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Pseudotanaidae Sieg, 1976 (Crustacea: Peracarida) from the Southern Ocean: diversity and bathymetric pattern

M. BŁAŻEWICZ ¹, A. JAKIEL ², R. N. BAMBER^{3,†}, & G. J. BIRD ⁴

¹Department of Invertebrate Zoology and Hydrobiology, University of Lodz, Łódź, Poland, ²Department of Genetics and Marine Biotechnology, IO PAN, Sopot, Poland, ³Independent, and ⁴Waikanae, Kāpiti, New Zealand

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Abstract

From the BIOPEARL 1 and 2 Programs to the Amundsen and Scotia Seas a large series of Tanaidacea was collected using an epibenthic sled. We carried out a thorough morphological analysis of 169 individuals and provide a description of 14 pseudotanaid species distributed in three genera. Twelve species of the genus *Pseudotanais* are represented by three morphogroups: “affinis+longisetosus”, “denticulatus+abathagastor”, and “forcipatus”. We provide a redescription of *Akanthinotanais gausi*, supplement the definitions of the genera *Akanthinotanais* and *Beksitanais*, and transfer *Pseudotanais abyssii* to the genus *Beksitanais*. Based on the literature and new data, we summarize knowledge of the Antarctic Pseudotanaidae and discuss this family’s spatial and bathymetric distribution.

<http://www.zoobank.org/urn:lsid:zoobank.org:pub:1A8F69F7-454D-4CB1-B745-3660AFD3BB82>

Keywords: The Antarctic, Amundsen Sea, Scotia Sea, continental slope, BIOPEARL

Introduction

Since 2000 there has been considerable progress in understanding the Antarctic benthos (Brandt et al. 2007b, 2012; De Broyer & Danis 2011; Kaiser et al. 2013; Błażewicz-Paszkowycz 2014). The inventory of the marine fauna of the Southern Ocean accounts for over 1300 species of Peracarida alone (De Broyer & Danis 2011). These crustacean brooders were dominated by mobile, morphologically diverse, and often big forms like Amphipoda or Isopoda, while the Tanaidacea, the smaller and more immobile congeners, were represented by only 160 species among 20 families (Błażewicz-Paszkowycz 2014). Three recent publications have supplemented the list of Southern Ocean tanaidaceans by another five species (Esquete et al. 2012; Błażewicz-Paszkowycz 2014; Segadilha & Araújo-Silva 2015; Segadilha et al. 2017). These 165 species represent just 0.3–0.7% of a predicted number of tanaidacean species

(Appeltans et al. 2012; Błażewicz-Paszkowycz et al. 2012) and is undoubtedly far from complete, with the continental slope and oceanic floor likely hiding more diverse habitats and remaining hardly explored (Pabis et al. 2014). A real measure of tanaidacean species richness and diversity, especially diverse shelf depths (McCallum et al. 2015; Poore et al. 2015) has not yet been properly addressed, so the discovery of new species in each new survey is quite expected.

The paratanaoidean family Pseudotanaidae (Sieg, 1976) often dominates deep-sea tanaidacean communities (Golovan et al. 2013; Błażewicz et al. 2019; Stępień et al. 2019; Józwiak et al. 2020). Recently, the family has received more taxonomical attention, resulting in a total of 74 formally described species. They are characterised by a three-articulated antennule and by a poorly calcified, short, and robust body (except *Parapseudotanais*

Correspondence: M. Błażewicz, Department of Invertebrate Zoology and Hydrobiology, University of Lodz, Banacha 12/16, Łódź 90-237, Poland.

Email: magdalena.blazewicz@biol.uni.lodz.pl

†Deceased February 2015.

Bird & Holdich, 1989a). The first three body segments (pereonites 1–3), are always greatly shortened (concurrently with the marsupium formed only from pereonite-4), positioning the first three pairs of pereopods at short intervals. These long, slender, and closely situated pereopods are often entangled and make morphological observation of them on whole specimens a great challenge. The three features combined length allow confident identification of pseudotanaids from the paratanaoideans (e.g. Larsen & Wilson 2002; Błażewicz-Paszkowycz 2007; Bird & Larsen 2009). Furthermore, the brood pouch (marsupium) in pseudotanaids is composed of one pair of oostegites and is perhaps the sole apomorphy expressed by the family. The long pereopods and unique character of the marsupium is considered an advantage for effective protection of fertilized eggs and juveniles during active walking.

Until now, the Pseudotanaidae in the Antarctic have been known from six species in two genera (Błażewicz-Paszkowycz 2014). Four of them, *Akanthinotanaïs gaussi* Vanhöffen, 1914; *A. guillei* Shiino, 1978; *Pseudotanaïs nordenskioldi* Sieg, 1977; and *P. longisetosus* Sieg, 1977, were originally described from the Southern Ocean (Vanhöffen 1914; Sieg 1977; Shiino 1978). Two other species, *P. abyssi* Hansen, 1913 and *P. affinis* Hansen, 1887,

have been recorded in the Antarctic, although they were originally described from the Arctic (Hansen 1887, 1913; Kudinova-Pasternak 1990). The distribution of the Pseudotanaidae found in the Southern Ocean is visualized in Figure 1. (Appendix 1).

During two cruises under the acronym BIOPEARL 1 and 2 (Biodiversity dynamics: Phylogeography, Evolution And Radiation of Life in Antarctica) in 2006 and 2008 to the Amundsen and Scotia Seas respectively, a rich series of the Tanaidacea using epibenthic sled was collected (Brandt & Barthel 1995); The 549 tanaidacean individuals collected belonged to 85 species included in 26 genera (Pabis et al. 2014). In that study, the Pseudotanaidae was an abundant and diverse group of 169 individuals. For this paper, we conducted a thorough morphological analysis of the latter group of crustaceans and provide a description of 14 new species together with a supplementary redescription of *Akanthinotanaïs gaussi* (Vanhöffen, 1914), which complements some morphological features missing in the work by Sieg (Vanhöffen 1914; Sieg 1977). Finally, we summarize current knowledge on Pseudotanaidae in the Southern Ocean using the published literature and analyse the distribution and bathymetric range for each species.

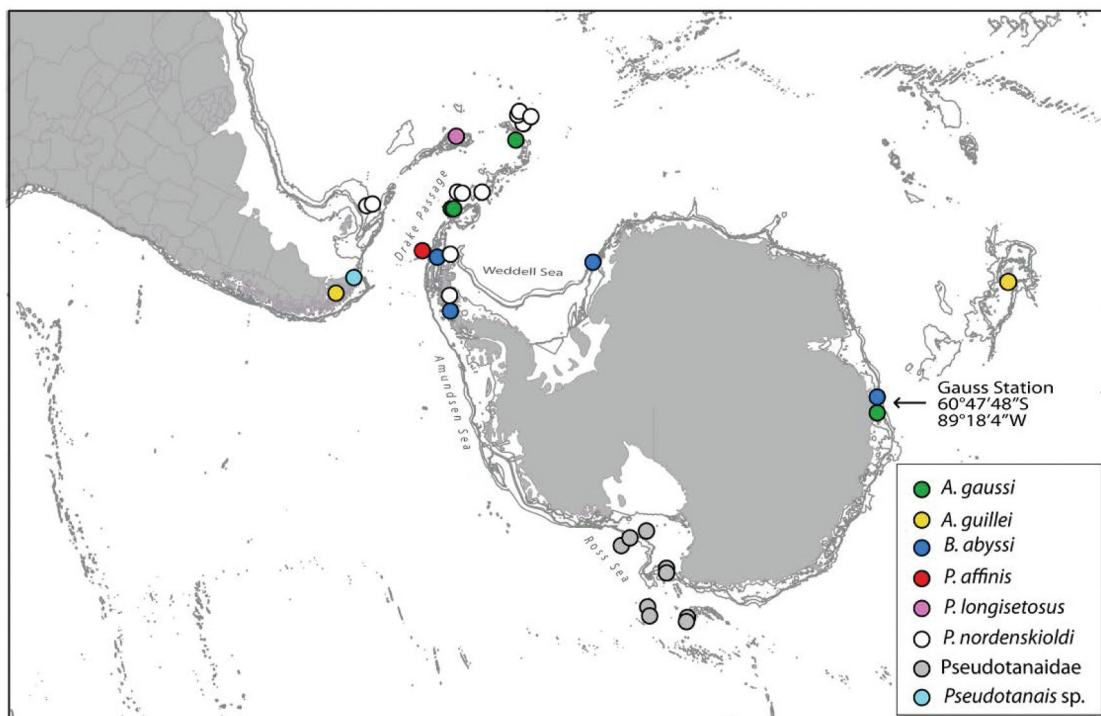


Figure 1. Spatial distribution of Antarctic Pseudotanaidae based on Vanhöffen (1914); Shiino (1978); Sieg (1986a, 1986b); Kudinova-Pasternak (1993); Błażewicz-Paszkowycz and Siciński (2014); and Pabis et al. (2015). The details of the records are in Appendix 1.

Material and methods

Stations and collection

The tanaidaceans were collected during the Austral summers 2005/06 and 2007/08 by the RRS *James Clark Ross* in the Amundsen and Scotia Seas using an epibenthic sled (EBS) (Brandt & Barthel 1995). This gear is considered an efficient way for collecting the light fraction of epi-macro-benthic communities (Frutos et al. 2016). In the Amundsen Sea, the samples were collected in two localities, i.e., the inner part of the sea (stations BIO4 and BIO5), and outer region (stations BIO3 and BIO6); in the Scotia Sea, the samples were collected in seven areas along the western side of the Antarctic Peninsula extending to the Scotia Arch, i.e., at Livingston Island (LI), Elephant Island (EI), South Orkney Islands (PB, Palmer Bay), South Sandwich Islands (ST, Southern Thule), South Georgia (SG), and Shag Rocks (SR). The depth range of the studied material is from 200 to 1500 m (Table 1, Figure 2).

The EBS was deployed in 17 stations of the Amundsen Sea at depths 500–1500 m and in 19 stations of the Scotia Sea from 200 to 1600 m. During these surveys pseudotanaids were recovered in 14 stations of the former and 14 stations of the latter. The samples were sieved on a 500 µm mesh and fixed in 96% un-denatured pre-cooled ethanol and frozen for at least 48 hours at -20°C .

Morphological analyses and Linnean taxonomy

Specimens were dissected with chemically sharpened tungsten needles, and the dissected appendages were then mounted on slides with glycerine as a medium and a paraffin-wax sealant ring (Figure 3). Drawings were prepared using a light microscope (Nikon Eclipse 50i) equipped with a *camera lucida*. Digital drawings were inked and arranged to plate in Photoshop.

- Morphological terminology is largely as in Jakiel et al. (Jakiel et al. 2019, 2020);
- the unique blade-like spine characteristic of most pseudotanaids is categorized as “long” when is at least 0.6x propodus, “intermediate” when it is 0.5x propodus and “short” when it is at most 0.3x the propodus;
- setae types are recognized as (1) simple setae (=without ornamentation), (2) serrate – with serration or denticulation, (3) plumose – with any type of plumose or delicate setulae distributed along the main axis, (4) penicillate – with a tuft of setules located distally and with a small knob on which

- a seta is fixed to the tegument and (5) rod setae – slightly inflated distally and with a pore;
- the dorsodistal seta occurring on the carpus of pereopod 4–6 has a chemosensory function – (“rod seta” Jakiel et al. 2019); it is categorized as “long” when it is at least 0.8x propodus, “intermediate” when it is 0.5x propodus and “short” when it is at most 0.25x propodus.

Splitting of *Pseudotanaids* into different morphogroups (“affinis+longisetosus”, “denticulatus+abathagastor” and “forcipatus”) follows Bird & Holdich (1989a) and Jakiel et al. (2019).

Type material has been lodged at the Natural History Museum (NHM) in London (UK).

Measurements and developmental stage identification

Total body length (BL) was measured along the main axis of symmetry from the rostrum to the end of the telson. Body width (BW) was measured at the widest point along the main axis of symmetry. The length was measured along the axis of symmetry, and the width perpendicular to the axis of symmetry at the widest spot. To simplify species descriptions, the expression “Nx” replaces “N times longer than/as long as” and “N L:W” replaces “N times longer than wide”. The measurements were made with a camera connected to the microscope (Nikon Eclipse Ci-L) and NIS-Elements View software (www.nikoninstruments.com). The body width and the length of the cephalothorax, pereonites, pleonites, and pleotelson were measured on whole specimens.

For all individuals, developmental stages were identified. In particular, we refer to the following stages:

- two stages of manca, i.e., “manca-2” and “manca-3” which refer to specimens without or with buds of pereopod-6, respectively.
- two stages of females, i.e., juvenile female with oostegites buds (equivalent to “preparatory female” *sensu* Bird & Holdich 1989a), and brooding female with developed marsupium).
- neuter – a stage that is morphologically similar to juvenile female, but lacking oostegite buds.
- “juvenile male” that shows incompletely developed sexual dimorphic characters, i.e., resembling the neuter but has thicker antennules (equivalent to “preparatory male” *sensu* Bird & Holdich 1989a).

In our collection no sexually mature male (“swimming male”) was recovered.

Table I. Details on the sampling stations collected with an epibenthic sledge during the BIOPEARL 1 and 2 Expeditions.

station	Localisation	Depth (m)	Start lat °S	End lat °S	Start long °W	End long °W
Amundsen Sea						
BIO3-EBS-1B	external part of the sea	577.67-577.68	71° 47.49'	71° 47.33'	106° 12.83'	106° 12.91'
BIO6-EBS-1A		1460.1-1473.81	71° 9.47'	71° 9.5'	110° 5.01'	110° 5.49'
BIO6-EBS-2A		1046.86-1040.78	71° 10.51'	71° 10.55'	109° 51.38'	109° 51.87'
BIO6-EBS-3A		481.11-478.14	71° 20.82'	71° 20.66'	110° 0.79'	110° 0.79'
BIO6-EBS-3E		484.03-477.19	71° 20.59'	71° 20.43'	109° 57.93'	109° 57.95'
BIO4-EBS-1A	internal part of the sea	1414.29-1413.5	74° 21.58'	74° 21.66'	104° 44.75'	104° 44.19'
BIO4-EBS-3A		504.29-489.65	74° 23.9'	74° 24'	104° 37.92'	104° 37.47'
BIO4-EBS-3B		495.97-508.53	74° 24.13'	74° 24.24'	104° 36.9'	104° 36.46'
BIO4-EBS-3D		502.65-507.12	74° 23.45'	74° 23.59'	104° 46.03'	104° 45.76'
BIO5-EBS-1A		1478.92-1486.13	74° 7.09'	74° 7.17'	105° 50.26'	105° 49.72'
BIO5-EBS-2A		1045.85-1113.97	73° 52.8'	73° 52.92'	106° 18.99'	106° 18.56'
BIO5-EBS-3A		568.68-553.97	73° 58.31'	73° 58.44'	107° 25.37'	107° 25.03'
BIO5-EBS-3B		551.7-545.76	73° 58.61'	73° 58.75'	107° 24.61'	107° 24.26'
BIO5-EBS-3D		547.27-544.97	73° 58.68'	73° 58.82'	107° 24.95'	107° 24.6'
Scotia Sea						
EI-EBS-1	Elephant Island, South Shetlands	1490.5-1503.15	61° 36.71'	61° 36.83'	55° 13.05'	55° 13.3'
EI-EBS-2		1000.27-1000.38	61° 34.38'	61° 34.44'	55° 14.54'	55° 14.87'
EI-EBS-4		199.39-204.17	61° 20.12'	61° 20.18'	55° 12.22'	55° 12.54'
LI-EBS-3	Livingston Island, South Shetlands	557.35-624.21	62° 23.73'	62° 23.7'	61° 46.25'	61° 46.59'
PB-EBS-4	Palmer Bay, South Orkney Islands	210.91-211.55	60° 49.3'	60° 49.45'	46° 29.1'	46° 28.93'
SR-EBS-4	Shack Rocks	203.6-201.02	53° 37.68'	53° 37.59'	40° 54.46'	40° 54.69'
SR-EBS-5		501.61-505	53° 19.27'	53° 19.27'	42° 14.05'	42° 13.79'
SR-EBS-6		1016.43-1027.42	53° 15.19'	53° 15.19'	42° 8.63'	42° 8.89'
SG-EBS-5E	South Georgia	316.07-315.59	53° 47.37'	53° 47.26'	37° 53.11'	37° 54.46'
SG-EBS-3E		496.22-477.95	53° 35.84'	53° 35.84'	37° 54.18'	37° 54.46'
ST-EBS-2	Southern Thule, Southern Sandwich	1019.11-1038.85	59° 30.42'	59° 30.4'	27° 18.15'	27° 18.47'
ST-EBS-3		543.88-519.86	59° 28.84'	59° 28.84'	27° 16.69'	27° 17.01'
ST-EBS-3B		500.31-501.06	59° 28.8'	59° 28.8'	27° 17.35'	27° 17.67'

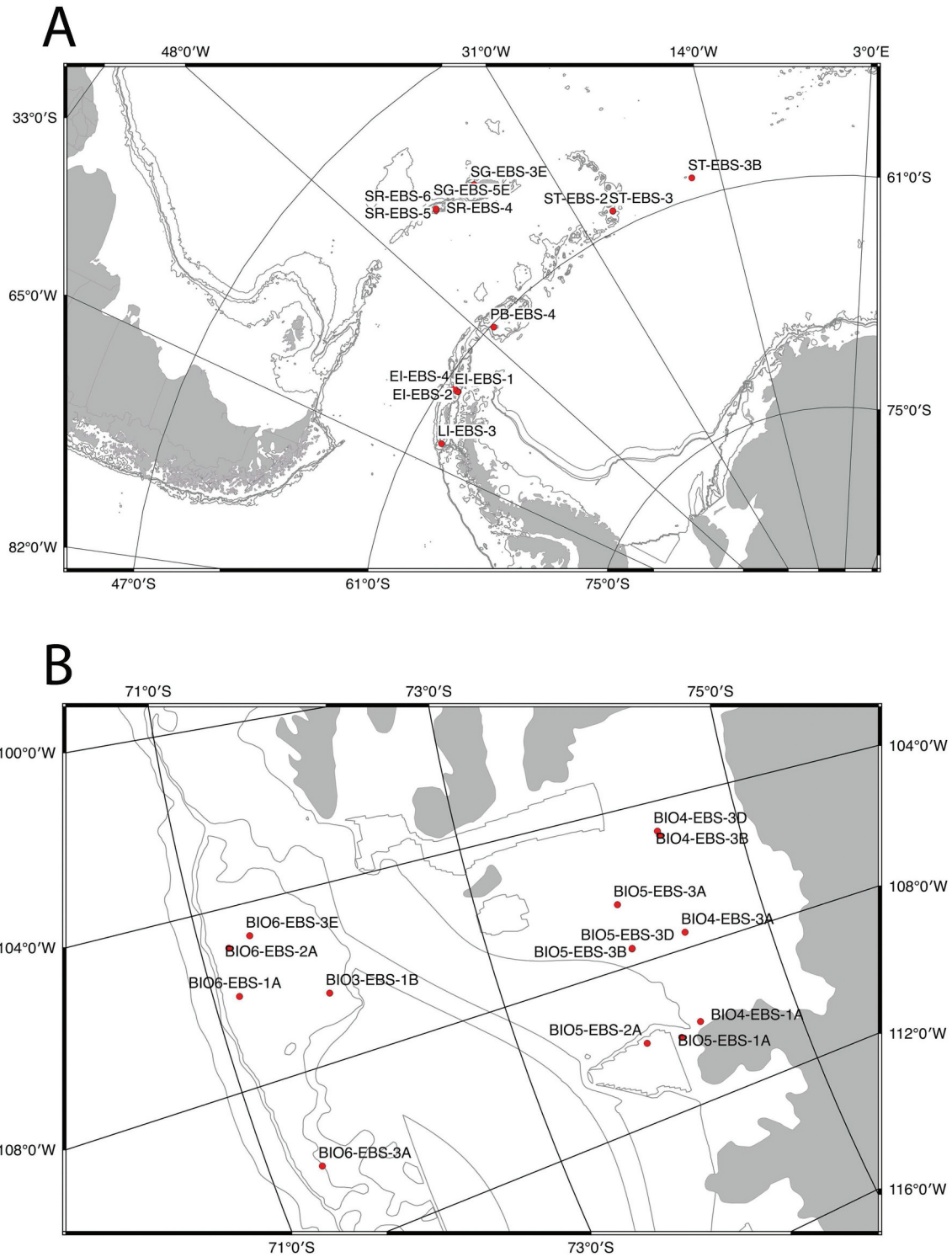


Figure 2. Distribution of the sampling stations collected with an epibenthic sledge during the BIOPEARL 1 and 2 Expeditions. For details of the station see Table I.

Distribution analysis

All 28 samples obtained with the EBS were included in the analysis in order to investigate the similarity/

dissimilarity among pseudotanaid communities. The hierarchical agglomerative clustering analysis was performed by using PRIMER 7 (Clarke & Gorley 2015) on presence-absence data, applying the Bray-Curtis

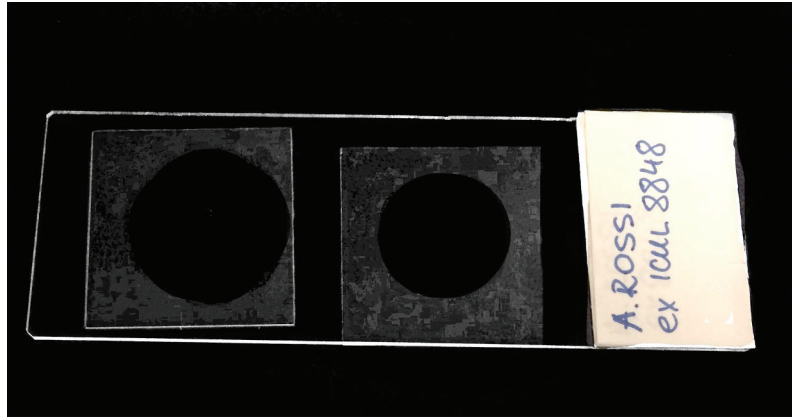


Figure 3. Dissected appendages mounted in glycerine on slides with a paraffin-wax sealant ring.

formula and the group average method. A SIMPROF test with 5% significance level was performed to assess the multivariate structure within groups.

Divergences in pseudotanaid composition between the areas were statistically tested using Analysis of Similarities (ANOSIM), where an R value closer to 1 signifies those similarities are greater within the areas while a value of zero signifies uniform similarities between and within the areas (Clarke & Gorley 2015). The similarity/dissimilarity between the samples were visualized with Heatmap.

Systematics

Order Tanaidacea Dana, 1849
 Suborder Tanaidomorpha Sieg, 1980
 Superfamily Paratanaoidea Lang, 1949
 Family Pseudotanaidae Sieg, 1976
Genus *Akanthinotanaeis* Sieg, 1977

Diagnosis. Amended after Sieg (1977): Eyes present or absent. Antenna article 2–3 with seta. Molar acuminate. Carpus pereopods 2–6 without blade-like spine, but with slender or bayonet-like spines.

Species included. *Akanthinotanaeis breviaquas* Larsen, 2012; *A. cabrali* Bamber, 2014; *A. gaussi* Vanhöffen, 1914; *A. gerlachi* Sieg, 1977; *A. guillei* Shiino, 1978; *A. longipes* Hansen, 1913; *A. makrothrix* Dojiri & Sieg, 1997; *A. malayensis* Sieg, 1977; *A. mortenseni* Sieg, 1977; *A. scrappi* Bamber, 2005; *A. siegi* Kudinova-Pasternak, 1985; *A. similis* Sieg, 1977; *A. rossi* sp. nov.

***Akanthinotanaeis gaussi* (Vanhöffen, 1914)**
 (Figures 4–6)

Synonymy. *Pseudotanaeis gaussi*: Vanhöffen (1914): 483–484, fig. 20; Kudinova-Pasternak (1975): 225;

Sieg (1984b): 102; Bird & Holdich (1989a): 293; Błazewicz-Paszkowycz (2014): 483.

Pseudotanaeis (= *Akanthinotanaeis*) *gaussi*: Sieg (1977): 50–54, figs: 34–38. Larsen et al. (2012): 42; Sieg and Heard (1988): 41.

Material examined. Brooding female 1.9 mm, neuter 1.3 mm, manca-2 1.1 mm, ICUL8821, BIO3-EBS-1B (NHM UK 2021.84); neuter 1.3 mm, ICUL8890, BIO4-EBS-1A (NHM UK 2021.85); two juvenile females 1.5–2.1 mm, two neuters 1.3–1.5 mm, ICUL8820, BIO4-EBS-3A (NHM UK 2021.86); juvenile female 1.4 mm, ICUL8825, BIO4-EBS-3A (NHM UK 2021.87); dissected neuter 1.4 mm, ICUL8913, BIO4-EBS-3A (NHM UK 2021.88); three neuters 1.4 mm, ICUL8822, BIO4-EBS-3B (NHM UK 2021.89); neuter 1.3 mm, ICUL8823, BIO4-EBS-3D (NHM UK 2021.90); juvenile female 2.0 mm, ICUL8824, BIO6-EBS-2A (NHM UK 2021.91)..

Diagnosis. Eyes absent. Antennule article-3 without thick-rod seta. Mandible molar acuminate. Cheliped carpus 2.6 L:W; palm 1.3 L:W; fixed finger 0.8x palm. Pereopod-1 carpus 0.5x propodus; propodus 0.7x dactylus and unguis combined length. Uropod exopod 0.7x endopod, two-articled; uropod endopod two-articled.

Etymology. The species was named in honour of Johann Friedrich Carl Gauss, German mathematician and physicist. The type locality of *Pseudotanaeis gaussi* is related to the Gauss Station, located during voyage of the Deutsche Südpolar-Expedition during 1901–1903.

Redescription of female with oostegites. BL = 1.8 mm. Body robust (Figure 4(a–d)) 3.8 L:W. Cephalothorax

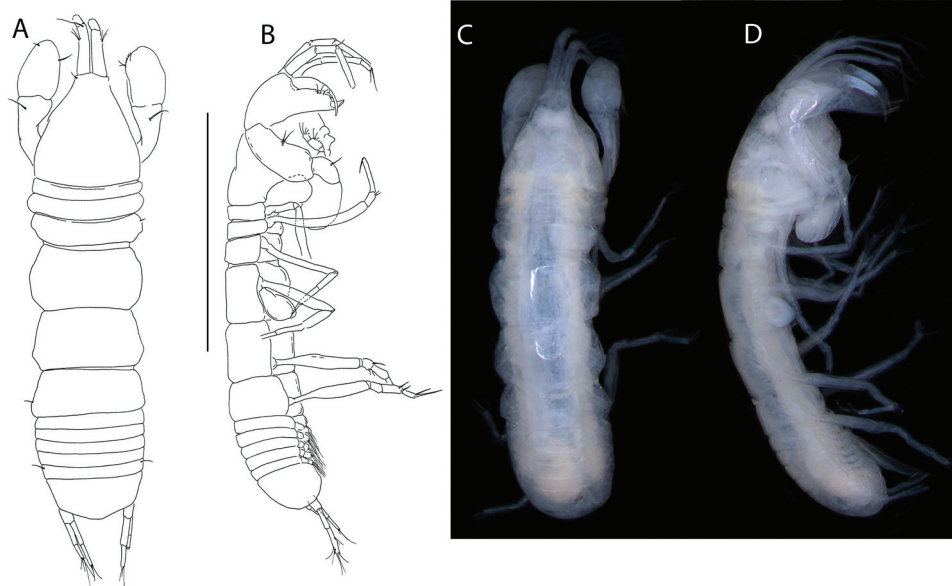


Figure 4. *Akanthinotanais gaussi* Vanhöffen, 1914, female, (a, c), dorsal; (b, d), lateral. Scale line = 1 mm.

1.1 L:W, 1.9x pereonites 1–3, 0.3x BL. Pereonites 0.5x BL, pereonites 1–6: 0.13, 0.17, 0.2, 0.5, 0.5 and 0.4 L:W, respectively. Pleon short, 0.2x BL. Pleonites 0.6 L:W. Pleotelson 2.8x pleonite-5.

Antennule (Figure 5(a)) elongate, slender; article-1 4.9 L:W, 3.3x article-2, with one simple and four penicillate mid-length setae, and three simple (one long, two short) and two penicillate distal setae; article-2 2.6 L:W, 0.5x article-3, with dorsodistal seta longer than article-2; article-3 8 L:W, with five simple and one penicillate setae, and one aesthetasc.

Antenna (Figure 5(b)) just longer than antennule; article-1 fused with body, naked; article-2 1.1 L:W, 0.7x article-2, with fine dorsodistal seta; article-3 1.5 L:W, 0.1x article-4, with fine dorsodistal seta; article-4 11.1 L:W 5.0x article-5, with subdistal penicillate seta, and three simple and one penicillate setae distally; article-5 3.0 L:W, with distal seta; article-6 minute with five distal setae.

Labrum (Figure 5(c)) rounded, naked.

Left mandible (Figure 5(d)) incisor distally pointed, margin finely serrate, *lacinia mobilis* well developed, distally serrate; molar acuminate, naked.

Right mandible (Figure 5(e)) incisor unequally bifid, margin serrate, molar as in left mandible.

Maxillule (Figure 5(f)) endite with seven distal spines (Figure 5(f)), setulate distally and subdistally; palp with two distal setae. Maxilla simple, semi-rounded.

Labium not seen.

Maxilliped (Figure 5(g)) basis wide proximally, subrectangular; palp article-1 naked; article-2 with inner setae (outer seta not seen); article-3 with four inner setae; article-4 with five distal and one subdistal setae. Maxilliped endites (Figure 6(g)) separated, with one gustatory cusp.

Epignath (Figure 5(h)) ribbon-shaped, flexible, distally rounded.

Cheliped (Figure 6(a)) basis large, 1.25 L:W, with round posterior lobe; merus shorter than carpus ventral margin, with midventral seta; carpus 2.6 L:W, 1.4x palm with dorsodistal seta, dorsoproximal seta broken; chela robust, non-forcinate, 2.3 L:W, 1.6x carpus L, palm 1.3 L:W, with seta near dactylus insertion; fixed finger 2.1 L:W, 0.8x palm, with ventral seta, cutting edge extended-convex, margin serrate with three setae, distal spine pointed; dactylus slender, dactylus 1.3x unguis, proximal seta present, unguis 4.2 L:W.

Pereopod-1 (Figure 6(b)) overall very slender; coxa present, seta not seen; basis slender, 12.6 L:W, 4.2x merus, with middorsal penicillate seta; ischium naked; merus 3.8 L:W, 0.7x carpus, naked; carpus anaxially articulated to merus, 5.5 L:W, 0.5x propodus, naked; propodus 8.0 L:W, 0.7x dactylus and unguis combined length, with one dorsal and one ventral subdistal setae; dactylus 0.5x unguis, with dorsoproximal long seta.

Pereopod-2 (Figure 6(c)) shorter and stouter than pereopod-1; coxa present, seta not seen; basis 6.0 L:W, 4.3x merus, naked; ischium with small ventral

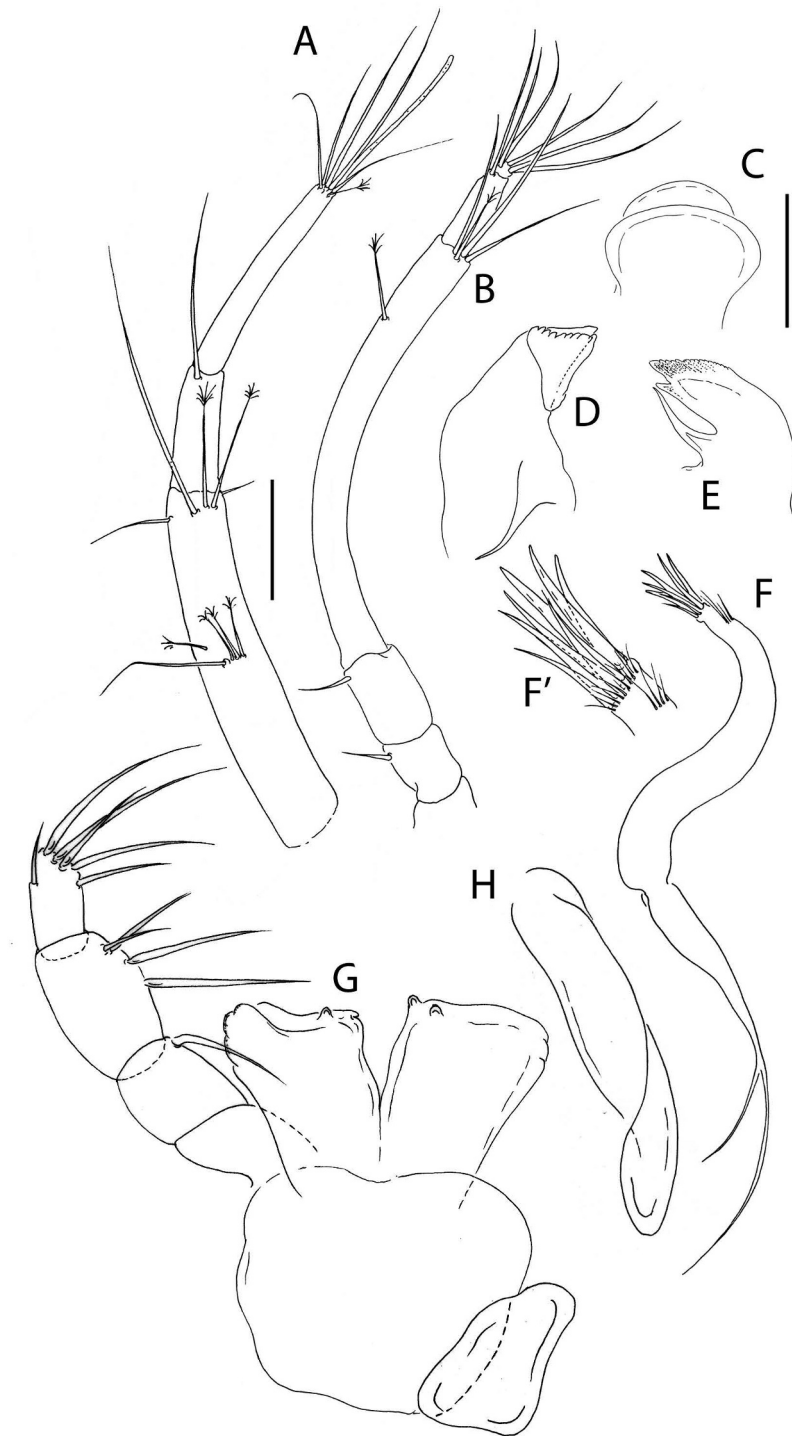


Figure 5. *Akanthinotanaeus gausi* Vanhöffen, 1914, female, (a), antennule; (b), antenna; (c), labrum; (d), left mandible; (e), right mandible; (f), maxillule, with (f'), detail of distal end of endite; (g), maxilliped; (h), epignath; Scale lines = 0.1 mm.

seta; merus 1.8 L:W, 0.5x carpus, with ventrodistal seta; carpus 4.0 L:W, 1.3x propodus, with small dorsodistal seta, long spine and seta ventrodistally; propodus 4.2 L:W, 0.8x dactylus and unguis

combined length, with distal spine (1.6x dactylus); dactylus 0.7x unguis.

Pereopod-3 (Figure 6(d)) coxa present, seta not seen; basis 9.3 L:W, 5.0x merus, with

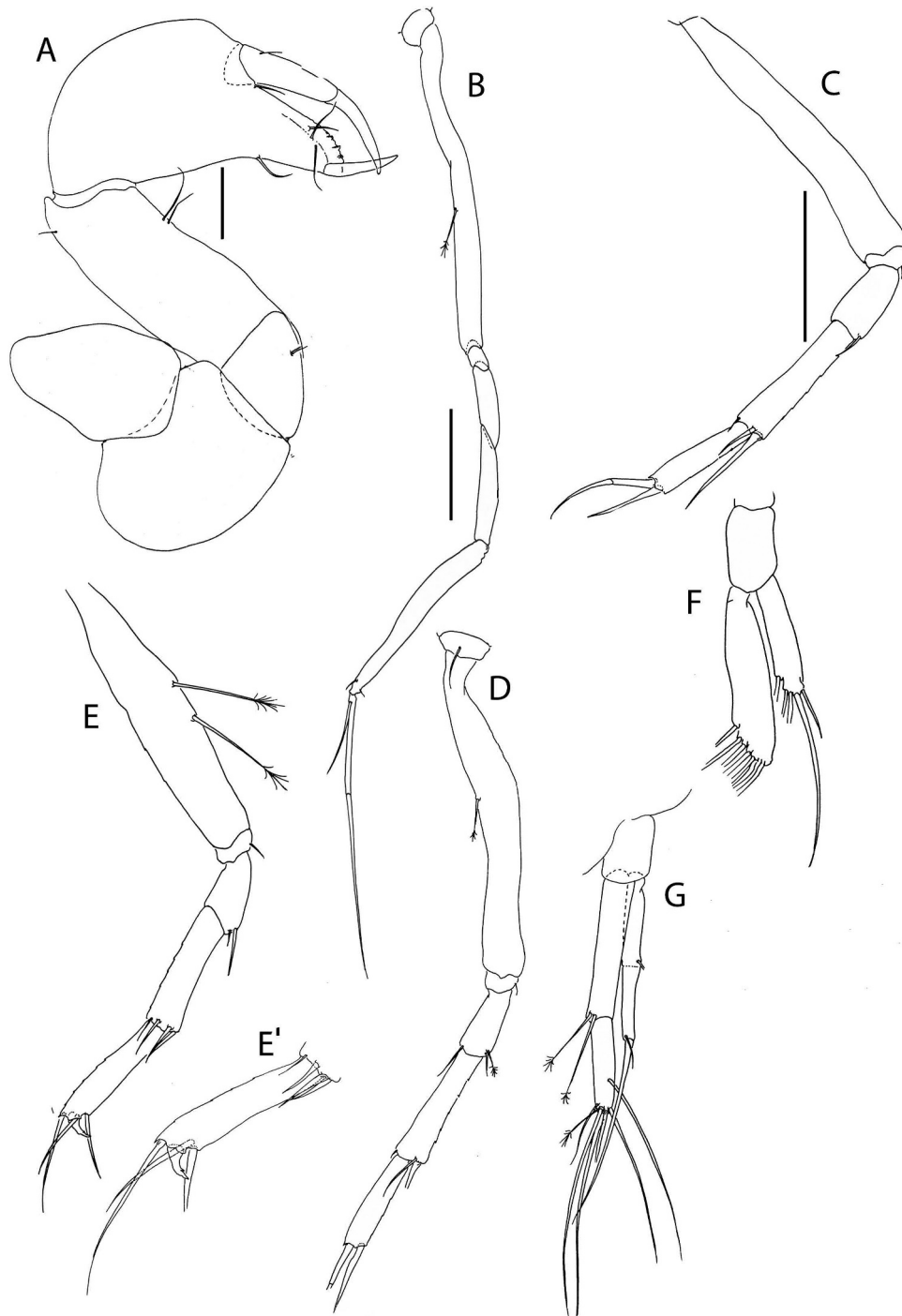


Figure 6. *Akanthinotanaiss gaussi* Vanhöffen, 1914, female, (a), cheliped; (b to d), pereopods 1 to 3; (e), pereopod-5, with (e'), detail of distal articles; (f), pleopod; (g), uropod. Scale lines = 0.1 mm.

middorsal penicillate seta; ischium with small ventral seta; merus 2.2 L:W, 0.6x carpus, with two simple and one penicillate distal setae; carpus 3.5 L:W, 1.1x propodus, with short dorsodistal spine, long spine, and seta ventrodistally;

propodus 4.0 L:W, with distal spine (1.5x dactylus); unguis broken.

Pereopod-4 broken.

Pereopod-5 (Figure 6(e,e')) basis 5.2 L:W, 5.2x merus, with two long penicillate ventral setae;

ischium with ventrodiscal seta; merus 1.7 L:W, 0.5x carpus, with one longer and one fine ventrodiscal setae; carpus 3.6 L:W, 1.0x propodus, with four distal setae; propodus 4.2 L:W, 4.0x dactylus and unguis combined length, with two ventrodiscal and one dorsodiscal spine; dactylus fused with unguis, unequally bifurcate.

Pleopod (Figure 6(f)) peduncle 1.6 L:W; endopod distinctly shorter than exopod, 4.2 L:W, with five plumose setae; exopod 3.5 L:W, with eight plumose setae.

Uropod (Figure 6(g)) peduncle 1.2 L:W; exopod and endopod two-articled; exopod 0.7x endopod, article-1 4.8 L:W, with seta, article-2 5.0 L:W with two setae; endopod article-1 5.0 L:W, 1.8x article-2, with two penicillate distal setae, article-2 4.45 L:W, with six simple and one penicillate setae.

Distribution. Amundsen Sea, 489–1414 m.

Remarks. We redescribe much of the morphology of *Akanthinotanaiss gaussi*, as Sieg's (1977) description and figures were based on a subadult ("neuter"), and were somewhat stylized.

Akanthinotanaiss gaussi is one of three blind species in the genus. The two-articled uropod exopod distinguishes *A. gaussi* from *A. longipes* and *A. similis*, where it is one-articled. Additionally, a two-articled

uropod endopod differentiates *A. gaussi* from *A. similis* with its one-articled endopod. Finally, the absence of thick rod seta on antennule article-3 differentiates *A. gaussi* from *A. longipes*, that has this seta.

McLelland (2008) pointed out that the only species of *Akanthinotanaiss* with two distal setae on the propodus of pereopod-1 was *A. guillei*, originally recorded from the Kerguelen Islands at depths of 10 and 32 m (Shiino 1978). In fact, although not described or figured by Sieg (1977) in his redescription of the lectotype, *A. gaussi* shares this feature. *Akanthinotanaiss guillei* is one of few Antarctic species known to have eyes.

***Akanthinotanaiss rossi* sp. nov.**

(Figures 7–9)

<http://www.zoobank.org/urn:lsid:zoobank.org:act:38AE8A73-31FB-40FB-A2C5-E9E5C16321C5>

Material examined

Holotype, juvenile female 1.6 mm, ICUL8847, SR-EBS-5 (NHM UK. 2021.92). Paratypes: neuter 1.1 mm, ICUL8885, SG-5E (NHM UK. 2021.93); neuter 1.5 mm, ICUL8849, SR-EBS-4 (NHM

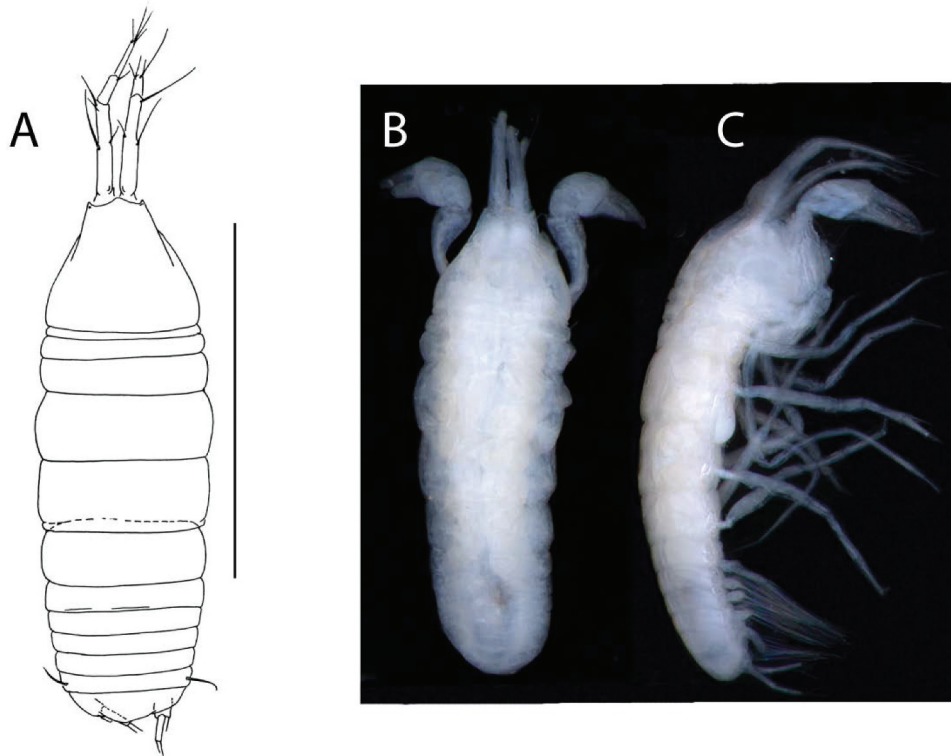


Figure 7. *Akanthinotanaiss rossi* sp. nov., holotype female, (a, b), dorsal; (c), lateral. Scale line = 1 mm.

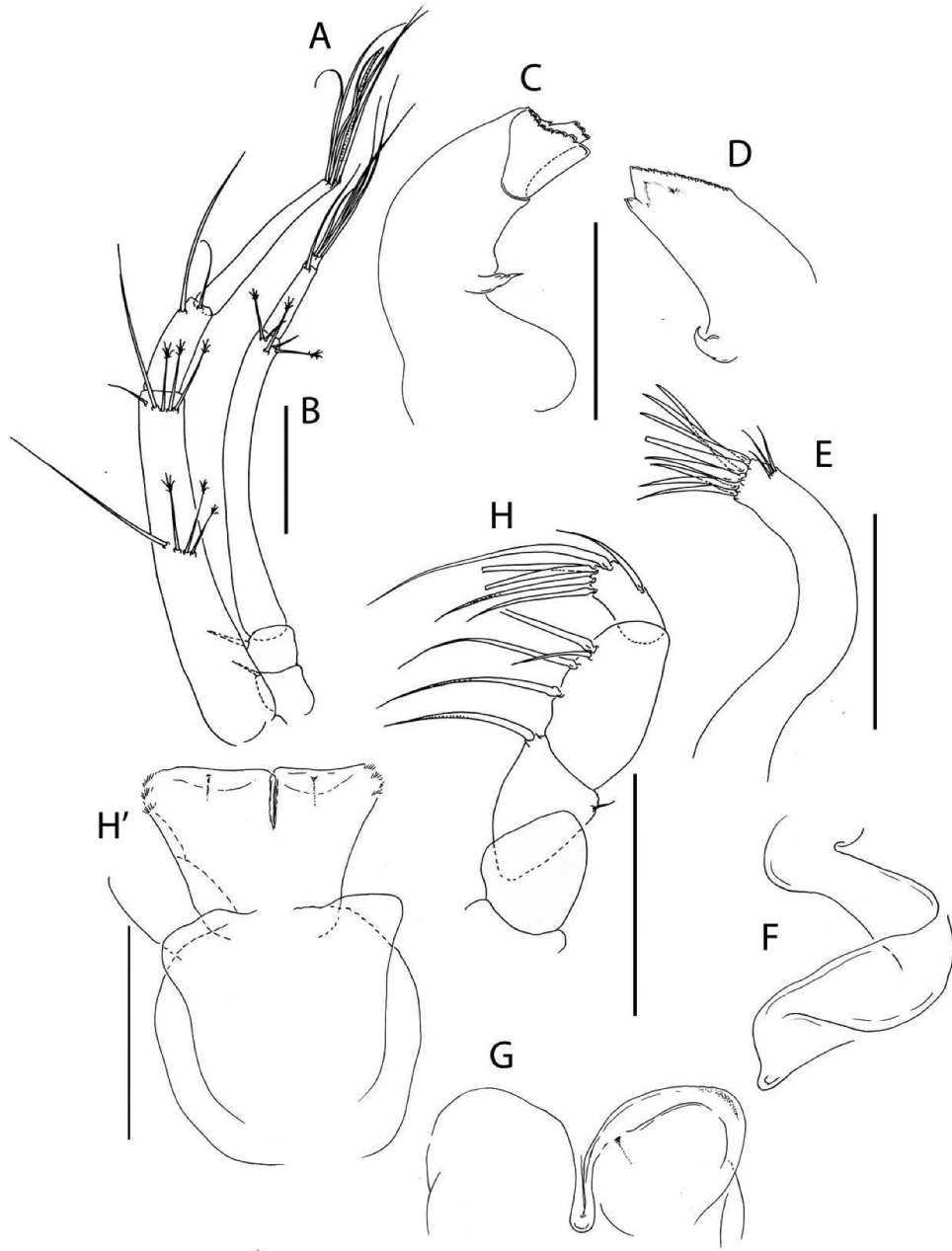


Figure 8. *Akanthinotanais rossi* sp. nov., (a), antennule; (b), antenna; (c), left mandible; (d), right mandible; (e), maxillule; (f), epignath; (g), labium; (h), maxilliped endites; (h'), maxilliped palp. Scale lines = 0.1 mm.

UK.2021.94); dissected neuter 1.5 mm, ICUL8918, SR-EBS-4 (NHM UK.2021.95); dissected 2 microscope slides (NOT LISTED IN ORIGINAL MS -LEH:), two neuters 1.4–1.5 mm, ICUL8848, SR-EBS-5 (NHM UK.2021.96); dissected neuter 1.4 mm, ICUL8902, SR-EBS-5 (NHM UK.2021.97).

Diagnosis. Eyes absent. Antennule article-3 without thick rod seta. Mandible molar acuminated, short. Cheliped carpus 2.5 L:W; palm 1.4 L:W; fixed finger 1.1x palm. Pereopod-1 carpus 0.8x propodus; propodus 1.2x dactylus and unguis combined length. Uropod exopod one-articled, 0.3x endopod; endopod two-articled.

Etymology. Species name in honour of Sir James Clark Ross, a British Royal Navy officer and explorer of the Antarctic.

Description of juvenile female (holotype). BL = 1.6 mm. Body robust (Figure 7(a–c)) 2.9 L:W. Cephalothorax 0.9 L:W, 2.1x pereonites 1–3, 0.3x BL. Pereonites 0.5x BL, pereonites 1–3 progressively longer, pereonites 1–6: 0.01, 0.12, 0.2, 0.4, 0.4 and 0.4 L:W, respectively. Pleon short, 0.3x BL. Pleonites 0.2 L:W, pleonite-5 with conspicuous lateral seta (one on each side). Pleotelson 1.8x pleonite-5.

Antennule (Figure 8(a)) article-1 5.1 L:W, 3.5x article-2, with one simple and three penicillate mid-length setae, and two simple and three penicillate distal setae; article-2 2.7 L:W, 0.6x article-3, with two (short and long) dorsodistal setae; article-3 7.4 L:W, with five simple setae and one aesthetasc distally.

Antenna (Figure 8(b)) shorter than antennule; article-2 1.1 L:W; 1.1x article-3, with seta (0.6x article-2); article-3 1.0 L:W, 0.15x article-4, with robust seta (1.0x article-3); article-4 8.3 L:W, 3.9x article-5, with two simple and three penicillate setae, distally; article-5 3.4 L:W, 5.7x article-6, with simple seta; article-6 1.0 L:W, with four distal setae.

Labrum not seen.

Left mandible (Figure 8(c)) incisor with distal margin truncate, with three blunt teeth, margin irregularly serrate; *lacinia mobilis* well developed, distal margin serrate; molar acuminate, small.

Right mandible (Figure 8(d)) incisor unequally bifid, outer margin serrate, molar as in left mandible.

Maxillule (Figure 8(e)) endite with eight distal spines and outer subdistal tuft of setules.

Maxilla not seen.

Labium (Figure 8(g)) simple smooth, with cusps in the middle of inner margin.

Epignath (Figure 8(f)) ribbon-shaped, flexible, distally truncate.

Maxilliped (Figure 8(h,h')) bases about as long as broad, naked; palp article-1 naked, article-2 with one fine outer and one long inner setae, article-3 with four (three long and one short) inner setae, article-4 with one subdistal and five distal setae, the distalmost seta very long; all inner/distal setae with distal half of inner margin finely denticulate; endites partially fused, with distal cleft about 0.3x total length, with one small gustatory cusp.

Cheliped (Figure 8(a)) slender; basis 2.3 L:W; merus 0.4x carpus ventral margin, with ventral seta; carpus 2.5 L:W, 1.4x palm, with two midventral setae and dorsodistal simple seta (dorsoproximal seta not seen); chela non-forcipate, 3.0 L:W, 1.4x carpus L, palm 1.4 L:W, with comb of 15

(14 small and one longer setae) on inner side, and with seta near dactylus insertion; fixed finger 3.0 L:W, 1.1x palm, with ventral seta; cutting edge almost simple but with few small teeth distally, with three setae; dactylus 5.0 L:W, cutting edge smooth, proximal seta not seen; unguis 0.4x dactylus.

Pereopod-1 (Figure 9(b)) very slender and elongate; basis 9.3 L:W, 5.1x merus, naked; ischium with ventral seta; merus 2.2 L:W, 0.3x carpus, naked; carpus 6.4 L:W, 0.8x propodus, naked; propodus 10.5 L:W, 1.2x dactylus and unguis combined length, naked; dactylus 0.5x unguis.

Pereopod-2 (Figure 9(c)) coxa with seta; basis 6.3 L:W, 4.5x merus, with one penicillate and one simple dorsoproximal setae; ischium with ventral seta; merus 2.0 L:W, 2.5x carpus, with two (short and long) ventrodial setae; carpus 5.0 L:W, 1.1x propodus, with small dorsodistal seta, two setae and slender spine ventrodially; propodus 6.4 L:W, 0.9x dactylus and unguis combined length, with long distal spine (1.9x dactylus); dactylus 0.4x unguis.

Pereopod-3 (Figure 9(d)), coxa with seta; basis 6.4 L:W, 5.3x merus, naked; ischium with ventral seta; merus 1.6 L:W, 0.5x carpus, with ventrodial seta; carpus 3.8 L:W, 0.9x propodus, with one dorsodistal and two ventrodial setae; propodus 6.3 L:W, 2.5x dactylus and unguis combined length, with one distal slender spine (4.8x dactylus); dactylus 0.7x unguis.

Pereopod-4 (Figure 9(e)) basis 5.0 L:W, 4.3x merus, naked; ischium with long and short setae; merus 2.1 L:W, 0.5x carpus, with ventrodial seta; carpus 4.3 L:W, 1.0x propodus, with three (two long and one short) ventrodial setae and dorsodistal seta; propodus 7.3 L:W, 2.9x dactylus and unguis combined length, with penicillate setae on dorsal margin, one ventrodial seta and one long, dorsodistal seta (2.1x dactylus and unguis combined length); dactylus 4.0x unguis.

Pereopod-5 (Figure 9(f)) basis 4.0 L:W, with two dorsoproximal penicillate setae, 4.3x merus; ischium with long and short setae; merus 1.7 L:W, 0.5x carpus, with ventrodial seta; carpus 5.2 L:W, 1.2x propodus, with four simple setae and one seta distally; propodus 7.3 L:W, 2.4x dactylus and unguis combined length, with penicillate seta on dorsal margin, ventrodial serrate seta and disto dorsal serrate seta (2.0x dactylus and unguis combined length); dactylus 3.2x unguis.

Pereopod-6 (Figure 9(g)) basis 4.4 L:W, 4.7x merus, with two dorsoproximal penicillate setae; ischium with long and short seta; merus 2.1 L:W, 0.5x carpus, with ventrodial seta; carpus 4.3 L:W, 1.0x propodus, with four distal setae; propodus 6.0 L:W, 3.0x dactylus and

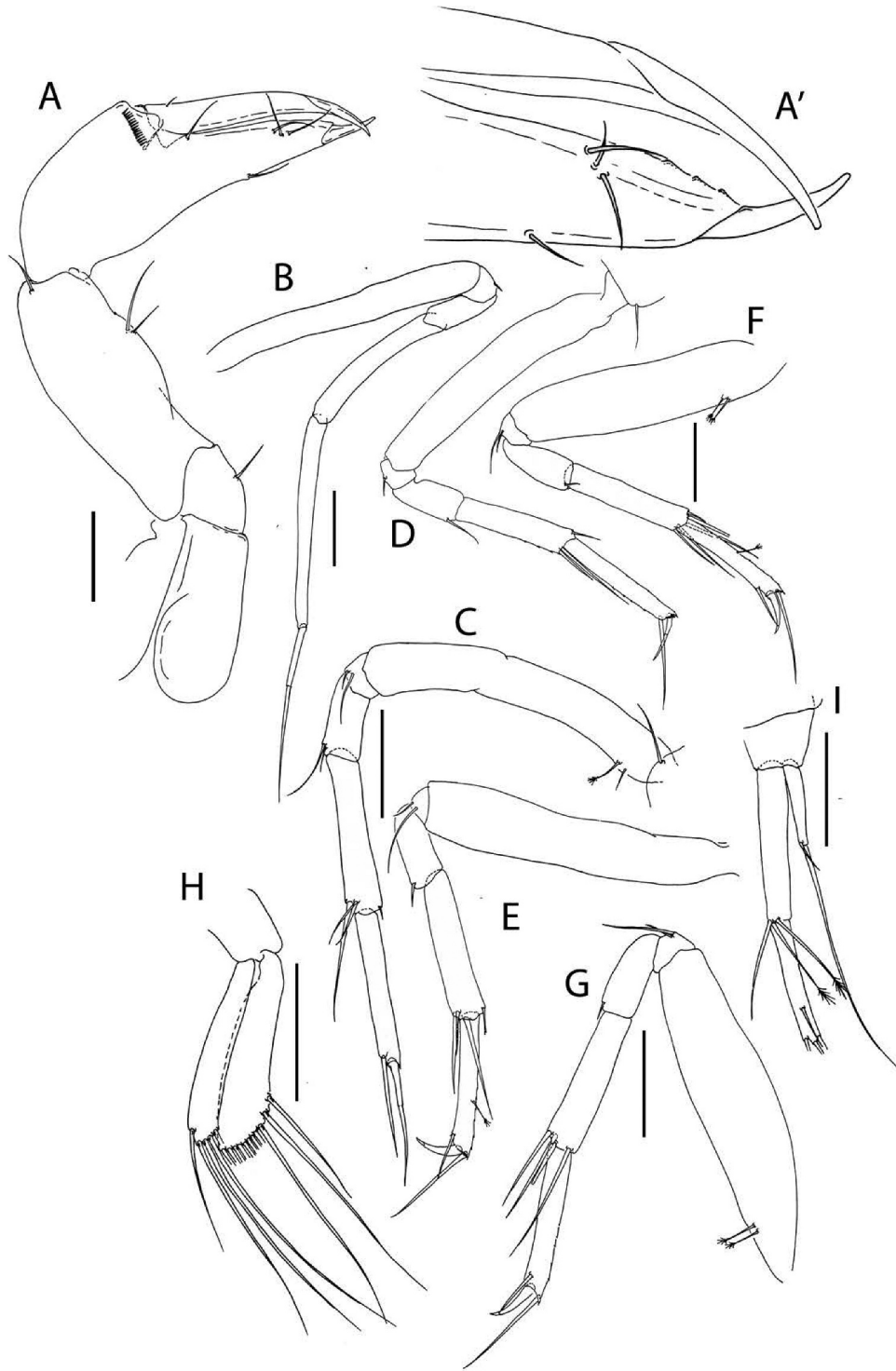


Figure 9. *Akanthinotanaiss rossi* sp. nov., (a), cheliped; A', detailed of chela; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4; (f), pereopod-5; (g), pereopod-6; (h), pleopod; (i), uropod. Scale lines = 0.1 mm.

unguiscombined length, with one ventral and one dorsal serrate setae (2.1x dactylus and unguis combined length); dactylus 4.0x unguis.

Pleopods (Figure 9(h)) peduncle 1.0 L:W; endopod lightly shorter than exopod, 6.2 L:W, with five setae; exopod 4.3 L:W, with eleven setae.

Uropod (Figure 8(i)) peduncle 0.7 L:W; exopod one-articled, 5.9 L:W, 0.3x endopod, with one short and one long setae; endopod two-articled, article-1 5.3 L:W, with one simple and two penicillate distal setae; article-2 8.3 L:W, with one subdistal simple seta and three distal setae.

Distribution. Shag Rocks, South Georgia, Southern Thule (South Sandwich Is), 201–505 m.

Remarks. *Akanthinotanaiss rossi* sp. nov., along with *A. gaussi*, *A. longipes*, *A. similis*, forms a group of blind species in the genus. It also has a short uropod exopod (0.3x endopod), which is usually 0.7x in the known blind *Akanthinotanaiss* species. It has an unusual short and simple molar, which is often longer, e.g., *A. similis* (Sieg 1977: 48, Figure 31) and occasionally serrate, e.g., *A. longipes* (Sieg 1977: 33, Figure 18).

A one-articled uropod exopod is an apomorphy that separates *A. rossi* from the other blind Antarctic species, *A. gaussi*. Furthermore, the two-articled uropodal endopod distinguishes *A. rossi* from *A. similis* (known from Blosson-Roscoff off Brittany, depth 20 m) that has a one-articled endopod. Finally, the absence of a thick rod seta on antennule article-3 separates *A. rossi* from *A. longipes* (Sieg 1977: Figure 18), which occurs off Iceland (depth 1438 m).

Genus: *Beksitanais* Jakiel, Palero & Błazewicz, 2019

Diagnosis. After Jakiel et al. 2019, amended. Antennule article-3 with one or two long thickened rod setae. Antenna article 2 and 3 with seta; article-6 with or without thickened rod seta. Maxilliped palp article-4 without thickened rod seta; endites almost completely fused, with two slender (palpate) gustatory cusps. Chela forcipate with serrate incisive margins, propodus (palm) without small folds in dorsodistal corner, proximal seta on fixed finger. Pereopods 4–6 dactylus and unguis fused with a small hook at tip. Uropod exopod one or two-articled, 0.5x endopod; endopod with pseudo-articulation (weakly two-articled).

Species included. *Beksitanais abyssis* (Hansen, 1913); *B. apocalyptica* Jakiel, Palero & Błazewicz, 2019; *B. vanhoeffeni* sp. nov.

***Beksitanais abyssis* (Vanhöffen, 1914), new combination**

Synonymy. *Pseudotanaiss abyssis*: Vanhöffen (1914): 449, 456, 483; Sieg (1977): 30, 50–55; Sieg

(1984b): 102; Sieg (1986a): 4, 9, 152; Sieg (1986b): 4, 5, 8, 17; Sieg & Heard (1988): 41; Błazewicz-Paszkwyc (2014): 483

non *Pseudotanaiss abyssis*: Hansen (1913): 25, 128, Figure 4; Holdich and Bird (1985): 445.

Remarks. *Pseudotanaiss abyssis*, redescribed by Sieg (1977), bears a thick rod seta on the antennule and has the characteristic shape of the forcipate type of chela but with the serrate margins and lack of small folds in dorsodistal corner apparently representative of the genus *Beksitanais*.

The only Antarctic record of *B. abyssis* is that of Vanhöffen (1914) at its type locality, the *Gauss Station* (60°47'48" S; 89°18'4", depth 385 m) and gave little descriptive detail, merely recognizing his material as being of Hansen's species. Sieg (1977) did not specify the origin of the material on which he based his redescription. We presume that the material described by Vanhöffen (1914) is actually a sister species to *B. vanhoeffeni*, and that *B. abyssis* is not bipolar in its distribution. Consequently, we move this species from *Pseudotanaiss* into *Beksitanais*.

***Beksitanais vanhoeffeni* sp. nov.**

(Figures 10–12)

<http://www.zoobank.org/urn:lsid:zoobank.org:act:4F5F543C-0856-4E1E-8865-CB9DD96A0263>

Material examined. Holotype juvenile female 1.2 mm, (1 microscope slide NOT IN ORIGINAL MS_LEH;), ICUL8839, BIO4-EBS-3A (NHM UK.2021.98). Paratypes: neuter 0.9 mm, ICUL8842, BIO3-EBS-1B (NHM UK. 2021.99); neuter 1.9 mm, ICUL8840, BIO4-EBS-3A (NHM UK.2021.100); female 1.1 mm, juvenile female 1.1 mm, juvenile male 1.1 mm, neuter 0.8 mm, manca 1.0 mm, ICUL8843, BIO4-EBS-3B (NHM UK.2021.101); dissected neuter 1.2 mm, ICUL8907, BIO4-EBS-3B (NHM UK.2021.102); dissected neuter 1.2 mm, ICUL8928, BIO4-EBS-3B (NHM UK.2021.103); neuter 1.2 mm, ICUL8841, BIO4-EBS-3D (NHM UK.2021.104); dissected male, ICUL8906, ST-EBS-3B (NHM UK.2021.105); one individual, ICUL8844, BIO5-EBS-3B (NHM UK.2021.106); one individual, ICUL8893, BIO5-EBS-3B (NHM UK.2021.107).

Diagnosis. Antennule article-3 with two long thick rod setae. Antenna article-6 with long thick rod seta. Uropod exopod two-articled.

Etymology. Named after the German biologist Professor Dr. Ernst Vanhöffen (1858–1918), in recognition of his studies on the Tanaidacea of the Antarctic (and elsewhere), and who first found (but not recognized) this species during the Deutsche Südpolar Expedition in 1902.

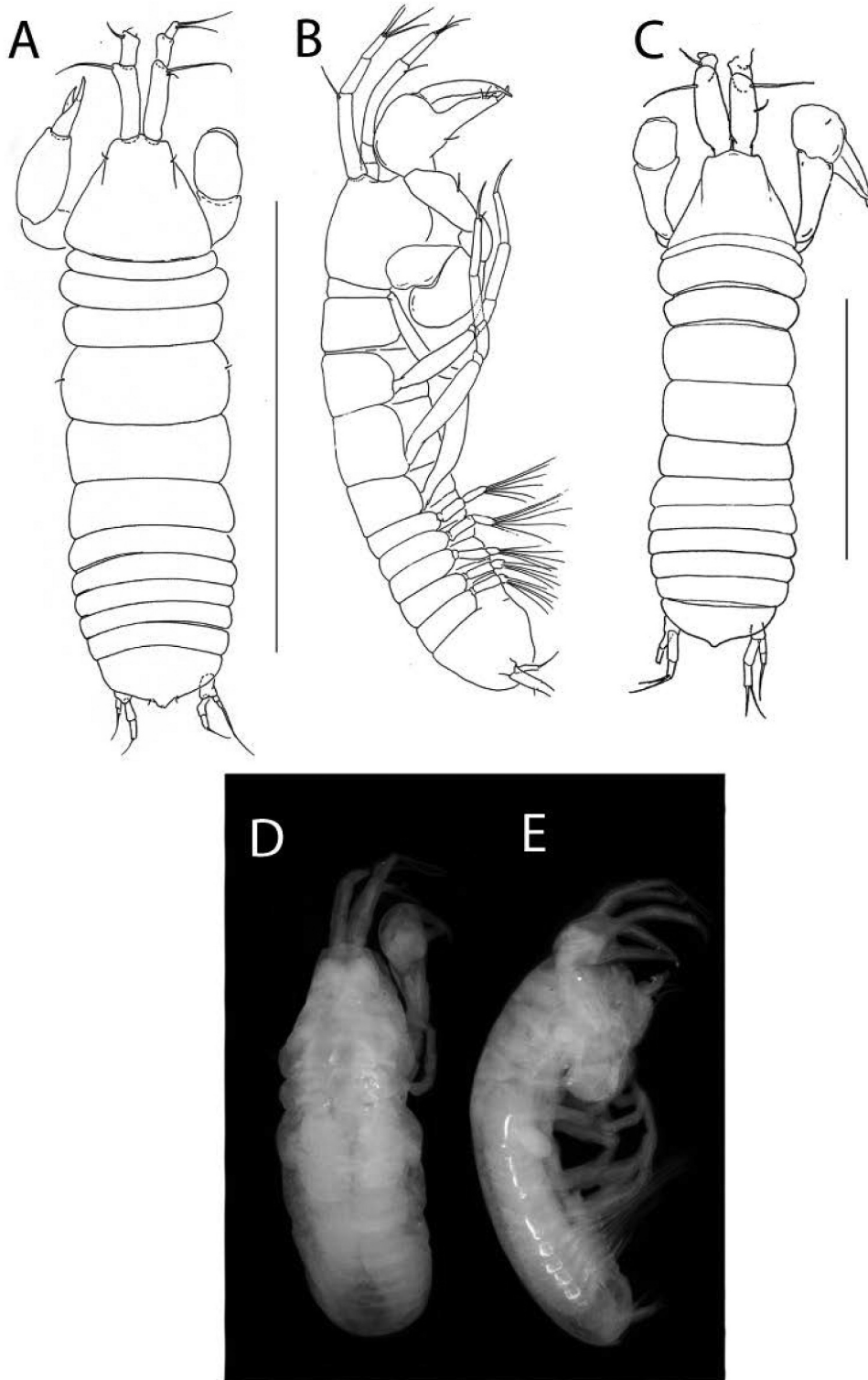


Figure 10. *Beksitanais vanhoeffeni* sp. nov., holotype female, (a, d), dorsal; (b, e), lateral; ©, juvenile male. Scale line = 1 mm.

Description of neuter. BL = 1.2 mm. Body robust (Figure 10(a–b,d–e)) 3.3 L:W. Cephalothorax 0.7 L:W, 0.9x pereonites 1–3, 0.2x BL. Pereonites

0.5x BL, pereonites 1–6: 0.1, 0.3, 0.2, 0.4, 0.4, and 0.3 L:W, respectively. Pleon short, 0.3x BL. Pleonites 0.9 L:W. Pleotelson 1.7x pleonite-5.

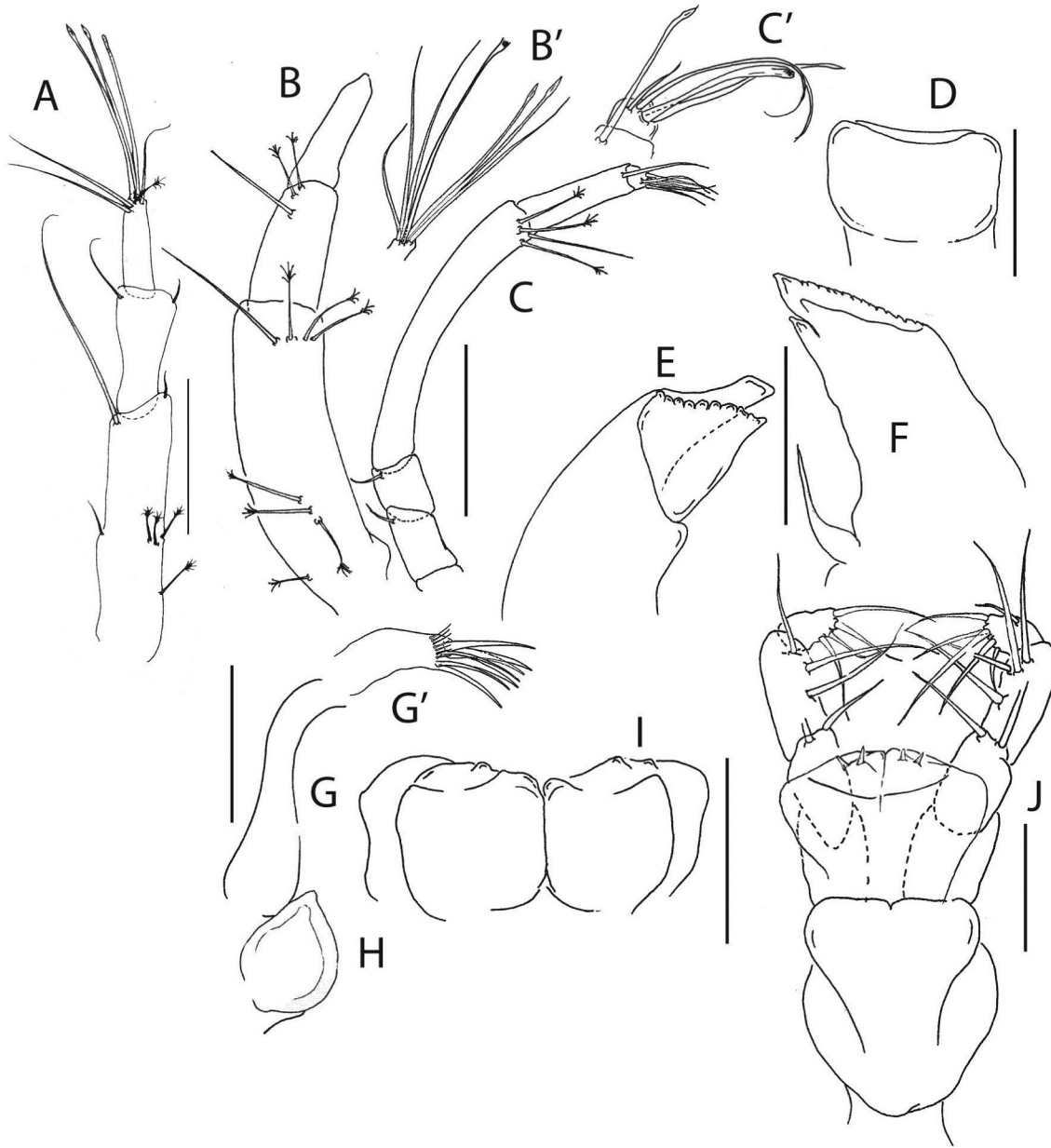


Figure 11. *Beksitanais vanhoeffeni* sp. nov., (a), female antennule; (b), male antennule; (b') detail of male antennule; (c), female antenna; (d), labrum; (f), left mandible; (e), right mandible; (g), maxillule; (g'), maxillule endite, distal; (h), maxilla; (i), labium; (j), maxilliped. Scale lines = 0.1 mm.

Antennule (Figure 11(a)) article-1 3.3 L:W, 3.0x article-2, four proximal penicillate seta, and one simple and middle setae; article-2 1.5 L:W, 0.9x article-3, with one long and short distal setae; article-3 2.3 L:W, with three simple, one penicillate, and two long rod setae, and with one aesthetasc, distally.

Antenna (Figure 11(c,c')) as long as antennule; article-2 1.2 L:W, 1.1x article-3, with seta (0.5x article-2); article-3 1.1 L:W, 0.2x article-4, with

seta (0.5x article-3); article-4 7.1 L:W, 2.8x article-5, with one simple and three penicillate distal setae; article-5 2.8 L:W, 5.0x article-6, with simple seta; article-6 0.8 L:W, with four distal setae and one long thick rod seta.

Labrum (Figure 11(d)) rounded, naked.

Left mandible (Figure 11(e)) incisor in shape of blunt tooth, margin simple; *lacinia mobilis* well developed, distal margin serrate; molar not seen.

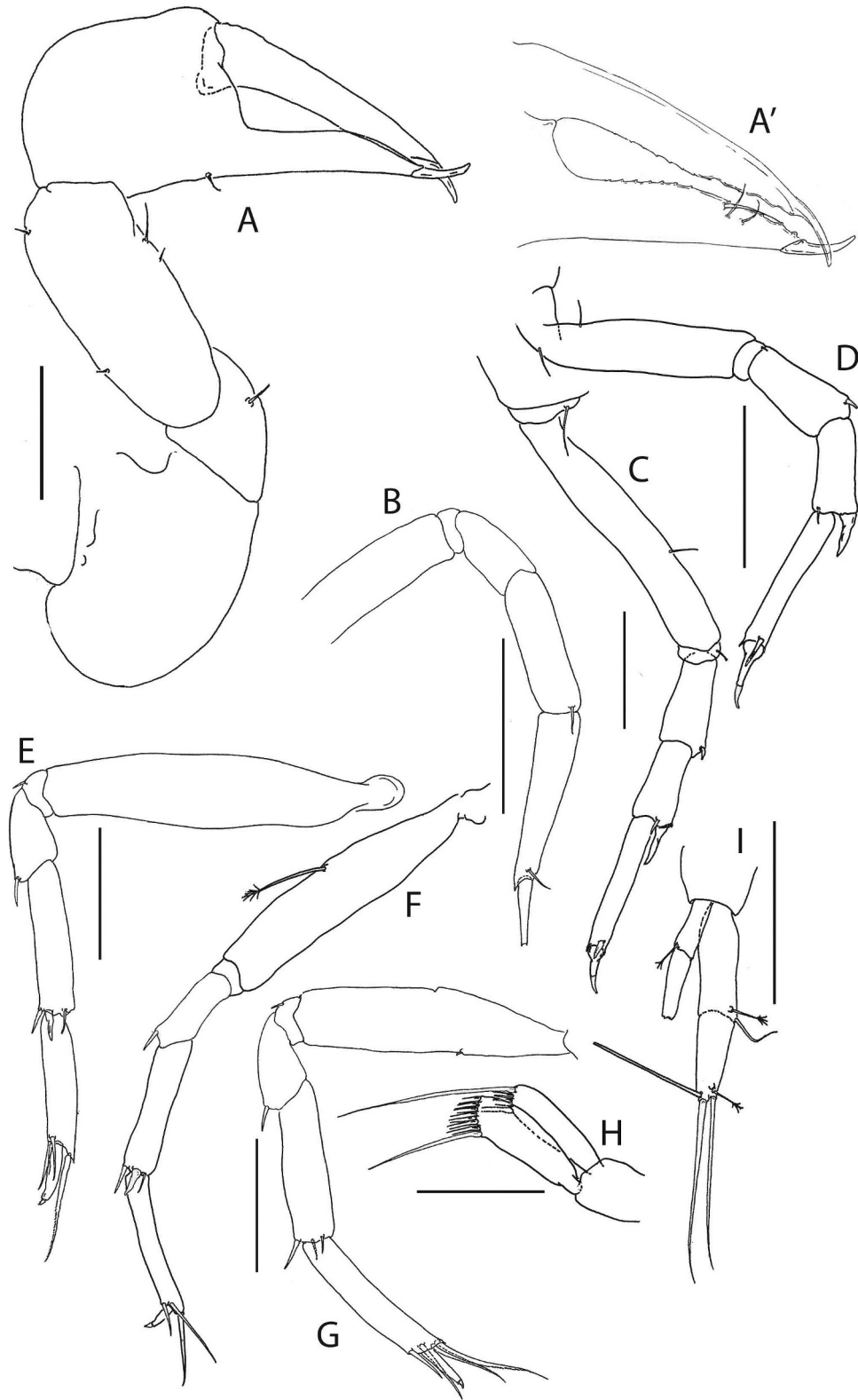


Figure 12. *Beksitanais vanhoeffeni* sp. nov., (a), cheliped; A', detail of chela; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4; (f), pereopod-5; (g), pereopod-6; (h), pleopod; (i), uropod. Scale lines = 0.1 mm.

Right mandible (Figure 11(f)) incisor unequally bifid, distal margin serrate; molar acuminate, simple.

Labium (Figure 9(i)) simple smooth, with distal cusps.

Maxillule (Figure 9(g, g')) endite with seven distal spines and distal crown of setules.

Maxilla (Figure 9(h)) simple, naked.

Maxilliped (Figure 9(j)) basis subrectangular, just longer than broad, naked; palp article-1, naked, article-2 with two inner setae (outer seta not observed), article-3 with four inner setae, article-4 with five distal and one subdistal setae; endites almost fused, with small distal cleft, each with two slender gustatory cusps.

Cheliped (Figure 12(a, a')) slender; basis 1.6 L:W; merus about as long as carpus ventral margin, with ventral seta; carpus 2.5 L:W, 1.6x palm, with two (longer and shorter) ventral setae, and with one mediodorsal and one dorsodistal setae; chela 2.6 L:W, 1.6x carpus L, palm 0.8 L:W; fixed finger 5.8 L:W, 1.4x palm, with ventral seta, cutting edge almost simple with three setae, distal spine curved upward; dactylus 4.3 L:W, cutting edge finely serrate, distalmost denticles larger, proximal seta not seen, unguis curved downward.

Pereopod-1 (Figure 12(b)) basis broken; ischium seta not seen; merus 1.7 L:W and 0.5x carpus; carpus 3.5 L:W, 0.9x propodus, with distal seta; propodus 4.6 L:W, with ventrodiscal seta; dactylus broken.

Pereopod-2 (Figure 12(c)) coxa with seta; basis 5.3 L:W, 3.1x merus, with simple mid-length seta; ischium with ventral seta; merus 2.1 L:W, 1.1x carpus, with short ventrodiscal spine; carpus 2.1 L:W, 0.5x propodus, with seta and short blade-like spine (0.3x propodus); propodus 6.8 L:W, 3.0x dactylus and unguis combined length, with one small ventrodiscal spine (0.6x dactylus); dactylus 2.0x unguis.

Pereopod-3 (Figure 12(d)) basis 4.5 L:W, 2.4x merus, with simple dorsal and ventral proximal setae; ischium with ventral seta; merus 1.9 L:W, 1.0x carpus, with short ventrodiscal spine; carpus 2.3 L:W, 0.6x propodus, with seta and short blade-like spine (0.3x propodus); propodus 5.6 L:W, 2.3x dactylus and unguis combined length, with distal spine (0.5x dactylus); dactylus 3.0x unguis.

Pereopod-4 (Figure 12(e)) basis 4.9 L:W, 4.5x merus; ischium with ventral seta; merus 1.3 L:W, 0.5x carpus, with slender ventrodiscal spine; carpus 3.9 L:W, 1.0x propodus, with dorsodistal seta (0.2x propodus), spine, and blade-like spine (0.3x propodus) ventrodistally; propodus 3.7 L:W, 3.3x dactylus and unguis combined length, with two serrate

ventral setae and serrate dorsal seta (2.6x dactylus and unguis combined length); dactylus 3.0 L:W, unguis small, hook-like.

Pereopod-5 (Figure 12(f)) basis 5.0 L:W, 3.2x merus, with midventral penicillate seta; ischium with ventral seta; merus 2.8 L:W, 0.7x carpus, with ventrodiscal spine; carpus 4.2 L:W, 0.9x propodus, with dorsodistal seta (0.15x propodus), spine and short blade-like spine (0.2x propodus) ventrodistally; propodus 6.8 L:W, 3.8x dactylus and unguis combined length, with two serrate ventral setae (short and long) and one serrate dorsal seta (2.0x dactylus and unguis combined length); dactylus 3.0 L:W, unguis small, hook-like.

Pereopod-6 (Figure 12(g)) basis 4.4 L:W, 3.8x merus (penicillate setae broken); ischium with ventral seta; merus 1.4 L:W, 0.5x carpus, with ventrodiscal spine; carpus 3.1 L:W, 0.9x propodus, with seta (0.12x propodus), spine, and blade-like spine (0.2x propodus); propodus 5.3 L:W, 3.2x dactylus and unguis combined length, with two serrate ventrodiscal setae and two serrate dorsodistal setae (2.3x dactylus and unguis combined length); dactylus 3.0 L:W, unguis small, hook-like.

Pleopods (Figure 12(h)) peduncle 1.2 L:W; endopod just shorter than exopod, 3.2 L:W, with four setae; exopod 3.0 L:W, with eight setae.

Uropod (Figure 12(i)) peduncle 0.8 L:W; exopod 0.6x endopod, article-1 2.8 L:W, with one penicillate seta, article-2 4.3 L:W, setae broken; endopod 5.3 L:W, with pseudo-articulation, article-1 3.0 L:W, with one simple and one penicillate setae, article-2 2.8 L:W, with three simple and one penicillate setae.

Juvenile male (Figure 10(c)) similar to female but antennule thicker (Figure 11(b, b')).

Distribution. Amundsen Sea, Southern Thule (Sandwich Is), 500–1113 m.

Remarks. *Beksitanais vanhoeffeni* sp. nov. is the third known species in the genus after *B. apocalyptic* that was recorded in a manganese nodule field in the Central Pacific (Jakiel et al. 2019) and the reclassification of *B. abyss* (this paper). *Beksitanais vanhoeffeni*, with a two-articled uropod exopod, can be separated from *B. apocalyptic* where this is one-articled. Moreover, its short pereonite-1 (0.4x pereonite-2), is distinct from that of *B. apocalyptic* that is slightly shorter than pereonite-2 (0.8x). Both species can be distinguished by a thick rod seta on antenna article-6 that is present in *B. vanhoeffeni* but absent in *B. apocalyptic*. Finally, the length of the dorsal seta of the pereopod-4 propodus allows discrimination of the species: in *B. vanhoeffeni* it is

2.6x as long as the dactylus and unguis combined length, while in *B. apocalypticica* it is 3.2x.

Overall, the most similar species to *B. vanhoeffeni* is *B. abyssi*. However, the length of the pereopod-2 propodus relative to the dactylus and unguis combined length can distinguish both species, namely 2.0x in *B. abyssi* and 3.0x in *B. vanhoeffeni*. Additionally, the uropod endopod of *B. apocalypticica* is more robust than in *B. vanhoeffeni* (5.3 L:W) and slender in *B. abyssi* (>7.0 L:W). Finally, the setae on antenna articles 2–3 in *B. vanhoeffeni* are short (<0.6x article), and longer in *B. abyssi* (about 0.8x).

Genus *Pseudotanaïs* Sars, 1882

Remarks. Sieg and Heard (1988) first pointed out that the morphology of *P. kurchatovi* Kudinova-Pasternak & Pasternak, 1978 did not match the definition of the genus. It lacks a blade-like spine in pereopods 2–6, as in the members of the genus *Akanthinotanaïs*. Moreover stout antennule, coronal molar of the mandibles and two setae on chela are characters which exclude *P. kurchatovi* from that genus. Because there is no access to the collection studied by Kudinova-Pasternak it is impossible to resolve the systematic position of the *P. kurchatovi* until new material allows for thorough morphological analysis.

“affinis+longisetosus” group

Diagnosis. After Jakiel et al. (2019).

Species included. *Pseudotanaïs affinis* Hansen, 1887; *P. curieae* Jakiel, Palero & Błażewicz, 2020; *P. chanelae* Jakiel, Palero & Błażewicz, 2020; *P. gatae* Jakiel, Palero & Błażewicz, 2019; *P. geralti* Jakiel, Palero & Błażewicz, 2019; *P. julietae* Jakiel, Palero & Błażewicz, 2019; *P. longisetosus* Sieg, 1977; *P. longispinus* Bird & Holdich 1989; *P. macrocheles* Sars 1882; *P. monroeeae* Jakiel, Palero & Błażewicz, 2020; *P. nipponicus* McLelland 2007; *P. nordenskioldi* Sieg, 1977; *P. romeo* Jakiel, Palero & Błażewicz, 2019; *P. spatula* Bird & Holdich 1989; *P. scalpellum* Bird & Holdich 1989; *P. svavarssoni* Jakiel, Stępień & Błażewicz 2018; *P. szymborskae* Jakiel, Palero & Błażewicz, 2020; *P. uranos* Jakiel, Palero & Błażewicz, 2019; *P. vitjazi* Kudinova-Pasternak 1966; *P. yenneferae* Jakiel, Palero & Błażewicz, 2019; *Pseudotanaïs* sp. O (*sensu* McLelland, 2008); *Pseudotanaïs* sp. P (*sensu* McLelland, 2008); *P. rapunzelae* sp. nov.; and *P. shackletoni* sp. nov.

Remarks. This is a complex group, with very subtle distinctions between the species. The (largely) diagnostic or useful characters of the species are summarised in Table II.

Pseudotanaïs rapunzelae sp. nov.

(Figures 13–15)

<http://www.zoobank.org/urn:lsid:zoobank.org:act:6820E0B8-E3D3-4911-A4D9-39753B7FC245>

Material examined. Holotype, neuter 1.3 mm, ICUL8866, ST-EBS-3 (NHM UK.2021.108). Paratypes: juvenile male 1.2 mm, ICUL8868, EI-EBS-1 (NHM UK.2021.109); brooding female 1.6 mm, dissected, ICUL8897, EI-EBS-1 (NHM UK.2021.110); neuter, partly dissected, ICUL8865, ST-EBS-3 (NHM UK.2021.111); neuter (damaged) dissected, ICUL8904, ST-EBS-3 (NHM UK.2021.112); neuter 1.2 mm, juvenile female 1.5 mm, ICUL8867, ST-EBS-3B (NHM UK.2021.113).

Diagnosis. Pereopod-2 carpus with long blade-like spine (0.8x propodus). Pereopods 5–6 carpus with long rod seta (1.2x propodus). Uropod exopod 0.8x endopod.

Etymology. Rapunzel is a princess in a Brothers Grimm fairy tale who, imprisoned in a high tower, offered to let down her long hair so that her lover could climb up to her. This alludes to the unusually long dorsodistal seta on pereopods 5 and 6.

Description of neuter (holotype). BL = 1.3 mm. Body robust (Figure 11(a–b,d–e)) 3.3 L:W. Cephalothorax 0.9 L:W, 1.0x pereonites 1–3, 0.2x BL. Pereonites 0.6x BL, pereonite-1 less than half length of pereonites 2–3, pereonites-1–6: 0.1, 0.3, 0.3, 0.5, 0.4, and 0.3 L:W, respectively. Pleon 0.3x BL. Pleonites 0.8 L:W. Pleotelson 1.6x pleonite-5.

Antennule (Figure 14(a)) article-1 3.9 L:W, 2.4x article-2, with one simple and one penicillate setae at mid-length, and one simple and one penicillate setae distally; article-2 3.3 L:W, 0.8x article-3, with one simple and one penicillate setae distally, both shorter than article; article-3 5.0 L:W, with two simple, two bifurcated, one penicillate setae, and one aesthetasc distally.

Antenna (Figure 14(b)) as long as antennule; article-2 1.3 L:W; 1.0x article-3, with slender spine (0.5x article-2); article-3 1.3 L:W, 0.2x article-4, with stouter spine (0.4x article-2); article-4 5.7 L:W, 2.3x article-5, with four simple and one penicillate setae distally; article-5 4.0 L:W, 10.0x article-6,

Table II. Diagnostic features distinguishing the species of "affinis+denticulatus" group.

Species	Region	Cephalothorax/ pereonites		Antenna		Antenna		Mandible molar		Maxilliped endite gustatory cusps, seta	Cheliped dactylus		P1 basis setae, simple
		1-3 L	pereonite-1/ pereonite-2 L	Antenna article-2	Antenna article-3	Antenna article-4 L: W	W	ventral spines, setae	setae				
<i>P. amundseni</i> sp. nov.	Ant.	1.3	0.5	spine, thin	seta	6.3	coronal		2, 0	naked	0		
<i>P. barnesi</i> sp. nov.	Ant.	1.2	0.4	naked	naked	2.0	coronal		2, 0	naked	1		
<i>P. biopearium</i> sp. nov.	Ant.	1.2	0.5	spine	spine	8.6	coronal		2, 1	naked	3		
<i>P. elephas</i> sp. nov.	Ant.	1.0	0.5	spine	seta, small	5.7	coronal		0, 1	naked?	1		
<i>P. kitsoni</i> sp. nov.	Ant.	1.0	0.4	spine	spine	5.8	coronal		2, 0	naked	1		
<i>P. livingstoni</i> sp. nov.	Ant.	1.4	0.4	spine	spine	6.3	coronal		2, 0	naked	2		
<i>P. palmeri</i> sp. nov.	Ant.	1.1	0.4	spine	spine, long	6.7	acuminate/subcoronal		2, 0	naked	2		
<i>P. corollatus</i>	NE.Atl.	1.0	0.9	spine, thin	spine, thin	5.8	coronal		0, 0	naked?	0		
<i>P. denticulatus</i>	NE.Atl.	1.2	0.4	spine	spine	8.4	coronal		0, 1	2 spines	2		
<i>P. abathagastor</i>	NW.Pac.	0.8	0.4	seta	spine	7.0	coronal		0, 0	naked?	2		
<i>P. locueloae</i>	NW.Pac.	n/d	n/d	spine, thin	spine	9.3	coronal		2, 1	naked	1		
<i>P. chaplini</i>	Trop.E.Pac.	n/d	n/d	spine	spine	8.6	acuminate/subcoronal		2, 1	naked	2		
<i>P. chopini</i>	Trop.E.Pac.	n/d	c. 0.5	seta	spine	6.9	acuminate/subcoronal		2, 1	naked?	0		
<i>P. georgesandae</i>	Trop.E.Pac.	n/d	n/d	spine	spine	8.4	coronal		2, 0	naked	0		
<i>P. mariae</i>	Trop.E.Pac.	1.0	0.4	seta	seta	5.0	coronal		2, 1	2 spines	2		
<i>P. oloughlini</i>	Trop.E.Pac.	1.0	0.8	spine	spine	6.8	acuminate/subcoronal		2, 1	naked	3		

Species	P1 merus		P2 merus		P3 carpus blade-		P4-6		Uropod		Uropod	
	seta	ventrodistal spine/seta	ventrodistal spine/seta	like spine/propodus	like spine/propodus	ischium setae	P 4-6 merus spine/seta	P6 carpus blade re prop	exopod/ endopod	exopod L: W	endopod L: W	
<i>P. amundseni</i> sp. nov.	dorsal	0, 2 =	0, 3	0.3	1	1, 1	0.2	0.7	10.0	9.3		
<i>P. barnesi</i> sp. nov.	absent	1, 0	0.6	0.6	2	1, 0	0.2	0.8	6.8	6.3		
<i>P. biopearium</i> sp. nov.	ventral	1, 1	0.4	0.4	2	1, 0	0.4	0.8	8.0	9.0		
<i>P. elephas</i> sp. nov.	dorsal	0, 2 ≠	0.4	0.4	2	2, 0	0.2	0.8	8.0	6.5		
<i>P. kitsoni</i> sp. nov.	ventral	1, 1	0.4	0.4	2	1, 1	0.25	0.9	8.2	10.0		
<i>P. livingstoni</i> sp. nov.	ventral, minute	1, 1	0.6	0.6	1	1, 1	0.4	0.8	8.0	7.8		
<i>P. palmeri</i> sp. nov.	ventral	1, 1	0.5	0.5	2	1, 1	0.4	1.0	8.2	8.4		
<i>P. corollatus</i>	ventral	0, 2	0.4	0.6	2	0, 2	0.4	0.8	8.0	6.6		
<i>P. denticulatus</i>	ventral	1, 1	0.5	0.5	2	1, 1	0.3	0.8	12.0	9.6		
<i>P. abathagastor</i>	absent	0, 2	0.5	0.7	1	1, 1	0.3	0.9	7.3	6.8		
<i>P. locueloae</i>	absent	0, 0	0.6	0.6	1	1, 0	n/d	n/d	n/d	n/d		
<i>P. chaplini</i>	ventral	1, 1	0.4	0.3	2	1, 0	0.2	1.1	12.0	6.5		
<i>P. chopini</i>	absent	0, 2	0.5	0.6	2	1, 1	0.4	0.9	8.4	7.5		
<i>P. georgesandae</i>	absent	1, 1	0.3	0.3	2	1, 0	0.2	0.9	8.5	6.6		
<i>P. mariae</i>	ventral	0, 2	0.4	0.5	2	1, 0	0.3	0.8	7.5	9.2		
<i>P. oloughlini</i>	absent	1, 1	0.6	0.7	1	1, 1	0.25	1.1	10.0	7.5		

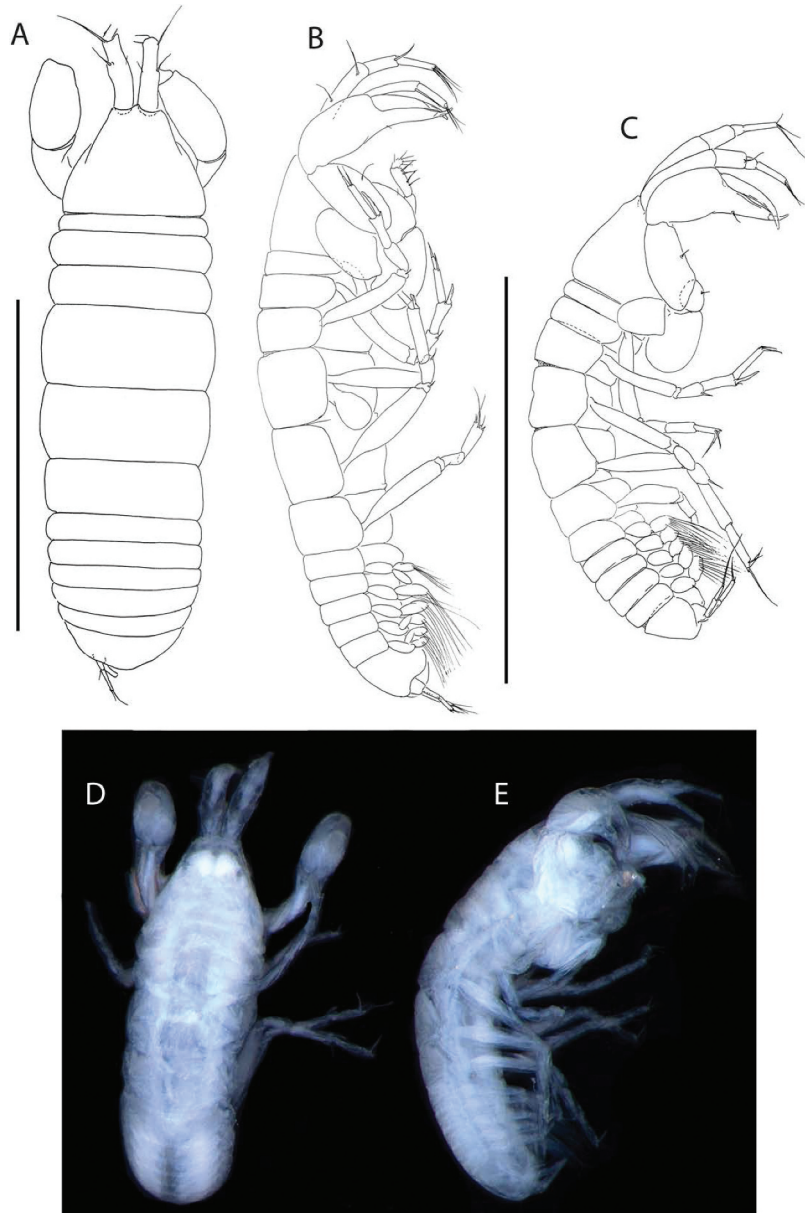


Figure 13. *Pseudotanais rapunzelae* sp. nov., female holotype, (a, c), dorsal; (b, d), lateral; male, (c), lateral. Scale lines = 1 mm.

distal seta not seen; article-6 2.0 L:W, with five distal setae.

Labrum (Figure 14(d)) rounded, flattened, naked.

Left mandible (Figure 14(e,e')) incisor distal margin forms blunt irregular tooth, margin irregularly serrate; *lacinia mobilis* well developed, distally serrate; molar acuminate, with distal spines, one longer than the others (Figure 12(e')).

Right mandible (Figure 14(f)) incisor unequally bifid, distal margin serrate; molar as in left mandible.

Maxillule (Figure 14(g)) endite with eight distal spines and outer subdistal tuft of setules; palp (Figure 14(g')) with two distal setae.

Maxilla (Figure 14(h)) almost rounded, naked.

Labium (Figure 14(k)), simple, naked, widely cleft.

Epignath (Figure 14(i)) simple, distally rounded.

Maxilliped (Figure 14(j,j')) bases naked; palp article-1 naked, article-2 with fine outer seta and three inner setae (two longer and one short), article-3 with four inner setae (three long and one short), article-4 with five distal and one sub-distal setae, articles 3

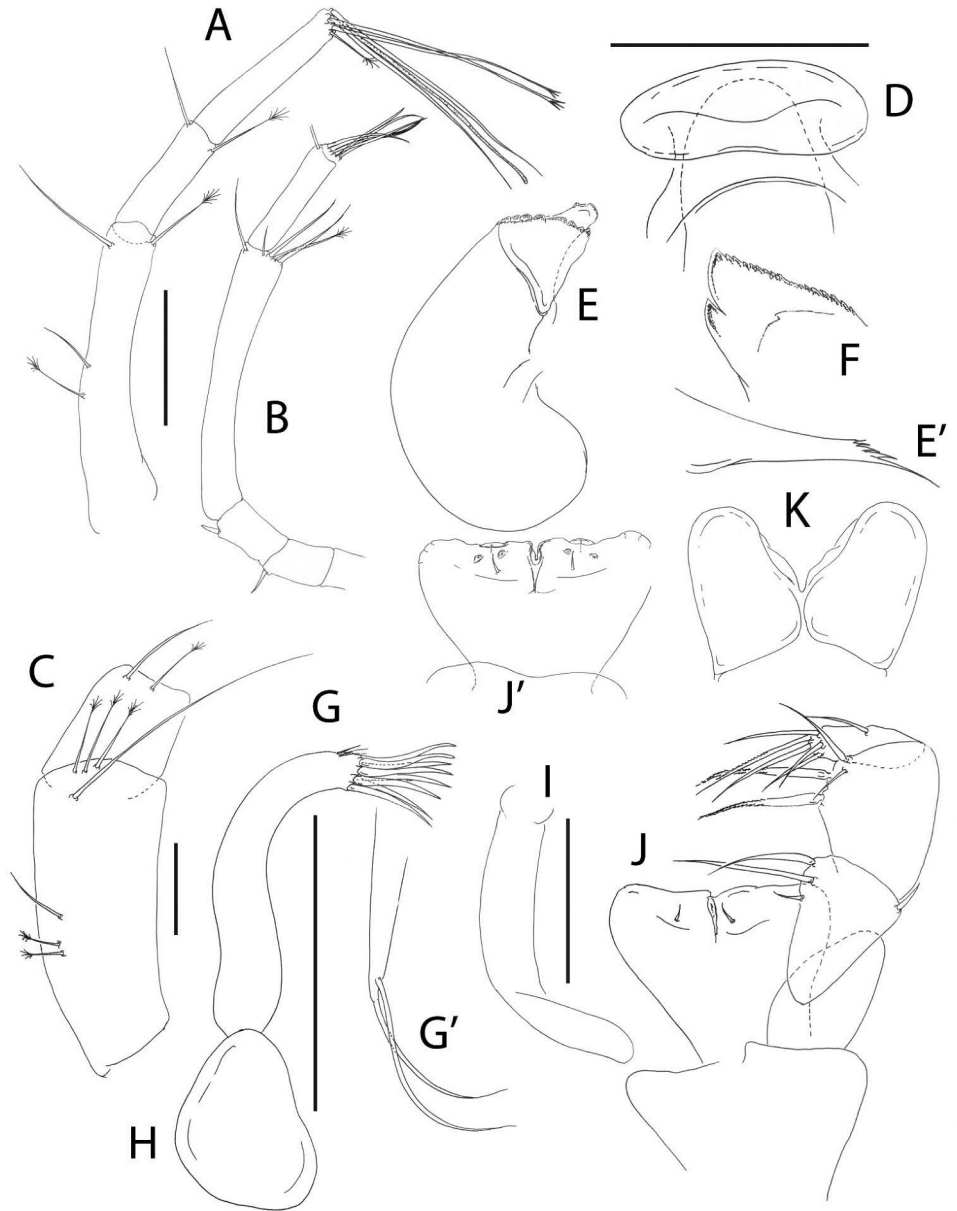


Figure 14. *Pseudotanaeis rapunzelae* sp. nov., (a), female antennule; (b), antenna; (c), antennule of subadult male; (d), labrum; (e), left mandible, with (e'), molar; (f), right mandible; (g), maxillule with (g'), maxillule palp; (h), maxilla; (i), epignath; (j), maxilliped and (j); maxilliped endites; (k), labium. Scale lines = 0.1 mm.

and 4 inner setae distal half margin finely denticulate; endites (Figure 12(j')) fused except for distal third, each with two gustatory cusps and subdistal seta.

Cheliped (Figure 15(a,a')) basis slender, 1.9 L:W, naked; merus 0.75x carpus ventral margin, with ventral seta; carpus 1.7 L:W, 0.9x palm, with two ventral setae, and with one middorsal seta and one dorsodistal setae; chela 2.9 L:W, 1.7x carpus length, palm 1.6 L:W, with seta near dactylus insertion; fixed finger 3.3 L:W, 0.8x palm, with ventral seta, cutting edge almost simple, poorly calcified, with

three setae; dactylus 5.7 L:W, cutting edge with two peg-like setae, without proximal seta.

Pereopod-1 (Figure 15(b)) coxa with seta; basis 7.15 L:W, 3.8x merus, with one dorsoproximal, one midventral and one ventrodistal simple setae; ischium with ventral seta; merus 2.0 L:W and 0.8x carpus, with long dorsodistal seta as long as article; carpus 3.1 L:W, 0.6x propodus, with two (short and long) dorsodistal setae; propodus 5.6 L:W (no seta observed); dactylus and unguis broken.

Pereopod-2 (Figure 15(c)) basis 5.5 L:W, 3.3x merus, with dorsoproximal penicillate seta and

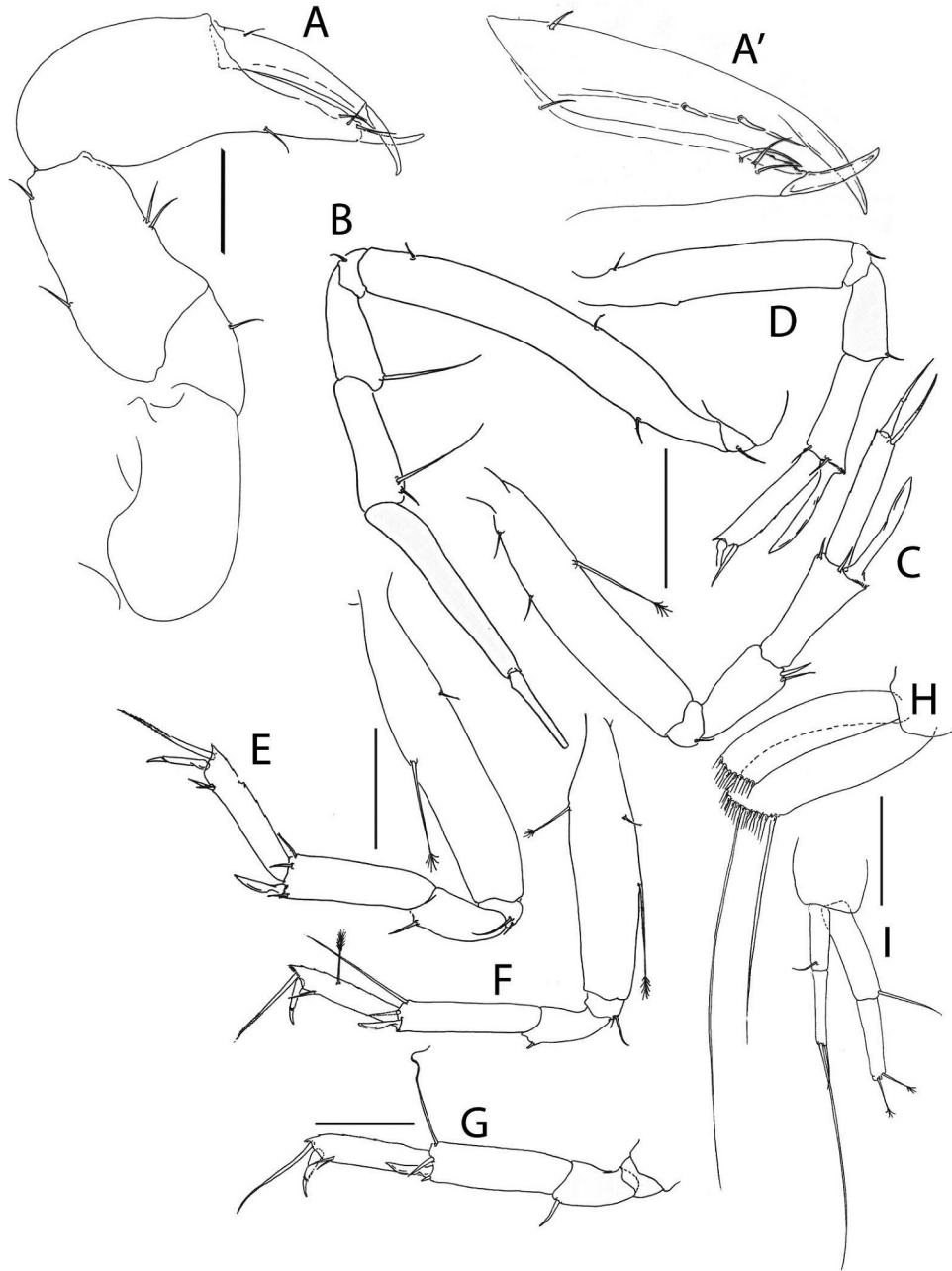


Figure 15. *Pseudotanais rapunzelae* sp. nov., (a), cheliped with (a') detail of chela; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4; (f), pereopod-5; (g), distal articles of pereopod-6; (h), pleopod; (i), uropod. Scale lines = 0.1 mm.

two simple ventroproximal setae; ischium with ventral seta; merus 1.8 L:W, 0.8x carpus, with seta and spine ventrodistally; carpus 2.2 L:W, 0.8x propodus, with one seta, one small spine and long blade-like spine (0.8x propodus); propodus 5.4 L:W, 1.6x dactylus and unguis combined length, with one distal seta (2.3x dactylus); dactylus 0.7x unguis.

Pereopod-3 (Figure 15(d)) basis 5.8 L:W, 3.5x merus, with ventroproximal seta; ischium with ventral seta; merus 1.9 L:W, 0.8x carpus, with ventrodistal seta; carpus 2.5 L:W, 0.8x propodus, with one seta, one small spine and long blade-like spine (0.8x propodus); propodus 5.2 L:W, with one distal seta; dactylus and unguis broken.

Pereopod-4 (Figure 15(e)) basis 5.4 L:W, 4.3x merus, with one dorsal penicillate and one simple ventral setae; ischium with two ventral setae (short and long); merus 1.9 L:W, 0.5x carpus, with one slender spine; carpus 3.5 L:W, 1.0x propodus, with one dorsodistal seta (0.2x propodus), one spine, one simple and one short blade-like spine (0.4x propodus); propodus 5.6 L:W, 2.3x dactylus and unguis combined length, with two ventrodiscal short and one dorsal long (1.7x dactylus and unguis combined length) setae; dactylus 5.0x unguis.

Pereopod-5 (Figure 15(f)) basis 4.6 L:W, 4.6x merus, with dorsoproximal penicillate seta, one simple and one penicillate ventral setae; ischium with two ventral setae (short and long); merus 1.7 L:W, 0.4x carpus, with one spine (broken); carpus 5.4 L:W, 1.4x propodus, with one long (1.2x propodus) dorsodistal seta, one spine and one short blade-like spine (0.4x propodus); propodus 4.0 L:W, 2.0x dactylus and unguis combined length, with dorsal penicillate seta, two ventrodiscal and one dorsal seta (1.7x dactylus and unguis combined length); dactylus 2.3x unguis.

Pereopod-6 (Figure 15(g)) basis broken; ischium setae not seen; merus 1.2 L:W, 0.4x carpus, with ventrodiscal spine; carpus 3.4 L:W, 1.0x propodus, with long (1.1x propodus) seta dorsodistal seta, one spine and one short blade-like spine (0.4x propodus); propodus 4.5 L:W, 2.4x dactylus and unguis combined length, with two ventrodiscal setae and dorsal seta (2.2x dactylus and unguis combined length); dactylus 2.0x unguis.

Pleopods (Figure 15(h)) endopod just shorter than exopod, 4.1 L:W, with seven setae; endopod 2.9 L:W, with nine setae.

Uropod (Figure 15(i)) peduncle 1.5 L:W; exopod and endopod two-articled; exopod 0.8x endopod, article-1 3.3 L:W, with distal seta, article-2 4.7 L:W, with two simple setae; endopod article-1 4.0 L:W, with distal seta, article-2 3.8 L:W, with two penicillate setae; other setae broken.

Subadult male. Slightly smaller than female (Figure 13(c); length 1.2 mm); proximal antennule article (Figure 14(c)) stouter (2.5 L:W) with more penicillate setae, and distal antennule article with indication of subdivision.

Distribution. Elephant Island (South Shetland Is), Southern Thule (Sandwich Is), 500–1503 m.

Remarks. *Pseudotanaids rapunzelae* sp. nov. is classified as a member of the “affinis+longisetosus” morphogroup because of the spine on antenna articles 2–3, relatively long distal spine on pereopods 2–3,

long dorsodistal rod seta on the carpus of pereopods 5–6, and the uropod exopod at least 0.8x endopod.

Currently, 13 species of this morphogroup have been observed with a long rod seta on the carpus of pereopods 5–6 (*P. chanelae*, *P. curieae*, *P. gatae*, *P. julietae*, *P. longisetosus*, *P. longispinus*, *P. monroae*, *P. nipponicus*, *P. spatula*, *P. szymborskae*, *P. romeo*, *P. uranos*, and *Pseudotanaids* sp. O. A short rod seta on the pereopod-4 carpus distinguishes the new species from *P. chanelae*, *P. curieae* and *P. longisetosus*, where this seta is long. *Pseudotanaids rapunzelae*, with long carpal seta on carpus pereopod-1, can be distinguished from *P. gatae*, *P. monroae* and *P. uranos*, which have a short seta at this location.

Also, *P. rapunzelae* has one short and one long seta (0.5x merus) on the ischium on pereopods 4–6 in contrast to *P. julietae*, *P. longispinus* and *P. spatula* (with single seta), *P. romeo* (ischium lacking seta), and *P. szymborskae* (two short, equal seta). The new species is most similar to *Pseudotanaids* sp. O (*sensu* McLelland) but the absence of a wide-based ventrodiscal spine on the carpus pereopods 2–3 separates *P. rapunzelae* from *Pseudotanaids* sp. O where this spine is present.

***Pseudotanaids shackletoni* sp. nov.**

(Figures 16–18)

<http://www.zoobank.org/urn:lsid:zoobank.org:act:04980C81-85FA-48C8-8F05-94FDA44FB881>

Material examined. Holotype, female 1.6 mm, ICUL8875, SG-EBS-3E (NHM UK.2021.114). Paratypes: neuter (damaged) dissected, ICUL8917, SG-EBS-5E (NHM UK.2021.115); juvenile female 1.7 mm, dissected, ICUL8874, SR-EBS-6 (NHM UK.2021.116).

Diagnosis. Pereopod-2 carpus with long blade-like spine (0.6x propodus). Pereopods 4–6 carpus with short rod seta. Uropod exopod 0.8x endopod.

Etymology. The species is named in honour of Sir Ernest Henry Shackleton, the polar explorer and leader of heroic cruise of HMS *Endurance*.

Description of female. BL = 1.6 mm. Body robust (Figure 16(a–c)) 3.2 L:W.

Cephalothorax 0.8 L:W, 1.1x pereonites 1–3, 0.2x BL. Pereonites 0.6x BL, pereonites 1–3 progressively longer, pereonites-1–6: 0.1, 0.2, 0.3, 0.6, 0.5 and 0.4 L:W, respectively. Pleon 0.3x BL. Pleonites 0.7 L:W, pleonites 1–3 with lateral setae. Pleotelson 1.5x pleonite-5.

Antennule (Figure 17(a)) article-1 4.8 L:W, 3.0x article-2, with two simple and group of penicillate setae at mid-length, and one simple and four

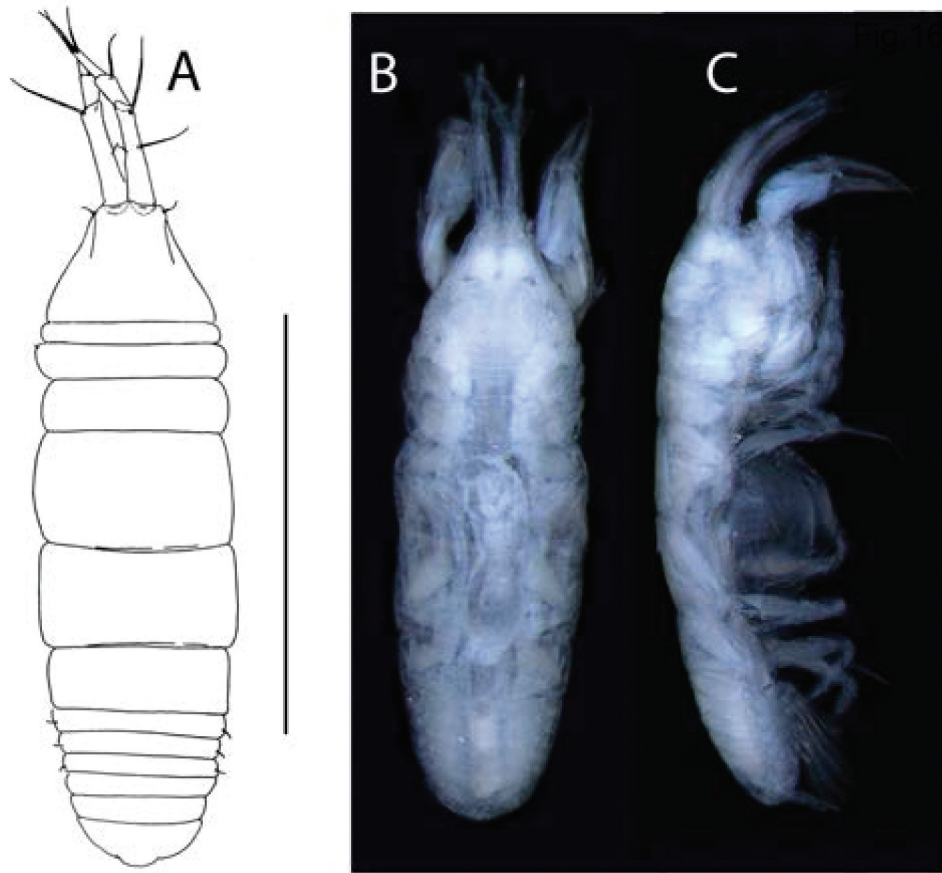


Figure 16. *Pseudotanais shackletoni* sp. nov., female holotype, (a, b), dorsal; (c), latera. Scale line = 1 mm.

penicillate setae distally; article-2 2.1 L:W, 0.8x article-3, with two simple and one penicillate setae distally; article-3 6.3 L:W, with three simple and two bifurcated setae and one aesthetasc.

Antenna (Figure 17(b)) slightly shorter than antennule; article-2 1.1 L:W, 0.8x article-3, with spine (0.4x article-2); article-3 1.3 L:W, 0.3x article-4, with more robust spine (0.4x article-2); article-4 6.7 L:W, 2.6x article-5, with four distal setae; article-5 3.6 L:W, 7.2x article-6 with distal seta; article-6 0.8 L:W, with five setae.

Left mandible (Figure 17(c)) incisor distal margin serrate, with blunt apex; *lacinia mobilis* well developed, distally serrate; molar not seen.

Labium (Figure 17(d)) simple, glabrous.

Maxillule (Figure 17(e)) endite with nine distal spines and outer subdistal tuft of setules.

Maxilla not seen.

Epignath (Figure 17(g)) simple, distally rounded.

Maxilliped (Figure 17(f)) bases as long as broad, naked, heart-shaped; palp article-1 naked; article-2 with fine outer and three inner two inner setae;

article-3 with three long and small inner setae; article-4 with four distal and one outer setae; endites naked, almost fully fused, with minute central cleft.

Cheliped (Figure 18(a)) basis 1.7 L:W, naked; merus 1.4x carpus ventral margin, with ventral seta; carpus 1.8 L:W, 1.1x palm, with two ventral, one middorsal and one dorsodistal setae; chela 2.5 L:W, 1.8x carpus length, palm 1.4 L:W, with small setae near dactylus insertion; fixed finger 2.8 L:W, 0.7x palm with ventral seta, cutting edge almost simple with three small setae, distal spine almost straight; dactylus 4.4 L:W, cutting edge smooth, with proximal seta.

Pereopod-1 (Figure 18(b)) coxa with seta; basis 6.5 L:W, 4.3x merus, with one dorsoproximal and two midventral simple setae; ischium with ventral seta; merus 2.1 L:W and 0.7x carpus, with dorsodistal seta; carpus 1.8 L:W, 0.6x propodus, with two short dorsodistal setae; propodus 7.0 L:W, 1.1x dactylus and unguis combined length, with short ventrodorsal seta; dactylus 0.7x unguis.

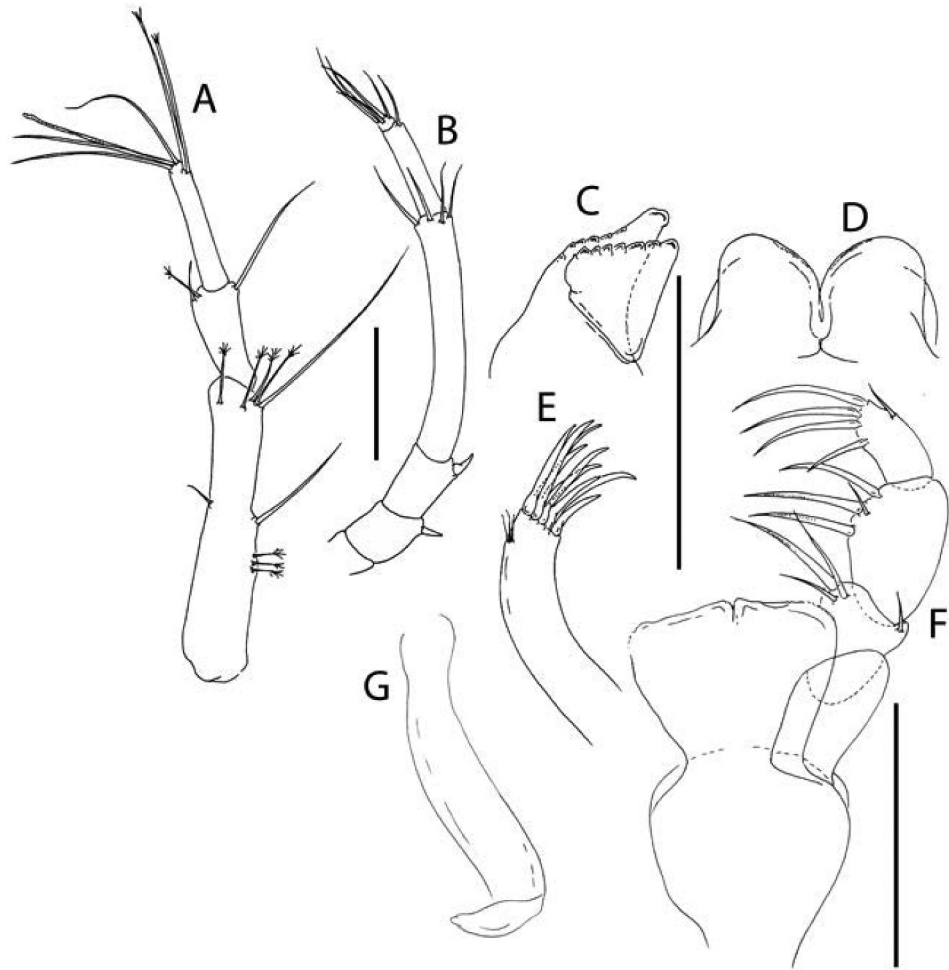


Figure 17. *Pseudotanaid shackletoni* sp. nov., (a), antennule; (b), antenna; (c), left mandible; (d), labium; (e), maxillule. Scale lines = 0.1 mm.

Pereopod-2 (Figure 18(c)) basis 4.4 L:W, 2.9x merus, with middorsal penicillate seta, one dorso-proximal, one ventroproximal, and one ventrodistal simple setae; ischium with ventral seta; merus 2.0 L:W, 0.9x carpus, with seta and spine ventrodistally; carpus 2.2 L:W, 0.7x propodus, with one seta, one spine and long blade-like spine (0.6x propodus); propodus 6.2 L:W, 2.8x dactylus and unguis combined length, with one distal spine (1.6x dactylus); dactylus 1.0x unguis.

Pereopod-3 (Figure 18(d)) basis 5.4 L:W, 3.2x merus, with one dorsoproximal penicillate seta, one ventroproximal and ventrodistal simple setae; ischium with ventral seta; merus 1.7 L:W, 0.9x carpus, with seta and spine ventrodistally; carpus 1.8 L:W, 0.7x propodus, with seta, spine, and long blade-like spine (0.7x propodus); propodus 6.5 L:W, with distal seta (1.6x dactylus); dactylus and unguis broken.

Pereopod-4 (Figure 18(e)) basis 3.6 L:W, 4.4x merus, with two dorsoproximal and one midventral penicillate setae; ischium with two ventral setae (broken); merus 1.2 L:W, 0.5x carpus, with spine; carpus 3.6 L:W, 1.0x propodus, with dorsodistal seta (0.4x propodus), two spines and one short blade-like spine (0.25x propodus); propodus 5.6 L:W, 2.3x dactylus and unguis combined length, with dorsal penicillate seta, two ventrodistal and one dorsal setae (1.8x dactylus and unguis combined length); dactylus 2.0x unguis.

Pereopod-5 (Figure 18(f)) basis 4.9 L:W, 4.0x merus, with two midventral penicillate setae; ischium with two ventral setae; merus 1.7 L:W, 0.6x carpus, with ventrodistal spine; carpus 3.6 L:W, 0.9x propodus, with dorsodistal seta (0.4x propodus), two setae and one short blade-like spine (0.2x propodus); propodus 6.6 L:W, 3.3x dactylus and unguis combined length, two ventrodistal and

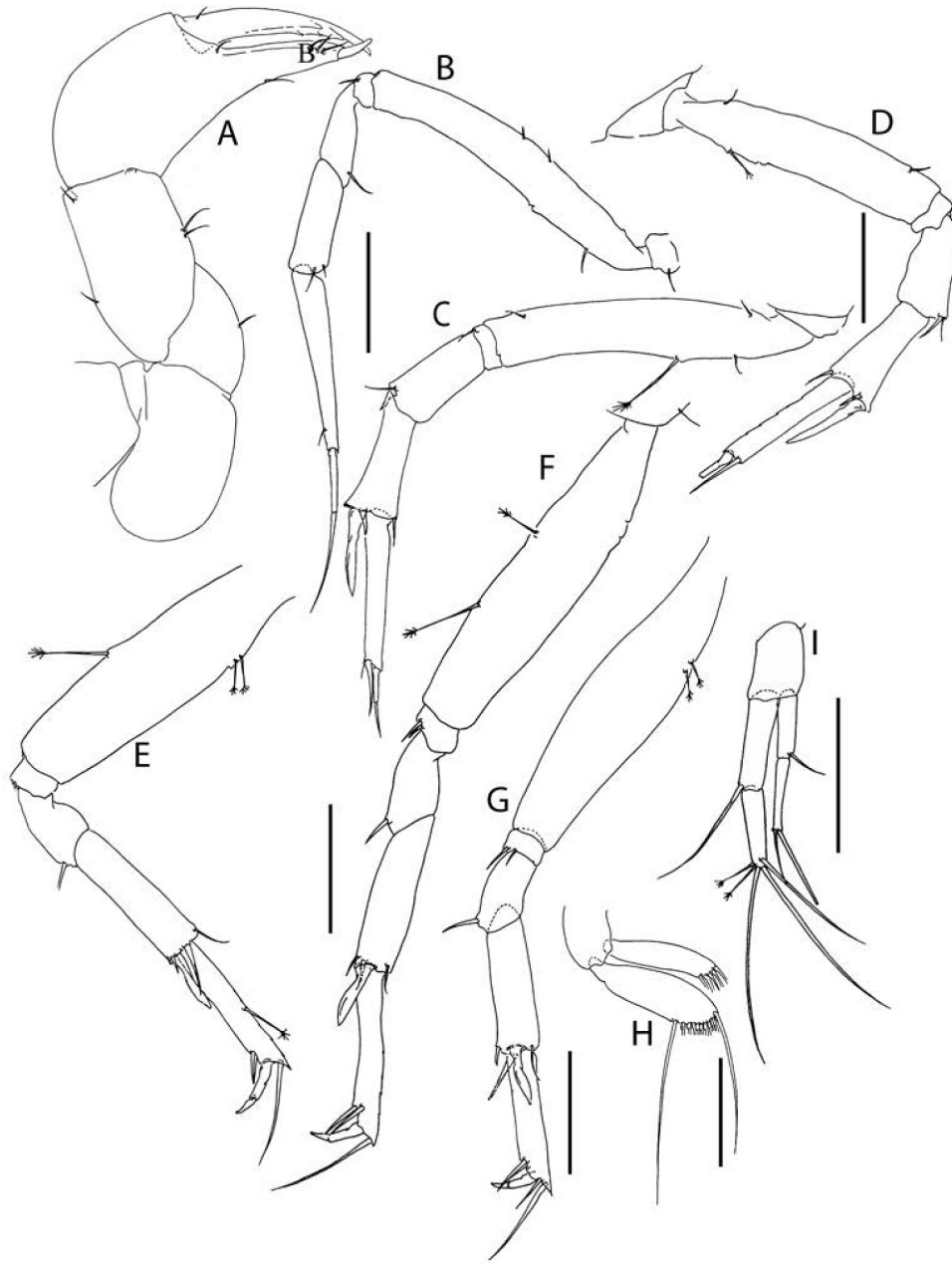


Figure 18. *Pseudotanaeis shackletoni* sp. nov., (a), cheliped; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4; (f), pereopod-5; (g), pereopod-6; (h), pleopod; (i), uropod. Scale lines = 0.1 mm.

one dorsal setae (2.2x dactylus and unguis combined length); dactylus 2.3x unguis.

Pereopod-6 (Figure 18(g)) basis 3.9 L:W, 4.1x merus, with two dorsal penicillate setae; ischium with two ventral setae; merus 1.7 L:W, 0.6x carpus, with ventrodistal spine; carpus 3.4 L:W, 1.0x propodus, with dorsodistal seta (0.4x propodus); propodus 5.4 L:W, 3.4x dactylus and

unguis combined length, two ventrodistal and two dorsal setae (longer seta 2.4x dactylus and unguis combined length); dactylus 1.7x unguis.

Pleopods (Figure 18(h)) peduncle 1.4 L:W; exopod shorter than endopod, 4.2 L:W, with five setae; exopod 3.1 L:W, with eleven setae.

Uropod (Figure 18(i)) peduncle 1.5 L:W; exopod two-articled, 0.8x endopod, article-1 4.3 L:W, with seta, article-2 7.0 L:W, with two simple setae;

endopod two-articled, article-1 3.8 L:W, with long seta article-2 4.0 L:W, with three simple and two penicillate setae.

Distribution. Shag Rocks, South Georgia, 477–1027 m.

Remarks. *Pseudotanaeis shackletoni* sp. nov. (Table II), with a long seta on the merus of pereopod-1, can be classified in the “affinis+longisetosus” morphogroup, but a short rod seta on the carpus of pereopods 5–6 differentiates it from *Pseudotanaeis chanelae*, *P. curieae*, *P. gatae*, *P. julietae*, *P. longisetosus*, *P. longispinus*, *P. monroeeae*, *P. nipponicus*, *P. rapunzelae*, *P. romeo*, *P. spatula*, *P. uranos* and *Pseudotanaeis* sp. O (*sensu* McLelland), which have a long seta. The new species, with a only a spine on the pereopods 4–6 merus, differs from *P. geraldii*, *P. nordenskioldi*, *P. svavarssoni*, *P. vitjazii*, *P. yenneferae* and *Pseudotanaeis* sp. C (*sensu* McLelland), which have both a spine and seta (but seta only in *P. svavarssoni* and two spines and seta in *P. vitjazii*). Finally, *P. shackletoni*, bearing two setae on the ischium of pereopods 4–6, can be distinguished from *P. scalpellum* that has a single seta.

Pseudotanaeis shackletoni is most similar to *P. affinis* but differs in the proportion of the pereopod-5 dactylus to unguis, 0.6x, versus 0.3x in *P. affinis*. The carpus of pereopod-5 in *P. shackletoni* is shorter than the propodus, while in *P. affinis* it is at least as long. Finally, the long blade-like spine on the pereopod-2 carpus is 0.6x propodus, slightly shorter than in *P. affinis* where this is 0.7x.

“denticulatus+abathagastor” group

Diagnosis. After Jakiel et al. (2019), amended. Antenna article 2–3 with spines, setae or naked. Mandible molar coronal or subcoronal/acuminate. Chela non-forcipate. Pereopod-1 basis with few (<3) setae; merus and carpus dorsodistal seta short. Pereopod-2 with short, semilong/intermediate or long blade-like spine on carpus. Pereopods 5–6 carpus dorsodistal seta short. Pereopods 4–6 unguis elongate. Uropod slender, exopod longer or slightly shorter than endopod.

Species included. *Pseudotanaeis corollatus* Bird & Holdich, 1989; *P. denticulatus* Bird & Holdich, 1989; *P. abathagastor* Błażewicz-Paszkowycz, Bamber & Józwiak, 2013; *P. chopini* Jakiel, Palero & Błażewicz, 2019; *P. georgesandae* Jakiel, Palero & Błażewicz, 2019; *P. chaplini* Jakiel, Palero & Błażewicz, 2019; *P. oloughlini* Jakiel, Palero & Błażewicz, 2019; *P. mariaae* Jakiel, Palero & Błażewicz, 2019; *P. locueloae* Jakiel, Palero & Błażewicz, 2019; *P. amundseni* sp. nov.; *P. barnesi* sp. nov.; *P. biopearli* sp. nov.; *P. elephas* sp. nov.; *P. kitsoni* sp. nov.; *P. livingstoni* sp. nov.; and *P. palmeri* sp. nov.

Remarks. As with the preceding “affinis+longisetosus” group, this is also complex, with species identification needing close attention. The (largely) diagnostic or useful characters of the species are summarised in Table II.

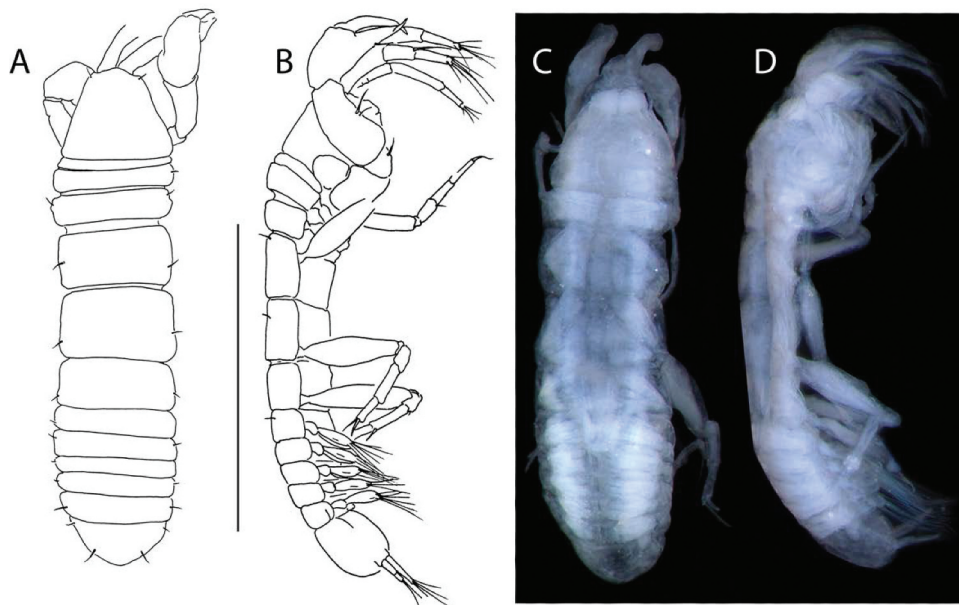


Figure 19. *Pseudotanaeis amundseni* sp. nov., female holotype, (a, c), dorsal; (b, d), lateral. Scale line = 1 mm.

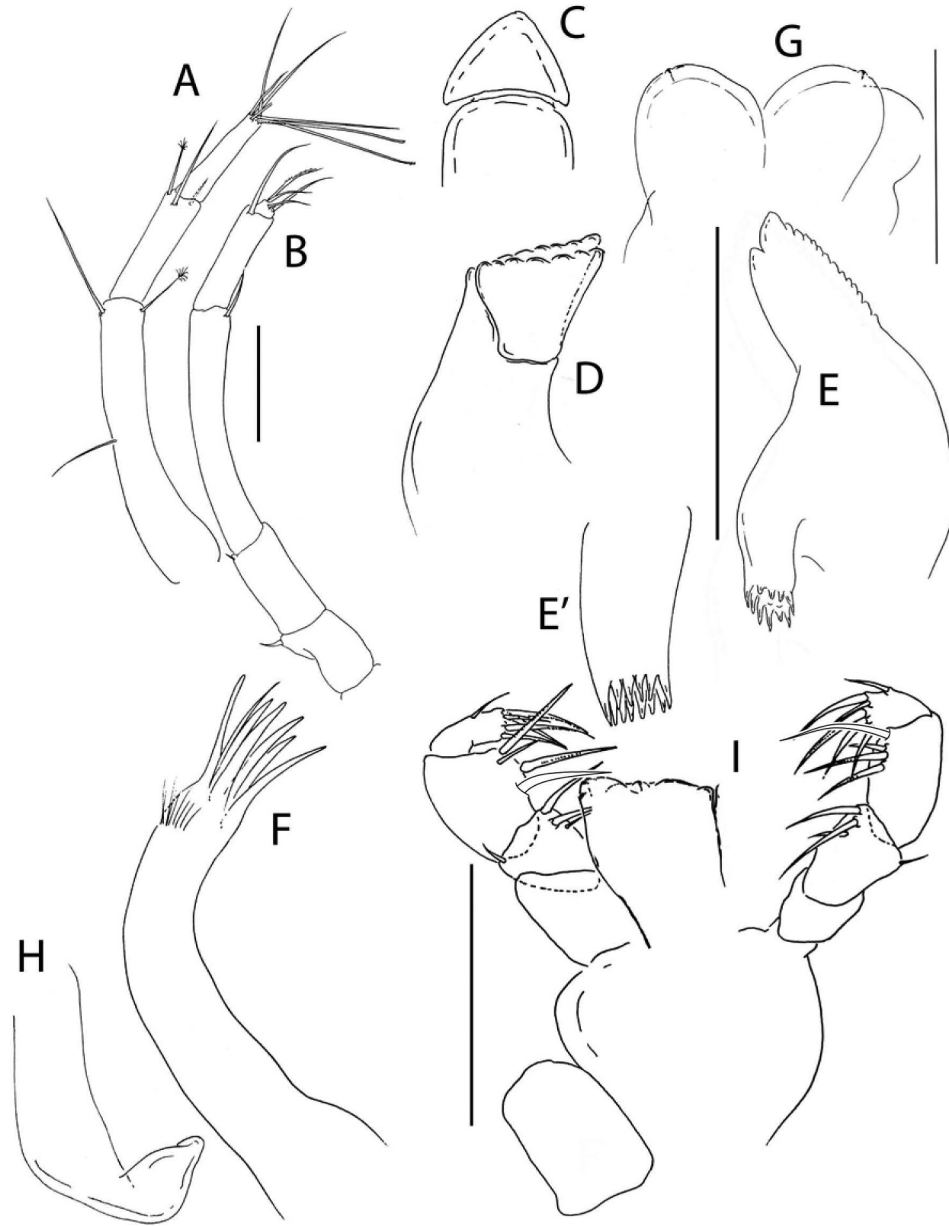


Figure 20. *Pseudotanais amundseni* sp. nov., (a), antennule; (b), antenna; (c), labrum; (d), left mandible; (e), right mandible; (e'), molar; (f), maxillule; (g), labium; (h), epignath; (i), maxilla and maxilliped. Scale lines = 0.1 mm.

***Pseudotanais amundseni* sp. nov.**
(Figures 19–21)

<http://www.zoobank.org/urn:lsid:zoobank.org:act:DBFC692D-1245-4C9E-BF75-CFEB5065876A>

Material examined. Holotype, neuter 1.4 mm, ICUL8826, BIO4-EBS-3B (NHM UK.2021.117). Paratypes: neuter 1.1 mm, ICUL8891, BIO4-EBS-3A (NHM UK.2021.118); two juvenile females 1.4–

1.6 mm (one dissected in slides), ICUL8827, BIO4-EBS-3B (NHM UK.2021.119); neuter, 1.6 mm, dissected, ICUL8916, BIO4-EBS-3B (NHM UK.2021.120); juvenile female 1.4 mm, ICUL8833, BIO4-EBS-3D (NHM UK.2021.121); neuter 1.7 mm, ICUL8828, BIO5-EBS-2A (NHM UK.2021.122); neuter 1.6 mm, ICUL8829, BIO5-EBS-3B (NHM UK.2021.123); neuter 1.4 mm, ICUL8830, BIO5-EBS-3D (NHM UK.2021.124); juvenile female 1.5

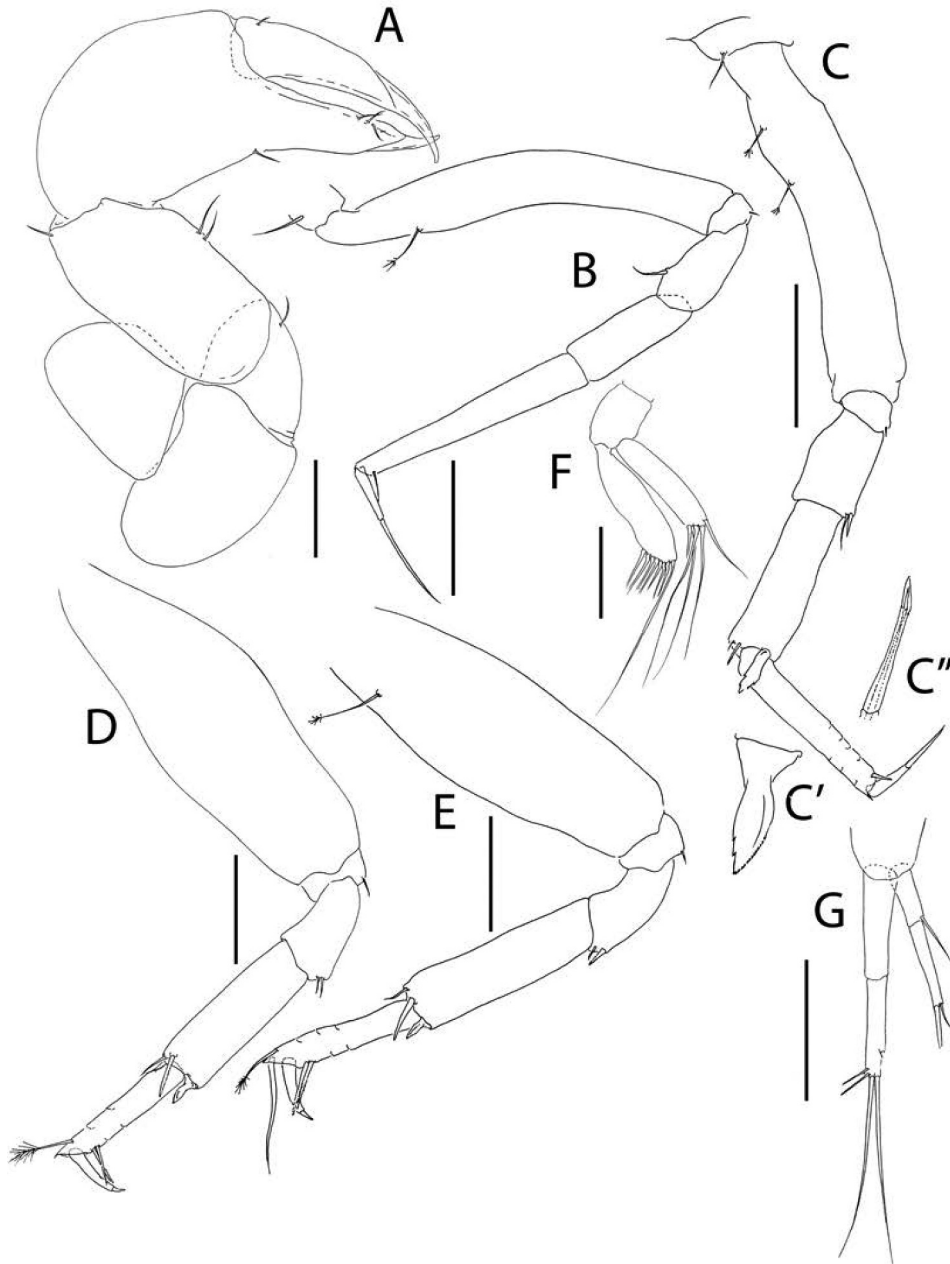


Figure 21. *Pseudotanais amundseni* sp. nov., (a), cheliped; (b), pereopod-1; (c), pereopod-2, with (c'), blade-like carpal spine and (c''), unguis; (d), pereopod-4; (e), pereopod-6; (f), pleopod; (g), uropod. Scale lines = 0.1 mm.

mm, (1 microscope slide – NOT IN ORIGINAL MS _ LEH:); ICUL8831, BIO6-EBS-3A (NHM UK.2021.125); juvenile female 1.9 mm, ICUL8832, BIO6-EBS-3E (NHM UK. 2021.126).

Diagnosis. Antenna article-2 with thin spine; article-3 with seta. Mandible molar coronal. Pereopods 2-3 carpus blade-like spine short

(0.3x propodus). Pereopods 4-6 ischium with seta; merus with spine and seta. Uropod exopod 0.7x endopod.

Etymology. The name of the species, whose type locality is the Amundsen Sea, is given in honour of Roald Engelbregt Gravning Amundsen, the Norwegian Polar pioneer.

Description of female. BL = 1.4 mm. Body robust (Figure 19(a–d)) 4.1 L:W. Cephalothorax 0.8 L:W, 1.5x pereonites 1–3, 0.2x BL. Pereonites 0.5x BL, pereonite-1 half as long as pereonites 2–3, pereonites-1–6: 0.1, 0.2, 0.2, 0.5, 0.6, and 0.4 L:W, respectively. All pereonites with small anterolateral setae. Pleon short, 0.3x BL. Pleonites 0.9 L:W, each with lateral seta. Pleotelson 1.4x pleonite-5, with lateral seta and laterodistal seta.

Antennule (Figure 20(a)) article-1 5.0 L:W, 2.6x article-2, with simple mid-length seta, and one simple and one penicillate setae distally; article-2 2.9 L:W, 1.1x article-3, with two simple (short and long) and one penicillate setae distally; article-3 4.2 L:W, with one distally bifurcated and five simple setae and one aesthetasc (some setae broken).

Antenna (Figure 20(b)) slightly longer than antennule; article-2 1.7 L:W; 0.9x article-3, with spine (0.3x article-2); article-3 2.2 L:W, 0.4x article-4, with minute seta (0.1x article-3); article-4 6.3 L:W, 2.4x article-5, with distal seta; article-5 3.0 L:W, 7.0x article-6, with seta; article-6 0.6 L:W, with two simple and two serrate setae distally.

Labrum (Figure 20(c)) dome-shaped, naked.

Left mandible (Figure 20(d)) *lacinia mobilis* well developed, distally serrate; incisor distal margin serrate.

Right mandible (Figure 20(e,e')) incisor unequally bifid, margin serrate (Figure 18(e')); molar coronal.

Labium (Figure 20(g)) simple, naked.

Maxillule (Figure 20(e)) endite with at least seven distal spines and outer subdistal tuft of setules.

Epignath (Figure 20(h)) ribbon-like, distally rounded.

Maxilla (Figure 20(i)) subrectangular, naked.

Maxilliped (Figure 20(i)) bases naked; palp article-1 naked; article-2 with fine outer seta and three inner (one small) setae; article-3 with three long and one short inner setae, article-4 with five distal and one sub-distal setae; all setae with finely denticulate margins on their distal half; endites fused, but with central distal cleft, each with two small gustatory cusps.

Cheliped (Figure 21(a)) robust, basis 1.5 L:W, naked; merus slightly shorter than carpus ventral margin, with ventral seta; carpus 1.7 L:W, 0.9x palm, with two midventral and one dorsodistal setae; chela 2.4 L:W, 1.7x carpus length, palm 1.4 L:W, with ventral seta; fixed finger 2.4 L:W, 0.8x palm, cutting edge almost simple, poorly calcified, with three inner setae, distal spine sharp but stout; dactylus 3.4 L:W, cutting edge smooth, with proximal seta.

Pereopod-1 (Figure 21(b)) basis 6.8 L:W, 4.3x merus, with dorsoproximal penicillate seta; ischium

with ventral seta; merus 1.6 L:W and 0.8x carpus, with dorsodistal seta; carpus 2.7 L:W, 0.5x propodus, naked; propodus 6.0 L:W, 1.4x dactylus and unguis combined length, with ventrodistal seta; dactylus 0.5x unguis; dactylus and unguis 0.6 as propodus.

Pereopod-2 (Figure 21(c)) coxa with seta; basis 5.4 L:W, 3.8x merus, with two dorsoproximal penicillate setae; ischium with small ventral seta; merus 1.5 L:W, 0.6x carpus, with ventrodistal seta and spine; carpus 3.0 L:W, 1.0x propodus, with seta, spine and short blade-like spine (0.3x propodus) distally (Figure 21(c')); propodus 6.0 L:W, 1.4x dactylus and unguis combined length, with ventrodistal spine (0.4x dactylus); dactylus 0.8x unguis (Figure 21(c'')).

Pereopod-3 similar to pereopod-2.

Pereopod-4 (Figure 21(d)) basis 2.9 L:W, 4.4x merus, naked; ischium with ventral seta; merus 1.5 L:W, 0.6x carpus, with seta and small spine ventrodistally; carpus 2.8 L:W, 1.2x propodus, with dorsodistal seta (0.25x propodus), spine and short blade-like spine (0.3x propodus); propodus 4.8 L:W, 1.3x dactylus and unguis combined length, with dorsodistal penicillate seta and two ventrodistal serrate setae (dorsal seta broken); dactylus 5.0x unguis; unguis very short.

Pereopod-5 similar to pereopod-4.

Pereopod-6 (Figure 21(e)) basis 3.0 L:W, 4.3x merus, with proximal penicillate seta; ischium with ventral seta; merus 1.5 L:W, 0.4x carpus, with seta and spine ventrodistally; carpus 3.5 L:W, 1.5x propodus, with dorsodistal seta (0.2x propodus), spine and blade-like spine (0.2x propodus) ventrodistally; propodus 4.8 L:W, 2.0x dactylus and unguis combined length, with dorsodistal penicillate seta, two ventral and one dorsal setae (1.9x dactylus and unguis combined length); dactylus 5.0x unguis.

Pleopods (Figure 21(f)) peduncle 1.6 L:W; endopod just shorter than exopod, 4.4 L:W, with five setae; endopod 4.0 L:W, with eight setae.

Uropod (Figure 21(g)) peduncle 0.8 L:W; exopod and endopod two-articled; exopod 0.3x endopod, article-1 2.8 L:W, with simple seta, article-2 5.0 L:W, with two distal setae; endopod article-1 3.3 L:W, article-2 5.7 L:W, with one subdistal, two simple and two penicillate distal setae.

Distribution. Amundsen Sea, 489–1046 m.

Remarks. *Pseudotanais amundseni* sp. nov. has a slender spine on antenna article-2 and can be separated from *P. abathagastor* and *P. mariae* that have a seta at this position. A small seta on antennal

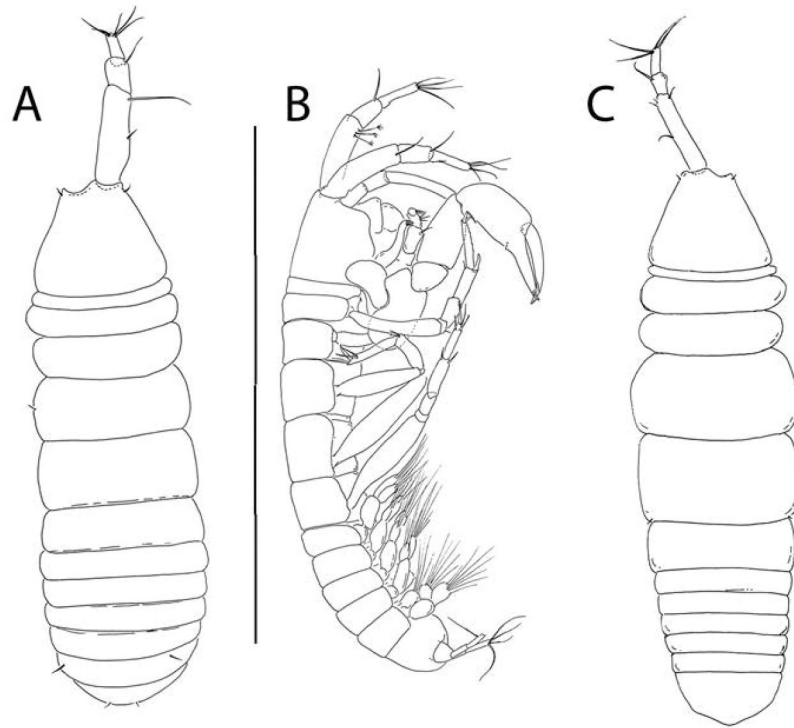


Figure 22. *Pseudotanais barnesi* sp. nov., juvenile male, (a), dorsal; (b), lateral; holotype female, (c, d), dorsal; € , lateral. Scale line = 0.1 mm.

article-3 also distinguishes *P. amundseni* from all other members of the group, in which this article is armed with a spine. In addition, a short carpal blade-like spine (0.3x propodus) on pereopods 2–3 makes *P. amundseni* different from *P. chopini*,

P. denticulatus, *P. locueloae* and *P. oloughlini*, where this spine is long or semilong/intermediate (at least 0.5x propodus). Finally, one seta on the ischium of pereopods 4–6 of *P. amundseni* differentiates it from *P. georgesandae* that has two setae on that article,

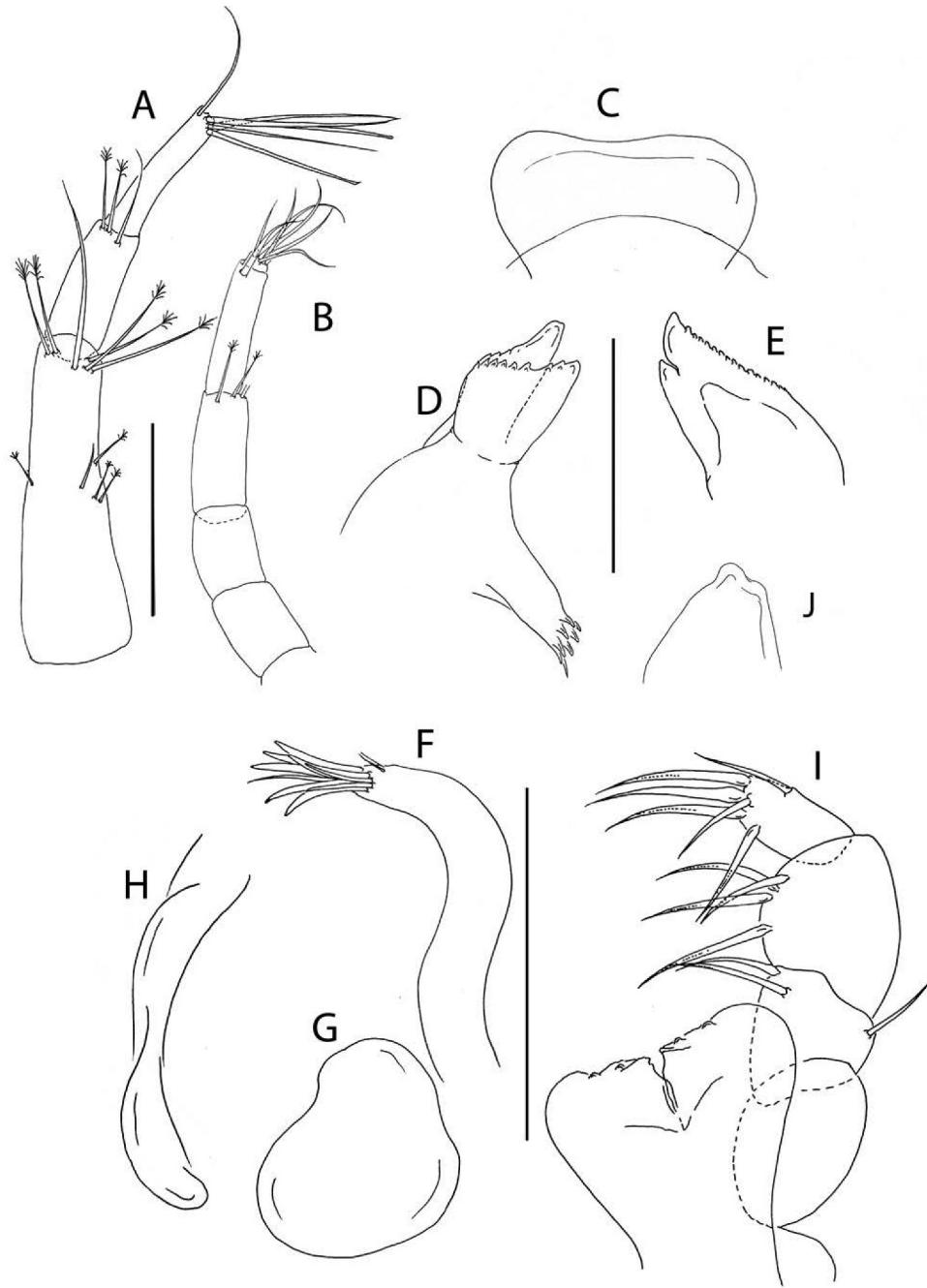


Figure 23. *Pseudotanaïs barnesi* sp. nov., (a), antennule; (b), antenna; (c), labrum; (d), left mandible; (e), right mandible; (f), maxillule; (g), maxilla; (j), labium; (i), maxilliped; (h), epignath. Scale lines = 0.1 mm.

while a spine and seta on the merus of pereopods 4–6 separates it from both *P. georgesandae* and *P. chaplini*.

***Pseudotanaïs barnesi* sp. nov.**

(Figures 22–24)

<http://www.zoobank.org/urn:lsid:zoobank.org:act:A38C890A-B82E-4029-943B-8889288779FC>

Material examined. Holotype, juvenile female 1.0 mm, ICUL8808, BIO5-EBS-3A (NHM UK.2021.127). Paratypes: neuter 1.3 mm, ICUL8816, BIO4-EBS-1A (NHM UK.2021.128); juvenile male 1.0 mm, ICUL8818, BIO4-EBS-2A(E) (NHM UK.2021.129); dissected neuter, ICUL8810, BIO4-EBS-3A (NHM UK.2021.130); juvenile female 1.3 mm, ICUL8817, BIO4-EBS-3A (NHM UK.2021.131);

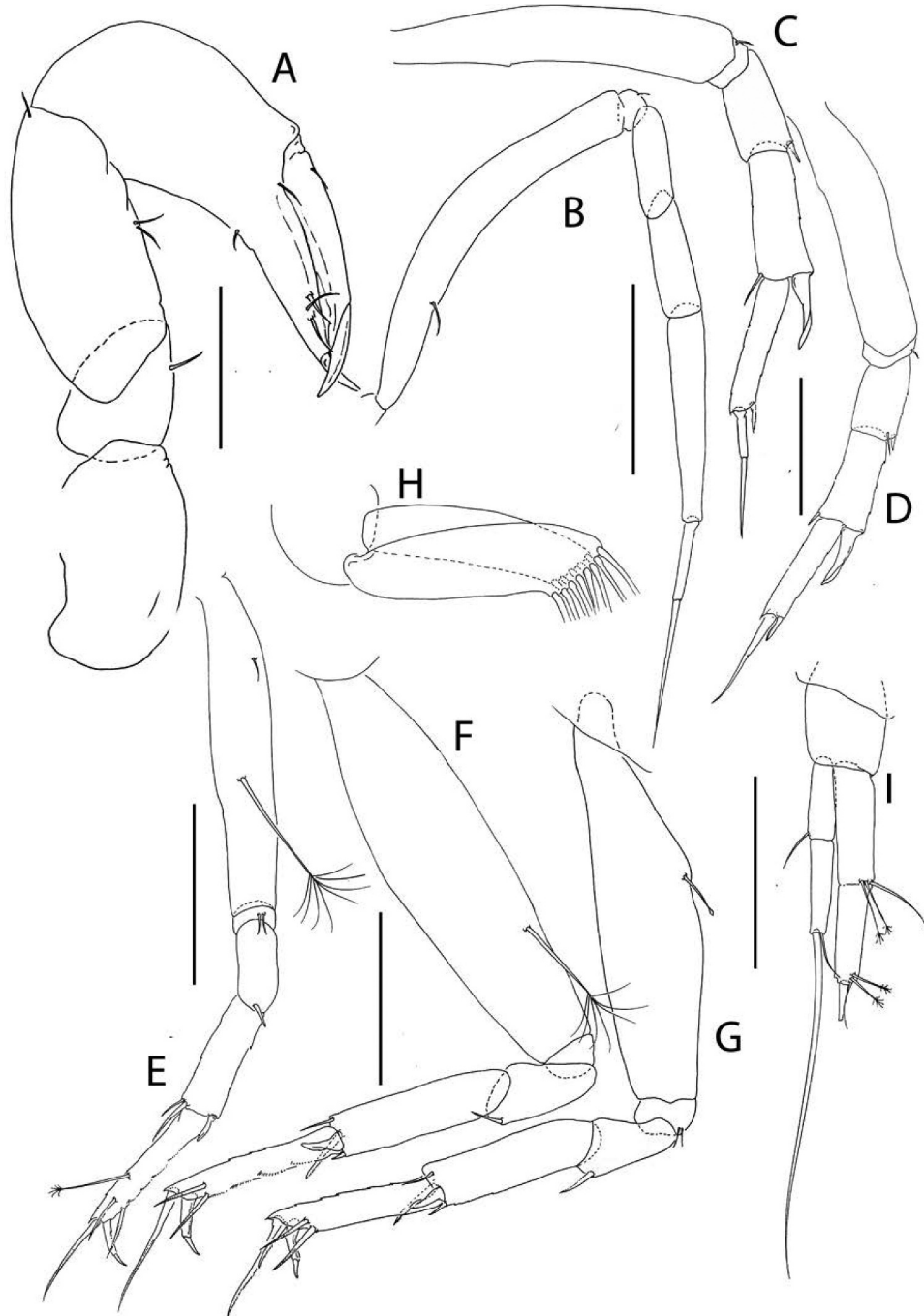


Figure 24. *Pseudotanais barnesi* sp. nov., (a), cheliped; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4; (f), pereopod-5; (g), pereopod-6; (h), pleopod; (i), uropod. Scale lines = 0.1 mm.

dissected neuter, ICUL8921, BIO4-EBS-3A (NHM UK.2021.132); juvenile male 0.9 mm, neuter 1.1 mm, ICUL8819, BIO4-EBS-3B (NHM UK.2021.133); two damaged juvenile females, ICUL8815, BIO5-EBS-1A (NHM UK.2021.134); neuter 1.2 mm, ICUL8814, BIO5-EBS-2A (NHM UK.2021.135); juvenile female 1.0 mm, juvenile male 1.0 mm,

ICUL8812, BIO5-EBS-3A (NHM UK.2021.136); dissected neuter, ICUL8922, BIO5-EBS-3A (NHM UK.2021.137); male 1.2 mm, juvenile male 1.1 mm, neuter 0.8 mm, ICUL8813, BIO5-EBS-3B (NHM UK.2021.138); neuter 1.1 mm, ICUL8805, BIO5-EBS-3D (NHM UK.2021.139); juvenile male 1.2 mm, ICUL8809, BIO5-EBS-3D (NHM

UK.2021.140); neuter 1.0 mm, ICUL8811, BIO5-EBS-3D (NHM UK.2021.141); dissected neuter, ICUL8920, BIO5-EBS-3D (NHM UK.2021.142).

Diagnosis. Antenna articles 2 and 3 naked, article-4 short (2.0 L:W). Pereopod-1 merus and carpus naked. Mandible molar coronal. Pereopods 2–3 carpus blade-like spine long (0.6x propodus). Uropod exopod 0.8x endopod.

Etymology. The name is in honour of David K.S. Barnes (British Antarctic Survey, UK), who collected the material and kindly made it available for our study.

Description of female. BL = 1.0 mm. Body robust (Figure 22(c–e)) 3.4 L:W. Cephalothorax 0.9 L:W, 1.3x pereonites 1–3, 0.2x BL. Pereonites 0.5x BL, pereonite-1 about half, or less, as long as pereonites 2–3, pereonites-1–6: 0.1, 0.17, 0.3, 0.4, 0.4, and 0.3 L:W, respectively. Pleon 0.9x BL. Pleonites 0.8 L:W; pleonite-5 with mid-lateral and pleotelson with distal pair of fine setae. Pleotelson 0.5 L:W, naked, tapering distally.

Antennule (Figure 23(a)) article-1 3.2 L:W, 2.3x article-2, with one simple and four penicillate setae at mid-length, with one simple and five long penicillate distal setae; article-2 2.5 L:W, 0.9x article-3, with one simple and two penicillate distal setae; article-3 4.6 L:W, with four simple distal setae and one aesthetasc.

Antenna (Figure 23(b)) shorter than antennule; article-2 1.4 L:W; 1.1x article-3, naked; article-3 1.2 L:W, 0.6x article-4, naked; article-4 2.0 L:W, 1.0x article-5, with one simple (broken) and two penicillate distal setae; article-5 3.9 L:W, 5.4x article-6, with distal seta; article-6 2.5 L:W, with six distal setae.

Labrum (Figure 23(c)) distally truncate, naked.

Left mandible (Figure 23(d)) incisor with distally elongated blunt tooth, margin weakly serrate; *lacinia mobilis* well developed, margin serrate; molar coronal.

Right mandible (Figure 23(e)) incisor unequally bifid, distal margin serrate; molar as left mandible.

Labium (Figure 23(j)) with rounded distal cusp on each lobe.

Maxillule (Figure 23(f)) endite with nine distal spines and outer subdistal tuft of setae.

Maxilla (Figure 23(g)) semi-rounded, naked.

Maxilliped (Figure 23(i)) palp article-1, naked; article-2 with one outer and two inner setae; article-3 with four (three longer and one shorter) inner setae, article-4 with five distal and one outer subdistal setae; all setae on articles 3 and 4 with finely denticulate margins in their distal half; endites with distinct distal cleft, each with two small gustatory cusps.

Epignath (Figure 23(h)) linguiform, naked.

Cheliped (Figure 24(a)) basis 1.8 L:W, naked; merus 0.8x carpus ventral margin, with ventral seta; carpus 2.2 L:W, 1.3x palm, with two ventral seta and dorsodistal seta; chela 3.0 L:W, 1.5x carpus length, palm 1.5 L:W, with ventral seta and one seta near dactylus insertion; fixed finger 3.5 L:W, 0.95x palm, cutting edge with poorly calcified margin and three setae, distal spine robust; dactylus 7.6 L:W, cutting edge smooth, with proximal seta.

Pereopod-1 (Figure 24(b)) basis 8.1 L:W, 6.8x merus, with dorsoproximal seta; ischium with ventral seta; merus 1.7 L:W and 0.6x carpus, naked; carpus 2.6 L:W, 0.5x propodus, naked; propodus 5.6 L:W, 0.9x dactylus and unguis combined length, naked: dactylus 0.6x unguis.

Pereopod-2 (Figure 24(c)) basis 5.7 L:W, 3.8x merus, with ventral seta; ischium with ventral seta; merus 1.8 L:W, 0.6x carpus, with ventrodiscal spine; carpus 2.5 L:W, 1.0x propodus, with dorsodistal seta and long blade-like spine (0.6x propodus); propodus 4.5 L:W, 1.0x dactylus and unguis combined length, with distal spine (0.6x dactylus); dactylus 0.6x unguis.

Pereopod-3 (Figure 24(d)) basis 4.8 L:W, 3.3x merus; ischium with ventral seta; merus 1.6 L:W, 0.8x carpus, with ventrodiscal seta and spine; carpus 2.1 L:W, 0.9x propodus, with dorsodistal seta and blade-like spine (0.6x propodus); propodus 3.8 L:W, 1.1x dactylus and unguis combined length, with distal spine (0.6x dactylus); dactylus 0.9x unguis.

Pereopod-4 (Figure 24(e)) basis 5.5 L:W, 3.9x merus, with midventral penicillate seta; ischium with two ventral setae; merus 2.1 L:W, 0.7x carpus, with spine; carpus 3.0 L:W, 0.8x propodus, with seta (0.2x propodus), spine and short blade-like spine (0.2x propodus); propodus 5.0 L:W, 3.0x dactylus and unguis combined length, with subdistal dorsal penicillate seta, two ventrodiscal serrate setae, and dorsal seta (2.1x dactylus and unguis combined length); dactylus 2.3x unguis.

Pereopod-5 (Figure 24(f)) like pereopod-4.

Pereopod-6 (Figure 24(g)) like pereopod-4, but propodus with two (long and short) dorsodistal setae.

Pleopods (Figure 24(h)) peduncle 0.9 L:W; endopod just shorter than exopod, 3.9 L:W, with five setae; exopod 3.6 L:W, with eight setae.

Uropod (Figure 24(i)) peduncle 1.3 L:W; exopod two-articled, 0.8x endopod, article-1 2.8 L:W, with simple seta, article-2 4.5 L:W, with two simple setae (one very long); endopod two-articled, article-1 3.1 L:W, with one simple and two penicillate setae, article-2 2.9 L:W, with two simple and two penicillate setae.

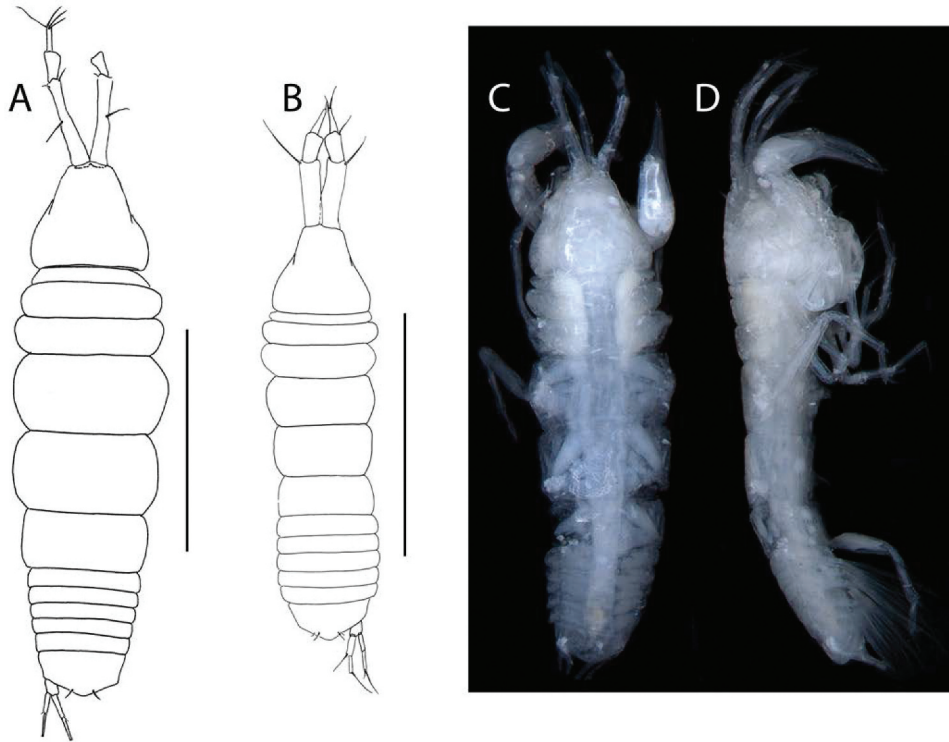


Figure 25. *Pseudotanaid biopearli* sp. nov., female holotype, (a, c), dorsal, (d), lateral; juvenile male, (b), dorsal. Scale lines = 1 mm.

Juvenile male (Figure 22(a–b)), body 1.0 mm. Similar to female, but with shorter (compact) pereonites and thicker antennule.

Distribution. Amundsen Sea, 478–1473 m.

Remarks. The coronal mandible molar and lack of setae on the merus and carpus of pereopod-1 in *Pseudotanaid barnesi* sp. nov. make it a member of the “denticulatus+abathagastor” morphogroup. The apparently naked antenna articles 2–3 is a unique character, separating it from its congeners. Besides, the short antenna article-4 (2.0 L:W), is an autapomorphy which separates *P. barnesi* from other members of the group where it is at least 5.7 L:W.

***Pseudotanaid biopearli* sp. nov.**
(Figures 25–27)

<http://www.zoobank.org/urn:lsid:zoobank.org:act:69ED7E2A-FA5F-41AD-8118-33B65DC8D47E>

Material examined. Holotype, neuter 2.4 mm, ICUL8834, BIO6-EBS-3A (NHM UK.2021.143). Paratypes: neuter 1.7 mm, dissected, ICUL8836, BIO6-EBS-1A (NHM UK.2021.144); 2 neuters 1.6–2.1 mm, ICUL8837, BIO6-EBS-1A (NHM UK.2021.145); neuter 1.7 mm, ICUL8838, BIO6-

EBS-1A (NHM UK.2021.146); juvenile female (poor condition), dissected, ICUL8914, BIO6-EBS-1A (NHM UK.2021.147); male, dissected, ICUL8915, BIO6-EBS-1A (NHM UK.2021.148.); neuter 1.8 mm, ICUL8835, BIO6-EBS-2A (NHM UK.2021.149); one individual ICUL8896, BIO6-EBS-1A (NHM UK.2021.150).

Diagnosis. Antenna articles 2–3 with spines. Mandible molar coronal. Pereopods 2–3 carpus blade-like spine short (0.4x propodus). Pereopods 4–6 ischium with two setae; merus with spine and seta. Uropod exopod 0.8x endopod.

Etymology. The name of the species comes from the acronym BIOPEARL: Biodiversity dynamics: Phylogeography, Evolution and Radiation of Life in the Antarctica program.

Description of female. BL = 2.4 mm. Body robust (Figure 25(a,c–d)) 3.4 L:W. Cephalothorax 0.9 L:W, 1.2x pereonites 1–3, 0.2x BL. Pereonites 0.6x BL, pereonites-1–6: 0.14, 0.2, 0.3, 0.5, 0.5, and 0.5 L:W, respectively. Pleon short, 0.2x BL. Pleonites 0.7 L:W, pleonites 3–5. Pleotelson 2.1x pleonite-5, with laterodistal seta.

Antennule (Figure 26(a)) article-1 4.3 L:W, 3.6x article-2, with two simple and two penicillate setae

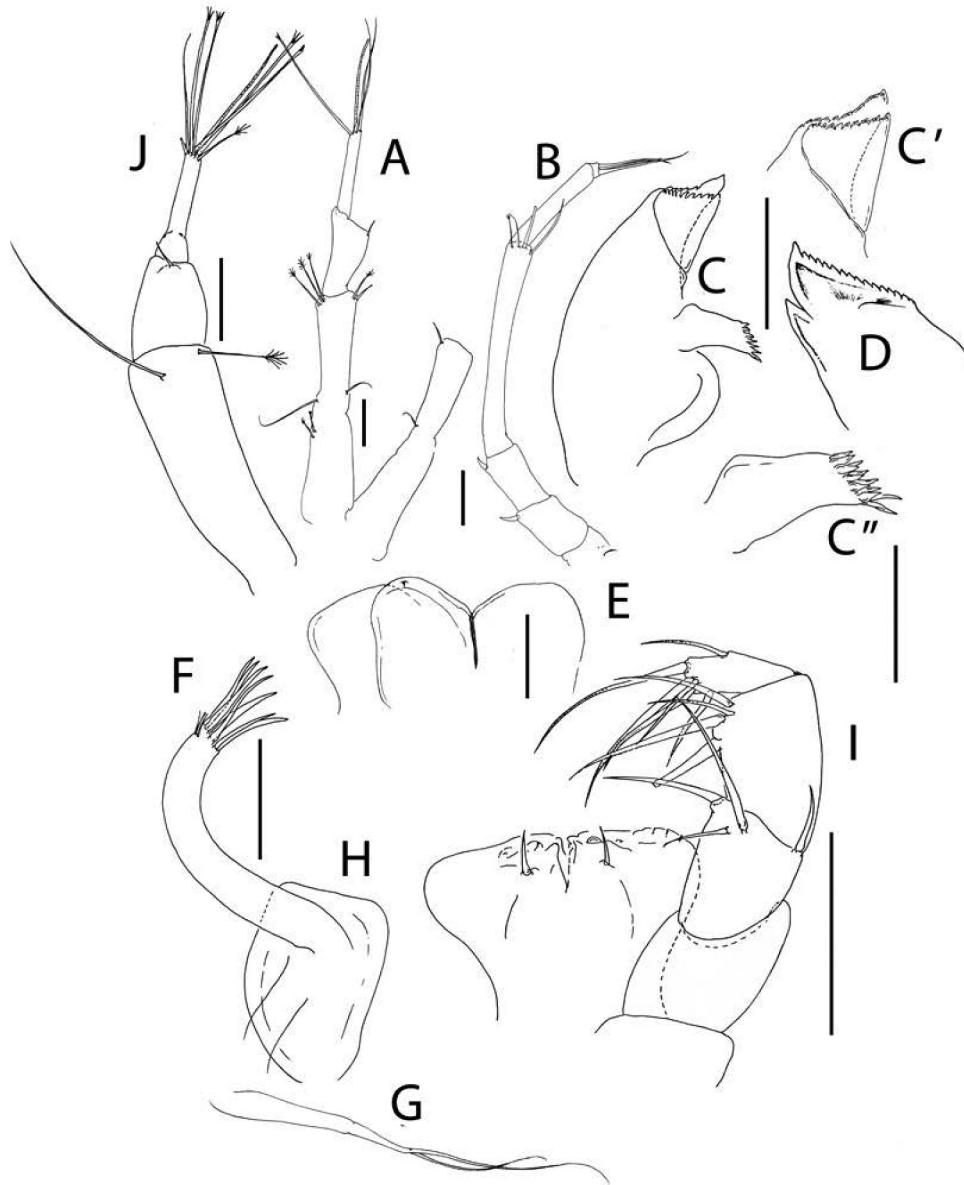


Figure 26. *Pseudotanaïs biopearli* sp. nov., (a), antennule of female; (b), antenna; (c), left mandible, with (c'), distal detail and (c''), molar; (d), right mandible; (e), labium; (f), maxillule; (g), maxillule endite; (h), maxilla; (i), maxilliped; (j), antennule of juvenile male. Scale lines = 0.1 mm.

at mid-length, and one simple and four penicillate distal setae; article-2 1.4 L:W, 0.8x article-3, with distal seta; article-3 5.3 L:W, with one bifurcated and two simple setae and one aesthetasc.

Antenna (Figure 26(b)) just longer than antennule; article-2 1.3 L:W; 1.0x article-3, with spine (0.3x article-2); article-3 1.5 L:W, 0.3x article-4, with spine (0.25x article-3); article-4 8.6 L:W, 2.0x article-5, with three simple and one penicillate distal setae;

article-5 5.5 L:W, 5.5x article-6, distal seta not seen; article-6 0.5 L:W, with three distal setae.

Labrum not seen.

Left mandible (Figure 26(c,c')) incisor distally pointed, margin serrate, molar coronal (Figure 26(c'')); *lacinia mobilis* well developed, distally serrate.

Right mandible (Figure 26(d)) incisor unequally bifid, distal margin serrate molar as left mandible.

Labium (Figure 26(e)) simple, unornamented.

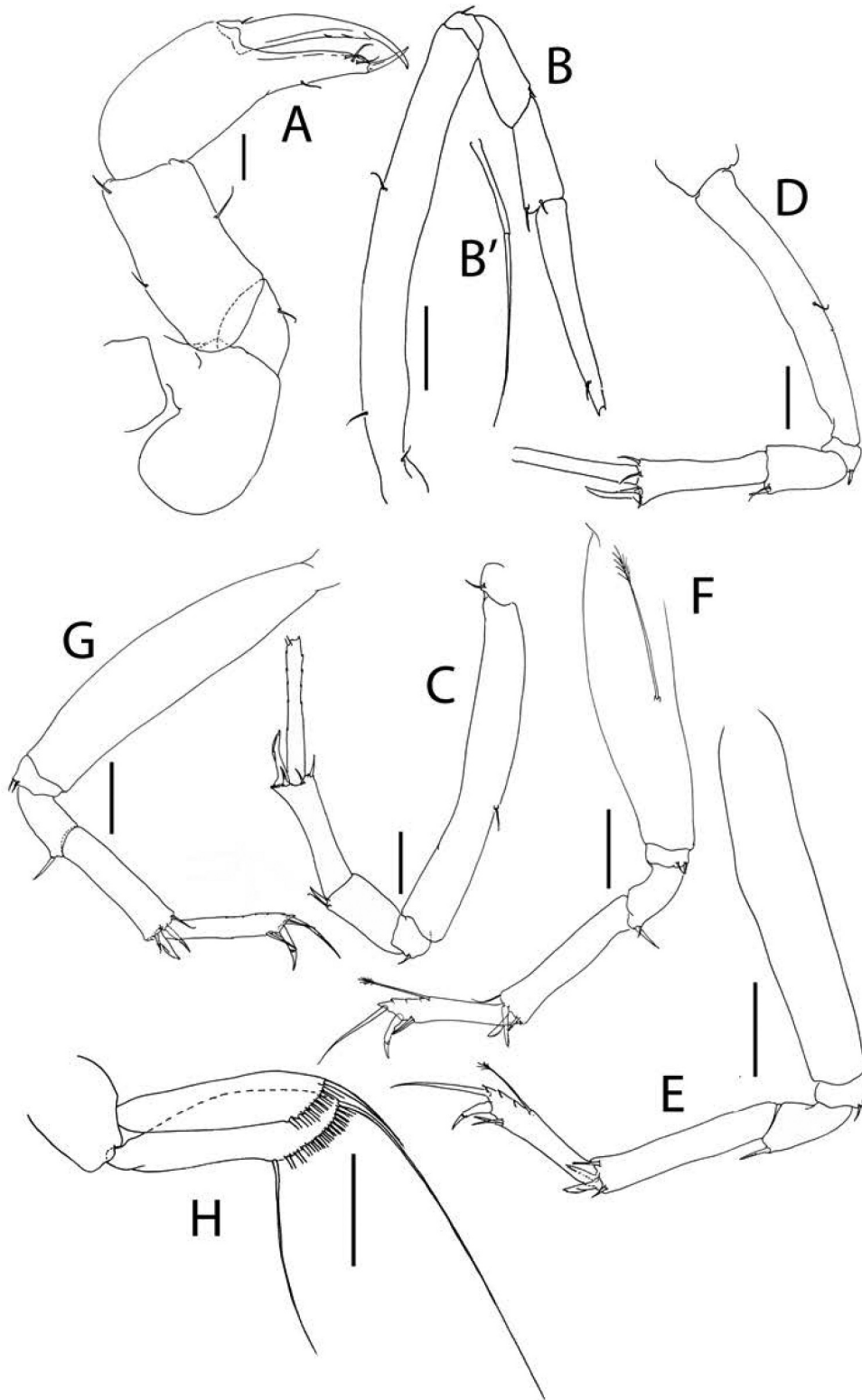


Figure 27. *Pseudotanaids biopearli* sp. nov., (a), cheliped; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4; (f), pereopod-5; (g), pereopod-6; (h), pleopod. Scale lines = 0.1 mm.

Maxillule (Figure 26(f,g)) endite with seven distal spines and outer subdistal tuft of setae.

Maxilla (Figure 26(h)) subrectangular, naked.

Maxilliped (Figure 26(i)) palp article-1 naked; article-2 with fine outer and three inner (two long and one short) setae; article-3 with four inner setae; article-4 with five distal and one sub-distal setae, finely denticulate in distal half. Maxilliped endites fused apart from distal cleft, each with subdistal seta and two small gustatory cusps.

Cheliped (Figure 27(a)) slender, basis 1.5 L:W, naked; merus 0.7x carpus ventral margin, with ventral seta; carpus 1.9 L:W, 1.0x palm, with two ventral setae, one middorsal and one dorsodistal setae; chela 3.1 L:W, 1.7x carpus length, palm 1.8 L:W; fixed finger 2.0 L:W, 0.9x palm, with short ventral seta, cutting edge weakly calcified, with three setae, distal spine slender; dactylus 5.0 L:W, cutting edge smooth, with proximal seta.

Pereopod-1 (Figure 27(b)) basis 9.0 L:W, 5.3x merus, with two ventral setae, and one dorsoproximal seta; ischium with ventral seta; merus 2.1 L:W and 1.0x carpus, with small ventrodial seta; carpus 2.4 L:W, 0.4x propodus, two dorsodistal setae; propodus 8.0 L:W, 0.7x dactylus and unguis combined length, with subdistal seta; dactylus 0.5x unguis.

Pereopod-2 (Figure 27(c)) basis 7.2 L:W, 5.0x merus, with midventral simple seta; ischium with ventral seta and spine; merus 1.6 L:W, 0.6x carpus, with seta and spine ventrodially; carpus 2.6 L:W, 0.8x propodus, with seta, two spines and short blade-like spine (0.4x propodus); propodus 6.7 L:W, with distal seta (broken); dactylus and unguis broken.

Pereopod-3 (Figure 27(d)) basis 5.6 L:W, 3.7x merus, with midventral seta; ischium with ventral seta; merus 1.5 L:W, 0.6x carpus, with ventrodial seta and spine; carpus 2.5 L:W, with seta, two spines and short blade-like spine (0.4x propodus); propodus, dactylus and unguis broken.

Pereopod-4 (Figure 27(e)) basis 4.7 L:W, 4.7x merus, naked; ischium with ventral seta (second seta broken); merus 1.5 L:W, 0.4x carpus, with spine (seta not seen); carpus 5.0 L:W, 1.5x propodus, with dorsodistal seta (0.23x propodus), two spines and short blade-like spine (0.3x propodus); propodus 4.7 L:W, 2.3x dactylus and unguis combined length, with dorsal penicillate seta, two ventrodial serrate setae and dorsal seta (2.0x dactylus and unguis combined length); dactylus 1.5x unguis.

Pereopod-5 (Figure 27(f)) basis 3.7 L:W, 3.7x merus, with midventral penicillate seta; ischium with seta; merus 2.1 L:W, 0.5x carpus, with seta and spine ventrodially; carpus 4.3 L:W, 1.4x propodus, with dorsodistal seta (0.3x propodus), two

spines and short blade-like spine (0.3x propodus); propodus 4.4 L:W, 4.4x dactylus and unguis combined length, with dorsodial penicillate seta, two ventrodial serrate setae and dorsodial dorsal seta (2.1x dactylus and unguis combined length); dactylus 3.0x unguis.

Pereopod-6 (Figure 27(g)) basis 4.6 L:W, 5.9x merus, naked; ischium with two ventral setae; merus 1.6 L:W, 0.4x carpus, with spine (seta not seen); carpus 3.6 L:W, 1.2x propodus, with dorsodial seta (0.2x propodus), two spines and short blade-like spine (0.4x propodus); propodus 4.4 L:W, 2.8x dactylus and unguis combined length, with two ventrodial serrate setae and two dorsal setae (longer seta 1.6x dactylus and unguis combined length); dactylus 1.7x unguis.

Pleopod (Figure 27(h)) peduncle 1.1 L:W; endopod just shorter than exopod, 4.3 L:W, with nine setae; exopod 3.4 L:W, with 17 setae.

Uropod (Figure 25(a)) peduncle 1.5 L:W; exopod and endopod two-articled; exopod 0.8x endopod, article-1 3.5 L:W, article-2 5.3 L:W; endopod article-1 4.0 L:W, article-2 6.0 L:W.

Subadult male body (Figure 25(b)) more parallel-sided and slightly smaller than that of female, figured specimen 1.8 mm long; cephalothorax as long as wide. Antennule (Figure 26(i)) more robust, article-1 with simple distal seta much longer than article-2, article-3 showing signs of subdivision and with four bifurcated, one simple and one penicillate setae distally.

Distribution. Amundsen Sea, 477–1486 m.

Remarks. The combination of antenna articles 2–3 with spines, coronal mandible molar, short dorsodial setae on the pereopod-1 merus and carpus, and slender uropods places *P. biopearli* sp. nov. in the “denticulatus+abathagastor” group. A spine present on the antenna article-2 distinguishes it from *P. abathagastor* and *P. mariae*, which have a seta, and from *P. barnesi*, which has this article naked. The slender basis of pereopod-5, that is less than 4 L:W, separates *P. biopearli* from *P. chaplini*, *P. chopini*, *P. corollatus*, *P. denticulatus*, *P. georgesandae* and *P. oloughlini*, where this proportion >4 L:W. Finally, *P. biopearli* has a shorter blade-like spine on pereopod-3 (0.4x propodus) than *P. locueloae* and *P. amundseni* (0.6x and 0.3x propodus, respectively).

***Pseudotanaeis elephas* sp. nov.**

(Figures 28–30)

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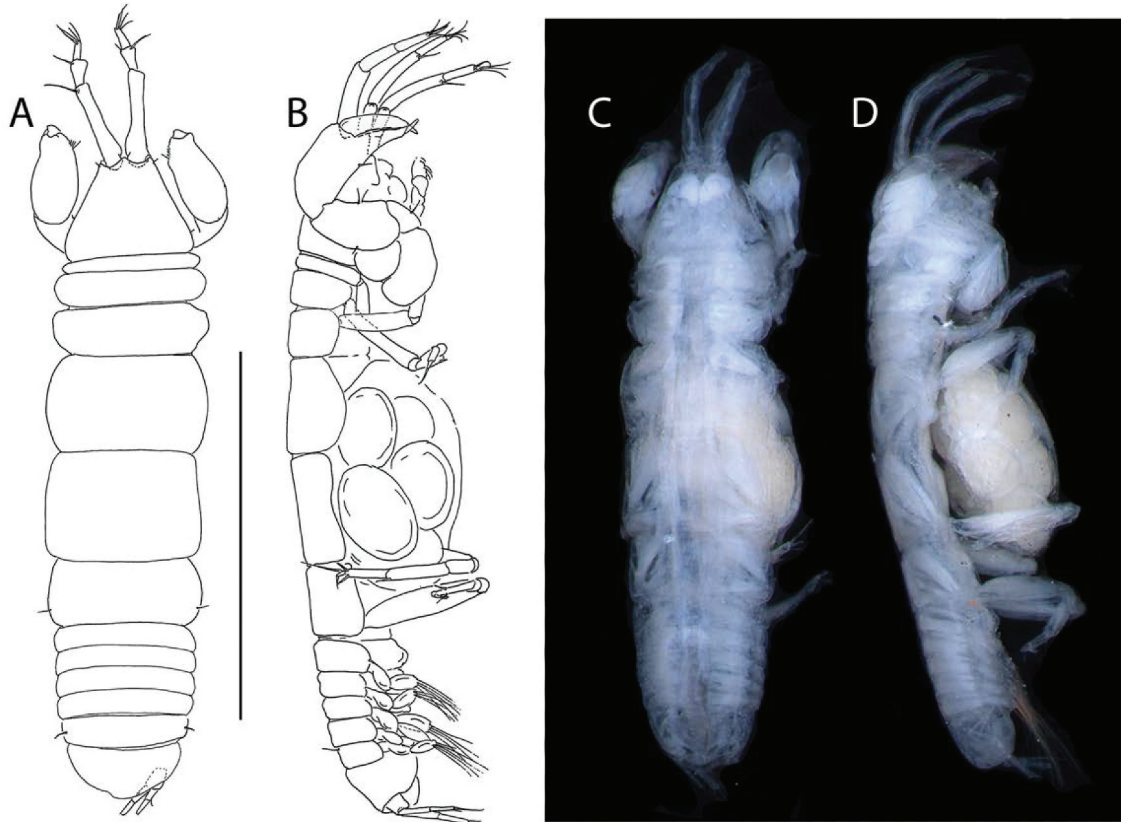


Figure 28. *Pseudotanaid elephas* sp. nov., female holotype, (a, c), dorsal; (b, d) lateral. Scale line = 1 mm.

Material examined. Holotype female 1.6 mm, ICUL8860, EI-EBS-1 (NHM UK.2021.151). Paratypes: juvenile female 1.4 mm, neuter 1.2 mm, ICUL8861, EI-EBS-1 (NHM UK.2021.152); neuter, dissected, ICUL8919, EI-EBS-1 (NHM UK.2021.153); neuter, dissected, ICUL8925, EI-EBS-1 (NHM UK.2021.154); female 1.8 mm, juvenile male 1.5 mm, manca 0.8 mm, ICUL8888, EI-EBS-2 (NHM UK.2021.155); juvenile female 1.5 mm (partly dissected), ICUL8862, LI-EBS-3 (NHM UK.2021.156); juvenile female 1.6 mm, ICUL8863, ST-EBS-2 (NHM UK.2021.157); juvenile male 1.3 mm, ICUL8864, ST-EBS-2 (NHM UK.2021.158); three individuals, JR 144 EI-EBS-2E.

Diagnosis. Antenna article-2 with spine; article-3 with minute seta. Mandible molar coronal. Pereopod-1 merus with short dorsodistal seta. Pereopod-2 carpus blade-like spine short (0.4x propodus). Pereopods 4–6 ischium with two setae; merus with two spines; carpus seta short. Uropod exopod 0.8x endopod.

Etymology. The Latin noun *elephas* alluding to the type locality, Elephant Island.

Description of female. BL = 1.6 mm. Body robust (Figure 28(a–d)) 3.9 L:W. Cephalothorax 0.8 L:W, 1.0x pereonites 1–3, 0.15x BL. Pereonites 0.6x BL, pereonite-1 at most half as long as pereonites 2–3, pereonites 1–6: 0.1, 0.2, 0.3, 0.6, 0.7, and 0.4 L:W, respectively. Pleon short, 0.3x BL. Pleonites 0.9 L:W, pleonite-5 with lateral setae. Pleotelson 1.5x pleonite-5, with conspicuous paired distal setae.

Antennule (Figure 29(a)) article-1 3.5 L:W, 2.1x article-2, with seta at mid-length, and two distal setae; article-2 1.5 L:W, 1.0x article-3, with two simple distal setae; article-3 5.0 L:W, with six simple and one penicillate setae, and one aesthetasc.

Antenna (Figure 29(b,b')) article-2 1.1 L:W, 0.7x article-3, with spine (0.4x article-2); article-3 2.2 L:W, 0.4x article-4, with minute seta (0.2x article-3); article-4 5.7 L:W, 2.1x article-5, with two simple and three penicillate distal setae; article-5 broken, with simple seta; article-6 1.5 L:W, with four distal setae.

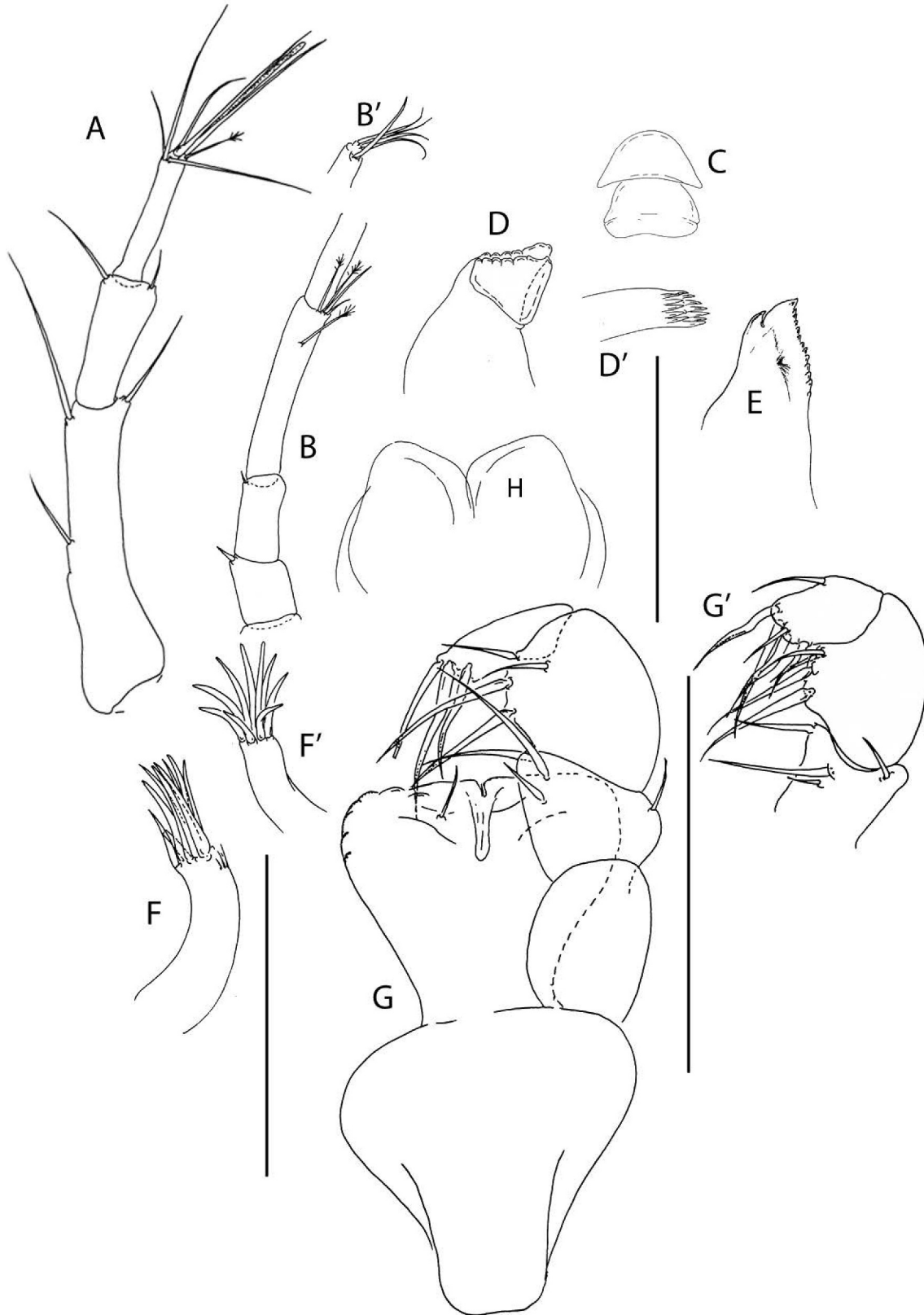


Figure 29. *Pseudotanaïs elephas* sp. nov., (a), antennule; (b), antenna, with (b'), distal antennal article; (c), labrum; (d), left mandible, with (d'), molar; (e), right mandible; (f), maxillule; (f'), maxillule endite, distal; (g), maxilliped; (g'), maxilliped palp; (h), labium. Scale lines = 0.1 mm.

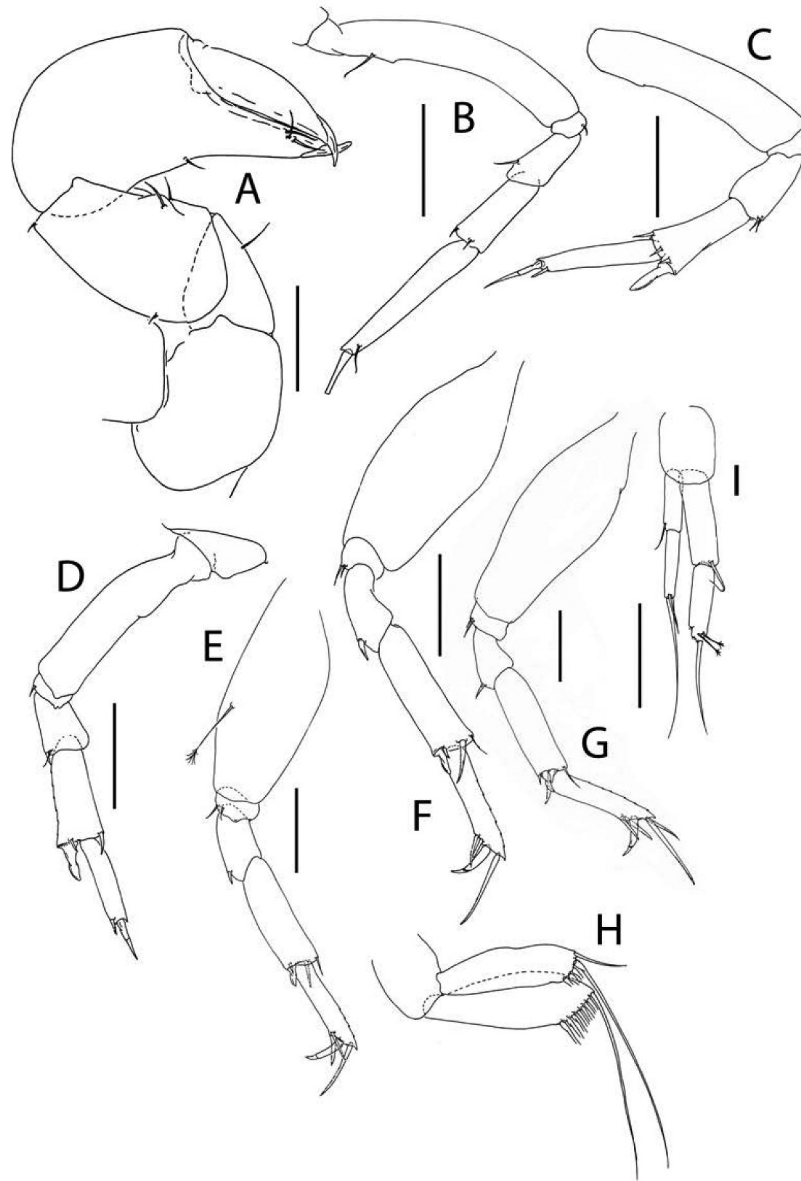


Figure 30. *Pseudotanaids elephas* sp. nov., (a), cheliped; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4; (f), pereopod-5; (g), pereopod-6; (h), pleopod; (i)l, uropod. Scale lines = 0.1 mm.

Labrum (Figure 29(c)) rounded, naked.

Left mandible (Figure 29(d)) incisor distally blunt, margin serrate; *lacinia mobilis* well developed, distally serrate; molar coronal (Figure 29(d')).

Right mandible (Figure 29(e)) incisor unequally bifid, distal margin serrate.

Labium (Figure 29(h)) lobe simple, unornamented.

Maxillule (Figure 29(f,f')) endite with nine distal spines and outer subdistal tuft of setules.

Maxilliped (Figure 29(g,g')) bases together chor-date, as long as broad, naked; palp article-1 naked,

article-2 with fine outer and three inner setae (two long and one short); article-3 with two long and two short inner setae; article-4 with five distal and one subdistal setae; endites fused but with mid-distal cleft, gustatory cusps not seen each with subdistal seta.

Cheliped (Figure 30(a)) robust; basis 1.5 L:W, naked; merus as long as carpus ventral margin, with ventral seta; carpus 1.6 L:W, 0.9x palm, with two ventral setae, one dorsoproximal and dorsodistal setae; chela 2.4 L:W, 1.75x carpus length, palm 1.5 L:W; fixed finger 2.3 L:W, 0.7x palm, with short ventral seta, cutting edge poorly calcified, with three

setae; dactylus robust, 2.9 L:W, without fine proximal seta.

Pereopod-1 (Figure 30(b)) basis 6.2 L:W, 4.1x merus, with dorsoproximal seta; ischium with ventral seta; merus 1.5 L:W and 0.7x carpus, with dorsodistal seta; carpus 2.8 L:W, 0.6x propodus, with two distal setae; propodus 5.3 L:W, with subdistal seta, unguis broken.

Pereopod-2 (Figure 30(c)) basis 4.2 L:W, 2.8x merus, naked; ischium with ventral seta; merus 1.1 L:W, 0.8x carpus, with two ventrodiscal setae; carpus 2.0 L:W, 0.8x propodus, with simple seta, two spines and semilong/intermediate blade-like spine (0.4x propodus); propodus 5.4 L:W, 1.8x dactylus and unguis combined length, with ventrodiscal spine (0.7x dactylus); dactylus 0.7x unguis.

Pereopod-3 (Figure 30(d)) basis 4.7 L:W, 3.9x merus, naked; ischium with ventral seta; merus 1.1 L:W, 0.5x carpus, with two ventrodiscal setae; carpus 2.3 L:W, 1.2x propodus, with simple seta, spine and semilong/intermediate blade-like spine (0.5x propodus); propodus 4.0 L:W, 2.0x dactylus and unguis combined length, with ventrodiscal spine (0.8x dactylus); dactylus 1.0x unguis.

Pereopod-4 (Figure 30(e)) basis 2.5 L:W, 3.5x merus, with midventral penicillate seta; ischium with two ventral setae; merus 1.5 L:W, 0.6x carpus, with two ventrodiscal spines; carpus 3.3 L:W, 1.2x propodus, with seta (0.2x propodus), two spines and short blade-like spine (0.3x propodus); propodus 4.4 L:W, 2.2x dactylus and unguis combined length, with two ventral setae and one dorsal seta (1.4x dactylus and unguis combined length); dactylus 4.0x unguis.

Pereopod-5 (Figure 30(f)) basis 2.5 L:W, 3.2x merus, naked; ischium with two ventral setae; merus 1.7 L:W, 0.6x carpus, with two ventrodiscal spines; carpus 3.3 L:W, 1.2x propodus, with dorsodistal seta (0.2x propodus), two spines and short blade-like spine (0.3x propodus); propodus 4.3 L:W, 2.4x dactylus and unguis combined length, with two ventral setae and dorsal seta (1.6x dactylus and unguis combined length); dactylus 2.7x unguis.

Pereopod-6 (Figure 30(g)) basis 2.8 L:W, 4.3x merus, naked; ischium with two ventral setae; merus 1.4 L:W, 0.5x carpus, with two ventrodiscal spines; carpus 3.6 L:W, 1.1x propodus, with dorsodistal seta (0.3x propodus), two regular spines and short blade-like spine (0.2x propodus); propodus 4.6 L:W, 2.3x dactylus and unguis combined length, with two serrate ventrodiscal setae, two serrate dorsal setae (longer seta 1.8x dactylus and unguis combined length); dactylus 4.0x unguis.

Pleopods (Figure 30(h)) peduncle 1.2 L:W; endopod just shorter than exopod, 3.6 L:W, with five setae, exopod 2.8 L:W, with eight setae.

Uropod (Figure 30(i)) peduncle 1.5 L:W; exopod and endopod two-articled; exopod 0.8x endopod, article-1 3.8 L:W, with simple distal seta, article-2 5.0 L:W, with two distal setae; endopod article-1 3.1 L:W, with seta, article-2 3.6 L:W, with two penicillate setae and at least three further setae (all but one detached).

Distribution. Elephant Island and Livingston Island (South Shetland Is), 557–1503 m.

Remarks. *Pseudotanaeis elephas* sp. nov., which has a small seta on antenna article-3, a coronal mandible molar, short setae on pereopod-1 carpus, and slender uropod, may be easily placed in the “denticulatus + abathagastor” morphogroup. Because this species is most similar to *P. amundseni*, it can be distinguished from the other members of the group by the same set of characters (see *P. amundseni* remarks). The blade-like spine on the pereopod-2 carpus that is 0.4x propodus is slightly longer than in *P. amundseni* (0.27x). Additionally, two setae (long and short) on the merus of pereopod-2, differentiate *P. elephas* from *P. amundseni* that has two setae of the same length. Finally, the dactylus and unguis of pereopods 4–5 in *P. elephas* is stouter, at most 3.5 L:W, compared to *P. amundseni* at 5.0 L:W.

***Pseudotanaeis kitsoni* sp. nov.**

(Figures 21–33)

<http://www.zoobank.org/urn:lsid:zoobank.org:act:C01D421D-7F64-4AAD-971B-B6642AEFF380>

Material examined. Holotype juvenile female 2.1 mm, ICUL8799, BIO4-EBS-3D (NHM UK.2021.159). Paratypes: juvenile male 2.3 mm, ICUL8801, BIO3-EBS-1B (NHM UK.2021.160); juvenile female 2.2 mm, ICUL8882, BIO3-EBS-1B (NHM UK.2021.161); neuter 2.6 mm, ICUL8883, BIO4-EBS-1A (NHM UK.2021.162); neuter 1.3 mm, ICUL8804, BIO4-EBS-1B (NHM UK.2021.163); neuter 1.4 mm, ICUL8803, BIO4-EBS-3A (NHM UK.2021.164); neuter 1.8 mm, ICUL8807, BIO4-EBS-3A (NHM UK.2021.165); juvenile female 2.1 mm, ICUL8879, BIO4-EBS-3A (NHM UK.2021.166); neuter 1.8 mm, dissected, ICUL8900, BIO4-EBS-3A (NHM UK.2021.167); neuter 1.9 mm, dissected, ICUL8901, BIO4-EBS-3A (NHM UK.2021.168); LOST, ICUL8802, BIO5-EBS-2A (not registered); LOST, ICUL8806, BIO6-EBS-3A (not registered); juvenile male 2.4 mm, neuter 2.3 mm, ICUL8800, BIO6-EBS-3E (NHM UK.2021.171); neuter 1.9 mm, dissected

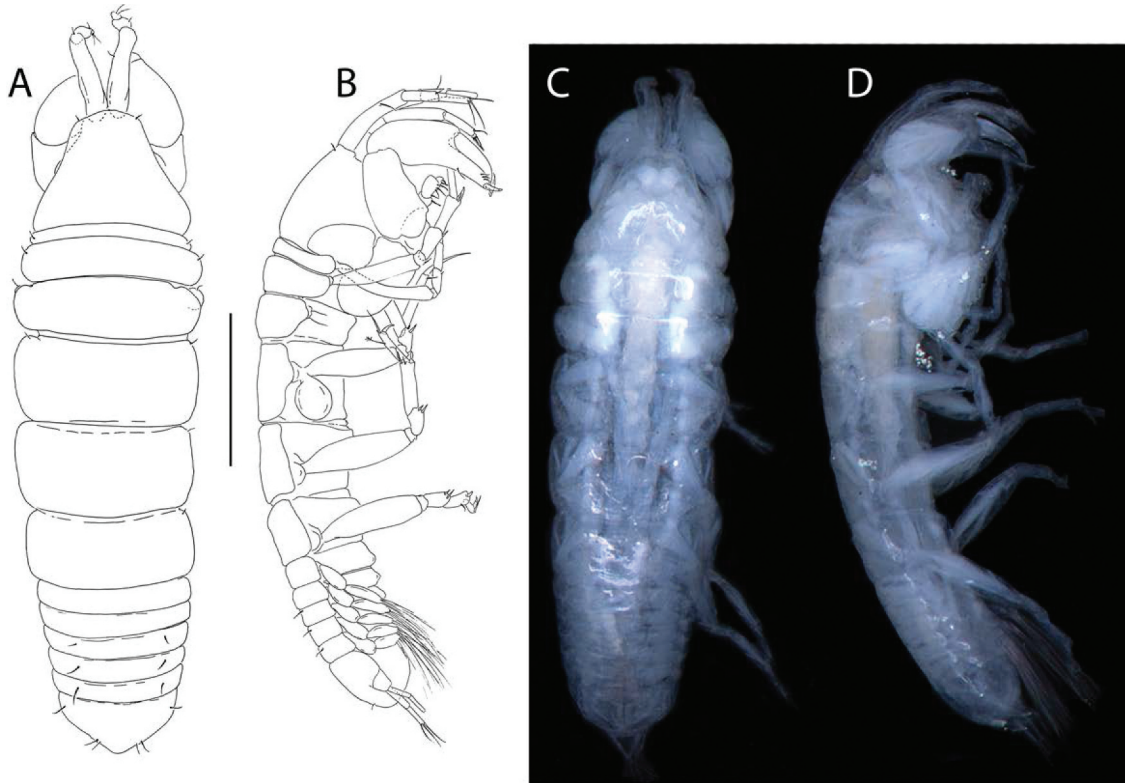


Figure 31. *Pseudotanaid kitsoni* sp. nov., female holotype, (a, c), dorsal; (b, d), lateral. Scale line = 1 mm.

ICUL8927, EI-EBS-2 (NHM UK.2021.172); one individual, ICUL8895, BIO5-EBS-2A (NHM UK.2021.173).

Diagnosis. Antenna articles 2–3 with spines. Mandible molar coronal. Pereopod-1 merus with ventrodistal seta. Pereopods 2–3 carpus blade-like spine short (0.4x propodus). Pereopods 4–6 ischium with two setae; merus with spine and seta. Uropod exopod 0.9x endopod.

Etymology. The species is named for Jane and Malcolm Kitson, for the years of friendship.

Description of female. BL = 2.1 mm. Body robust (Figure 31(a–d)) 3.5 L:W. Cephalothorax 0.7 L:W, 1.0x pereonites 1–3, 0.3x BL. Pereonites 0.5x BL, pereonites-1–6: 0.08, 0.2, 0.3, 0.4, 0.5 and 0.5 L:W, respectively, all pereonites with small anterolateral setae. Pleon short, 0.2x BL. Pleonites 0.7 L:W, pleonites 3–5 with dorsolateral setae on each side; pleotelson 2.3x pleonite-5, with lateral setae and paired laterodistal setae.

Antennule (Figure 32(a)) article-1 3.7 L:W, 2.5x article-2, with two simple and three penicillate setae at mid-length, and one simple and two penicillate distal setae; article-2 1.7 L:W, 1.1x article-3, with two simple (long and short) and one penicillate

distal setae; article-3 4.5 L:W, with four simple, two bifurcated and one penicillate setae, and one aesthetasc.

Antenna (Figure 32(b)) about as long as antennule; article-2 1.1 L:W; 0.8x article-3, with spine (0.3x article-2); article-3 1.6 L:W, 0.4x article-4, with spine (0.2x article-3); article-4 5.8 L:W, 1.9x article-5, with subdistal penicillate seta, three simple and two penicillate distal setae; article-5 4.4 L:W, 7.8x article-6, with simple seta; article-6 0.8 L:W, with five distal setae.

Labrum (Figure 32(c)) rounded, naked.

Left mandible (Figure 32(d)) incisor distally in shape of blunt spine, margin irregularly serrate; *lacinia mobilis* well developed, distally serrate; molar coronal.

Right mandible (Figure 32(e,e')) incisor unequally bifid, distal margin irregularly serrate; molar as left mandible.

Maxillule (Figure 32(f)) endite with eight distal spines and outer subdistal setule.

Maxilla (Figure 32(h)) almost circular, naked.

Labium (Figure 32(g)) simple, rounded, glabrous.

Epignath (Figure 32(i)) linguiform, simple, naked.

Maxilliped (Figure 32(j)) bases together chordate, naked; palp article-1 naked, article-2 with one outer

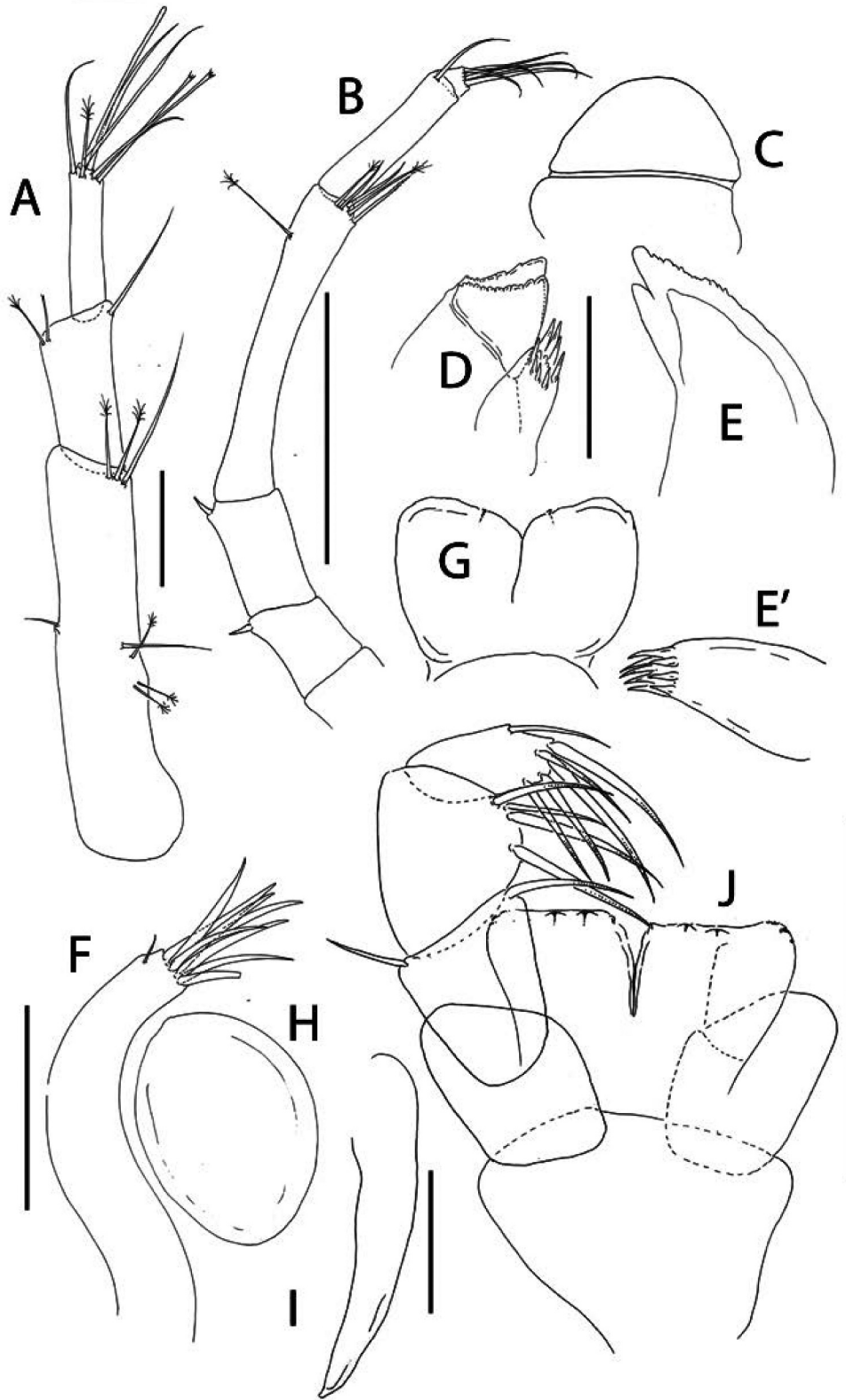


Figure 32. *Pseudotanais kitsoni* sp. nov., (a), antennule; (b), antenna; (c), labrum; (d), left mandible; (e), right mandible, with E', molar; (f), maxillule; (g), labium; (h) maxilla; (i), epignath; (j), maxilliped. Scale lines = 0.1 mm.

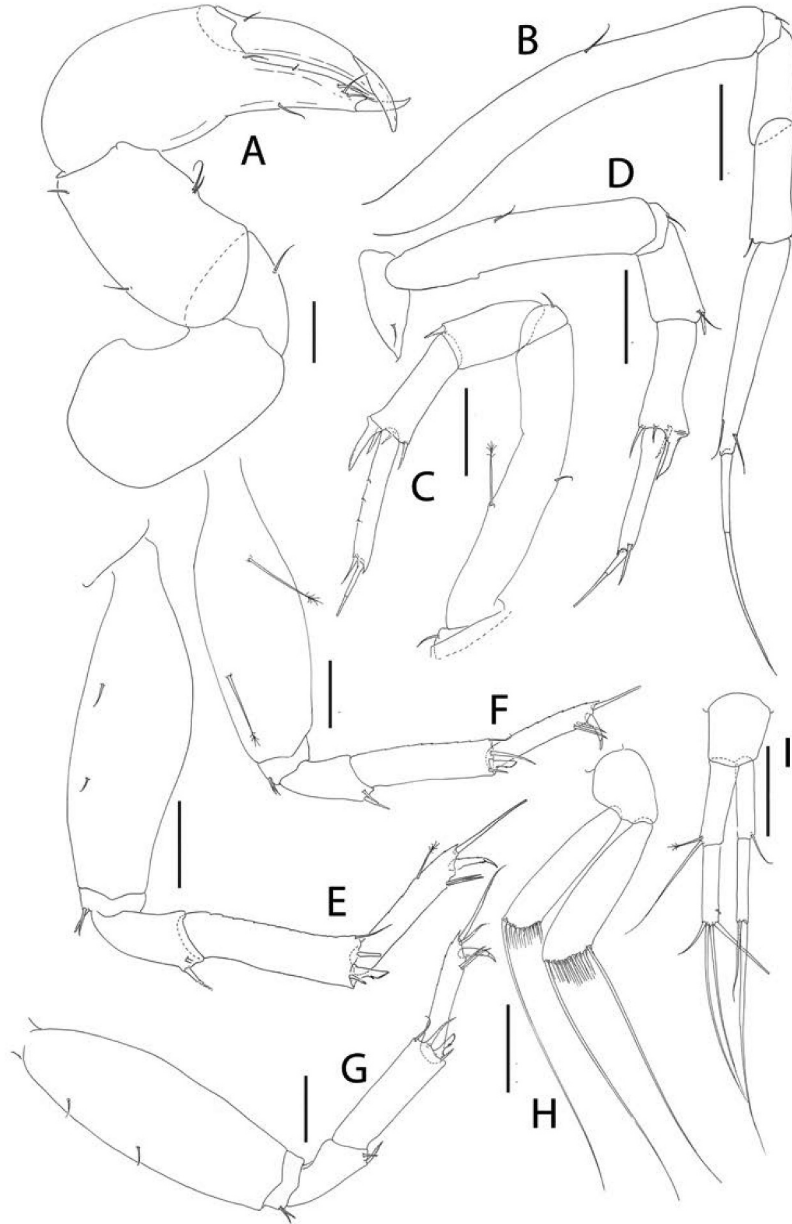


Figure 33. *Pseudotanais kitsoni* sp. nov., (a), cheliped; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4; (f), pereopod-5; (g), pereopod-6; (h), pleopod; (i), uropod. Scale lines = 0.1 mm.

and one inner setae; article-3 with four (three long and one short) inner setae; article-4 with five distal and one subdistal setae; all setae with finely-denticulate in their distal half; endites mostly fused but with distinct central cleft, gustatory cusps very small.

Cheliped (Figure 33(a)) robust, basis 1.5 L:W, naked; merus as long as carpus ventral margin, with ventral seta; carpus 1.8 L:W, 0.95x palm, with two midventral setae, one middorsal and one dorsodistal simple setae; chela 2.8 L:W, 1.8x

carpus length, palm 1.5 L:W; fixed finger 3.0 L:W, 0.8x palm, with ventral seta, cutting edge poorly calcified with three setae; dactylus 6.3 L:W, cutting edge smooth, with proximal seta; unguis robust.

Pereopod-1 (Figure 33(b)) basis 7.1 L:W, 3.5x merus, with midventral seta; ischium with ventral seta; merus 2.0 L:W and 0.8x carpus, with ventrodistal seta; carpus 2.7 L:W, 0.6x propodus, with dorsodistal short seta; propodus 6.9 L:W, with one dorsal and one ventral setae, dactylus 0.4x unguis.

Pereopod-2 (Figure 33(c)) basis 5.9 L:W, 3.3x merus, with middorsal penicillate seta and midventral simple seta; ischium with ventral seta; merus 1.8 L:W, 0.8x carpus, with seta and spine ventrodistally; carpus 2.5 L:W, 0.8x propodus, with dorsodistal spine, seta and spine, and blade-like spine (0.4x propodus) distally; propodus 6.0 L:W with distal seta (1.0x dactylus); unguis broken.

Pereopod-3 (Figure 33(d)) basis 5.5 L:W, 3.5x merus, with midventral simple seta; ischium with ventral seta; merus 1.5 L:W, 0.7x carpus, with seta and spine ventrodistally; carpus 2.3 L:W, 0.9x propodus, with dorsodistal seta, seta and spine and ventrodistal blade-like spine (0.4x propodus) distally; propodus 2.8 L:W, 1.8x dactylus and unguis combined length, with distal seta (1.4x dactylus); dactylus 0.8x unguis.

Pereopod-4 (Figure 33(e)) basis 3.0 L:W, 3.8x merus, with two short setae; ischium with two ventral setae; merus 1.7 L:W, 0.5x carpus, with seta and spine ventrodistally; carpus 4.0 L:W, 1.25x propodus, with dorsodistal seta (0.25x propodus), two spines and short blade-like spine (0.3x propodus)

distally; propodus 5.3 L:W, 2.9x dactylus and unguis combined length, with two serrate ventrodistal setae and serrate dorsal seta (1.8x dactylus and unguis combined length); dactylus 2.7x unguis.

Pereopod-5 (Figure 33(f)) basis 3.0 L:W, 4.4x merus, with two penicillate setae; ischium with two ventral setae; merus 1.5 L:W, 0.5x carpus, with seta and spine ventrodistally; carpus 3.8 L:W, 1.2x propodus, with dorsodistal seta (0.2x propodus), two spines and short blade-like spine (0.2x propodus); propodus 5.0 L:W, 2.8x dactylus and unguis combined length, with two ventrodistal and dorsodistal setae; dactylus 3.5x unguis.

Pereopod-6 (Figure 33(g)) basis 2.9 L:W, 4.6x merus, with two ventral submarginal setae; ischium with two ventral setae; merus 1.4 L:W, 0.5x carpus, with seta and spine ventrodistally; carpus 3.1 L:W, 1.0x propodus, with dorsodistal seta (0.3x propodus), two spines and short blade-like spine (0.25x propodus) distally; propodus 4.5 L:W, 3.4x dactylus and unguis combined length, with two ventrodistal setae and two dorsal setae (longer setae 2.6x dactylus and unguis combined length); dactylus 3.0x unguis.

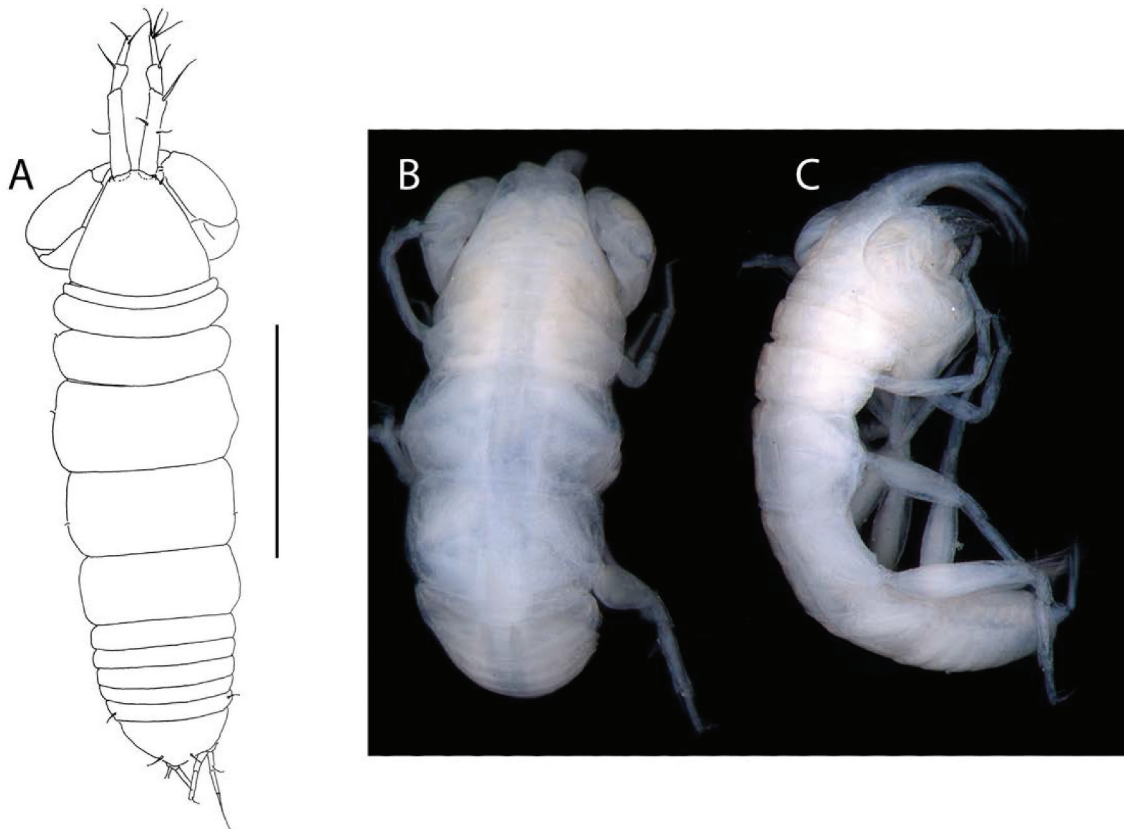


Figure 34. *Pseudotanais livingstoni* sp. nov., female holotype, (a, b) dorsal; (c), lateral. Scale line = 1 mm.

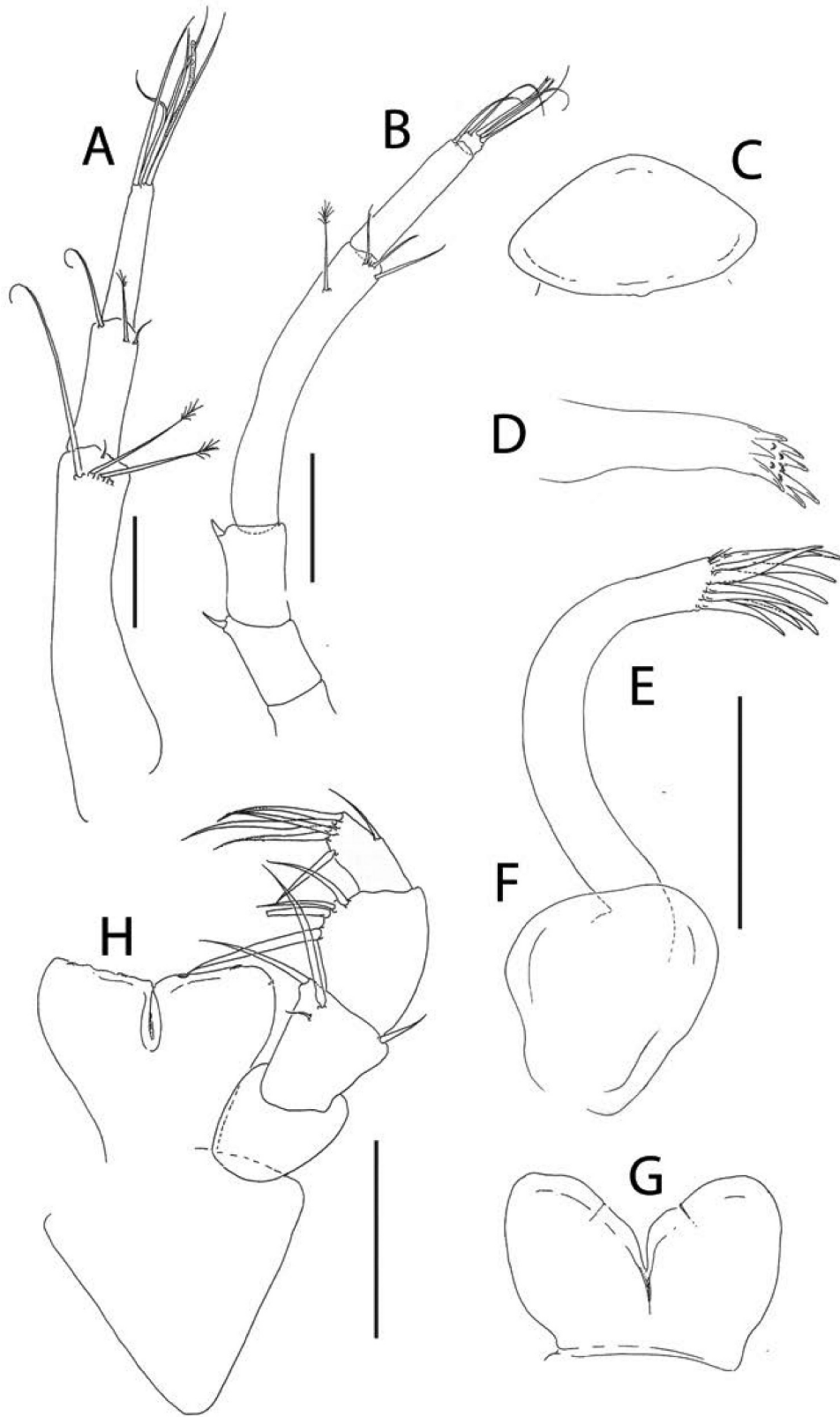


Figure 35. *Pseudotanaeis livingstoni* sp. nov., (a), antennule; (b), antenna; (c), labrum; (d), mandibular molar; (e), maxillule; (f), maxilla; (g), labium; (h), maxilliped. Scale lines = 0.1 mm.

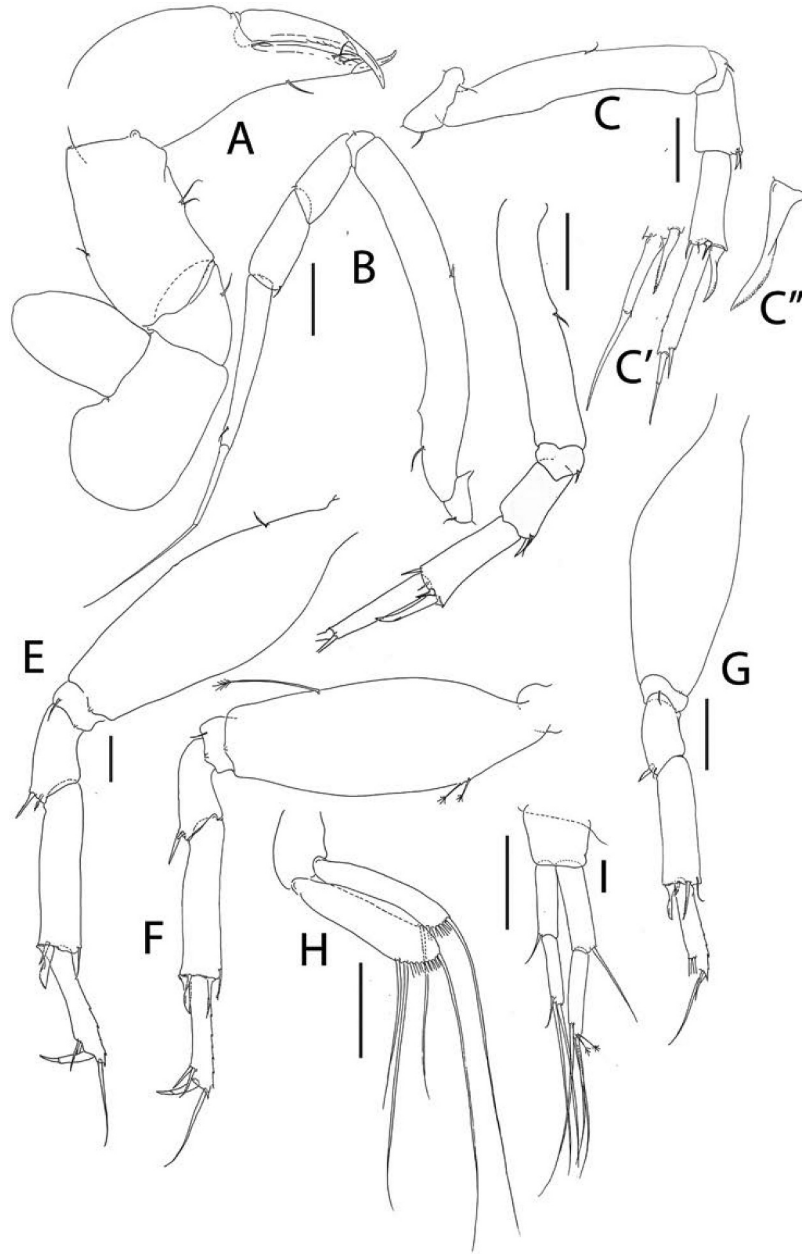


Figure 36. *Pseudotanaïs livingstoni* sp. nov., (a), cheliped; (b), pereopod-1; (c), pereopod-2, with (c'), detail of dactylus and unguis, and (c''), blade-like carpal spine; (d), pereopod-3; (e), pereopod-4; (f), pereopod-5; (g), pereopod-6; (h), pleopod; (i), uropod. Scale lines = 0.1 mm.

Pleopods (Figure 33(h)) peduncle 1.2 L:W; endopod slightly shorter than exopod, 4.7 L:W, with nine setae; endopod 3.9 L:W, with 10 setae.

Uropod (Figure 33(i)) peduncle 1.2 L:W; exopod and endopod two-articled; exopod 0.9x endopod, article-1 4.3 L:W, with distal seta, article-2 6.7 L:W, with two setae (one very long); endopod article-1 3.3 L:W, with one simple and one penicillate setae, article-2 4.5 L:W, with one subdistal and four distal setae.

Distribution. Amundsen Sea, Elephant Island (South Shetland Is), 477–1473 m.

Remarks. The spines on antenna articles 2–3 allow differentiation of *P. kitsoni* sp. nov. from five species of the “denticulatus+abathagastor” group, particularly *P. abathagastor* and *P. elephas*, which have a spine and seta on antenna articles 2–3, respectively; *P. mariae* that has only setae, *P. barnesi* with

both articles naked, and *P. amundseni* that has a spine and minute seta, respectively.

The uropod exopod that is slightly shorter than the endopod (0.9x) separates *P. kitsoni* from *P. chaplini* and *P. oloughlini*, where it is longer, while the coronal mandible molar separates *P. kitsoni* from *P. chopini* that has an subcoronal/acuminate molar. Two setae on pereopods 4–6 ischium distinguish it from *P. denticulatus* that has a spine and seta, while a spine and seta on the pereopods 4–6 merus separates *P. kitsoni* from *P. corollatus* (with two setae), and *P. georgesandae* and *P. locueloae* (both with one spine only). A short blade-like spine on the pereopod-6 carpus in *P. kitsoni* (0.25x propodus) is different from *P. biopearli* that has a longer spine (0.4x). *Pseudotanaid kitsoni* lacks a subdistal seta on the maxilliped endite that is present in *P. biopearli*.

***Pseudotanaid livingstoni* sp. nov.**

(Figures 34–36)

<http://www.zoobank.org/urn:lsid:zoobank.org:act:0B774067-D568-4576-9E18-ACC983BC554E>

Material examined. Holotype neuter 2.4 mm, ICUL8870, LI-EBS-3 (NHM UK.2021.174); two neuters 2.2–2.4 mm, ICUL8871, EI-EBS-2 (NHM UK.2021.175); neuter, dissected, ICUL8880, EI-EBS-2 (NHM UK.2021.176); neuter, dissected, ICUL8924, EI-EBS-2 (NHM UK.2021.177); neuter, dissected, ICUL8926, EI-EBS-2 (NHM UK.2021.178); neuter 1.8 mm, ICUL8873, EI-EBS-4 (NHM UK.2021.179); neuter 2.3 mm, ICUL8869, LI-EBS-3 (NHM UK.2021.180); juvenile female 1.6 mm, neuter 1.8 mm, ICUL8872, ST-EBS-2 (NHM UK.2021.181); one individual, ICUL8898, EI-EBS-2 (NHM UK.2021.182).

Diagnosis. Antenna articles 2–3 with spines. Mandible molar coronal. Pereopod-1 merus with minute ventrodiscal seta. Pereopod 3 carpus blade-like spine long (0.6x propodus). Pereopods 4–6 ischium with seta; merus with spine and seta. Uropod exopod 0.8x endopod.

Etymology. From the type locality, Livingston Island.

Description of female. BL = 2.4 mm. Body robust (Figure 34(a–c)) 3.2 L:W. Cephalothorax 0.9 L:W, 0.7x pereonites 1–3, 0.2x BL. Pereonites 0.6x BL, pereonite-1 half, or less, as long as pereonites 2–3, pereonites-1–6: 0.08, 0.2, 0.3, 0.5, 0.5, and 0.4 L:W, respectively. Pleon 0.3x BL. Pleonites 0.7 L:W, pleonite-5 with lateral setae. Pleotelson 3.0x pleonite-5, with distolateral setae.

Antennule (Figure 35(a)) article-1 3.9 L:W, 2.5 article-2, with two simple and three penicillate distal setae; article-2 2.8 L:W, 1.0x article-3, with two

simple and one penicillate distal setae; article-3 4.5 L:W, with five simple distal setae and one aesthetasc.

Antenna (Figure 35(b)) as long as antennule; article-2 1.7 L:W, 0.9x article-3, with spine (0.3x article-2); article-3 1.7 L:W, 0.4x article-4, with spine (0.2x article-3); article-4 6.3 L:W, 1.9x article-5, with one subdistal penicillate seta and four simple distal setae; article-5 4.3 L:W, 7.5x article-6, with distal seta; article-6 0.8 L:W, with three simple and two bifurcated distal setae.

Labrum (Figure 35(c)) rounded, naked.

Mandibular molar coronal (Figure 34(d)). Other parts of mandibles not found.

Maxillule (Figure 35(e)) endite with nine distal spines and outer subdistal tuft of setules.

Maxilla (Figure 35(f)) semioval, simple.

Labium (Figure 35(g)) simple, naked, widely cleft.

Maxilliped (Figure 33(h)) bases together deltoid, as long as broad, naked; palp proximal article-1 naked, article-2 with fine outer and three inner (two longer and one shorter) setae, article-3 with four inner setae, article-4 with five distal and one sub-distal setae; all inner setae with finely-denticulate margins in their distal half; endites fused except for distal third, each with two small and shallow gustatory cusps.

Cheliped (Figure 36(a)) basis 1.4 L:W, naked; merus just shorter than carpus ventral margin, with ventral seta; carpus 1.6 L:W, 0.9x palm, with two ventrodiscal setae, one middorsal seta and one dorsodistal seta; chela 2.7 L:W, 1.8x carpus length, palm 1.7 L:W; fixed finger 3.0 L:W, 0.7x palm with one ventral seta, and with three setae on cutting edge; dactylus 5.3 L:W, cutting edge smooth, without proximal seta.

Pereopod-1 (Figure 36(b)) coxa with seta; basis 8.0 L:W, 5.3x merus, with dorsoproximal and mid-ventral simple setae; ischium with ventral seta; merus 1.7 L:W and 0.7x carpus, with minute ventrodiscal seta; carpus 2.4 L:W, 0.6x propodus, with short dorsodistal seta; propodus 7.6 L:W, 0.8x dactylus and unguis combined length, with subdistal seta; dactylus 0.6x unguis.

Pereopod-2 (Figure 36(c)) basis 5.7 L:W, 3.4x merus, with midventral seta and two simple ventral setae; ischium with ventral seta; merus 1.7 L:W, 0.8x carpus, with ventrodiscal seta and spine; carpus 2.6 L:W, 0.8x propodus, with seta, spine and long blade-like spine (0.4x propodus) distally (Figure 36(c,c'')); propodus 6.8 L:W, 1.7x dactylus and unguis combined length, with distal seta (1.0x dactylus); dactylus 0.8x unguis (Figure 36(c,c')).

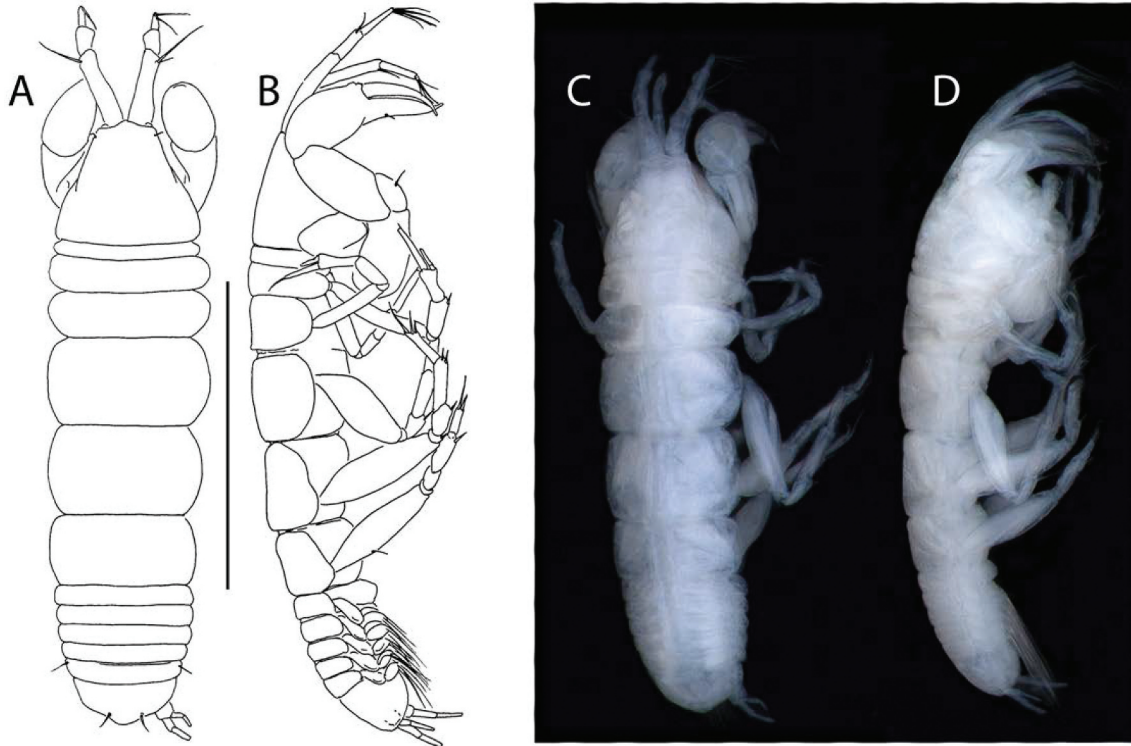


Figure 37. *Pseudotanais palmeri* sp. nov., female holotype, (a, c), dorsal; (b, d), lateral. Scale line = 1 mm.

Pereopod-3 (Figure 36(d)) basis 5.5 L:W, 3.2x merus, with midventral seta; ischium with ventral seta; merus 1.7 L:W, 0.8x carpus, with ventrodistal seta and spine; carpus 2.2 L:W, 0.9x propodus, with seta, two spines and long blade-like spine (0.6x propodus) distally; propodus 4.8 L:W, with distal seta; dactylus and unguis broken.

Pereopod-4 (Figure 36(e)) basis 2.8 L:W, 3.9x merus, with ventroproximal seta; ischium with ventral seta; merus 1.8 L:W, 0.5x carpus, with seta and spine; carpus 4.0 L:W, 1.4x propodus, with seta (0.4x propodus), spine and short blade-like spine (0.4x propodus) distally; propodus 5.0 L:W, 2.1x dactylus and unguis combined length, with two ventrodistal setae and one dorsal seta (1.7x dactylus and unguis combined length); dactylus 2.0x unguis.

Pereopod-5 (Figure 36(f)) basis 2.8 L:W, 4.4x merus, with two dorsoproximal and one midventral penicillate setae; ischium with ventral seta; merus 1.6 L:W, 0.5x carpus, with seta and spine; carpus 4.4 L:W, 1.4x propodus, with seta (0.3x propodus), two spines and short blade-like spine (0.3x propodus); propodus 5.0 L:W, 2.8x dactylus and unguis combined length, with two ventrodistal and one dorsodistal seta (2.2x dactylus and unguis combined length); dactylus 2.0x unguis.

Pereopod-6 (Figure 36(g)) basis 2.9 L:W, 4.2x merus, with two dorsoproximal and one midventral penicillate setae; ischium with ventral seta; merus 1.7 L:W, 0.6x carpus, with seta and spine; carpus 3.9 L:W, 1.2x propodus, with seta (0.2x propodus), two spines and short blade-like spine (0.4x propodus); propodus 4.0 L:W, with two ventrodistal and two dorsodistal setae; dactylus and unguis broken.

Pleopods (Figure 36(h)) peduncle 1.5 L:W; endopod just shorter than exopod, 4.4 L:W, with seven setae; endopod 3.5 L:W, with ten setae.

Uropod (Figure 36(i)) peduncle 0.9 L:W; exopod and endopod two-articled; exopod 0.8x endopod, article-1 3.4 L:W, with simple seta, article-2 4.7 L:W, with three simple setae; endopod article-1 3.3 L:W, with simple seta; article-2 5.7 L:W, with two simple and two penicillate setae.

Distribution. Elephant Island and Livingston Island (South Shetland Is), Southern Thule (Sandwich Is), 199–1038 m.

Remarks. *Pseudotanais livingstoni* sp. nov., with spines on antenna article-3, a coronal mandible molar, short setae on the pereopod-1 carpus, and a slender uropod, is classified to the “denticulatus + abathagastor” morphogroup.

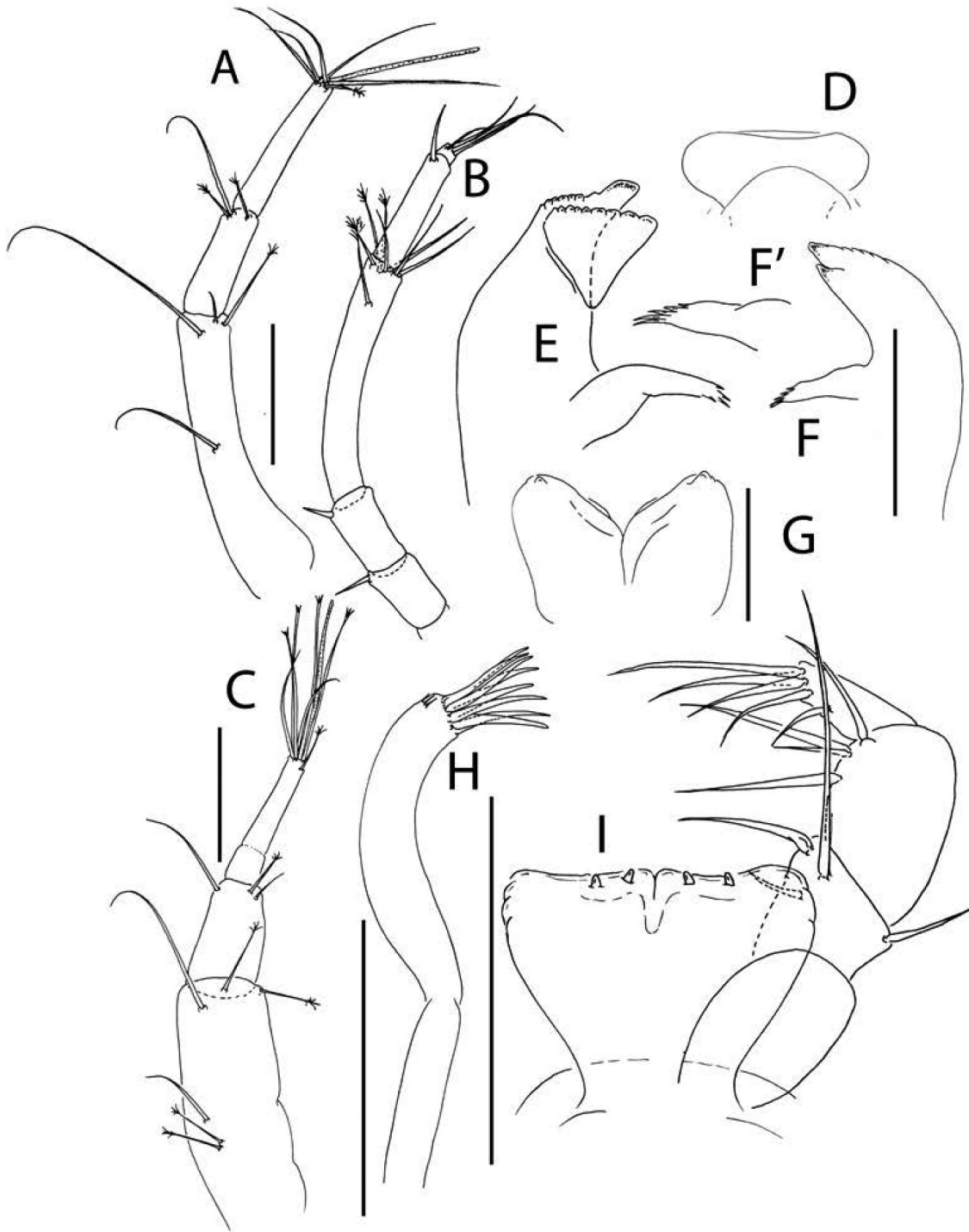


Figure 38. *Pseudotanais palmeri* sp. nov., (a), antennule of female; (b), antenna; (c), antennule of juvenile male; (d), labrum; (e), left mandible; (f), right mandible, with (f'), detail of pars molaris; (g), labium; (h), maxillule; (i), maxilliped. Scale lines = 0.1 mm.

Pseudotanais livingstoni is most similar to *P. kitsoni* and therefore can be distinguished from the other members of “denticulatus+abathagastor” group by the same set of characters (see Remarks *P. kitsoni*).

These two species can be distinguished by:

- a blade-like spine on the carpus of pereopod-3 that is semilong/intermediate in *P. livingstoni*

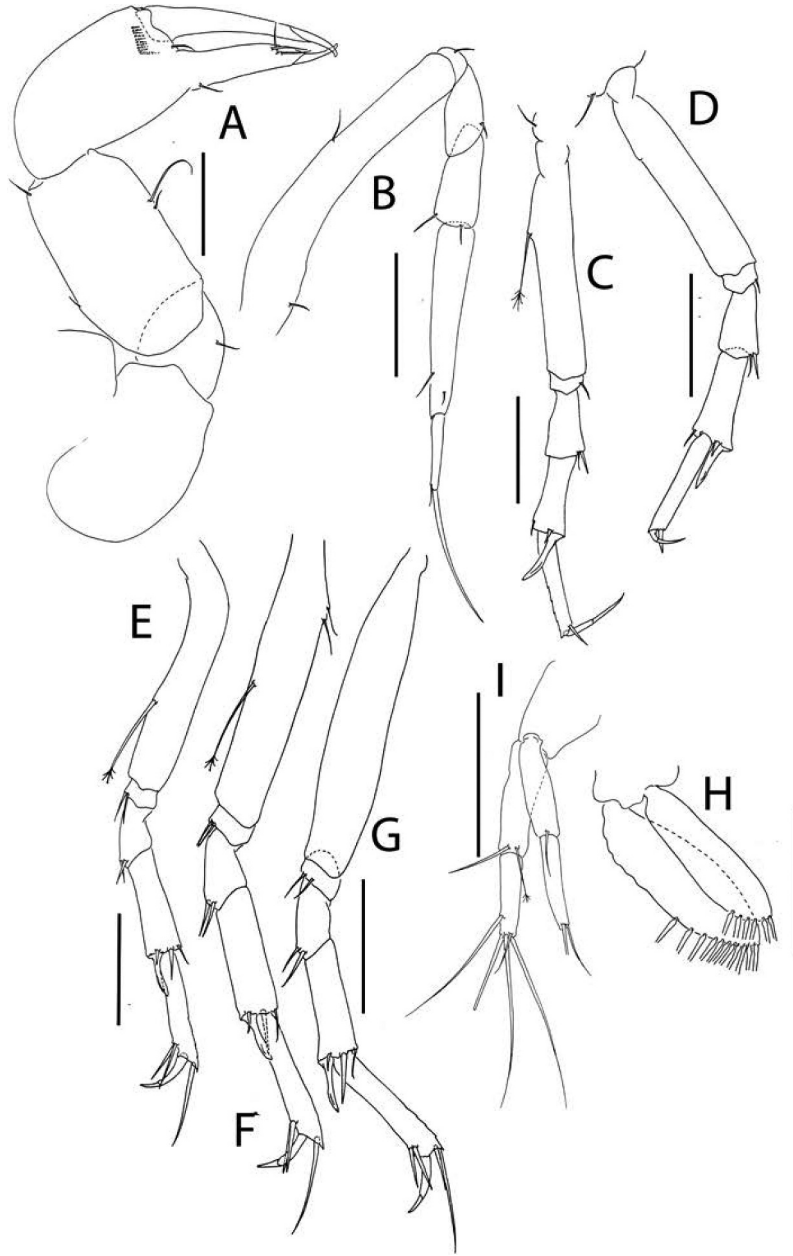


Figure 39. *Pseudotanaïs palmeri* sp. nov., (a), cheliped; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4; (f), pereopod-5; (g), pereopod-6; (h), pleopod; (i), uropod. Scale lines = 0.1 mm.

- (0.6x propodus) but short in *P. kistoni* (0.4x propodus);
- the proportion between the dactylus and unguis of pereopod-5, 2.0x in *P. livingstoni* but 3.5x in *P. kistoni*;
- the length of the blade-like spine on the carpus of pereopod-6, 0.4x propodus in *P. livingstoni* and 0.25x in *P. kistoni*.

***Pseudotanaïs palmeri* sp. nov.**

(Figures 37–39)

<http://www.zoobank.org/urn:lsid:zoobank.org:act:72077206-DC84-4C0B-89E6-1B550F104DCE>

Material examined. Holotype, neuter 1.8 mm, ICUL8877, PB-EBS-4 (NHM UK.2021.183); female 1.4 mm, 2 juvenile males 1.2 mm, two

neuters 1–1.5 mm, ICUL8878, PB-EBS-4 (NHM UK.2021.184); neuter, dissected, ICUL8909, PB-EBS-4 (NHM UK.2021.185); neuter, dissected, ICUL8910, PB-EBS-4 (NHM UK.2021.186); one individual, ICUL8894, PB-EBS-4 (NHM UK.2021.187).

Diagnosis. Antenna article 2–3 with spines; article-3 spine 0.4x article-3. Mandible molar subcoronal/acuminate. Maxilliped gustatory cusps conical. Pereopods carpus 2–3 blade-like semilong/intermediate (0.5x propodus). Uropod exopod as long as endopod.

Etymology. The species, whose type locality is the Palmer Bay, (South Orkney Islands) was named in honour of Nathaniel Brown Palmer, the sailing captain and ship designer.

Description of neuter. BL = 1.8 mm. Body robust (Figure 37(a–d)) 3.9 L:W. Cephalothorax 0.9 L:W, 1.3x pereonites 1–3, 0.2x BL. Pereonites 0.5x BL, pereonite-1 half, or less, as long as pereonites 2–3, pereonites 1–6: 0.1, 0.2, 0.3, 0.5, 0.8, and 0.5 L:W, respectively. Pleon short, 0.2x BL. Pleonites 0.7 L:W, pleonite-5 with lateral setae. Pleotelson 2.0x pleonite-5, with conspicuous paired distal setae.

Antennule (Figure 38(a)) article-1 3.8 L:W, 2.7x article-2, with long seta at mid-length, and two simple (one long) and one penicillate setae distally; article-2 2.5 L:W, 0.7x article-3, with one simple and two penicillate setae distally; article-3 5.4 L:W, with four simple and one penicillate setae and one aesthetasc.

Antenna (Figure 38(b)) just shorter than antennule; article-2 1.4 L:W; 0.8x article-3, with spine (0.5x article-2); article-3 1.9 L:W, 0.4x article-4, with spine (0.4x article-3); article-4 6.7 L:W, 2.1x article-5, with four simple and four penicillate setae distally; article-5 3.7 L:W, 7.3x article-6, with simple seta; article-6 1.0 L:W, with four distal setae.

Labrum (Figure 38(d)) rounded, naked.

Left mandible (Figure 36(e)) incisor distally elongated with blunt tip, margin serrate; *lacinia mobilis* well developed, distally serrate; molar subcoronal/acuminate, with five distal spines.

Right mandible (Figure 38(f,f')) incisor unequally bifid, margin weakly serrate; molar as in left mandible.

Maxillule (Figure 38(h)) endite with eight distal spines and outer subdistal tuft of setules.

Labium (Figure 38(g)) with apical cusps.

Maxilliped (Figure 38(i)) palp article-1 naked, article-2 with one outer and three inner (two short and one long reaching distal tip of palp) inner setae, article-3 with four inner (three long and one short)

setae, article-4 with five inner/distal setae; endites fused but with mid-distal cleft, each with two conical gustatory cusps.

Cheliped (Figure 39(a)) basis 1.7 L:W; merus 0.7x carpus ventral margin, with ventral seta; carpus 1.8 L:W, 1.2x palm, with two midventral setae (one long), one dorsodistal and one mediodorsal setae; chela sub-forcinate, 3.0 L:W, 1.6x carpus L, palm 1.6 L:W; fixed finger 3.2 L:W, 0.8x palm with ventral seta, cutting edge weakly calcified, smooth with three setae; dactylus 4.2 L:W, cutting edge smooth, proximal seta not seen; unguis slender.

Pereopod-1 (Figure 39(b)) basis 5.8 L:W, 4.7x merus, with dorsoproximal and midventral simple setae; ischium with ventral seta; merus 1.9 L:W and 0.7x carpus, with ventrodorsal seta; carpus 2.4 L:W, 0.5x propodus, with two distal setae; propodus 5.8 L:W, 0.9x dactylus and unguis combined length, with two subdistal setae, dactylus 0.5x unguis.

Pereopod-2 (Figure 39(c)) coxa with seta; basis 7.1 L:W, 3.8x merus, with dorsoproximal penicillate seta; ischium with ventral seta; merus 1.9 L:W, 0.9x carpus, with simple seta and spine ventrodorsally; carpus 2.4 L:W, 0.8x propodus, with simple seta, small spine and semilong/intermediate blade-like spine (0.5x propodus); propodus 4.4 L:W, 3.7x dactylus and unguis combined length, with distal spine (1.0x dactylus); dactylus 0.7x unguis.

Pereopod-3 (Figure 39(d)) coxa with seta; basis 5.6 L:W, 3.3x merus; ischium with seta; merus 2.1 L:W, 0.8x carpus, with seta and spine ventrodorsally; carpus 2.0 L:W, 0.9x propodus, with setae, small spine and semilong/intermediate blade-like spine (0.5x propodus) distally; propodus 5.5 L:W, 2.8x dactylus and unguis combined length, with distal spine (1.3x dactylus); dactylus 0.8x unguis.

Pereopod-4 (Figure 39(e)) basis 5.5 L:W, 4.6x merus, with midventral penicillate seta; ischium with two long ventral setae; merus 1.5 L:W, 0.5x carpus, with ventrodorsal seta and spine; carpus 2.8 L:W, 0.9x propodus, with simple seta, seta (0.2x propodus), spine and short blade-like spine (0.4x propodus); propodus 5.0 L:W, 1.9x dactylus and unguis combined length, with two ventral setae, one dorsal seta (1.4x dactylus and unguis combined length); dactylus 2.3x unguis.

Pereopod-5 (Figure 39(f)) basis 5.3 L:W, 5.3x merus, with two dorsoproximal setae and midventral penicillate seta; ischium with two long ventral setae; merus 1.2 L:W, 0.5x carpus, with ventrodorsal seta and spine; carpus 3.3 L:W, 0.9x propodus, with one seta, one seta (0.2x propodus), spine and short blade-like

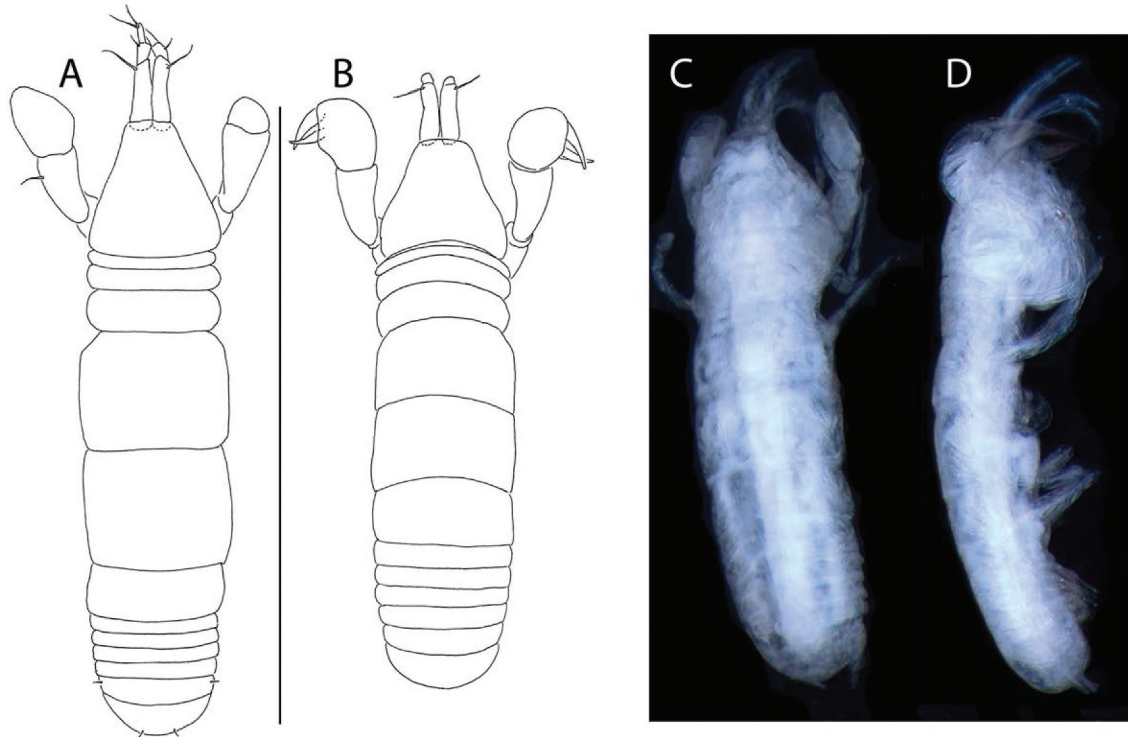


Figure 40. *Pseudotanais discoveryae* sp. nov., juvenile female holotype, (a, c), dorsal; (d), lateral; neuter, (b), dorsal. Scale line = 0.1 mm.

spine (0.4x propodus); propodus 5.0 L:W, 3.8x dactylus and unguis combined length, with two ventrodistal setae, dorsodistal seta (1.6x dactylus and unguis combined length); dactylus 1.8x unguis.

Pereopod-6 (Figure 39(g)) basis 5.5 L:W, 5.1x merus, naked; ischium with two long ventral setae; merus 1.8 L:W, 0.6x carpus, with ventrodistal seta and spine; carpus 2.7 L:W, 0.8x propodus, with simple seta, seta (0.2x propodus), spine and short blade-like spine (0.4x propodus) distally; propodus 5.0 L:W, 2.1x dactylus and unguis combined length, with two ventrodistal setae, two dorsodistal setae (longer seta 1.6x dactylus and unguis combined length); dactylus 1.8x unguis.

Pleopod (Figure 39(h)) endopod just shorter than exopod, 3.8 L:W, with six setae; endopod 3.0 L:W, with eleven setae.

Uropod (Figure 39(i)) peduncle 0.9 L:W; exopod and endopod two-articled; exopod 1.0x endopod, article-1 3.7 L:W, with simple seta, article-2 5.0 L:W, with two setae; endopod article-1 3.4 L:W, with one simple and one penicillate setae, article-2 3.6 L:W, with one subdistal seta and four distal setae.

Subadult male. Similar to female, but antennule (Figure 35(a')) stouter, article-3 showing signs of subdivision and with four bifurcated distal setae.

Distribution. Palmer Bay (South Orkneys Is), 210–211 m.

Remarks. *Pseudotanais palmeri* sp. nov. has a uropod exopod as long as the endopod. In all the other species of the group this is slightly shorter (0.9x) or slightly longer (*P. chaplini* and *P. ooughlini*). The spines on antenna article 2–3 distinguish *P. palmeri* from *P. abathagastor*, *P. amundseni*, *P. chopini*, *P. elephas* and *P. mariae*, which have a combination of seta and spine on these articles; however no species has a spine on both articles and *P. barnesi* has naked antennule articles 2 and 3. The relatively long and slender spine on antenna article-3 (0.4x article-3) separates *P. palmeri* from all but one members of the “denticulatus+abathagastor” group. The exception is *P. corollatus*, that has antennal spines similar to *P. palmeri*; nevertheless *P. corollatus* has pereonites 1–2, almost equally long, while *P. palmeri* has pereonite-1 clearly shorter than pereonite-2.

“forcipatus” group

Diagnosis. After Bird & Holdich (1989a). Antenna articles 2–3 with spine or strong seta. Mandible molar acuminate. Chela forcipate, cutting edges smooth.

Species included. *P. artoo* Błażewicz-Paszkowycz & Stępień, 2015; *P. californiensis*

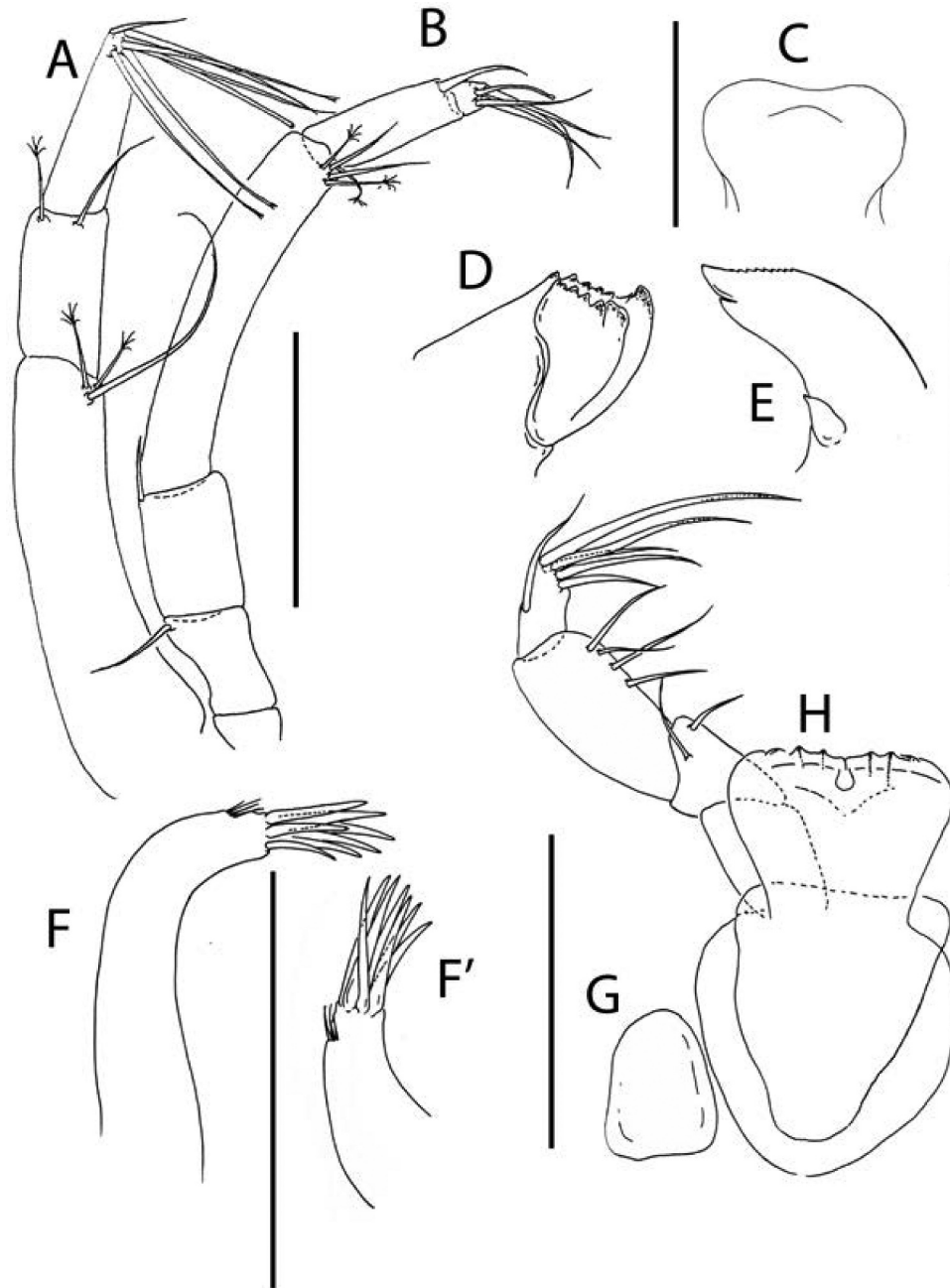


Figure 41. *Pseudotanaidis discoveryae* sp. nov., (a), antennule; (b), antenna; (c), labrum; (d), left mandible; (e), right mandible; (f), maxillule; (f'), maxillule endite, distal; (g), maxilla; (h), maxilliped. Scale lines = 0.1 mm.

Dojiri & Sieg, 1997; *P. forcipatus* Lilljeborg, 1864 [type species of *Pseudotanaidis*]; *P. falcicula* Bird & Holdich, 1989; *P. isabelae* García-Herrero, Sánchez, García-Gómez, Pardos & Martínez, 2017; *P. jonesi* Sieg, 1977; *P. mediterraneus* Sars, 1882; *P. mexikolpos* Sieg & Heard, 1988; *P. misericorde* Jakiel, Stępień & Błażewicz, 2018; *P. soja* Błażewicz-Paszkowycz, Bamber & Józwiak, 2013; *P. stiletto* Bamber, 2009; *P. unicus* Sieg,

1977; *P. vulsella* Bird & Holdich, 1989; *P. discoveryae* sp. nov.; *P. enduranceae* sp. nov.; and *P. scotti* sp. nov.

***Pseudotanaidis discoveryae* sp. nov.**

(Figures 40–42)

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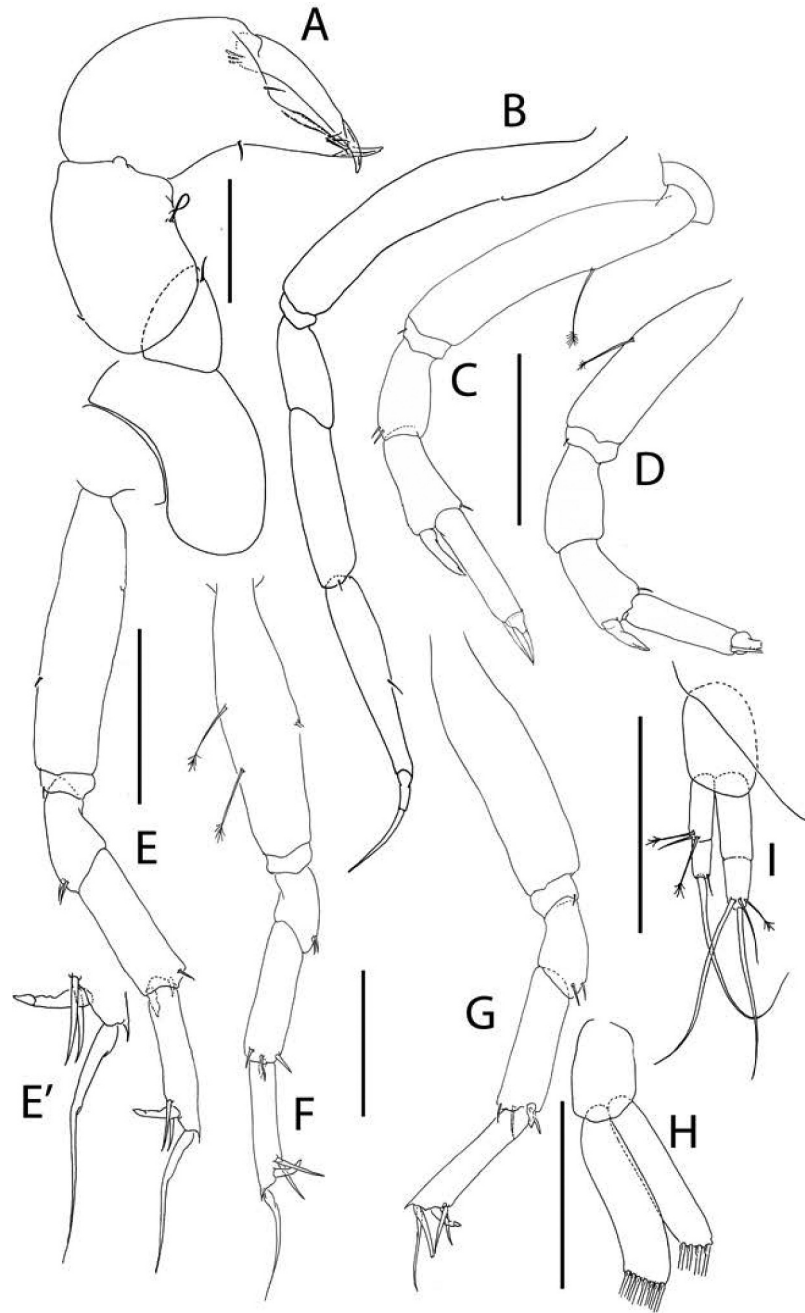


Figure 42. *Pseudotanais discoveryae* sp. nov., (a), cheliped; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4 and (e') detail of dactylus and unguis; (f), pereopod-5; (g), pereopod-6; (h), pleopod; (i), uropod. Scale lines = 0.1 mm.

Material examined. Holotype, juvenile female 1.2 mm, ICUL8859, ST-EBS-3 (NHM UK.2021.188); brooding female 1.1 mm, 3 neuters 0.9–1.3 mm, juvenile female 1.1 mm, ICUL8856, ST-EBS-3 (NHM UK.2021.189); two females 1.2–1.5 mm, two neuters 1.1–1.2 mm, ICUL8857, ST-EBS-3 (NHM UK.2021.190); brooding female 1.1 mm, two neuters 0.9–1.2 mm ICUL8858, ST-EBS-3B (NHM UK.2021.191); three females 1.0–1.2

mm, two neuters 0.8–1.0 mm, ICUL8889, ST-EBS-3B (NHM UK.2021.192); 1.2 mm neuter, dissected, ICUL8908, ST-EBS-3B (NHM UK.2021.193).

Diagnosis. Antenna articles 2–3 with seta. Pereopods 2–3 carpus blade-like spine 0.5x propodus. Uropod exopod 0.8x endopod.

Etymology. The species named after the steam barque RRS *Discovery*. Her first mission known as Discovery Expedition was led by Robert Falcon Scott and Sir Ernest Shackleton who explored the Southern Ocean.

Description of juvenile female. BL = 1.2 mm. Body robust (Figure 40(a,c-d)) 4.2 L:W. Cephalothorax 1.1 L:W, 1.8x pereonites 1-3, 0.2x BL. Pereonites 0.6x BL, pereonites-1-6: 0.1, 0.15, 0.3, 0.8, 0.8, and 0.4 L:W, respectively. Pleon short, 0.2x BL. Pleonites 0.7 L:W, pleonite-5 with lateral setae. Pleotelson 1.1x pleonite-5.

Antennule (Figure 41(a)) article-1 3.3 L:W, 2.9x article-2, with one long and two penicillate distal setae; article-2 1.8 L:W, 0.8x article-3, with one simple and one penicillate distal setae; article-3 3.2 L:W, with two simple and four bifurcated setae and one aesthetasc.

Antenna (Figure 41(b)) about as long as antennule; article-2 1.4 L:W; 0.8x article-3, with seta (0.8x article-2); article-3 1.5 L:W, 0.3x article-4, with seta (0.5x article-3); article-4 5.9 L:W, 2.5x article-5, with two simple and three penicillate distal setae; article-5 2.9 L:W, 5.2x article-6, with simple seta; article-6 1.3 L:W, with five distal setae.

Labrum (Figure 41(c)) rounded, naked.

Left mandible (Figure 41(d)) incisor margin serrate, with blunt apex; *lacinia mobilis* well developed, distally serrate.

Right mandible (Figure 41(e)) incisor unequally bifid, distal margin weakly serrate; molar acuminate, simple, short.

Maxillule (Figure 41(f,f)) endite with at least seven distal spines and outer subdistal tuft of setules.

Maxilla (Figure 41(g)) subrectangular, naked.

Maxilliped (Figure 41(h)) bases together chordeate, as long as broad, naked; palp article-1 naked, article-2 with two inner setae, article-3 with slender inner setae, article-4 with five long distal and one outer subdistal setae; distal setae with finely denticulate margins in their distal half; endites almost completely fused, with shallow medial cleft, and with two small gustatory cusps on distal margin.

Cheliped (Figure 42(a)) robust; basis 1.5 L:W; merus slightly longer than carpus ventral margin, with ventral seta; carpus 1.6 L:W, 1.0x palm, with two midventral setae and one mediodorsal seta; chela 2.3 L:W, 1.7x carpus length, palm 1.4 L:W; fixed finger 2.7 L:W, 0.7x palm, with short ventral seta, cutting edge finely crenulate, with three setae; dactylus 4.6 L:W, cutting edge smooth, without proximal seta.

Pereopod-1 (Figure 42(b)) basis 6.3 L:W, 4.0x merus, naked; ischium naked; merus 1.9 L:W and 0.5x carpus, naked; carpus 3.9 L:W, 0.8x propodus,

with small distal seta; propodus 5.3 L:W, 1.7x dactylus and unguis combined length, with small mid-dorsal seta, dactylus 0.5x unguis.

Pereopod-2 (Figure 42(c)) basis 5.2 L:W, 3.6x merus, with middorsal penicillate seta; ischium with ventral seta; merus 1.5 L:W, 0.8x carpus, with two ventrodorsal setae; carpus 2.0 L:W, 0.9x propodus, with simple dorsodorsal seta and semi-long/intermediate blade-like spine (0.5x propodus); propodus 4.2 L:W, 2.3x dactylus and unguis combined length, with distal seta (2.5x dactylus); dactylus 0.6x unguis.

Pereopod-3 (Figure 42(d)) basis 3.7 L:W, 2.2x merus, with midventral penicillate seta; ischium with ventral seta; merus 1.7 L:W, 1.2x carpus, with two ventrodorsal setae; carpus 1.4 L:W, 0.8x propodus, with short seta and semi-long/intermediate blade-like spine (0.5x propodus); propodus 3.0 L:W, with distal seta; dactylus and unguis broken.

Pereopod-4 (Figure 42(e,e')) basis 5.7 L:W, 3.2x merus, with two setae; ischium with ventral seta; merus 1.5 L:W, 0.6x carpus, with two ventrodorsal setae; carpus 2.5 L:W, 0.8x propodus, with seta, one seta (0.12x propodus) and short blade-like spine (0.2x propodus); propodus 5.5 L:W, 3.3x dactylus and unguis combined length, with two ventral setae and one dorsal seta (3.3x dactylus and unguis combined length); dactylus 2.3x unguis.

Pereopod-5 (Figure 42(f)) basis 3.5 L:W, 3.7x merus, with ventral (penicillate?) seta and two dorsal penicillate setae; ischium with ventral seta; merus 1.5 L:W, 0.6x carpus, with two ventrodorsal setae; carpus 3.3 L:W, 1.2x propodus, with simple seta, seta (0.18x propodus) and short blade-like spine (0.2x propodus); propodus 3.7 L:W, 3.1x dactylus and unguis combined length, with two ventral setae and one dorsal seta (3.0x dactylus and unguis combined length); dactylus 2.5x unguis.

Pereopod-6 (Figure 42(g)) basis 3.7 L:W, 2.8x merus; ischium with one ventral seta; merus 2.0 L:W, 0.7x carpus, with two ventrodorsal setae; carpus 3.0 L:W, 1.1x propodus, with one simple seta, one seta (0.15x propodus and one short blade-like spine (0.2x propodus)); propodus 3.9 L:W, 3.9x dactylus and unguis combined length, with two ventral serrate setae ventrally and two dorsal serrate setae; dactylus 3.7x unguis.

Pleopods (Figure 42(h)) peduncle 1.5 L:W; endopod shorter than exopod, 4.9 L:W, with four setae; endopod 4.0 L:W, with seven setae.

Uropod (Figure 42(i)) peduncle 1.5 L:W; exopod and endopod two-articled; exopod 0.8x endopod, article-1 2.6 L:W, with one simple and two penicillate setae, article-2 2.0 L:W, two setae (short and long);

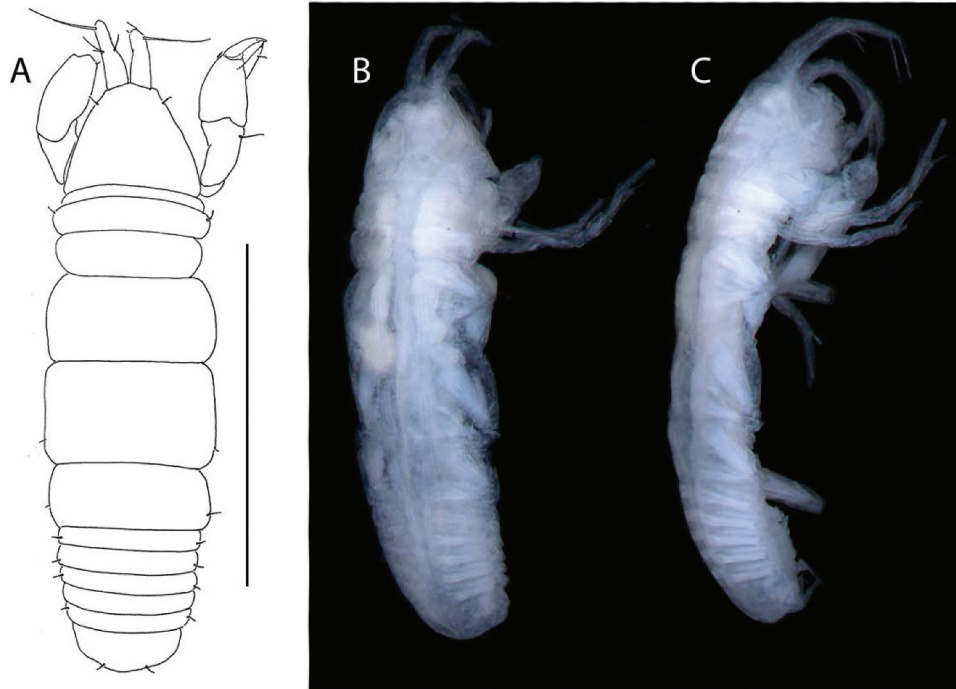


Figure 43. *Pseudotanais enduranceae* sp. nov., holotype female, (a), (b), dorsal; (c), lateral. Scale line = 1 mm.

endopod article-1 2.6 L:W, article-2 1.7 L:W, with one penicillate and three simple setae.

Neuter (Figure 38(b)). Generally similar to juvenile female but has different body-proportions (Figure 38(b)): pereonite-3 is only 1.4x pereonite-2 and 4.0 L:W; pereonites 4 and 5 are subequal, 2.3x pereonite-3 and 1.7 L:W; pereonite-6 is 2x pereonite-3, and 2 L:W.

Distribution. Southern Thule (Sandwich Is), 500–543 m.

Remarks. *Pseudotanais discoveryae* sp. nov. is the ninth blind forcipate-chela species of *Pseudotanais*. The character of the uropods allows it to be distinguished from the other members of “forcipatus group”. The proportion of the uropod exopod to the endopod, 0.8x in *P. discoveryae*, separates it from the species *P. artoo*, *P. californiensis*, *P. forcipate*, *P. jonesi* and *P. soja*, where the exopod reaches only half length of the endopod uropod. Moreover, relatively short uropods with an exopod 4.7 L:W can separate *P. discoveryae* from *P. falcicula*, *P. misericorde*, and *P. vulsella*, which have an exopod at least 5 L:W. Additionally, the long seta on antenna article-2 (as long as article-2) distinguishes *P. discoveryae* from other members of the “forcipatus group”, where this seta is at most 0.8x article-2.

***Pseudotanais enduranceae* sp. nov.**

(Figures 43–45)

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Diagnosis. Antenna articles 2–3 with seta. Pereopods 2–3 carpus blade-like spine 0.5x propodus. Uropod exopod 0.9x endopod.

Material examined. Holotype, neuter 1.7 mm, ICUL8845, BIO4-EBS-3B (NHM UK.2021.194); neuter 1.5 mm, ICUL8846, BIO4-EBS-3D (NHM UK.2021.195); male, dissected, ICUL8911, BIO4-EBS-3D (NHM UK.2021.196); female, dissected, ICUL8912, BIO4-EBS-3D (NHM UK.2021.197).

Etymology. The species name refers to the steam barquentine HMS *Endurance*, famous for her last catastrophic expedition to Antarctic (1914–1915) led by Sir Ernest Henry Shackleton.

Description of neuter. BL = 1.7 mm. Body robust (Figure 43(a–c)) 3.6 L:W. Cephalothorax 0.8 L:W, 1.1x pereonites 1–3, 0.2x BL. Pereonites 0.5x BL, pereonite-1 half, or less, as long as pereonites 2–3, pereonites-1–6: 0.07, 0.2, 0.3, 0.5, 0.6 and 0.4 L:W, respectively. Pleon short, 0.2x BL. Pleonites 0.7 L:W each with lateral setae. Pleotelson 2.2x pleonite-5.

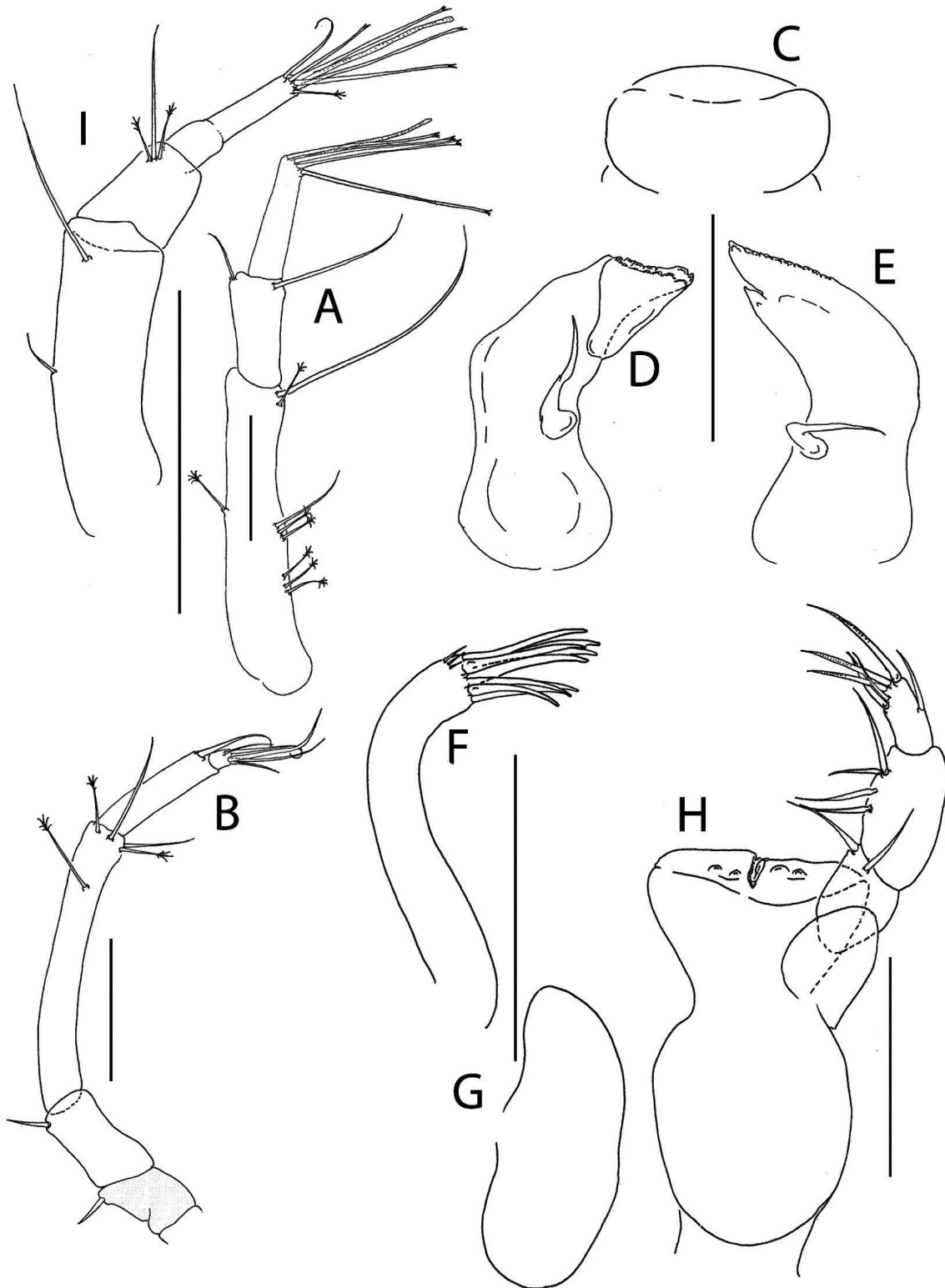


Figure 44. *Pseudotanaeis enduranceae* sp. nov., (a), antennule of female; (b), antenna; (c), labrum; (d), left mandible; (e), right mandible; (f), maxillule, (g), maxilla; (h), maxilliped; (i), antennule of juvenile male A. Scale lines = 0.1 mm.

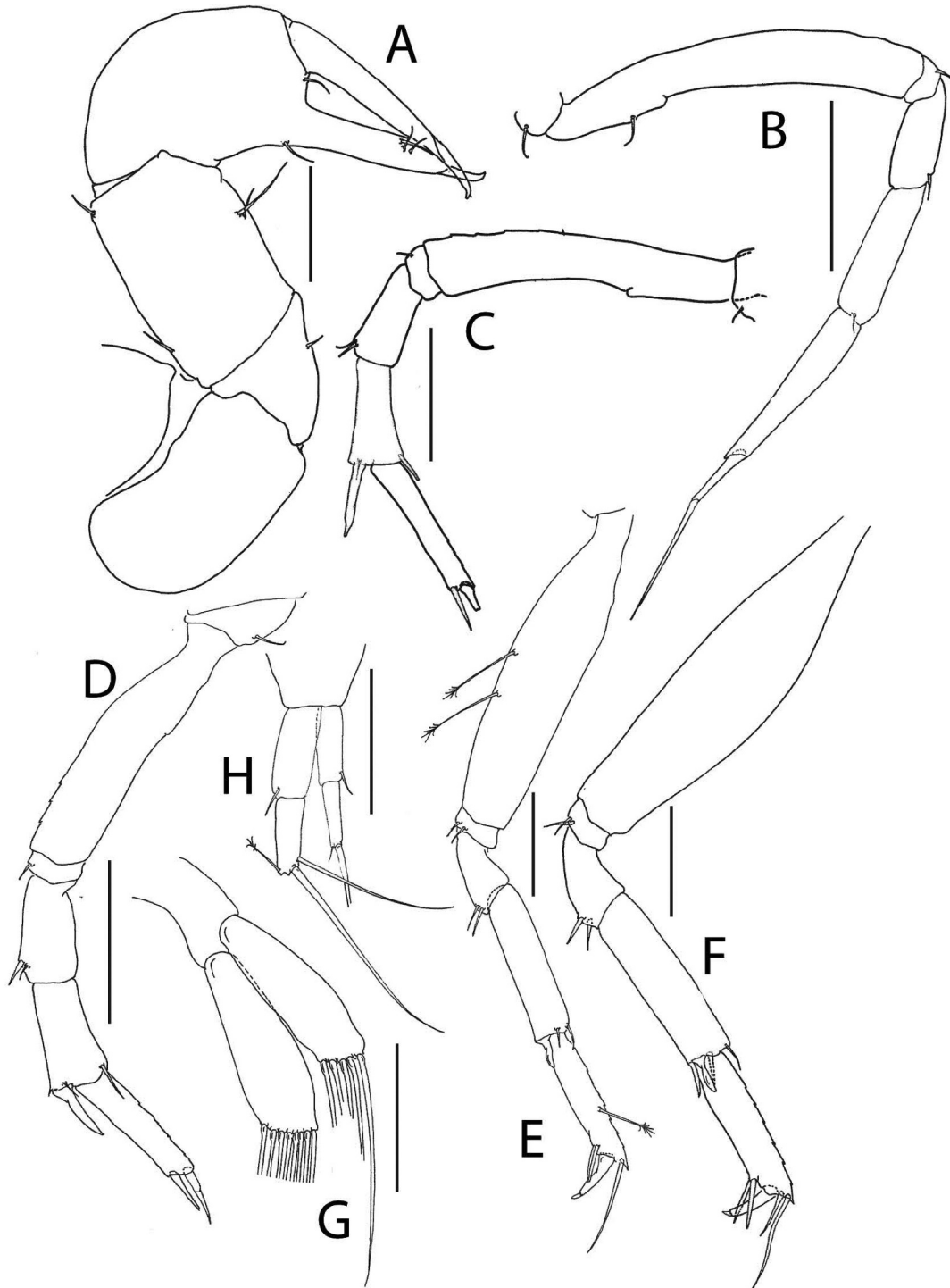


Figure 45. *Pseudotanais enduranceae* sp. nov., (a), cheliped; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4; (f), pereopod-6; (g), pleopod; (h), uropod. Scale lines = 0.1 mm.

Antennule (Figure 44(a)) as long as antennule; article-1 5.1 L:W, 2.8x article-2, with mid-inner penicillate seta, three penicillate setae in proximal

half, outer margin with two groups of simple and penicillate setae, one simple and two penicillate setae distally; article-2 2.2 L:W, 0.9x article-3, with

one inner and one longer outer distal setae; article-3 3.7 L:W, with four bifurcated distal setae and one aesthetasc.

Antenna (Figure 44(b)) shorter than antennule; article-2 1.1 L:W; 0.6x article-3, with seta (0.6x article-2); article-3 1.9 L:W, 0.4x article-4, with seta (0.4x article-3); article-4 7.1 L:W, 2.3x article-5, with two simple and three penicillate distal setae; article-5 3.7 L:W, 7.3x article-6 with simple seta; article-6 1.0 L:W, with five distal setae.

Labrum (Figure 44(c)) rounded, naked.

Left mandible (Figure 44(d)) incisor distally with two small teeth, margin weakly serrate; *lacinia mobilis* well developed, distally serrate; molar slender, elongate, and acuminate.

Right mandible (Figure 44(e)) incisor unequally bifid, distal margin serrate, as in left mandible; molar as left mandible.

Labium not seen.

Maxillule (Figure 44(f)) endite with eight distal spines and outer subdistal tuft of setae.

Maxilla (Figure 44(g)) ovoid, naked.

Maxilliped (Figure 44(h)) bases together ovoid, longer than broad, naked; palp article-1 naked; article-2 with two inner setae, outer seta not seen; article-3 with four inner setae; article-4 with five distal and one sub-distal setae. endites cleft, each with two distal gustatory cusps.

Cheliped (Figure 45(a)) basis 1.8 L:W; merus as long as carpus ventral margin, with ventral seta; carpus 1.5 L:W, 0.9x palm, with two midventral setae, and one mediodorsal and one dorsodistal setae; chela 2.7 L:W, 1.8x carpus L, palm 1.6 L:W; fixed finger 3.4 L:W, 0.7x palm with ventral seta, cutting edge simple with three small setae, distal spine straight and slender, with tip bent up; dactylus 5.4 L:W, cutting edge smooth, without proximal seta; unguis straight and slender, with tip bent down.

Pereopod-1 (Figure 45(b)) coxa with seta; basis 7.0 L:W, 4.1x merus with dorsoproximal seta; ischium with ventral seta; merus 2.1 L:W and 0.8x

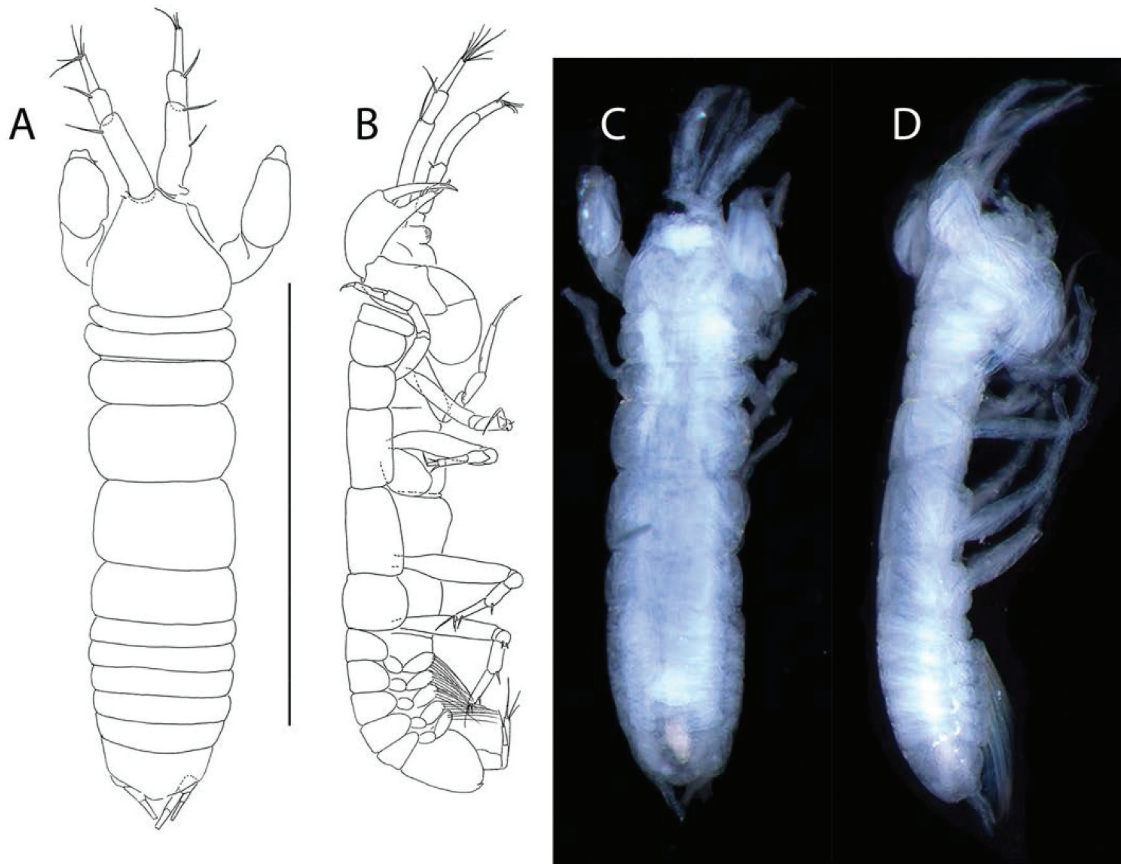


Figure 46. *Pseudotanaïs scotti* sp. nov., holotype female, (a, c), dorsal; (b, d), lateral. Scale line = 0.1 mm.

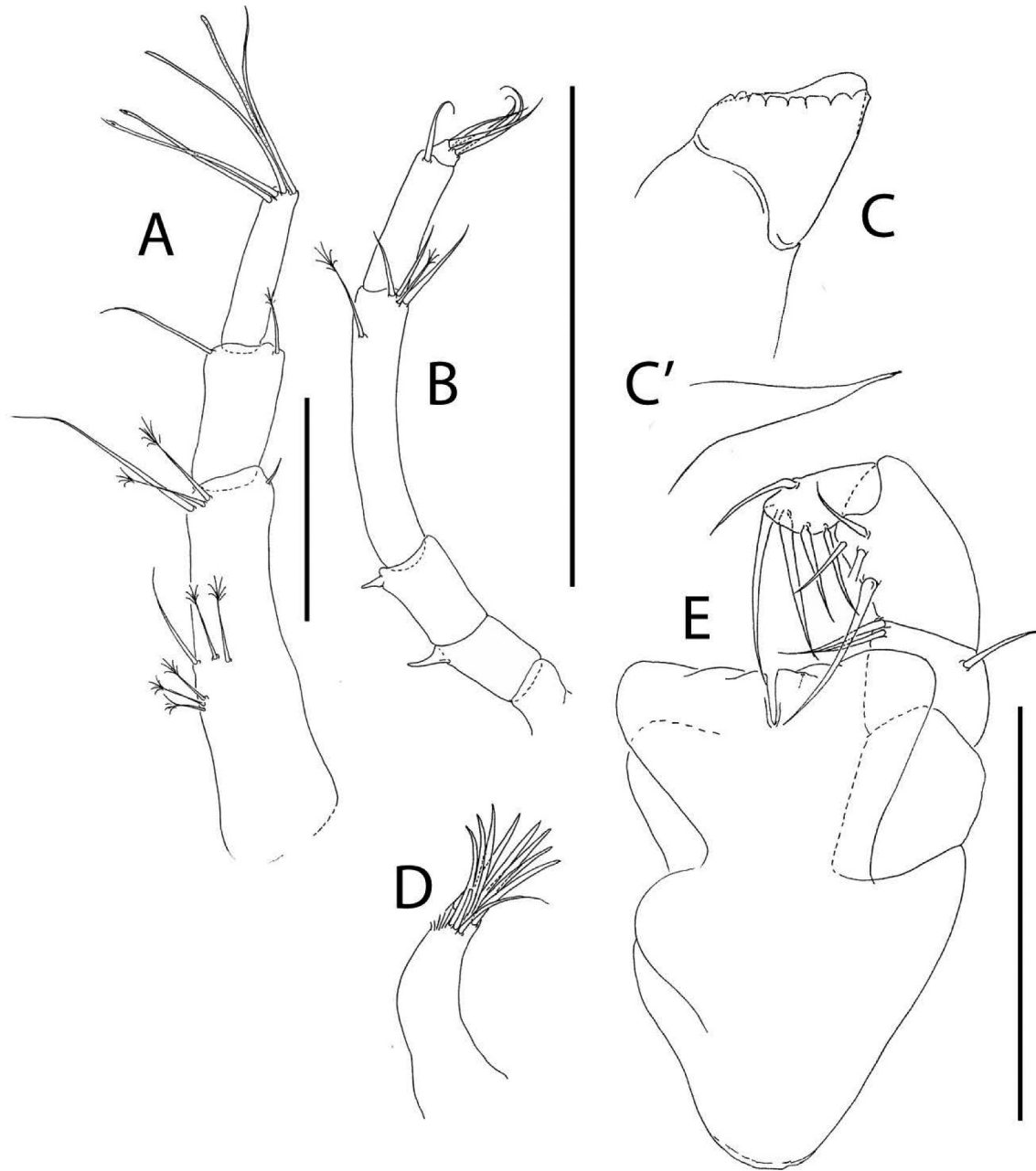


Figure 47. *Pseudotanais scotti* sp. nov., (a), antennule; (b), antenna; (c), left mandible, distal; (c'), mandible molar; (d), maxillule endite; (e), maxilliped. Scale lines = 0.1 mm.

carpus, with ventrodistal seta; carpus 3.1 L:W, 0.6x propodus, with ventrodistal seta; propodus 5.7 L:W, 0.9x dactylus and unguis combined length, naked; dactylus 0.5x unguis.

Pereopod-2 (Figure 45(c)) coxa with seta; basis 5.7 L:W, 3.6x merus, naked; ischium with ventral seta; merus 2.0 L:W, 0.9x carpus, with spine and seta ventrodistally; carpus 1.8 L:W, 0.7x propodus, with seta, and spine, and long blade-like spine (0.6x

propodus); propodus 5.4 L:W, with one distal spine (1.5x dactylus); unguis broken.

Pereopod-3 (Figure 45(d)) coxa with seta; basis 4.4 L:W, 2.8x merus, naked; ischium with ventral seta; merus 1.7 L:W, 0.9x carpus, with one ventrodistal seta and one spine; carpus 1.7 L:W, 0.8x propodus, with two simple setae and one semilong/intermediate blade-like spine (0.5x propodus); propodus 4.2 L:W, 2.1x dactylus and unguis combined

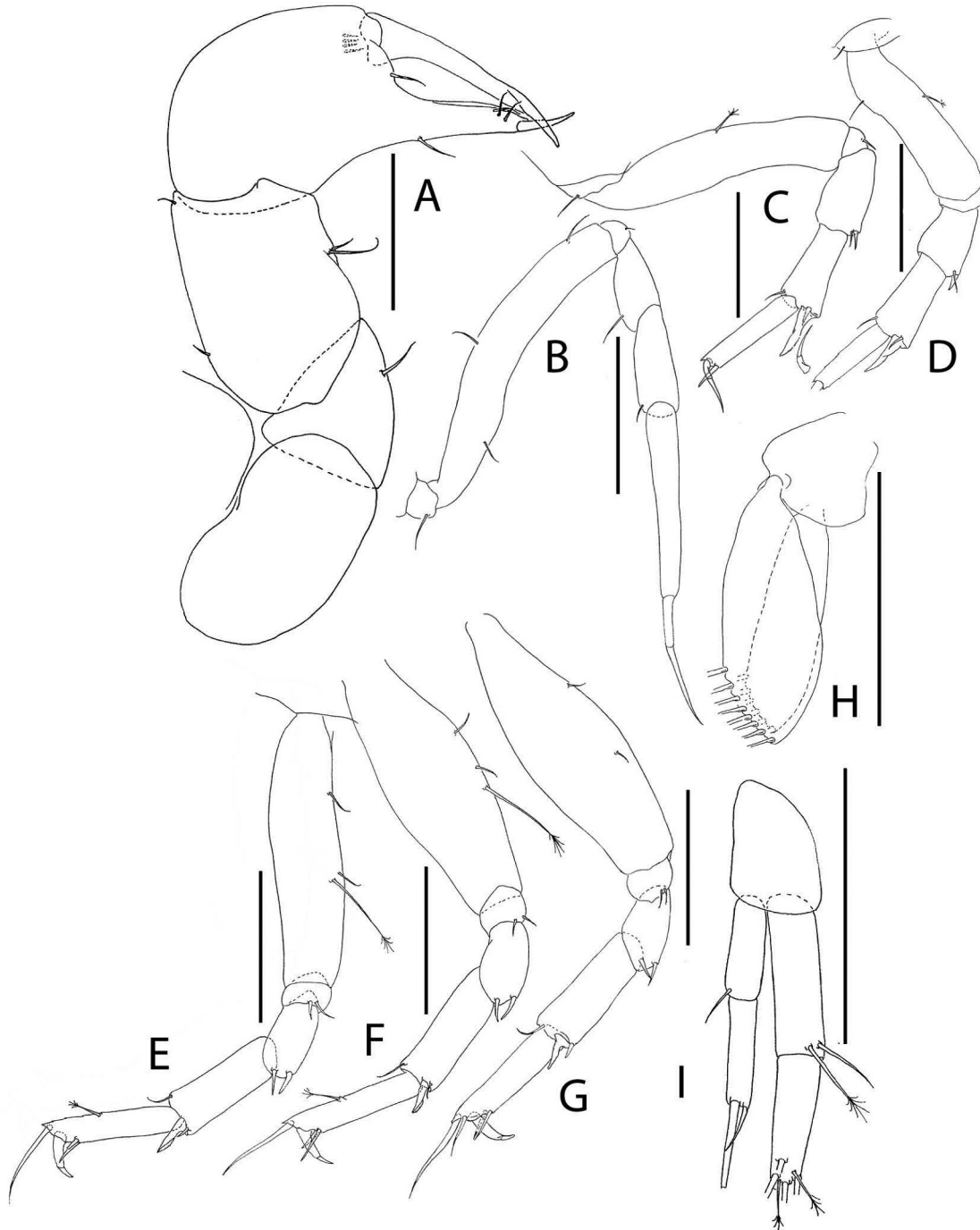


Figure 48. *Pseudotanaids scotti* sp. nov., (a), cheliped; (b), pereopod-1; (c), pereopod-2; (d), pereopod-3; (e), pereopod-4; (f), pereopod-5; (g), pereopod-6; (h), pleopod; (i), uropod. Scale lines = 0.1 mm.

length, with one distal seta (0.8x dactylus); dactylus 0.7x unguis.

Pereopod-4 (Figure 45(e)) basis 4.5 L:W, 5.3x merus, with two ventral penicillate setae; ischium with two ventral setae; merus 1.5 L:W, 0.4x carpus, with two ventrodorsal spines; carpus 4.1 L:W, 1.2x propodus, with one simple seta,

one seta (0.2x propodus) and one short blade-like spine (0.2x propodus); propodus 4.2 L:W, 2.3x dactylus and unguis combined length, with one middorsal penicillate seta, two serrate ventral setae, one serrate dorsal seta (1.7x dactylus and unguis combined length); dactylus 4.5x unguis.

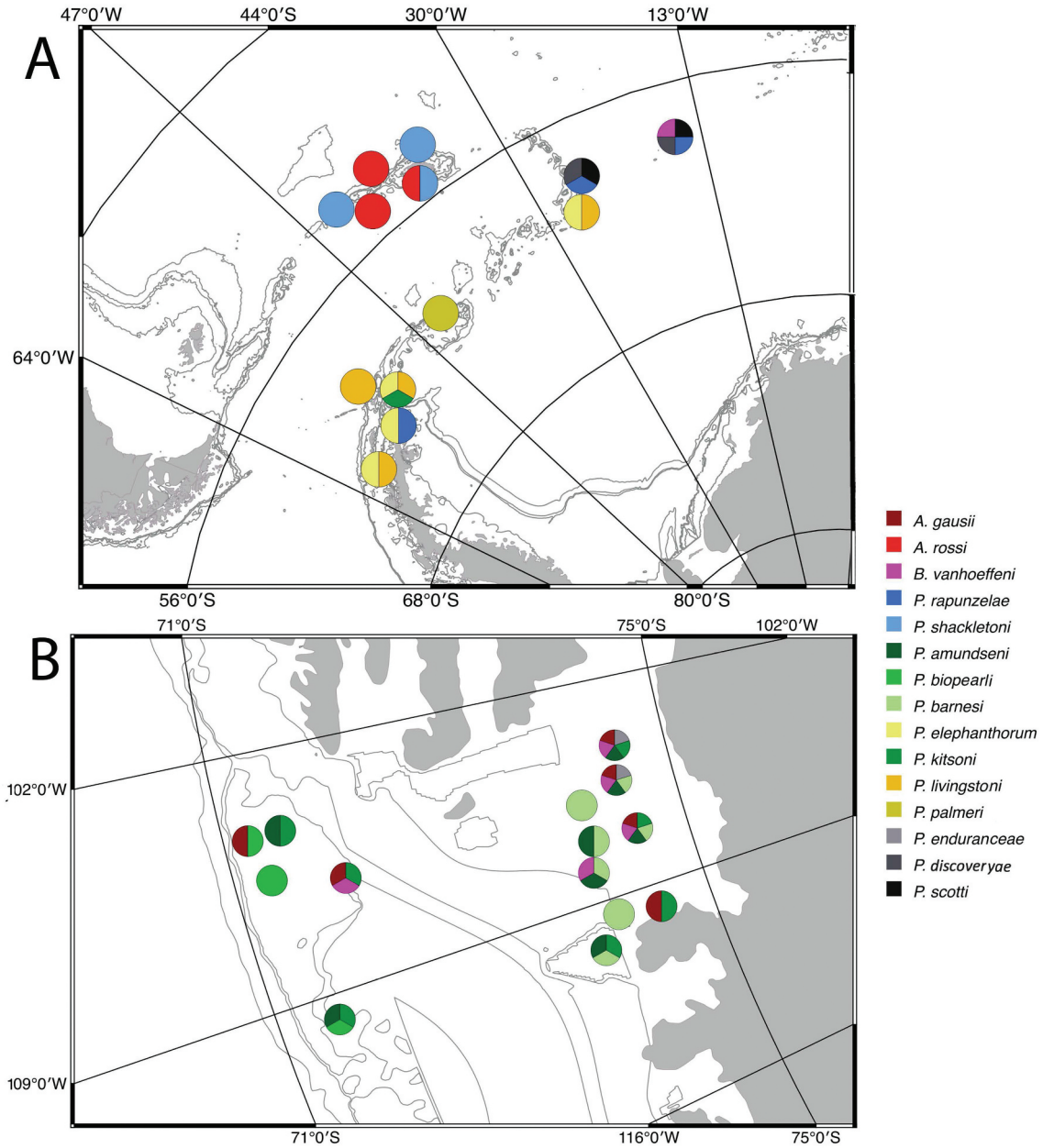


Figure 49. Geographic distribution of newly described Pseudotanaidae from the BIOPEARL 1 and 2 expeditions.

Pereopod-5 missing.

Pereopod-6 (Figure 45(f)) basis 4.5 L:W, 5.1x merus, naked; ischium with two ventral setae; merus 1.5 L:W, 0.4x carpus, with two ventrodistal spines; carpus 3.9 L:W, 1.2x propodus, with one simple seta, one seta (0.2x propodus) and one short blade-like spine (0.2x propodus); propodus 4.1 L:W, 2.6x dactylus and unguis combined length, with two serrate ventral setae, two serrate dorsal setae (longer seta 1.6x dactylus and unguis combined length); dactylus 10.0x unguis.

Pleopods (Figure 45(g)) peduncle 1.5 L:W; endopod just shorter than exopod, 3.4 L:W, with five setae; endopod 2.9 L:W, with eight setae.

Uropod (Figure 45(h)) peduncle 0.8 L:W; exopod and endopod two-articled; exopod article-1 2.8 L:W, with one simple seta, article-2 4.3 L:W, with two setae (short and long); endopod article-1 2.4 L:W, with one simple seta, article-2 2.8 L:W, with two simple and one penicillate seta.

Subadult male. Similar to female, but antennule (Figure 44(i)) stouter, article-3 showing signs of subdivision.

Distribution. Amundsen Sea, 489–507 m.

Remarks. *Pseudotanaid enduraceae* sp. nov., with its uropod exopod 0.9x as long as the endopod, can be distinguished from *P. artoo*, *P. californiensis*, *P. forcipatus*, *P. jonesi* and *P. soja*, where it is relatively shorter (0.5x). It is most similar to *P. discoveryae* although its uropod endopod is 4.3 L:W (4.7 L:W in *P. discoveryae*), the seta on antenna article-2 is 0.5x as long as article-3 (as long as article-3 in *P. discoveryae*) and the exopod uropod is 0.9x as long as endopod (0.8x in *P. discoveryae*).

***Pseudotanaid scotti* sp. nov.**

(Figures 46–48)

<http://www.zoobank.org/urn:lsid:zoobank.org:act:C3C4C558-DB67-4A3E-9DC4-F59B5DA278B1F59B5DA278B1>

Material examined. Holotype, juvenile female 1.2 mm, ICUL8851, ST-EBS-3 (NHM UK.2021.198). Paratypes: juvenile female 1.2 mm, ICUL8850, ST-EBS-3 (NHM UK.2021.199); Paratypes: two neuters 0.8–1.2 mm, juvenile male 1.2 mm, juvenile female 1 mm, ICUL8853, ST-EBS-3 (NHM UK.2021.200); two neuters 0.9–1.2 mm, juvenile female 1.1 mm, manca 0.8 mm, ICUL8854, ST-EBS-3 (NHM UK.2021.201); juvenile female 1.5 mm, ICUL8855, ST-EBS-3 (NHM UK.2021.202); neuter, dissected ICUL8905, ST-EBS-3B (NHM UK.2021.203).

Etymology. The species named in honour of Captain Robert Falcon Scott, an officer of the British Royal Navy, the explorer of the Antarctic and leader of the Discovery Expedition.

Diagnosis. Antenna articles 2–3 with spines. Pereopods 2–3 carpus blade-like spine 0.6x propodus. Uropod exopod 0.7x endopod.

Description of female. BL = 1.2 mm. Body robust (Figure 46(a–d)) 4.1 L:W. Cephalothorax 0.9 L:W, 1.4x pereonites 1–3, 0.2x BL. Pereonites 0.5x BL, pereonites-1–6: 0.12, 0.18, 0.3, 0.5, 0.6 and 0.3 L:W, respectively. Pleon short, 0.3x BL. Pleonites 0.9 L:W each with lateral setae. Pleotelson 1.8x pleonite-5.

Antennule (Figure 47(a)) article-1 5.1 L:W, 2.6x article-2, with one simple and five penicillate setae at mid-length, and two (long and short) simple and two penicillate setae distally; article-2 1.9 L:W, 0.9x article-3, with simple and

penicillate; article-3 4.0 L:W, with four simple and one aesthetasc.

Antenna (Figure 47(b)) just shorter than antennule; article-2 1.2 L:W; 0.9x article-3, with spine (0.5x article-2); article-3 1.1 L:W, 0.3x article-4, with spine (0.4x article-3); article-4 5.9 L:W, 1.9x article-5, with three simple and two penicillate distal setae distally and subdistally; article-5 3.0 L:W, 8.0x article-6 with seta; article-6 0.8 L:W, with four distal setae.

Left mandible (Figure 47(c)) incisor distally rounded, margin simple; *lacinia mobilis* distal margin crenulate; molar narrow long, acute (Figure 47(c')).

Maxillule (Figure 47(d)) endite with eight distal spines and outer subdistal tuft of setules.

Maxilliped (Figure 47(e)) bases together chordeate, about as long as broad, naked; palp article-1 naked, article-2 with two inner setae and one long outer seta, article-3 with four inner setae, article-4 with one outer sub-distal and four inner-distal setae; endites with distal cleft, distal gustatory cusps not seen.

Cheliped (Figure 48(a)) robust; basis 1.8 L:W; merus 1.2x carpus ventral margin, with ventral seta; carpus 1.4 L:W, 1.0x palm, with two ventral setae, one mediodorsal and one dorsodistal setae; chela 2.5 L:W, 1.9x carpus length, palm 1.3 L:W with four small setae on inner side and one seta near dactylus insertion; fixed finger 3.2 L:W, 0.8x palm, with ventral seta, cutting edge simple, with three small setae; dactylus 4.2 L:W, cutting edge smooth, without proximal seta; unguis almost straight and pointed.

Pereopod-1 (Figure 48(b)) coxa with seta; basis 6.7 L:W, 5.0x merus with one dorsoproximal and one ventral simple seta; ischium with ventral seta; merus 1.5 L:W, 0.6x carpus, with dorsodistal seta; carpus 2.9 L:W, 0.5x propodus, with dorsodistal seta; propodus 7.4 L:W, 1.4x dactylus and unguis combined length, naked; dactylus 0.6x unguis.

Pereopod-2 (Figure 48(c)) coxa with seta; basis 4.5 L:W, 3.0x merus, with ventral penicillate seta; ischium with ventral seta; merus 1.5 L:W, 1.0x carpus, with seta and small spine ventrodistally; carpus 1.9 L:W, 0.75x propodus, with seta, spine and semi-long/intermediate blade-like spine (0.5x propodus) distally; propodus 4.0 L:W, 2.0x dactylus and unguis combined length, with distal spine (0.5x dactylus); dactylus 0.7x unguis.

Pereopod-3 (Figure 48(d)) coxa with seta; basis 3.7 L:W, 3.0x merus, with ventral seta; ischium with ventral seta; merus 1.1 L:W, 0.7x carpus,

with seta and small spine ventrodistally; carpus 1.9 L:W, 0.7x propodus, with two setae and blade-like spine (0.7x propodus); propodus 4.0 L:W, 2.0x dactylus and unguis combined length (distal spine not observed); dactylus 0.7x unguis.

Pereopod-4 (Figure 48(e)) basis 4.2 L:W, 2.9x merus, with two simple (short) and one penicillate (long) ventral setae; ischium with two ventral setae; merus 2.1 L:W, 0.8x carpus, with two ventrodistal spines; carpus 2.6 L:W, 0.9x propodus, with simple seta, rod setae (0.2x propodus) and short blade-like spine (0.4x propodus); propodus 4.4 L:W, 2.4x dactylus and unguis combined length, with middorsal penicillate seta, two ventral setae and one dorsal seta (1.9x dactylus and unguis combined length); dactylus 2.0x unguis.

Pereopod-5 (Figure 48(f)) as pereopod-4.

Pereopod-6 (Figure 48(g)) basis 3.2 L:W, 4.3x merus, with two ventral setae; ischium with two ventral setae; merus 1.4 L:W, 0.6x carpus, with two ventrodistal spines; carpus 2.8 L:W, 1.0x propodus, with simple seta, seta (0.3x propodus) and short blade-like spine (0.3x propodus); propodus 3.7 L:W, 2.4x dactylus and unguis combined length, with two ventral setae and two dorsal setae (longer seta 2.1x dactylus and unguis combined length); dactylus 3.5x unguis.

Pleopods (Figure 48(h)) peduncle 0.9 L:W; endopod just shorter than exopod, 3.6 L:W, with six setae; endopod 2.6 L:W, with eight setae.

Uropod (Figure 48(i)) peduncle 1.4 L:W; exopod and endopod two-articled; exopod 0.7x endopod, article-1 3.2 L:W, with simple seta, article-2 5.0 L:W, two setae (short and long); endopod article-1 3.3 L:W, with one simple and one penicillate setae, article-2 3.3 L:W, with four simple and two penicillate setae.

Distribution. Southern Thule (Sandwich Is), 500–543 m.

Remarks. *Pseudotanaeis scotti* sp. nov. is the eleventh blind forcipate pseudotanaid. The length of the uropod exopod to the endopod (0.8x) separates it from *P. artoo*, *P. californiensis*, *P. forcipatus*, *P. jonesi* and *P. soja*, with a uropod exopod half as long as the endopod. From other members of the “forcipatus group” that have a seta on the antennule articles 2 and 3 it can be distinguished by the presence of a spine.

Key to the identification of Antarctic pseudotanaids (females)

1. Blade-like spines on carpus of pereopods 2–6:
absent, simple or bayonet-like (Figure 6(c)) 2

present (Figure 15(c)) 4

2. Eyes:
present *Akanthinotanaeis guillei*
absent (or not pigmented) (Figure 4) 3

3. Uropod exopod; ischium of pereopod-1; dactylus of pereopod-1:
two-segmented; naked; with long proximal seta (Figure 6(g)) *A. gaussi*
one-segmented; one seta; naked (Figure 9(i))
..... *A. rossi* sp. nov.

4. Chela:
forcipate (Figure 12(a)) 5
not-forcipate (Figure 15(a)) 8

5. Antenna article-6 thick rod seta; chela cutting edge:
present; serrate (Figures 11(c’); Figure 12(a’)) ..
..... *B. vanhoeffeni* sp. nov.
absent; smooth (Figures 41(b), 42(a)) (“forcipatus” gp.) 6

6. Antenna articles 2–3 with:
spines (Figure 47(b)) *P. scotti* sp. nov.
setae (Figure 41(b)) 7

7. Antenna article-2 seta; uropod endopod:
0.5x article-3; 4.3 L:W (Figures 44(c); 45(h))
..... *P. enduranceae* sp. nov.
as long as article-3, 4.7 L:W (Figures 41B; 42(i))
..... *P. discoveryae* sp. nov.

8. Pereopod-2 propodus seta:
clearly longer than dactylus (Figure 15(c)) (“affinis+longisetosus” gp.) 9
as long as or shorter than dactylus (Figure 21(c))
 (“denticulatus+abathagastor” gp.) 12

9. Pereopods 5–6 carpus dorsodistal seta:
long (Figure 15(g)) 10
short (Figure 18(g)) 11

10. Pereopod-4 carpus dorsodistal seta:
long *P. longisetosus*
short (Figure 15(e)) *P. rapunzelae* sp. nov.

11. Pereopods 4–6 ischium with; pereopods 4–6 merus with; pereopod-5 proportion carpus to propodus:
one seta; spine and seta; at least as long as
..... *P. nordenskioldi*
two setae; spine; shorter (Figure 18(f))
..... *P. shackletoni* sp. nov.

12. Antenna article-2:
naked (Figure 23(b)) *P. barnesi* sp. nov.

- with spine (Figure 26(c)) 13
13. Antenna article-3 with:
 minute seta (Figure 20(b)) 14
 spine (Figure 26(c)) 15
14. Pereopod-2 merus with: carpus blade like spine;
 pereopods 4–5 proportion dactylus to unguis:
 two seta same length; 0.27x propodus; 5.0x
 (Figure 21(c); 21(d)) *P. amundseni* **sp. nov.**
 two setae (short and long); 0.4x propodus; at most
 3.5x (Figures 30C; 30(c)) *P. elephas* **sp. nov.**
15. Uropod exopod:
 as long as endopod (Figure 39(i))
 *P. palmeri* **sp. nov.**
 shorter than endopod (Figure 33(i)) 16
16. Pereopod-6 carpus blade like spine:
 0.25x propodus (Figure 33(g)) *P. kitsoni* **sp. nov.**
 0.4x propodus (Figure 36(g)) 17
17. Pereopod-3 carpus blade-like spine:
 0.6x propodus. (Figure 36(d))
 *P. livingstoni* **sp. nov.**
 0.4x propodus (Figure 27(d))
 *P. biopearli* **sp. nov.**

Results

(i). **Diversity.** The 169 pseudotanaids analysed in this paper revealed 15 species belonging to three genera: *Akanthinotanaids*, *Beksitanais*, and *Pseudotanaids*, with seven species recorded in the Amundsen Sea and eight species in the Scotia Sea (Table III; Appendix 2). Only one species, *Akanthinotanaids gaussi*, was formerly known from the Antarctic coast (Vanhöffen 1914; Kudinova-Pasternak 1975); the fourteen others were new to science and represent three morphogroups: “affinis+longisetosus”, “denticulatus+abathagastor” and “forcipatus” (Bird & Holdich 1989a; Jakiel et al. 2019).

All the pseudotanaid species recorded in the Amundsen Sea were considered to be unique for the region because they are mostly absent elsewhere (Table III, Figure 49) and grouped within clade 1 (similarity cluster, Figure 50). The exception was *P. kitsoni* that was present also at Elephant Island, and *B. vanhoeffeni* recorded also in the South Sandwich Islands. The cluster analysis revealed five robust groups of samples distinguished at 20% of similarity, i.e., (1) Amundsen Sea (12 stations), (2) Amundsen Sea (2 stations), (3) Elephant Island + Livingstone + S. Sandwich (4 stations), (4) Southern Tule + Elephant Island (3 stations), and

(5) South Georgia + Shag Rocks (5 stations). One station from Palmer Bay (South Orkney Islands) was represented by only one species (*P. palmeri*) and was an outlier.

The most similar grouping within clade 1 of ten samples (all BIO4, three BIO5, two BIO6, one BIO3) was characterised by the presence of five species: *B. vanhoeffeni*, *P. amundseni*, *P. barnesi*, *P. kitsoni* and *A. gaussi*. A pair of stations (BIO5-EBS-1A and BIO5-EBS-3A) made a distinct sub-clade distinguished by the presence of *B. biopearli*. Two stations (BIO6-EBS-1A and BIO6-EBS-2A) from clade 2 shared low diversity (one or three species). Clade 4 was indicated by the presence of *P. elephas* and *P. livingstoni*, with clade 5 by *P. rapunzelae*, *P. enduranceae* and *P. discoveryae*. Finally, clade 5 was defined by *A. rossi* and *P. shackletoni*.

An ANOSIM analysis confirms a general difference in pseudotanaids species composition between the areas (Global R = 0.567, $p < 0.01$). The strongest dissimilarity ($R = >0.61$, $p < 0.001$) was between the Amundsen Sea and Southern Tule/Shag Rock, and between the Amundsen Sea and Elephant Island $R = 0.579$; $p < 0.05$. Heat map Figure 50

The number of the pseudotanaids individuals representing each species varied between 3 and 21 (Median = 11) (Table III). In the Amundsen Sea the most abundant species were: *P. barnesi* (21 ind.), *P. kitsoni* (16 ind.), *A. gaussi* (15 ind.) and *B. vanhoeffeni* (14 ind.), and in the Scotia Sea — *P. discoveryae* (19 ind.) and *P. scotti* (12 ind.). The least abundant species were *P. shackletoni* (3 ind.) and *P. enduranceae* (4 ind.).

(ii). **Depth gradient.** Except for *Akanthinotanaids guillei*, which is a truly shallow water species (10–32 m), all the pseudotanaids occurred deeper than the Antarctic shelf (>500 m) (Figure 52) and showed relatively wide bathymetric spans, between 300 and 1300 m. The distribution of only one species, *P. nordenskioldi*, covers a depth range of 6050 m (Kudinova-Pasternak 1993).

(iii). **Feeding.** Food preferences of pseudotanaids have been rarely studied, and there are no studies applying biochemical methods to indicate their position in Antarctic food-webs. Direct observation of pseudotanaids reveals an empty digestive system in most specimens, which together with weak sclerotinisation of the integument make internal observation feasible. In general, shallow-water tanaidaceans in the Antarctic were classified as unselective detritivores (Błażewicz-Paszkowycz & Ligowski 2002) or bacterivorous (Delille et al. 1985) although they have been proved to prey on meiofauna or their

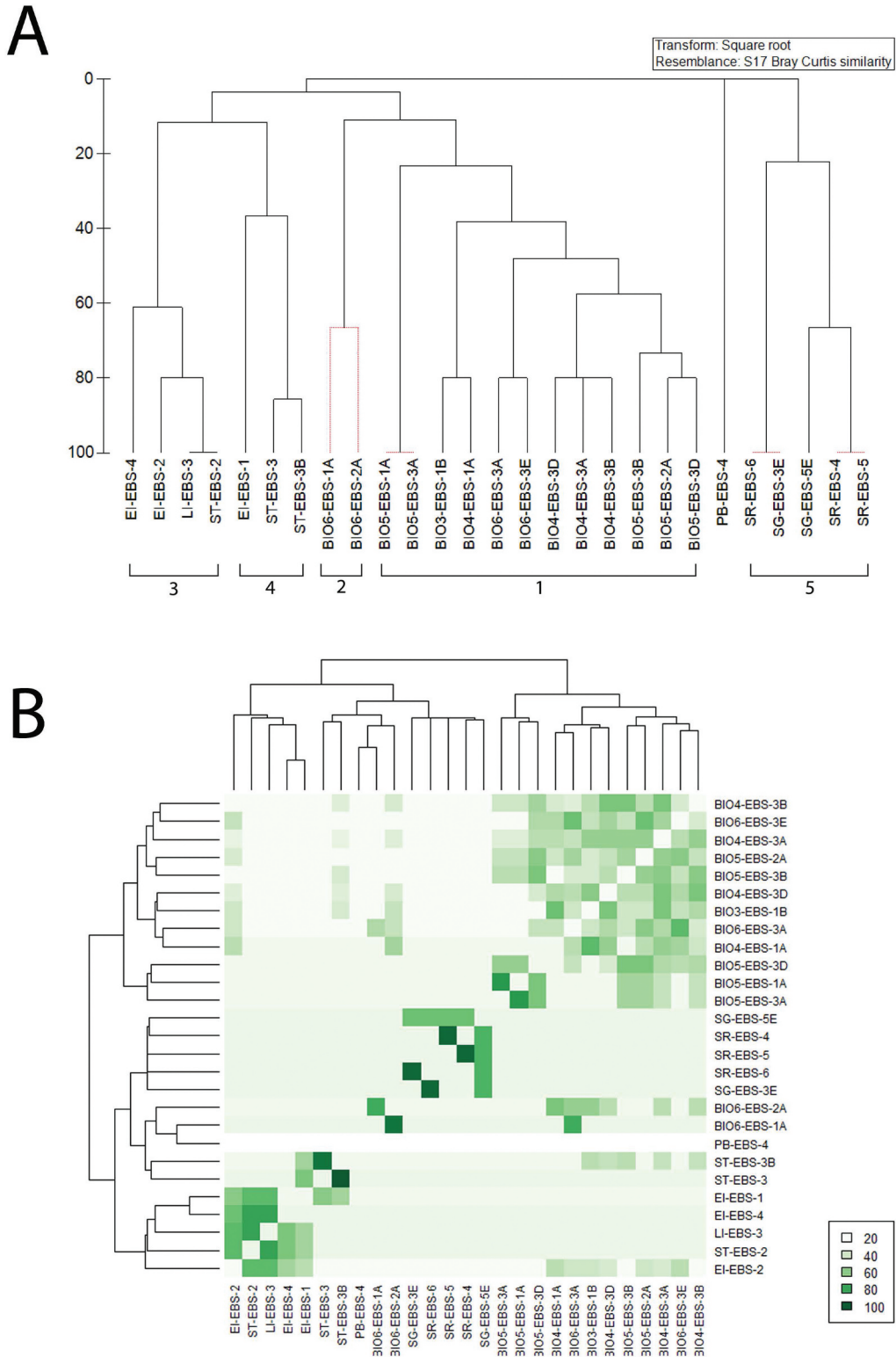


Figure 50. (a) Dendrogram of similarity between the stations based on pseudotanaid presence-absence data, the Bray-Curtis algorithm, and group average clustering. (b) A Heat Map of similarity/dissimilarity between the samples based on pseudotanaids presence-absence data: intensity of colour corresponds to level of similarity.

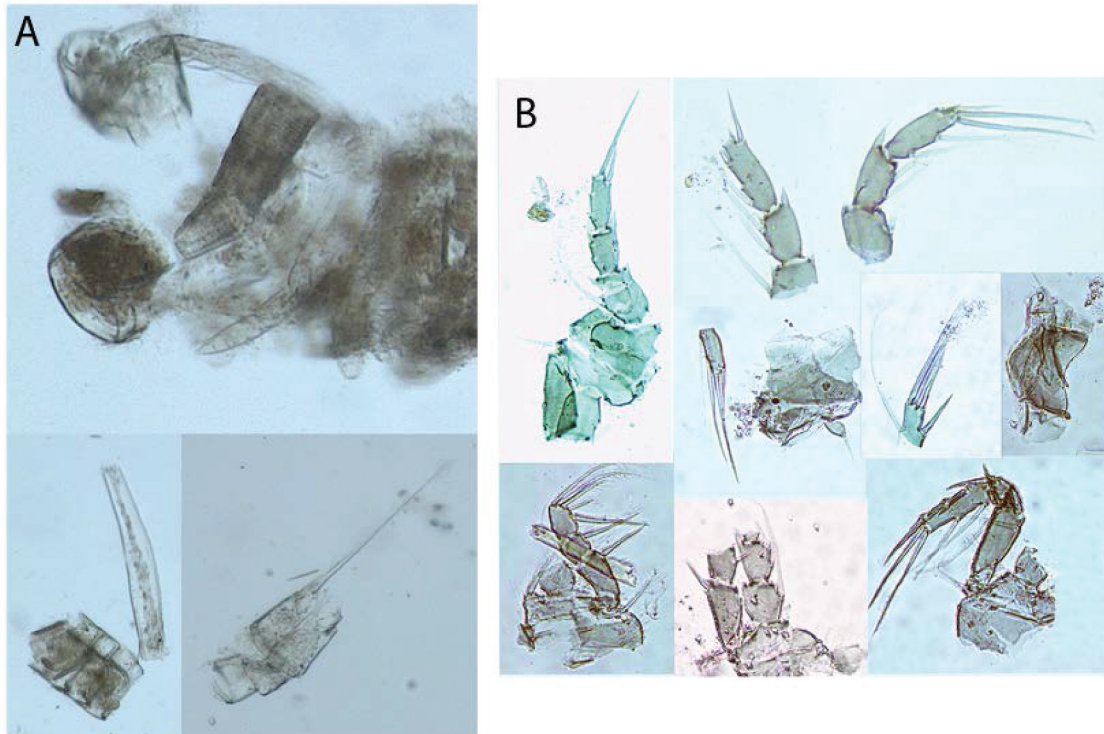


Figure 51. Stomach content of *Pseudotanaeis kitsoni* sp. nov. (a) and *Akanthinotanaeis rossi* sp. nov. (b). Apart from a foraminiferan tests (shells) now disintegrated under the coverslip, fragments of crustaceans (left) and unidentified fragments of “worms” are observed (right).

larval stage including polychaetes or echinoderms, as well as on some nematodes or copepods (Larsen 2005) or they parasitise the tegument of holothurians (Alvaro et al. 2011). The coronal or piercing mandibular molars present in pseudotanaeids implies that they might be non-opportunistic and non-selective predators.

Most of the pseudotanaeids that we studied revealed empty digestive tracts, however, in two species, *A. rossi* and *P. kitsoni*, fragments of harpacticoid copepods, intact foraminiferan tests and other unidentified possible animal tissue fragments were identified (Figure 52). The foraminiferan tests broke into fine pieces under a cover glass, possibly suggesting their semi-digested stage.

Discussion

(i). Species composition. We have increased the number of currently known Antarctic Pseudotanaeidae by the fourteen species recorded in the Amundsen and Scotia Seas, bringing the total number to 20 species (Vanhöffen 1914; Kudinova-Pasternak 1975, 1990, 1993; Sieg 1977, 1986a, 1986b; Shiino 1978) (Appendix 1). The updated

taxonomical position of *B. abyssi* and description of *B. vanhoeffeni* are the first records of the genus in the Southern Ocean.

Previously, the Pseudotanaeidae were known from six species in Antarctic waters. i.e., *Akanthinotanaeis gausi*, *A. guillei*, *Beksitanais abyssi*, *Pseudotanaeis affinis*, *P. nordenskiöldi*, and *P. longisetosus*. *Beksitanais abyssi* originally described from the Arctic (Hansen 1913) was later recorded in the Antarctic (Vanhöffen 1914; Sieg 1986a; Kudinova-Pasternak 1993). The same situation concerns *P. affinis* that was primarily recorded in the Arctic but was later discovered in the Scotia Sea (Kudinova-Pasternak 1990), Figure 1. There are several hypotheses (including geological transport, anti-tropical distribution, or equatorial submergence) that rationalize bipolar distribution of taxa with high dispersal capability or planktonic stages (e.g., Stepanjants et al. 2006; Havermans et al. 2013; Moles et al. 2017) but none can be satisfactorily applied for the deep-sea Pseudotanaeidae. Considering the typical tanaeidan peracarid brooding mode of reproduction, and their rather limited population connectivity, a bipolar distribution of any macrofauna lacking planktonic stages is highly improbable (Brandt

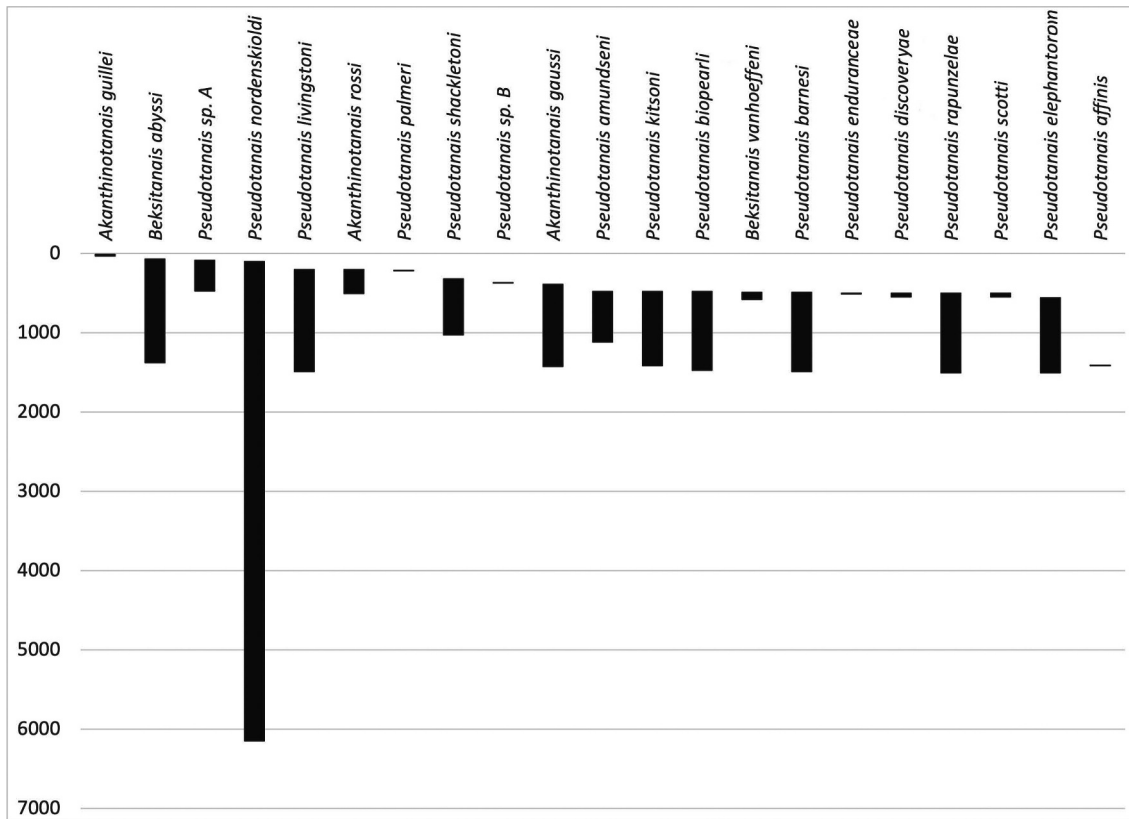


Figure 52. Bathymetric depth of Antarctic Pseudotanaidae based on the literature and current data. (Vanhöffen 1914; Shiino 1978; Sieg 1986a, 1986b; Kudinova-Pasternak 1993; Błażewicz-Paszkowycz & Siciński 2014; Pabis et al. 2014).

et al. 2012; Riehl & Kaiser 2012; Kaiser et al. 2013). Therefore, it is more likely that the Antarctic records of *P. affinis* represent a distinct species.

(ii). Distribution. Our data, collated with literature records, reveal a clear difference between the pseudotanaid fauna on either side of the Drake Passage (Figures 1, 49, 50). Except for *P. nordenskiöldi*, which has an apparently wide bathymetric and latitudinal zoogeographical distribution, all the pseudotanaids recorded along the Scotia Arch (Livingston I., Elephant I., South Orkney Is, and partly South Sandwich Is) were absent from South Georgia, Shag Rock and Patagonia. However, *P. shackletoni* and *A. rossii* were recorded only at South Georgia and Shag Rock and were absent south of the Polar Front. Here, we can speculate about restricted migration in south-north (or reversal) direction and about the role of Antarctic Current (ACC) as zoogeographical factor affecting distribution of pseudotanaids inhabiting the West Antarctic. Also, we could postulate that, if passive transport from north to south direction is possible for pseudotanaids, we should expect

the presence of eye-bearing pseudotanaids, like *A. guillei*, on the Antarctic shelf.

The spatial distribution of Pseudotanaidae in the Amundsen Sea, as well as along the Antarctic Peninsula, and Scotia Arch up to the South Sandwich Islands suggests rather restricted zoogeographical ranges, although a potential for gene flow cannot be excluded. The Amundsen Sea fauna, characterized by distinctive set of the pseudotanaid species, may not be unique. *Beksitanais vanhoeffeni* and *P. kitsoni* were also found frequently in the South Sandwich Islands and Elephant Island environments, respectively. This pattern might imply their potentially wider or continuous distribution concealed within unsampled or under-sampled areas between these localities.

We could further speculate that *B. abyssi* has a continuous distribution along the whole Antarctic slope (see Figure 1). The continuous-Circumantarctic ranges for Antarctic fauna associated with the ACC have been postulated for many invertebrate groups (Brey et al. 1996) and validated in a species-habitat modelling approach

7(O'Hara et al. 2011). Several shallow-water tanaidacean species (e.g., *Nototanais dimorphus* Beddard, 1886) associated with algal habitats might have been passively distributed around the Antarctic (Błażewicz-Paszkowycz 2014). In the deeper waters, the connectivity between physically separated populations is proposed to be sustained by the oceanic currents. The ACC, which extends down to 4000 m (<https://oceancurrents.rsmas.miami.edu/southern/antarctic-cp.html>), could facilitate gene flow within the deeper living fauna, but evidence for circumpolar distribution is equivocal and has been questioned in genetic studies for several groups of benthic invertebrates (Held 2003; Held & Wägele 2005; Brandão et al. 2010; Allcock et al. 2011; Arango et al. 2011). Therefore, in the alternative scenario, the records of *B. vanhoeffeni* and *P. kitsoni* outside Amundsen Sea could represent separate populations of closely related and morphologically indistinguishable (=cryptic) species.

(iii). Habitat preferences. Unfortunately, not much is known about tanaidacean habitat preferences, but observation from the upper slope of North Atlantic indicates that the quality of the sediments and their dynamics along a benthic boundary layer influence pseudotanaids, hence “muddy-sand or other muddy-substrata”, have been indicated as clearly favourable (Bird & Holdich 1989a). Supposedly, the character of the sediments is an essential condition for tube-building fauna (Hassack & Holdich 1987), although pseudotanaids might use the tubes only for reproduction. Some authors consider them as fairly mobile tanaidaceans, well-adapted for walking assuming their elongated pereopods and reduced to one pair of oostegites marsupium (Bird & Holdich 1989a, 1989b; Jakiel et al. 2019). It is worth noting that soft sediments generally make a favourable habitat for harpacticoid copepods and might be an important element of the pseudotanaid diet (Figure 51).

(iv). Diversity. From our study Pseudotanaidae are perceived to be an important component of the Antarctic macrobenthic communities on the deeper shelf and are certainly a less significant component of shallow water communities. Most of the previous records of Antarctic Pseudotanaidae were located at deeper shelf levels (>500 m) along the western side of the Antarctic Peninsula and along the Scotia Arch (Figure 1). Sieg (1986a, 1986b), who produced two large monographs on Antarctic tanaidaceans from the upper shelf of the Antarctic Peninsula and Weddell Sea, recorded only two pseudotanaids, *Beksitanais abyssi* (Weddell Sea) and *P. nordenskioldi* (Bransfield Strait), out of a total of 47 tanaidacean species. Pseudotanaids were not recorded in the shallow and

extensively sampled bays like Admiralty Bay (South Shetland Is.) (Błażewicz-Paszkowycz & Sekulska-Nalewajko 2004; Siciński et al. 2011), Anvers Island (Lowry 1975), Deception Island (Gallardo 1987), and Marguerite Bay (Sieg 1984a), as well as the Franklin and Ross Islands (Ross Sea) (Sieg 1983a).

On the East Antarctic shelf pseudotanaids were noted only three times, with two nominal species and two morpho-species (Vanhöffen 1914; Sieg 1986b; Błażewicz-Paszkowycz & Siciński 2014). Additionally, 2–3 species were recorded on the shelf of the Ross Sea (Błażewicz-Paszkowycz & Siciński 2014; Pabis et al. 2015), although they were identified only to morpho-species level. In studies of deeper shelf and upper slope of East Antarctic, pseudotanaids were represented by seven, eight and nine species in the Ross Sea, Amundsen Sea and Scotia Sea, respectively (Pabis et al. 2015; this study). In three EBS samples taken out of the Ross Sea at the depth 3212–3490 m, tanaidaceans were the dominant peracarids (Lörz et al. 2013), five of the 31 morpho-species listed were Pseudotanaidae (Pabis et al. 2015).

To complete the picture on the Antarctic pseudotanaids it must be emphasised that the Antarctic abyss stays almost completely unknown in terms of the Pseudotanaidae, although field investigations off the Ross Sea imply that they are as equally diverse component of benthic assemblages as in any other part of the world Ocean (Bird & Holdich 1989a; Jakiel et al. 2019, 2020). A high diversity of pseudotanaids in Antarctic abyssal and slope simply demonstrates our deficiency in knowledge of these peracarids and the Antarctic macrobenthos in general. The asymmetry between the diversity of Pseudotanaidae in the East and West Antarctic is striking and reveals the paucity and rarity of the Pseudotanaidae in the former. For this reason, the noticeable rareness of pseudotanaids in the East Antarctic should be interpreted as result of lesser scientific attention being given to that part of the Southern Ocean. The low diversity of Pseudotanaidae on the shelf contrasting with their high diversity on the slope, could imply a deep-sea origin of the family on the Antarctic shelf, at least for the blind species.

Episodes of glacial interglacial cycles for the last 30 million years have created the unique character of the Antarctic fauna (Clarke et al. 2004; Bentley & Hodgson 2009; Kaiser et al. 2013) (Clarke et al. 2004; Bentley and Hodgson 2009; Kaiser et al. 2013). Fragmented by the advance of the Antarctic icecap populations on the shelf are supposed to have survived glacial maxima in bathyal shelters and later undergone an adaptive radiation into vacant shelf habitats. The

descendants of those events are currently represented by discrete phylogenetic lineages (Raupach et al. 2009). The concept of glacial shelters is commonly accepted and given as justification for the wider bathymetric ranges of the Antarctic fauna (Brey et al. 1996). Sieg (Sieg 1983b) has pointed out that most of the tanaidaceans on the Antarctic shelf are blind (Błażewicz-Paszkowycz 2014) suggesting their deep-sea origin, however this fact does not exclude passive migration from the area outside the Polar Front (Sands et al. 2015). Passive transport with brown-algae as a vector is not precluded for justification of several eye-bearded species which are associated with algal habitats, (e.g., *Nototanaid dimorphus*, *Zeuxo phyalensis* Sieg, 1980, *Zeuxoides ohlini*, Stebbing, 1914 or *Zeuxoides troncosoi* Esquete & Bamber, 2012 (Sieg 1986a; Esquete et al. 2012; Błażewicz-Paszkowycz 2014; Błażewicz-Paszkowycz & Siciński 2014). In the case of pseudotanaids living in deeper shelf which rich in soft sediments (Bird & Holdich 1989a, 1989b), rafting or ship hauling would seem to be unlikely.

Conclusions

The explorations of the Antarctic benthos on the deeper shelf and shelf break, with sampling gear appropriate for the small and light fraction of macrobenthos (Brandt & Barthel 1995; Frutos et al. 2016) have revealed a remarkable diversity of peracarids, of which the Pseudotanaidae constitute a diverse and clearly underestimated component (Błażewicz-Paszkowycz 2007; Brandt et al. 2007b; Pabis et al. 2014). Our results increase the number of the previously known pseudotanaids species from six to 20 known from the Antarctic, and from 75 to 89 known in the world ocean. Except for the clearly shallow water subantarctic species *A. guillei*, most of the Antarctic pseudotanaids have bathymetric ranges of less than a thousand meters. The exception is *P. nordenskioldi*, whose wide bathymetric range (6000 m) raises suspicion about the conspecific character of its records. The spatial distribution of Pseudotanaidae reveals evidence for disjunct geographical ranges of fauna inhabiting Subantarctic and West Antarctic Regions (De Broyer & Danis 2011).

The Antarctic slope and abyssal are indicated as the domain of peracarid diversity with a confound number of the species (Clark & Johnston 2003; Brandt et al. 2007a). Moreover, it is assumed that the Antarctic bathyal zone served as a glacial refuge for recent macrobenthos (Thatje et al. 2005; Ingels et al. 2012; Kaiser et al. 2013). Without genetic data and adequate geographic coverage, firm conclusions

about the origin of the Antarctic Pseudotanaidae cannot be made. However, the higher diversity below the shelf break, and the presence of blind representatives of the family, suggest they could have survived the Cenozoic glaciations in bathyal shelters or have an abyssal origin.

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Disclosure statement

No financial interest or benefit has arisen from the direct applications of this research.

Supplementary material

Supplemental data for this article can be accessed [here](#)

ORCID

M. Błażewicz  <http://orcid.org/0000-0002-4753-3424>
 A. Jakiel  <http://orcid.org/0000-0002-9597-8364>
 G. J. Bird  <http://orcid.org/0000-0002-7518-9149>

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