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# Pseudidotheidae (Crustacea: Isopoda: Valvifera) reviewed with description of a new species, first from Australia

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**Abstract** Poore, G.C.B., and Bardsley, T.M. 2004. Pseudidotheidae (Crustacea: Isopoda: Valvifera) reviewed with description of a new species, first from Australia. *Memoirs of Museum Victoria* 61(1): 75–83.

The family Pseudidotheidae, comprising only four species of *Pseudidothea*, is reviewed. A new highly-ornamented species from south-eastern Australia, *Pseudidothea hoplites*, is described. A key to species of the genus and family is provided.

**Keywords** Isopoda, Valvifera, Pseudidotheidae, *Pseudidothea*, new species, south-west Pacific, Australia

## Introduction

The family Pseudidotheidae Ohlin, 1901 was erected for the east Patagonian genus and species *Pseudidothea bonnieri* Ohlin, 1901 on the basis of the male first pleopods being modified for a copulatory function, a character never before recorded in the Isopoda. Ohlin also noted that the second to seventh pereopods are of virtually the same size and form. He regarded the Pseudidotheidae as an intermediate link between the Idoteidae Samouelle, 1819 and Arcturidae Dana, 1849. Barnard (1920) noted that the Pseudidotheidae have a flattened body, pereonite 4 never elongate, pereopod 1 prehensile and pereopods 2–4 stout. In Arcturidae the body is cylindrical, pereonite 4 often elongate, pereopod 1 setiferous and pereopods 2–4 slender and setiferous. Nordenstam (1933) added another character: penial processes fused but distally cleft or bilobate.

Pseudidotheidae are distinguished, with other arcturoid valviferans, from Idoteidae and similar families by having the head fused to pereonite 1 (with a few exceptions not so in Idotedidae), penial processes fused but distally cleft, and pleopod 1 with an elongate peduncle and modified exopod in the male. Wägele (1989, 1991) treated the family as one of four subfamilies of Arcturidae, the others being Arcturinae, Xenarcturinae Sheppard, 1957 and Holidoteinae Wägele, 1989. He included *Arcturides* Studer, 1882 with *Pseudidothea* in Pseudidotheinae which, he believed, shared the synapomorphy of all pleonites fused and not divided by furrows. This state is true of all arcturoid families, with rare reversals in two genera (Poore, 2001). Arcturididae Poore, 2001 (*Arcturides* alone), Pseudidotheidae and Xenarcturidae were treated as families by Poore (2001), three members of an unresolved clade. Poore (2001) separated pseudidotheids from other arcturoid families by the uniquely undifferentiated pereopods 2–4, similar to more posterior ambulatory pereopods. While it is true that all limbs are ambulatory and 2–4 do not bear long filtering setae of the arcturid type, pereopods 2 and 3 are more robust than 4–7. In Xenarcturidae, only pereopods 2 and 3 are slender, setose and arcturid-like while pereopods 4–7 are ambulatory. In Arcturididae, pereopods 2–7 are all similar and ambulatory. Holidoteidae was only remotely related in Poore's (2001) cladogram (see revision by Poore, 2003).

The family contains only *Pseudidothea*, the type species of which is a junior synonym of an earlier described species, "*Idothea Miersii*" Studer, 1884, an observation suggested by Ohlin, suspected by later authors, and confirmed here. *Microarcturus scutatus* Stephensen, 1947 from the South Shetland Islands, was transferrred to *Pseudidothea* by Sheppard (1957). Hurley (1957) described *Pseudidothea richardsoni* from New Zealand. Here, a fourth species is described from southern Australia.

All limbs are drawn from the left side unless otherwise stated. The following abbreviations are used in figures: A1, A2, antennae 1, 2; MD, mandible; MP, maxilliped; MX1, maxilla 1; MX2, maxilla 2; P1–P7, pereopods 1–7; PL1–PL5, pleopods 1–5; U, uropod; l, left; r, right. Material is lodged at Museum Victoria, Melbourne (NMV); the Canterbury Museum, Christchurch, New Zealand (CMNZ), Museum of New Zealand (Te Papa Tongarewa) (MNZ), Zoological Institute and Museum, Hamburg, and Museum für Naturkunde, Berlin.

**Pseudidotheidae** Ohlin

Pseudidotheidae Ohlin, 1901: 274–276.—Stebbing, 1905: 43.—Barnard, 1920: 381.—Nordenstam, 1933: 112–113.—Hale, 1946: 168.—Sheppard, 1957: 173–174.—Poore, 2001: 227.

Pseudidotheinae.—Wägele, 1989: 137–138.—Wägele, 1991: 80-81.

*Diagnosis*. Body strongly vaulted. Head and pereonite 1 fused. Pereonite 4 of similar length to pereonite 3. All pleonites fused into pleotelson. Body variously tuberculate or spinose; pleotelson without dorsolateral ridges ending in mediodorsal posterior spine, never with posterior dorsolateral pair of strong spines; limbs and most of surface covered with fine setae that trap sediment. Dorsal coxal plates 2–7 obsolete, bases of pereopods exposed. Mouthparts and pereopod 1 visible in lateral view. Eyes well developed. Antenna 2 flagellum of 2 or 3 articles plus distal claw. Pereopod 1 a gnathopod, pereopods 2 and 3 differentiated from ambulatory pereopods 4–7. Pereopod 1 dactylus evenly curved along anterior margin, evenly tapering. Pereopods 2 and 3 with propodus able to close on carpus, articles broad and with posterior robust setae; with prominent dactylus, unguis short. Pereopods 4–7 similar and ambulatory. Pereopods of males without dense mat of fine setae. Uropodal exopod (smaller ramus) tapering (with terminal setae only), more than half as long as endopod. Oostegites 1–4 functional, not supported by coxal lobes; oostegite 5 present or absent. Penes fused as a single penial plate, apically simple or barely slit. Pleopod 1 peduncle more elongate than on other pleopods; with marginal setae on rami longer than or equal to length of rami. Pleopod 1 exopod of male thickened and with groove on posterior face, with few simple setae along straight lateral margin; with groove on posterior face of exopod ending on tapering distolateral apical extension. Pleopod 2 of male with appendix masculina about as long as endopod, basally less than half width of endopod.

*Remarks*. The diagnosis is rephrased from Poore (2001) to better define limb differentiation. We note that the body is covered with fine setae, not illustrated in the new species and indicated or mentioned only in passing for other species by Hurley (1957) and Brandt and Wägele (1990). Such setation is not a typical valviferan characteristic. Poore (2001) defined the family as lacking oostegites on pereopod 5; this is true of three species but not of *P. scutata*. The presence of a fifth pair of oostegites in one species is anomalous among arcturoid families. It is seen elsewhere only in Austrarcturellidae Poore and Bardsley, 1992 where oostegites 5 are vestigial and act as egg guides rather than as part of the marsupium.

Wägele (1989) considered *Arcturides* a family member but Poore (2001) erected a separate family for this genus.

***Pseudidothea*** Ohlin, 1901

*Pseudidothea* Ohlin, 1901: 276.—Nordenstam, 1933: 113.—Hale, 1946: 168.—Sheppard, 1957: 174.—Hurley, 1957: 15.—Wägele, 1991: 84–87.

*Type species. Pseudidothea bonnieri* Ohlin, 1901 (by monotypy).

*Diagnosis*. As for family.

*Remarks*. Ohlin (1901) was "almost convinced" that *Pseudidothea bonnieri* was identical to *Idotea miersii* Studer, 1884 and noted that "the localities where they were dredged are nearly the same." He nevertheless, erected his new species. He also expressed his "suspicion" that his new genus was identical to *Arcturides* Studer, 1883. Hale (1946) listed three characters that separated the two genera. In *Arcturides*, the coxae of pereonites 2–7 are distinctly marked off, the antenna 2 flagellum is of three articles and the uropodal exopod as long as endopod. Hale's view was confirmed by Poore (2001) whose phylogenetic analysis concluded the two genera belong in different families.

**Key to species of *Pseudidothea***

1. Pereonites 2 and 3 with forked dorsolateral spines; all pereonites with lateral rows of blade-like ridges, each with anteriorly and posteriorly directed spines; tergites produced laterally over coxae to form a shield with 3 points; . . . . . *Pseudidothea hoplites*
— Pereonites with low or high flat tubercles; tergites produced laterally as large tubercles or rounded or flattened laterally; . . . . . 2
2. Pereon with large high flat tubercles; pereonite 1 with dorsal pair, pereonites 2–4 with dorsal and lateral pair and pereonites 5–7 with dorsal, dorsolateral and lateral pair; male pleopod 2 with appendix masculina twice as long as rami . . . . . *Pseudidothea scutata*
— Pereon with low irregular tubercles; male pleopod 2 with appendix masculina and rami subequal . . . . . 3
3. Uropodal exopod with a single strong setae, endopod with 3 pappose setae; antenna 2 peduncle with long fine setae on articles 3–5; pereopods without tubercles; male pleopod 1 endopod with 5 lateral spinules proximally, 5 apical plumose setae; exopod with 15 spinules on lateral margin, tapering distally to an obtuse apex . . . . . *Pseudidothea richardsoni*
— Uropod rami each with single seta; antenna 2 peduncle with short setae on articles 3–5; pereopods with tubercles; male pleopod 1 endopod with plumose setae marginally; exopod with 16–17 spinules laterally, with acute apex bent outwards . . . . . *Pseudidothea miersii*

***Pseudidothea hoplites*** sp. nov.

Figures 1–3

*Material examined.* Holotype. Western Bass Strait, 70 km W of Cape Farewell, King Island, Tasmania (39°38.2'S, 143°07.2'E), 127 m, sand, epibenthic sled, R. Wilson on RV *Tangaroa*, 21 Nov 1981 (stn BSS 195), NMV J8705 (male, 4.4 mm).

*Paratypes*. Type locality, NMV J8706 (1 female); 36 km SSW of Stokes Point (40°26.7'S, 143°41.4'E), 85 m, rock dredge, 22 Nov 1981 (stn BSS 198), NMV J8709 (1); 59 km WNW of Cape Farewell (39°28'S, 143°17'E), 103 m, Smith-McIntyre grab/pipe dredge, G.C.B. Poore on HMAS *Kimbla*, 10 Oct 1980 (stn BSS 81), NMV J8703 (1).

Victoria, 80 km SSE of Cape Otway (39°26'S, 142°57'E), 113 m, 9 Oct 1980 (stn BSS 67), NMV J8701 (2); NMV J23186 (1 ovigerous female, 5.1 mm, figured); 51 km SSW of Cape Otway, Victoria

(39°16'S, 143°17'E), 90 m, 10 Oct 1980 (stn BSS 73), NMV J8702 (1); 45 km SSW of Cape Otway (39°15'S, 143°19'E), 94 m (stn BSS 74), NMV J8704 (2 males); 55 km SW of Cape Otway (39°16.7′S, 143°06.7'E), 95 m, rock dredge, R. Wilson on RV *Tangaroa*, 21 Nov 1981 (stn BSS 193), NMV J8707 (male, female); 44 km SW of Cape Otway (39°06.3'S, 142°55.6'E), 81 m (stn BSS 192), NMV J23077 (1); 60 km SW of Cape Otway (39°06.3'S, 142°55.6′E), 84 m, fine shell (stn BSS 191), NMV J8708 (1).

*Other material.* Tasmania. Breaksea Island, Bathurst Harbour (43°20'S, 145°57'E), 4 m, NMV J23085 (1 ovigerous female, SEM examination). Isle des Phoques (42°25'S, 148°10′E), NMV J23084 (1). Bicheno, eastern side of Waubs Bay, reef (41°53'S, 147°18′E), 7 m, *Macrocystis* holdfasts (stn TAS 94), NMV J23081 (1); E side of Waubs Bay, reef local name "Split Rock" (41°53'S, 147°18'E), 11 m, red and brown algae (stn TAS 102), NMV J23083 (2); granite reef 50 m offshore, N end of "The Gulch" (41°53'S, 147°18'E), 7 m, erect red algae (stn TAS 88), NMV J53071 (1); reef close to base of "Split Rock" (41°53'S, 147°18'E), 12 m, fine sand from base of reef (stn TAS 96), NMV J23082 (1).

Victoria. "Harry's Hole", W side of Twin Reefs, Venus Bay (38°41'S, 145°39'E), 9 m, rocky (stn CPA 8), NMV J23079 (1). 75 m SW of Eagles Nest (38°40'S, 145°40'E), 8 m (stn CPA 3), NMV J23078 (1). Off Eagles Nest (38°40.67'S, 145°38.76′E), 10–11 m, mixed algae (stn BUN 3), NMV J53073 (1). Aireys Inlet (38°28'S, 144°06′E), from *Sphacelaria*, NMV J23080 (1).

*Diagnosis*. Head dorsally strongly elevated, with paired double or single spines. Pereonite 1 with 1 pair of small dorsal spines, 2 small lateral spines. Tergites 2–7 each produced laterally in form of a with 3 points, anteriorly, posteriorly and laterally. Pereonites 2 and 3 with small paired middorsal spines, large paired dorsolateral forked spines, and lateral ridges produced acutely anteriorly and posteriorly; pereonites 4–7 with dorsolateral and lateral ridges, each produced acutely anteriorly and posteriorly, and several anterodorsal and posterodorsal spines. Pleotelson with anterolateral processes, paired anterodorsal convexities, a series of 3 spines on each side (dorsal–lateral) and pair of mediodorsal convexities, remaining pleotelson tapers to an obtuse apex.

Male antenna 1 flagellum with 6 clusters of aesthetascs. Antennae and pereopods with tubercles. Antenna 2 with short setae on articles 3–5. Male pleopod 1 endopod about 1.5 times as long as peduncle with plumose setae apically; exopod longer, 8 spinules on lateral margin, tapering distally, thickened and folded laterally to partially cover a groove that runs to the apex. Male pleopod 2 appendix masculina styliform, slightly longer than endopod. Uropodal exopod about two-thirds as long as endopod; exopod with a strong apical seta; endopod with 3 brush setae and 2 setules. Oostegite absent from pereopod 5.

*Description. Ornamentation.* Head dorsally strongly ele-vated, with paired double or single spines. Eyes prominent, arising laterally. Lateral margin of head armed with about 7 small teeth, extending downwards and outwards. Head fused to pereonite 1, partial suture visible laterally. Pereonite 1 with pair of small dorsal spines, 2 small lateral spines, lateral margin with about four small teeth. Tergites 2–7 produced laterally to form a shield with 3 spines, laterally, anteriorly and posteriorly. Pereonites 2 and 3 with small paired dorsal spines, large paired dorsolateral forked spines, and lateral ridges finished anteriorly and posteriorly with a small spine. Pereonite 4–7 with dorsolateral and lateral ridges, finished anteriorly and posteriorly with a small spine. Pereonite 4 with 4 anterodorsal and posterodorsal spines, pereonites 5 and 6 with 3 and pereonite 7 with 2 and a single dorsal denticle.

Sculpture of pleotelson from anterior to posterior as follows. A central pair of dorsal convexities each with an anteriorly directed spine, lateral to these a series of 3 anteriorly directed spines on each side, followed by large lateral convexities on each side, followed by a pair of central dorsal convexities, remaining pleotelson tapers to an obtuse apex.

*Antennae, mouthparts and limbs* (from male). Antenna 1 peduncle articles with brush setae, articles rounded and becoming successively smaller; flagellum article 1 very short; article 2 with 6 aesthetascs and setules. Antenna 2 peduncle articles 3–5 with blunt tubercles on lower margin, bearing robust setae, especially on articles 4 and 5; flagellum almost as long as peduncle article 5, articles becoming successively smaller, first with distal robust seta and setules, second with setules, third a short claw.

Mandible incisor with 4 uneven teeth; left lacinia mobilis almost as wide as incisor, with 3 teeth; right lacinia mobilis an unevenly toothed column; left molar process with concave face rimmed by obscure teeth and bearing a setal cluster; right molar process with face ending with row of blunt teeth and bearing setal cluster. Maxilla 1 inner lobe with 2 long pappose setae; outer lobe with 11 apical setae, some obscurely dentate. Maxilla 2 inner lobe oblique margin with 6 pappose setae along posterior edge, 5 setae on anterior edge; middle lobe with 2 longer pappose setae; outer lobe with 3. Maxilliped endite with complex of thin pappose setae and rows of blunt tubercles; palp with tubercles and long setae on mesial margins of articles 2–5; articles 1 and 2 short, 3 and 4 of subequal length, 3 produced mesially, article 5 one-fifth as long as 4, almost as long as wide; epipod apex with small blunt tooth.

Pereopod 1 held close to the mouthparts; merus–propodus with uneven posterior tubercles and stout pectinate setae; propodus almost as wide as long, with rows of mesial pectinate setae along anterodistal margin; proximal part of dactylus linear, about 2.5 times as long as greatest width, complexly setose with mesial pectinate setae, 1 spinule on posterior margin, posterodistal corner of dactylus with a spinule, seta and 2 setules; unguis a strong claw, less than half length of dactylus.

Pereopod 2 basis–merus short, subequal, carpus–dactylus longer; merus with complex tubercle on lower margin bearing short setae; carpus longer than greatest width, with tubeculate ridge on lower margin bearing 2 long robust setae; propodus robust, about twice as long as wide, with 2 robust setae on lower margin opposing carpus; proximal part of dactylus almost 3 times as long as wide, unguis a short claw. Pereopod 3 similar to pereopod 2. Pereopods 4–7 basis–merus with blunt tubercles on upper margin, most articles with well spaced setae on lower margin; basis about 1.5 times as long as wide; ischium-carpus subequal, about as wide as long; propodus about 2.5 times as long as wide, dactylus similar to pereopod 2.

Male pleopod 1 peduncle twice as long as wide, with 4 coupling hooks; endopod lamellar with 6 apical plumose setae;

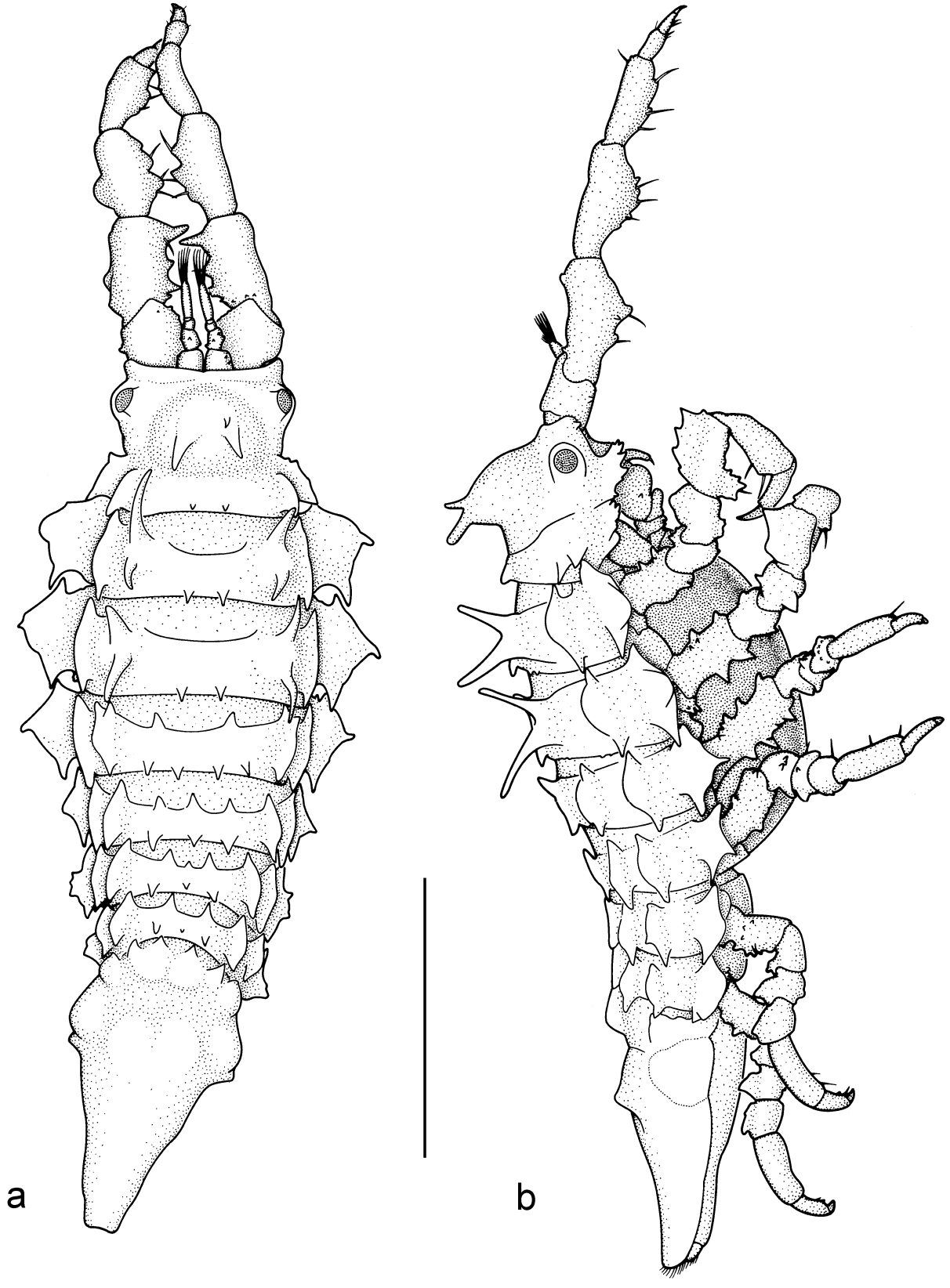


Figure 1. *Pseudidothea hoplites.* Paratype female, NMV J23186. Dorsal and lateral views. Scale bar 2 mm.

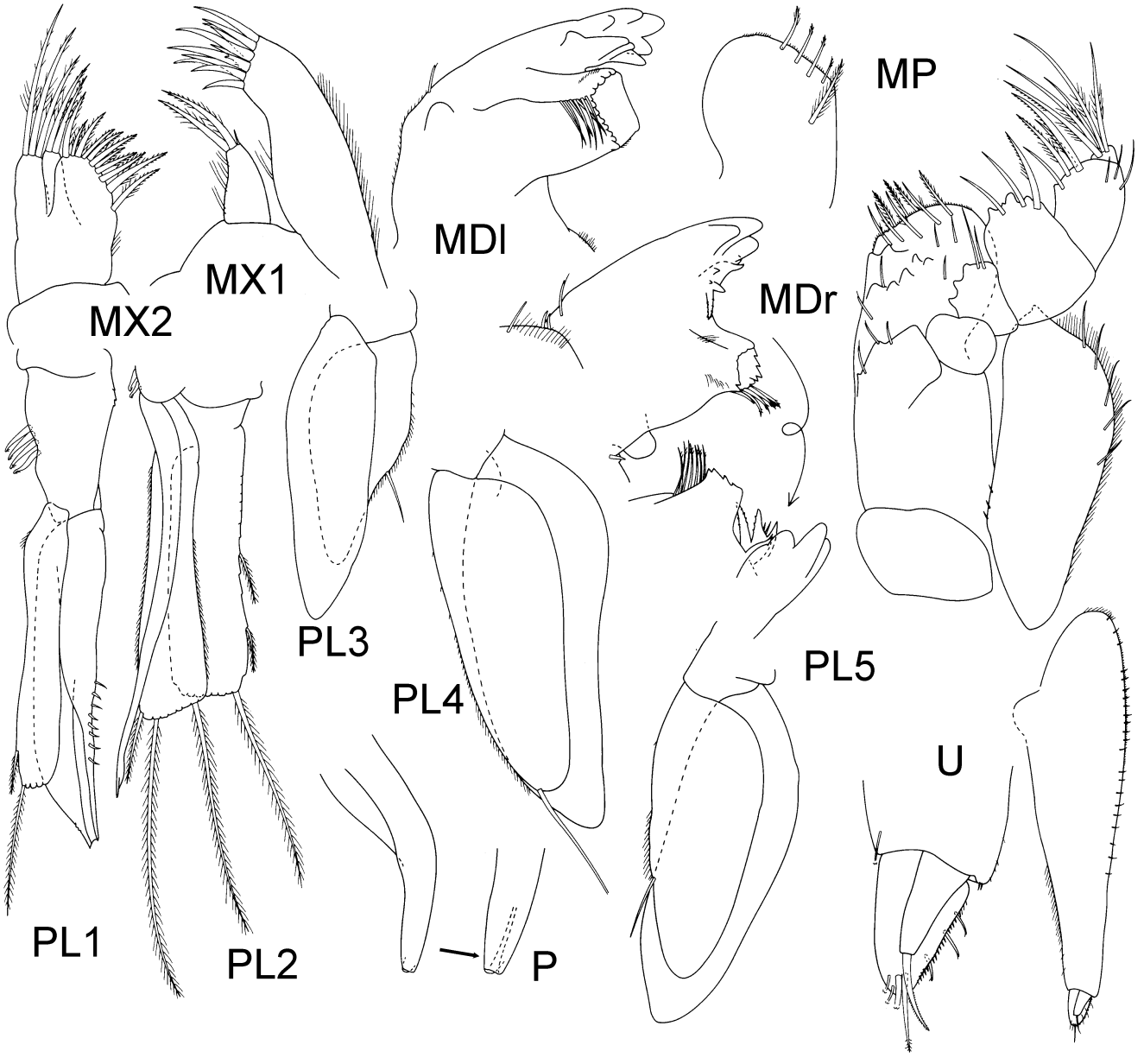


Figure 2. *Pseudidothea hoplites.* Holotype male, NMV J8705. Left and right mandibles, maxillae 1 and 2, maxilliped with detail of anterior face of endite. Pleopods 1–5; penial process; uropod with detail of rami.

exopod longer than endopod with 8 spinules on lateral margin, tapering distally, thickened and folded laterally to partially cover a groove that runs to the apex. Male pleopod 2 rami apically flattened, endopod with 9 apical plumose setae; exopod with 21 marginal plumose setae; appendix masculina styliform, slightly longer than endopod. Pleopods 3–5 becoming successively larger, rami apically rounded with single simple seta on endopod.

Uropod unarmed, rounded anteriorly, tapering posteriorly; exopod about two-thirds as long as endopod, conical, with apical seta; endopod broader, apically rounded with 4 distal setae and 3 lateral setae.

*Sexual differentiation.* Female differs from male in broader body, especially of pereonites 2–4; ornamentation more developed; antenna 1 flagellum with 3 clusters of aesthetascs on article 2; pereopods 1–4 with oostegites, pereopod 5 without oostegite; penial process absent; pleopods 1 and 2 without male modifications. Male with ventral terga separate on pereonites 1–4 and fused across midline of pereonites 5–7.

*Etymology. Hoplites* (Gr.), man in armour, in reference to the elaborate spines and ridges.

*Distribution*. South-eastern Australia (Victoria and Tasmania), 4–127 m depth.

*Remarks*. *Pseudidothea hoplites* is distinguished from other species of *Pseudidothea* by the complex ornamentation of the

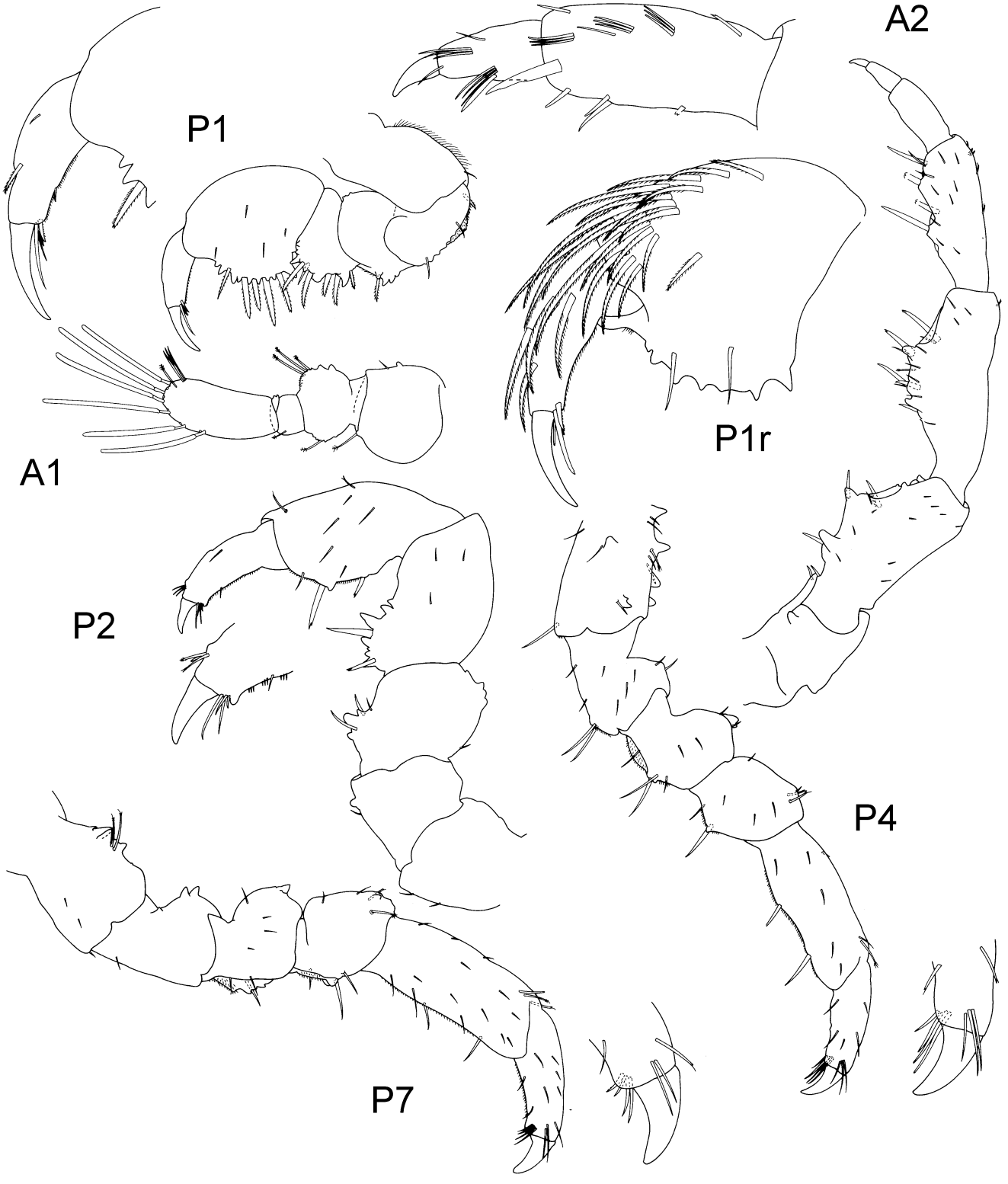


Figure 3. *Pseudidothea hoplites.* Holotype male, NMV J8705. Antennnae 1 (not all aesthetascs drawn) and antenna 2; left pereopod 1 with detail of dactylus; inner face of right pereopod 1 propodus. Pereopods 2, 4 and 7, with details of dactyli.

pereon comprising forked projections on pereonites 2 and 3, and dorsolateral and lateral lobes produced front and back. It is most similar to *P. richardsoni* from New Zealand but is much more ornamented. The lateral projections of pereonites 2 and 3 are more exaggerated but both species have anterior and posterior spines.

### ***Pseudidothea miersii*** (Studer)

*Idothea Miersii* Studer, 1884: 17, pl. 1 fig. 5. (lapsus for *Idotea*)

*Pseudidothea bonnieri* Ohlin, 1901: 276–281, fig. 6.—Nordenstam, 1933: 114, fig. 27.—Sheppard, 1957: 175–176.

*Pseudidothea miersii*.— Barnard, 1920: 380–381.—Nordenstam, 1933: 114.—Shepherd, 1957: 175–176, figs 1d, 14a–f.—Kussakin, 1967: 267–269, figs 28, 29.

*Arcturides miersii*.—Nierstrasz, 1941: 262.

*Diagnosis*. Head dorsally convex; pereon with irregular minute tubercles. Pleotelson with blunt anterolateral processes, dorsally smooth, tapering to broadly truncate and slighty upturned apex. Male antenna 1 flagellum with about 6 clusters of aesthetascs. Antennae and pereopods without tubercles. Antenna 2 peduncle with short setae on articles 3–5. Pereopods minutely setose and with tubercles. Male pleopod 1 endopod about 1.5 times as long as peduncle with marginal plumose setae; exopod longer, 16–17 spinules on lateral margin, tapering distally, to acute apex bent outwards, with oblique furrow opening at apex. Male pleopod 2 appendix masculina tapering to acute point, slightly longer than endopod. Uropodal exopod with strong apical setae, endopod with 1 short seta; exopod about two-thirds as long as endopod (Ohlin, 1901). Oostegite absent from pereopod 5 (Sheppard, 1957).

*Distribution*. East Patagonia, Falkland Islands, 115–500 m depth.

*Remarks*. Studer (1884) based his new species *Idothea miersii* on a specimen 9 mm long, collected by the *Gazelle* Expedition off the east coast of South America at 47°1'6"S, 63°29'6"W at 63 fathoms (110 m). In the same paper he redescribed his earlier named species, *Arcturides cornutus*. Ohlin (1901) based *Pseudidothea bonnieri* on two males, 9 mm long, in the Hamburg Museum. When Ohlin (1901) described *P. bonnieri* he was almost convinced that his specimens were identical with *Idothea miersii* (Studer) and in a footnote reported how he had tried to borrow Studer's material from the Museum für Naturkunde in Berlin but "got the reply that, as there were only two of them, it would be against the regulations to send them away from the Museum." Angelika Brandt compared material from the museums in Hamburg and Berlin on our behalf:

from Hamburg, a 4 mm manca and a 6.4 mm male (ZMH K-1877) labelled and catalogued "*Pseudidothea bonnieri*, Pisagua, Chile, 19°27'S, 70°10'W, K. Kophamel 1877–1889"; and

from Berlin, a 6.2 mm male (18804) labelled "Zool. Mus. Berlin 18804 *Pseudidothea bonnieri* (Syntype) Ohlin, 1901 Leg. Kap. Kophamel, 3.VI.1888, 43°6'S, 60°W" and on another label "*Pseudidothea bonnieri* Ohlin, 1901 (*Idothea miersi* (Studer)", and catalogued in Berlin with further information, "Hamburger Museum ded. Pisagua".

Brandt (pers. comm.) could find no differences between the specimens and concluded that one of Ohlin's two males had been donated to the museum in Berlin. This seems certain. The locality recorded by the two museums, but not the coordinates and collecting date of the Berlin specimen, is at odds with the type locality and more recent records of the species and is clearly wrong. Ohlin must have included antennae in his total length of 9 mm while Brandt's measurements of 6.2 and 6.4 mm do not. The manca was not mentioned by Ohlin. Studer's material can not now be found although Ohlin's footnote tells that it existed in 1901. It is tempting to speculate that, being unable to borrow Studer's material and convinced of the synonymy of his species *bonnieri* with Studer's *miersii*, Ohlin sent one of his syntypes to Berlin for comparison. This may explain why the Berlin male has two species names but whoever concluded this remains a mystery.

Sheppard (1957) examined many specimens from the Falklands region, reported them as *Pseudidothea bonnieri* but thought too that *I. miersii* was a synonym. Kussakin (1967) also illustrated a species using the older species name, as *Pseudidothea miersii*, and noted that *P. bonnieri* is probably a synonym. He observed that slight differences exist: in *P. bonnieri* the second article of the peduncle of antenna 1 bears a rounded tubercle with four setae (referring to Sheppard, 1957); in Kussakin's specimens there is a slight swelling with five setae. The epipod of the maxilliped in Sheppard's illustration of *P. bonnieri* has slightly concave lateral margins, while in Kussakin's specimens it has a regular oval form with convex lateral margins. We consider that these minor differences can be attributed to intraspecific variation or mounting.

To add to the confusion, Nierstrasz (1941) synonymised Studer's two species, *Pseudidothea bonnieri* and *Arcturides cornutus*, without explanation. It seems improbable that Studer could confuse his own two species in one paper and specimens of *A. cornutus* in our possession look nothing like a pseudidotheid; in fact, Poore (2001) placed the two species in different families.

We conclude, with Kussakin (1967), that *P. bonnieri* should be treated as a junior synonym of *P. miersii*. We treat as additional evidence the observation that all authors have reported only one species like this off eastern South America; the only other in the genus in the region, *P. scutata* Stephenson, 1947 is quite different.

### ***Pseudidothea richardsoni*** Hurley

Figure 4

*Pseudidothea richardsoni* Hurley, 1957: 15–17, figs 74–91.

*Material examined.* New Zealand, Banks Peninsula region. Off Lyttelton, 4 fm [7.3 m], H. Suter, CMNZ (4 females, 5.1–6.1 mm; 4 males, 4.8–5.1 mm, 1 figured); NMV J47116 (1 female, 1 male). Big Bay, mud bottom, 12 m, MNZ CR-9846 (2). Beacon Rock, mud bottom, 10–12 m, MNZ CR-9850 (1). E side of Port Levy, mud bottom, MNZ CR-9855 (1).

*Diagnosis*. Head with anterior margin vaguely tuberculate, dorsally with tubercles, pereon finely setose and vaguely tuberculate; tergites slightly laterally produced. Pleotelson with blunt anterolateral processes, laterally tuberculate, dorsally

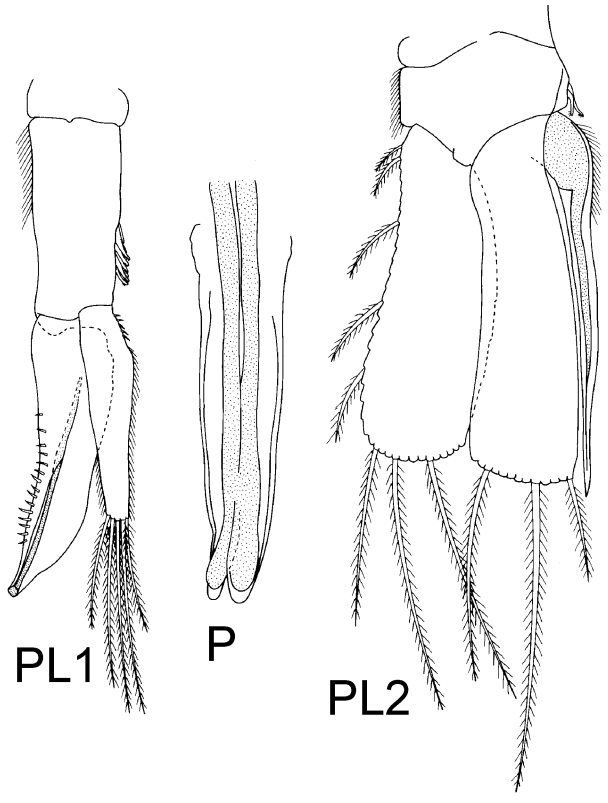


Figure 4. *Pseudidothea richardsoni.* Male, CMNZ. Pleopods 1 and 2; penial process.

smooth, tapering to a blunt apex. Male antenna 1 flagellum with about 7 clusters of aesthetascs. Antennae and pereopods without tubercles. Pereopods finely setose. Antenna 2 peduncle with long, fine setae on articles 3–5. Male pleopod 1 endopod about as long as peduncle, with plumose setae apically; exopod longer than endopod, with 15 spinules on lateral margin, tapering distally, thickened and folded laterally to partially cover groove that runs to apex. Male pleopod 2 appendix masculina styliform, about as long as endopod. Uropodal exopod with strong apical setae, endopod with 3 pappose setae; exopod about two-thirds as long as endopod. Oostegite absent from pereopod 5.

*Descriptive notes.* We examined a male specimen of *P. richardsoni* and here figure and describe pleopods 1 and 2 and the penial process:

Male pleopod 1 peduncle twice as long as wide, with 8 coupling hooks mesially; endopod lamellar with 5 lateral spinules proximally, tapering distally with 5 apical plumose setae; exopod longer than endopod with 15 spinules on lateral margin, tapering distally, thickened and folded laterally to partially cover a groove that runs to the obtuse apex. Male pleopod 2 endopod with 13 apical plumose setae; exopod with 39 marginal plumose setae; appendix masculina styliform, about as long as endopod. Penial process fused, distally bilobate.

*Distribution*. Cook Strait and Lyttelton Harbour, New Zealand, 7–146 m depth.

*Remarks*. Hurley (1957) observed that *P. richardsoni* is close to "*P. bonnieri* Ohlin" (=*P. miersii*) but he considered there are sufficient differences to warrant a separate species; these include uropodal endopod with three pappose setae, lack of tubercles on the pereopods and antenna 2 peduncle with long fine setae on articles 3–5.

The first male pleopods are also different from those of *P. miersii*. *Pseudidothea miersii* has a male pleopod 1 peduncle with 6–7 coupling hooks, endopod with plumose setae marginally, exopod with 16 or 17 spinules laterally and with an acute apex bent outwards, almost at right angles. In contrast, *P. richardsoni* has a peduncle with eight coupling hooks, an endopod with five lateral spinules proximally and five apical plumose setae, and an exopod with 15 spinules on its lateral margin, tapering distally to an obtuse apex.

### ***Pseudidothea scutata*** (Stephensen)

*Microarcturus scutatus* Stephensen, 1947: 15–17, figs 5, 6.
*Pseudidothea scutatus* Sheppard, 1957: 176–180, figs 15, 16.
*Pseudidothea scutatas*.—Brandt and Wägele, 1990: 97–105, figs 1–3 (lapsus)

*Material examined.* Antarctica, Western Weddell Sea, A. Brandt on RV *Polarstern*, Jan–Feb 2002 (ANDEEP stns): 61°09.82'S, 54°33.40'W, 302–306 m, NMV J47401 (1 male); 61°11.94'S, 54°37.37'W, 302–306 m, NMV J47402 (1 male); 61°20.51'S, 55°28.66'W, 159–117 m, NMV J47403 (1 female); 61°44.88'S, 58°1.54'W, 256–295 m, NMV J47404 (1 male); 59°52.21'S, 59°58.75'W), 3643–3622 m, NMV J47405 (1 specimen).

*Diagnosis*. Head smooth, pereonites with large, high, flat tubercles: pereonite 1 with 1 pair of dorsal tubercles and 3 pairs of shorter lateral processes; pereonites 2–4 with 1 pair of dorsal and 1 pair of lateral tubercles and 1 or 2 pairs of shorter dorsolateral processes; pereonites 5–7 with 1 pair each of dorsal, dorsolateral and lateral tubercles. Pleotelson with subacute anterolateral processes, 3 pairs of mediodorsal spines and shorter and more irregular processes, apically acute and bent dorsally. Male antenna 1 flagellum with about 25 clusters of aesthetascs. Antenna 2 and pereopods 2 and 3 with tubercles. Antenna 2 peduncle with long, fine setae on articles 3–5. Male pleopod 1 endopod about as long as peduncle with plumose setae laterally and apically; exopod longer than endopod, with diagonal groove, apically tapering, bent outwards and terminating in an acute tooth, proximal half of lateral margin with short setae, distal half with longer, plumose setae. Male pleopod 2 appendix masculina apically acute, about twice as long as rami (Stephensen, 1947). Uropodal exopod about two-thirds as long as endopod, each ramus with single seta (Sheppard, 1957). Oostegite present on pereopod 5.

*Distribution*. South Shetland Islands, Antarctic Peninsula, 159–3622 m depth.

*Remarks*. Sheppard (1957) included Stephensen's *Microarcturus scutatus* in the synonymy of what she called "*Pseudidothea scutatus* sp. n.". She admitted that Stephensen's "species appears to be identical with my specimens" and that she received Stephensen's paper after making her own descriptions and figures. Her intention would appear to

have been be to make a new combination rather than a new species.

The species differs from all other species of *Pseudidothea* in the presence of well developed oostegites on pereopods 5 (Sheppard's 1947 observation confirmed in new material). Although the pair of fifth oostegites meet in the middle, they are flat and do not help in enclosing the eggs.

The dorsal and lateral pereonal tubercles of the holotype, a 20-mm long male, are separated by gaps smaller than the tubercle diameters. In the same-sized female described by Brandt and Wägele (1990) the tubercles are relatively smaller and separated by gaps equal to their diameters. The uropodal rami of the two specimens also differ: the endopod of the male being shorter and narrower than the exopod while the two are subequal in the female. In the absence of other material, we assume these differences are sexual rather than specific. The new material collected during the 2002 ANDEEP cruise is typical of this well-described species. The individual dredged from 3643–3622 m depth, much deeper than the usual depths of a few hundred metres, could not be distinguished from the rest.

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## References

Barnard, K.H. 1920. Contributions to the crustacean fauna of South Africa. No. 6. Further additions to the list of marine Isopoda. *Annals of the South African Museum* 17: 319–438.

Brandt, A., and Wägele, J.W. 1990. Redescription of *Pseudidothea scutatas* (Stephensen, 1947) (Isopoda, Valvifera) and adaptations to a microphagous nutrition. *Crustaceana* 58: 97–105.

Dana, J.D. 1849. Conspectus crustaceorum quae in orbis terrarum circumnavigatione, Carolo Wilkes e classe Reipublicae, Foederate Duce, lexit et descripsit (continued.). *American Journal of Sciences and Arts* 8: 424–428.

Hale, H.M. 1946. Isopoda –Valvifera. *British, Australian and New Zealand Antarctic Research Expedition, 1929–1931. Reports–Series B (Zoology and Botany)* 5: 161–212.

Hurley, D.E. 1957. Some Amphipoda, Isopoda and Tanaidacea from Cook Strait. *Zoology Publications from Victoria University College* 21: 1–20.

Kussakin, O.G. 1967. Fauna of Isopoda and Tanaidacea in the coastal zones of the Antarctic and Subantarctic waters. [Translation from Russian by the Israel Program for Scientific Translations, Jerusalem, 1968.]. *Biological Reports of the Soviet Antarctic Expedition (1955–1958)* 3: 220–389.

Nierstrasz, H.F. 1941. Die Isopoden der Siboga-Expedition. IV. Isopoda Genuina. III. Gnathiidea, Anthuridea, Valvifera, Asellota, Phreatocoidea. *Siboga Expéditie Monographie* 19: 235–308.

Nordenstam, A. 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: 1–284, 282 pls, errata.

Ohlin, A. 1901. Isopoda from Tierra del Fuego and Patagonia. *Wissenschaftliche Ergebnisse der Schwedischen Expedition in die Magellanregion oder nach den Magellansländern 1895–1897* 2: 261–306, pls 220–225.

Poore, G.C.B. 2001. Isopoda Valvifera: diagnoses and relationships of the families. *Journal of Crustacean Biology* 21: 213–238.

Poore, G.C.B. 2003. Revision of Holidoteidae, an endemic southern African family of Crustacea, and re-appraisal of taxa previously included in its three genera (Isopoda: Valvifera). *Journal of Natural History* 37: 1805–1846.

Poore, G.C.B., and Bardsley, T.M. 1992. Austrarcturellidae (Crustacea: Isopoda: Valvifera), a new family from Australasia. *Invertebrate Taxonomy* 6: 843–908.

Samouelle, G. 1819. *The entomologists' useful compendium; or an introduction to the knowledge of British Insects, comprising the best means of obtaining and preserving them, and a description of the apparatus generally used; together with the genera of Linné, and modern methods of arranging the Classes Crustacea, Myriapoda, spiders, mites and insects, from their affinities and structure, according to the views of Dr. Leach. Also an explanation of the terms used in entomology; a calendar of the times of appearance and usual situations of near 3,000 species of British Insects; with instructions for collecting and fitting up objects for the microscope.* Thomas Boys: London. 496 pp, 412 pls.

Sheppard, E.M. 1957. Isopod Crustacea Part II. The sub-order Valvifera. Families: Idoteidae, Pseudidotheidae and Xenarcturidae fam. n. With a supplement to isopod Crustacea, Part 1. The family Serolidae. *Discovery Reports* 29: 141–197, pls 148, 149.

Stephensen, K. 1947. Tanaidacea, Isopoda, Amphipoda and Pycnogonida. *Scientific Results of the Norwegian Antarctic Expeditions 1927–28* 27: 1–90.

Studer, T. 1882. Über eine neue Art Arcturus und eine neue Gattung der Idotheiden. *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin* 1882: 56–58.

Studer, T. 1884. Isopoden, gesammelt während der Reise S.M.S. Gazelle um die Erde 1874–76. *Abhandlungen der Mathematisch-Physikalischen Klasse der Königlich Bayerischen Akademie der Wissenschaften* 1883: 1–28, pls 21, 22.

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

Wägele, J.-W. 1991. *Antarctic Isopoda Valvifera.* Koeltz Scientific Books: Königstein. 213 pp.