Zootaxa 1515: 1–29 (2007)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

Revision of *Austrosignum* Hodgson and *Munnogonium* George & Strömberg (Paramunnidae) with descriptions of eight new genera and two new species, (Crustacea: Isopoda: Asellota)

JEAN JUST[1] & GEORGE D. F. WILSON[2]

[1]*Museum of Tropical Queensland, 70-100 Flinders Street, Townsville, Queensland 4810, Australia (Hon. Associate, Museum Victoria, Melbourne). E-mail: jeanjust@bigpond.com.au*
[2]*Australian Museum, 6 College Street, Sydney NSW 2010, Australia. E-mail: buz.wilson@austmus.gov.au.*

Table of contents

Abstract

The paramunnid genera *Austrosignum* Hodgson, 1910 (type species *A. glaciale* Hodgson, 1910) and *Munnogonium* George & Strömberg, 1968 (type species *M. waldronense* George & Strömberg, 1968) are re-diagnosed. Twenty seven species are reviewed. *Austrosignum* is restricted to two described species, *Munnogonium* to five described species. The remaining 20 species are placed in the following eight new genera: *Boreosignum* (type species *Austrosignum maltinii* Schiecke & Fresi, 1972), *Cryosignum* (type species *Paramunna lunata* Hale, 1937), *Meridiosignum* (type species *M. macquariensis* sp. nov.), *Tethygonium* (type species *T. quadricuspis* sp. nov.), *Quetzogonium* (type species *Austrosignum*

Accepted by J. Svavarsson: 13 Apr. 2007; published: 25 Jun. 2007

dentatum Winkler, 1994), *Advenogonium* (type species *Austrosignum fuegiae* Doti & Roccatagliata, 2005), *Zizzygonium* (type species *Paramunna magellanensis* Winkler, 1994), *Kussakinella* (type species *Austrosignum spinosum* Kussakin, 1982).

Key words: Isopoda, Asellota, Paramunnidae, *Austrosignum*, *Munnogonium*, new genera, new species

Introduction

Species in the Paramunnidae range in size from about 0.6 mm to approximately 3.0 mm. They occur from the intertidal to abyssal depths, and from Arctic and Antarctic conditions to the tropics. Recently subgroups within the family have been shown to be considerably more diverse than previously thought (Just & Wilson 2004, 2006). Those studies also supported Wilson's (1980) conclusion that the Paramunnidae occur overwhelmingly in southern hemisphere temperate to cold waters. Including new species herein, the family now comprises 148 named species.

The aim of this paper is to review the genera *Austrosignum* Hodgson, 1910 (type species *A. glaciale* Hodgson,1910) and *Munnogonium* George & Strömberg, 1968 (type species *M. waldronense* George & Strömberg, 1968). Lack of clarity in the diagnoses of the two genera has, over time, led to significant confusion as to where to place newly discovered species more or less similar to the two type species. Species with strong, triturative mandible molars and dorsally visible coxae V–VII traditionally have been referred to *Austrosignum* or *Munnogonium* on the basis of the presence (*Austrosignum*) or absence (*Munnogonium*) of a mandibular palp. Other characters, such as the length of eyestalks, have been considered in separating the two genera, but they have not been applied consistently. Although the type species of *Munnogonium* lacks a mandibular palp, the presence of a palp in the type species of *Austrosignum* has been conjectured from Hodgson's (1910) descriptions of *A. grande* and *A. glaciale* (see discussion in Wilson 1997: 75). Of the former Hodgson wrote (p. 67) "The [mandible] palp was not observed"; of the latter (p. 68) "The [mandible] palp is long, three-jointed". We have examined the types of both *Austrosignum grande* and *A. glaciale* and have found that neither species possesses a mandible palp, (Hodgson probably mistook the maxillipedal palp for that of the mandible palp in the latter species).

Bowman & Schultz (1974) moved *Austrosignum grande* and four other species of *Austrosignum* to *Munnogonium* based on their presumed (*A. grande*) or observed lack of a mandibular palp, implicitly leaving Hodgson's (1910) second species, *A. glaciale* (presumed by the authors to have a mandibular palp) as the type species of *Austrosignum* as designated by Menzies (1962). Subsequently, new species have been described in *Munnogonium* as well as *Austrosignum*, but not with reference to distinctive diagnoses. Table 1 shows that 24 species have been described in *Austrosignum* or *Munnogonium* or have subsequently been transferred between or to one or the other of those genera.

We re-diagnose *Austrosignum* and *Munnogonium*, restricting the former to two and the latter to five described species. An empirical cladistic analysis provides support for a new classification for the remaining 20 species listed in Table 1. We therefore propose eight new genera, two of which take new species as their types.

Methods

Taxonomic data

Many species reported during the 20th Century were inadequately described and illustrated. To place those species in the context of this revision, we have examined most type materials, as indicated by "T" in Table 1. We will redescribe and reillustrate these species based on their types in a subsequent paper.

TABLE 1. Species described in, subsequently transferred to, or here placed in the *Austrosignum/Munnogonium* complex.

Original combination	Subsequent view	This paper
Austrosignum dentatum Winkler, 1994	no change	*Quetzogonium* dentatum*, comb. nov.
A. erratum Schultz, 1964	*Munnogonium*, by Georges & Strömberg (1968), tentatively synonymized with *Munnogonium tillerae* by Wilson (1997)	*Munnogonium erratum*
A. escandellae Castelló, 2004	no change	*Austrosignum escandellae*
A. falklandicum Nordenstam, 1933 T	no change	*Munnogonium falklandicum*, comb. nov.
A. fuegiae Doti & Roccatagliata, 2005	no change	*Advenogonium* fuegiae*, comb. nov.
A. globifrons Menzies, 1962 T	*Munnogonium*, by Bowman & Schultz (1974)	*Munnogonium globifrons*
A. glaciale Hodgson, 1910 T	syn. of *A. grande* Hodgson, by Kussakin (1982)	*Austrosignum glaciale*
A. grande Hodgson, 1910 T	*Munnogonium* by Bowman & Schultz (1974), Malyutina & Ushakova (2001), *Austrosignum* by Kussakin (1982)	*Austrosignum glaciale*, syn. nov.
A. latifrons Menzies, 1962 T	no change	Paramunnidae *incertae sedis*
A. maltinii Schiecke & Fresi, 1972	*Munnogonium*, by Bowman and Schultz (1974), *Metamunna*, by Wolff and Brandt (2000)	*Boreosignum* maltinii*, comb. nov.
A. spinosum Kussakin, 1982	no change	*Kussakinella* spinosum*, comb. nov.
A. tillerae Menzies & Barnard, 1959	*Munnogonium*, by Bowman and Schultz (1974)	*Munnogonium tillerae*
Munnogonium adenensis Müller, 1991	no change	*Tethygonium* adenensis*, comb .nov.
M. affinis Malutina & Ushakova, 2001	no change	*Boreosignum* affinis*, comb. nov.
M. armigerum Shimomura & Mawatari, 2000	no change	*Tethygonium* armigerum*, comb. nov.
M. orientale Shimomura & Mawatari, 2000	no change	*Boreosignum* orientale*, comb. nov.
M. polynesiensis Müller, 1989	*Metamunna*, by Wolff and Brandt (2000)	*Boreosignum* polynesiensis*, comb. nov.
M. somersensis Kensley, 1994	no change	*Boreosignum* somersensis*, comb. nov.
M. subtilis Kensley, 1976	*Metamunna*, by Wolff and Brandt (2000)	*Meridiosignum* subtilis*, comb. nov.
M. wilsoni Hooker, 1985	*Metamunna*, by Wolff and Brandt (2000)	*Boreosignum* wilsoni*, comb. nov.
M. waldronense George and Strömberg, 1968	syn. of *Austrosignum tillerae* Menzies & Barnard, 1959, by Bowman and Schultz (1974)	*Munnogonium waldronense*
Austrimunna incisa Richardson, 1908 T	*Austrosignum* by Vanhöffen (1914), *Paramunna* by Stephensen (1927)	*Cryosignum* incisum*, comb. nov.
Paramunna lunata Hale, 1937 T	?*Pleurosignu*m by Menzies (1962), *Pleurosignum* by Kensley (1977), syn. of *Austrosignum grande* by Kussakin (1982), *Paramunna*, by Brandt (1999)	*Cryosignum* lunatum*, comb. nov.
P. kerguelensis Vanhöffen, 1914 T	*Metamunna*, by Wolff and Brandt (2000)	*Meridiosignum* kerguelensis*, comb. nov.
P. magellanensis Winkler, 1994 T	no change	*Zizzygonium* magellanensis*, comb. nov.
P. menziesi Winkler, 1994 T	no change	*Meridiosignum* menziesi*, comb. nov.
Pleurogonium variabile Schiecke & Modigh-Tota, 1976	no change	*Tethygonium* variabile*, comb. nov.

T: type material examined. *: new genus described herein.

Terminology, measurements and methods are those explained, illustrated and used in Just & Wilson (2004, 2006). The descriptions were generated from a DELTA database (Dallwitz 1980, Dallwitz *et al.* 2000a, 2000b) and subsequently edited for clarity of language. The descriptions are short because we use the DELTA method of "Implicit Attributes." Unless indicated otherwise in the descriptions, these attributes are implicit throughout the descriptions and not listed, except where the characters concerned are inapplicable because they are dependent on a state that is not present (e.g., a spine absence prevents one from describing its shape). For completeness, we list the Implicit Attributes here, because the dataset has changed somewhat since our original publications. In particular, characters like the presence of a frontal projection and coxae visible in dorsal view needed to have their "Implicit" status changed.

Implicit attributes

Body ovate, dorsally with scattered fine simple setae.

Head not sexually dimorphic, male head length similar to that of females and juveniles. Frontal margin without projections. Anterodorsal surface smooth, without ornamentation. Eyes on lobes produced laterally from head. Eyestalks prominent, of male or female, without projection on posterolateral margin, shaft axis approximately linear, shaft before apex approximately parallel.

Pereonites 1–7 lateral margins not projecting, coxae visible in dorsal view. Pereonite 1 of terminal male only slightly enlarged compared to adult females or juveniles. Pereonites 1–7 dorsal surface smooth, without median projections, lateral margins without single elongate seta. Pereonite 4 in dorsal view extending to margins of pereonites 3 and 5. Pereonite 5 in dorsal view extending laterally to margins of pereonites 4 or 6. Pereonite lateral margins without robust setae, smooth (unornamented).

Pleonite 1 free. Pleotelson laterally rounded but with inflection between proximal and lateral margins; posterior margin produced, without sharp spine-like tip, smooth, fringing setae short, not projecting substantially at pleotelson tip.

Antennula projecting from head laterally, with 6 articles; article 1 not extending beyond pereonite 1 lateral margin, article 1 lacking spines; article 2 tubular and rounded distally, distal articles inserting apically.

Antenna article 2 lateral margin smooth, lacking spines. Article 3 projecting medially from article 2, scale absent, article with proximolateral bulge having seta, elongate, length distinctly longer than articles 1–2 together, width in male and female similar; without crenate flange on lateral margin or medial margin, medial margin smooth proximally, lateral margin smooth, distomedial margin without projection. Article 4 without spine. Article 5 approximately tubular.

Mandible palp present, shorter than incisor process, article 2 inflated, article 3 not curved, with few setae. Maxilliped palp articles 1-2 without lateral spine.

Pereopodal coxae I-IV lateral margins rounded in dorsal view, without projections.

Pereopod I coxa without projections, distinctly articulated on pereonite 1, of male unelaborated, anterior margin simple; ischium anterodistal margin smooth; ischium shaft without spines; merus with smooth anterior margin, merus with smooth posterior margin; merus posterior margin with only fine setae; posterior carpus-margin with 2 robust setae, posterior margin robust setal shafts straight, posterior margin with no denticles or spines proximal to robust setae, posterior margin with no denticles or spines between robust setae, posterior margin with no denticles or spines distal to robust setae; propodus without distal spine, opposing margin with simple setae, smooth, dactylus ventral claw thin, positioned directly adjacent to dorsal claw, projecting along dactylar axis, without spines. Pereopod II basis smooth; ischium posterior margin smooth; carpus and propodus ventral margin with short robust setae; dactylus dorsal claw robust, less than length of dactylus; ventral claw much shorter than dorsal claw. Pereopod V-VII coxae extending beyond tergite in dorsal view, lateral margins rounded, without elongate or robust setae, without denticles or spines.

Male pleopods I sagittate, lateral lobes with rounded proximal sublobe, distal sublobe emerging adjacent to proximal lateral sublobe. Male pleopods II stylet simple arc-shaped curve, tapering smoothly to tip, reaching near end of protopod.

Uropods recessed, protopod or insertion not exposed, not covered dorsally with small flap of cuticle or hood, with two rami; endopod distal margin rounded.

Characters not treated

With the exception of the mandibles, mouthparts are similar across the *Paramunna* complex (Just & Wilson 2004: 382), *Austronanus* group (Just & Wilson 2006) and among basal Paramunnidae treated herein and thus provide little or no information for separating genera or species. Similarly, pleopods, except I (male) and II (female operculum), hardly vary in these paramunnid taxa (see Just & Wilson 2004: 380) and are of little value in identifying genera and species. As a result, these features are not addressed in this paper.

Cladistic Analysis

A phylogenetic analysis was based on described species using types inspected by us or from the literature and several new species, some of which will be described below. The character list is based on the list for the *Paramunna* complex published by Just & Wilson (2004, 2006), to which readers should refer for a fuller explanation of the data set. A few new characters have been added, but these are simple features, so the character list is self-explanatory. The character list and data matrix is provided on TreeBase (http:/TreeBase.org/, study accession number S1790, matrix accession number M3272). As in the datasets used previously, some features have been logically divided into two or more characters to clarify their homology relationships. For example, characters 82 and 83 concern a spine on the distomedial margin of antennal article 3, the first testing whether the spine is present, and the second dealing with the shape of the spine. Because the two characters concern logically different attributes, combining them into a single character would conflate their homology relationships. All characters are considered multistate and are evaluated as unordered.

Because *Austrosignum glaciale* (= *A. grande*) was used as an outgroup in the previous analyses, we therefore chose three taxa external to the Paramunnidae. The relationships of families in the basal section of the Asellota are not well established, as can be seen in conflicting hypotheses between Wilson (1987) and Wägele (1989). To obtain a general result, we chose outgroups from basal exemplars of several clades, based on well-described taxa from the literature: Munnidae-Santiidae clade (*Santia longisetosa* Shimomura & Mawatari, 2001), "Janiridae" (*Austrofilius* cf. "*furcatus*" in Winkler & Brandt 1993), and Xenosellidae (*Xenosella coxospinosa* Just, 2005). These taxa were chosen because they had short antennulae and broad cephalic regions between the antennae. The taxa in Table 1 were included in the matrix (with the exception of *Munnogonium globifrons*) together with several new species, two of which are described here as *Tethygonium quadricuspis* gen. nov., sp. nov. and *Meridiosignum minidenticulatum* gen. nov., sp. nov. A third new species, *Munnogonium* sp. nov. "slope 1" will be treated in another paper. Exemplars, usually the type species, from the genera of the *Paramunna* complex and the *Austronanus* complex were also included, with the exception that all species of *Omonana* were included owing to a great deal of missing data in that group.

Phylogenetic analyses used PAUP* (ver.4b10, Swofford 2002), with the following commands that implement a tree space search: *hsearch addseq=random nchuck=3 chuckscore=1 nreps=1000 randomize=trees; hsearch start=current nchuck=0 chuckscore=0*. Multistate characters were considered non-additive, and multistate taxa were considered polymorphic, with steps added to terminal taxa to account for putative character changes within taxon changes. To test the clades used in the classification, the data matrix was submitted to sensitivity testing as described in Just & Wilson (2004), a 1000 replicate bootstrap (Felsenstein, 1985) analysis, with a 20 iteration tree space search (*nchuck=20*) for each bootstrap iteration, and calculation of character support (Bremer 1994). MacClade (ver.4, Maddison & Maddison 2000) was used to generate a PAUP* command file with converse constraints for an analysis of character support. Consensus diagrams of the trees resulting from the initial unweighted analysis (Fig. 1), are available on TreeBase (study accession number S1790, matrix accession number M3272).

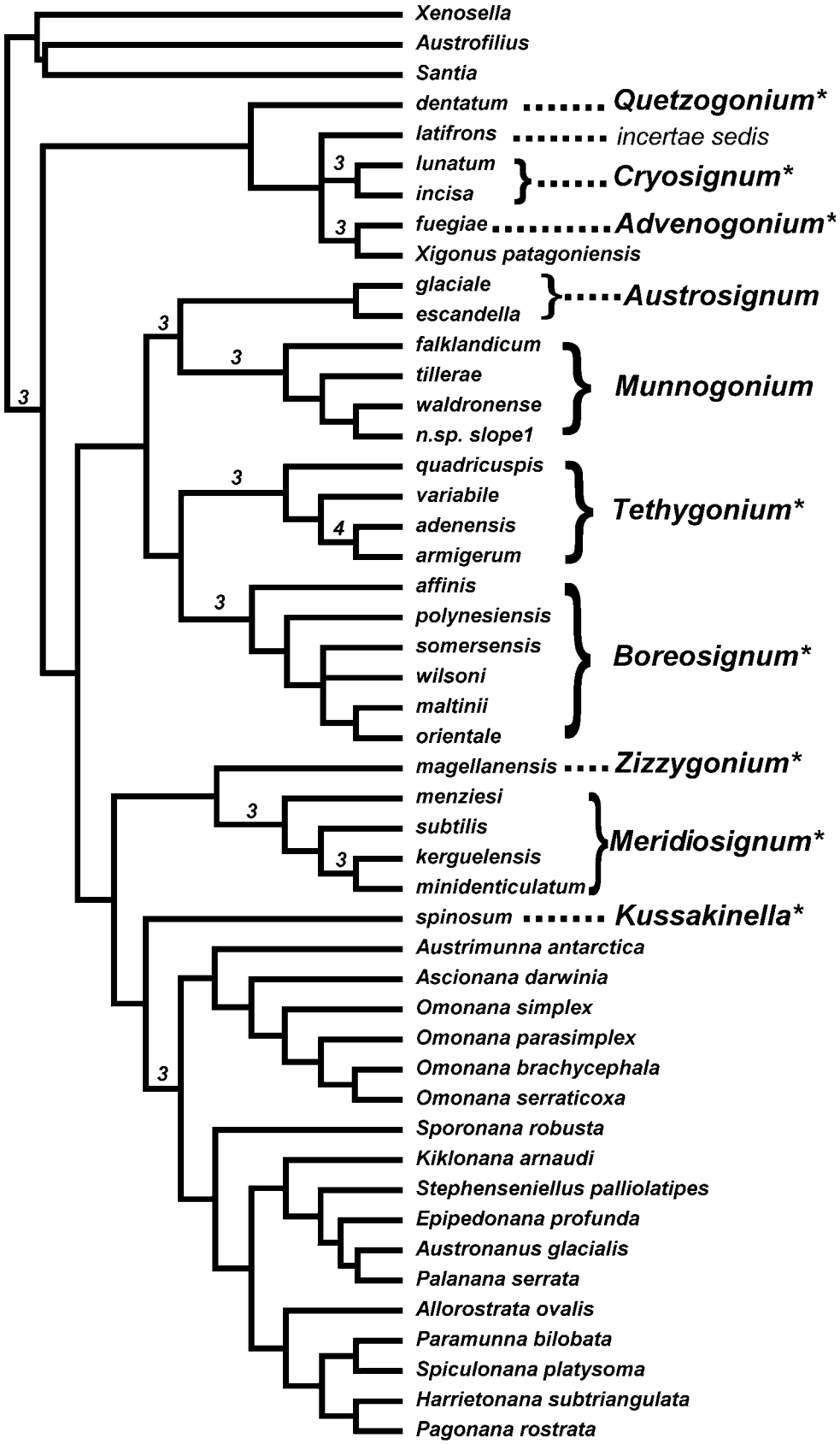

FIGURE 1. Parsimony analysis of species in the *Austrosignum-Munnogonium* complex, strict consensus of 4 trees, length 539 steps (consistency index excluding uninformative characters = 0.3952; retention index = 0.5863, rescaled consistency index = 0.2317). Bremer support values greater than 2 are shown on branches relevant to the *Austrosignum-Munnogonium* complex. Generic classification indicated to the right of the species names, *= gen. nov.

Institutional abbreviations

AM, Australian Museum, Sydney. NHM, Natural History Museum (British Museum), London. NMV, Museum Victoria, Melbourne. SAMA, South Australian Museum, Adelaide.

Classification

The parsimony analysis of the data matrix found 4 shortest trees, length 539, a consensus for which is shown in Figure 1. *Austrosignum glaciale* forms a clade only with *A. escandella*, and *Munnogonium waldronense* is restricted to a 4-species clade including *M. falklandicum*, *M. tillerae* and *M*. sp. nov. "slope 1". As in the 2004 analysis, most clades were supported by few steps in a Bremer analysis (shown in Fig.1), largely a result of a high number of taxa and few characters available for analysis. Moreover, several of the taxa are incompletely scored, being only known from males or females. A sensitivity analysis similar to that used in Just & Wilson (2004) found the clades used in the classification to be robust to objective changes in the character weighting (based on the fit of the characters to the tree). The deeper structure of these cladograms, however, collapsed so that the intergeneric relationships are not robust to changes in the character weights. The clades that remain are defined as new genera, as indicated in Figure 1. These clades were also retained in different compositions of the included Paramunnidae species, such as an analysis that included all species described in Just & Wilson (2004, 2006). The species *latifrons* did not form a clade with *Cryosignum* in this analysis because it is known only from the female type and could not be scored for the male characters that define this group. Because we cannot yet confidently classify *latifrons*, we left it as *incertae sedis* (see Table 1). Although *Xigonus patagoniensis* appears to be a sister group of *fuegiae* in the unweighted analysis, this relationship is not retained in the consensus over all weightings in the sensitivity analysis. Similarly, *dentatum* and *magellanensis* did not retain clade relationships (Fig. 1). The peculiar species *spinosum* did not appear to be part of any clade in any analysis. Consequently, these latter four species were classified as monotypic genera.

Taxonomy

Key to genera previously classified as *Munnogonium* and *Austrosignum*

We present a key to the genera treated in this study. A considerable number of undescribed species, primarily from Australia and the subantarctic and Antarctic regions, are known to us. Many of those taxa represent undescribed genera that share with those treated herein the plesiomorphic truncate molar (determined by inspecting an intact specimen in glycerin) and dorsally visible coxa on pereonites 5–7. We recommend that specimens for identification should not be dissected, because the characters below are based on external morphology only. When identifying specimens, users are advised to not rely solely on this key, but to consult the diagnoses and illustrations of the genera.

1 Pleotelson lateral margins smooth 2
- Pleotelson lateral margins fully denticulate along lateral curvature 6
- Pleotelson lateral margins with a few denticles level with uropods ..... *Quetzogonium* gen. nov.
2 Pereonites and pleon dorsally smooth or with low transverse ridges 3
- Pereonites with mid-dorsal conical spine(s) ..... *Kussakinella* gen. nov.
3 Eyestalks vestigial, about as long as broad 4
- Eyestalks prominent, length at least twice width 5
4 Eyestalks round, downward angled; head anterior margin convex or straight; pereopod I carpus with 3

straight robust setae on posterior margin; pereopod II carpus and propodus with elongate, slender robust setae on posterior margin..... *Munnogonium*

- Eyestalks conical, pointing laterad, head anterior margin concave in middle, laterally inflated; pereopod I carpus with 2 straight robust setae on posterior margin; pereopod II carpus and propodus with normal stout robust setae on posterior margin..... *Advenogonium* gen. nov.

5 Pereopod I carpus triangular, with 2 long and 1 short robust setae (latter not described for *A. escandellae*); mandible palp absent; uropod endopod, acutely pointed, curved mediad..... *Austrosignum*

- Pereopod I carpus oval, with 2 robust setae; mandible palp present; uropod endopod normal, rounded truncate ..... *Cryosignum* gen. nov.

6 Head front margin convex or nearly straight without prominent lateral parts; mandible palp absent; antenna article 3 lateral margin straight..... 7

- Head front margin concave in middle, prominently rounded laterally; mandible palp present; antenna article 3 broadly expanded laterally..... *Zizzygonium* gen. nov.

7 Antennula article 1 at least twice as long as eyestalk; pereopod I propodus without robust setae on opposing margin; pleotelson posterior projection with short lateral setae, but no setae on rounded apex 8

- Antennula article 1 shorter than or at most reaching apex of eyestalk; pereopod I propodus with 1 or 2 robust setae on opposing margin; pleotelson posterior projection with fringe of long setae around apex.... ..... *Meridiosignum* gen. nov.

8 Pereopod I carpus oval with several (3 or more) hook-shaped robust setae; dactylus with acute posterior spine proximal to accessory claw ..... *Tethygonium* gen. nov.

- Pereopod I carpus triangular with 2 straight robust setae; dactylus without posterior spine..... .....*Boreosignum* gen. nov.

Austrosignum Hodgson

Austrosignum Hodgson, 1910: 65.

Type species. *Austrosignum glaciale* Hodgson, 1910. —Subsequent designation.

Species included. *A. escandellae* Castelló, 2004, *A. glaciale* Hodgson, 1910.

Diagnosis. *Head* front margin evenly convex. *Pereonites* dorsally smooth or with low transverse ridges. *Pleotelson* lateral margins smooth. *Eyestalk* length at least twice greatest width. *Antennula* article 1 at most as long as eyestalk. *Mandible palp* absent. *Pereopod I* carpus triangular, with 2 straight robust setae on posterior margin and one smaller, straight robust setae more distally, with rectangular, ciliated spine on margin between main robust setae; propodus with simple setae only. *Pereopod II* carpus and propodus posterior margin with a few short robust setae. *Uropod* endopod acutely pointed, curving medially.

Note on type species. Hodgson (1910) did not fix a type species for his new genus *Austrosignum*. He described the two new species *A. grande* and *A. glaciale* in that sequence. Menzies (1962: 50) was the first author to fix a type species for *Austrosignum* Hodgson by designating *A. glaciale* as the type species of the genus. Although he thereby violated ICZN Recommendation 69B (11, “position precedence”), Menzies’ designation is valid according to ICZN Article 69 (a) (iv). Subsequent statements by several authors that *A. grande* is the type species of *Austrosignum* are therefore incorrect. We agree with Kussakin (1982) that *Austrosignum glaciale* and *A. grande* are synonymous, but under the former name rather than the latter as proposed by Kussakin.

Remarks. *Austrosignum* differs from *Munnogonium* as follows (characters of the latter in brackets): antennula article 1 not reaching apex of elongate eyestalks (much longer than vestigial eyestalks), pereopod I carpus posterior margin with 2 robust setae plus 1 small robust seta more distally (with 3 equal sized robust

setae); pereopod II carpus and propodus posterior margin with short, stout robust setae (elongate, thin robust setae), uropod endopod acutely pointed, curving medially (straight, rounded truncate), female operculum ovoid (distal part tapering with concave distolateral margins). *Austrosignum* is more similar to *Cryosignum* gen. nov. (below), but differs as follows: mandible palp absent (present in *Cryosignum*), pereopod I carpus triangular with 2 long and 1 short robust setae posteriorly (oval with 2 robust setae), uropod endopod acutely pointed, curving medially (straight, rounded truncate), terminal male enlarged pereonite 1 with broadly rounded anterior margin, not fused to coxa (strongly and acutely forward projecting, coxa fused to pereonite), terminal male head freely articulating with pereonite 1 (fused to pereonite 1).

The third smaller carpal seta is removed from the posterior margin and inserted on the medial face. In *A. glaciale*, this seta is easily seen in lateral view, but we have examined undescribed species of *Austrosignum*, in some of which the seta is inserted medially just behind the most distal of the normal 2 robust setae. In that position, the third seta can be difficult to observe in lateral view. The third robust seta has not been reported from *A. escandellae*. If not found after reviewing the species, we are uncertain if A. *escandellae* should be retained in *Austrosignum*.

Austrosignum glaciale Hodgson, 1910

Figs 2–4

Austrosignum glaciale Hodgson, 1910:68, pl.X, fig.2; Menzies, 1962:50.
Austrosignum grande Hodgson, 1910:66, pl.X, fig.1; Menzies, 1962:50.
Munnogonium grande (Hodgson, 1910). —Bowman & Schultz, 1974:266.
Austrosignum grande Hodgson, 1910. — Kussakin, 1982:94 (senior synonym of *A. glaciale*)
Austrosignum grande Hodgson, 1910. —Junior synonym of *A. glaciale*. Corrected synonymy, herein.
Not *Paramunna antarctica* (Richardson, 1906) of Hale (1937). — Menzies, 1962:52

Type fixation. Lectotype, ♀, NHM 1910.3.18.147. — Here designated

Material examined. *Lectotype*. Ovigerous ♀, 2.1 mm, Winter Quarters, McMurdo Bay, Ross Island, Antarctica, 77°51'S 166°36'E, inside 20-fathom line [36.5 m], January 1902, 'Discovery' coll., NHM 1910.3.18.147.

Paralectotypes. 1 preparatory ♀, 1 young ♀, same data as lectotype, NHM 1910.3.18.148–149.

Other material. 1 large terminal ♂ (2.8 mm), 1 small ♂, 1 preparatory ♀, (syntypes of *Austrosignum grande* Hodgson, 1910), Winter Quarters, McMurdo Bay, Ross Island, Antarctica, 77° 51'S 166° 36'E, inside 20-fathom line [36.5 m], February and March 1902, 'Discovery' coll., NHM 1910.3.18.144–146. 1 specimen, North Bay off Cape Evans, McMurdo Sound, Ross Island, Antarctica, 77° 38.17'S, 166° 24.5'E, on sponge, 18 m, G.D. Wilson and T.E. DeLaca by hand on SCUBA , 20 December 1976, AM P64142. 12 ♂, 1 ♀, Davis Station, Antarctica, 68° 34.5'S, 77° 53'E, M. Tucker, site C, 25 January 1982, NMV J4765. 1 spent ♀, Davis Station, Antarctica, 68° 34.5'S, 77° 7'E, M Tucker, site 9, 1 January 1982, NMV J4776. 1 spent ♀, Davis Station, Antarctica, 68° 38'S, 77° 48'E, M. Tucker, site 9, 21 December 1981, NMV J4778.

Description. *Body* ovate; width 0.55 length in female, width 0.47–0.51 length in male (larger value - terminal male), widest at pereonites 3. *Head* longer in male than female, length 0.44–0.50 width (larger value subterminal male), length 0.42 width; length posterior to eyestalks 1.1 anterior length in female, 1.5 anterior length in male. *Frontal margin* without angular lateral margins adjacent to antennae, shallow convex, almost straight medially. *Eyestalks* in female length 4.0 width, male length 3.5–6.3 width (larger value terminal male), apex rounded, long axis angling forward at approximately 30° in female, 40° in male.

Pereonites 1–4 lateral margins not projecting, coxae visible in dorsal view (coxae II-IV not visible in adult females). Pereonite 1 of terminal male greatly enlarged. Pereonite 1 sagittal length in female 1.8 pereonites midline length, in male 1.9 pereonites midline length. Pereonite 1–7 lateral margin rounded.

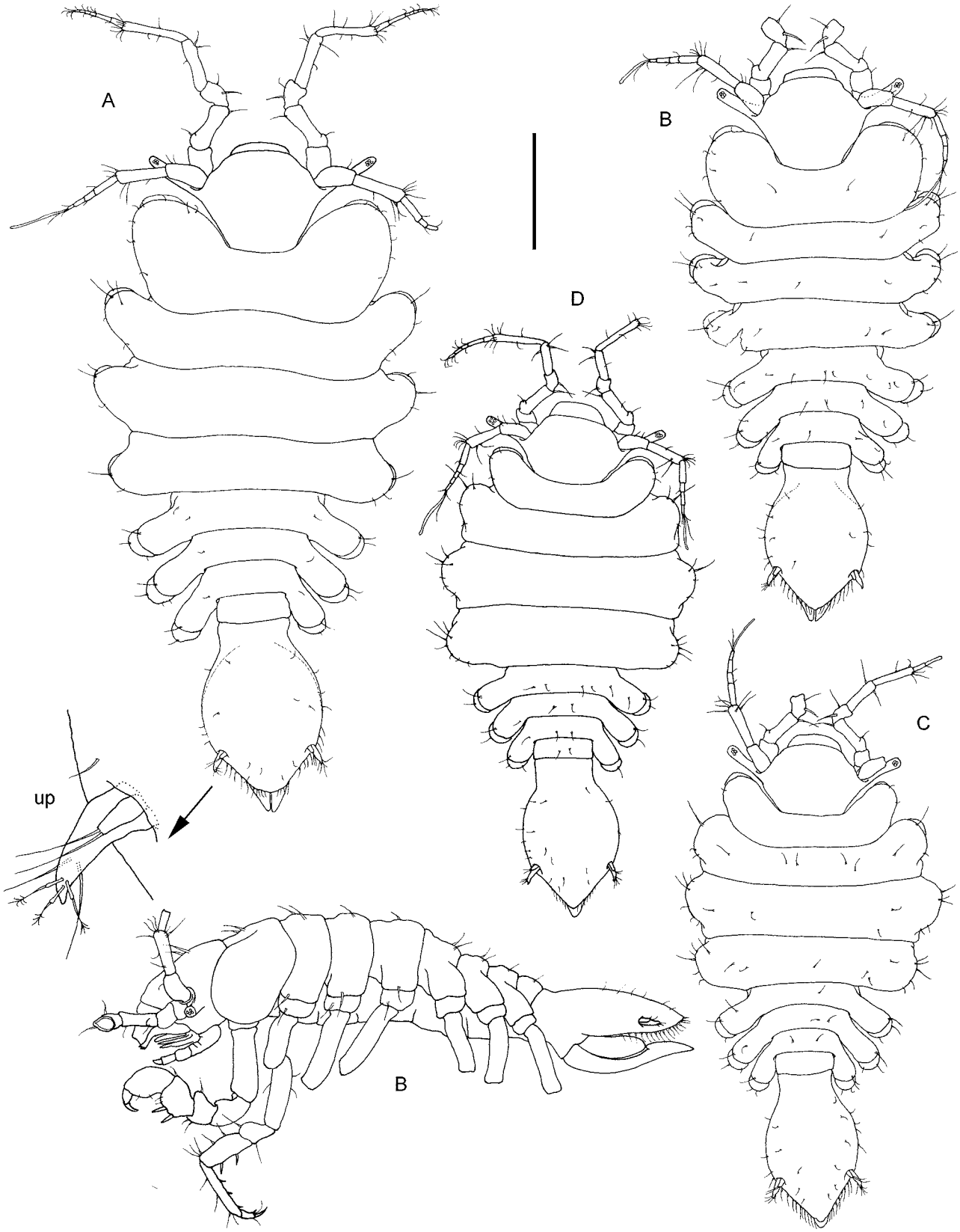

FIGURE 2. *Austrosignum glaciale* Hodgson, 1910. **A**, terminal male. **B**, young male. **C**, female, (A, B and C: syntypes of *A. grande* Hodgson, 1910). **D**, lectotype, female. **up**, uropod. Scale bar for all habitus figures: 0.5 mm.

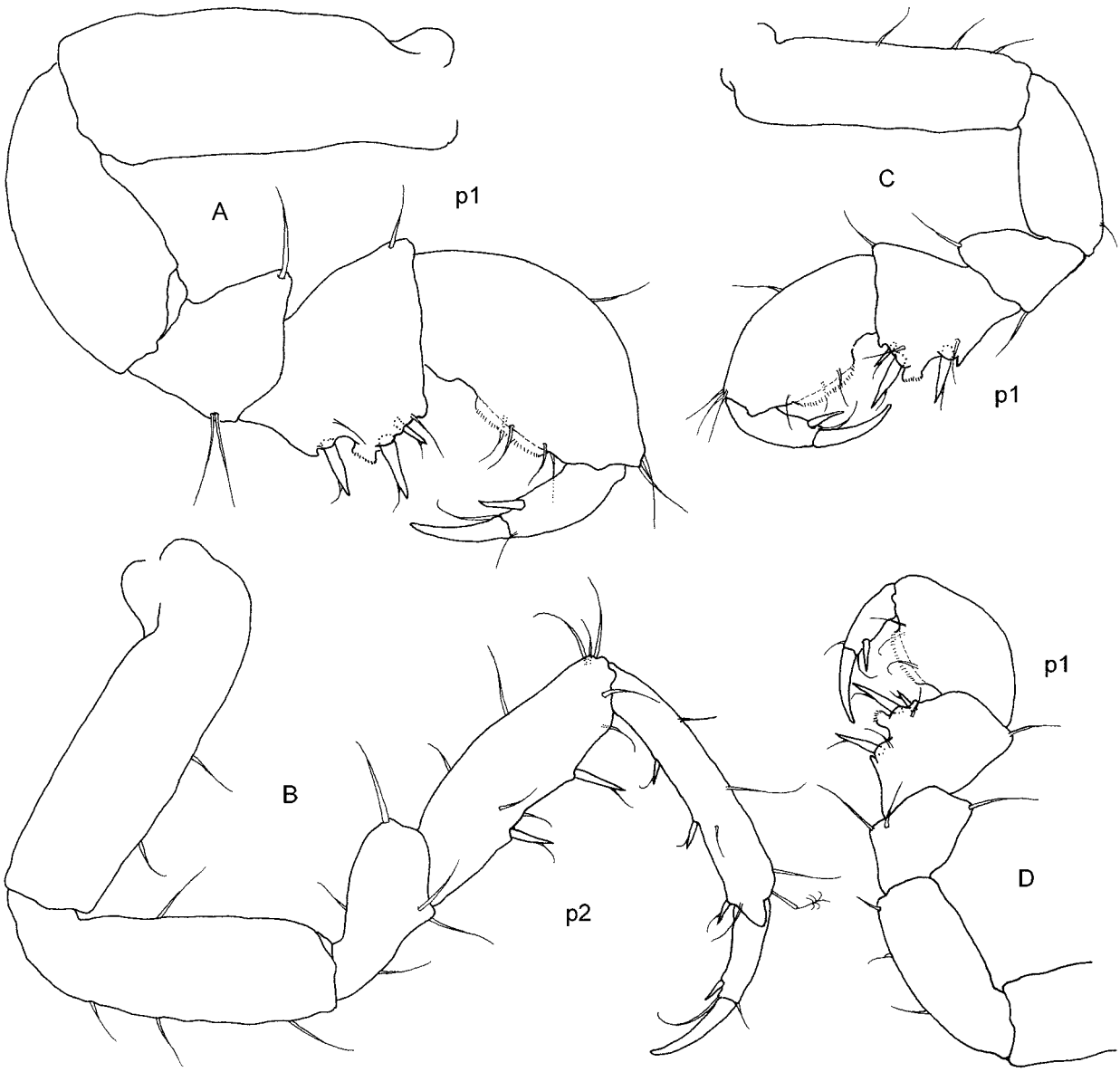

FIGURE 3. *Austrosignum glaciale* Hodgson, 1910. **A**, terminal male. **B**, young male. **C**, female; (A, B and C: syntypes of *A. grande* Hodgson, 1910). **D**, lectotype, female. **p1**, pereopod I; **p2**, pereopod II.

Pleon length 1.90 width in female, 1.60 width in male (n=2). *Pleonite 1* width 0.86–0.91 distance between uropods (largest non-terminal male, n=3), length 0.4 width. *Pleotelson* laterally rounded, lacking inflection between lateral and proximal margins; length in ventral view proximal to pleopod insertion 0.26 total pleotelson length; lateral margin with proximal neck before convex margin; lateral margins smooth; posterior margin forming 80° angle, evenly curving into lateral margin, apex more broadly rounded in terminal male.

Antennula articles 1–2 combined extending beyond eyestalk apex; article 1 shorter than 2, width subequal to 2, tubular; 4–6 of subequal length, shorter than 3 (3 nearly as long as 4–6 combined).

Antenna article 3 in ventral view tubular, width 0.44 length, 5 only slightly longer than article 4; flagellum with 6 articles, proximal article subequal to next article.

Pereopod I basis anterior margin smooth, length 2.6–3.5 width (largest value female); carpus distal width 0.72–0.96 posterior margin length (largest value terminal male), posterior margin robust setae shafts straight, posterior margin with single spine proximal to robust setae, with crenate ridges (cuticular combs) on square spine between main robust setae; propodus narrowing distally to insertion of dactylus, with crenate ridge on opposing margin.

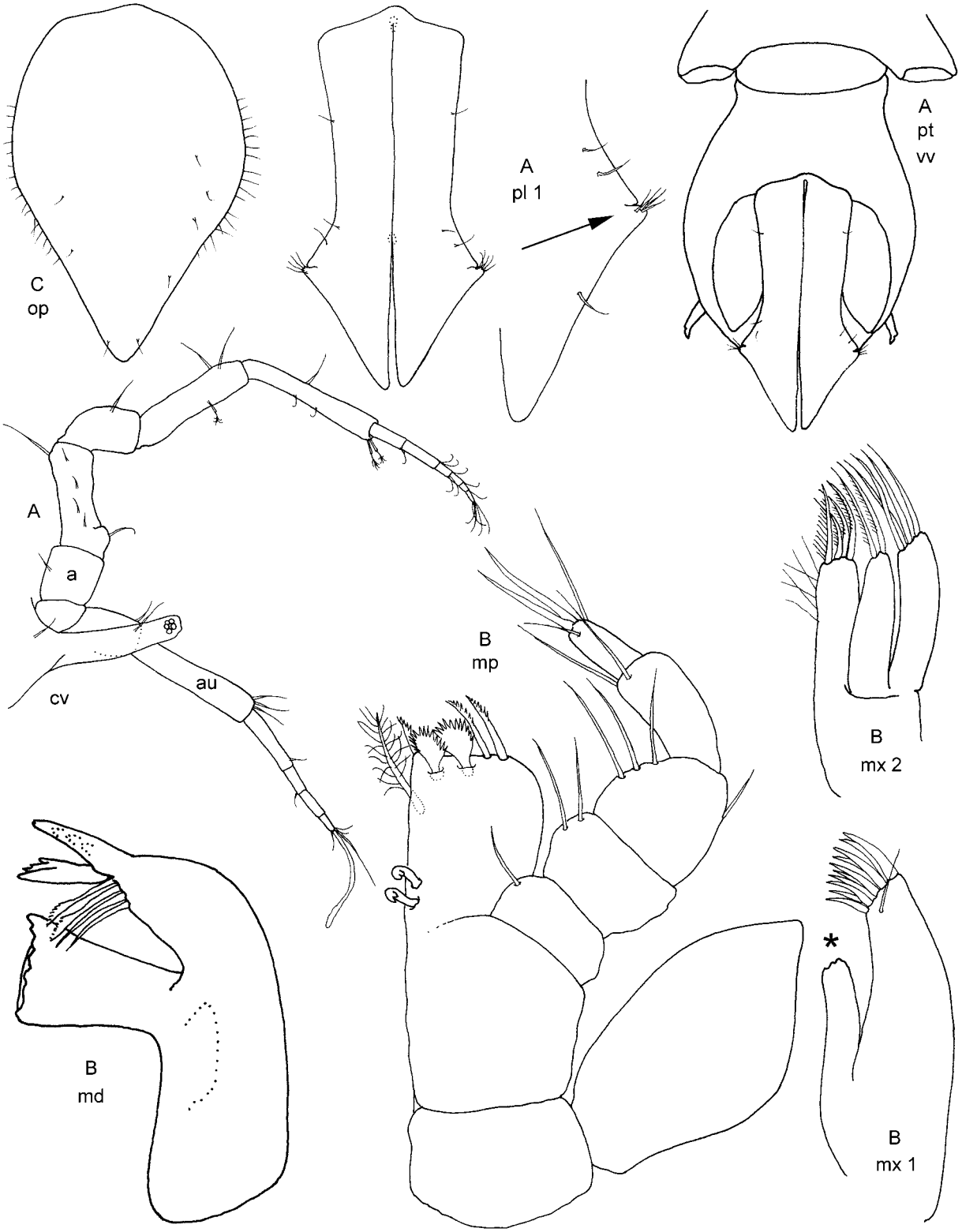

FIGURE 4. *Austrosignum glaciale* Hodgson, 1910. **A**, terminal male. **B**, young male. **C**, female; (A, B and C: syntypes of *A. grande* Hodgson, 1910). **a**, antenna; **au**, antennula; **cv**, head ventral view; **md**, mandible; **mp**, maxilliped; **mx**1 and 2, maxilla 1 and 2; **op**, female operculum; **pl** 1 pleopod I; **pt**, pleotelson; **vv**, ventral view. Asterisk, apical setae broken off.

Male pleopods I lateral lobes distinctly projecting from midlateral margin, width 0.4 distance to midline; distal projection length 0.31 pleopod total length, forming acute angle, with pointed apices. *Female operculum* ovoid, width 0.67 length.

Uropods dorsal and directly adjacent to lateral margin of pleotelson.

Size. Largest ♂, 2.8 mm; largest ♀, 2.2 mm.

Distribution. McMurdo Sound to Adelie Land, Antarctica. 18– ca. 36 m.

Remarks. The following reports with illustrations of *Austrosignum glaciale* and *A. grande* represent incorrect identifications. *Austrosignum glaciale*, Vanhöffen (1914): we have examined Vanhöffen's material and have found that none of the specimens belong in *Austrosignum*. The bulk of the specimens represent an undescribed species that does not fit *Cryosignum*, either. A few specimens represent other undescribed species. *A. glaciale*, Monod (1931; not seen, see *Cryosignum* gen. nov. below), *A. glaciale*, Nordenstam (1933; see *Cryosignum* gen. nov. below), *A. grande*, Menzies (1962; see *Cryosignum* gen. nov. below); Menzies (1962, caption for his fig. 11) stated that the specimen illustrated by him is the holotype of *Austrosignum grande*. This is incorrect; the only specimen examined by Menzies was the male from southern Chile listed in his 'Material examined'.

Advenogonium gen. nov.

Type species. *Austrosignum fuegiae* Doti & Roccatagliata, 2005. — Here designated.

Species included. *Advenogonium fuegiae* (Doti & Roccatagliata, 2005), comb. nov.

Diagnosis. *Body* ovate. *Head* front margin dorsoventrally thick in lateral view, concave in middle in dorsal view with low, broadly rounded lobes laterally. *Pereonites* dorsally smooth. *Pleotelson* lateral margins smooth. *Eyestalks* robust, conical, apex rounded, pointing laterad, length/width not definable but not overreaching pereonite 1. *Antennula* article 1 much shorter than eyestalk. *Antenna* article 3 with spines on lateral margin. *Mandible palp* present. *Pereopod I* carpus triangular, with 2 straight robust setae posteriorly; propodus with 2 robust setae on posterior margin. *Pereopod II* carpus and propodus posterior margin with a few short robust setae. *Uropod* endopod straight, apex truncate.

Etymology. The name of this genus includes the Latin *advena* meaning stranger.

Remarks. We have not seen material of this species. Our analysis is based on description and illustrations in Doti & Roccatagliata (2005: 510, figs 1–7). Doti & Roccatagliata (2005: 520) recognised that their *Austrosignum fuegiae* might need to be placed in a separate genus, but were unable to do so pending a re-definition of *Austrosignum*.

Advenogonium fuegiae differs from other genera with smooth pleotelson lateral margins by its bulbous, medially concave front margin of the head, conically tapering eyestalks, and the presence of a mandible palp.

Distribution. Beagle Channel, Argentina. 15–35 m.

Boreosignum gen. nov.

Type species. *Austrosignum maltinii* Schiecke & Fresi, 1972. —Here designated.

Species included. *Boreosignum affinis* (Malyutina & Ushakova, 2001), comb. nov., *B. maltinii* (Schiecke & Fresi, 1972), comb. nov., *B. orientale* (Shimomura & Mawatari, 2000), comb. nov., *B. somersensis* (Kensley, 1994), comb. nov., *B. wilsoni* (Hooker, 1985), comb. nov., *B. polynesiensis* (Müller, 1989), comb. nov.

Diagnosis. *Body* ovate. *Head* front margin evenly convex, not projecting. *Pereonites* dorsally smooth. *Pleotelson* entire lateral margins denticulate. *Eyestalk* length at least twice greatest width. *Antennula* article 1 at least twice length of eyestalk. *Mandible palp* absent. *Pereopod I* carpus triangular, with 2 straight robust setae posteriorly; propodus with simple setae only on posterior margin. *Pereopod II* carpus and propodus posterior margin with a few short robust setae. *Uropod* endopod straight, apex truncate.

Etymology. The genus name incorporates the Latin *boreus* meaning northerly, alluding to the largely Northern Hemisphere distribution of the included species.

Remarks. We have not seen material of *Boreosignum maltinii*. No reports on the species are subsequent to the original description. Our analysis is based on description and illustrations in Schiecke & Fresi (1972).

Boreosignum is most similar to *Tethygonium*, from which it differs by having 2 straight robust setae on the posterior margin of carpus of pereopod I as opposed to 3 or more curved robust setae in *Tethygonium*. Both genera have article 1 of the antennula at least twice as long as the eyestalk, while other genera with fully serrate pleotelson margins have the article at most as long as the eyestalk.

Distribution. Mediterranean, Japan, Korea, Bermuda (cave), Gulf of Mexico, Society Islands. 5–25.5 m.

Cryosignum gen. nov.

Type species. *Paramunna lunata* Hale, 1937. — Here designated.

Species included. *Cryosignum incisum* (Richardson, 1908), comb. nov., *C. lunatum* (Hale, 1937), comb. nov.

Diagnosis. *Body* ovate (posteriorly tapering in terminal males). *Head* front margin evenly convex, not projecting. *Terminal males* with strongly enlarged and forward pointing lateral parts of pereonite 1. *Pereonites* dorsally smooth or with low transverse ridges. *Pleotelson* lateral margins smooth. *Eyestalk* length at least twice greatest width. *Antennula* article 1 at most as long as eyestalk. *Mandible palp* present. *Pereopod I* carpus oval, with 2 straight robust setae on posterior margin; propodus with 2 robust setae on posterior margin. *Pereopod II* carpus and propodus posterior margin with a few short robust setae. *Uropod* endopod straight, apex rounded truncate.

Etymology. The genus name incorporates the Greek κρύος (krios or kryos) meaning cold, alluding to the Antarctic-subantarctic distribution of its component species.

Remarks. *Cryosignum* differs from *Munnogonium* and *Austrosignum* as discussed under *Austrosignum* (above).

The following specimens reported by various authors as *Austrosignum glaciale* or *A. grande* may belong in *Cryosignum*. Pereopod I of the male of *A. glaciale*, Monod (1931, dorsal habitus and pereopod I illustrated; specimens not seen by us) has an oval carpus with two robust setae and two robust setae on the propodus. In *A. glaciale*, Nordenstam (1933; specimens seen by us) the presence of a mandible palp and normal uropods places the specimens in *Cryosignum*, this is an undescribed species. *A. grande*, Menzies (1962; specimen seen by us) has an oval pereopod I carpus, a mandible palp and normal uropods. This places the specimen in *Cryosignum*; it is an undescribed species.

Austrosignum latifrons Menzies, 1962, which we have examined, may belong in *Cryosignum*, but only because it lacks the definitive features of *Austrosignum* and has a mandibular palp. Our analysis places this species near but not definitively part of the *Cryosignum* clade. As a result, we have assigned it to an indefinite generic position (*incertae sedis*).

Cryosignum lunatum (Hale, 1937), comb. nov.

Figs 5–6

Paramunna lunata Hale, 1937: 41, fig. 17.
Pleurosignum lunata? — Menzies (1962: 55).
Pleurosignum lunata. — Kensley (1977: 259).
Paramunna antarctica (Richardson, 1908), identification by Hale (1937: 38, fig. 15), here determined.
Not *Austrosignum grande* Hodgson, 1910. — Synonymy proposed by Kussakin (1982: 94).
Not *Paramunna lunata*. — Brandt (1999: 130, figs 1–2).

Type fixation. Holotype, terminal male, SAMA C3725. — Original designation.

Material examined. *Holotype*. Terminal ♂, 2.7 mm, Antarctica, Adelie Land, Main Base, Boat Harbour, 67°S 142° 36'E, 3.5–7 m (2–4 fms), September 1913, SAMA C3725.

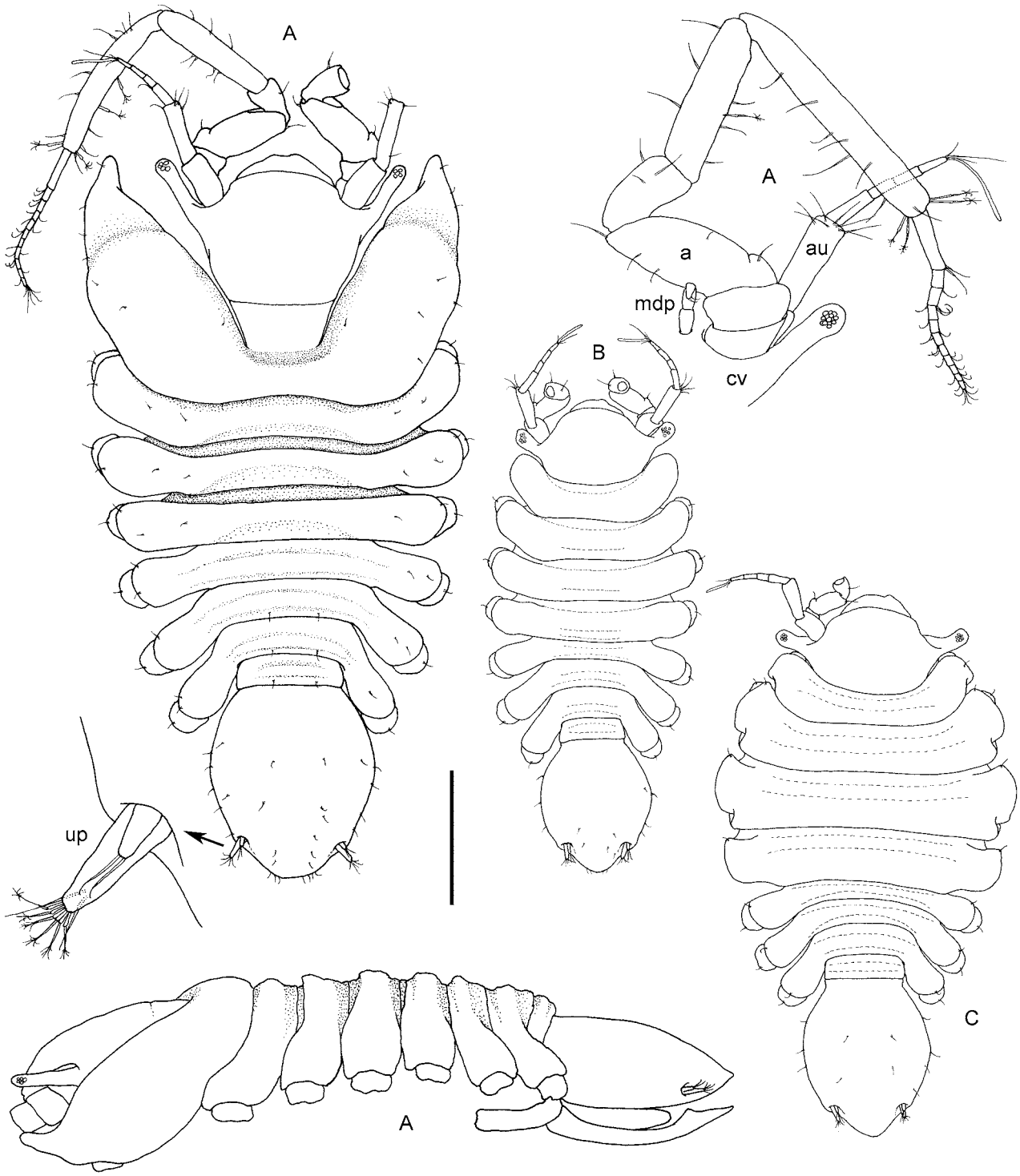

FIGURE 5. *Cryosignum lunatum* (Hale, 1937), comb. nov. **A**, holotype, terminal male. **B**, young male. **C**, ovigerous female. (B and C identified as *Paramunna antarctica* (Richardson) by Hale 1937). **a**, antenna; **au**, antennula; **cv**, head ventral view; **mdp**, mandible palp; **up**, uropod. Scale bar for all habitus figures: 0.5 mm.

Paratype. Terminal ♂ lacking pleotelson and all pereopods, same data as holotype, SAMA C3729.

Other material. 3 young ♂, 2 ♀, identified as *Paramunna antarctica* (Richardson, 1908) by Hale (1937), same data as holotype and paratype, SAMA C6339. 1 fully developed ♀, Antarctica, Prydz Bay, Davis Station, 68° 34.5'S 77°57'E, M. Tucker, Site A, 24 January 1982, NMV J4766. 2 near terminal ♂, Antarctica, Prydz Bay, Davis Station, 68° 34.5'S 77°53'E, M. Tucker, Site C, 25 January 1982, NMV J4775. 1 ♀, Antarc-

tica, Prydz Bay, Davis Station, 68° 38'S 77°48'E, M. Tucker, Site 9, 6 January 1982, NMV J55501. 1 ovigerous ♀, Antarctica, Prydz Bay, Davis Station, 68° 34.5'S 77° 53'E, M. Tucker, Site C, 4 June 1982, NMV J4777.

Description. *Body* width 0.57 length in female, 0.43–0.53 in male (largest value terminal male), widest in female at pereonite 3, in terminal male at pereonite 1. *Head* longer in male than female, length 0.71 width in terminal male, otherwise length 0.46 width; length posterior to eyestalks 1.4 anterior length, 2.5 anterior length in terminal male; head of terminal male posteriorly fused to pereonite 1. *Frontal margin* without angular lateral margins adjacent to antennae, shallow convex, almost straight medially. *Eyestalks* in female length 2.75 width, terminal male length 4.5 width, apex rounded, shaft before apex approximately parallel, long axis angling forward at approximately 30° in female, 40–60° in male (larger value terminal male).

Pereonites 1–4 lateral margins not projecting, coxae visible in dorsal view, except in adult females. Pereonite 1 of terminal male greatly enlarged. Pereonite 1 sagittal length in female 2.3 pereonites midline length, 3.6 in male . Pereonites 1–7 dorsal surface with transverse ridges. Pereonite lateral margin 1–7 rounded.

Pleon length 1.40 width. *Pleonite 1* width 1.1 distance between uropods (n=3), length 0.3 width (n=2). *Pleotelson* laterally rounded, lacking inflection between lateral and proximal margins, without proximal neck; lateral margin convex; posterior margin produced (terminal male apex more rounded than others), forming 90° angle, evenly curving into lateral margin.

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

Antenna article 3 in ventral view inflated midlength, margins curved, width 0.53 length, article 5 distinctly longer than 4; flagellum with 11 articles, proximal article distinctly longer than more distal articles.

Pereopodal coxae I–IV lateral margins rounded in dorsal view (except for coxa I of terminal male); pereopod I coxa of terminal male with anteriorly projecting large angular plate fused to pereonite; basis anterior margin smooth, basis length 2.9–4.4 width (largest value terminal male, n=2); carpus oval, posterior margin with 1 denticle proximal to robust setae, 1 denticle between robust setae (tiny); propodus narrowing distally to insertion of dactylus, with 2 robust setae on opposing margin.

Male pleopods I lateral lobes distinctly projecting from midlateral margin, width 0.3 distance to midline; distal projection length 0.31 pleopod total length, forming acute angle, with pointed apices. *Female operculum* ovoid, width 0.86 length.

Uropods dorsal and directly adjacent to lateral margin of pleotelson.

Size. Largest ♀, 2.0 mm; largest ♂, 2.7 mm.

Distribution. Adélie Land to Princess Elizabeth Land, Antarctica. 3.5–7 m (2–4 fms; depths not known for Davis Station samples).

Remarks. The specimens identified as *Austrimunna antarctica* by Hale (1937) are in fact females of *Cryosignum lunatum*. Several factors argue for this observation.

1.The holotype and paratype males (both terminal) of *C. lunatum* and the smaller *A. antarctica* were collected at the same locality.

2.All specimens share the transverse ridges on the dorsal surface.

3.Pereopod I of all specimens share the characteristic oval carpus, and a propodus with 2 robust setae on the opposing margin.

4.All specimens have a mandible palp.

5.The smaller specimens are not *Austrosignum antarctica* (see Just & Wilson, 2004 for redescription and reillustration of that species).

In addition, the specimen described by Brandt (1999, as *Paramunna lunata*) from the South Shetland Islands is not this species because it lacks dorsal ridges and the uropodal exopod is extremely short.

Terminal males of *Cryosignum lunatum* differ from similar stages of *C. incisum* (features of which are in parentheses) as follows: antennular article 1 distally truncate (distally angular), uropods recessed (uropod not recessed, protopod exposed), pereon with low rounded transverse ridges (no ridges), pleotelson without exten-

sion or “neck” after pleonite 1 (with distinct elongation). Other features that differ between the two species may be owing to the syntype male of *C. incisum* not being fully terminal.

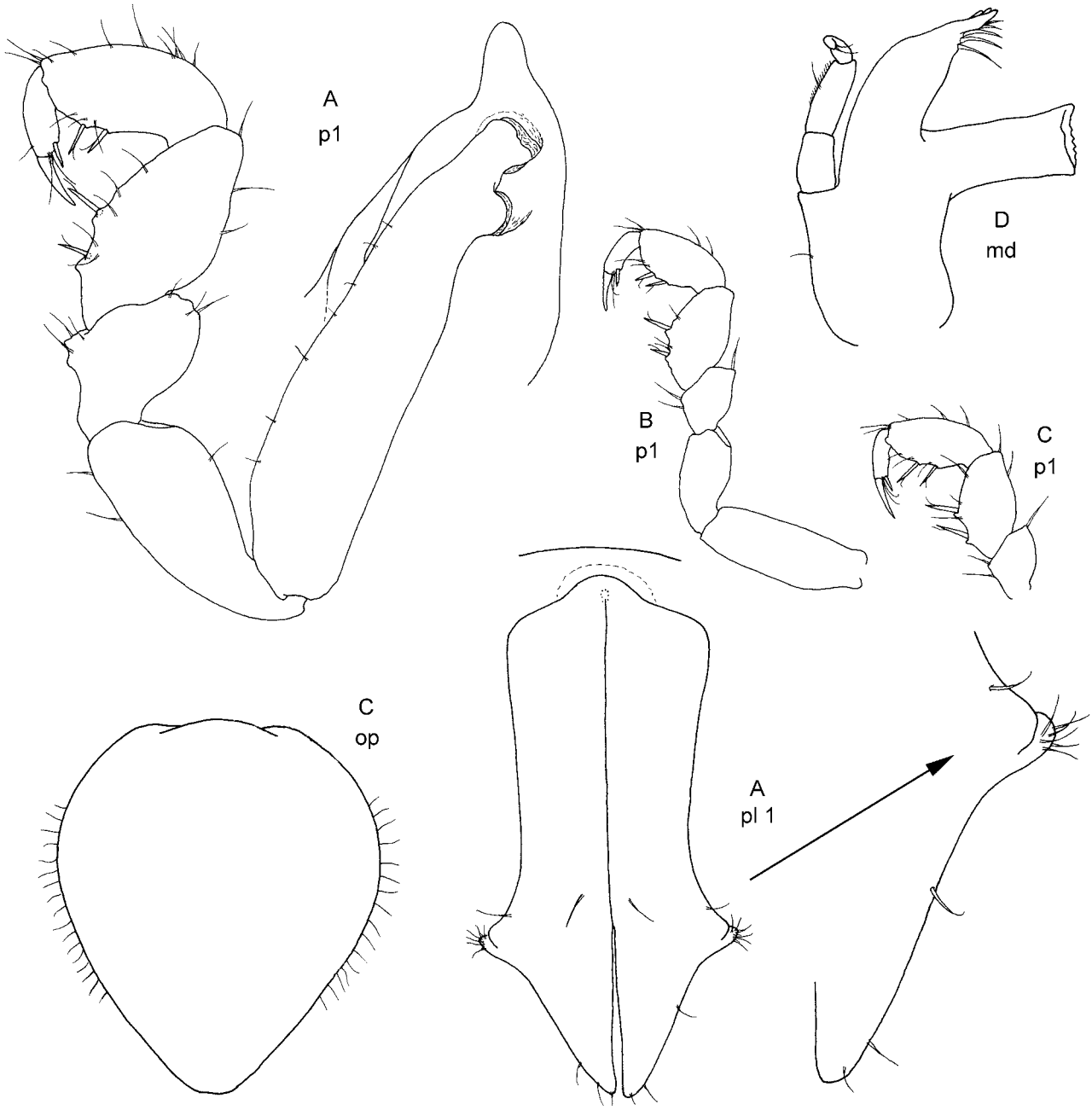

FIGURE 6. *Cryosignum lunatum* (Hale, 1937), comb. nov. **A**, holotype, terminal male. **B**, young male. **C**, ovigerous female. **D**, paratype, male. (B and C identified as *Paramunna antarctica* (Richardson) by Hale 1937). **md**, mandible; **op**, female operculum; **p1**, pereopod I (all shown to same scale); **pl** 1, pleopod I.

***Kussakinella* gen. nov.**

Type species. *Austrosignum spinosum* Kussakin, 1982. —Here designated.

Species included. *Kussakinella spinosa* (Kussakin, 1982), comb. nov.

Diagnosis. *Body* with nearly parallel margins in male (female not known). *Head* front margin broadly rounded in dorsal view. *Pereonites* with mid-dorsal conical spines. *Pleotelson* lateral margins smooth; posterior margin with acute apical spine-like projection. *Eyestalks* robust, apex rounded, slightly wider than long. *Antennula* article 1 shorter than eyestalk. *Antenna* article 3 shorter than article 4. *Mandible palp* absent. *Pereopod I* carpus triangular, with 2(?) straight robust setae posteriorly; propodus with simple setae only on posterior margin. *Pereopod II* carpus and propodus posterior margin with a few short robust setae. *Uropod* endopod straight, apex truncate.

Etymology. The genus is named in honour of the late great Russian isopodologist Oleg G. Kussakin.

Remarks. We have not seen the single specimen reported by Kussakin. Our analysis of the species is based on Kussakin's illustrations (1982: fig.10–11). We are in doubt about the number of robust setae on the posterior margin of pereopod I carpus.

Kussakinella spinosa differs from all other species treated herein by its slender body with nearly parallel margins, dorsal spines on pereonites, and a spine-like apical projection on the pleotelson.

Distribution. South Shetland Islands, 17 m.

***Meridiosignum* gen. nov.**

Type species. *Meridiosignum minidenticulatum* sp. nov.

Species included. *Meridiosignum kerguelensis* (Vanhöffen, 1914), comb. nov., *M. minidenticulatum* sp. nov., *M. menziesi* (Winkler, 1994), comb. nov., *M. subtilis* (Kensley, 1976), comb. nov.

Diagnosis. *Body* ovate (posteriorly tapering in terminal males). *Head* front margin weakly convex to nearly straight, not projecting. *Pereonites* dorsally smooth. *Pleotelson* lateral margins denticulate; apex with row of elongate fringing setae projecting well beyond terminal margin. *Eyestalk* length at least twice greatest width. Antennula article 1 at most as long as eyestalk. *Mandible palp* absent. *Pereopod I* carpus triangular, with 2 straight robust setae posteriorly; propodus with 2 or 1 (*M. menziesi*) robust setae on posterior margin. *Pereopod II* carpus and propodus posterior margin with a few short robust setae. *Uropod* endopod straight, apex truncate.

Etymology. The genus name incorporates the Latin *meridianus* meaning southern, an allusion to the Southern Hemisphere, mostly subantarctic to cold temperate, distribution of the species.

Remarks. Species in *Meridiosignum* gen. nov. differs from those in other genera with lateral margin of pleotelson fully serrate as follows: *Boreosignum* and *Tethygonium* species have article 1 of the antennula at least twice as long as the eyestalk (at most as long as eyestalk in *Meridiosignum*), *Zizzygonium* has the front margin of the head concave, a mandible palp is present, pereopod I carpus is oval (front margin weakly convex, mandible palp absent, carpus triangular).

We have examined the original materials from Chile identified as *Paramunna kerguelensis* by Menzies (1962: 47, fig. 8) and the type material of *Paramunna menziesi* Winkler, 1994. Both authors illustrated their specimens without coxal plates V–VII visible in dorsal view. The coxal plates are, however, clearly visible in both materials. We agree with Winkler (1994: 255) that Menzies' *P. kerguelensis* should be referred to *P. menziesi* (here transferred to the new genus *Meridiosignum*).

***Meridiosignum minidenticulatum* sp. nov.**
Figs 7–8

Type fixation. Holotype, ♀, AM P60890. Here designated.

Type locality. Macquarie Island, Australia.

Etymology. The species is named for the numerous small denticles on the lateral margins of the pleotelson.

Material examined. *Holotype*. preparatory ♀, 1.40 mm, Aerial Cove, Macquarie Island, 54° 29' S , 158° 57' E, 2 February 1978, fine sediments in cracks and crevices and under rock overhangs, 3-4.5 m, coarse sediments from small sediment patches on level bottom, stn MA-382, AM P60890.

Paratypes. 12 ♂, 21 ♀, same data as holotype, AM P75374.

O*ther material* (this material is in poor condition having dried out or been roughed up during sampling, and is therefore not suitable as paratypes). 1 terminal ♂, Australia, Macquarie Island (54° 30' S, 158° 57' E), 26 Jan 1978, stn MA-357, AM P60888. 2 ♂, 6 ♀, Caroline Cove, Macquarie Island, Australia, off large rock on south west side of Cove, 54° 46'S 158° 48'E, 8 m, *Plocamium, Codium, Ophiocantha* and a scallop collected by R.W. Ricker, all from boulders in dense *Macrocystis pyrifera* bed, J.K. Lowry (SCUBA), 15 January 1978, stn MA-300, NMV J52111. 3 ♂, 2 ♀, Caroline Cove, Macquarie Island, Australia, three rocks at mouth of cove, 54° 46'S 158° 48'E, red algae from dense *Macrocystis* bed, 13-18 m, J.K. Lowry (SCUBA), 16 January 1978, stn MA-307, NMV J52112. 78 specimens, Caroline Cove, Macquarie Island, Australia, inner cove north of hut, 54° 46'S 158° 48'E, *Codium* flat adjacent to *Macrocystis* bed, 13 m, J.K. Lowry (SCUBA), 17 January 1978, stn MA-311, NMV J52114. 1 ♂, 2 ♀, Aerial Cove, Macquarie Island, Australia, 54° 29'S 158° 57'E, 5 m, mainly bryozoans from sheltered base of vertical face near Cove entrance; dominant alga, *Codium*, J.K. Lowry (SCUBA), 12 December 1977, stn MA-107, NMV J52118. 2 ♀, 1 juvenile ♂, Caroline Cove, Macquarie Island, Australia, off large rock on south west side of Cove, 54° 46'S 158° 48'E, 8 m, *Macrocystis pyrifera* holdfasts, dictyotalean, *Plocamium* and a red tunicate from dense *Macrocystis* bed on boulder bottom, J.K. Lowry (SCUBA), 15 January 1978, stn MA-298, NMV J52119.

Description. *Body* ovate (female) or tapering posteriorly (terminal male); width 0.68 length in female, width 0.58 length in male, widest in female at pereonite 3, widest in male at pereonites 1–3. *Head* length 0.49–0.51 width (male, female respectively); length posterior to eyestalks 1.2 anterior length, 1.6 anterior length in terminal male. *Frontal margin* with angular lateral margins adjacent to antennae, shallow convex, almost straight medially. *Eyestalks* in female length 2.6 width, male length 3.7 width, apex rounded, shaft before apex constricted proximally, long axis angling forward at approximately 40° in female, 35° in terminal male.

Pereonites 1–4 lateral margins not projecting, coxae not visible in dorsal view. Pereonite 1 of terminal male greatly enlarged. Pereonite 1 sagittal length in female 3.0 pereonites midline length, 3.1 in male. Pereonite lateral margin 1 rounded, 2–4 linear, 5–7 rounded. Pereonite lateral margins 6 smooth, 7 with denticles on posterolateral margin forming only.

Pleon length 1.10 width in female, 1.20 in male. *Pleonite 1* width 0.81–0.84 distance between uropods (terminal male, female respectively), length 0.3 width. *Pleotelson* laterally rounded, lacking inflection between lateral and proximal margins; lateral margin convex, denticulate, with 16–17 denticles per side. Pleotelson posterior margin forming 80° angle, set apart from lateral margins by concavity at level of uropods.

Antennula articles 1–2 combined extending beyond eyestalk apex, 1 shorter and broader than 2, inflated; 4–6 of subequal length, shorter than 3.

Antenna article 3 in ventral view tubular, width 0.33–0.57 length (female, terminal male respectively), 5 distinctly longer than article 4; flagellum with 7 articles, proximal article distinctly longer than more distal articles, 1.8 length of second article.

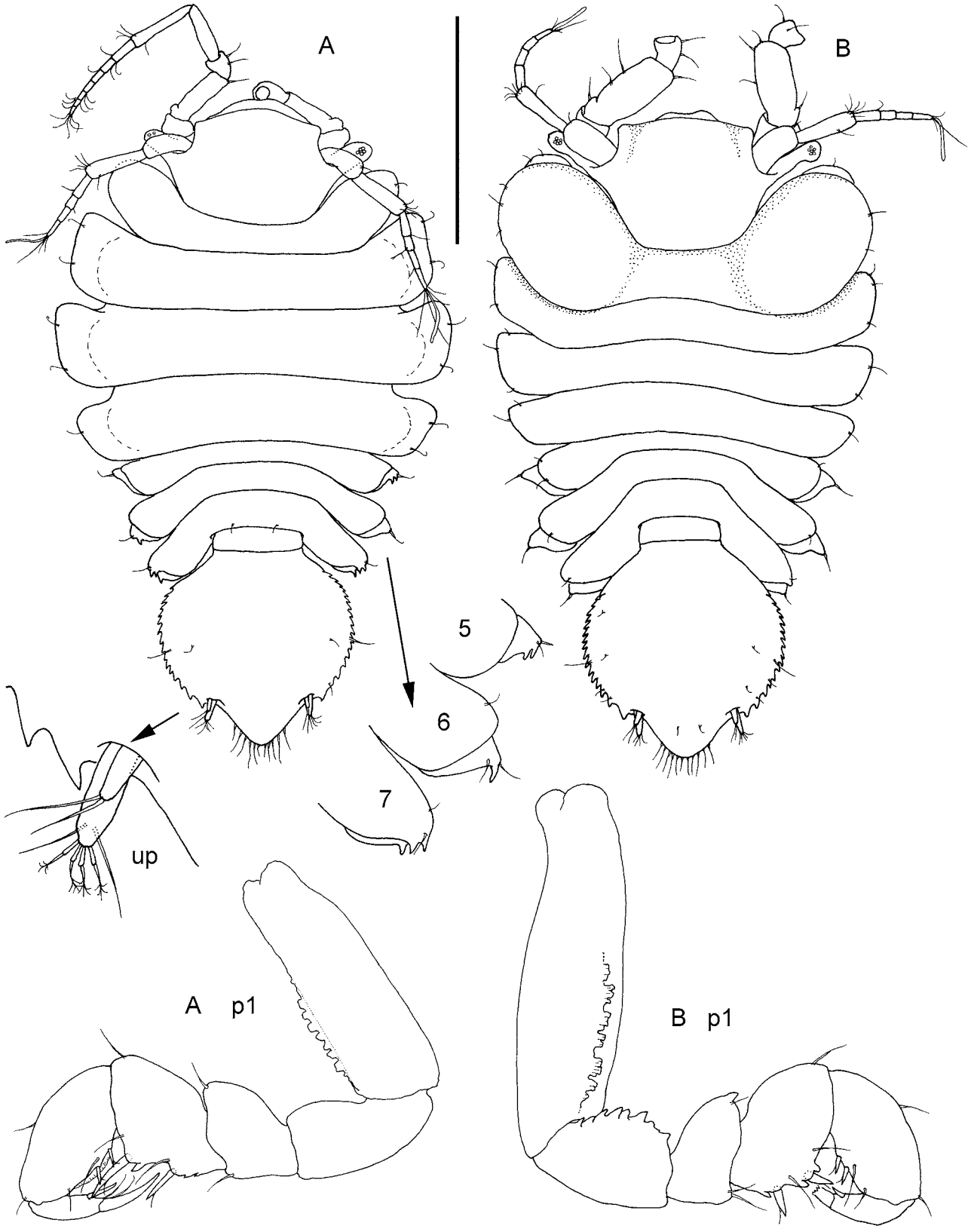

FIGURE 7. *Meridiosignum minidenticulatum* gen. nov., sp. nov. **A**, holotype, female; **B**, paratype, terminal male. **p1**, pereopod I, **up**, uropod, **5–7**, coxae 5–7. Small arrow indicates male coxa I. Scale bar for both habitus figures: 0.5 mm.

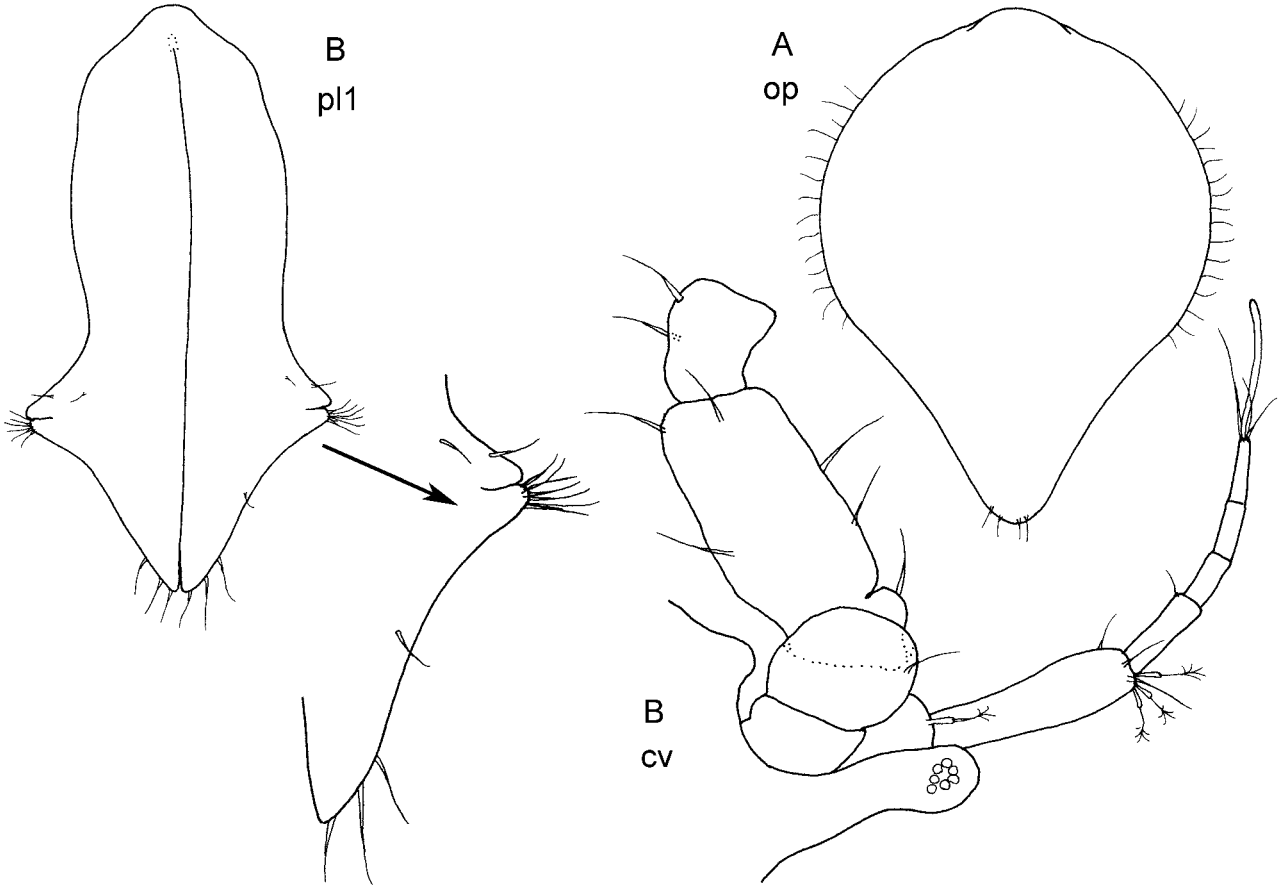

FIGURE 8. *Meridiosignum minidenticulatum* gen. nov, sp. nov**. A**, holotype, female. **B**, paratype, terminal male. **cv**, ventral view of head, **op**, female operculum, **pl1**, male pleopod I

Pereopod I coxa with short, convex anterior projection in terminal male; basis with crenate ridge on anterior margin, basis length 3.4 width; ischium anterodistal margin with sharp spines in row (male); merus with 1 spine on anterior margin (male); carpus triangular, distal width 1–1.3 posterior margin length (female, male respectively), posterior margin with 2 denticles proximal to robust setae (some specimens lack one denticle), 1 denticle between robust setae, one denticle distal to robust setae; propodus narrowing distally to insertion of dactylus, with 2 robust setae, with crenate ridge on opposing margin. Pereopod II basis with crenate ridge. Pereopod V-VII coxae with 1 or 2 denticles in female, smooth in male.

Male pleopods I lateral lobes distinctly projecting from midlateral margin, width 0.4 distance to midline; distal projection length 0.30 pleopod total length, forming acute angle, with pointed apices. *Female operculum* distal part tapering with concave distolateral margins, width 0.75 length.

Uropods dorsal and directly adjacent to lateral margin of pleotelson.

Size. Largest ♀, 1.40 mm; largest ♂, 1.40 mm.

Distribution. Macquarie Island, Australia. 3–4.5 m.

Remarks. *Meridiosignum minidenticulatum* sp. nov. differs from congeners by the larger number and smaller denticles on the lateral margin of the pleotelson. It differs from *M. kerguelensis* in having the lateral margins of pereonites 2–4 linear (concave in *M. kerguelensis*). In *Meridiosignum subtilis* the eyestalks angle forward at approximately 55° (35–40° in *M. minidenticulatum*). *Meridiosignum menziesi* is the only species with 1 in stead of 2 robust setae on posterior margin of pereopod I propodus.

Munnogonium George & Strömberg

Munnogonium George & Strömberg, 1968: 15.

Type species. *Munnogonium waldronense* George & Strömberg, 1968. — Original designation.

Species included. *Munnogonium erratum* (Schultz, 1964), *M. falklandicum* (Nordenstam, 1933), comb. nov., *M. globifrons* (Menzies, 1962), *M. tillerae* (Menzies & Barnard, 1959), *M. waldronense* George & Strömberg, 1968.

Diagnosis. *Body* ovate. *Head* front margin not projecting. *Pereonites* dorsally smooth. *Pleotelson* lateral margins smooth. *Eyestalks* vestigial, not longer than wide, downward pointed. *Antennula* article 1 at least twice length of eyestalk. *Mandible palp* absent. *Pereopod I* carpus triangular, with 3 straight, subequal robust setae on posterior margin; propodus with simple setae only on posterior margin. *Pereopod II* carpus and propodus posterior margin with several long, very slender robust setae on posterior margin. *Uropod* endopod straight, apex truncate.

Remarks. The type material of *Munnogonium waldronense* was not examined and we have not had access to topotypic material. We have, however, examined the type material of *M. globifrons* and *Austrosignum falklandicum* (here transferred to *Munnogonium*), and topotypic material of *M. tillerae*. The diagnosis of *Munnogonium* presented above is based on George & Strömberg's (1968) description and illustrations. The diagnosis fits the other species here referred to *Munnogonium*.

We do not follow Bowman & Schultz (1974) in synonymising *Munnogonium waldronense* under the name *M. tillerae*. George & Strömberg's description and illustrations of *M. waldronense* from the San Juan Archipelago, Washington, (1968, figs 1–2) differ from the holotype of *M. tillerae* from southern California illustrated by Menzies & Barnard (1959, fig 1) and paratypes illustrated by Bowman & Schultz (1974: figs 21–31) in the shape of the front margin of the head (straight to slightly concave in *M. waldronense*, broadly convex in *M. tillerae*) and in *M. waldronense* having an elongate proximal neck on the male pleotelson, which is not found in *M. tillerae.* We have confirmed this on topotypic material of *M. tillerae*.

Quetzogonium gen. nov.

Type species. *Austrosignum dentatum* Winkler, 1994. — Here designated.

Species included. *Quetzogonium dentatum* (Winkler, 1994), comb. nov.

Diagnosis. *Body* ovate. *Head* front margin concave in middle. *Pereonites* dorsally smooth. *Pleotelson* lateral margins with a few denticles level with uropods. *Eyestalks* robust, rounded, pointing laterad, approximately as long as wide. *Antennula* article 1 shorter than eyestalk. *Antenna* article 3 with spines on lateral margin. *Mandible palp* present. *Pereopod I* carpus triangular, with 2 straight robust setae posteriorly; propodus with 2 robust setae on posterior margin. *Pereopod II* carpus and propodus posterior margin with a few short robust setae. *Uropod* endopod straight, apex truncate.

Etymology. The genus name is comprised of an arbitrary combination of letters and the traditional paramunnid ending *–gonium*.

Remarks. We have not seen Winkler's (1994) material. Our analysis of the species is based on description and illustrations in Winkler (1994: 284, figs 34–37).

Quetzogonium differs from the other genera treated here by the combination of a concave front margin of the head, the presence of a mandibular palp, and denticulate margins of the pleotelson.

Distribution. Magellan Strait, Chile. 12–40 m.

***Tethygonium* gen. nov.**

Type species. *Tethygonium quadricuspis* sp. nov. —Here designated.

Species included. *Tethygonium adenensis* (Müller, 1991), comb. nov., *T. armigerum* (Shimomura & Mawatari, 2000), comb. nov., *T. quadricuspis* sp. nov., *T. variabile* (Schiecke & Modigh-Tota, 1976), comb. nov.

Diagnosis. *Body* ovate. *Head* front margin evenly convex, not projecting. *Pereonites* dorsally smooth. *Pleotelson* lateral margins denticulate. *Eyestalks* variable, vestigial to approximately twice as long as wide. *Antennula* article 1 at least twice length of eyestalk. *Antenna* article 3 with mediodistal spine. *Mandible palp* absent. *Pereopod I* carpus oval, with several (3–5) curved robust setae; propodus with simple setae only on posterior margin; *dactylus* posterior margin with acute spine proximal to accessory claw. *Pereopod II* carpus and propodus posterior margin with a few short robust setae. *Uropod* with 1 or 2 rami, endopod straight, apex truncate.

Remarks. The species referred here to *Tethygonium* present considerable variation. The type species *T. quadricuspis* has projections on the lateral margins of pereonites 1–4, and coxae 1–4 are not visible in dorsal view (projections only on coxae, coxae 1–4 visible in dorsal view). Eyestalks in *T. adenensis* and *T. armigerum* are 1.5 to 2.0 times longer than broad (vestigial in *T. variabile* and *T. quadricuspis*). *Tethygonium adenensis* and *T. armigerum* are described as having uniramous uropods (biramous in *T. variabile* and *T. quadricuspis*). We are uncertain about the significance of these differences. We prefer, for the time being, to keep the 4 species together in the new genus *Tethygonium* based primarily on the unusual curved carpal setae and the joint possession of an acute spine posterior to the accessory claw on the dactylus of pereopod I. These are also the principal characters by which *Tethygonium* differs from *Boreosignum*.

Distribution. Mediterranean, Gulf of Aden, Sea of Japan, southeastern Australia. 70–1000 m.

***Tethygonium quadricuspis* sp. nov.**
Figs 9–11

Type fixation. Holotype, ♀, NMV J 20118. —Here designated.

Material examined. *Holotype*. ♀, 1.0 mm (+ 3 slides), SE Australia, Bass Strait, S of Pt. Hicks, 38°21.90'S 149°20.0'E, 1000 m, WHOI epibenthic sled, G.C.B. Poore *et al.*, 23 July 1986, RV *Franklin*, stn SLOPE 32, NMV J20118.

Description (female). *Body* width 0.50 length, widest at pereonite 3. *Head* length 0.62 width; length posterior to eyestalks 1.6 anterior length. *Frontal margin* without angular lateral margins adjacent to antennae, broadly rounded. *Eyestalks* vestigial, shaft before apex rounded bump, long axis angling forward at approximately 30° (ocelli not observed).

Pereonites lateral margin 1–3 angular with anterolaterally projecting spine, 4 rounded with small anterior spine, 5–7 rounded; coxae 4-7 visible in dorsal view. Pereonite 1 sagittal length 3.0 pereonite~~s~~ midline length. Pereonite lateral margins 5–7 smooth.

Pleon length 1.40 width in female. *Pleonite 1* width 0.75 distance between uropods, length 0.3 width. *Pleotelson* laterally rounded, lacking inflection between lateral and proximal margins; length in ventral view proximal to pleopod insertion 0.35 total pleotelson length; lateral margin convex, denticulate, with 10–11 denticles per side. Pleotelson posterior margin in female forming 60° angle, set apart from lateral margins by concavity at level of uropods.

Antennula article 1 longer than 2, width subequal to 2, tubular; 3–6 all of subequal length. *Antenna* article 3 in ventral view tubular, width 0.36 length, distomedial margin with blunt projection, 4 with distolateral anteriorly curved spine, 5 only slightly longer than article 4; flagellum with 7 articles, proximal article subequal to more distal articles.

Pereopod I basis with single spine on lateral margin, length 3.7 width; ischium with 1 posterior and 1 lateral spines; carpus oval, posterior margin with 3 subequal, curved robust setae; propodus narrowing distally to insertion of dactylus. Pereopod VII coxa with single denticle.

Female operculum distal part tapering with concave distolateral margins, width 0.68 length.

Uropods dorsal and directly adjacent to lateral margin of pleotelson.

Size. Single female, 1.0 mm.

Distribution. Bass Strait, south-eastern Australia. 1000m.

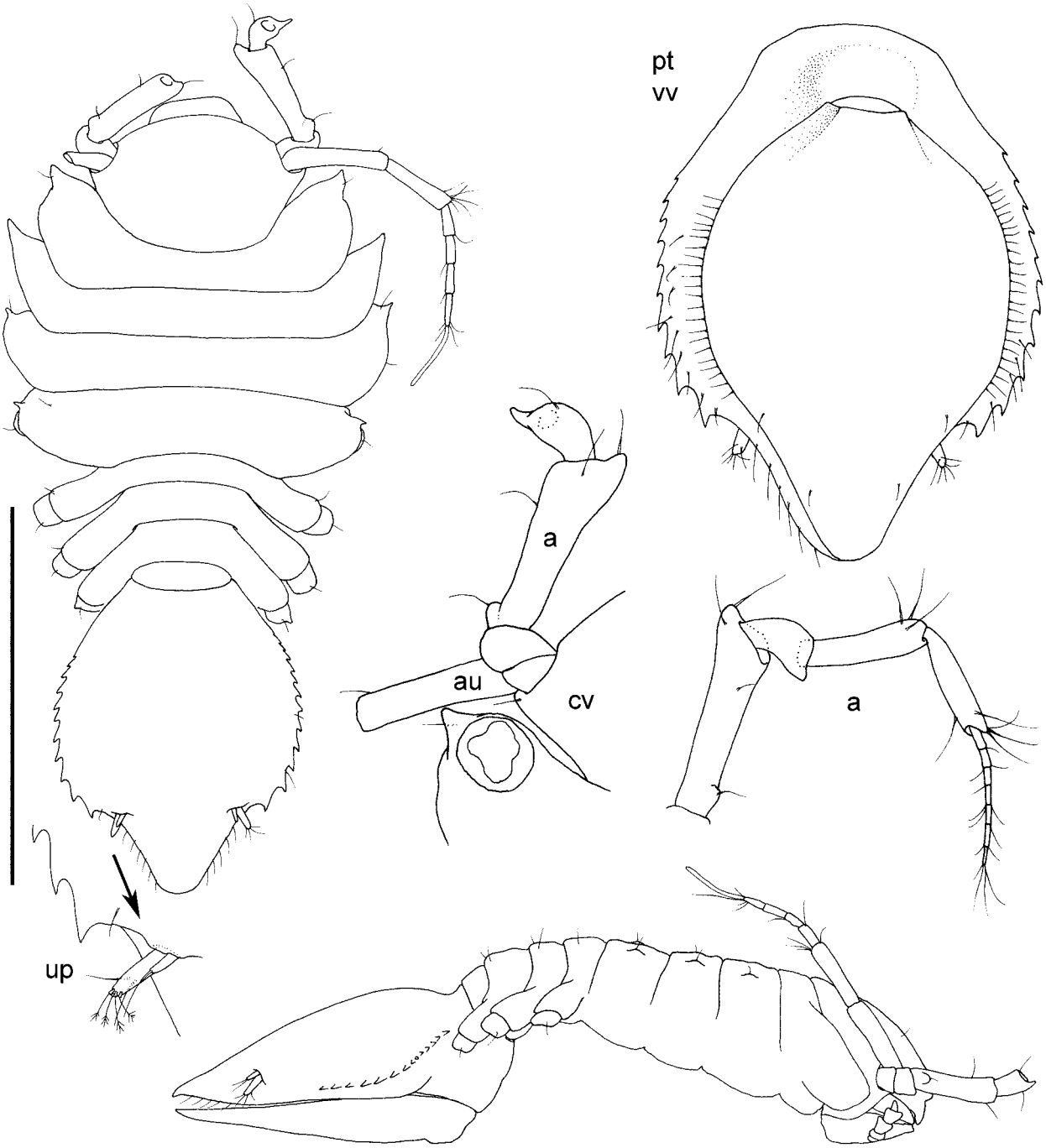

FIGURE 9. *Tethygonium quadricuspis* gen. nov., sp. nov., holotype, female, dorsal and lateral views. **a**, antenna; **au**, antennula; **cv**, head ventral view; **pt**, pleotelson with operculum; **up**, uropod; **vv**, ventral view. Scale bar for habitus figures: 0.5 mm.

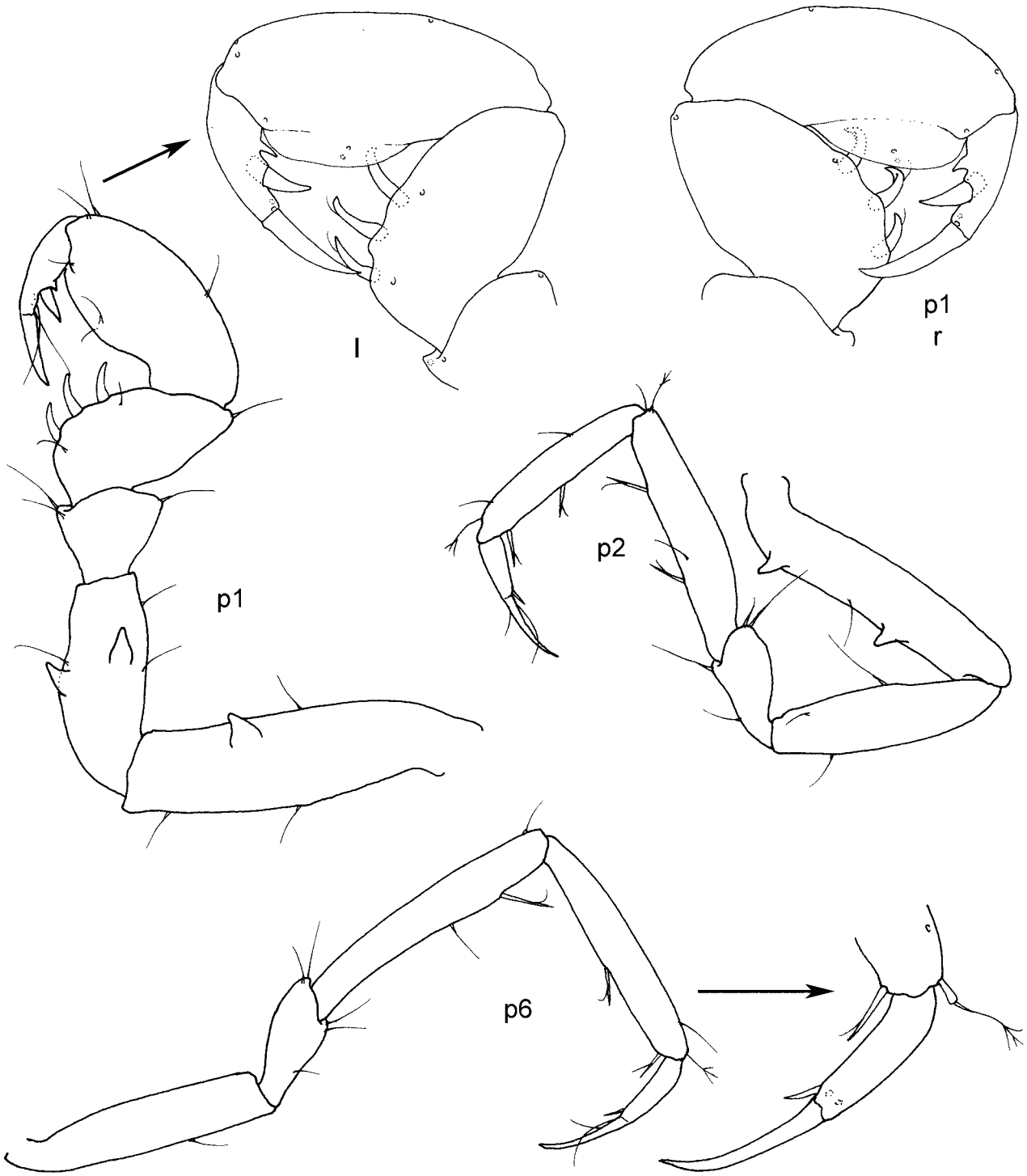

FIGURE 10. *Tethygonium quadricuspis* gen. nov., sp. nov., holotype, female. **p1, 2** and **6**, pereopods I, II and VI; **l**, left; **r**, right.

***Zizzygonium* gen. nov.**

Type species. *Paramunna magellanensis* Winkler, 1994. —Here designated.

Species included. *Zizzygonium magellanensis* (Winkler, 1994), comb. nov.

Diagnosis. *Body* ovate. *Head* front margin concave in middle in dorsal view, broadly rounded laterally. *Pereonites* dorsally smooth. *Pleotelson* lateral margins denticulate. *Eyestalks* robust, apex rounded, slightly

longer than wide, with proximal constriction. *Antennula* article 1 much shorter than eyestalk. *Antenna* article 3 lateral margin broadly expanded, convex. *Mandible palp* present. *Pereopod I* carpus oval, with 2 straight robust setae posteriorly; propodus with 1 robust setae on posterior margin. *Pereopod II* carpus and propodus posterior margin with a few short robust setae. *Uropod* endopod straight, apex truncate.

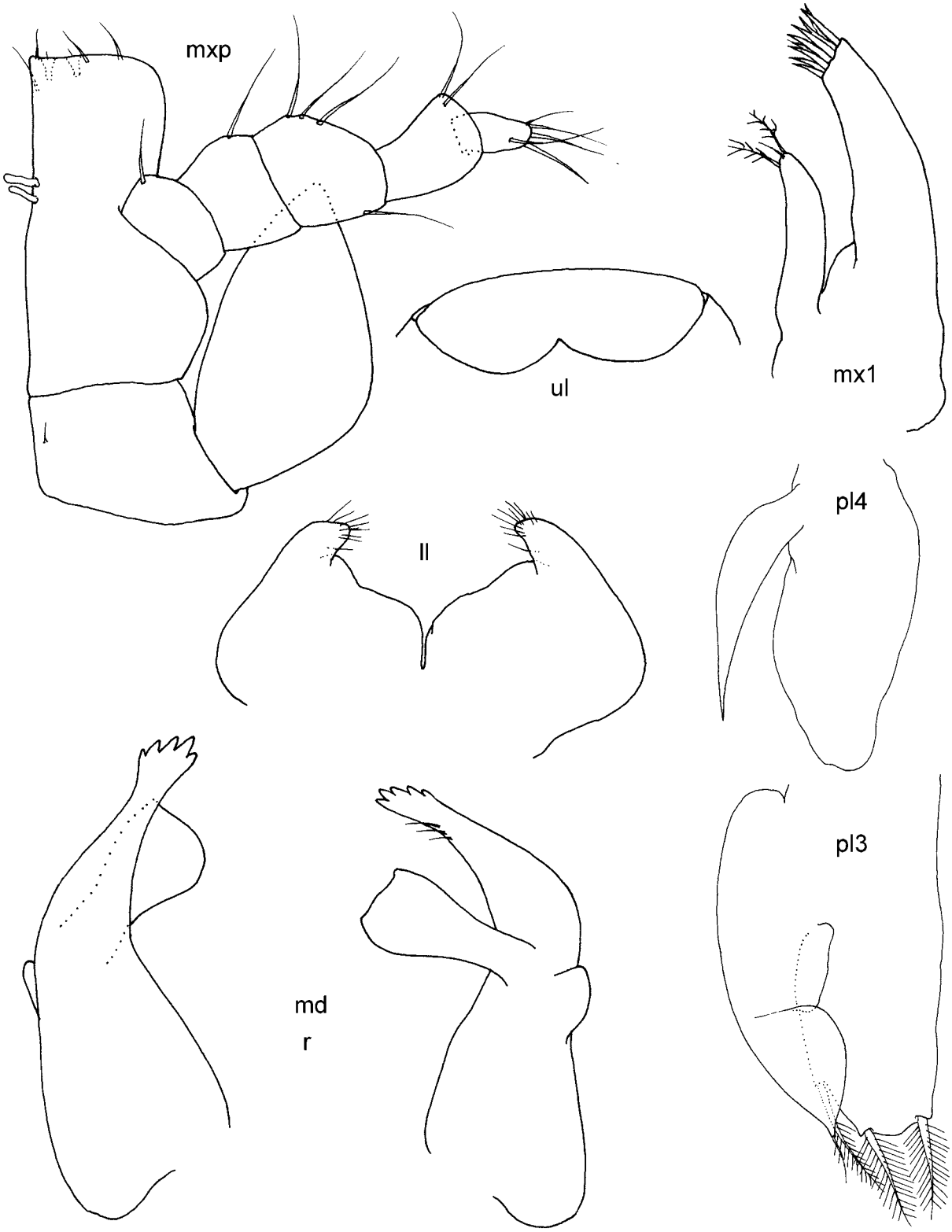

FIGURE 11. *Tethygonium quadricuspis* gen. nov., sp. nov., holotype, female. **ll**, lower lip; **md**, right mandible; **mx1**, maxilla 1; **mxp**, maxilliped; **pl3** and **4**, pleopods 3 and 4; **ul**, upper lip.

Etymology. The genus name is comprised of an arbitrary combination of letters and the traditional paramunnid ending *–gonium*.

Distribution. Magellan Channel, Chile. 9–12 m.

Remarks. *Zizzygonium* gen. nov. differs from the other genera treated here by the combination of concave front margin of the head, a laterally bulging article 3 of the antenna, the presence of a mandible palp, oval pereopod I carpus, and denticulate pleotelson margins.

Discussion

Many taxa that we have considered in this project were "redescriptions" of previously named species. Upon our evaluation of the original types, these secondary descriptions frequently proved to be specimens that were different from the original species. Certainly this was the case with the many redescriptions of *Austrosignum glaciale* Hodgson (or *A. grande*), but also *Cryosignum lunatum* (Hale) and *Munnogonium tillerae* and others. As a general rule, our research has shown that if new specimens are not from the type locality, the burden of proof of a species concept lies with the redescriber who must re-illustrate the original types (which can be done without dissection). This burden arises because many original descriptions from the last century were made without knowledge of the features necessary for identification. In addition, our evidence (Just & Wilson, 2004, 2006) indicates that Paramunnidae species generally are narrow range endemics, so that specimens that match the original types are only from the type localities (*viz*. Hodgson's species from Winter Quarters Bay, McMurdo Sound, Antarctica), or nearby. Most redescriptions that we have studied did not reillustrate the original types, thus confusing the concepts of these species for other users of the taxonomy.

Remarks on *Metamunna*

The name *Metamunna* Tattersall, 1905 has been applied to some species treated in this paper (see Table 1). Wilson (1997) suggested that several species described in or subsequently transferred to *Munnogonium*, together with several species in other genera, might eventually be placed in *Metamunna* (type and only species *M. typica* Tattersall, 1905, from off western Ireland; type material not yet located, see Wilson 1997), but he did not formally make the transfer. Based on Wilson (1997), with no further arguments, Wolff & Brandt (2000) provided a description of *Metamunna*, a key to *Metamunna* covering the species mentioned by Wilson, and included *Munnogonium wilsoni* Hooker, 1985 in *Metamunna*. Castelló (2004, table 1), quoting Wilson (1997) but not Wolff & Brandt (2000), listed several species of *Austrosignum* and *Munnogonium* as *Metamunna*, but provided no further information. Just & Wilson (2004) placed *Metamunna* as a *nomen dubium*, because the genus could not, and still cannot, be diagnosed due to the short and graphic nature of Tattersall's description and illustrations of *M. typica* and the unavailability of the type material.

Acknowledgments

We gratefully acknowledge the following for providing access to type material and unpublished collections: C.O. Coleman (Museum für Naturkunde, Berlin), D. Defaye (Museum National d'Histoire Naturelle, Paris), M. Lowe (NHM), K. Sindemark Kronestedt (Swedish Museum of Natural History, Stockholm), P. Berents and S. Keable (Australian Museum, Sydney), W. Zeidler (South Australian Museum, Adelaide), and G. Poore and J. Taylor (Museum Victoria, Melbourne). Museum of Tropical Queensland, Townsville, a branch of the Queensland Museum, is thanked for providing working facilities for one of us (JJ), and Museum Victoria, Melbourne, where much of the early work on this project was done, is thanked for similar facilities. A grant from the Australian Biological Resources Study, Department of the Environment and Heritage, to one of us (JJ, Reg. no. 201127) is gratefully acknowledged.

References

Bowman, T.E. & Schultz, G.A. (1974) The isopod crustacean genus *Munnogonium* George & Strömberg, 1968 (Munnidae, Asellota). *Proceedings of the Biological Society of Washington*, 87(25), 265–272.

Brandt, A. (1999) Redescriptions of *Paramunna lunata* Hale, 1937 and *Pleurosignum chilense* Menzies, 1962 (Crustacea. Isopoda, Paramunnidae). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut*, 96, 129–139.

Bremer, K. (1994) Branch support and tree stability. *Cladistics*, 10, 295–304.

Castelló, J. (2004) Two new species of Paramunnidae (Crustacea, Isopoda, Asellota) from the South Shetland Islands. *Antarctic Science*, 16(3), 239–252.

Doti, B.L. & Roccatagliata, D. 2005 On two paramunnid species from the Beagle Channel, Argentina (Crustacea: Isopoda: Asellota). *Proceedings of the Biological Society of Washington*, 118(3), 509–521.

Dallwitz, M.J. (1980) A general system for coding taxonomic descriptions. *Taxon* 29, 41–46.

Dallwitz, M.J., Paine, T.A., & Zurcher, E.J. (2000a) User's guide to the DELTA editor. Available from http://biodiversity.uno.edu/delta/

Dallwitz, M.J., Paine, T.A., & Zurcher, E.J. (2000b) User's guide to the DELTA system, a general system for processing taxonomic descriptions. Edition 4.12, December 2000. 158 pp. (CSIRO: Canberra.).

Felsenstein, J. (1985) Confidence limits on phylogenies: an approach using the bootstrap. *Evolution*, 39, 783–791.

George, R.Y. & Strömberg, J.-O. (1968) Some new species and new records of marine isopods from San Juan Archipelago, Washington, U.S.A. *Crustaceana*, 14(3), 225–254.

Hale, H.M. (1937) Isopoda and Tanaidacea. *Australasian Antarctic Expedition 1911-14. Scientific Reports, Ser. C2, Zoology and Botany,* 2(2), 1–45.

Hodgson, T.V. (1910) Crustacea. IX. Isopoda. *National Antarctic Expedition, Natural History,* 5, 1–77.

Hooker, A. (1985) New species of Isopoda from the Florida Middlegrounds (Crustacea: Peracarida). *Proceedings of the Biological Society of Washington*, 98(1), 255–280.

Just, J. (2005) Xenosellidae, a new family of Janiroidea (Asellota: Isopoda: Crustacea), for *Xenosella coxospinosa* gen. nov., sp. nov., from the marine bathyal of eastern Australia. *Zootaxa* 1085, 21–32.

Just, J. & Wilson, G.D.F. (2004) Revision of the *Paramunna* complex (Isopoda: Asellota: Paramunnidae). *Invertebrate Systematics*, 18, 377–466

Just, J. & Wilson, G.D.F. (2006) Revision of *Austronanus*, with two new genera and five new species (Isopoda: Asellota: Paramunnidae). *Zootaxa*, 1111, 21–58.

Kensley, B. (1976) Isopodan and tanaidacean Crustacea from the St Paul and Amsterdam Islands, southern Indian Ocean. *Annals of the South African Museum*, 69(11), 261–323.

Kensley, B. (1977) New records of marine Crustacea Isopoda from South Africa. *Annals of the South African Museum*, 72(13), 239–265.

Kensley, B. (1994) Records of shallow-water marine isopods from Bermuda with descriptions of four new species. *Journal of Crustacean Biology*, 14(2), 319–336.

Kussakin, O.G. (1982) Supplement to the isopod crustacean fauna from the shelf zones of the Antarctic (From the material of the Soviet Antarctic Expedition 1965-1968). In: Fauna and distribution of Crustaceans from the Southern and Antarctic Waters. (Eds. Kafanov, A.I., Kussakin, O.G.). *Academy of Sciences of the USSR (Far East Science Center), Vladivostok*, 73–105.

Maddison, W.P. & Maddison, D.R. (2000) MacClade 4. 492 pp. (Sinauer Associates, Inc.: Sunderland, Massachusetts, USA)

Malyutina, M.V. & Ushakova, A.A. (2001) *Munnogonium affinis* sp. n., a new species of isopod (Asellota: Paramunnidae) from the coast of Korea, Sea of Japan. *Biologiya Morya, Vladivostok*, 27(1), 56–60.

Menzies, R.J. (1962) The zoogeography, ecology, and systematics of the Chilean marine isopods. Reports of the Lund University Chile Expedition 1948-49. *Lunds Universitets Årsskrift, N.F. Avd. 2*, 57(11), 1–162.

Menzies, R.J. & Barnard, J.L. (1959) Marine Isopoda on coastal shelf bottoms of southern California: systematics and ecology. *Pacific Naturalist*, 1(11), 3–35.

Monod, Th. (1930) Tanaidacés et isopodes sub-antarctiques de la collection Kohl-Larsen du Senkenberg Museum. *Senkenbergiana* 12, S 335, 10–30.

Müller, H.-G. (1989) *Munnogonium polynesiensis* n. sp. from coral reefs at Bora Bora and Moorea, Society Islands (Isopoda: Asellota: Paramunnidae). *Bulletin Zoologisch Museum*, 12(2), 57–62.

Müller, H.-G. (1991) Four new species of shallow-water Asellota from the Gulf of Aden. *Senckenbergiana Maritima***,** 21(5/6), 205–214.

Nordenstam, Å. (1933) Marine Isopoda of the families Serolidae, Idotheidae, Pseudidotheidae, Arcturidae, Parasellidae and Stenetriidae mainly from the South Atlantic. *Further Zoological Results of the Swedish Antarctic Expedition 1901-1903*, 3(1), 1–283.

Richardson, H. (1906) Isopodes (Premiere Mémoire). In: *Expédition Antarctique Française (1903-1905) commandée par le Dr Jean Charcot* (Eds J. Charcot and L. Joubin), *Crustacés*, 1–21. (Documents scientifiques de Science naturelle, Masson et Cie, Paris.)

Richardson, H. (1908) Isopodes (Deuxieme Mémoire). In: *Expédition Antarctique Française (1903-1905) commandée par le Dr Jean Charcot* (Eds J. Charcot and L. Joubin). *Crustacés*, 1–8. (Documents scientifiques de Science naturelle, Masson et Cie, Paris.)

Schiecke, U. & Fresi, E. (1972) Record of the asellote isopod *Austrosignum* Hodgson from the Bay of Naples: *Austrosignum maltinii* n. sp. (Paraselloidea, Munnidae). *Crustaceana, Supplement* 3, 31–38.

Schiecke, U. & Modigh-Tota, M. (1976) *Pleurogonium variabile* n. sp. aus dem Golf von Neapel (Italien). *Pubblicazioni della Stazione Zoologica di Napoli*, 40, 114–122.

Schultz, G.A. (1964) Some marine isopod crustaceans from off the southern California coast. *Pacific Science*, 18(3), 307–314.

Shimomura, M. & Mawatari, S.F. (2000) Two new species of *Munnogonium* (Isopoda: Asellota: Paramunnidae) from Japan. *Species Diversity* 5, 215–227.

Shimomura, M. & Mawatari, S.F. (2001) A new asellote isopod of the genus *Santia* Sivertsen & Holthuis, 1980 (Crustacea: Isopoda: Asellota: Santiidae) from Japan. *Proceedings of the Biological Society of Washington* 114, 929–937.

Swofford, D.L. 2002. PAUP*. Phylogenetic Analysis Using Parsimony (*and Other Methods). Version 4b10. Sinauer Associates, Sunderland, Massachusetts.

Tattersall, W.M. (1905) Some new and rare Isopoda taken in the British area. - *Report of the British Association for the Advancement of Science, 74th Meeting at Cambridge, August 1904, Transactions of Section D*, 601–602.

Vanhöffen, E. (1914) Die Isopoden der Deutschen Südpolar Expedition 1901-1903. *Deutsche Südpolar Expedition*, 15, 447–598.

Wägele, J.W. (1989) Evolution und phylogenetisches System der Isopoda. Stand der Forschung und neue Erkenntnisse. *Zoologica*, 140, 1–262.

Wilson, G.D. (1980) New insights into the colonization of the deep sea: Systematics and zoogeography of the Munnidae and the Pleurogoniidae *comb. nov.* (Isopoda; Janiroidea). *Journal of Natural History*, 14, 215–236.

Wilson, G.D.F. (1987) The road to the Janiroidea: Comparative morphology and evolution of the asellote isopod crustaceans. *Zeitschrift für Zoologische Systematik und Evolutionsforschung*, 25, 257–280.

Wilson, G.D.F. (1997) The suborder Asellota. In: *Taxonomic Atlas of the Benthic Fauna of the Santa Maria Basin and Western Santa Barbara Channel*, (Eds J.A. Blake, P.H. Scott), 11, 59–120. (Santa Barbara Museum of Natural History: Santa Barbara, CA, USA.)

Winkler, H. (1994) Paramunnidae (Crustacea: Isopoda: Asellota) from the Magellan Strait. *Zoological Journal of the Linnean Society*, 110, 243–296.

Winkler, H. & Brandt, A. (1993) Janiridae (Crustacea, Asellota) from the Southern Hemisphere: *Ianiropsis varians* sp. n. and redescriptions of five little-known species. *Zoologica Scripta* 22, 387–424.

Wolff, T. & Brandt, A. (2000). Caribbean species of Munnidae, Paramunnidae and Santiidae (Isopoda: Asellota). *Steenstrupia*, 25, 121–146.