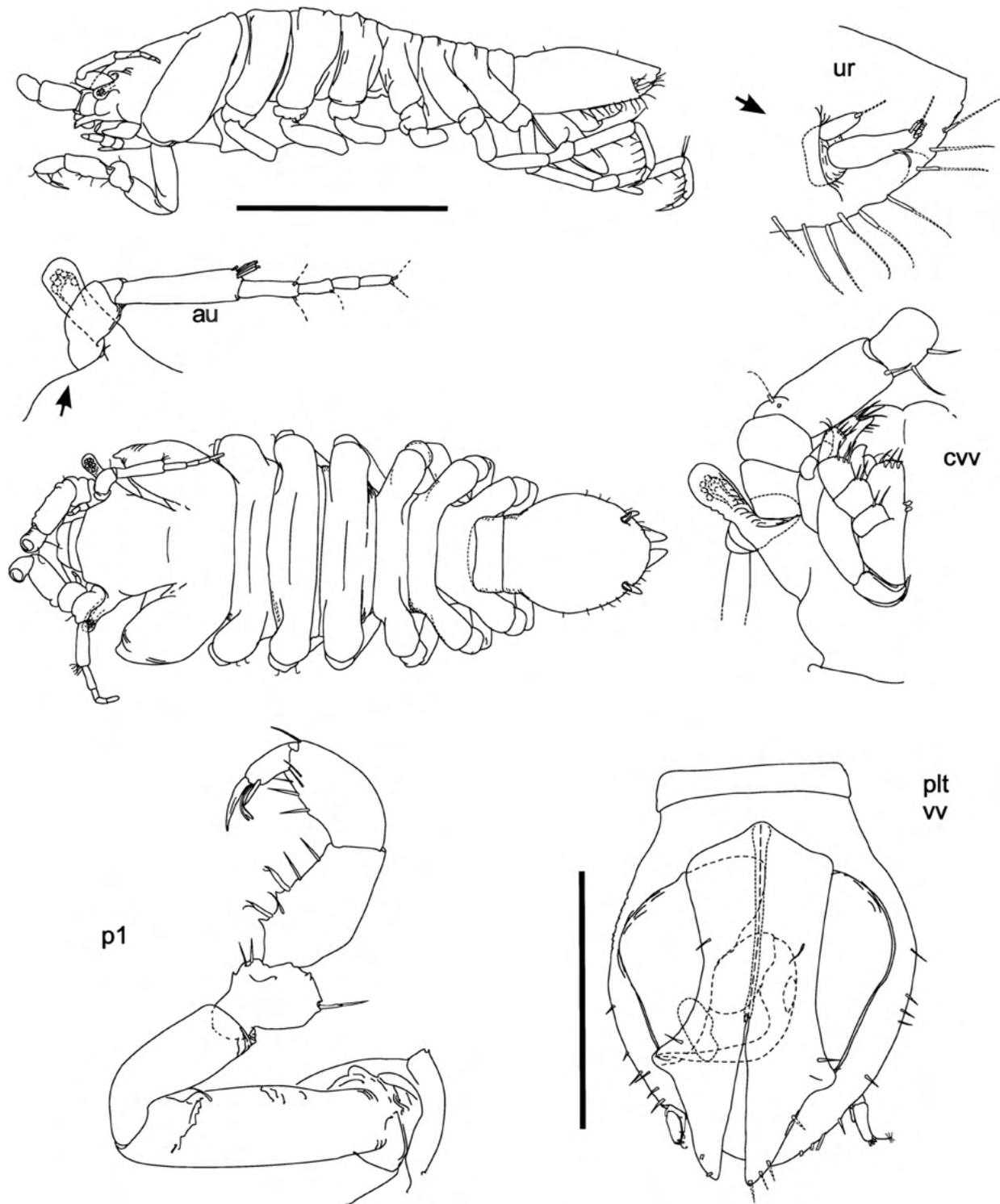


FIGURE 6. *Cryosignum incisum* (Richardson, 1908). **Lectotype** ♂, MNHN IS 3057. au, antennula; cvv, head ventral view; p1, pereiopod I; ur, uropod; plt vv, pleotelson, ventral view.

Pereionite 1 of terminal male greatly enlarged; sagittal length in male 1.6–2.3 pereionite midline length (lectotype ♂, T ♂), in female 1.3 pereionite midline length (ovigerous ♀); pereionite 1–7 dorsal surface with transverse ridges (low, rounded); pereionite lateral margins coxae visible in dorsal view (T ♂ coxa fused to pereionite 1); pereionite 1–7 lateral margins not projecting (T ♂ projecting forward), rounded.

Pleon length 1.5 width in female (ovigerous ♀), 1.4–1.5 width in male (T ♂, lectotype ♂). *Pleonite 1* width 0.97–1.0–1.3 distance between uropods (lectotype ♂, T ♂, ovigerous ♀), length 0.4 width (lectotype ♂, ovigerous ♀).

♀). *Pleotelson* laterally rounded but with weak inflection between proximal and lateral margins (less so in T ♂), dorsal surface smooth; length of pleonite 1 in ventral view 0.08 total pleotelson length; posterior margin apex broadly rounded to narrowly rounded (T ♂, ovigerous ♀), evenly curving into lateral margin; in female forming 70° angle (ovigerous ♀), in male forming 85–90° angle from vertex to uropod insertions (T ♂, lectotype ♂).

Antennula articles 1–2 combined extending beyond eyestalk apex, article 1 shorter than article 2, inflated, broader than 2; article 2 distal margin with cluster of 5 penicillate setae; articles 4–6 of subequal length, all shorter than 3. *Antenna* article 3 male much more robust than female, tubular, width 0.48–0.45–0.61 length (ovigerous ♀, lectotype ♂, T ♂), article 5 distinctly longer than article 4 (ovigerous ♀); flagellum with 10 articles (ovigerous ♀), proximal article distinctly longer than more distal articles, proximal article 2.1 length of second article (ovigerous ♀).

Mandible molar process distally wedge-shaped, triturative surface sloping; with anterior spine, distinctly projecting medially from gnathal surface; with distinctly projecting spine on posterior margin of gnathal surface; mandible palp present.

Pereiopod I coxa without projections (ovigerous ♀) or with anterior projections (T ♂), anterior margin simple (T ♂, ovigerous ♀), in terminal males fully fused to pereionite 1; basis anterior margin smooth, length 3.7–3.6–4.5 width (lectotype ♂, ovigerous ♀, T ♂); pereiopod I carpus oval, distal width 0.48–0.52 posterior margin length (T ♂, ovigerous ♀), posterior margin with 2 robust setae, with 1 denticle proximal to each robust seta; propodus narrowing distally to insertion of dactylus, with 2 robust setae. *Pereiopod III* basis anterior margin smooth.

Male pleopod I lateral lobes moderately projecting from midlateral margin, width about 0.3 distance to midline (lectotype ♂); lateral lobes distal sublobe partly overlapping proximal sublobe; distal projection length 0.32 pleopod total length, forming acute angle, with pointed apices. *Female operculum* distal part tapering with concave distolateral margins, width 0.69 length.

Uropods dorsal and directly adjacent to lateral margin of pleotelson; protopod present but not exposed, (may be exposed in decalcified specimens).

Size. Largest ♀ 2.1 mm (ovigerous); largest ♂ 2.7 mm (lectotype).

Distribution. Antarctica, Palmer Peninsula, Wiencke Island and Anvers Island, 5–30 m.

Remarks. Richardson (1908) reported 2 males and 2 females of *Cryosignum incisum* (Richardson, 1908) but did not designate a holotype. We have examined one male and one female from this syntype series. The male (somewhat decalcified but otherwise in good condition) appears to be the specimen illustrated by Richardson (1908, fig. 9). We have designated this specimen as lectotype. The female is an undescribed species of *Austrosignum* sensu stricto; it has been removed from the syntype series. The remaining two syntypes (now possible paralectotypes), if still in existence, need to be examined to ascertain their status.

A study of a collection of males from Arthur Harbor, Anvers Island, shows that the lectotype is in a subterminal stage of development. The more extreme terminal males of this species show the similar forms as in *C. lunatum* (Hale, 1937). We have used these non-type specimens to score females and male variation.

We have not seen a female *Cryosignum incisum* (Richardson, 1908) from the type collection, but females from the Anvers Island collection have a more compact pereion and a more angular pleotelson than males. This species is quite similar to other described species of the genus although it can be distinguished by these features: the pleotelson is laterally rounded but with small inflection between proximal and lateral margins; the frontal margin of the head is nearly straight laterally and has angular margins adjacent to the antennae; the eyestalk shaft is constricted proximally so that the tips are broader than the rest of the shaft. The other three species *C. lunatum*, *C. latifrons* and *C. nordenstami* lack an inflection between lateral and proximal margins of the pleotelson; the frontal margin of the head is broadly rounded and lacks angular margins adjacent to the antennae, and the eyestalks shafts are approximately parallel. Brandt (1999) described a male of this genus from the South Shetland Islands as “*Paramunna lunata*”, which we subsequently excluded from that species (Just & Wilson, 2007). Now that we have seen male specimens of *Cryosignum incisum* from Anvers Island (nearby and west of Wiencke Island, the type locality), Brandt’s specimen appears to be related to this species although we cannot be certain how close without inspection of the specimen. Recently Zemko *et al.* (2017) reported a single specimen as *Cryosignum incisum* from Admiral Bay, South Shetland Islands.

The Anvers Island collection shows important variability in several features. The pleotelson has an ontogenetic change from a more angular pleotelson posterior margin (vertex) in females and juvenile males to a more rounded form in mature males. This can also be seen to a lesser degree in *C. lunatum*. In addition, the preservation of the

specimens appears to affect this feature as well. The lectotype male has a rounded vertex and an exposed uropodal protopod similar to a decalcified terminal male from the Anvers collection while another male in better condition had a rounded angular vertex and a retracted protopod. Therefore, in *Cryosignum* at least, these features need to be used with caution, especially where one of the sexes is missing.

***Cryosignum latifrons* (Menzies, 1962), comb. nov.**

(Fig. 7)

Austrosignum latifrons Menzies, 1962: 50, fig. 9.

Paramunnidae *incertae sedis*.—Just & Wilson, 2007: 14, table 1, fig. 1.

Type fixation. Lectotype, ♀, SMNH 3220.—Here designated.

Type locality. Seno [Gulf of] Reloncavi, southern Chile.

Remarks on type material. Menzies (1962: 50) listed 3 females, but did not designate a holotype. Among these syntypes we have designated the ‘female cotype’ illustrated by Menzies (1962, fig. 9A) as lectotype.

Material examined. Lectotype, ♀, 1.3 mm, Chile, Seno Reloncavi, N of Isla Quellin, 41°51’S, 72°55’W, 100 m, small stones, probably also hard sand, Lund Universitet Chile Expedition 1948–49, 23 January 1949, stn M40, SMNH Type-3220.

Paralectotypes. 2 smaller females (one without head), same data as lectotype, in separate vial together with lectotype, SMNH Type-3220.

Description (lectotype). *Body* width 0.6 length, widest at pereionite 3. *Head* length 0.41 width; length posterior to eyestalks 0.8 anterior length. *Frontal margin* broadly rounded, without angular lateral margins adjacent to antennae. *Eyestalks* in female length 1.7 width, apex rounded, shaft constricted in proximal third, long axis angling forward at most 10°.

Pereionite 1 sagittal length 1.7 pereionite midline length; pereionite 1 lateral margin linear to slightly concave, 2–4 rounded, with small posteriorly projecting lobes, 5–7 rounded; lateral margins of pereonites 2–4 with tiny denticles on posterior half.

Pleon length 1.3 width. *Pleonite 1* width equals distance between uropods, length 1.3 width. *Pleotelson* laterally rounded, smooth, lacking inflection between lateral and proximal margins; posterior margin forming 80° angle, evenly curving into lateral margin, margins micro-serrate with simple setae, apex rounded.

Antennula with 6 articles (left aberrant with 5); articles 1–2 combined extending beyond eyestalk apex; article 1 length subequal to 2, inflated, broader than 2; articles 5–6 of subequal length, longer than equal articles 3–4. *Antenna* article 3 tubular, width 0.50 length, article 5 distinctly longer than article 4; flagellum with 10 articles, proximal article distinctly longer than more distal articles, 2.7 length of second article.

Pereiopod I basis anterior margin smooth, length 1.5 width; carpus oval, distal width 1.0 posterior margin length, posterior margin with 1 tiny denticle proximal to each robust seta; propodus narrowing distally to insertion of dactylus, with 2 robust setae.

Operculum broadly ovoid, width 0.90 length, without concave distal margins, apex rounded.

Uropods dorsal, adjacent to lateral margin of pleotelson; protopod recessed or absent.

Size. Largest female 1.3 mm.

Distribution. Southern Chile, 100 m.

Remarks. In our analysis of the *Austrosignum*–*Munnogonium* complex (Just & Wilson, 2007: 14, table 1, fig. 1) we placed *Austrosignum latifrons* Menzies, 1962 as Paramunnidae *incertae sedis* because the species did not unambiguously align with the *Cryosignum* clade as expected due to lack of males in the type material, although it appeared in our cladogram as sister group to *Cryosignum*. This issue still is not resolved, but we now find the *incertae sedis* label unhelpful in referring to the species. If we disregard aspects of the diagnosis of *Cryosignum* (Just & Wilson, 2007: 14) which refer to males only, this species fits the diagnosis of *Cryosignum* as opposed to *Austrosignum* and *Munnogonium*. We therefore transfer the species from *incertae sedis* to *Cryosignum*.

Cryosignum latifrons shares with females of the type species *C. lunatum* general body shape, eye stalk configuration, a mandible palp, the oval carpus of pereopod I with 2 straight robust setae, propodus of pereopod I with 2 robust setae on posterior margin, a perfectly ovoid operculum, and a straight, apically rounded uropod endopod. It differs from all species of *Cryosignum* in the shape of the lateral margins of pereionites 2–4, each of which has a

pronounced posterior, rounded, finely serrate lobe, and in the broadly rounded frontal margins reaching to the base of the eyestalks.

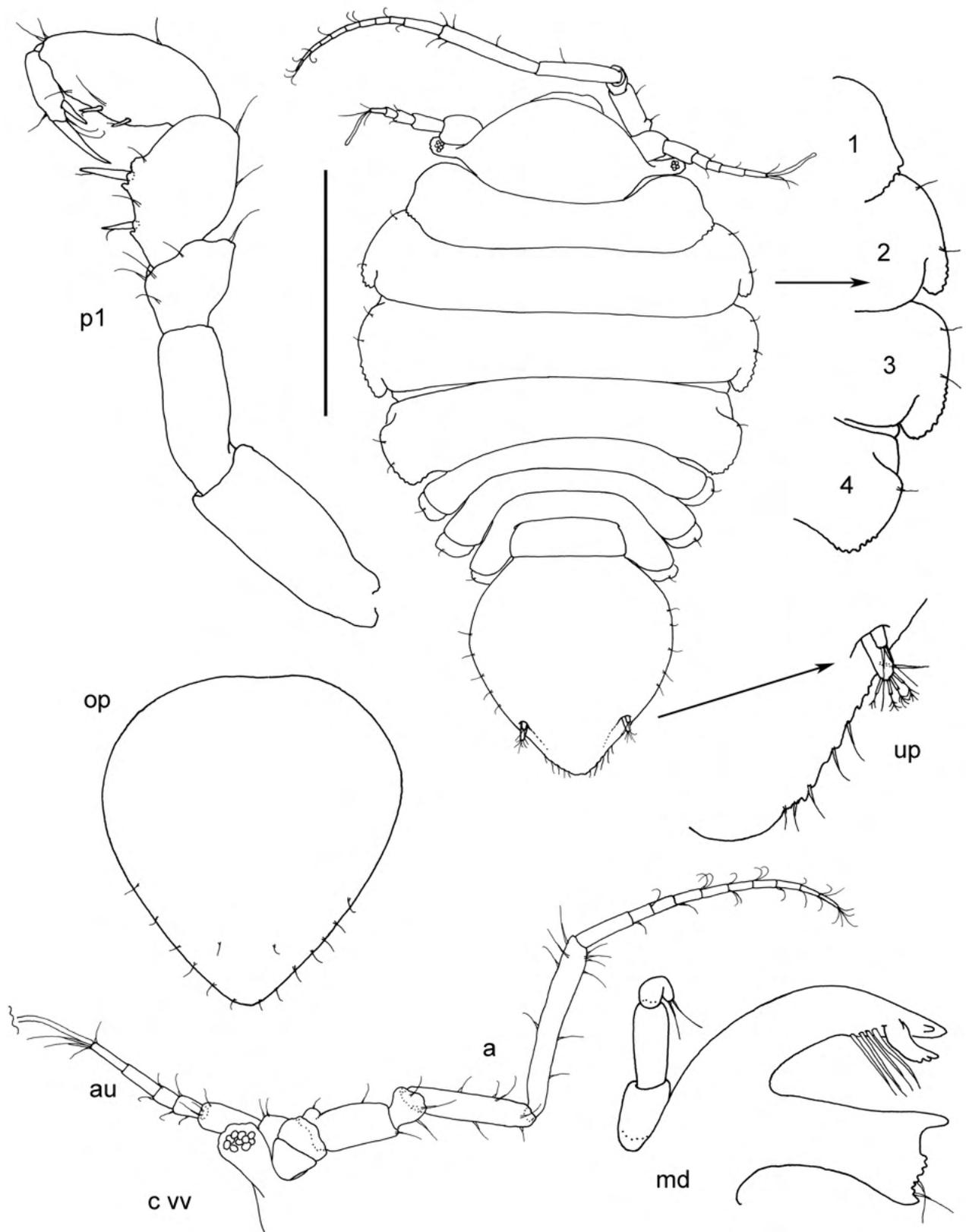


FIGURE 7. *Cryosignum latifrons* (Menzies, 1962). **Lectotype**, ♀. a, antenna; au, antennula; cvv, head ventral view; md, mandible; op, operculum; p1, pereiopod I; up, uropod; 1-4, pereionites 1 to 4 lateral margins. Scale for habitus, 0.5 mm.

Cryosignum nordenstami sp. nov.

(Fig. 8)

Austrosignum glaciale Hodgson, 1910.—Nordenstam, 1933: 241, fig. 66.

'*Cryosignum*' undescribed species.—Just & Wilson, 2007: 14.

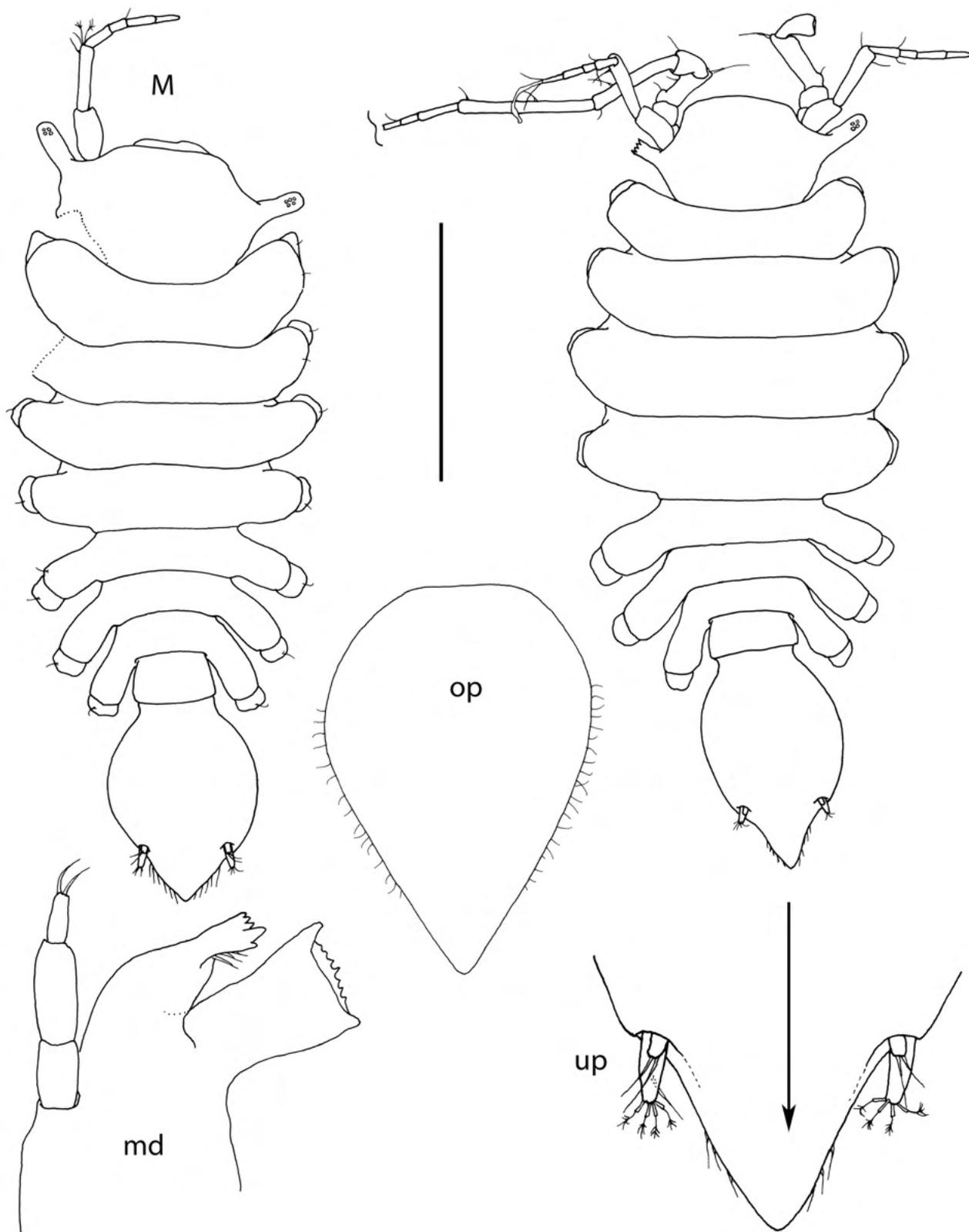


FIGURE 8. *Cryosignum nordenstami* sp. nov., H, holotype, ♀; M, paratype, ♂. md, mandible; op, operculum; up, uropod. Scale for habitus (both), 0.5 mm.

Type fixation. **Holotype**, ♀, SMNH 79450.—Here designated.

Type locality. South Georgia, north of Grytviken.

Etymology. The species is named for Dr Åke Nordenstam, who reported these specimens from South Georgia.

Material examined. **Holotype.** ♀ (pereiopods I missing), 1.5 mm. South Georgia, north of Grytviken, 54°22'S, 36°28'W, 12–15 m, sand and algae, Swedish Antarctic Expedition 1901–1903, stn 28, 24 May 1902, SMNH 79540.

Paratype. Same data as **holotype**. SMNH 79541, (♂ 1.5 mm, pereiopods I and pleopod I missing).

Description. *Body* width 0.43 length in female, 0.40 in male, widest at pereionite 3 in both. *Head* length 0.40 width (♀), length posterior to eyestalks 1.4 anterior length. *Frontal margin* nearly straight with rounded angular lateral margins adjacent to antennae. *Eyestalks* length 2.4 width, apex rounded, long axis angling forward at 35–40°.

Pereionite 1 female sagittal length 1.4 pereionites midline length, 1.8 in male; pereionite 1–7 lateral margin rounded. Coxal plates 1–7 simple, squarish (except 1 in male bluntly pointed), visible in dorsal view.

Pleon length 1.9 width in female, 1.7 in male. *Pleonite 1* width subequal to distance between uropods in both sexes, length 0.5 width in female, 0.6 in male. *Pleotelson* slender, laterally convex, smooth, with small inflection between lateral and proximal margins; posterior margin forming 60° angle, with slight concavity level with uropods in female, 80° angle without concavity in male, apex in both pointed.

Antennula with 6 articles, articles 1–2 combined extending beyond eyestalk apex; article 1 about half length of 2, inflated; articles 3, 5 and 6 of subequal length, longer article 4.

Antenna article 3 tubular, width 0.33 length, article 5 distinctly longer than article 4; flagellum proximal article distinctly longer than more distal articles.

Operculum ovoid, width 0.7 length, without lateral concavity, apex pointed.

Uropods dorsal and directly adjacent to lateral margin of pleotelson, protopod hidden or absent.

Size. Largest female 1.5 mm; largest male 1.5 mm.

Distribution. South Georgia, 12–15 m.

Remarks. Nordenstam (1933) reported two females and one male of *Austrosignum glaciale* Hodgson, 1910 from Station 28. He further noted that the largest female measured 1.7 mm. We have seen only one female and one male. Since our female measures 1.5 mm and has not been dissected (mandible, operculum; see Nordenstam's fig. 66), we must have had the smaller female for examination. Hence, Nordenstam's fig. 66b ('Right second pereiopod, immature female') seems to belong to the specimen here designated as holotype of *Cryosignum nordenstami* **sp. nov.** The second, larger female, if still in existence, should not be considered a paratype at the moment, because we cannot vouch for its placement in this species.

The paratype male is likely to be immature as well, as it is the same size as the female. This would explain why the male does not have the secondary sexual characteristics of more mature and terminal males in other species. *Cryosignum nordenstami* **sp. nov.** differs from congeners by the narrower, pointed pleotelson.

***Cryosignum* sp.**

(Fig. 9)

Austrosignum grande Hodgson, 1910.—Menzies, 1962: 52, fig. 11.

'*Cryosignum*' undescribed species.—Just & Wilson, 2007: 14.

Material examined. Male, 1.3 mm, Southern Chile, Seno Reloncavi, off Puerta Montt, 41°30'15"S, 72°57'50"W, 35 m, coarse sand, 14 July 1949, stn M142, SMNH Gen coll. 155406 (single specimen reported by Menzies, 1962.)

We do not name this mature, but probably not fully terminal, male. It was collected in the vicinity of the type locality of *Cryosignum latifrons* (above), only a few month later. There is thus a possibility that the specimen could be the so far unknown male of that species, although it differs from the female in the shape of the lateral margins of pereionites 2–4. While that could be an expression of sexual dimorphism, the issue cannot be resolved until the sexes are collected together.

We refer the specimen to *Cryosignum* on account of presence of a mandible palp (observed but not illustrated), an oval pereiopod I carpus, 2 robust setae on pereiopod I propodus, smooth pleotelson margins, and a straight, api-

cally truncate uropodal endopod. This combination of characters distinguishes *Cryosignum* from other genera in the *Austrosignum–Munnogonium* complex.

Menzies (1962, fig. 11) illustrated this specimen with the caption (part) "...A, holotype male in toto." That statement was clearly an unintended error.

Remarks. In their study of the isopod fauna of the South Atlantic Tristan da Cunha Archipelago Sievertsen and Holthuis (1980) reported the presence of a single male of *Paramunna antarctica* (Richardson, 1906) from Stoltenhoff island, (37°25'S, 12°30'W, 30–45 m). Just & Wilson (2004, table 1) revived Richardson's original genus *Austrimunna* for the species *Austrimunna antarctica* Richardson, 1906. However, Richardson's species is part of the *Paramunna* complex (Just & Wilson 2004) and not the *Austrosignum–Munnogonium* complex under consideration here. The specimen shown by Sievertsen & Holthuis (fig. 27) is a species of *Cryosignum*, similar to *Cryosignum* sp. of this paper, but because of lack of detailed description by Sievertsen and Holthuis and differences in rendition between Sievertsen and Holthuis' and our illustrations we cannot be certain they belong to the same species.

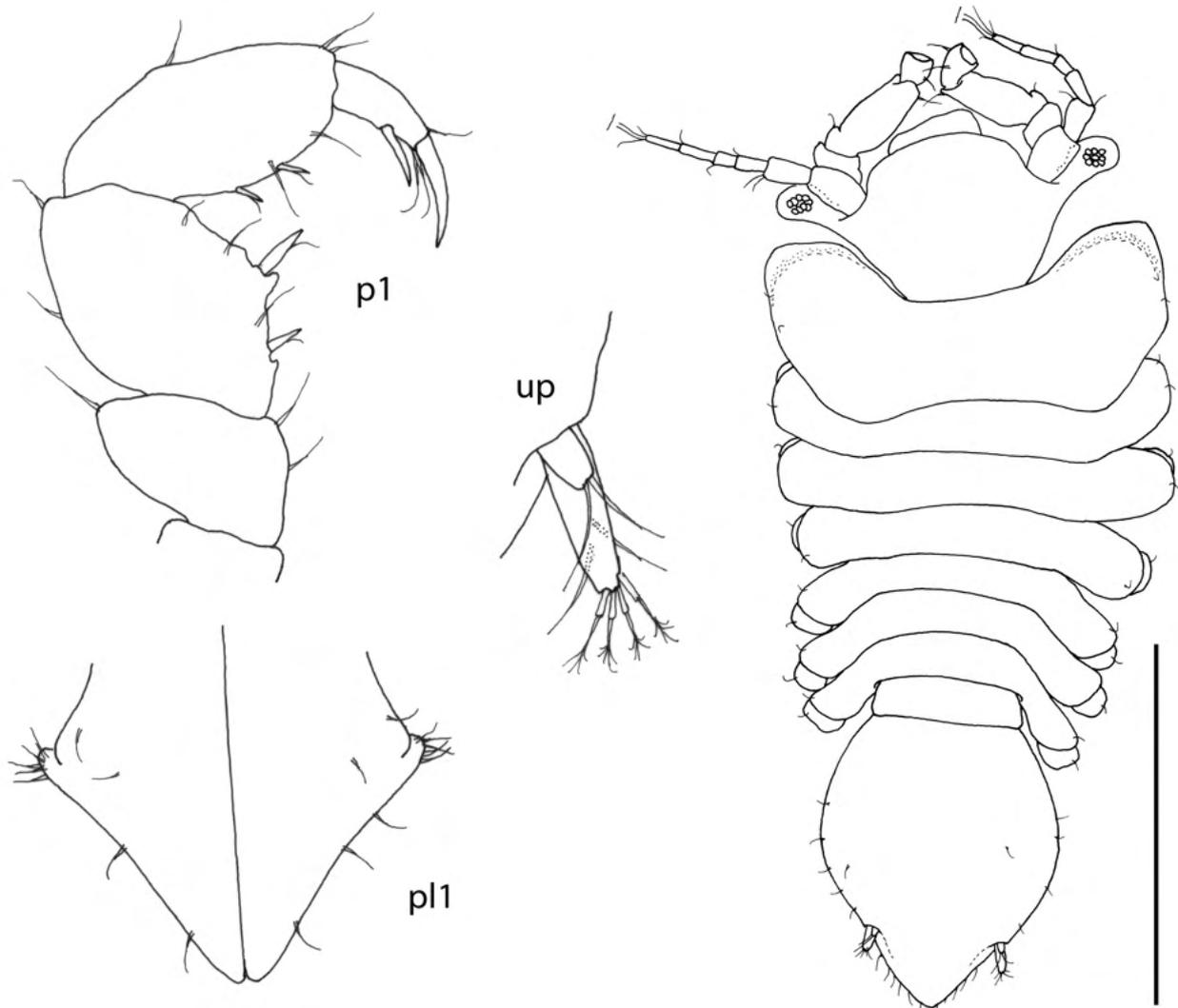


FIGURE 9. *Cryosignum* sp., ♂. p1, pereopod I; pl1, pleopod I; up, uropod. Scale for habitus, 0.5 mm.

Meridiosignum Just & Wilson, 2007

Key to species of *Meridiosignum*

- | | | |
|----|---|---|
| 1. | Pereopod I carpus oval | 2 |
| - | Pereopod I carpus triangular | 4 |
| 2. | Frontal margin shallow convex, almost straight medially | 3 |

- Frontal margin sinuous, convex at midline and concave laterally *Meridiosignum disparitergum* Doti & Roccatagliata, 2009
- 3. Pereionite 1–4 lateral margins not projecting; pereionite 1 lateral margin rounded; pereionite 5–7 lateral margins not projecting; pereionite 5 lateral margin rounded *Meridiosignum kerguelensis* (Vanhöffen, 1914)
- Pereionite 1–4 lateral margins distinctly projecting; pereionite 1 lateral margin angular and projecting; pereionite 5–7 lateral margins with angular projection, coxae visible dorsally posterior to projection; pereionite 5 lateral margin angular but not projecting over coxae *Meridiosignum undulatum* Doti & Roccatagliata, 2009
- 4. Pereiopod I ischium anterior margin smooth, without cuticular ornamentation 5
- Pereiopod I ischium anterior margin with small spines 6
- Pereiopod I ischium anterior margin with crenate ridge *Meridiosignum convexum* sp. nov.
- 5. Antennula articles 4–6 of subequal length, all shorter than 3; uropods on lateral margin of pleotelson *Meridiosignum subtilis* (Kensley, 1976)
- Antennula articles 3 and 5–6 of subequal length, longer than article 4; uropods dorsal and directly adjacent to lateral margin of pleotelson *Meridiosignum menziesi* (Winkler, 1994)
- 6. Antennula articles 4–6 of subequal length, all shorter than 3; pereionite 5–6 lateral margin rounded; pereionite 7 lateral margins denticulate; antenna article 3 male much more robust than female . . . *Meridiosignum minidenticulatum* Just & Wilson, 2007
- Antennula articles 3 and 5–6 of subequal length, longer than article 4; pereionite 6–7 lateral margin angular but not projecting over coxae; pereionite lateral margins smooth; antenna article 3 male and female similar *Meridiosignum macquariensis* sp. nov.

Meridiosignum kerguelensis (Vanhöffen, 1914)

(Figs 10–11)

Paramunna kerguelensis Vanhöffen, 1914: 574, fig. 105a, b.—Wolff, 1962: 252.

Metamunna kerguelensis.—Wolff & Brandt, 2000: 130–131.

Meridiosignum kerguelensis.—Just & Wilson, 2007: 3, 18.

not *Paramunna kerguelensis* (Chile).—Menzies, 1962: 47; Wolff, 1962: 252.

Type fixation. Lectotype, ovigerous ♀.—Here selected.

Type locality. Kerguelen, Southern Ocean.

Remarks on type material. Vanhöffen (1914) only illustrated a single female specimen that he referred to as “type”; we identified this specimen based on the configuration of the body and a missing flagellum on the antenna. Although Vanhöffen (1914:574) indicated that only 7 specimens were present, 2 vials from Gauss station 5I02 (5 January 1902) were found in the collection, and the vial containing his illustrated female specimen (also illustrated herein) had 8 specimens, 2 of which were manca. We suspect that he overlooked one of the manca when counting. Another vial in ZMB 17711 from the same Gauss station 5I02 (date 5 January 1902) contained an ovigerous female and an adult male, both of which are illustrated here.

Material examined. Lectotype, ovigerous ♀, 1.5 mm, drawn “type” of Vanhöffen (1914), Kerguelen, Gauss station 5I02, ZMB 17711.

Paralectotypes. Same data as lectotype, ZMB 32001(adult ♂ illustrated herein, 1.7 mm, 2 ovigerous females, juvenile male, 3 juvenile females, 2 manca).

Other material (not listed by Vanhöffen). Kerguelen, Gauss stn 24I02 (ovigerous female) and Gauss stn 15II03 (ovigerous female). AM P60462.

Description. Body ovate, width 0.55 length and widest at pereionite 3 in both sexes. Head length 0.40 width; length posterior to eyestalks in female 0.43 anterior length, 1.3 anterior length in male. Frontal margin shallow convex, almost straight medially with angular lateral margins adjacent to antennae (several denticles on lateral corners). Eyestalks in female length 1.5 width, male length 1.8 width, apex rounded, shaft slightly constricted proximally, long axis angling forward at approximately 30° (♀) and 40° (♂), with 3–6 ocelli.

Pereionite 1 sagittal length in female 2.3 pereionite midline length, 2.6 in male; pereionites lateral margin 1 rounded, 2–3 centrally concave, 4 with anterior lobe followed by small concavity, 5–6 rounded, smooth, 7 pointed with 2 denticles on posterolateral margin.

Pleon length 1.17 width in female, 1.20 width in male. Pleonite 1 width equal to distance between uropods in female, 0.87 in male. Pleotelson laterally convex, lacking inflection between lateral and proximal margins; with 9–10 denticles per side, margins anterior to denticles straight; posterior projection set apart from lateral margins by concavity at level of uropods, forming angle of 70°, apex broadly rounded, apex and adjacent margins fringed with elongate setae.

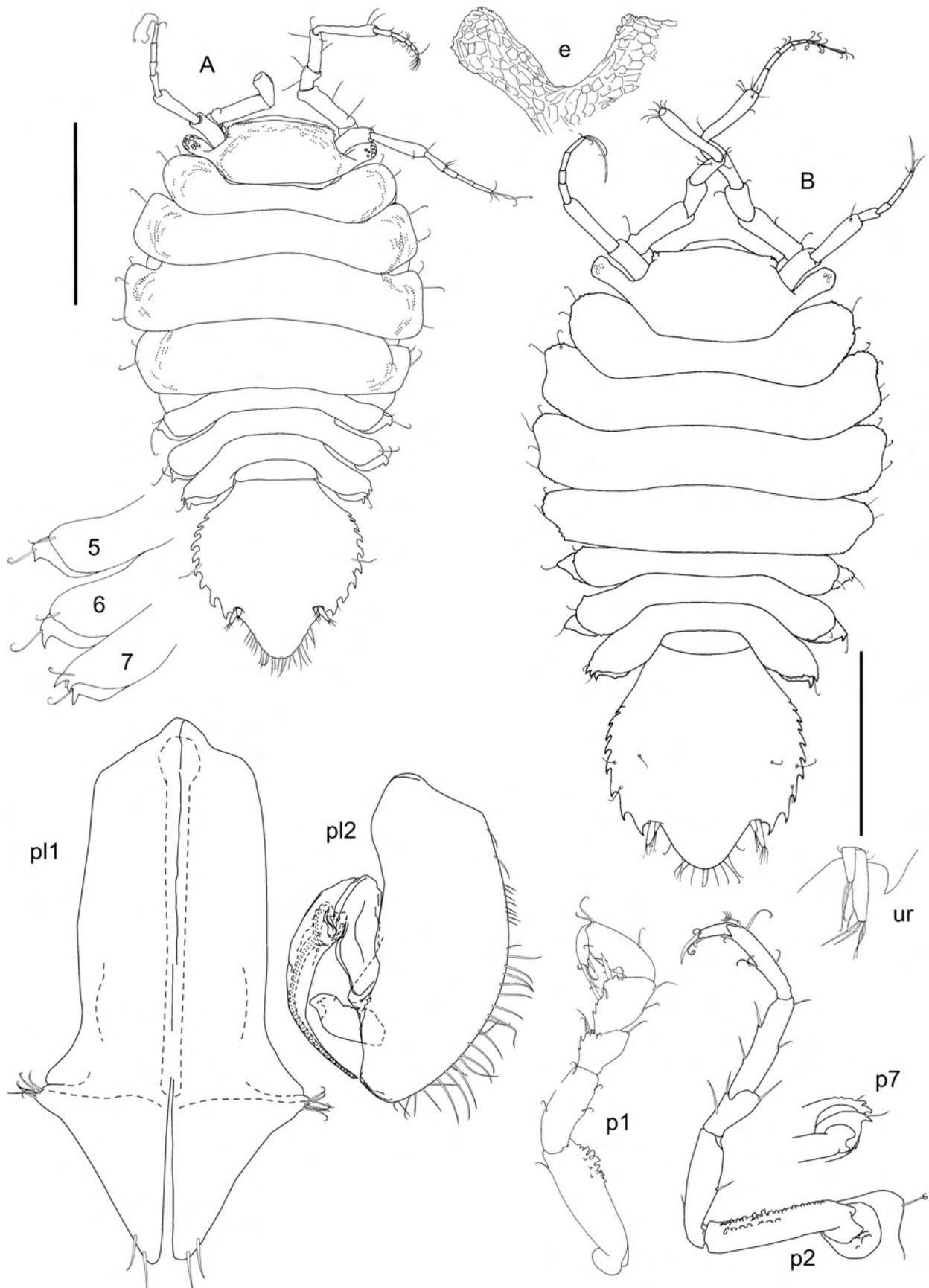


FIGURE 10. *Meridiosignum kerguelensis* (Vanhöffen, 1914), A, lectotype, ♀, 5, 6, 7, pereonite 5–7 lateral margins and coxae. B (all other figs.), paralectotype, copulatory ♂; e, eyestalk; pl1, pleopod I, pl2, pleopod II, p1, pereiopod I; p2, pereiopod II; p7 lateral margin and coxa of pereonite 7; ur, uropod. Scale for habitus, 0.5 mm.

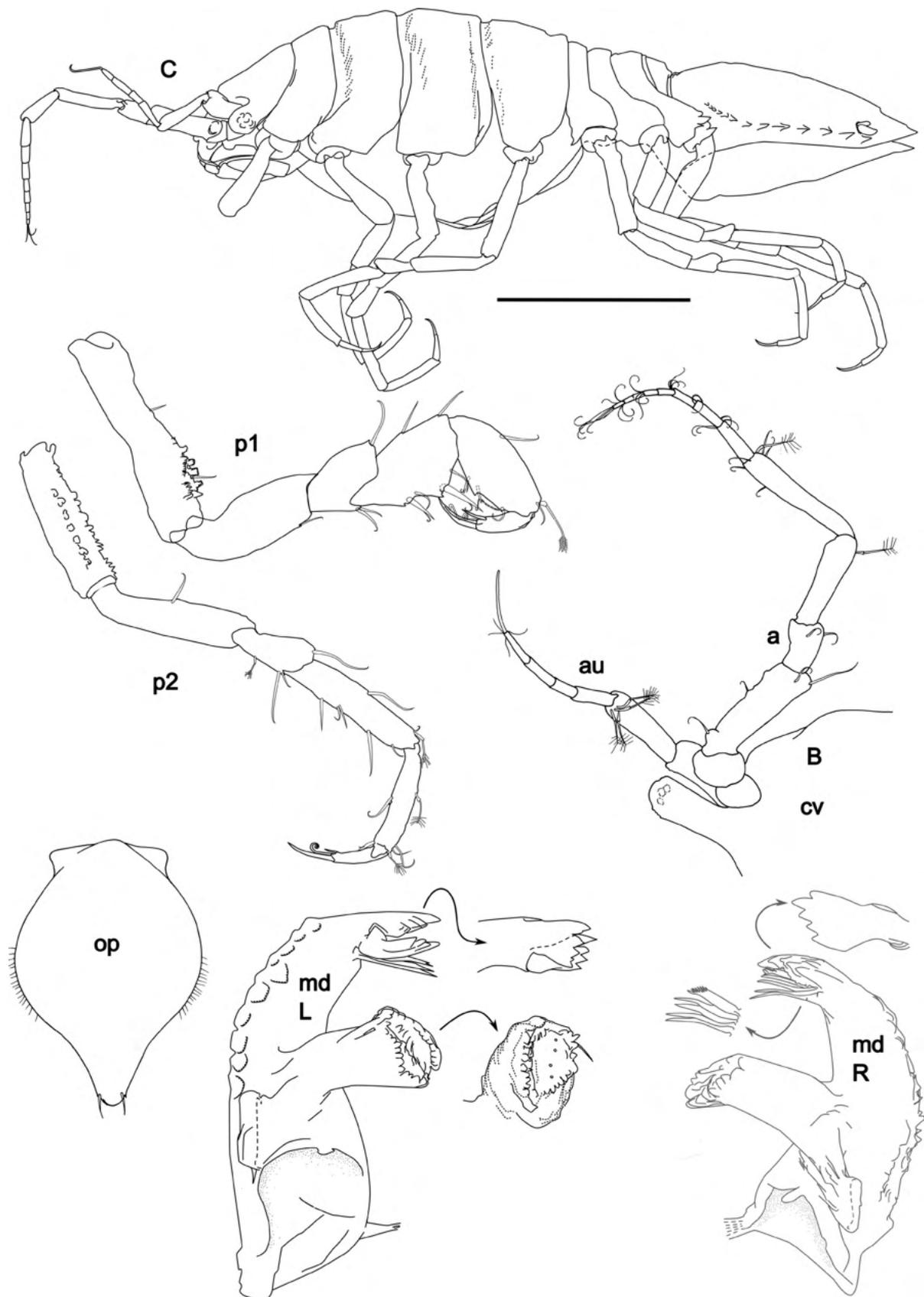


FIGURE 11. *Meridiosignum kerguelensis* (Vanhöffen, 1914), paralectotypes. C, ovigerous ♀, p1, pereiopod I; p2, pereiopod II; op, operculum; md L, left mandible dorsal view with enlargements of incisor process anterior view and molar process medial view; md R, right mandible dorsal view with enlargements of incisor process anterior view and spine row posterior oblique view. B, copulatory ♂, cv, head ventral view; au, antennula; a, antenna. Scale for habitus, 0.5 mm.

Antennula articles 1–2 combined extending beyond eyestalk apex; article 1 shorter than 2, tubular, width subequal to 2; articles 3 and 5–6 of subequal length, longer than article 4.

Antenna article 3 tubular, width 0.35 length, article 5 distinctly longer than 4; flagellum with 8 articles, article 1 distinctly longer than more distal articles.

Mandible molar process distally truncate, triturative surface cylindrical, without anterior spine.

Pereiopod I basis with crenate ridges on anterodistal margin; ischium smooth; merus occasionally with 2 tiny spines on posterior margin (♂); carpus narrowly triangular, distal width 0.72 posterior margin length, posterior margin with small projections at base of robust setae; propodus narrowing distally to insertion of dactylus, with 2 robust setae, opposing margin with fimbriate ridge. *Pereiopod II* basis with double row of crenate ridges. Coxal plates of pereiopods 1–4 not visible in dorsal view, 5–7 coxae visible in dorsal view, with apical spine.

Pleopod I lateral lobes distinctly projecting from lateral margin, width 0.35 distance to midline; distal projections 0.32 pleopod total length, combined forming acute angle of 60° with bluntly pointed setiferous apices. Female operculum width 0.70 length, distal part strongly tapering with concave distolateral margins, apex bluntly rounded with single seta on each side.

Uropods dorsal, immediately adjacent to lateral margin of pleotelson; protopod absent or hidden.

Size. Largest female 1.5 mm. Largest male 1.7 mm.

Distribution. Kerguelen Island, Observatory Bay.

Remarks. Of the species with pereionites 2–4 laterally concave with broadly rounded lobes *Meridiosignum kerguelensis* (Vanhöffen, 1914) is most similar to *M. macquariensis* sp. nov., but the concavity in females is much more pronounced in the latter. *Meridiosignum kerguelensis* lacks a row of spines or crenation on the anterior margin of ischium of pereiopods I and II, and has a crenate double row rather than the single row of *M. macquariensis* sp. nov. on the basis of those legs.

Males and females do not show any apparent variation in the body shape, although the front margin is rounder on manca and small juveniles. Cuticular roughness or “honeycombing” on the pereionites becomes more pronounced with age, and the spines on the coxae of pereiopods V–VII are not present in the juveniles or manca.

***Meridiosignum convexum* sp. nov.**

(Figs 12–13)

Type fixation. Holotype, ♀, NIWA 143904.—Here designated.

Type locality. Campbell Island, New Zealand.

Etymology. The species is named for the convex lateral margins of pereionites.

Material examined. *Holotype.* ♀, 1.7 mm, east of Vire Point, Perseverance Harbour, Campbell Island, New Zealand, 52°33'S, 169°10'E, red algae, sediment and detritus trapped in slimy mucous, J.K. Lowry, stn CA 95, 3 Jan 1980, NIWA 143904.

Paratypes. **Campbell Island, New Zealand:** Same data as holotype, NIWA 143905 (1 ♂, 4 ♀). Perseverance Harbour, east side of Vire Point, 52°33'S, 169°10'E, 3 Jan 1980, AM P76910 (2 spms). Cliffs west of Davis Point, Perseverance Harbour, Campbell Island, 52°34'S, 169°13'E, from mixed red algae from among boulders, J.K. Lowry, 7 Feb 1980, CA–277, AM P76911 (1 young ♂, 1 ♀). Depot Point, Tucker Cove, Perseverance Harbour, Campbell Island, 52°33'S, 169°7'E, from *Codium*, *Xiphophora*; red, green and brown algae, P.C. Terrill, 31 Dec 1979, stn CA–50, AM P60457 (2 young ♂, 3 ♀). Caves east of Divers Point, Perseverance Harbour, Campbell Island, 52°34'S, 169°11'E, from *Macrocystis pyrifera* holdfasts, red and coralline algae, P.C. Terrill, 3 Jan 1980, stn CA–86, AM P76912 (1 juv. ♂). East of Vire Point, Perseverance Harbour, Campbell Island, 52°33'S, 169°10'E, from sediment, mussels and broken shell, P.C. Terrill, 12 Feb 1980, stn CA–335, AM P76908 (1 ♂). Depot Point, Tucker Cove, Perseverance Harbour, Campbell Island, New Zealand, 52°33'S, 169°7'E, among *Codium*, *Xiphophora*, red, green, and brown algae, low tide mark, P.C. Terrill, 31 Dec 1979, stn CA–51, AM P68207 (6 adult ♀, 3 juv.). Depot Point, Tucker Cove, Perseverance Harbour, Campbell Island, 52°33'S, 169°7'E, from *Codium*, *Xiphophora*, red, green, and brown algae, low tide mark, P.C. Terrill, 31 Dec 1979, stn CA–54, AM P68208 (4 adult ♀, 2 young ♀, 2 ♂). Cliffs west of East Cape, Smoothwater Bay, Campbell Island, 52°33'S, 169°13'E, 12–18 m, from holdfast of *Durvillea antarctica*, sediment and red algae, 13 Jan 1980, stn CA–150, AM P68209 (1 adult ♀).

Snares Island, New Zealand: Senecio Pool, 6–7 m, among *Caulerpa brownii* on vertical rock, G.D. Fenwick, 6 January 1977, stn SA–3488, NMV J40707 (5 ♂, 8 ♀, 3 juv.).

Auckland Island, New Zealand: Ranui Cove, 50°32.5'S, 166°17'E, among *M. pyrifer* holdfasts and red algae on anchor of "Acheron", J.K. Lowry, 7 Feb 1973, stn SA-1485, AM P92211 (6 ♀, 4 juv.). Rose Island to Shoe Island, Port Ross, 50°31'S, 166°15'E, J.K. Lowry, 14 Feb 1973, stn SA-1489, AM P92212 (1 preparatory ♀).

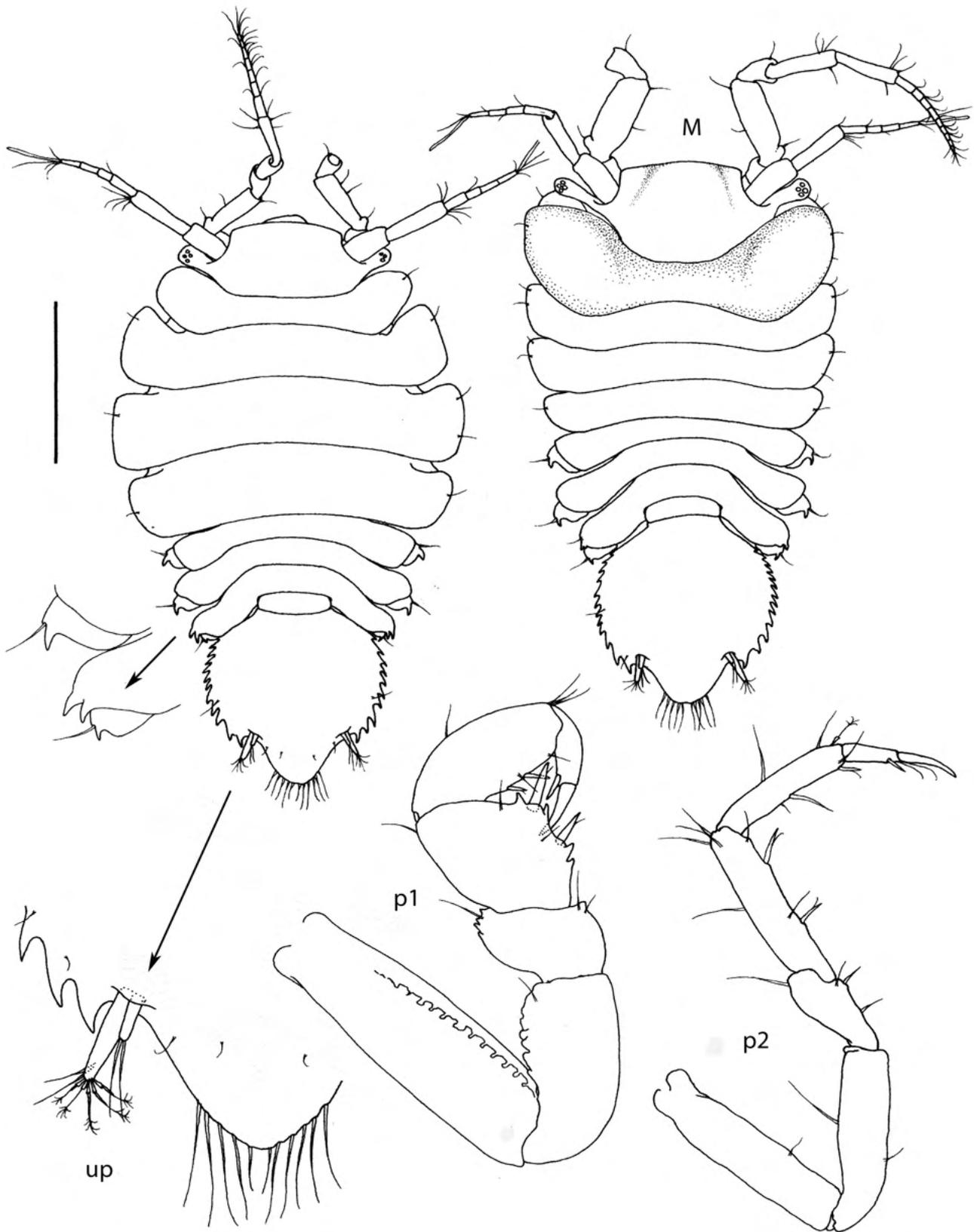


FIGURE 12. *Meridiosignum convexum* sp. nov., holotype, ♀, except M, paratype, T♂. p1–2, pereopods I and II; up, uropod. Scale for habitus (both), 0.5 mm.

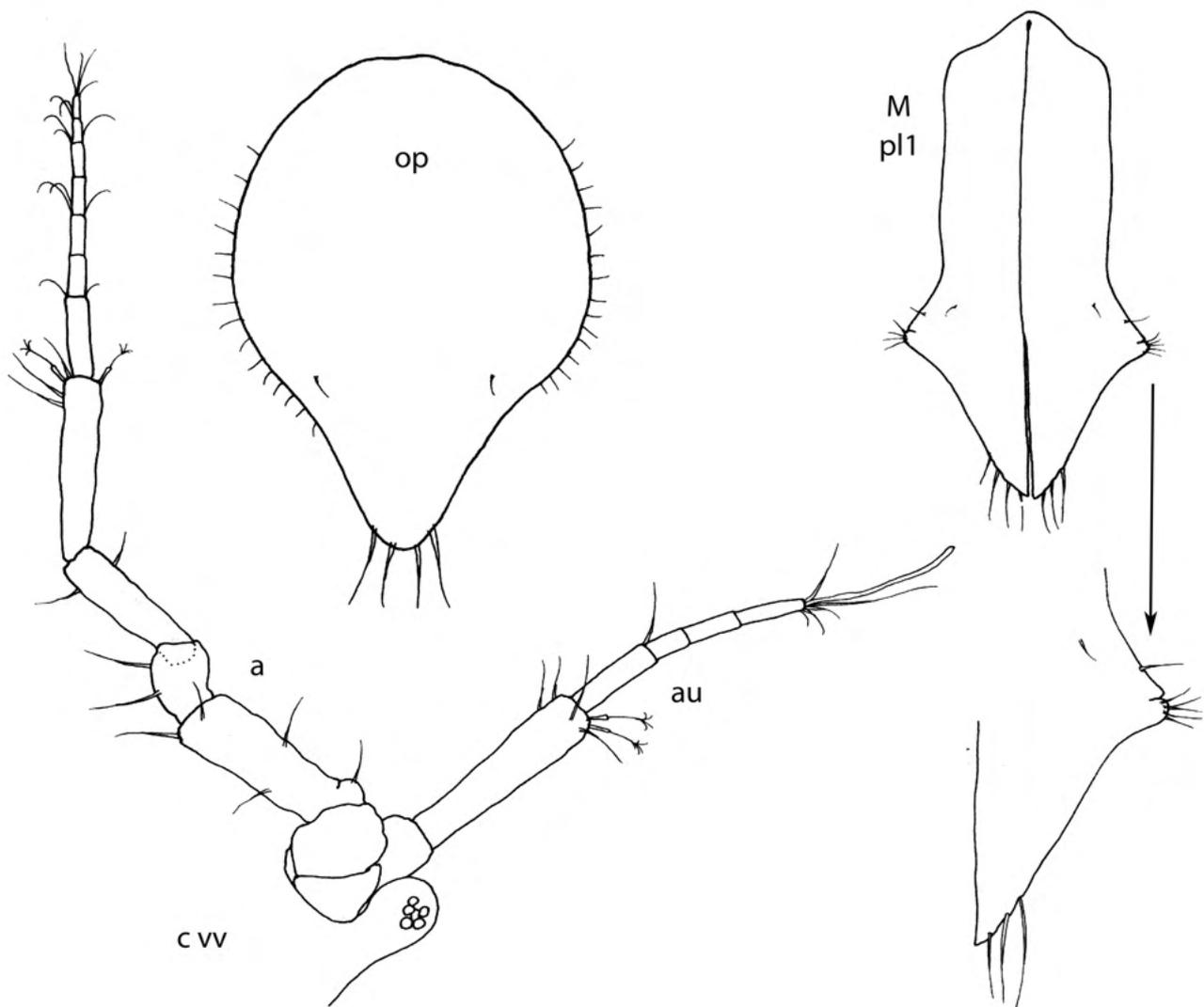


FIGURE 13. *Meridiosignum convexum* sp. nov., holotype, ♀, except M, paratype, T♂. a, antenna; au, antennula; cvv, head ventral view; op, operculum; pl1, pleopod I.

Description. *Body* width 0.61 length in female, 0.57 length in male, widest in female at pereionite 3, widest in terminal male at pereionites 1 and 2.

Head longer in male than female, length in male 0.6 width, in female 0.5 width; length posterior to eyestalks 1.3 anterior length in male 0.93 in female. *Frontal margin* with angular lateral margins adjacent to antennae, shallow convex, almost straight medially. *Eyestalks* in female length 1.7 width, in male 2.6 width, slightly expanded distally, apex rounded, long axis angling forward at approximately 30° in female and male.

Pereionites 1–6 lateral margins not projecting, rounded; pereionite 7 lateral margins with 2 (♀) and 1 (♂) recurved spines apically; pereionite 1 of terminal male greatly enlarged, sagittal length in terminal male 2.8 pereionite midline length, in female 2.2 pereionite midline length. Coxae 2–4 (♂) and 1–4 (♀) not visible in dorsal view; coxal plate 1 in male rounded forward pointing; coxae 5–7 visible in dorsal view, with 1 recurved spine on apex.

Pleon length 1.1 width in female, 1.2 width in male. *Pleonite 1* width 0.7 of distance between uropods (♂, ♀), length 0.30 width in female, 0.25 in male. *Pleotelson* broadly rounded, without inflection between proximal and lateral margins, proximal margin shorter than lateral margin; proximal margin forming 50° angle with medial axis of pleon (♂, ♀); lateral margins with 10–13 denticles each side; posterior projection forming 70° angle (♂, ♀), set apart from lateral margins by concavity at level of uropods, apex broadly rounded with fringe of long setae.

Antennula articles 1–2 combined extending beyond eyestalk apex; article 1 shorter than 2, tubular, slightly broader than 2; article 3 as long as 4 and 5 combined, 5 slightly shorter than 6.

Antenna article 3 tubular, width 0.40 length, article 5 distinctly shorter than article 6; flagellum with 7 articles, proximal article as long as second and third articles combined.

Pereiopod I basis length 3.3 width, with crenate ridge on anterior margin; ischium with row of blunt spines on anterior margin; merus with several small anterodorsal spines; carpus triangular, distal width subequal to posterior margin length, posterior margin with 2 spines proximal to robust setae, 1 spine between robust setae, one spine distal to robust setae; propodus narrowing distally to insertion of dactylus, with 2 robust setae on opposing margin.

Male pleopods I lateral lobes distinctly projecting from lateral margin, width 0.30 distance to midline; distal sublobe with tuft of simple setae; distal projection length 0.32 pleopod total length, combined lobes forming acute angle of 60°, with pointed, setiferous apices. *Female operculum* distal part tapering with moderately concave distolateral margins, width 0.72 length, setiferous apex broadly rounded.

Uropods dorsal and directly adjacent to lateral margin of pleotelson; protopod absent or hidden.

Size. Largest female 1.7 mm; largest male 1.7 mm.

Distribution. New Zealand, subantarctic islands, intertidal to 23 m.

Remarks. *Meridiosignum convexum* sp. nov. is most similar to *M. minidenticulata* Just & Wilson, 2007 except that the pleotelson lateral margins has 10–13 large denticles whereas the latter species has 15–17 small denticles.

***Meridiosignum macquariensis* sp. nov.**

(Figs 14–15)

Type fixation. Holotype, ♀, AM P76943.—Here designated.

Type locality. Macquarie Island, Australia.

Etymology. The species is named for the type location, Macquarie Island.

Material examined. *Holotype*, ♀, 1.5 mm. Australia, Macquarie Island, Aerial Cove, 54°29'S, 158°57'E, 3–4.5 m, fine sediments in cracks and crevices and under rock overhangs, and coarse sediments from small sediment patches on level bottom, stn MA–382, AM P76943.

Paratypes. Same data as holotype, AM P76944 (29 ♀, 20 ♂; T♂ of 1.3 mm illustrated). Australia, Aerial Cove, Macquarie Island, 54°29'S, 158°57'E, 5 m, sponges and bryozoans from sheltered base of vertical rock face near cove entrance, *Codium* dominant alga, J.K. Lowry (SCUBA), 12 December 1977, stn MA108, NMV J52116, (2 adult ♀). Australia, Aerial Cove, Macquarie Island, 54°29'S, 158°57'E, 6 m, red algae on rocks, D.S. Horning (SCUBA), 2 February 1978, stn MA–384, NMV J52120 (1 ♀).

Description. *Body* width 0.55 length in female, 0.53 length in male, widest in female at pereionite 3, widest in terminal male at pereionites 2–3.

Head slightly longer in male than female, length in male 0.5 width, in female 0.58 width; length posterior to eyestalks 2.0 anterior length in male, 1.3 in female. *Frontal margin* shallow convex, almost straight medially with angular lateral margins adjacent to antennae. *Eyestalks* in female length 1.7 width, in male 2.5 width, slightly expanded distally, apex rounded, long axis angling forward at approximately 40° in male, 30° in female. *Mandible* body with single lateral seta at place of normal palp.

Pereionite 1 of terminal male enlarged, sagittal length in terminal male 2.6 pereionite midline length, in female 2.5 midline length; lateral margins rounded, except tiny mid-lateral spine in male; pereionites 2–4 lateral margins concave with rounded anterior and posterior corners; pereionites 5–7 bluntly pointed.

Coxal plate 1 in terminal male with short anterior rounded projection. Coxae otherwise not visible on pereionites 1–4 in dorsal view; coxae 5–7 visible in dorsal view, bluntly pointed with 1 recurved spine on 7.

Pleon length 1.2 width in female, 1.2 in male. *Pleonite 1* as wide as distance between uropods, length 0.20 of width (♀), 0.80 and 0.23 respectively (♂); *Pleotelson* proximal margin shorter than lateral margin, forming 40° angle with medial axis of pleon; lateral margins evenly convex with 9–10 denticles per side; posterior projection forming 70° angle in female, 80° in male, set apart from lateral margins by concavity at level of uropods, apex broadly rounded, with extensive fringe of long setae.

Antennula articles 1–2 combined extending beyond eyestalk apex; article 1 tubular, shorter and slightly broader than 2; article 3 and 6 of equal length, longer than unequally long 4 and 5.

Antenna article 3 tubular, width 0.30 length, article 4 0.85 length of 5; flagellum with 8 articles, proximal article 1.15 length of second article, following articles successively shorter.

Pereiopod I basis length 3.3 width, with crenate ridge on anterior margin; ischium with row of spines on anterior margin; merus with simple setae only; carpus triangular, distal width 0.85 posterior margin length, posterior margin with 2 strong robust setae, with 2 spines proximal to robust setae, 1 spine between robust setae, one spine

distal to robust setae; propodus narrowing distally to insertion of dactylus, with 2 robust setae and crenate ridge on opposing margin. *Pereiopod II* basis with crenate ridge on anterior margin; ischium with row of spines on anterior margin; carpus and propodus with simple setae, except 1 robust seta posterodistally on propodus.

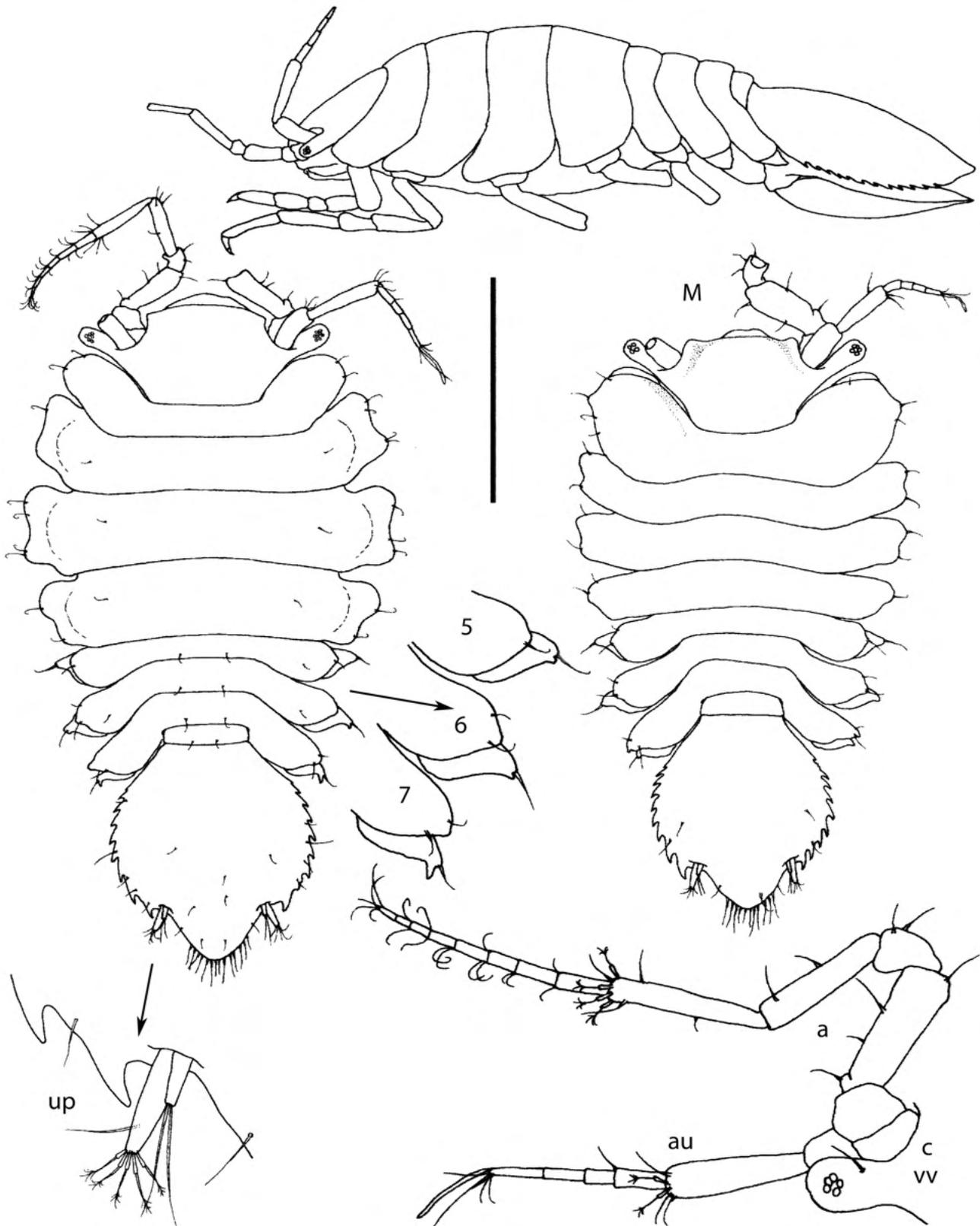


FIGURE 14. *Meridiosignum macquariensis* sp. nov., holotype, ♀ (dorsal and lateral view), except M, paratype, T♂. a, antenna; au, antennula; cvv, head ventral view; up, uropod; 5–7, pereionites 5–7 with coxa. Scale for habitus (both), 0.5 mm.

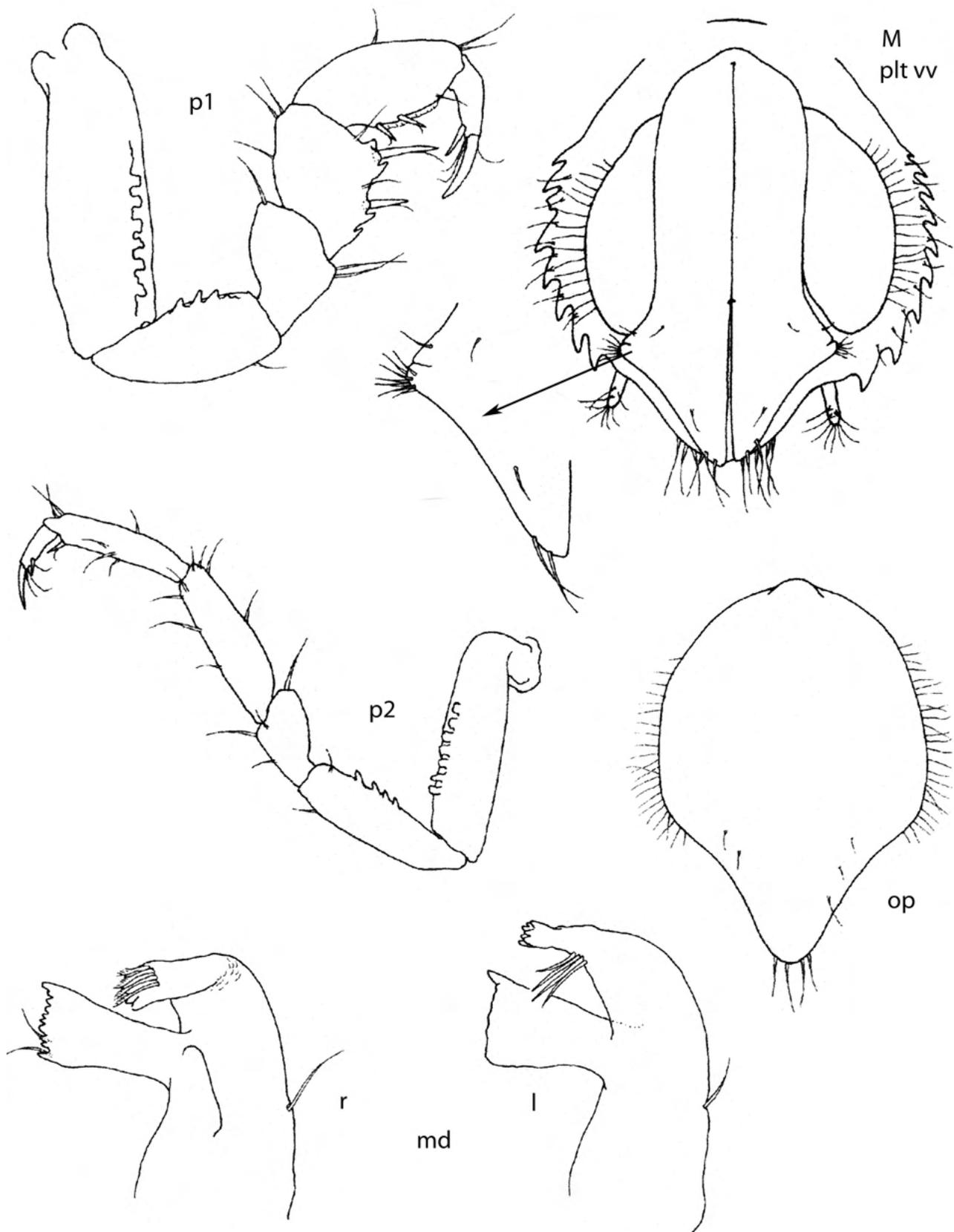


FIGURE 15. *Meridiosignum macquariensis* sp. nov., holotype, ♀, except M, paratype, T♂. l, left; md, mandible; op, operculum; p1–2, pereopods I and II; plt vv, pleotelson ventral view; r, right.

Male pleopods I lateral lobes distinctly projecting from midlateral margin, width 0.40 distance to midline; distal sublobe with tuft of simple setae; distal projection length 0.27 pleopod total length, forming acute angle, with pointed, setiferous apices. *Female operculum* width 0.70 length, distal part tapering with concave margins, setiferous apex rounded.

Uropods dorsal and directly adjacent to lateral margin of pleotelson. Protopod absent or hidden.

Size. Largest female 1.5 mm; largest terminal male 1.3 mm.

Distribution. Macquarie Island, Australia, 3–6 m.

Remarks. *Meridiosignum macquariensis* **sp. nov.** shares with *M. kerguelensis* the configuration of the concave lateral margins with rounded lobes of pereonites 2–4. For differences between the two species see above (*Meridiosignum kerguelensis*).

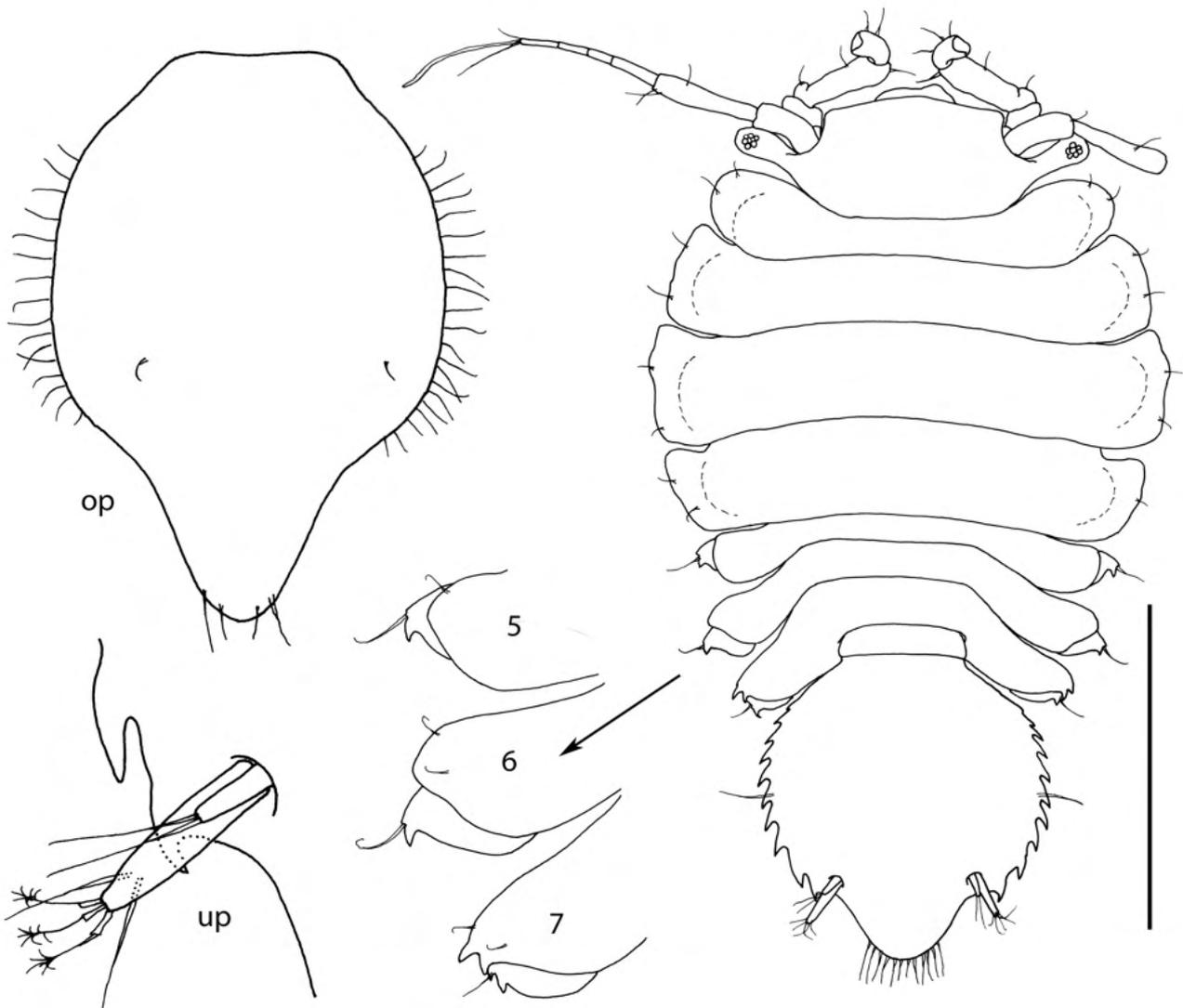


FIGURE 16. *Meridiosignum* sp., ♀. op, operculum; up, uropod; 5–7, pereonites 5 to 7 with coxa. Scale for habitus, 0.5 mm.

***Meridiosignum* sp.**

(Fig. 16)

Material examined. 1 ♀, Falkland Islands, Pt. Albermarle, Albermarle Harbour, 52°90'S, 60°33'W, 15 m, sand with algae, Swedish South Polar Expedition 1901–03, stn 56, SMNH 79543.

Remarks. Nordenstam labeled the single female *Paramunna kerguelensis* Vanhöffen, but did not publish it in his 1933 study. The specimen belongs in *Meridiosignum*. It is similar to females of *Meridiosignum menziesi* (Winkler, 1994) shown by Doti and Roccatagliata (2009) from south-eastern Argentine and the southernmost Magellanic

area, but without pereopods and an adult male for comparison we cannot make a definite identification. We record it here to further document the distribution of the genus.

***Munnogonium* George & Strömberg, 1968**

As rediagnosed by Just & Wilson (2007) *Munnogonium* is known from the eastern Pacific north of San Diego, the south-western Atlantic, Magellan Strait southern Chile, and now Australia. The three eastern Pacific species, *Munnogonium tillerae* (Menziés & Barnard, 1959), *M. erratum* (Schultz, 1964), and *M. waldronense* George & Strömberg, 1968, were poorly defined but surveys of the literature and specimens allow us to provide a better key.

Key to species of *Munnogonium*

1. Frontal margin with projection; pereonite 1–4 lateral margins coxae not visible in dorsal view 2
- Frontal margin without projection; pereonite 1–4 lateral margins coxae visible in dorsal view 3
2. Pleotelson lateral margin convex; antennula article 1 length shorter than article 2; antennula articles 4–6 of subequal length, all shorter than 3; antenna article 5 distinctly longer than article 4 ***Munnogonium diplonychia*** Doti & Roccatagliata, 2013
- Pleotelson lateral margin with proximal neck before convex margin; antennula article 1 length subequal to article 2, or longer than article 2; antennula articles 4 and 6 shorter than articles 3 and 5; antenna article 5 only slightly longer than article 4
. ***Munnogonium quequensis*** Doti & Roccatagliata, 2013
3. Pleotelson posterior margin evenly curving into lateral margin 4
- Pleotelson posterior margin set apart from lateral margins by concavity at level of uropods
. ***Munnogonium falklandicum*** (Nordenstam, 1933)
4. Pereiopod I merus posterior margin with fine setae only; uropods on lateral margin of pleotelson 5
- Pereiopod I merus posterior margin with one robust seta on distally; uropods dorsal and directly adjacent to lateral margin of pleotelson 7
5. Antennula article 1 length subequal to article 2, or longer than article 2; pereiopod I coxa in terminal males fully fused to pereonite 1; pereiopod II propodus ventral margin with simple setae only ***Munnogonium tillerae*** (Menziés & Barnard, 1959)
- Antennula article 1 length shorter than article 2; pereiopod I coxa distinctly articulated on pereonite 1; pereiopod II propodus ventral margin with short robust setae 6
6. Pereiopods II basis posterior margin in males without projections; pereiopod II carpus ventral margin with row of elongate robust setae; pereiopod II dactylus dorsal claw thin, longer than dactylus length; male pleopod I lateral lobes distal sublobe with robust seta on apex ***Munnogonium globifrons*** (Menziés, 1962)
- Pereiopods II basis posterior margin in males with distal lobe; pereiopod II carpus ventral margin with short robust setae; pereiopod II dactylus dorsal claw robust, shorter than dactylus length; male pleopod I lateral lobes distal sublobe with tuft of simple setae ***Munnogonium erratum*** (Schultz, 1964)
7. Frontal margin broadly rounded; body widest in male at pereonite 4; pereiopod I propodus opposing margin with robust seta; uropod endopod distal margin rounded ***Munnogonium longicaudatum* sp. nov.**
- Frontal margin concave medially; body widest in male at pereonite 3; pereiopod I propodus opposing margin with simple setae; uropod endopod distal margin with rounded point medially, curving laterally
. ***Munnogonium waldronense*** George & Strömberg, 1968

***Munnogonium falklandicum* (Nordenstam, 1933)**

(Fig. 17)

Austrosignum falklandicum Nordenstam, 1933: 5, 244, fig. 67a–d; 278, “Table of Distribution”.—*Austrosignum falklandicum* Nordenstam, 1933: 244 (species heading). (See below regarding the spelling of the epithet.)

Austrosignum falclandicum Vanhöffen, 1914.—Menziés, 1962: 50, *lapsus calami*.

Austrosignum falclandicum Nordenstam, 1933.—Menziés, 1962: 52, unjustified emendation.

Munnogonium falklandicum (Nordenstam, 1933).—Just & Wilson, 2007: table 1.

Type fixation. **Syntypes**, ♂, ♀.—Originally designated as ‘Types’.

Material examined. **Syntypes.** Preparatory ♀, 1.8 mm (Nordenstam 1933: fig. 67A, reported as 1.9 mm), 1 slide with pereopods I–III, Falkland Islands, Port William, 51°40’S, 57°42’W, 22 m, sand, 3 September 1902, Swedish Antarctic Expedition stn 51, SMNH Type-8816. ♂, 1.6 mm, south of West Falkland, on the Burwood Bank, 53°45’S, 61°10’W, 137–150 m, broken shell with stones, 12 September 1902, Swedish Antarctic Expedition stn 59, SMNH Type-8817.

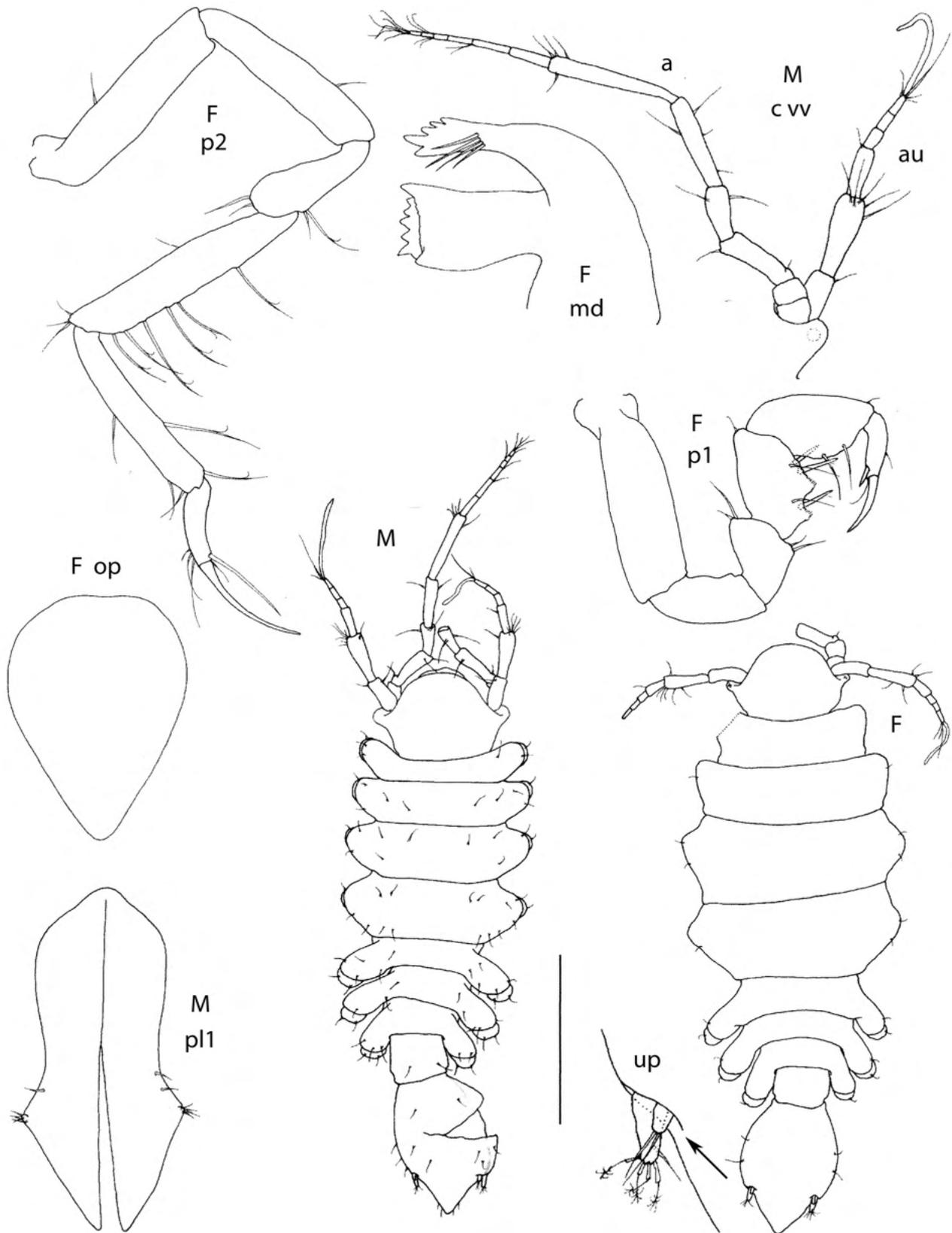


FIGURE 17. *Munnogonium falklandicum* (Nordenstam, 1933), F, syntype ♀; M, syntype ♂. a, antenna; au, antennula; cvv, head ventral view; md, mandible; op, operculum; p1–2, pereopods I and II; p11, pleopod I; up, uropods. Scale for habitus (both), 0.5 mm.

Description. *Body* width 0.40 length in female, 0.33 length in male, widest in both at pereionite 3.

Head length 0.65 width (♂), 0.60 (♀); length posterior to eyestalks 1.1 anterior length. *Frontal margin* broadly rounded without angular lateral margins adjacent to antennae. *Eyestalks* vestigial, length equaling width, apex a rounded bump, long axis angling forward at approximately 40°.

Pereionite 1 sagittal length in female 1.1 pereionites midline length, 1.8 in male; pereionite 1 lateral margin rounded (male) or apparently linear (female), 2–4 rounded projecting (less so in female), 5–7 rounded; coxal plates 1–7 visible in dorsal view in male, coxae 5–7 visible in female.

Pleon length 1.8 width in female. *Pleonite 1* length/width about 1.0; width/distance between uropods 0.84 (♀), 0.80 (♂), longer than pereionite 7 middorsally. *Pleotelson* slender, laterally convex, lacking inflection between lateral and proximal margins; posterior projection set apart from lateral margins by moderate concavity at level of uropods, apex pointed.

Antennula article 1 tubular shorter than 2, reaching to or extending just beyond pereionite 1 lateral margin, article 2 moderately expanded distally, articles 4–6 of subequal length, all about half length of 3. *Antenna* (♂) article 3 tubular, width 0.35 length, article 5 distinctly longer than article 4; flagellum with 6 articles, articles 1 and 2 of equal length, longer than distal ones.

Pereiopod I basis anterior margin smooth, length 3.3 width; ischium smooth; carpus oval, posterior margin with fimbriate projection proximal to each of the 2 posterior robust setae; propodus narrowing distally to insertion of dactylus, opposing margin with 2 long simple setae. *Pereiopod II* carpus and propodus with long slender robust setae on posterior margin, unguis and ventral claw thin, elongate, both longer than dactylus.

Male pleopods I lateral lobes moderately projecting from lateral margin, width 0.3 distance to midline; distal projection length 0.30 pleopod total length, with pointed apices, combined forming acute angle of 60°. *Female operculum* ovoid, lateral margins without concavity, width 0.70 length; posterior projection bluntly pointed, forming 80° angle.

Uropods dorsal and directly adjacent to lateral margin of pleotelson, protopod absent or hidden.

Size. Largest female 1.8 mm. Largest male 1.6 mm.

Distribution. Falkland Islands. 22–150 m.

Remarks. In his ‘Localities and Material’, Nordenstam (1933: 245) listed two specimens, a female from stn 51 and a male from stn 59, both designated ‘Type’, hence they are syntypes. We have examined these two specimens together with 3 slides labelled as ‘*Austrosignum falklandicum* n. sp.’ by Nordenstam. The two specimens are in a rather poor condition; the male lacks all pereiopods, and the pleon is twisted and cracked (Fig. 17 M); the female (Fig. 17 F) lacks one pereiopod I, the other is damaged, all mouthparts are dissected out with some collateral damage to pereionite 1.

Translated from the Swedish, one of the slides is labelled ‘pereiopod 1–3’. Pereiopods II and III can be seen, but pereiopod I are embedded in dried-out matrix and useless for illustration. It is just possible to verify Nordenstam’s illustration (1933, fig. 67c) of 3 robust setae on the carpus. This slide presumably belongs to the syntype female. The second slide is labelled ‘Maxilliped’; nothing could be found. The third slide is labelled ‘Antennae, mandible, upper lip, ♂ st.51’. All parts can be seen, but because both syntypes have antennulae, antennae and in the case of the male the mandibles intact, this slide must represent a specimen not reported by Nordenstam. We cannot know if it represents *Austrosignum falklandicum*, and we have, therefore, disregarded that slide.

When describing this species, Nordenstam (1933: 244) gave the species heading as ‘*Austrosignum falklandikum* n. sp.’ In the accompanying fig. 67 and also in the contents on page 5, in the table on page 278, and on the slides he used the form ‘*Austrosignum falklandicum* n. sp.’ Menzies (1962) used the species name ‘*Austrosignum falclandicum*’, which is an unjustified emendation. We believe Nordenstam’s intention was to use the name ‘*A. falklandicum*’, since the locality is the Falkland Islands and the suffix *-cum* is the proper Latinization.

Munnogonium falklandicum differs from the two species recently described from the east coast of Argentina (Doti & Roccatagliata 2013, *M. quequensis* and *M. diplonychia*) by not having a setiferous knob on the front margin of the head, by pleonite 1 being longer than pereionite 7, and by having a more slender body. For further discussion, see Doti & Roccatagliata (2013).

Munnogonium globifrons (Menzies, 1962)

(Fig. 18)

Austrosignum globifrons Menzies, 1962: 52, fig. 10.

Munnogonium globifrons.—Bowman & Schultz, 1974: 266; Just & Wilson, 2007: 22, table 1.

Type fixation. **Holotype**, ♂, SMNH 3221.—Original designation.

Remarks on type material. Menzies (1962: 52) stated that the type locality yielded 3 males and 3 females. SMNH 3221 contained one microvial with the presumed male holotype that was missing pleopod I. One juvenile female labelled ‘allotype’ was found in the vial with the holotype. Additionally, one small male, one female with anterior parts missing, and two juvenile females were found in a separate microvial. We presume that these five additional specimens are the paratypes.

Type Locality. Magellan Strait, South of Punta Arenas, Chile.

Material examined. **Holotype.** ♂ (pleopod I missing), 1.1 mm, Chile, Magellan Strait, near the estuary of Rio los Ciervos, South of Punta Arenas, 53°11'S, 70°55'W, tidal belt, gravel and clay, mixed with mud and covered with boulders; exposed kelp; 3 May 1949, Lund University Chile Expedition 1948–49, stn M115, SMNH 3221.

Paratypes. Same data as holotype, SMNH Type-8818, (1 juv. ♀ (labelled allotype, in microvial with holotype), 1 small ♂, 1 ♀ anterior parts missing, 2 juvs ♀).

Description (male). *Body* widest at pereionites 3–4 (5 appears somewhat flattened). Dorsally with scattered setae. *Head* length 0.65 width; length posterior to eyestalks 1.3 anterior length. *Frontal margin* broadly rounded without angular lateral margins adjacent to antennae. *Eyestalks* length equals width, apex a rounded bump, long axis angling forward at 40°.

Pereionite 1 sagittal length 3 times pereionite midline length. Pereionites 1–7 lateral margins rounded. Coxal plates 1–7 rounded, visible in dorsal view.

Pleon length 1.6 width. *Pleonite* 1 proximal width equals distance between uropods, length 0.4 width. *Pleotelson* laterally convex, smooth, lacking inflection between lateral and proximal margins; posterior projection forming 70° angle, evenly curving into lateral margin, apex narrowly rounded.

Antennula article 1 much longer than eyestalk, slightly curved, tubular, shorter than 2, width subequal to 2, reaching to or just beyond pereionite 1 lateral margin, articles 4–6 of subequal length, all shorter than 3. *Antenna* in ventral view tubular, width 0.25 length.

Pereiopod I basis anterior margin smooth, length 2.4 width; ischium smooth, merus with few simple setae, carpus narrowly triangular, distal width equals posterior margin length, posterior margin with 3 subequal robust setae, with 1 fimbriate projection proximal to middle robust setae; propodus narrowing distally to insertion of dactylus, with fimbriate opposing margin and a few simple setae. *Pereiopod* II carpus and propodus with long slender robust setae on posterior margin; unguis much longer than dactylus, ventral claw slender, as long as dactylus.

Male pleopods I lateral lobes distinctly projecting from lateral margin, width 0.3 distance to midline, distal sub-lobe with curved robust seta on apex; each distal projection forming acute angle of about 30°, with blunt apices.

Uropods on lateral margin of pleotelson, protopod absent or hidden.

Size Largest male 1.1 mm.

Distribution. Magellan Strait, Chile. Intertidal.

Remarks. *Munnogonium globifrons* differs from all congeners by the proportionately much larger head relative to the rest of the body, and by the presence of a curved robust seta on each lateral lobe of pleopod I.

Munnogonium longicaudatum sp. nov.

(Figs 19–21)

Type fixation. **Holotype**, ♂, NMV J18983.—Here designated.

Type locality. Australia, New South Wales.

Etymology. The epithet is a reference to the elongate pleon of this species.

Material examined. **Holotype**, ♂, 1.8 mm, Australia, New South Wales, off Nowra, 34°59.52'S, 51°5.94'E, 204 m, coarse shell, WHOI epibenthic sled, GCB Poore *et al.*, RV *Franklin*, 14 July 1986, stn SLOPE 1, NMV J18983. Unique.

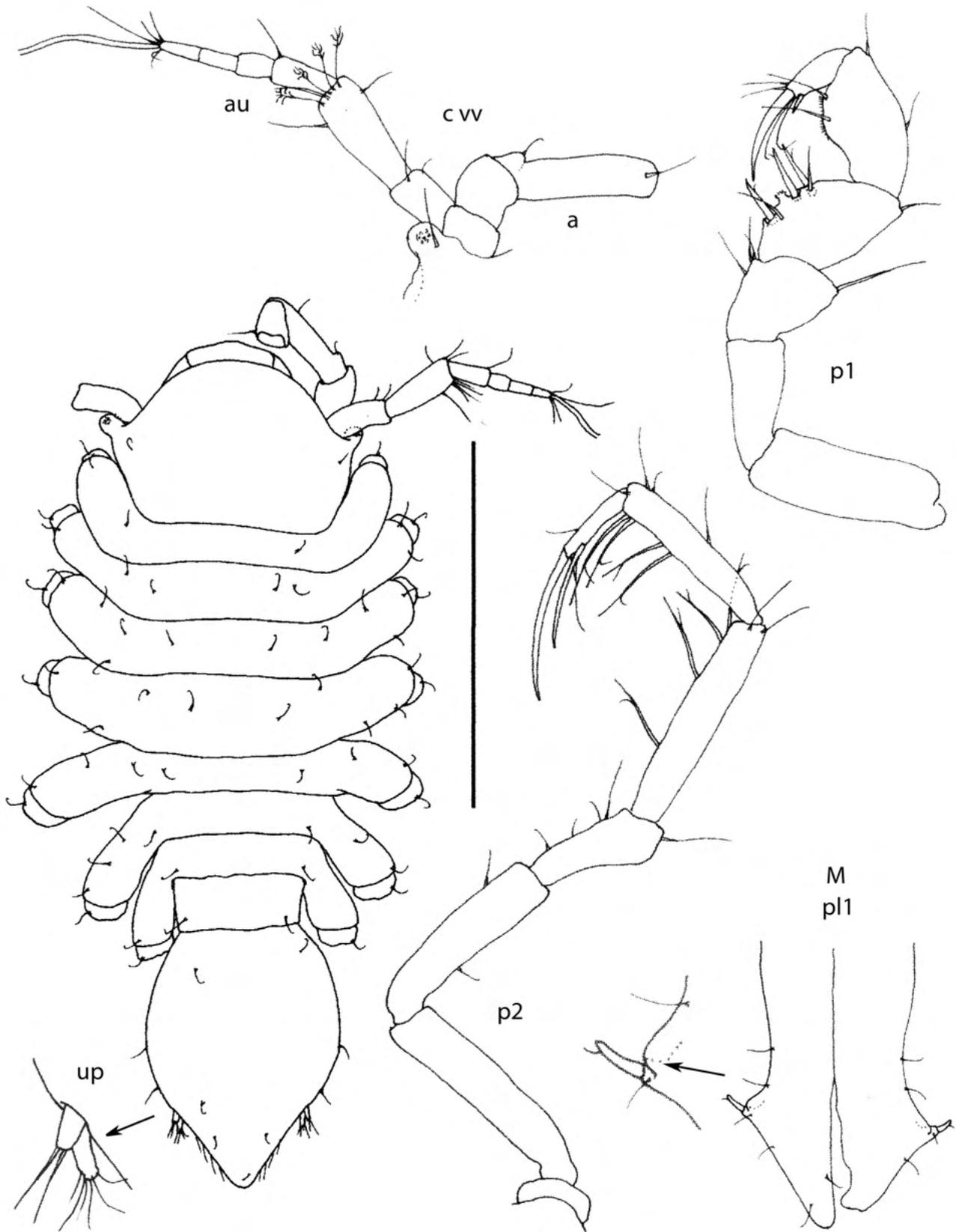


FIGURE 18. *Munnogonium globifrons* (Menzies, 1962), holotype, ♂. a, antenna; au, antennula; cvv, head ventral view; p2, pereopod I; p1-2, pleopods I-II; up, uropod. Scale for habitus, 0.5 mm.

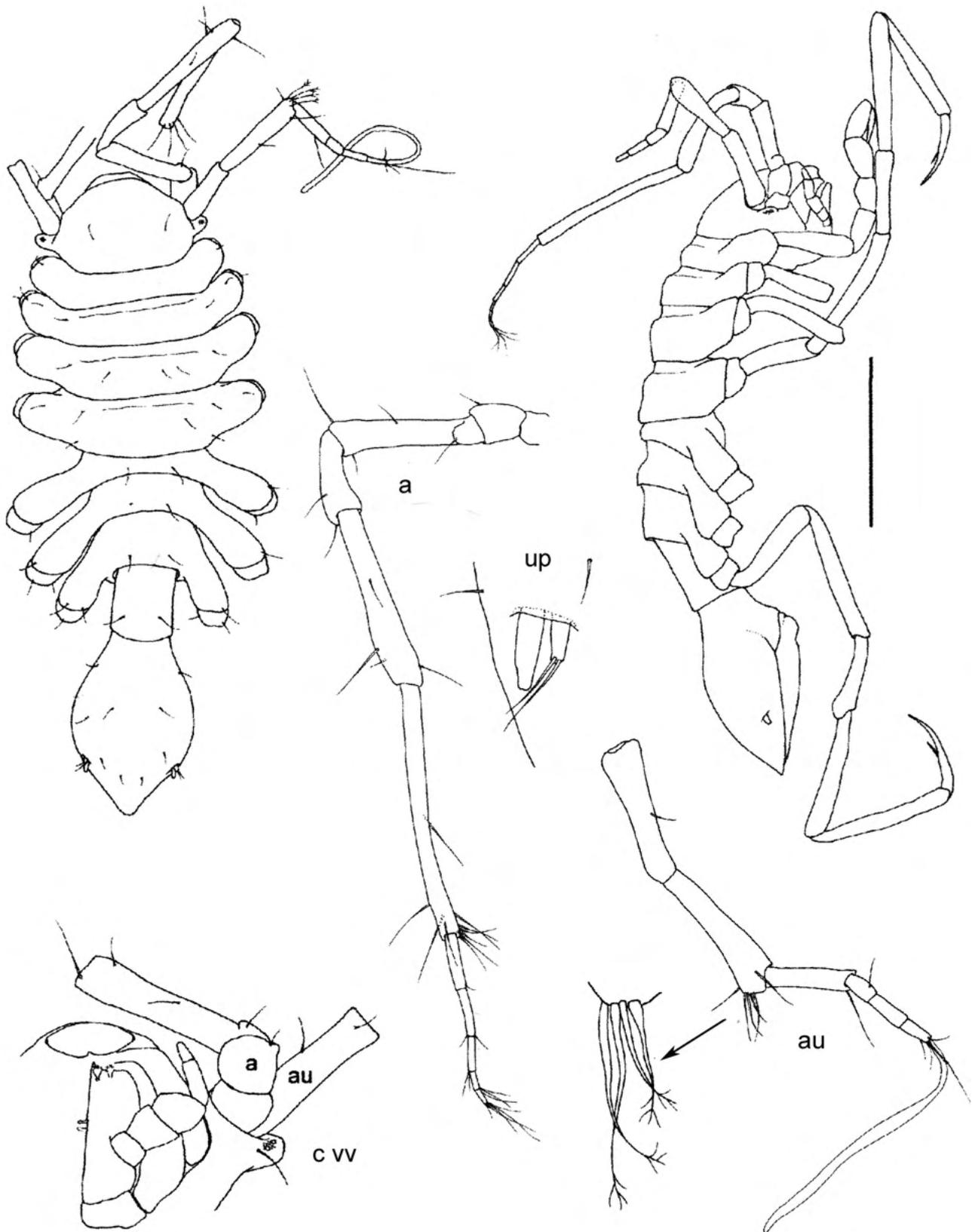


FIGURE 19. *Munnogonium longicaudatum* sp. nov., holotype, ♂; a, antenna; au, antennula; cvv, head ventral view; up, uropod. Scale for habitus, 0.5 mm.



FIGURE 20. *Munnogonium longicaudatum* sp. nov., holotype, ♂; p1, 2, 7, pereopods I, II and VII.

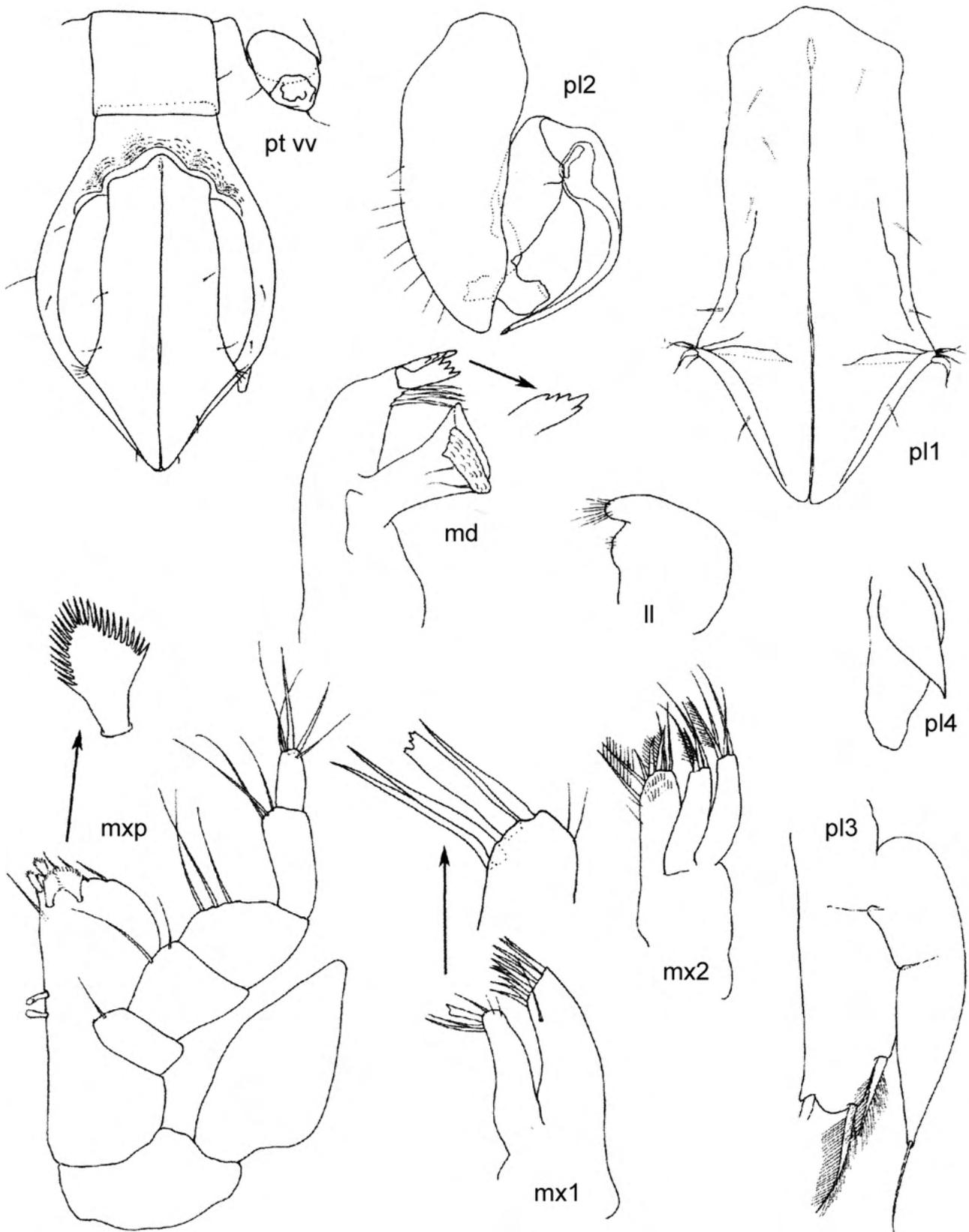


FIGURE 21. *Munnogonium longicaudatum* sp. nov., holotype, ♂; ll, lower lip; md, mandible; mx1–2, maxilla 1 and 2; mxp, maxilliped; pl1–4, pleopods I to IV (all 4 to scale); pt vv, pleotelson ventral view.

Description (male). *Body* width 0.40 length, widest at pereionite 5, with scattered dorsal setae; pereionites 1–4 with weak transverse ridge dorsally. *Head* length 0.54 width; length posterior to eyestalks subequal to anterior length. *Frontal margin* broadly rounded without angular lateral margins adjacent to antennae. *Eyestalks* vestigial, length equal to width, apex rounded, long axis angling forward at 25° degrees.

Pereionite 1 sagittal length 1.8 pereionites midline length; lateral margin of pereionites 1–7 rounded. Coxal plates 1–7 rounded, visible in dorsal view.

Pleon length 2.0 width. *Pleonite 1* width 0.7 distance between uropods, length 1.3 width. *Pleotelson* lateral margin convex, smooth, without inflection between lateral and proximal margins; anterior length in ventral view 0.1 total pleotelson length; posterior projection forming 80° angle, evenly curving into lateral margins, apex bluntly pointed.

Antennula article 1 about 3 times longer than rounded eyestalk; articles 1 and 2 of equal length, article 1 reaching well beyond pereionite 1 lateral margin, article 1 tubular, width subequal to 2; article 2 apical margin with tuft penicillate setae; article 3 as long as subequal sized articles 4–6 combined. *Antenna* article 3 tubular, width 0.25 length, article 5 distinctly longer and slenderer than article 4; flagellum with 5 articles, articles 1 and 2 subequal, 3–5 successively shorter.

Pereiopod I basis anterior margin smooth, length 4.3 width; ischium smooth; merus posterior margin with one robust seta on distal corner; carpus oval, posterior margin with 3 subequal robust setae, with crenate ridges proximal to posterior 2 robust setae and at base of middle robust seta; propodus narrowing distally to insertion of dactylus, with 1 robust seta among simple setae, opposing margin fimbriate. *Pereiopod II* carpus and propodus ventral margin with rows of about 8–9 long, stiff curved robust setae; unguis much longer than slender dactylus, ventral claw as long as dactylus; *pereiopod VII* articles with few simple setae and some short, slender robust setae.

Male pleopods I lateral lobes moderately projecting from lateral margin, width 0.3 distance to midline; distal projection length 0.32 pleopod total length, forming acute angle of 70°, with rounded apices.

Uropods dorsal and directly adjacent to lateral margin of pleotelson in dorsal view; protopod absent or hidden.

Size. Male, 1.8 mm.

Distribution. Off Nowra, New South Wales, Australia, 204 m.

Remarks. *Munnogonium longicaudatum* sp. nov. is characterised primarily by the much elongate pleonite 1 in males (females unknown). It shares this character with *Munnogonium waldronense* George & Strömberg, 1968 (type species of genus) and *M. quequensis* Doti & Roccatagliata, 2013, but the former has a straight to concave head frontal margin as opposed to a broadly convex head in the new species; *M. quequensis* has a mid-frontal round projection with micro-setae on the head.

***Munnogonium tillerae* (Menzies & Barnard, 1959).**

(Figs 22–25)

Austrosignum tillerae Menzies & Barnard, 1959: 8–9, fig. 1.

Munnogonium tillerae pars: Bowman & Schultz, 1974: 270; Wetzer *et al.*, 1991: 15–

16; Wilson, 1997: 73, fig. 1.28B; Just & Wilson, 2007: 3, 22.

not *Austrosignum erratum* Schultz, 1964: 307.

not *Munnogonium erratum*: Wetzer *et al.*, 1991: 15

not *Munnogonium waldronense* George & Strömberg, 1968.—Bowman & Schultz, 1974: 270.

Type fixation. **Holotype**, ♀, AHF 567 (current LACM 56.26-11).—Original designation.

Type Locality. The type locality is herein restricted to off San Diego, California.

Material examined. **Holotype**, ♀, 1.0 mm; R/V *Velero* IV station 4753, 8 December 1956; 5.2 miles at 294' True from Pt. Loma Light, San Diego, California, 32°41.8'N, 117°20.4'W, 101 m, sediment green mud, AHF 567 (current LACM 56.26–11).—Not seen, apparently lost.

Paratype, RN *Velero* IV station 4753 (type locality), LACM 56–26.2 (ovigerous ♀, 1.0 mm).

Other material (topotypic, AM P72159). F.J. Rokop & G.D. Wilson, 11 Aug 1970, R/V *Agassiz* student cruise, off Silver Strand, San Diego County, approximately 32°33.77' N, 117°18.81' W, 128 m, (approximately 50 specimens). A. Hegdus, AM 08 Dec 2014, (4 specimens remain, mostly carcasses).

Description. *Body* width 0.48 length in female, 0.46 length in male, widest in female and male at pereionite 3; pereionites with rounded transverse ridge dorsally.

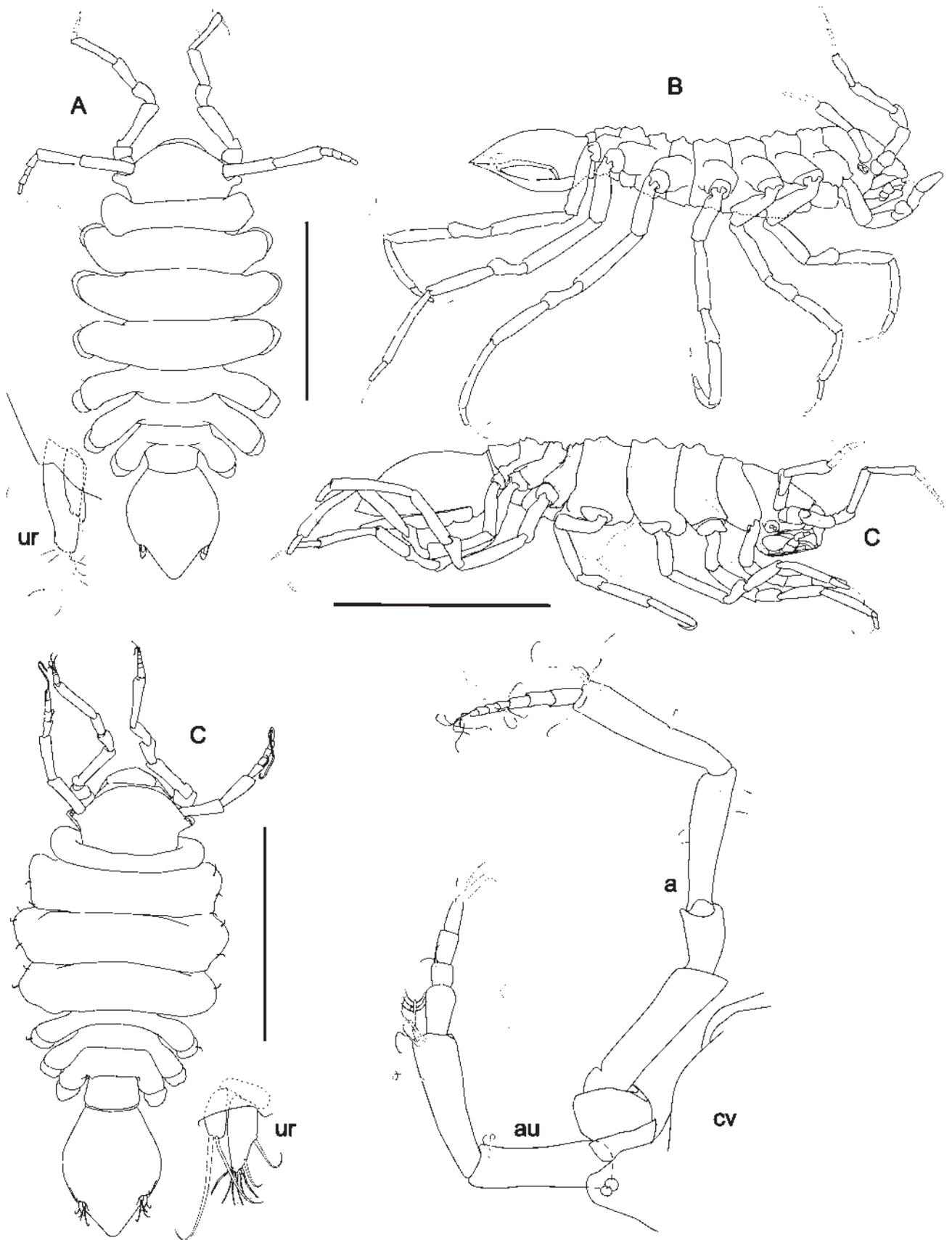


FIGURE 22. *Munnogonium tillerae* (Menzies & Barnard, 1959), topotypes, AM P72159. A, copulatory male, dorsal and lateral habitus; ur, uropod. C, ovigerous female, dorsal and lateral habitus; ur, uropod; cv, head ventral view; au, antennula; a, antenna. Scale for habitus (all), 0.5 mm.

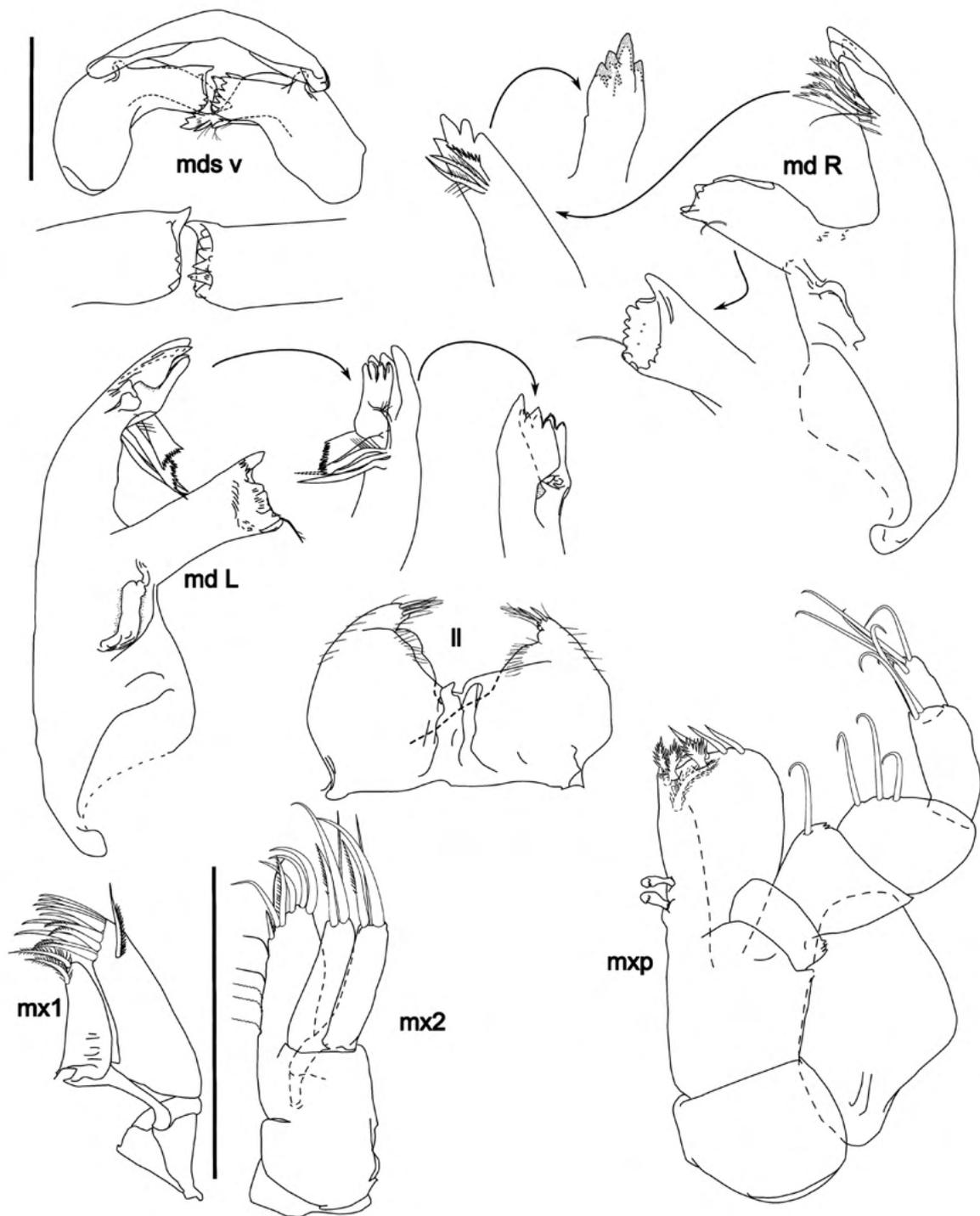


FIGURE 23. *Munnogonium tillerae* (Menzies & Barnard, 1959), topotype, AM P.72159, mouthparts from ovigerous female (C in figure 22). mds v, both mandibles, with enlargement, ventral view; md R, right mandible dorsal view; md L, left mandible; II, lower lip; mx1, maxilla 1; mx2, maxilla 2; mxp, maxilliped. Scale bars, 0.1mm.

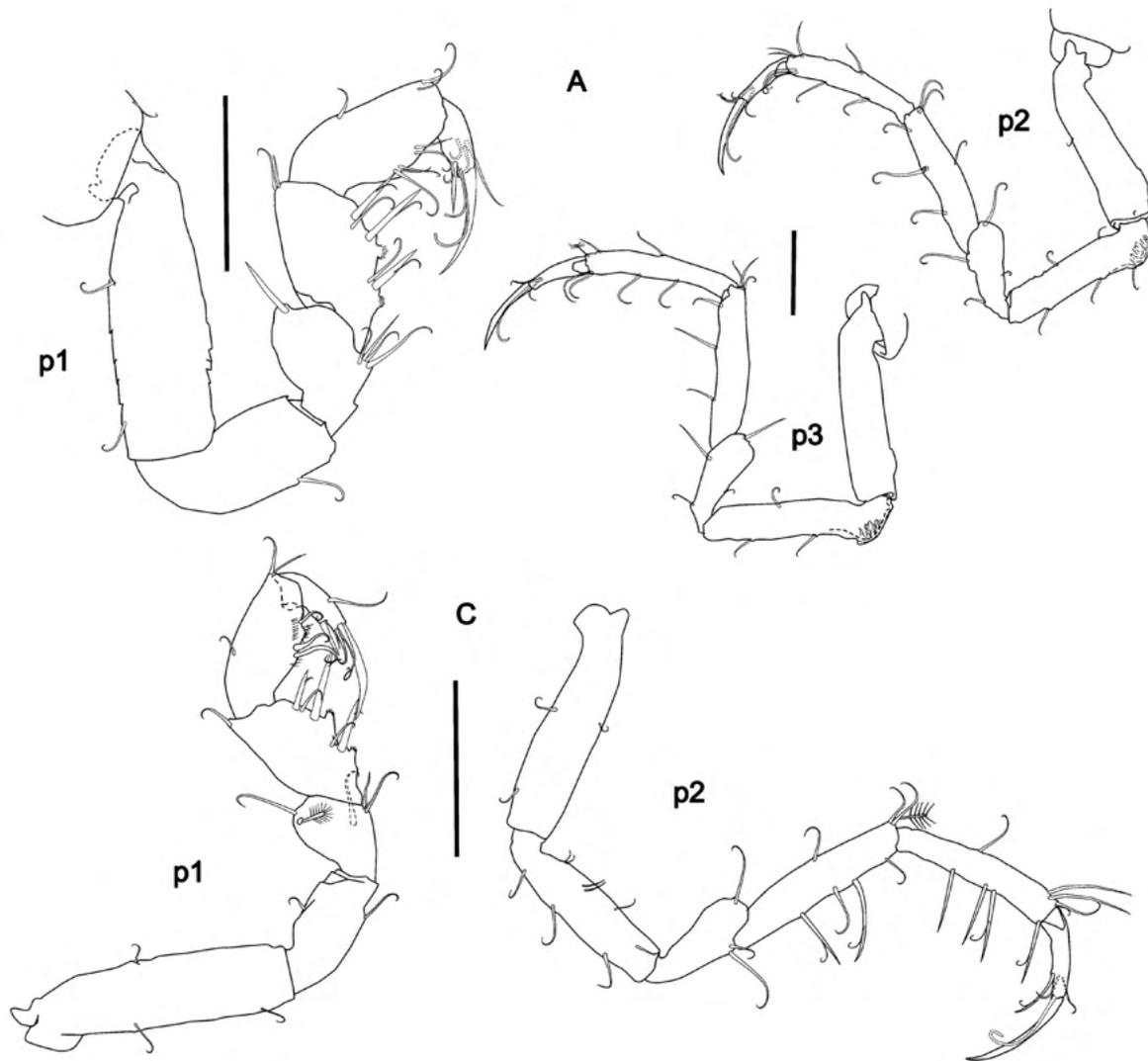


FIGURE 24. *Munnogonium tillerae* (Menzies & Barnard, 1959), topotypes, AM P.72159. A, copulatory male in figure 22; p1–p3, pereopods I–III; C, ovigerous female in figure 22; p1–p3, pereopods I–III. Scale bars, 0.1mm.

Head length in females 0.56 width; length posterior to eyestalks in female 0.5 anterior length, length posterior to eyestalks in male 0.42 anterior length. *Frontal margin* broadly rounded, without angular lateral margins adjacent to antennae. *Eyestalks* in female length 1.6 width, in male length 1.5 width, shaft with mid anterior rounded bump, angling forward at approximately 25° in female, 20° in male, with two ocelli visible internally. Mandible molar process distally wedge-shaped, triturative surface sloping; with anterior spine distinctly projecting medially from gnathal surface.

Pereonite 1 sagittal length in female 1.6 pereonite midline length, in male 1.8 pereonite midline length. *Coxal plate 1* in copulatory males fully fused to pereonite 1; coxae (1)2–7 visible in dorsal view in males, coxae 5–7 in females visible in dorsal view; pereonite 1–7 laterally rounded, not projecting.

Pleon length 1.6 width in female, 1.5 width in male. *Pleonite 1* width 0.75 and 0.80 distance between uropods (♂, ♀), length 0.52 and 0.62 width (♂, ♀). *Pleotelson* laterally convex, smooth, and lacking inflection between lateral and proximal margins, dorsal surface smooth; mid convexity with submarginal ventral row of setae; anterior length in ventral view 0.10 and 0.13 total pleotelson length (♂, ♀); posterior projection forming 85° angle (♂, ♀) from narrowly rounded apex to uropod insertions.

Antennula article 1 extending far beyond eyestalk apex and pereonite 1 lateral margin; article 1 length subequal to article 2, tubular, width subequal to 2, article 2 with apical tuft of setae; articles 3–6 short and stout, 4–6 of subequal length, all shorter than 3. *Antenna* article 3 tubular, width 0.3 length, articles 4 and 5 of subequal length;

flagellum with 7 articles, proximal article longer than more distal articles, proximal article 1.3 length of second article.

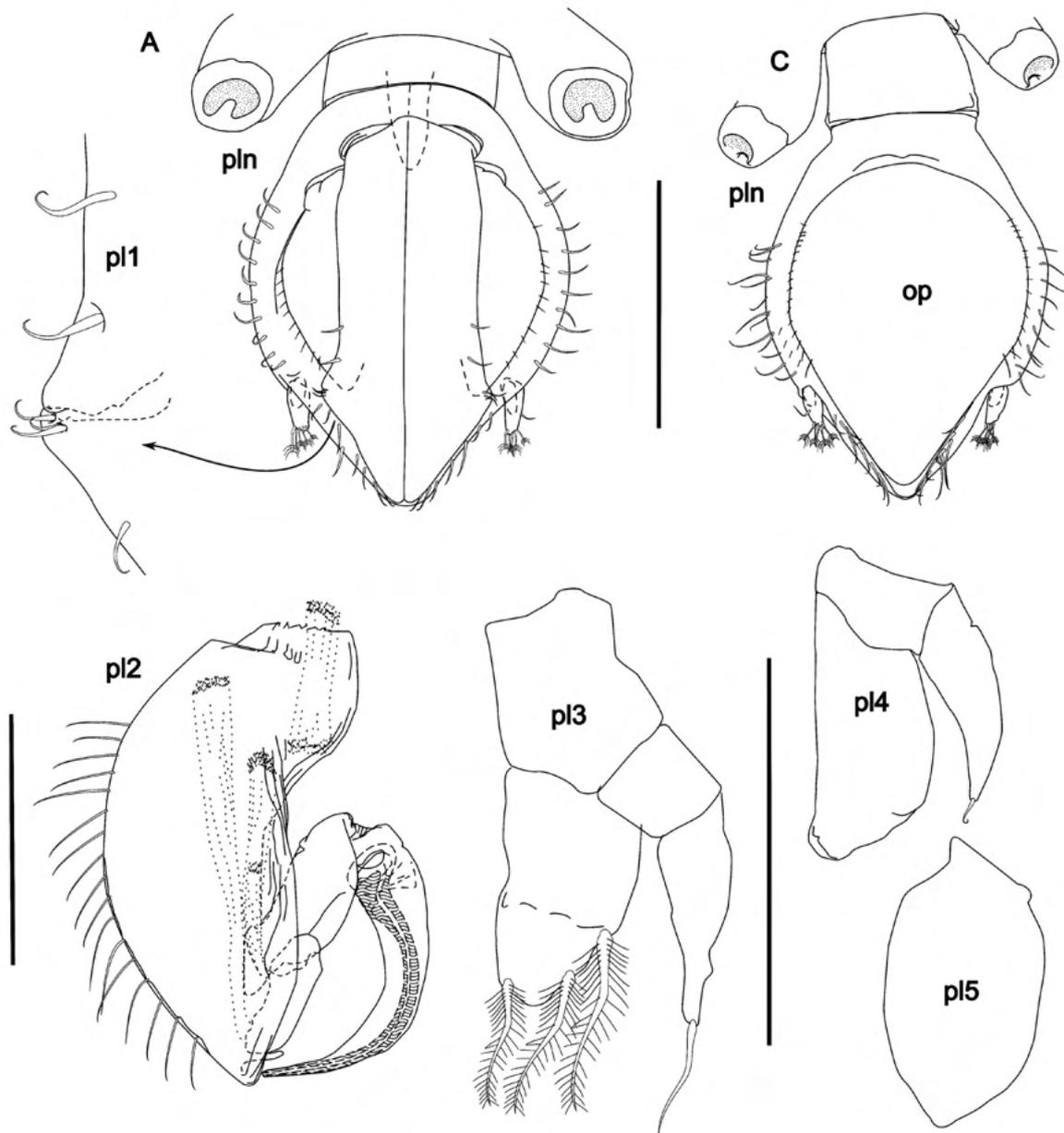


FIGURE 25. *Munnogonium tillerae* (Menzies & Barnard, 1959), topotypes, AM P72159. A, copulatory male in Figure 22; pl1, pleopod I; pln, pleon ventral view; pl2, pleopod II and appendix masculina; pl3–pl5, pleopod III–V. A, ovigerous female in Figure 22; pln, pleon ventral view; op, operculum. Scale bars 0.2 mm.

Pereopod I basis anterior margin anterior margin smooth (♂ with weak lateral dentition distally), length 3.1 and 3.8 width (♂, ♀); carpus oval, posterior margin with 3 subequal robust setae (middle setae longest), posterior margin with translucent, fimbriate projections at base of proximal 2 robust seta; propodus narrowing distally to insertion of dactylus, opposing margin with translucent, fimbriate flange and several simple setae. *Pereopod II* and *III* basis anterior margin smooth; ischium posterior margin in males with proximoventral indurate lobe; pereopod II of female carpus and propodus ventral margin with row of elongate stiff robust setae; dactylus dorsal and ventral claws thin, elongate, dorsal claw longer than dactylus, ventral claw about 4/5 length of dactylus.

Male pleopod I lateral lobes moderately projecting from midlateral margin, width 0.25 distance to midline; distal projection length 0.3 pleopod total length, forming acute angle of 70°, with bluntly pointed apices. *Female operculum* ovoid, width 0.75 length, apex bluntly rounded.

Uropods on lateral margin of pleotelson; protopod hidden.

Size. Largest female 1.2 mm, male 1.3 mm.

Distribution. Pacific Ocean off San Diego, California, 101–127 m.

Remarks. The types were assessed by Wilson (1997), and the holotype of *Munnogonium tillerae* found to be missing (note in vial left by Bowman & Schultz; see also Wetzer *et al.*, 1991:16). A single paratype female from the type locality remains, so this specimen can be used as representative of the species, if necessary. Menzies & Barnard (1959) listed material from further north to Pt Conception (Velero stations 4814, 4822, 5176, 5193) but we do not consider these specimens to be part of the type series.

Munnogonium tillerae (Menzies & Barnard, 1959) is similar to *M. falklandicum* (Nordenstam, 1933), but of much less slender body and shorter pleonite 1. It differs by pereopod I carpus posterior margin having translucent flanges at the base of the robust setae only, and male pleopods I has blunt apices, while the latter species has pereopod I carpus denticles distal to robust setae and male pleopod I has pointed apices.

After studying additional illustrations made of *Munnogonium cf. tillerae* (Wilson, 1997) specimens from the Santa Maria Basin, we conclude that *M. tillerae* from San Diego is distinct from these specimens. We herein restrict *Munnogonium tillerae* (Menzies & Barnard, 1959) to the population occurring off San Diego. Unfortunately, the type of *M. erratum* has been destroyed although the specimens studied by Wilson, 1997 are nearby and at around the same depth.

M. tillerae occurs around the first depth transition off shore from San Diego, just below 100 metres depth. This break may correspond to the paleo-shoreline from the last glacial maximum, around 12,000 years ago

***Tethygonium* Just & Wilson, 2007**

Key to species of *Tethygonium*

1. Frontal margin nearly straight laterally *Tethygonium monocuspis* sp. nov.
- Frontal margin broadly rounded 2
- Frontal margin concave laterally 3
2. Eystalks vestigial; eystalks shaft before apex rounded bump; pereionite 1–4 lateral margins coxae not visible in dorsal view; pereionite 1 lateral margin angular and projecting *Tethygonium quadricuspis* Just & Wilson, 2007
- Eystalks short; eystalks shaft before apex approximately parallel; pereionite 1–4 lateral margins coxae visible in dorsal view; pereionite 1 lateral margin rounded *Tethygonium variabile* (Schiecke & Modigh-Tota, 1976)
3. Pereiopod I carpus oval; pereionite lateral margins denticulate; antenna article 3 distomedial margin with blunt or broadly rounded projection; pereiopod I merus posterior margin with one robust seta on distal margin *Tethygonium armigerum* (Shimomura & Mawatari, 2000)
- Pereiopod I carpus triangular; pereionite lateral margins smooth; antenna article 3 distomedial margin with pointed or spine-like projection; pereiopod I merus posterior margin with only fine setae *Tethygonium adenensis* (Müller, 1991)

***Tethygonium monocuspis* sp. nov.**

(Figs 26–27)

Type fixation. *Holotype*, ♀, AM P60463.—Here designated.

Type locality. Victoria, south-east Australia.

Etymology. The species is named for the single lateral spine on pereionite 2.

Material examined. *Holotype*. ♀, 0.9 mm, Australia, Victoria, east of Seal Islands, 38°59.1'S, 148°31.6'E, collected with benthic sled, stn SS05/94/60, AM P60463.

Paratypes. Australia, New South Wales, off Nowra, 34°59.52'S, 151°5.94'E, 204 m, coarse shell, WHOI epibenthic sled, GCB Poore *et al.*, CSIRO RV *Franklin*, 14 July 1986, stn SLOPE 1, NMV J20116, (1 late ♂ manca, pereopod VII and pleopod I not fully developed). Australia, New South Wales, off Nowra, 34°59.52'S, 151°5.94'E, 204 m, coarse shell, WHOI epibenthic sled, Poore, GCB *et al.*, CSIRO RV *Franklin*, 14 July 1986, stn SLOPE 1, NMV J20117, (1 ♀).

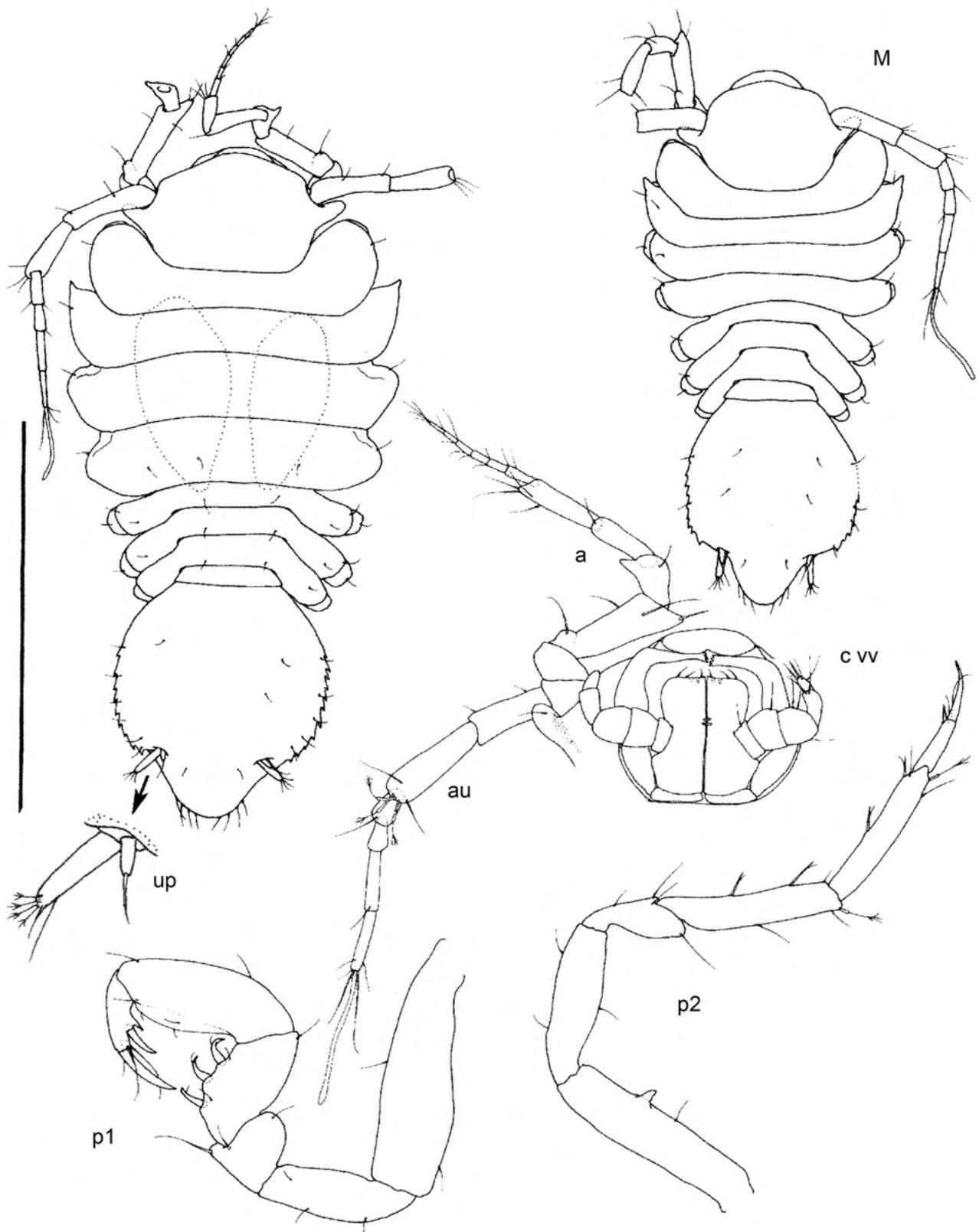


FIGURE 26. *Tethygonium monocuspis* sp. nov. Holotype, ♀, except M, paratype, late ♂ manca. a, antenna; au, antennula; cvv, head ventral view; p1–2, pereopods I and II; up, uropods. Scale for habitus (both), 0.5 mm.

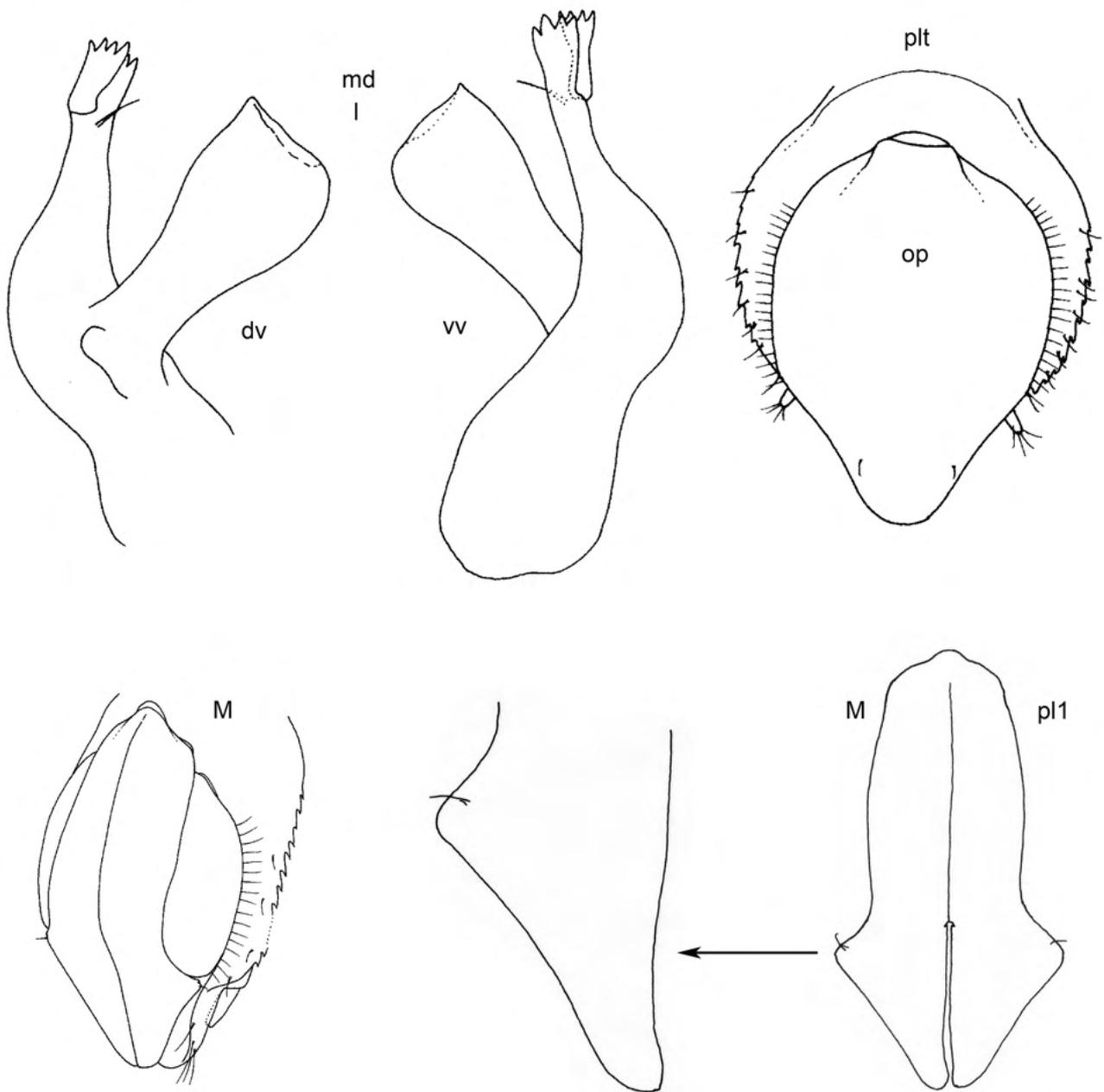


FIGURE 27. *Tethygonium monocuspis* sp. nov. **Holotype**, ♀, except M, paratype, late ♂ manca. dv, dorsal view; md l, left mandible; op, operculum; pl1, pleopod 1; plt, pleotelson (oblique view in M); vv, ventral view.

Description (female). *Body* width 0.50 length, widest at pereionite 2. *Head* length 0.53 width; length posterior to eyestalks 1.2 anterior length. *Frontal margin* convex with weak rounded mid projection, with blunt angular lateral margins adjacent to antennae. *Eyestalks* slightly longer than broad, reaching to about middle of pereionite 1 anterior margin, apex rounded, long axis angling forward at approximately 30°, (ocelli not observed).

Pereionites 1 and 3–7 lateral margin rounded, lateral margin of pereionite 2 angular with forward projecting spine; coxae visible in dorsal view on pereionites 1 and 5–7 (1–7 in ♂). Pereionite 1 sagittal length 2.5 pereionite midline length.

Pleon length 1.2 width. *Pleonite 1* width equal to distance between uropods, length 0.2 width. *Pleotelson* laterally convex, lacking inflection between lateral and proximal margins, with 9–10 small denticles per side; posterior projection, set apart from lateral margins by concavity at level of uropods, forming 70° angle with broadly rounded setiferous apex.

Antennula article 1 reaching much beyond eye lobes and pereionites 1, article 2 about 0.75 length of 1, 1 and

2 of equal width, tubular; articles 5 and 6 elongate, of subequal length, each as long as combined 3 and 4. *Antenna* article 3 tubular to slightly widening to medio-apical projection, width approximately 0.35 length, article 4 with distolateral spine, article 5 0.85 length of 6; flagellum with 6 successively shorter articles.

Pereiopod I basis smooth, length 3.5 width; ischium smooth; merus with a few simple setae; carpus oval, posterior margin with 3 subequal, forward curved robust setae; propodus narrowing distally to insertion of dactylus; dactylus with strong posterior claw, half length of unguis, and marginal spine proximal to posterior claw. *Pereiopod II* basis with single anterior spine.

Female operculum width 0.73 length; distal part tapering with weakly concave distolateral margins, forming 70° angle, apex broadly rounded.

Uropods dorsal and adjacent to lateral margin of pleotelson; small protopod visible.

Size. Largest female, 0.85 mm.

Distribution. Eastern Australia, New South Wales to Victoria.

Remarks. The immature male is generally like the female, except all coxae are visible in dorsal view. *Tethygonium monocuspis* **sp. nov.** and its only Australian congener *T. quadricuspis* Just and Wilson, 2007 (Bass Strait, Australia) are the only species in the genus with lateral pereionite spines. They differ primarily in that the latter has lateral spines on pereionites 1–4 rather than pereionite 2 only, obsolete eyestalks, pereiopod I basis with a single and ischium with 2 stout spine.

Summary

The precursor for the present paper (Just and Wilson 2007) revised a group of paramunnid species centered around the classical genera *Austrosignum* and *Munnogonium*, resulting in the diagnosis, following a parsimony analysis, of an additional 8 new genera and 2 new species, hence the use of the term *complex*. The present study provides the ultimate support for several genera by illustrating and describing type material of originally poorly described species including several genotypes and through documentation of new materials. The *Austrosignum-Munnogonium* complex now comprises 10 genera with 37 species (Table 1).

Presently 26 species occur only south of the equator, primarily from southern temperate to Antarctic waters. In the northern hemisphere the remaining 11 species are found in the Mediterranean, in the north-western Indian ocean, around Korea and Japan and in the eastern Pacific from Canada to California. Species occur generally in shallow water from near intertidal to around the shelf break, except in the genus *Tethygonium* where species are found from the lower shelf to several hundred meters depth, even as deep as 1000 meters (Australian *Tethygonium quadricuspis*). The distribution patterns of species in the *Austrosignum-Munnogonium* complex support our conclusion on the larger *Paramunna* complex (Just & Wilson 2004) that paramunnid species have restricted distributions, with a high degree of endemism. For that reason, we predict that more species in the present complex of genera, and perhaps in new related genera, will be found in Antarctica and around the subantarctic islands as well as along the southern hemisphere temperate or cooler coasts of the Atlantic, Indian and Pacific Oceans. Similarly, new taxa can also be expected along boreal and sub-boreal coasts in the northern hemisphere, whereas northern genera do not appear to have adapted to arctic or subarctic conditions.

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TABLE 1. List of Genera and species of the *Austrosignum-Munnogonium* complex, distribution and depth.

<i>Austrosignum escandellae</i> Castello, 2004	South Shetland Islands	45 m
<i>glaciale</i> Hodgson, 1910	Eastern Antarctica	18- ca. 36 m
<i>latum</i> sp. nov.	California	20 m
<i>pilosum</i> sp. nov.	Macquarie Island, Australia	13 m
<i>A. sp.</i>	Antarctica, Palmer Peninsula	25 m
<i>Advenogonium fuegia</i> (Doti & Roccatagliata, 2005)	Beagle Channel, Argentina	15–35 m
<i>Boreosignum affinis</i> (Malyutina & Ushakova, 2001)	Korea, Sea of Japan	15.5–25.5 m
<i>maltini</i> (Shiecke & Fresi, 1972)	Bay of Naples, Italy	5–6 m
<i>orientale</i> (Shimomura & Mawatari, 2000)	Japan, Shiso-Jima Island	10 m
<i>somersensis</i> (Kensley, 1994)	Bermuda	0–10 m
<i>wilsoni</i> (Hooker, 1985)	W Florida Gulf of Mexico	30 m
<i>polynesiensis</i> (Müller, 1989)	Society Islands, Bora-Bora	0.5–2 m
<i>B. spp.</i>	East and south Australia	4–5 m
<i>Cryosignum incisum</i> (Richardson, 1908)	Western Antarctica	5–30 m
<i>latifrons</i> (Menziés, 1962)	Southern Chile	100 m
<i>lunatum</i> (Hale, 1937)	Eastern Antarctica	3.5–7 m
<i>nordenstami</i> sp. nov.	South Georgia Islands	12 m
<i>C. sp.</i>	S Chile, Seno Ronclavi	35 m
<i>Kussakinella spinosum</i> (Kussakin, 1982)	South Shetland Islands	17 m
<i>Meridiosignum convexum</i> sp. nov.	Subantarctic Is. New Zealand	0–23
<i>disparitergum</i> Doti & Roccatagliata, 2009	Argentina off Rio de la Plata	129 m
<i>kerguelensis</i> (Vanhöffen, 1914)	Kerguelen Island	shallow
<i>macquariensis</i> sp. nov.	Macquarie Island, Australia	3–4.5 m
<i>menziési</i> (Winkler, 1994)	Magellan Strait, Chile	0–9 m
<i>multidenticulatum</i> Just & Wilson, 2007	Macquarie Island Australia	3–4.5 m
<i>subtilis</i> (Kensley, 1976)	St Paul and Amsterdam Isl.	50–60 m
<i>undulatum</i> Doti & Roccatagliata, 2009	Argentina off Rio de la Plata	129 m
<i>M. sp.</i>	Falkland Is., Albermarle Hbr	15 m
<i>Munnogonium diplonychia</i> Doti & Roccatagliata, 2013	Argentina	15 m
<i>erratum</i> (Schultz, 1964)	USA, California	135 m
<i>falklandicum</i> (Nordenstam, 1933)	Falkland Islands	22–150 m
<i>globifrons</i> (Menziés, 1962)	Magellan Strait, Chile	tidal belt
<i>longicaudatum</i> sp. nov.	Eastern Australia, off Nowra	204 m
<i>quequensis</i> Doti & Roccatagliata, 2013	Argentina, Puerto Quequén	45 m
<i>tillerae</i> (Menziés & Barnard, 1959)	USA California off San Diego	101–127 m
<i>waldronense</i> George & Strömberg, 1968	USA San Juan Archipelago	0–60 m
<i>Quetzogonium dentatum</i> (Winkler, 1994)	Chile, Magellan Strait	12–40 m
<i>Tethygonium adenensis</i> (Müller, 1991)	Gulf of Aden	228–235 m
<i>armigerum</i> (Shimomura & Mawatari, 2000)	Japan, SW Honshu	115 m
<i>monocuspis</i> sp. nov.	South-eastern Australia	204 m
<i>quadricuspis</i> Just & Wilson, 2007	Australia, Eastern Bass Strait	1000 m
<i>variabilis</i> (Shiecke & Modigh-Tota, 1976)	Italy, Golf of Naples	35–190 m
<i>Zizzygonium magellanensis</i> (Winkler, 1994)	Chile, Magellan Strait	9–12 m

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