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***Marmachius*, a spectacular new genus of Antarcturidae (Crustacea: Isopoda: Valvifera)**

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Abstract

A new genus and species of Antarcturidae, *Marmachius fortunae*, is described from the bathyal of south-eastern Australia. *Antarcturus*, type genus of the family, and *Marmachius* are diagnosed. The new genus differs from other antarcturid genera by the combination of the possession of middorsal spines, extremely long spines generally, free pleonite 1, and the groove on the exopod of the male pleopod 1 opening distolaterally on a lobe-like apex beset with numerous fine setae. *Antarcturus princeps* is transferred to the new genus.

Key words: Crustacea, Isopoda, Valvifera, Antarcturidae, *Antarcturus*, *Marmachius*, new genus, new species

Introduction

Among the numerous new species of isopods discovered in Australia during the last few decades are many valviferans. These have prompted a review of the families (Poore 2001) plus revisions and descriptions of new species of Idoteidae (Poore & Lew Ton 1993), Chaetiliidae (e.g. Poore 1985; 1991a), Holognathidae (Poore & Lew Ton 1990), Austrarcturellidae (Poore & Bardsley 1992), Arcturidae (e.g. King 2000; 2003) and the South African endemic Holidoteidae (Poore 2003). The family Antarcturidae Poore, 2001 was erected to distinguish Nordenstam's (1933) *Antarcturus*-group of species from Arcturidae Bate & Westwood, 1862 s. s. Antarcturids are characterised by complete fusion of the head and pereonite 1, lateral margins of the head and pereonite 1 not expanded downwards to enclose the mouthparts, pereopod 1 subchelate, and the exopod of pleopod 1 of the male with an oblique groove. Brandt (1990) and Wägele (1991) described new genera from Antarctica, as Arcturidae, and provided keys to genera and species. Their diagnoses relied heavily on variations in carapace spination patterns. While some genera can be defined in this way considerable variation exists within some of the species groups/genera they recognised. Poore (1998) reviewed one genus, *Chaetarcturus* Brandt, 1990 and described two new species. This genus was rediagnosed on the possession of rows of evenly-space long parallel setae on the meri-dactyli of pereopods 2–4, called “filter setae” by Brandt and Wägele (most other genera have such setae only on the merus-propodus). The groove on the posterior face of the exopod of the male pleopod 1 opens distolaterally on a subterminal triangular projection in species of *Chaetarcturus*. The structure of this pleopod varies considerably across the Antarcturidae and is promising as a generic diagnostic character. In species of *Fissarcturus* Brandt, 1990 the groove opens laterally on the exopod margin and is covered by a small lobe (see for example Brandt 2007). In both genera, further species groups can be separated on the basis of spination and sculpture and these may warrant generic status (Brandt 2007; Poore 1998). Today, 15 genera with 133 species of Antarcturidae are described (Schotte *et al.* 2008 onwards) but several more exist in collections from Australia. This paper describes a new spectacularly spinose species. On first glance it appeared to belong to *Antarcturus* s.l. but can be differentiated from the type species and many others of this diverse genus on the basis of several features.

Here, *Antarcturus* is rediagnosed more tightly with reference to its type species and a new genus erected for the new species and another already described. The generic diagnoses come from a DELTA database of genera (Dallwitz *et al.* 1999) under construction. Brandt (1990) and many other authors, including me, have described and illustrated the mouthparts of many species of antarcturids. These have never proved to be of specific value, or even valuable at higher taxonomic levels within this family. They are not illustrated for this new species. Pereopod 1 of

all antarcturids possesses numerous closely-set setae on the opposing faces of the propodal palm and dactylus. Pereopods 2–4 have double rows of long setae along the flexor margins. These limbs have always proven difficult to illustrate fully with standard pen-and-ink methods. Here, photographs using multi-focal-plane methods are used to illustrate limbs complimented by line drawings for detail. For simplicity, carapace spines on the new species are referred to as ‘long’, twice or more as long as the body diameter, ‘short’ about half this length, ‘very short’ third to quarter of maximum spine length, and ‘tubercle’ for projections little taller than wide. Each body segment may have median, submedian, sublateral and lateral spines that are confusing in general habitus views. The pattern is described in words and diagrammatically.

Antarcturus zur Strassen, 1902

Type species. *Antarcturus oryx* zur Strassen, 1902 (subsequent designation by Stebbing 1908).

Antarcturus zur Strassen, 1902: 686.—Stebbing 1908: 52–53.—Vanhöffen 1914: 519.—Tattersall 1921: 236–237.—Nordenstam 1933: 122–128.—Nierstrasz 1941: 258–259.—Menzies 1962a: 194.—Menzies 1962b: 88.—Kussakin 1971: 241–243.—Menzies & George 1972: 9.—Schultz 1978: 36.—Kussakin 1982: 273–276.—Brandt 1990: 7–10.—Wägele 1991: 144.

Diagnosis. Body weakly geniculate between pereonites 4 and 5, anterior pereon slightly elevated. Head with pair of submedian spines between eyes. Pereonites with supracoxal spines on all pereonites, with paired sublateral spines, without paired submedian spines (sometimes with tubercles), without middorsal spines. Pleonite 1 fused to remaining pleotelson; pleonites without middorsal spines, with paired submedian spines or tubercles, with pairs of sublateral tubercles or with few pairs of sublateral spines, none more prominent than others or with prominent pair of sublateral spines near midpoint, with marginal lateral spines, with prominent paired posterior sublateral spines, without prominent medial posterior spine dorsal to margin. Antenna 2 flagellum of 9 or more short articles. Pereopods 2–4 with regular rows of long setae along flexor margins of merus-propodus; unguis short, curved. Pleopod 1 of male exopod groove opening distolaterally on margin, scarcely produced at opening. Pleopod 2 of male, appendix masculina acute, about as long as endopod. Oostegites 2–4 supported by ventral coxal processes, largest on pereonite 4; oostegite 5 absent, without ventral coxal processes.

Remarks. Zur Strassen (1902) separated his new genus *Antarcturus* from *Arcturus* Latreille, 1829 on the basis of the absence of a lateral covering of the mouthparts; in *Arcturus* (and in Arcturidae s.s.) mouthparts and usually pereopod 1 are not visible in lateral view. His differentiation is now true of Antarcturidae and related families generally (Poore 2001). Kussakin (1982) synonymised *Dolichiscus* Richardson, 1913 and ‘*Microarcturus*’ Nordenstam, 1933 with *Antarcturus* and his diagnosis was little more specific than that of zur Strassen. *Dolichiscus* is now regarded as a member of Austrarcturellidae (Poore 2001) and ‘*Microarcturus*’ is a nomen nudum, albeit with several described species (Poore 1991b). Zur Strassen (1902) included *Arcturus coppingeri* and *Arcturus furcatus* Studer, 1882 with his new species *Antarcturus oryx* but did not select a type species; Stebbing (1908) selected the last of these as type species. Kussakin (1982) incorrectly stated that the type species is *Arcturus coppingeri* Miers, 1881.

In the context of diagnosing six new arcturid (now antarcturid) genera, Brandt (1990) rediagnosed and restricted *Antarcturus* on the basis of slender body shape, fused pleotelson segments, paired spines on the head and pereonites, two long posterior pleotelsonic spines, long antenna 2 with multiarticulate flagellum, subchelate pereopod 1, and pereopods 2–4 dactylus without long setae and with two unguis. Her characterisation of the cephalothorax (head plus pereonite 1) spination, “supraocular spines, followed by another pair of lobes, which bear one or more spines ... followed by two smaller dorsomedial elevations; caudal margin of cephalothorax characterized by an elevation with several large or small spines”, allows for some variability. Cephalothorax spination of members of this genus varies considerably; Brandt (1990) divided them into three groups, an *oryx*-group, *hodgsoni*-group and *horridus*-group on this basis. The pair of long posterior pleotelsonic spines seems universal in the 32 species presently assigned to *Antarcturus*. Half of the species described in the genus have been transferred to other antarcturid genera or to *Dolichiscus* Richardson, 1913 (Austrarcturellidae), most by Brandt (1990). All except five of the species presently accepted are from Southern Ocean and Antarctica; four have been described from the north-western Pacific Ocean (Kussakin 1982) and one from off the Galapagos Islands (Benedict 1898).

***Marmachius* n. gen.**

Type species. *Marmachius fortunae* n. sp., by original designation.

Diagnosis. Body weakly geniculate between pereonites 4 and 5, anterior pereon slightly elevated. Head with pair of submedian spines between eyes. Pereonites with supracoxal spines on all pereonites, with paired sublateral spines (exceptionally long), with paired submedian spines (exceptionally long), with middorsal spines on posterior margins of pereonites 1–5. Pleonite 1 free from remaining segments of pleotelson; pleotelson dorsal surface bulbous, differentiated from lateral margin by longitudinal groove; pleonites 5 and 6 with middorsal spines, with paired submedian spines or tubercles, with few pairs of sublateral spines, none more prominent than others, with marginal lateral spines, with prominent paired posterior sublateral spines, with prominent medial posterior spine dorsal to margin. Antenna 2 flagellum of 9 or more short articles. Pereopods 2–4 with regular rows of long setae along flexor margins of merus-propodus; unguis short, curved. Pleopod 1 of male exopod groove opening distolaterally on lobe-like apex beset with numerous fine setae. Pleopod 2 of male, appendix masculina elongate, acute, considerably longer than endopod. Oostegites 2–4 unknown.

Included species. *Marmachius fortunae* n. sp., *Antarcturus princeps* Kussakin & Vasina, 1998.

Etymology. For friend and fellow traveller Michael Marmach, whose carefully prepared 35-mm photographs of crustaceans revealed their hitherto hidden colours and set Museum Victoria on the road to a web presence.

Remarks. The new genus shares many features with *Antarcturus* s.s. Both genera have paired submedian spines on the head, sublateral and lateral (supracoxal) spines on all pereonites and lateral spines on the pleotelson. All are much longer in *Marmachius* than in any species of *Antarcturus*. Submedian spines are prominent on all segments in *Marmachius* but are evident only as tubercles in *Antarcturus oryx*. Both genera possess posterolateral spines on the pleotelson. Only *Marmachius* possesses middorsal spines, on the posterior margins of pereonites 1–5, on pleonites 5 and 6, and a prominent medial posterior spine dorsal to the margin. Pleonite 1 is free from the remaining pleotelson in *Marmachius* but not so in *Antarcturus*. The oblique groove on the male pleopod 1 exopod opens on a distolateral shallow notch in *Antarcturus* but opens distolaterally on a lobe-like apex beset with numerous fine setae in *Marmachius*. This structure has not been illustrated as such in any other antarcturid. The figure of the male pleopod 1 of *Antarcturus princeps* is sufficiently similar and this species is here included in *Marmachius*. These two species share elongate spines seen elsewhere only in *Acantharcturus* Schultz, 1981. The male pleopod 1 of its type species, *A. acutipleon* Schultz, 1981 resembles that of *Marmachius* in as far as Schultz's illustration allows. I have examined his holotype (USNM 181252) but the pleopods are lost. The species also has a free pleonite 1 and middorsal spines on the posterior margins of pereonites 1–5 but not on the pleon. Instead, the pleotelson ends in a strong posterior marginal spine, not a supramarginal one, lacks prominent paired sublateral posterior spines, and is evenly tapering instead of having a bulbous shape distinct from the margin. *Acantharcturus* also differs in having a shorter antenna 2 flagellum (four articles rather than nine), and having a setiform unguis on pereopods 2–4 rather than a short one.

***Marmachius fortunae* n. sp.**

(Figs 1–3)

Antarcturus sp.—Poore, 2001: fig. 1g.

Material examined. *Holotype.* Australia, Victoria, 85 km S of Point Hicks, 38.5235°S, 149.3517°E, 1984–1360 m, G.C.B. Poore et al. on RV *Franklin*, beam trawl, 26 Oct 1988 (stn SLOPE 72), Museum Victoria (NMV) J16897 (male, 39 mm).

Description. *Total body length* about 4.7 times as long as greatest width, almost cylindrical. *Head* with excavate frontal margin; with pair of submedian long spines curving forwards, 1 short and 1 very short sublateral spines on each side; maxillipedal segment with pair of short straight submedian spines, 2 lateral tubercles each side.

Pereonite 1 with pair of submedian long spines curving forwards, 1 median short straight spine, second pair of submedian very short spines, pair of sublateral long spines anteriorly directed and curved, 2 short lateral (supracoxal) spines arranged obliquely on each side, second longer; coxa fused, laterally notched, with 2 tubercles.

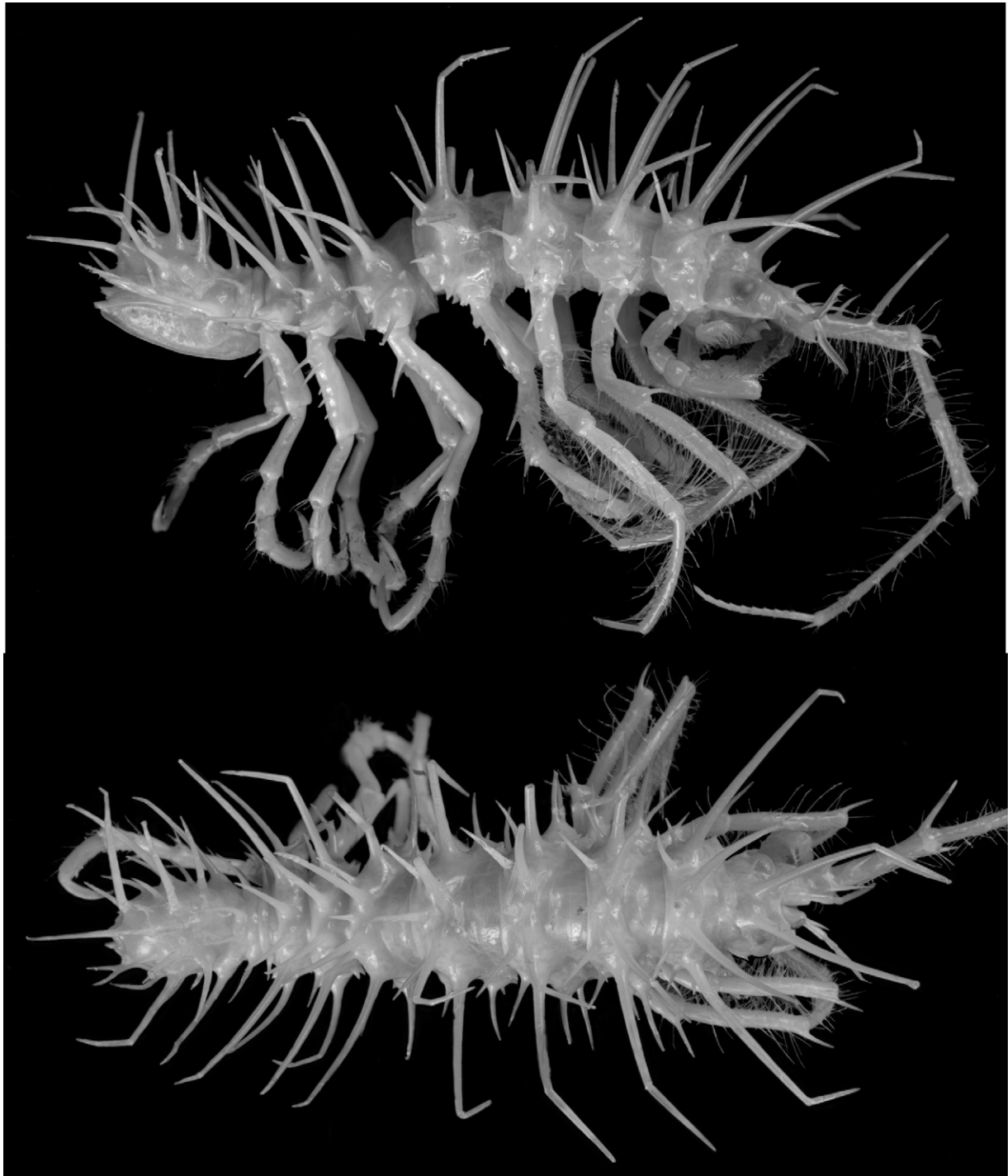


FIGURE 1. *Antarcturus fortuneae* n. sp. Holotype. The specimen is somewhat damaged; only one of the long posterolateral spines is present and it points laterally and vertically instead of naturally posteriorly (cf. fig. 3).

Pereonite 2 with pair of proximate submedian short straight spines, pairs of submedian and sublateral long spines curving forward, 1 median short straight spine, followed by pair of submedian very short spines, 2 lateral (supracoxal) short spines set obliquely on each side (second shorter and more dorsal) and with tubercle between, 3 tubercles in oblique row in front of supracoxal spine on each side; coxa with circlet of 4 very short spines laterally; ventral coxal plate with 1 tubercle in midline. *Pereonites 3 and 4* with essentially same spine pattern as pereonite 2 except on ventral coxal plates: ventral coxal plate 3 with 2 tubercles on midline, plate 4 with 1 median tubercle and 2 near basis articulation. *Pereonite 5* with pair of submedian long spines curving backwards, pair of submedian short spines, 1 lateral (supracoxal) long spine curving backwards and shorter lateral spine anteriorly on each side, 1

median short spine; coxa with 1 long spine laterally directed and posterior tubercle, circlet of 3 tubercles; ventral coxal plate with pair of submedian tubercles. *Pereonites 6* as pereonite 5 but without median spine. *Pereonite 7* as pereonite 6 but without second pair of shorter submedian spines.

Pleonite 1 plus pleotelson 0.2 total body length. *Pleonite 1* free; with 1 short lateral spine on each side. *Pleonites 2–6* fused to telson, only vague lateral indications of pleonites 2 and 3. *Pleonite 2* with pairs of submedian tubercles, sublateral short spines, lateral short spines; *pleonite 3* with pairs of long submedian and very long lateral spines. *Remaining pleotelson* swollen dorsally and laterally and overlapping margin posterolaterally and posteriorly; with 3 pairs of submedian spines, second long; 4 pairs of sublateral spines, first 2 long, third short, and terminal one as long as pleotelson and posteriorly directed; 5 lateral spines, first very long, remaining shorter; and 3 median short spines in row, last pointing posteriorly and longest.

Antenna 1 reaching to middle of article 3 of antenna 2; article 1 with 1 spine on upper margin. *Antenna 2* 0.9 times as long as body, ratio of lengths of peduncle articles 3–5, flagellum, 1:1.5:2.0:1.3; article 2 with 1 tubercle on upper margin, 2 distal spines; article 3 with 2 spines on upper margin, second much longer, 2 distal spines; article 4 with 2 distal spines; article 5 with 1 distal spine; flagellum of 9 articles; peduncle article 3 with rows of long setae along lower margin, articles 4 and 5 surrounded by scattered long setae.

Pereopod 1 basis with 1 lateral tubercle, distal margin with row of long setae; ischium–carpus with many long setae on flexor margin; propodus mesial face richly setose close to extensor and flexor margins, slightly concave between; dactylus oval in cross-section, setose especially distally, unguis reaching distal margin of carpus.



FIGURE 2. *Antarcturus fortunae* n. sp. Holotype. p1, p2, p6, left pereopods 1, 2 and 6; p, penial plate; pl1, pl2, right pleopods 1 and 2, posterior views. Scale bars = 1 mm, a applies to top and b to bottom row.

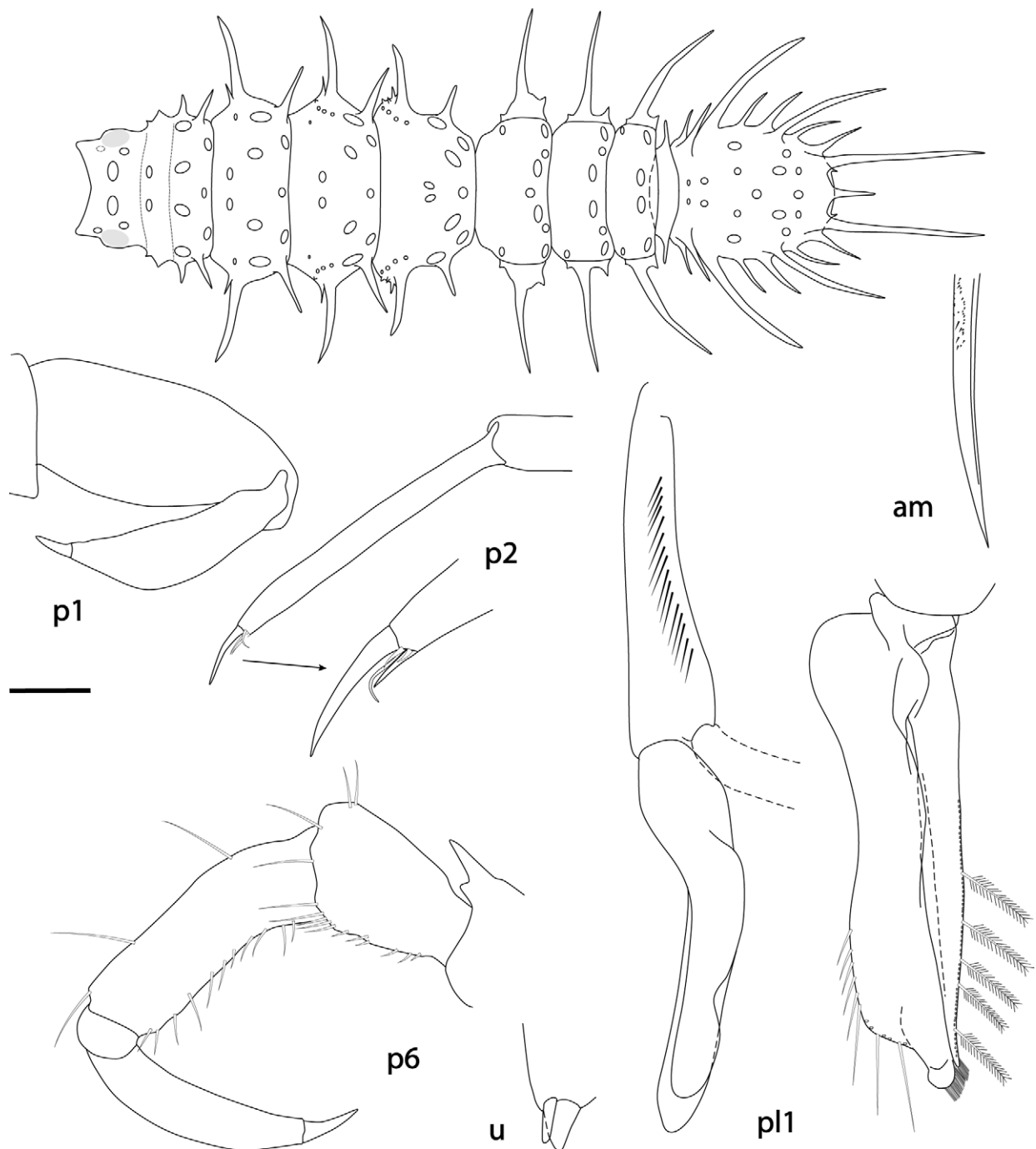


FIGURE 3. *Antarcturus fortuneae* n. sp. Holotype. Stylised dorsal view, lateral spines, coxal spines and pleonal sublateral spines full length, median, submedian and pereonal sublateral as ellipses. p1, p2, p6, distal articles of left pereopod 1 (setae not shown), pereopods 2 and 6; pl1, pleopod 1 in mesial view with peduncle, endopod deflected (left) and posterior face of exopod (right); am, appendix masculina apex; u, uropodal rami. Scale bar = 1 mm (pereopod distal articles only).

Pereopod 2, ratio of lengths of basis: carpus: propodus: dactylus 1:2.0:2.5:1.4; basis with 1 lateral spine plus tubercles; ischium, merus and carpus each with 1 distal spine; merus–propodus with long setae along flexor margin, carpus and propodus surrounded by less dense long setae; propodus curved; dactylus 13 times as long as wide. *Pereopods 3 and 4* essentially similar to pereopod 2.

Pereopod 5, ratio of lengths of basis: ischium: propodus: dactylus 1:0.6:0.5:0.5; basis with 2 proximal spines, longer than 3 straight spines in row along lateral margin; merus with 1 distal spine; carpus with row of c. 6 short robust setae and stout setae distally on flexor margin; propodus with row of c. 10 sharp robust setae, smaller distally, along flexor margin; dactylus stout, curved. *Pereopods 6 and 7* basis similar to pereopod 5 but with 2 proximal spines, longer than 2 straight spines in row along lateral margin; merus with 1 distal spine.

Penial plate elongate, tapering proximally and distally.

Pleopod 1 peduncle with 27 tubercles laterally, c. 20 retinaculae mesially; exopod as long as endopod, 3.8 times as long as wide, with proximomesial lobe, waisted at midpoint; posterior face of exopod with prominent ridge extending over middle third, overlapping mesial edge of groove; lateral edge of groove sharp, mesial edge ill-defined; groove ending near tapering distolateral extension terminating in swollen tip with cluster of numerous fine setae.

Pleopod 2 endopod with appendix masculina 1.2 times as long as endopod, with acute apex.

Uropod peduncle with few tubercles; exopod broader than linear endopod, of equal lengths.

Etymology. For *Fortuna*, the Roman God of Luck, on account of the isopod's bad luck in finding itself in the path of the trawl and our good luck in finding it in the trash on the trawl deck.

Remarks. The species was illustrated in a line drawing by Poore (2001). *Marmachus fortuna* differs from the other species of the genus, *M. princeps* (Kussakin & Vasina, 1998) collected in the Emerald Basin, between New Zealand and the Macquarie Island ridge, at a depth of 4300 m. While both species are decorated with pairs of long dorsal spines these are more prominent in the new species and curving forward rather than posteriorly as in *M. princeps*. Each pereonite of *M. princeps* has two pairs of long spines and others are relatively much shorter; in *M. fortuna* the more lateral spines are not as relatively diminished. Kussakin & Vasina (1998) did not specifically mention medial spines but their figure shows what could be a short medial spine on at least pereonites 3–5. They specifically stated that the posterior medial spine is very short but it is not in their figure; this spine may be longer in the new species. The pleotelson is more spinose in the new species, pereopods 2–4 appear more elongate while pereopods 5–7 are more compact.

Acknowledgments

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