European Journal of Taxonomy 825: 1–76
https://doi.org/10.5852/ejt.2022.825.1829
ISSN 2118-9773
www.europeanjournaloftaxonomy.eu
2022 · Hendrycks E.A. & De Broyer C.
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Monograph

urn:lsid:zoobank.org:pub:2AA16E5D-428F-4827-9944-E2EDC3CF90FD

New deep-sea Atlantic and Antarctic species of *Abyssorchomene* De Broyer, 1984 (Amphipoda, Lysianassoidea, Uristidae) with a redescription of *A. abyssorum* (Stebbing, 1888)

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Abstract. During the Census of Marine Life *Polarstern* ANDEEP I-III and *Meteor* M79/1 DIVA-3 expeditions, autonomous baited trap systems were employed to sample the mobile, necrophagous amphipods from abyssal depths. Within DIVA-3 (July 10–August 26 2009), a free-fall baited trap was used successfully at three stations in the southwest Atlantic, once in the Argentine Basin and twice in the Brazilian Basin. A total of twenty-one stations were sampled by baited traps during the ANDEEP I-III (2002, 2005) cruises in the Southern Ocean. Trap sets recovered large numbers of scavenging lysianassoid and alicelloid amphipods, including specimens of the widespread and commonly considered cosmopolitan uristid species *Abyssorchomene abyssorum* (Stebbing, 1888). During examinations of these and other North Atlantic collections of *A. abyssorum*, two similar new species *A. patriciae* sp. nov. and *A. shannonae* sp. nov. were discovered. Important morphological characters which differentiate the two new species from their congeners are found in the shape of the head lobe, coxa 1, gnathopod 2, coxa 5, pereopod 7 basis and uropod 3 rami length. The new species are fully figured and an identification key is provided. *Abyssorchomene abyssorum* is redescribed and for the first time, the female is fully described and illustrated from new material. The Southern Ocean endemic *A. scotianensis* (Andres, 1983) is also described and illustrated from new collections to complement the original description.

Keywords. Amphipoda, *Abyssorchomene*, scavengers, abyssal, Atlantic, Southern Ocean.

Hendrycks E.A. & De Broyer C. 2022. New deep-sea Atlantic and Antarctic species of *Abyssorchomene* De Broyer, 1984 (Amphipoda, Lysianassoidea, Uristidae) with a redescription of *A. abyssorum* (Stebbing, 1888). *European Journal of Taxonomy* 825: 1–76. https://doi.org/10.5852/ejt.2022.825.1829

Introduction

Scavenging amphipods play a significant role in the deep-sea and Antarctic benthic trophic webs by rapidly consuming and recycling organic food falls (e.g., Stockton & DeLaca 1982; Britton & Morton

1994; De Broyer *et al.* 2004; Corrigan *et al.* 2014) and in providing a food source to other deep-sea organisms (Jones *et al.* 1998; Cousins *et al.* 2013; Higgs *et al.* 2014).

Among these scavengers, mostly belonging to the superfamilies Lysianassoidea and Alicelloidea, species from the uristid genus *Abyssorchomene* De Broyer, 1984 can be frequently and abundantly collected in baited traps (e.g., Thurston 1979, 1990; Jones *et al.* 1998; Duffy *et al.* 2013, 2016b; Fujii *et al.* 2013; Horton *et al.* 2013). However, their accurate identification often poses difficulties due to their very similar morphology and their so far neglected sexual dimorphism, as shown in the present paper. *Abyssorchomene abyssorum* (Stebbing, 1888) for instance, has been collected extensively (see Table 1 for details) and appears to be a widespread deep-sea, pelago-benthic species, possibly cosmopolitan (Thurston 1990; Brandt *et al.* 2012; Duffy *et al.* 2013). However, in examining specimens attributed to *A. abyssorum*, we noticed recurrent morphological differences between specimens of different origins, which have revealed two different, pseudocryptic species. These specimens are here attributed to *A. patriciae* sp. nov. and *A. shannonae* sp. nov.

New Antarctic and Atlantic deep-sea *Abyssorchomene* material was collected in the framework of the Census of Marine Life (McIntyre 2010) during 21 baited trap operations by the *RV Polarstern* ANDEEP I-III (ANtarctic benthic DEEP-sea biodiversity) campaigns in the Southern Ocean (De Broyer *et al*. 2003, 2004, 2007; Brandt & Hilbig 2004; Brandt & Ebbe 2007) as well as at three southwest Atlantic stations by the *RV Meteor* M79/1 DIVA-3 (Diversity of the Abyssal Atlantic) deep-sea project (Martinez Arbizu *et al.* 2015). In particular, the DIVA-3 expedition gave us the opportunity to collect a significant sample of females, males and juveniles attributed to *A. abyssorum* in the Argentine Abyssal Basin, not far from Stebbing's type-locality. We therefore consider this material as belonging to Stebbing's species and containing the true female of *A. abyssorum*, so far undescribed in detail.

Material and methods

Amphipod material for this study was obtained from multiple sources. Much of the deep-sea Southern Ocean baited trap material was collected by one of us (CDB) and colleagues during their frequent Antarctic expeditions between the years 1989–2005 on board the *Polarstern* (De Broyer *et al.* 2004, 2006). Abyssal material from the German led DIVA-3 M79/1 expedition to the southwest Atlantic (July 10–August 26 2009) was collected using the same autonomous baited trap borrowed from the Royal Belgian Institute of Natural Sciences (RBINS). The expedition was run aboard the German *RV Meteor* (Martínez Arbizu *et al.* 2015). Collection depths ranged from 4480–5093 m in the Argentine and Brazilian Basins. The remaining amphipod material was borrowed from museums worldwide, especially important being type specimens of *Orchomene abyssorum* Stebbing, 1888, from the Natural History Museum (NHM) in London and *Orchomene scotianensis* Andres, 1983, from the Zoological Museum, Hamburg (ZMH). Other important collections borrowed were from the National Oceanography Centre (NOC), Southampton, UK (Discovery Collections), the Muséum national d'histoire naturelle (MNHN), Paris and the Zoological Museum, University of Copenhagen (ZMUC).

Dissected appendages and mouthparts were mounted on slides in polyvinyl lactophenol, stained with lignin pink or occasionally mounted in glycerin. Pencil drawings were prepared using Nikon SMZ-U and Wild M5 stereo microscopes and a Leitz Diaplan compound microscope, fitted with a drawing tube. The pencil drawings were then scanned and digitally inked using the software Adobe© Illustrator CS5 on a Wacom Intuos® 5 Touch drawing tablet, following the methods outlined in Coleman (2003, 2009). Most appendages are illustrated in medial orientation. The standard positions used for measuring appendages and their articles to determine ratios in this paper are outlined in Figure 1. On figures, looped arrow lines indicate an enlargement of a drawing and straight arrows point to a particular detail (such as a spine, etc). Circles (solid and dotted) on the appendages indicate the insertion points of omitted setae. Body length was measured from the tip of the rostrum to the end of the telson in a straight line parallel to the body, after flexing the specimen into a slightly curved position (see Fig. 1). All scale bars shown are in mm.

In the descriptions, the 'term tooth' is used for non-articulated, pointed ectodermal structures, 'spine' for stout, inflexible articulated structures (synonymous of "robust setae" of Watling 1989) and "seta" for slender, flexible articulated structures (d'Udekem d'Acoz & Hendrycks 2011). Classification of the mandibular palp setae follows Lowry & Stoddart (1993).

Type specimens and voucher material of *Abyssorchomene abyssorum*, *A. patriciae* sp. nov., *A. scotianensis* and *A. shannonae* sp. nov. are deposited at the following natural history institutions: Royal Belgian Institute of Natural Sciences (RBINS), Brussels (Belgium); Canadian Museum of Nature (CMN), Ottawa (Canada); Natural History Museum (NHM), London (UK) and the Zoological Museum, Hamburg (ZMH).

The following abbreviations are used in the figures:

A	=	antenna (1–2)
aes	=	aesthetascs
cal	=	calceolus
Cx	=	coxa (1–7)
Ep	=	epimeron plate (1–3)
f	=	female
Gn	=	gnathopod (1–2)
H	=	head
ip	=	inner plate
l	=	left
LL	=	lower lip
m	=	male
Md	=	mandible
Mx	=	maxilla (1–2)
Mxpd	=	maxilliped
op	=	outer plate
P	=	pereopod (3–7)
Pln	=	pleonite (1–3)
plp	=	palp
r	=	right
T	=	telson
U	=	uropod (1–3)
UL	=	upper lip
Ur	=	urosomite (1–3).

Results

Taxonomy

Phylum Arthropoda von Siebold, 1848
Subphylum Crustacea Brünnich, 1772
Order Amphipoda Latreille, 1816
Superfamily Lysianassoidea Dana, 1849
Family Uristidae Hurley, 1963

Genus ***Abyssorchomene*** De Broyer, 1984

Abyssorchomene De Broyer, 1984: 198.

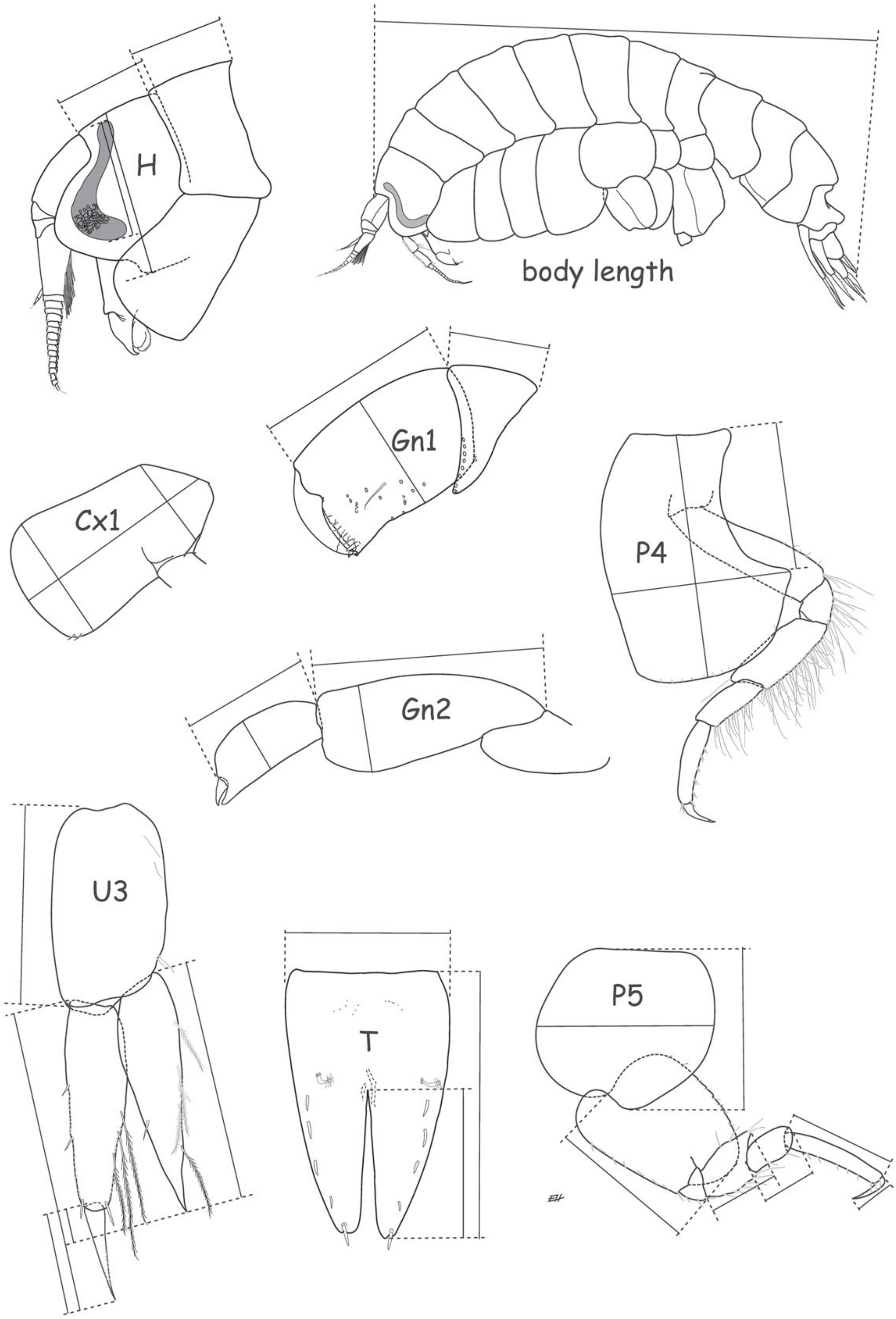

Fig. 1. Measuring standards used in descriptions.

Abyssorchomene – Barnard & Karaman 1991: 507 (in part). — Lowry & Kilgallen 2014: 6–8.

Type species

Orchomenopsis chevreuxi Stebbing, 1906, original designation.

Abyssorchomene abyssorum (Stebbing, 1888)
Figs 2–9

Orchomene abyssorum Stebbing, 1888: 676–679, pl. 21.

Orchomenopsis abyssorum Sars 1895: 74. — Stebbing 1906: 84, fig. 14. — ?Chevreux 1900: 23–24. — Chevreux 1903: 92. — ?Walker 1903: 224, 232. — Chevreux 1905: 7 (in list). — ?Stephensen 1925: 125. — Chevreux 1935: 59–60 (in part, part = *Abyssorchomene* cf. *abyssorum*).
Anonyx abyssorum Della Valle 1893: 824.
Orchomenella abyssorum Ruffo 1949: 10 (in list). – Schellenberg 1955: 192 (in list). — Barnard J.L. 1958: 96 (in list). — ?Birstein & Vinogradov 1960: 188–189, 227, 232, fig. 8. — Gurjanova 1962: 433 (in key). — Hurley 1963: 125–126. — Barnard J.L. 1964: 86, 89 (in key). — ?Birstein & Vinogradov 1964: 164. — Thurston & Allen 1969: 364. — Sanderson 1973: 37 (in list). — ?Lowry & Stoddart 1994: 129, 180–181. — Vinogradov G. 1999: 1147, 1164–1165 (in part; part = *Abyssorchomene scotianensis*).
Orchomene abyssorum – Lowry & Bullock 1976: 94–95 (in part; part = *Abyssorchomene scotianensis*). — Shulenberger & Barnard 1976: 248. — Andres 1983: 209, 211–212. — ?Austin 1985: 601 (in list).— Barnard & Karaman 1991: 508 (in part; part = *Abyssorchomene scotianensis*). — ?Kaufmann 1992: 1–170. — ?Bellan-Santini 1998: 145–146, 148.
Abyssorchomene abyssorum – De Broyer 1983: 142–144 (in part; part = *Abyssorchomene scotianensis*). — Palerud & Vader 1991: 32 (in list). — ?Jones *et al.* 1998: 1124–1125. — ?Witte 1999: 143. — ?Janssen *et al.* 2000: 3005, 3010–3011, 3013, 3015. — Thurston 2001: 358, 360, 362, 365, 369 (in part; part = *Abyssorchomene scotianensis*). — ?Treude *et al.* 2002: 1284–1285, 1288. — ?Horton 2005: 1. — Brandt *et al.* 2012: 144, 146, 152, 155 (biogeography). (in part). — Lowry & Kilgallen 2014: 6–9. — ?Duffy *et al.* 2016a: 1691–1692, 1694–1696. — ?Duffy *et al.* 2016b: 424. — ?Lacey *et al.* 2016: 126, 128, 131. — Corbari & Sorbe 2018: 2. — ?Bribiesca-Contreras *et al.* 2021: 9.
Orchomenopsis (*Orchomene*) *abyssorum* – Costello *et al.* 1989: 32 (in list).
Orchomene (*Abyssorchomene*) *abyssorum* – ?Barnard & Ingram 1990: 26–29, figs 15–17.

non *Orchomenopsis chilensis* f. *abyssorum* – Schellenberg 1926: 291–292, fig. 27 (= *Abyssorchomene scotianensis*).
non *Orchomenella abyssorum* – Barnard K.H. 1932: 69, fig. 28 (= *Abyssorchomene* cf. *scotianensis,* except fig. 27b = *Abyssorchomene abyssorum*). — Nicholls 1938: 35, fig. 15 (= *Abyssorchomene* cf. *scotianensis*). — Dahl 1954: 282 (= *Abyssorchomene* cf. *scotianensis*). — Dahl 1959: 225 (= *Abyssorchomene* sp. nov.). — Birstein & Vinogradov 1962: 41 (= *Abyssorchomene* cf. *scotianensis*).
non *Orchomene abyssorum* Arnaud 1974: 572 (ecology), (= *Abyssorchomene scotianensis*). — Lowry 1982: 320 (= *Abyssorchomene scotianensis*). — Wakabara *et al.* 1990: 2, 4, 6 (= *Abyssorchomene* cf. *scotianensis*).
non *Abyssorchomene abyssorum* – Thurston 1990: 262–263, 269 (= *A. patriciae* in part; part =*A.* cf. *patriciae*; T. Horton, pers. com.). — Diffenthal & Horton 2007: 31 (= *A. gerulicorbis*; T. Horton, pers. com.). — Horton & Thurston 2009: 433–434 (= *A. gerulicorbis*; T. Horton, pers. com.). — Gutteridge 2012: 5, 22, 24 (= *A. patriciae*; T. Horton, pers. com.). — Corrigan *et al.* 2013: 156, 158–161 (= *A.* cf. *patriciae*). — Cousins *et al.* 2013: 303-304 (= *A.* cf. *shannonae*; T. Horton, pers. com.). — Duffy *et al.* 2013: 360–368 (= *A. patriciae*; T. Horton, pers. com.). — Horton *et al.* 2013: 352, 354–358

Table 1 (continued on next four pages). Overview of *Abyssorchomene abyssorum* (Stebbing, 1888) (s.l.) specimen records in literature. (Abbreviations: [fide TH] = T. Horton, pers. com.; mab = m above bottom; fm = fathom).

Source	Original ID	Specimens	Attributed to	Ocean	Location	Expedition-ship-year-station	Lat./Long. (DMS)	Min./Max. depth (m)	mab
Stebbing 1888	*Orchomene abyssorum*	1 ♂	*Abyssorchomene abyssorum*	SW Atlantic	Argentine Basin	*Challenger* (1873–76) stn 323	35°39′S, 050°47′W	-/3475 (1900 fm)	
Chevreux 1900	*Orchomenopsis abyssorum*	1 ♂	*A. ?abyssorum*	NE Atlantic	W of Porcupine Abyssal Plain	*Hirondelle* (1888) stn 256	48°24′48″N, 020°38′30″ W	2200 /	
Chevreux 1903	*O. abyssorum*	2 ♀	*A. abyssorum*	NE Atlantic	W of Azores Is.	*Princesse Alice I* (1895) stn 532	37°52′N, 027°03′W	-/2178	
Chevreux 1903	*O. abyssorum*	many ind.	*A. abyssorum*	NE Atlantic	W of Azores Is.	*Princesse Alice I* (1896) stn 730	37°58′N, 028°33′30″ W	-/2660	
Walker 1903	*O. abyssorum*	1 ind.	*A. ?abyssorum*	NE Atlantic	N of Porcupine Abyssal Plain	*Oceana* (1898) tow-net 4j	52°27′06″N, 015°40′ W	-/2871 (1570 fm)	
Walker 1903	*O. abyssorum*	1 ind.	*A. ?abyssorum*	NE Atlantic	N of Porcupine Abyssal Plain	*Oceana* (1898) tow-net 5h	52°18′01″N, 015°53.9′W	-/2578 (1410 fm)	
Walker 1903	*O. abyssorum*	1 ind.	*A. ?abyssorum*	NE Atlantic	N of Porcupine Abyssal Plain	*Oceana* (1898) tow-net 5k	52°18′01″N, 015°53.9′W	-/2761 (1510 fm)	
Stephensen 1925	*O. abyssorum*	1 ♂	*A.* sp.	NE Atlantic	W of Iceland	*Ingolf* (1895–96) stn 91	64°44′N, 031°00′W	-/2317	
Schellenberg 1926	*O. chilensis* f. *abyssorum*	3 juv.	*A. scotianensis*	Southern Ocean	Wilhelm II Coast	*Gauss* (1901–03) Gauss-station	66°02′S, 089°38′E	-/385	
Barnard 1932	*Orchomenella abyssorum*	1♂, 1 ♀	*A.* cf. *scotianensis*	Southern Ocean	off Livingston I.	*Discovery* (1925–27) stn 208	62°49′30″S, 060°10′30″ W	0/800 (787)	
Chevreux 1935	*Orchomenopsis abyssorum*	see Chevreux 1903	*A. abyssorum*	NE Atlantic	W of Azores Is.		See Chevreux 1903		
Chevreux 1935	*O. abyssorum*	3 ind.	*A.* cf. *abyssorum*	NE Atlantic	Biscay Abyssal Plain	*Princesse Alice II* (1903) stn 1479	44°39′N, 002°11′W	-/1414	
Chevreux 1935	*O. abyssorum*	1 ind.	*A.* cf. *abyssorum*	NE Atlantic	Biscay Abyssal Plain	*Princesse Alice II* (1903) stn 1500	44°34.0′N, 004°38.5′ W	-/4330	
Chevreux 1935	*O. abyssorum*	1 ind.	*A.* cf. *abyssorum*	NE Atlantic	N of Canary Is.	*Princesse Alice II* (1904) stn 1760	29°16′N, 016°11′W	0/3000	
Chevreux 1935	*O. abyssorum*	3 ind.	*A.* cf. *abyssorum*	NE Atlantic	SW of Azores Is.	*Princesse Alice II* (1904) stn 1856	36°46′N, 026°41′W	0/3250	

Table 1 (continued). Overview of *Abyssorchomene abyssorum* (Stebbing, 1888) (s.l.) specimen records in literature. (Abbrevations: [fide TH] = T. Horton, pers. com.; mab = m above bottom; fm = fathom)

Source	**Original ID**	**Specimens**	**Attributed to**	**Ocean**	**Location**	**Expedition-ship-year-station**	**Lat./Long. (DMS)**	**Min./Max. depth (m)**	**mab**
Chevreux 1935	*O. abyssorum*	4 ind.	*A.* cf. *abyssorum*	NE Atlantic	SW of Azores Is.	*Princesse Alice II* (1905) stn 2108	31°44′30″N, 042°39′ W	-/3465	
Chevreux 1935	*O. abyssorum*	2 ind.	*A.* cf. *abyssorum*	NE Atlantic	W of Azores Is.	*Princesse Alice II* (1905) stn 2244	37°04′N, 028°01′W	0/3000	
Nicholls 1938	*Orchomenella abyssorum*	many ind.	*A.* cf. *scotianensis*	Southern Ocean	off Queen Mary Land	*Aurora* (1912–14) Western Base	66°18′S, 094°58′E	-/494 (270 fm)	
Nicholls 1938	*O. abyssorum*	several ind.	*A.* cf. *scotianensis*	Southern Ocean	off Queen Mary Land	*Aurora* (1912–14) stn 10	65°06′S, 096°13′E	-/594 (325 fm)	
Dahl 1954	*O. abyssorum*	1 ind.	*A.* cf. *scotianensis*	Southern Ocean	Ross Sea, Ross Ice Shelf	*Sir James Clark Ross* (1923–24)	Discovery Inlet n.d.	-/550	
Dahl 1959	*O. abyssorum*	1 ♀	*A.* sp. nov.	SW Pacific	Kermadec Trench	*Galathea* (1950–52) stn 649	35°16′S, 178°40′W	8210/8300	
Birstein & Vinogradov 1960	*O. abyssorum*	1 ♂	*A.* cf. *abyssorum*	SW Pacific	Kermadec Trench	*Vityaz* (1958) stn 3831	32°00′S, 182°47′E	0/9120	
Birstein & Vinogradov 1960	*O. abyssorum*	1 ♀	*A.* cf. *abyssorum*	SW Pacific	E of New Zealand	*Vityaz* (1958) stn 3838	41°19′S, 177°44′E	0/3000	
Birstein & Vinogradov 1962	*O. abyssorum*	1 ♂	*A.* cf. *scotianensis*	Southern Ocean	off Wilkes Land	*Ob* (1956) stn 36	62°55′S, 118°52′E	0/3700	
Birstein & Vinogradov 1962	*O. abyssorum*	1 ind.	*A.* cf. *scotianensis*	Southern Ocean	off Wilkes Land	*Ob* (1956) stn 44	66°08′S, 128°25′E	210/550	
Birstein & Vinogradov 1962	*O. abyssorum*	1 ind.	*A.* cf. *scotianensis*	Southern Ocean	off Wilkes Land	*Ob* (1956) stn 48	63°18′S, 135°14′E	0/3600	
Birstein & Vinogradov 1964	*O. abyssorum*	1 ♂	*A.* ?*abyssorum*	Indian Ocean	Central	*Vityaz* (1960) stn 4634	02°46.8′S, 065°41.8′E	0/1980	>1400
Barnard & Ingram 1990	*Orchomene* (*Abyssorchomene*) *abyssorum*	1 ♂	*A.* cf. *abyssorum*	Central Pacific	Galapagos Vents	*SIO* (1979) stn 882	00°47.9′N, 086°09.2′W	-/2491	
Thurston 1990	*Abyssorchomene abyssorum*	215 ind.	*A. patriciae* [fide TH]	NE Atlantic	Porcupine Abyssal Plain	n.d.		3852/4849	

Table 1 (continued). Overview of *Abyssorchomene abyssorum* (Stebbing, 1888) (s.l.) specimen records in literature. (Abbrevations: [fide TH] = T. Horton, pers. com.; mab = m above bottom; fm = fathom).

Source	Original ID	Specimens	Attributed to	Ocean	Location	Expedition-ship-year-station	Lat./Long. (DMS)	Min./Max. depth (m)	mab
Thurston 1990	*A. abyssorum*	1 ind.	*A.* cf. *patriciae* [fide TH]	NE Atlantic	Biscay Abyssal Plain	n.d.		3144/4780	
Thurston 1990	*A. abyssorum*	4 ind.	*A.* cf. *patriciae* [fide TH]	NE Atlantic	Cape Verde Basin	*Discovery* (1976) stn 9131	20° N, 022° W	3760/3920	100–250
Thurston 1990	*A. abyssorum*	3 ind.	*A.* cf. *patriciae* [fide TH]	NE Atlantic	Cape Verde Basin	*Discovery* (1976) stn 9131	20° N, 022° W	3500/3760	250–500
Thurston 1990	*A. abyssorum*	5 ind.	*A.* cf. *patriciae* [fide TH]	NE Atlantic	Cape Verde Basin	*Discovery* (1976) stn 9131	20° N, 022° W	3000/3500	500–1000
Thurston 1990	*A. abyssorum*	3 ind.	*A.* cf. *patriciae* [fide TH]	NE Atlantic	Cape Verde Basin	*Discovery* (1976) stn 9541	20° N, 022° W	3970/4040	0–20
Thurston 1990	*A. abyssorum*	1 ind.	*A.* cf. *patriciae* [fide TH]	NE Atlantic	Cape Verde Basin	*Discovery* (1976) stn 9541	20° N, 022° W	3740/3870	20–100
Thurston 1990	*A. abyssorum*	1 ind.	*A.* cf. *patriciae* [fide TH]	NE Atlantic	Cape Verde Basin	*Discovery* (1976) stn 9541	20° N, 022° W	3020/3520	500–1000
Wakabara *et al.* 1990	*Orchomene abyssorum*	1 ind.	*A.* cf. *scotianensis*	Southern Ocean	off Elephant I.	*Prof. W. Besnard* stn 1	61°16′00″ S, 055°05′ W	-/60	
Kaufmann 1992	*O.* cf. *abyssorum*	many ind.	*A.* cf. *abyssorum*	E Pacific	San Clemente Basin	n.d.	32°30′ N, 118°01′ W	-/1850	
Lowry & Stoddart 1994	*Orchomenella abyssorum*	1 ♂	*A. ?abyssorum*	S Pacific	Marquesas Is.	*Marara* (1990) stn 293	09°47′ S, 139°11.8′ W	-/900	
Jones *et al.* 1998	*A. abyssorum*	33 ind.	*A. ?abyssorum*	NE Atlantic	Porcupine Abyssal Plain	*Discovery* (1996)	48°36.1′ N, 016°10′ W	-/4800	
Witte 1999	*A. abyssorum*	16 ind.	*A. ?abyssorum*	NW Indian	W Arabian Sea	*Sonne* (1997) stn WAST	16°12.0′ N, 060°16.0′ E	-/4040	
Janssen *et al.* 2000	*A. abyssorum*	4 ind.	*A. ?abyssorum*	NW Indian	W Arabian Sea	*Sonne* (1998) stn SAST	10°02′ N, 065°00′ E	-/4420	
Janssen *et al.* 2000	*A. abyssorum*	7 ind.	*A. ?abyssorum*	NW Indian	W Arabian Sea	*Sonne* (1998) stn CAST	14°25′ N, 064°34′ E	-/3950	

Table 1 (continued). Overview of *Abyssorchomene abyssorum* (Stebbing, 1888) (s.l.) specimen records in literature. (Abbrevations: [fide TH] = T. Horton, pers. com.; mab = m above bottom; fm = fathom).

Source	Original ID	Specimens	Attributed to	Ocean	Location	Expedition-ship-year-station	Lat./Long. (DMS)	Min./Max. depth (m)	mab
Diffenthal & Horton 2007	*A. abyssorum*	n.d.	*A. gerulicorbis* [fide TH]	NW Indian	N Arabian Sea	*Charles Darwin 151* (2003) stn 56137-5	22°51.067′N, 065°59.916′ E	-/1864	
Horton & Thurston 2009	*A. abyssorum*	n.d.	*A. gerulicorbis* [fide TH]	NW Indian	N Arabian Sea	*Charles Darwin 151* (2003) stn 56141-01	22°59.784′N, 066°24.786′ E	-/1182	
Horton & Thurston 2009	*A. abyssorum*	n.d.	*A. gerulicorbis* [fide TH]	NW Indian	N Arabian Sea	*Charles Darwin 151* (2003) stn 56141-13	22°59.776′N, 066°24.758′ E	-/1184	
Cousins *et al.* 2013	*A. abyssorum*	9 ind.	*A.* cf. *shannonae* [fide TH]	S Indian	Crozet Plateau	(n.d.) M6 stn 15775-1/16	48°59′S, 051°13′E	4190/4191	
Duffy *et al.* 2013	*A. abyssorum*	subset of Horton *et al.* 2013	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	see Horton *et al.* 2013			
Horton *et al.* 2013	*A. abyssorum*	1965 ind.	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2007) stn JC011-079	53°56.44′N, 036°11.56′ W	-/2564	
Horton *et al.* 2013	*A. abyssorum*	4972 ind.	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2007) stn JC011-098	54°04.08′N, 034°09.43′ W	-/2500	
Horton *et al.* 2013	*A. abyssorum*	3107 ind.	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2007) stn JC011-114	54°02.31′N, 034°09.60′ W	-/2453	
Horton *et al.* 2013	*A. abyssorum*	3250 ind.	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2009) stn JC037-013	49°02.00′N, 027°43.44′ W	-/2501	
Horton *et al.* 2013	*A. abyssorum*	5995 ind.	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2009) stn JC037-052	53°59.32′N, 036°08.12′ W	-/2570	

Table 1 (continued). Overview of *Abyssorchomene abyssorum* (Stebbing, 1888) (s.l.) specimen records in literature. (Abbrevations: [fide TH] = T. Horton, pers. com.; mab = m above bottom; fm = fathom).

Source	Original ID	Specimens	Attributed to	Ocean	Location	Expedition-ship-year-station	Lat./Long. (DMS)	Min./Max. depth (m)	mab
Horton *et al.* 2013	*A. abyssorum*	9297 ind.	*A. patriciae*	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2009) stn JC037-060	53°58.46′N, 036°06.12′ W	-/2340	
Horton *et al.* 2013	*A. abyssorum*	42 479 ind.	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2009) stn JC037-076	53°58.34′N, 034°02.94′ W	/2552	
Horton *et al.* 2013	*A. abyssorum*	40 376 ind.	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2009) stn JC037-083	54°02.31′N, 034°09.54′ W	/2452	
Horton *et al.* 2013	*A. abyssorum*	40 096 ind.	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2010) stn JC048-008	53°59.32′N, 036°08.07′ W	-/2628	
Horton *et al.* 2013	*A. abyssorum*	37 602 ind.	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2010) stn JC048-020	54°03.95′N, 034°09.12′ W	-/2505	
Horton *et al.* 2013	*A. abyssorum*	10 174 ind.	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2010) stn JC048-032	48°47.34′N, 028°38.45′ W	-/2448	
Horton *et al.* 2013	*A. abyssorum*	11 987 ind.	*A. patriciae* [fide TH]	Central N Atlantic	Mid-Atlantic Ridge area	*James Cook* (2010) stn JC048-046	49°02.01′N, 027°43.44′ W	-/2507	
Lacey *et al.* 2016	*A. abyssorum*	n.d.	*A. ?abyssorum*	SW Pacific	Kermadec Trench	n.d.		1488/–?	
Lacey *et al.* 2016	*A. abyssorum*	n.d.	*A. ?abyssorum*	SW Pacific	New Hebrides Trench	n.d.		?/5600	
Horton *et al.* 2020	*A. abyssorum*	many ind.	*A. patriciae* [fide TH]	N Atlantic	Porcupine Abyssal Plain	*P.A.P.-Sustained Observatory*	48°50′N, 016°30′W	/4850	
This paper	*A. abyssorum*	> 60 ind.	*A. abyssorum*	SW Atlantic	Argentine Basin	DIVA-3 *Meteor* (2009) stn 531	35°56.49′S, 048°53.85′W	/4586	

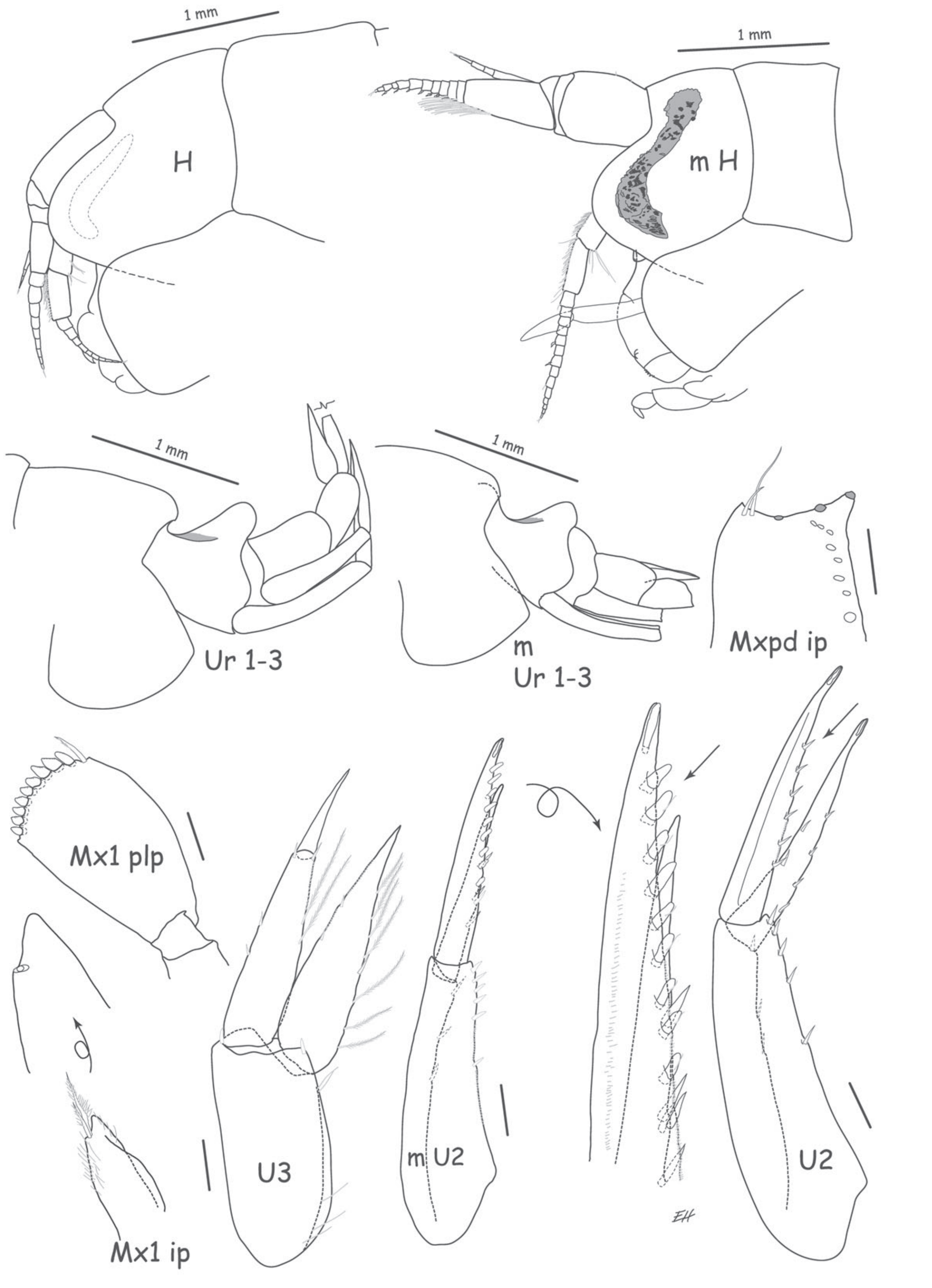

Fig. 2. *Abyssorchomene abyssorum* (Stebbing, 1888), ♀, 9.5 mm (ZMH K-61206); ♂, 7.0 mm (ZMH K-61207), DIVA-3 M79/1 station 531, Southwest Atlantic, Argentine Basin, depth 4586 m., 15 July 2009. Female eye position/size shown is approximate. Outer ramus is oriented on the left side of the uropods. Figures with sex not indicated are of female. Scale bars = 0.1 mm unless indicated otherwise.

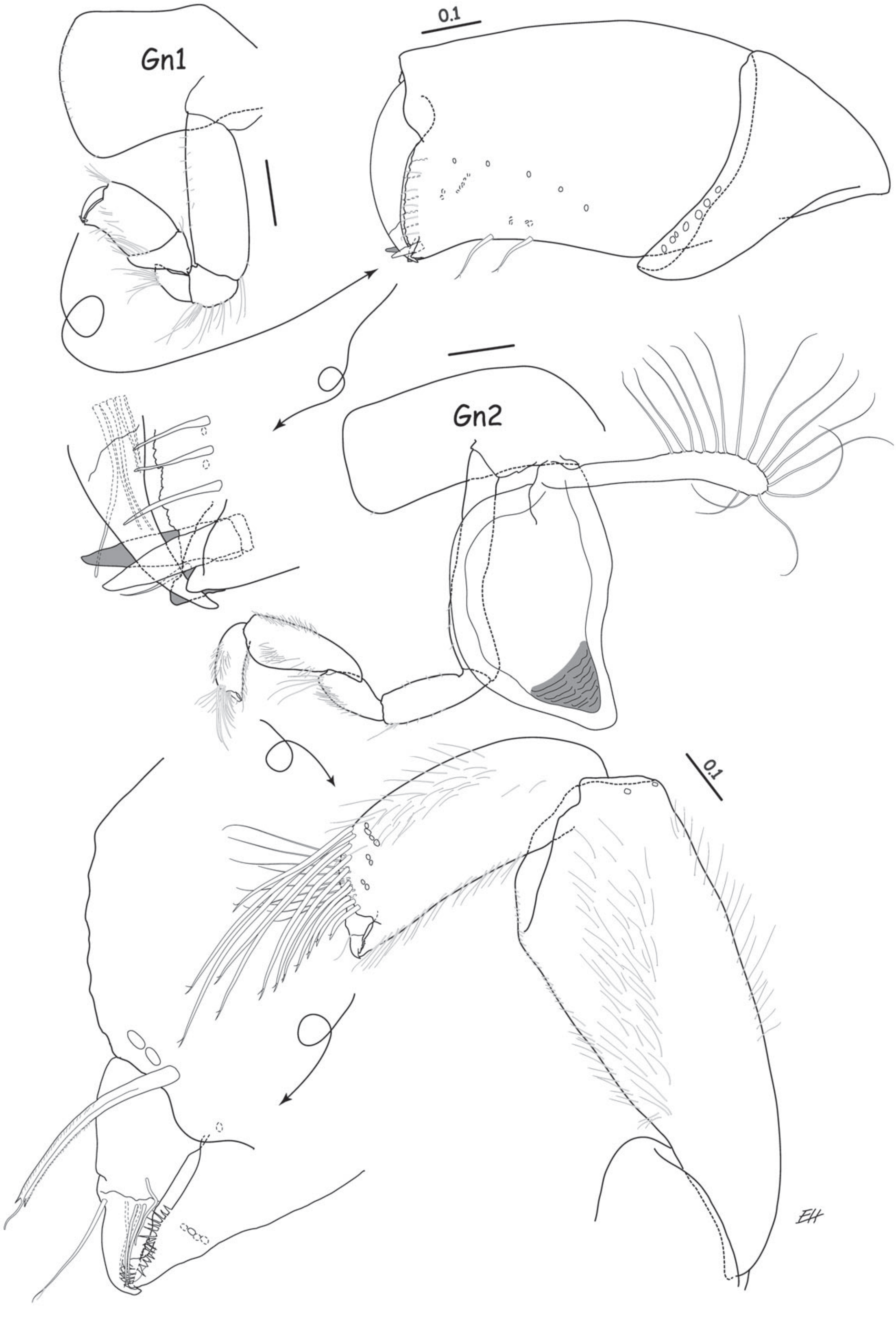

Fig. 3. *Abyssorchomene abyssorum* (Stebbing, 1888), ♀, 9.5 mm (ZMH K-61206). Rows of pectinate setae omitted on propodus of Gn2 detail. Scale bars = 0.5 mm unless indicated otherwise.

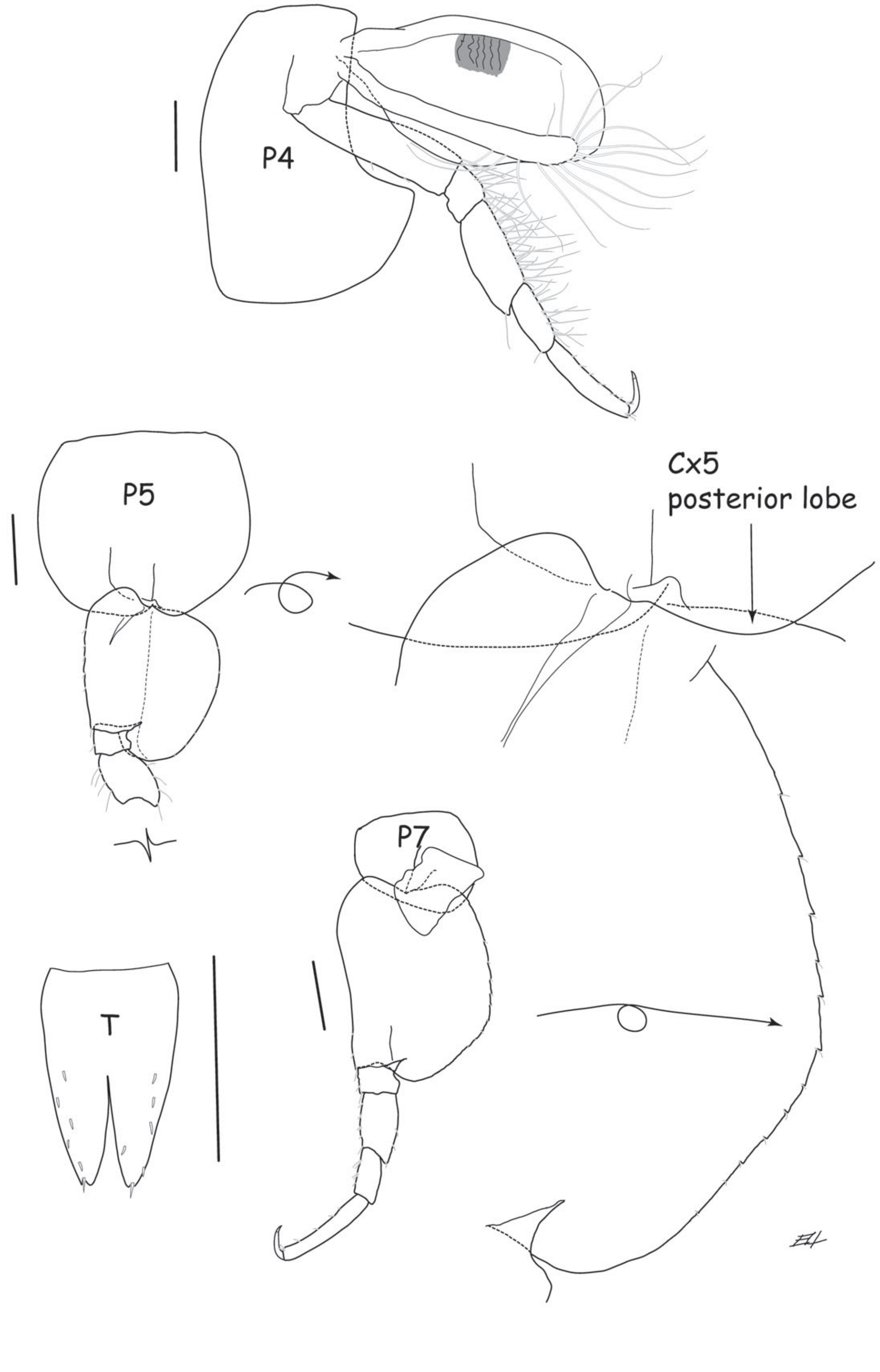

Fig. 4. *Abyssorchomene abyssorum* (Stebbing, 1888), ♀, 9.5 mm (ZMH K-61206). Scale bars = 0.5 mm.

(= *A. patriciae*; T. Horton, pers. com.). — Priede *et al.* 2013: 8 (= *A.* cf. *patriciae*). — Horton *et al.* 2020: 6–7, 11 (= *A. patriciae*; T. Horton, pers. com.).

New diagnosis

Pereonites 1–7 and pleonites 1–2 with a weak but distinct dorsoposterior hump on each segment. Lateral cephalic lobe broadly rounded, dorsal margin regularly convex and slightly more convex than the nearly straight ventral margin. Antennae 1–2 of male with calceoli, female without. Epistome level with upper lip. Maxilla 1 palp, distal end weakly convex with conical apical spines contiguous. Maxilliped inner plate, distal margin conspicuously excavate; outer plate inner margin not scalloped. Coxa 1 slightly widened distally, ~ 1.2–1.3 × proximal width. Gnathopod 2 propodus of male and female narrow, length ~ 2.3–2.5 × width, dactylus very small, inserted on the posterodistal one-third of distal margin, palm lacking concavity. Coxa 5 very weakly posterolobate, posterodistal lobe narrow with posterodistal margin nearly straight. Pereopod 7 basis with anterior margin slightly concave, posterior margin subparallel to anterior margin in the proximal two-thirds, distal third with a distinct, nearly straight bevel (male less distinct and more rounded). Uropod 1 peduncle length greater than 1.5–1.7 × length of outer ramus. Uropod 3 inner ramus extends past distal end of article 1 and reaches ~ 70% length of article 2 of outer ramus. Telson cleft ~ 52–56% of length.

Material examined

Holotype

SOUTHWEST ATLANTIC • ♂ (7.5 mm, figured, see Figs 5–9, dissected in 3 tubes, carcass missing/lost); east of Buenos Aires; *HMS Challenger*, station 323; 35°39′ S, 50°47′ W; depth 3475 m (1900 fathoms); bottom blue mud, temperature 33.1°F; 28 Feb. 1876; BMNH 1889.5.15.23

Additional material

SOUTHWEST ATLANTIC • 1 ♀ (9.5 mm, mature, with setose brood plates, illustrated, see Figs 2–4, appendages on 2 slides); Argentine Basin; *RV Meteor* DIVA-3 M79/1 expedition, station 531; 35°56.49′ S, 48°53.85′ W; depth 4586 m; gear, baited traps; 15 Jul. 2009; E. Hendrycks leg.; ZMH K-61206 • 1 ♂ (7.0 mm, appendages on 2 slides, partly illustrated, see Fig. 2); same collection data as for preceding; ZMH K-61207 • 5 ♂♂, 5 ♀♀, 4 juveniles; same collection data as for preceding; ZMH K-61208 • 10 ♂♂, (one of these 7.0 mm, dissected, appendages on 3 slides), 5 ♀♀, 7 juveniles; same collection data as for preceding; CMNC 2022-0001 • 5 ♂♂, 10 ♀♀, 3 juveniles; same collection data as for preceding; RBINS INV. 138.486.

NORTH ATLANTIC • 9 ♀♀ (with mature ♀♀, 7–10 mm, 1 mature ♀, 10 mm, appendages on 8 slides, 1 nearly mature ♀, 9.5 mm, appendages on 3 slides); near Azores; *Hirondelle* 1896 campaign, station 730; 37°58′ N, 28°33′30″ W; depth 2660 m; bottom sandy clay; gear, baited traps; 3–5 Aug. 1896; MNHN, collection Chevreux (no registration number, see Chevreux 1903: 92).

Description

Female

Based on female (mature), 9.5 mm (ZMH K-61206).

Pereonites 1–7 and pleonites 1–2 (Fig. 2). With weak but distinct dorsoposterior hump on each segment.

Pleonite 3 (Fig. 2). With a distinct, rounded posterodorsal elevation slightly overhanging urosomite 1.

Coxae 1–2 (Figs 2–3). Subequal to slightly longer (1.1 × to 1.25 ×) than the depth of corresponding pereonites (in lateral view).

COXAE 3–4 (Fig. 4). Slightly longer (1.1 × to 1.25 ×) than the depth of corresponding pereonites, coxa 3 not shown.

EPIMERON 3 (Fig. 2). Subquadrate, with posterodistal angle slightly obtuse, apex rounded, posterior margin weakly but regularly convex, ventral margin regularly convex.

UROSOMITE 1 (Fig. 2). With a deep, narrow dorsal concavity in front of the strong, regularly rounded dorsal boss, convex on posterior margin, boss projecting strongly upright and backward, slightly overhanging urosomite 2.

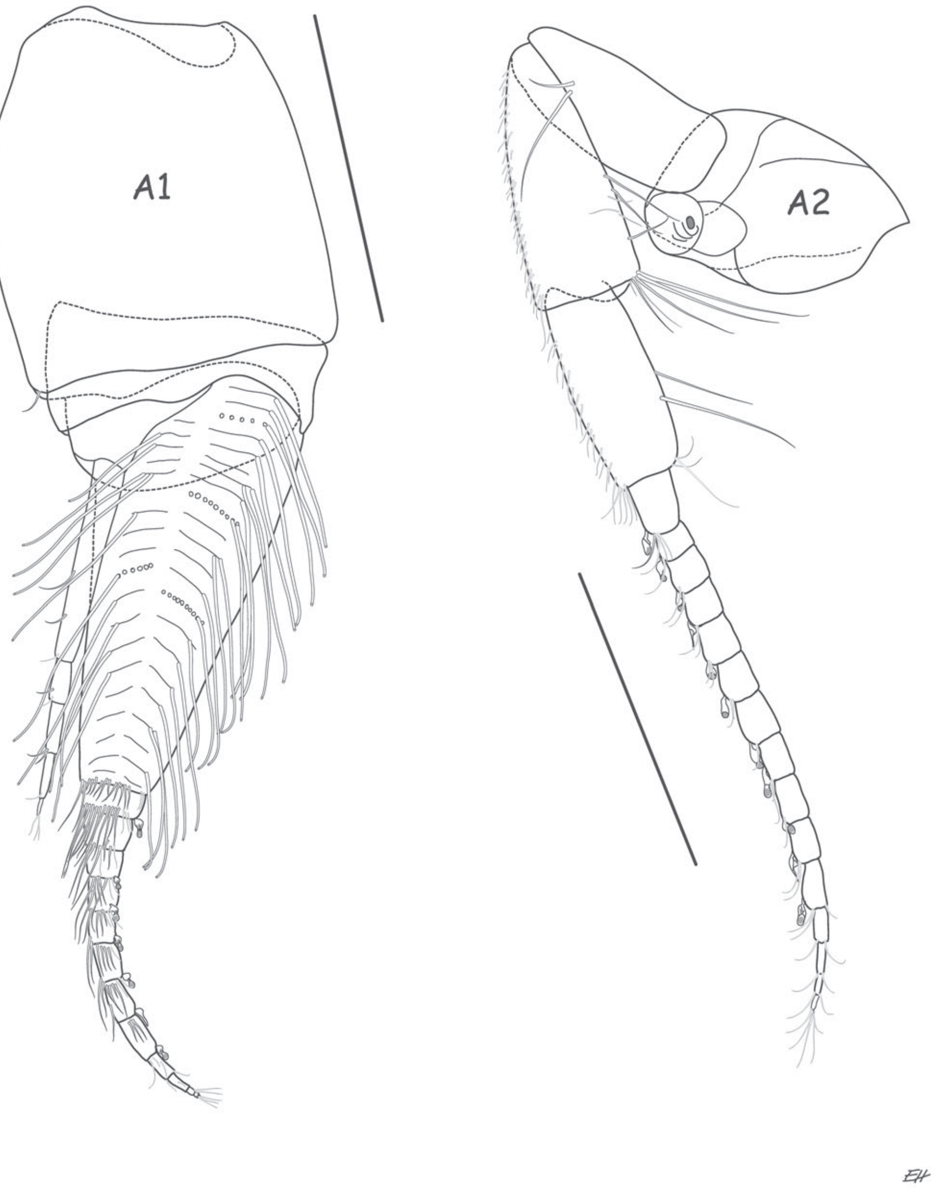

Fig. 5. *Abyssorchomene abyssorum* (Stebbing, 1888), holotype, ♂, 7.5 mm (BMNH 1889.5.15.23). Most aesthetascs omitted from A1 callynophore. Scale bars = 0.5 mm.

Head (Fig. 2). About equal in length to pereonite 1.

Lateral cephalic lobe (Fig. 2). Broadly rounded; dorsal margin regularly convex and slightly more convex than the nearly straight ventral margin.

Eye (Fig. 2). Nearly indistinguishable, but non ommatidial, formed of pigment granules; crescent-shaped, narrow, parallel to head anterior margin (estimated in figure by dotted outline).

Antenna 1 (Fig. 2). Peduncular article 1 without anterodistal lobe, slightly dilated, length about 1.4 × width; flagellum 10-articulate, first article of flagellum callynophorate, densely furnished with double row of aesthetascs medially, callynophore small, shorter (67%) than the remaining articles combined; accessory flagellum 5-articulate, first article slightly shorter (80%) than remaining articles combined; calceoli absent.

Antenna 2 (Fig. 2). Slightly longer than antenna 1; geniculate between peduncular articles 3–4, peduncular articles 4–5 lined with anteromedial brush setae; flagellum 12-articulate, calceoli absent.

Epistome (Fig 2). Level with the upper lip, from which it is separated by a small slit and weak shallow indentation; weakly concave above upper lip.

Upper lip (Fig. 2). Anterior margin convex, not protruding; midventral margin with a small, angular projection.

Mandible. Incisor distinctly convex and slightly widened, dorsolateral and ventromedial corners with small tooth; left lacinia mobilis slender, curved, distally with small teeth, right lacking; accessory spine row with 3 strong spines, interspersed with fine setae; molar somewhat falciform, not columnar, forming a narrow crest, acutely produced on proximal end, setose with small triturative surface, hairy process (cf. Oleröd 1975) located proximal to molar; palp attached proximal to molar; article 2 with 15A2 setae, article 3 missing (refer to Fig. 6 of male holotype for general morphology and setae details).

Lower lip. Outer lobes broad, inner margins strongly setose, distal inner margins excavated; without inner lobes; mandibular processes rounded.

Maxilla 1 (Fig. 2). Outer plate with 11 spine-teeth in 7⁄4 crown arrangement; palp article 2 widened, with 9 contiguous (or nearly contiguous, separated by much less than the width of a spine) distal conical spines and one apical strong seta on outer corner; inner plate short with subrounded apical projection, and two unequally sized plumose setae inserted subapically (refer to Fig. 7 of male holotype for general morphology).

Maxilla 2. Outer and inner plates strongly tapering distally, both lined with strong rows of pectinate medial marginal spines and setae; inner plate much shorter and slightly narrower than outer plate, apex just reaching the proximal end of medial setal row of outer plate (refer to Fig. 7 of male holotype for general morphology).

Maxilliped (Fig. 2). Inner plate short, reaching about one third length of outer plate and reaching half length of palp article 1; outer corner of inner plate reaching about the level of the basal insertion of palp article 2; inner plate, distal margin conspicuously excavate, with slight mediodistal extension protruding slightly higher than the outer corner, with 3 weakly protruding nodular spines, unequally spaced, the two inner nodular spines closer to each other, the third nodular spine at the bottom of the excavation; outer plate well developed, subovate, length 1.8 × width, distal margin of outer plate reaching slightly below the distal margin of palp article 2, with two dissimilar apical spines and numerous (~ 12) strongly

Fig. 6. *Abyssorchomene abyssorum* (Stebbing, 1888), holotype, ♂, 7.5 mm (BMNH 1889.5.15.23). Scale bar = 0.1 mm.

embedded, medial nodular spines, medial margin nearly smooth; palp strongly setose medially, article 4 well developed, about 60% of the length of article 3, with few apical fine setae on inner margin (refer to Fig. 7 of male holotype for general morphology).

Gnathopod 1 (Fig. 3). Coxa moderately widened, distal width 1.3 × proximal width and about 72% of length; anterior margin weakly concave; posterior margin very slightly concave, nearly straight; distal margin slightly convex in posterior half, more strongly convex in anterior half; basis stout, as wide as propodus, anterior margin with 7 very short setae; ischium subequal to merus; carpus short, less than half the length of propodus, posterodistal lobe not guarding propodus; propodus subchelate, subrectangular, very weakly tapering, length 1.57 × width, posterior margin slightly concave with distinct inflexion point at about distal two-thirds; palm slightly convex, with irregular microserrations, palm corner with 2 blunt protrusions and defined by 1 medial and 1 lateral spine; dactylus barely overriding palm corner.

Gnathopod 2 (Fig. 3). Coxa subrectangular, length 2.36 × width, anterior margin nearly straight, posterior margin slightly concave, distal margin straight; ischium shorter than carpus; carpus length 1.8 × propodus; propodus chelate, surface finely setose with distal groups of long pectinate setae, slender, length 2.45 ×width, much narrower (0.6 ×) than carpus, ventral margin very slightly concave, nearly straight; dactylus very small, inserted on the posterodistal one-third of distal margin, with distal micro-ornamentation, palm not excavate.

Pereopod 3. Coxa subrectangular, with anterior margin nearly straight, posterior margin slightly concave, length 2.4 × width; rest of pereopod as in pereopod 4.

Pereopod 4 (Fig. 4). Coxa length 1.38 × width, posterior margin strongly excavate, with strong, sub-triangular posterodistal lobe, angle subquadrate and apex rounded, posterior corner located at distal 66% of the length; posterior margins of ischium-merus-carpus with clusters of long setae; propodus with 6 short spine groups; dactylus 0.44 × length of propodus.

Pereopod 5 (Fig. 4). Coxa slightly wider (1.15 ×) than long, very slightly posterolobate, posterodistal lobe narrow, not regularly convex, with posterodistal margin nearly straight; basis shorter than coxa, length 0.84 × coxa, length 1.12 × width, posterodistal lobe broadly rounded, slightly surpassing the distal margin of ischium; merus slightly expanded, width 0.7 × length, bearing anterior and posterior setae; rest of pereopod missing.

Pereopod 6. Basis weakly narrowing distally, with posterior margin slightly serrate and regularly convex, anterior margin nearly straight on 80% of its length, length 0.70 × the combined length of the remaining articles, posterodistal lobe not reaching distal margin of ischium; merus slightly expanded (narrower than in P5) and bearing few anterior and posterior setae; propodus slightly shorter than merus-carpus, with 6 clusters of short spines; dactylus about 0.3 × length of propodus.

Pereopod 7 (Fig. 4). Coxa small, subovate; basis with anterior margin slightly concave, posterior margin subparallel to anterior margin in the proximal two-thirds, distal third with a distinct, nearly straight bevel; posterior margin with 10–11 weak serrations; posterodistal lobe not extending to distal margin of ischium; merus not expanded (narrower than P6), anterior margins of merus-carpus with short spine groups, posterior margin bearing few short slender spines; propodus slightly shorter than merus-carpus; dactylus 0.35 × length of propodus.

Uropod 1. Peduncle relatively long, about 1.5 × length of outer ramus and 1.7 × length of inner ramus, dorsolateral and dorsomedial margins spinose (with 14 dorsomedial spines); inner ramus slightly shorter than outer, margins of rami poorly spinose, with slender spines, medial margin of outer ramus lacking spines (refer to Fig. 9 of male holotype for general morphology).

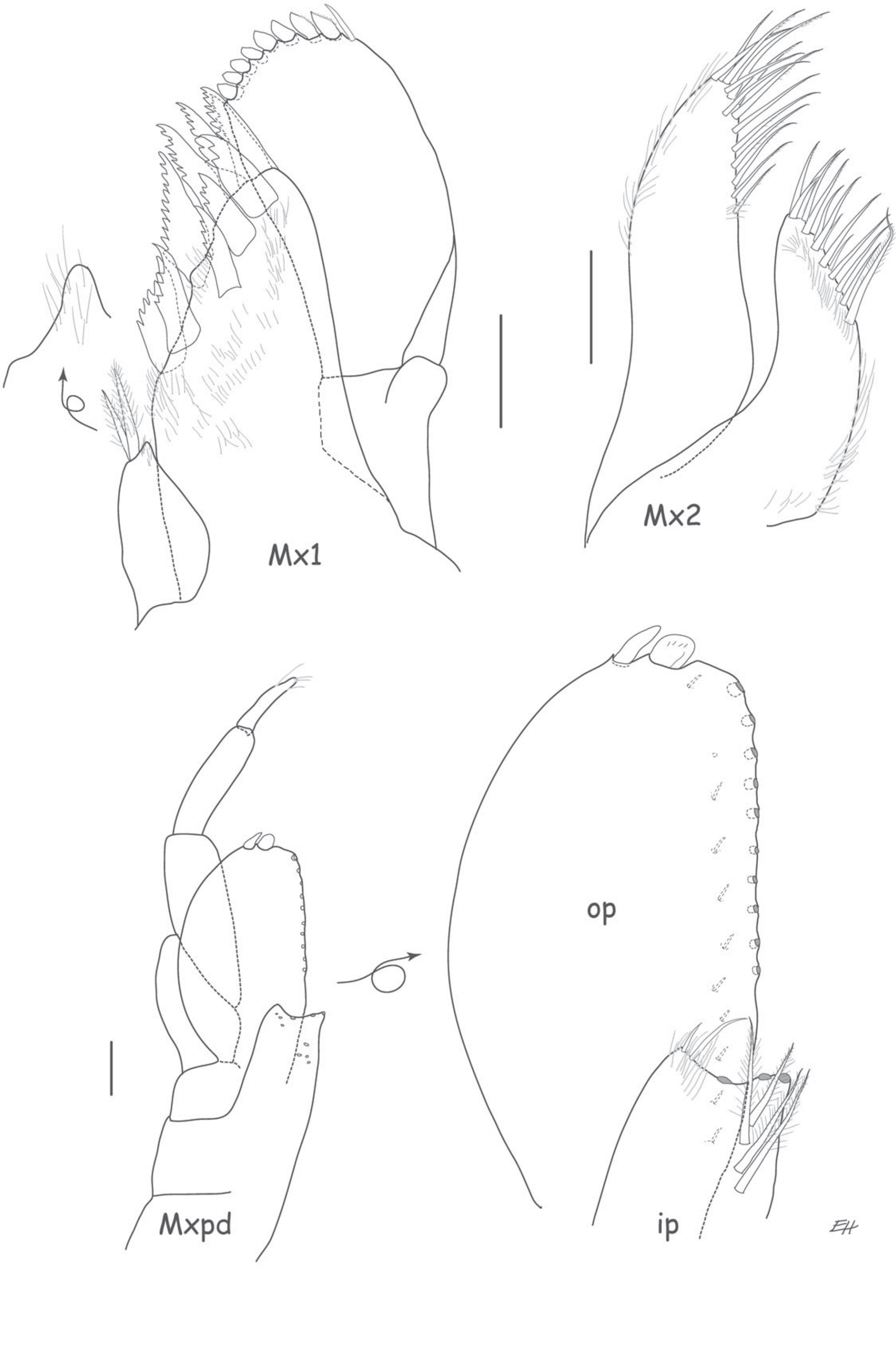

Fig. 7. *Abyssorchomene abyssorum* (Stebbing, 1888), holotype, ♂, 7.5 mm (BMNH 1889.5.15.23). Setae omitted on Mxpd. Scale bars = 0.1 mm.

Uropod 2 (Fig. 2). Peduncle 1.27 × length of outer ramus, with 5 closely spaced spines on distal outer margin, inner margin with 3; inner ramus shorter than outer ramus; outer ramus with 6 equally spaced thin sharp spines on dorsolateral margin; inner ramus margins with small slender spines.

Uropod 3 (Fig. 2). Peduncle 0.79 × length of biarticulate outer ramus; second article of outer ramus long, about 0.5 × length of article 1; inner ramus extends past distal end of article 1 and reaches ~ 70% of article 2 of outer ramus; inner margins of rami with long plumose setae and few spines.

Telson (Fig. 4). 1.6 × longer than wide, cleft (52.5%), lobes tapering distally with 4–5 lateral, submarginal spines and 1 distal spine.

Gills 5–6. With 1 long tubular accessory lobe on gill 5 and 2 on gill 6, inserted basally.

Gill 7 (Fig. 4). Present, well developed.

Brood plates (Figs 3–4). On gnathopod 2 and pereopods 3–5, long, slender and curved distally, largest on gnathopod 2 and pereopods 3–4, with long brood setae, 16 setae on gnathopod 2 plate and 15 on pereopod 4.

Stomodeum. Extending to the 7th pereonite.

Male

Based mostly on 7.5 mm holotype, Figs 5–9 (BMNH 1889.5.15.23) and 7 mm male (ZMH K-61207) specimens (Fig. 2 for head and body characteristics).

Similar to female, but differing as follows:

Body. Smaller than female and slightly less robust.

Lateral head lobe (Fig. 2). Slightly narrower.

Antenna 1 (Figs 2, 5). Peduncular article 1 stouter, more compact; callynophore stronger, about as long or slightly longer than the remaining flagellar articles, flagellum 12–13-articulate, articles shorter, slightly setose, with calceoli.

Antenna 2 (Figs 2, 5). Slightly longer (1.25 ×) than antenna 1; flagellum 13–16-articulate, with calceoli.

Coxa 1 (Figs 2, 8). Weakly widened distally, less than in female, distal width 1.25 × proximal width and 60% length, anterior margin and posterior margins very slightly concave at midpoint.

Coxa 2–4 (Fig. 9). Distinctly narrower than in female, coxa 4 length 1.5 × width.

Mandible (Fig. 6). Incisor distinctly convex and slightly widened, dorsolateral and ventromedial corners with small tooth; left lacinia mobilis curved, with 2 strong and 1 weak apical teeth, right lacking; accessory spine row with 3 strong spines, interspersed with fine setae; molar forming a narrow crest, somewhat falciform, acutely produced on proximal end, setose with small triturative surface; hairy process (cf. Oleröd 1975) located proximal to molar; palp attached proximal to molar; article 2 1.58 × length of article 3, with 20 A2 setae, article 3 straight, slightly falciform, with 1 A3 seta, a long rank of 20 D3-pectinate marginal setae and 2 E3 seta.

Lower lip. Outer lobes broad, inner margins strongly setose, distal inner margins excavated; without inner lobes; mandibular processes rounded.

Fig. 8. *Abyssorchomene abyssorum* (Stebbing, 1888), holotype, ♂, 7.5 mm (BMNH 1889.5.15.23). Setae omitted on merus-propodus outline of Gn2. Scale bars = 1 mm

Maxilla 1 (Fig. 7). Outer plate with 11 spine-teeth in 7⁄4 crown arrangement; palp article 2 very weakly widened, with 8 distal conical spines and one apical strong seta on outer corner; inner plate with short subacute apical projection, and two unequally sized plumose setae inserted subapically.

Maxilla 2 (Fig. 7). Outer and inner plates strongly tapering distally, both with strong rows of pectinate medial marginal spines and setae; inner plate much shorter and narrower than outer plate (narrower than female), apex just reaching the proximal end of medial setal row of outer plate.

Maxilliped (Fig. 7). Inner plate short, reaching about 0.3 × length of outer plate and reaching half length of palp article 1; outer corner of inner plate reaching about the level of the basal insertion of palp article 2; inner plate, distal margin conspicuously excavate, slight mediodistal extension about equal to outer corner (lower than female), with 3 weakly protruding nodular spines, unequally spaced, the two inner nodular spines closer to each other, the third nodular spine at the bottom of the excavation; outer plate well developed, subovate, length 1.8 × width, distal margin of outer plate slightly shorter than distal margin of palp article 2, with two dissimilar apical spines and numerous (9–10) strongly embedded, medial nodular spines, medial margin nearly smooth; palp strongly setose medially, article 4 well developed, about 60% of the length of article 3, with 3 apical setae on inner margin (note: medial marginal setae omitted on palp of Mxpd).

Gnathopod 1 (Fig. 8). Basis narrower than propodus width, anterior margin with only 1 short seta; propodus of similar proportions to female, length 1.55 × width, but posterior margin slightly less concave.

Gnathopod 2 (Fig. 8). Propodus of similar shape and proportions to female, length ~ 2.3 × width.

Pereopod 5 (Fig. 9). Coxa slightly more posterolobate; basis slightly longer, length 1.17 × width.

Pereopod 7 (Fig. 9). Basis, posteroventral bevel not as distinct or as straight.

Uropod 1 (Fig. 9). Peduncle long, about 1.7 × length of outer ramus and 1.9 × length of inner ramus, dorsolateral and dorsomedial margins spinose; inner ramus shorter than outer, margins of rami poorly spinose, with slender spines, medial margin of outer ramus lacking spines.

Uropod 2 (Figs 2, 9). Distolateral marginal spines of peduncle grouped closely together at distal end of peduncle; inner ramus distinctly shorter than outer; outer ramus distolateral spines stouter, more numerous, bluntly rounded and more closely spaced distally, proximal spine acute (see comments, p. 24).

Uropod 3 (Fig. 9). Second article of outer ramus shorter than female, about 0.34 × length of article 1.

Urosomite 1 (Fig. 2). Dorsal concavity broader, boss slightly narrower, posterior margin less convex.

Telson (Fig. 9). Cleft deeper (56%) than female.

Distribution

Southwest Atlantic: Argentine Abyssal Basin (Stebbing 1888; this paper), Northeast Atlantic abyssal plains (Chevreux 1903). Pacific deep-sea (Dahl 1959; Birstein & Vinogradov 1960; Barnard & Ingram 1990; Lowry & Stoddart 1994; Lacey *et al.* 2016) and Indian Ocean occurrences (Birstein & Vinogradov 1964; Witte 1999; Janssen *et al.* 2000) remain to be confirmed. No co-occurrence with *A. patriciae* sp. nov. was documented so far.

Depth range

Bottom records: 3475 m (Stebbing 1888) to 4586 m (this paper).

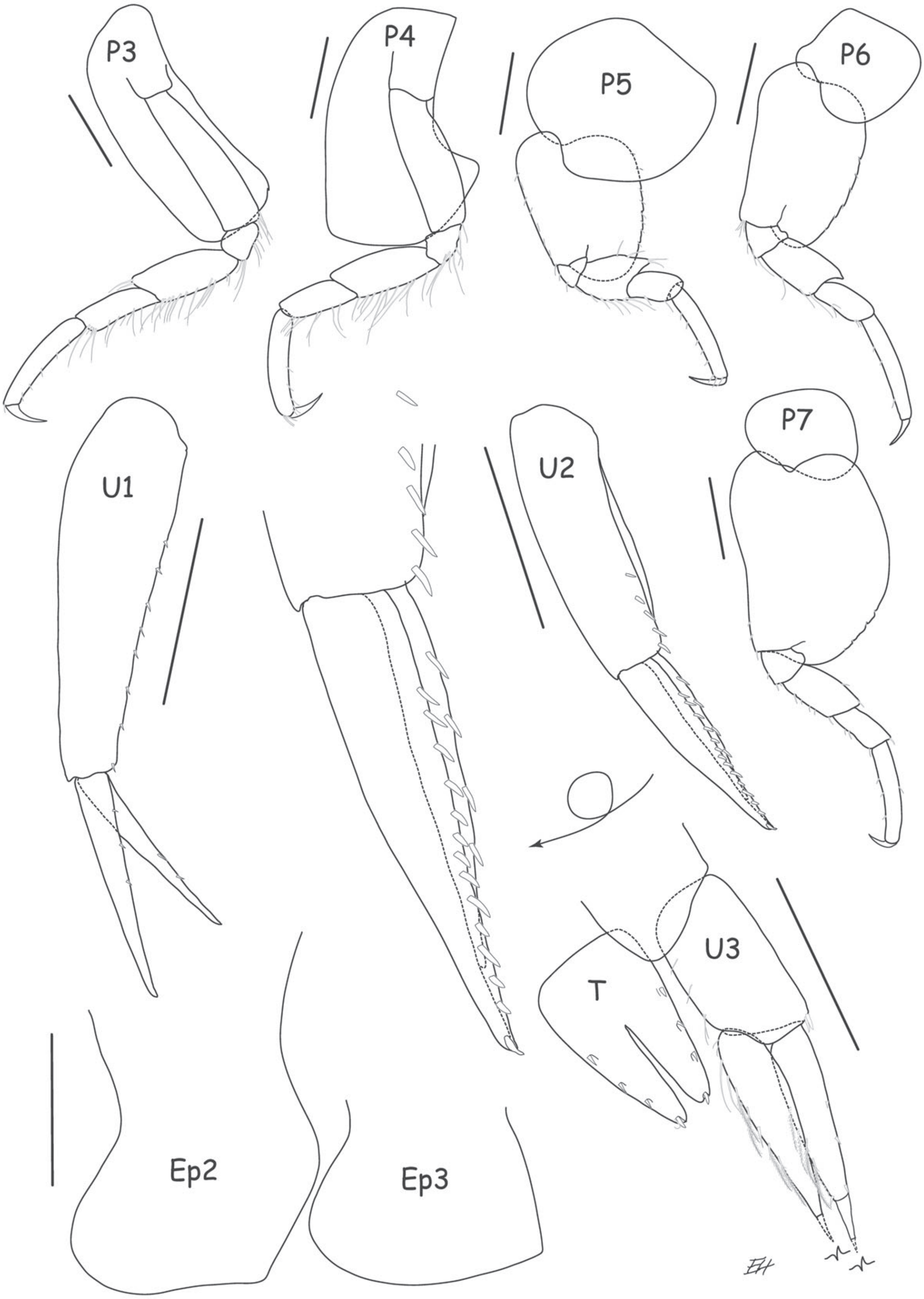

Fig. 9. *Abyssorchomene abyssorum* (Stebbing, 1888), holotype, ♂, 7.5 mm (BMNH 1889.5.15.23). Gills missing from P3–7. Outer ramus is oriented on the left side of the uropods. Scale bars = 0.5 mm.

Midwater records: 2178 m from the surface (Chevreux 1903). Along with *A. scotianensis* and *A. shannonae* sp. nov. (see below), *A. abyssorum* is one of many scavenging amphipods recorded so far by midwater trawls at some distance from the bottom. Other documented cases include *A. chevreuxi* (Stebbing, 1906); *A. ?distinctus* (Birstein & Vinogradov, 1960); *Cyclocaris* sp.; *Eurythenes* sp.; *Paralicella caperesca* Shulenberger & Barnard, 1976; *P. tenuipes* Chevreux, 1908; *Scopelocheirus* sp. and *Valettieta gracilis* Lincoln & Thurston, 1983: see Thurston 1990. As well as: *Pseudorchomene coatsi* (Chilton, 1912); *A. plebs* (Hurley, 1965); *A. rossi* (Walker, 1903) and *Orchomenella cavimanus* (Stebbing, 1888): see De Broyer *et al.* 2007.

Remarks

Orchomene abyssorum was described by Stebbing (1888), from a single male specimen (about 7.5 mm long) collected by the *HMS Challenger* in the Argentine Basin at a depth of 3475 m. As shown by the extensive citation list, *Abyssorchomene abyssorum* has been widely reported and is generally considered as having a wide-ranging, even cosmopolitan distribution (Barnard & Ingram 1990; Thurston 1990, 2001; Barnard & Karaman 1991; Duffy *et al.* 2013), but this concept is being challenged and will change with our study. There are still many questions regarding species identity of single specimens which await confirmation by critical study of the material.

We examined and refigured the male holotype specimen (appendages and mouthparts; the carcass is apparently lost). As a result, we have noticed some obvious discrepancies between our observations and drawings, and the original illustrations of Stebbing. Some of these are as follows (Stebbing's differences are outlined in parentheses): antenna 1 peduncular article 1 dorsal margin is less convex and the ventral margin is less concave (vs dorsal margin strongly convex, ventral margin strongly concave); mandible palp article 3 is straighter (vs strongly curved and more falciform); maxilla 1 palp is shorter, less curved with the distal margin straighter (vs palp longer, more strongly curved with distal margin strongly convex); maxilla 2 outer plate broader (1.35 ×), (vs very narrowed, much less than width of inner plate); maxilliped outer plate shorter, with inner margin nearly straight (vs outer plate longer, with inner margin concave and strongly serrated); gnathopod 1 propodus is broader (length 1.5 × width) with a short carpal lobe (vs longer, length 2 × width and more curved, with a longer carpal lobe, strongly guarding the hind margin); gnathopod 2 propodus has a very slight concave ventral margin, with a small dactylus and the posterodistal margin is slightly convex (vs strongly concave ventral margin, with a larger dactylus and the posterodistal margin is strongly sloped, level with the dactylus); epimeron 3 is narrowly rounded at the posteroventral corner (vs more broadly rounded at the posteroventral corner) and the dorsal boss of urosomite 1 is narrowly rounded and more upright (vs broadly rounded and lower). There are other minor differences which we have not included here. Reasons for these discrepancies are most likely numerous but possibly related to microscopy drawing technique and available equipment, attention to various details and whether these were completed freehand in some cases.

A special dimorphic character has been found in the male uropod 2 outer ramus distolateral spines. They are in a comb-like arrangement and are much stouter and bluntly rounded, more numerous and more closely spaced distally, with the proximal spine(s) being acute. This morphology and arrangement of ramal spines are not found in females, which are always acute, slender and more evenly spaced. The function of this peculiar spine morphology and arrangement in males are unknown, but possibly related to mating. All male specimens of *Abyssorchomene* discussed present this uropod 2 outer ramus spine character and it has not been reported or elaborated in the literature as far as we know (see Figs 2, 9, 17, 25, 33).

Part of the material identified by Chevreux (1903) from the *Hirondelle* campaign 1896 (station 730 near the Azores, depth 2660 m) was also examined. It consisted of nine female specimens including fully mature ones. These specimens present all the diagnostic characters of *Abyssorchomene abyssorum* as redescribed here (in particular, the weak dorsal corrugations – sometimes difficult to distinguish – and the narrow female gnathopod 2 propod without an excavate palm), confirming Chevreux's identification. The rest of Chevreux's material (1935) collected from some other North Atlantic abyssal regions has not been seen and remains to be carefully checked.

Walker (1903) recorded three specimens of which one is registered in the Natural History Museum (London) collections: BMNH 1905.9.7.23: one specimen, 6 mm, non-gravid, without visible oostegites, male (?), with gnathopod 2 propod length more than twice the width and palm straight, without a proximal concavity (Lauren Hughes, pers. com.), which does not allow to differentiate it from the male of *A. patriciae* sp. nov. In his paper, Walker did specifically thank Stebbing for verification of his *Orchomene abyssorum* identification, but we consider this identification as uncertain.

We also checked the single specimen identified by Stephensen (1925) from the Ingolf 1895–96, station 91, North Atlantic, west of Iceland, 64°44′ N, 31°00′ W, depth 2317 m, bottom 3.1°C, held in the Zoological Museum, University of Copenhagen (ZMUC). The specimen is fragmentary and in poor condition, with the head missing. We recognise it as a male. The slender gnathopod 2 propodus was used by Stephensen to attribute the specimen to *Orchomenopsis abyssorum*, but this male character is shared by all species of the *A. abyssorum* complex. So, due to the poor and incomplete condition of this specimen, the definitive identification remains unclear.

Dahl (1959) discussed a 12 mm female specimen from the *Galathea* station 649, southwest Pacific, Kermadec Trench, 35°16′ S, 178°40′ W, depth 8210–8300 m, grey clay with pumice, 14 February 1952, also held in the ZMUC collections, but unfortunately provided no figures. We examined his material and found that it differs from *A. abyssorum* by the more strongly expanded coxa 1, the proportionally shorter propodus of gnathopod 1, the wider, subovate propodus of gnathopod 2 and the strongly convex distal margin of maxilla 1 palp. As well, this material comes from much greater depths than *A. abyssorum*. We conclude that it is possibly a new species of *Abyssorchomene*.

From the figures and comments provided by Birstein & Vinogradov (1960), including the first detailed reference to a female (from the Kermadec Trench), we are of the opinion that their specimens differ in many characters from *A. abyssorum* as redescribed here. We have not seen this material. The figures show that these specimens differ in the following ways: in the more elongate carpal lobe of gnathopod 1 slightly but distinctly guarding the propodus, the proportionally smaller and narrower male gnathopod 1 propodus, the more elongate carpus of gnathopod 2, the distinctly curved propodus of gnathopod 2, the slightly spaced terminal spines on the maxilla 1 palp, the slightly different shape of the pereopod 7 basis with the hind margin parallel to the anterior margin on two-thirds of its length, the shorter inner ramus of uropod 3 and the sinuous inner margins of the telson lobes. Contrary to Barnard & Ingram (1990), we doubt that these morphological differences in the Kermadec Trench specimens can be considered as intraspecific variations of *A. abyssorum.* Until these specimens are examined in detail, the species attribution remains unknown.

Birstein & Vinogradov (1964) collected, in the Central Indian Ocean, a male (8 mm) that we cannot attribute with certainty to *A. abyssorum*, as there were no illustrations of the specimen and we were not able to examine the material to confirm its identity.

Barnard & Ingram (1990) redescribed in detail *A. abyssorum* based on new material (a single small male, 6.41 mm, Scripps Institution of Oceanography (SIO), station 882, Galapagos Vents area, 00°47.9′ N, 86°09.2′ W, depth 2491 m). They considered Chevreux's (1900, 1903, 1935) North Atlantic material, as well as Birstein & Vinogradov's (1960) records as the only firm identifications of *A. abyssorum*. The small male described and finely illustrated shows the gnathopod 1 carpal lobe slightly more elongate and guarding the propodus to a greater degree than on the type and DIVA-3 specimens. The pereopod

5 basis has a slightly different relative length: it is shorter than the coxa instead of longer in the type specimen and the DIVA-3 males. This shape is closer to that of the DIVA-3 female described here and may be due to the immature state of the specimen. The epimeron 3 shows a slightly sinuous posterior margin which is very slightly and regularly convex, but nearly straight in the type, DIVA-3 and Chevreux's material. Like Stebbing (1888), Barnard & Ingram (1990) did not mention the presence of the weak dorsal corrugations, clearly distinct on our DIVA-3 material and slightly less so in Stebbing's figure of pleonites 1–2, but not on the pereonites on his in-toto illustration. Other minor differences between the male described by Barnard & Ingram (1990) and the type and DIVA-3 male specimens include: the shorter extension of the poorly distinct eye, i.e., 44% of the head height instead of 75% (a character however unclear and somewhat unreliable in long preserved specimens); the much narrower lateral head lobe; the coxa 4, with a very different shape and smaller posteroventral lobe; the coxa 5 width subequal to its height (instead of slightly wider than high); the much shorter inner ramus of uropod 3; the maxilla 2 with tip of inner plate not reaching the basal end of outer plate setal row and the nodulous apical spines of the maxilliped inner plate located differently. Given all these differing characters, it is unlikely to belong to *A. abyssorum* and at this time the specific attribution of this single male specimen remains unresolved.

Thurston (1990) collected *A. abyssorum* in four North Atlantic abyssal plains by bottom traps or midwater trawls but didn't make any morphological comment. It is important to note that not all the specimens in this paper were seen by Thurston (Tammy Horton, pers. com.). However, T. Horton (pers. com.) checked the sample from the Porcupine Abyssal Plain (see Table 1) and concluded it belongs to *A. patriciae* sp. nov. This likely applies to all the samples examined by Thurston 1990.

Concerning the Southern Ocean material attributed to *A. abyssorum* (Schellenberg 1926; Barnard 1932; Nicholls 1938; Dahl 1954), Dahl (1959) expressed his doubts about its conspecifity with *A. abyssorum* (Stebbing 1888). Andres (1983) definitively distinguished the Antarctic continental shelf specimens from the abyssal and hadal ones in describing *A. scotianensis.* He considered the juvenile specimens of Schellenberg (1926) as belonging to his new species but couldn't confirm the affiliation of the specimens of Barnard (1932), Nicholls (1938) and Dahl (1954), as the length-width relationship of coxa 1 and of the basis-propodus of gnathopod 1 were not described.

All *A. abyssorum* identifications should be carefully checked by considering the new species described here. In Table 1, we tentatively attribute the various records to the most likely correct species determined by our study.

Abyssorchomene abyssorum shares with the two new species, *A. patriciae* sp. nov. and *A. shannonae* sp. nov. dorsodistal corrugations on the pereonites 1–7 and pleonites 1–2*,* a character unique among all the species of the genus *Abyssorchomene* (sensu Lowry & Kilgallen 2014; Horton *et al.* 2021). This character separates this complex from the remaining *Abyssorchomene* species. All three species are very close morphologically and males are very difficult to separate.

In *A. abyssorum*, the gnathopod 2 propod, similar in both sexes, is very slender (length 2.3–2.5 × width) and the palm presents a very narrow gap and lacks a concavity. In contrast, the females of *A. patriciae* sp. nov. and *A. shannonae* sp. nov. have a broadened, suboval propod (length 1.5–1.7 × width) with a very distinct concavity on the palm. Coxa 1 is slightly (females) to weakly (males) widened distally. It is slightly more widened in both the new species, *A. patriciae* and *A. shannonae* (especially in females). Coxa 5 is very weakly posterolobate in *A. abyssorum* but distinctly more in *A. patriciae* and *A. shannonae*. The distal bevel of the posterior margin of the pereopod 7 basis is straighter in *A. patriciae* and *A. shannonae*, and in the former species, the basis is more subrectangular, with the front margin straight. The uropod 3 inner ramus extends to about 70% of the length of the outer ramus article

2; in *A. shannonae*, it is much shorter, reaching about 20–25% of the length of the outer ramus article 2 and in *A. patriciae*, the inner ramus reaches to about 63% of the length of article 2. Other differences are provided in the key to the species (see p. 68).

Abyssorchomene patriciae sp. nov.
urn:lsid:zoobank.org:act:267EAAEE-5F5C-4DAA-93F9-014B36F6B0AB
Figs 10–17

non *Abyssorchomene abyssorum* – Thurston 1990: 262–263, 269 (= *A. patriciae* in part; part =*A.* cf. *patriciae*; T. Horton, pers. com.). — ?Jones *et al.* 1998: 1124–1125. — Gutteridge 2012: 5, 22, 24 (= *A. patriciae*; T. Horton, pers. com.). — Corrigan *et al.* 2013: 156, 158–161 (= *A.* cf. *patriciae*). — Duffy *et al.* 2013: 360–368 (= *A. patriciae*; T. Horton, pers. com.). — Horton *et al.* 2013: 352, 354–358 (= *A. patriciae*; T. Horton, pers. com.). — Priede *et al.* 2013: 8 (= *A.* cf. *patriciae*). — Horton *et al.* 2020: 6–7, 11 (= *A. patriciae*; T. Horton, pers. com.).

Diagnosis

Pereonites 1–7 and pleonites 1–2 with a slight but distinct dorsoposterior hump on each segment.

Lateral cephalic lobe broadly rounded, dorsal and ventral margins slightly dissimilar in shape, dorsal margin strongly convex, ventral margin nearly straight with a very slight concavity. Antennae 1–2 of male with calceoli, female without. Epistome level with and scarcely differentiated from upper lip. Maxilla 1 palp distal end weakly convex and with conical apical spines contiguous. Maxilliped inner plate, distal margin shallowly but distinctly concave, with a very weak mediodistal extension; outer plate inner margin very weakly scalloped. Coxa 1 distinctly widened, distal width 1.3 × proximal width or greater. Gnathopod 2 propodus of female broadened, subovate, length 1.7 × width (different in form to narrow male propodus), dactylus large, inserted at the top of distal margin and occupying most of the length (~ 85%) of the distal margin, forming a distinct, small gap on the palm. Coxa 5 posteroventral lobe narrowly rounded, posterior margin with distinct straight section. Pereopod 7 basis, posteroventral corner shallowly and weakly beveled. Uropod 1 peduncle relatively short, length less than 1.5 × length of outer ramus. Uropod 3 inner ramus extends to ~ 63% of article 2 of uropod 3 outer ramus. Telson cleft ~ 52% of length.

Etymology

The species name is dedicated to Patricia De Broyer, the daughter of the co-author.

Material examined

Holotype

NORTHEAST ATLANTIC • ♀ (mature, 10.5 mm, figured, appendages on 3 slides); Porcupine Abyssal Plain; *RRS James* Cook (2011), station JC 062-063; 49°05.3′ N, 16°40.0′ W; depth 4848 m; gear, baited traps, A-trap B2; 8 Aug. 2011; NHM UK 2022.6 (see Horton *et al.* 2020).

Allotype

NORTHEAST ATLANTIC • 1 ♂ (7.5 mm, figured, appendages on 3 slides); same collection data as for holotype; NHM UK 2022.7.

Paratypes

NORTHEAST ATLANTIC • 3 ♀♀ (7.0–10.8 mm), 2 ♂♂ (5.5–7.0 mm); same collection data as for holotype; NHM UK 2022.8 • 3 ♀♀, 2 ♂♂; same collection data as for holotype; CMNC 2022-0002 • 3 ♀♀, 3 ♂♂; same collection data as for holotype; RBINS INV. 138.487.

Additional material

NORTHEAST ATLANTIC • 10 specs (♀♀ & ♂♂); same collection data as for holotype; NHM UK 2022.9 • 20 specs (♀♀ & ♂♂); same collection data as for holotype; CMNC 2022-0003 • 20 specs (♀♀ & ♂♂); same collection data as for holotype; RBINS INV. 138.488.

NORTHWEST ATLANTIC • 2 ♀♀ (7.5–8.5 mm); Mid-Atlantic Ridge area, north of Charlie-Gibbs Fracture Zone; *RRS James* Cook (2009), station JC 037-060; 53°58.46′ N, 36°06.12′ W; depth 2340 m; gear baited traps; 27–30 Aug. 2009; CMNC 2022-0004 • 3 ♀♀; same collection data as for preceding; RBINS INV. 138.489.

Description

Holotype

Mature female, 10.5 mm, NHM UK 2022.6.

Pereonites 1–7 and pleonites 1–2 (Figs 10–11). With a slight but distinct dorsoposterior hump on each segment (note: Fig. 10 is of male, but female is similar).

Fig. 10. *Abyssorchomene patriciae* sp. nov., habitus, ♂, size unknown, *RRS James Cook* (2007), Northwest Atlantic, Mid-Atlantic Ridge, north of Charlie-Gibbs Fracture Zone, station JC 011-079, 53°56.44′ N, 36°11.56′ W, depth 2564 m, trap deployed 5 August 2007 (photo taken August 7, 2007 by David Shale, permission granted).

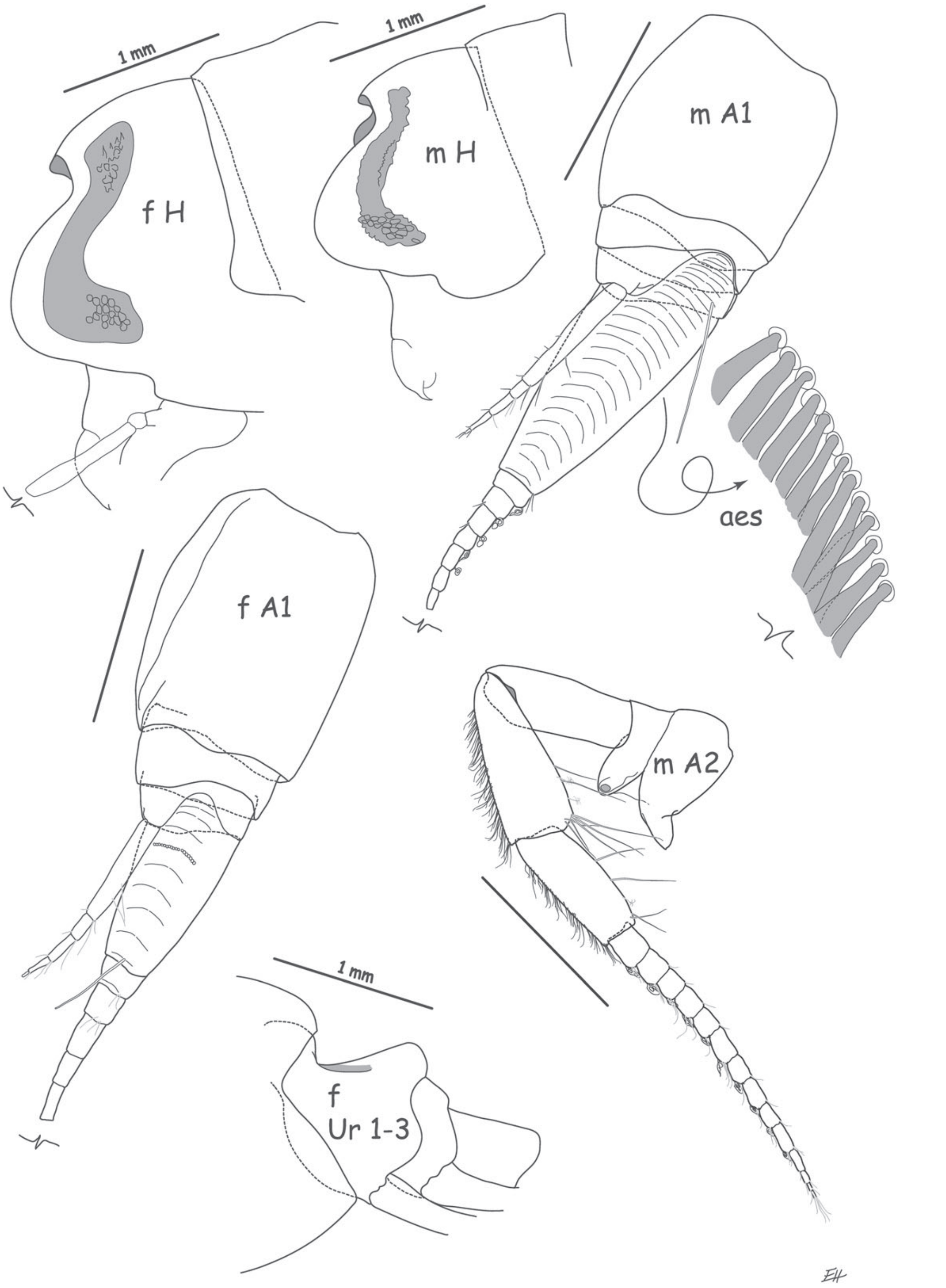

Fig. 11. *Abyssorchomene patriciae* sp. nov., holotype, ♀, 10.5 mm (NHM UK 2022.6); allotype, ♂, 7.5 mm (NHM UK 2022.7), *RRS James Cook* (2011), station JC 062-063, Northeast Atlantic, Porcupine Abyssal Plain, depth 4848 m, 8 August 2011. Aesthetascs omitted from A1 callynophore. End of flagellar articles missing on male and female A1. Scale bars = 0.5 mm unless indicated otherwise.

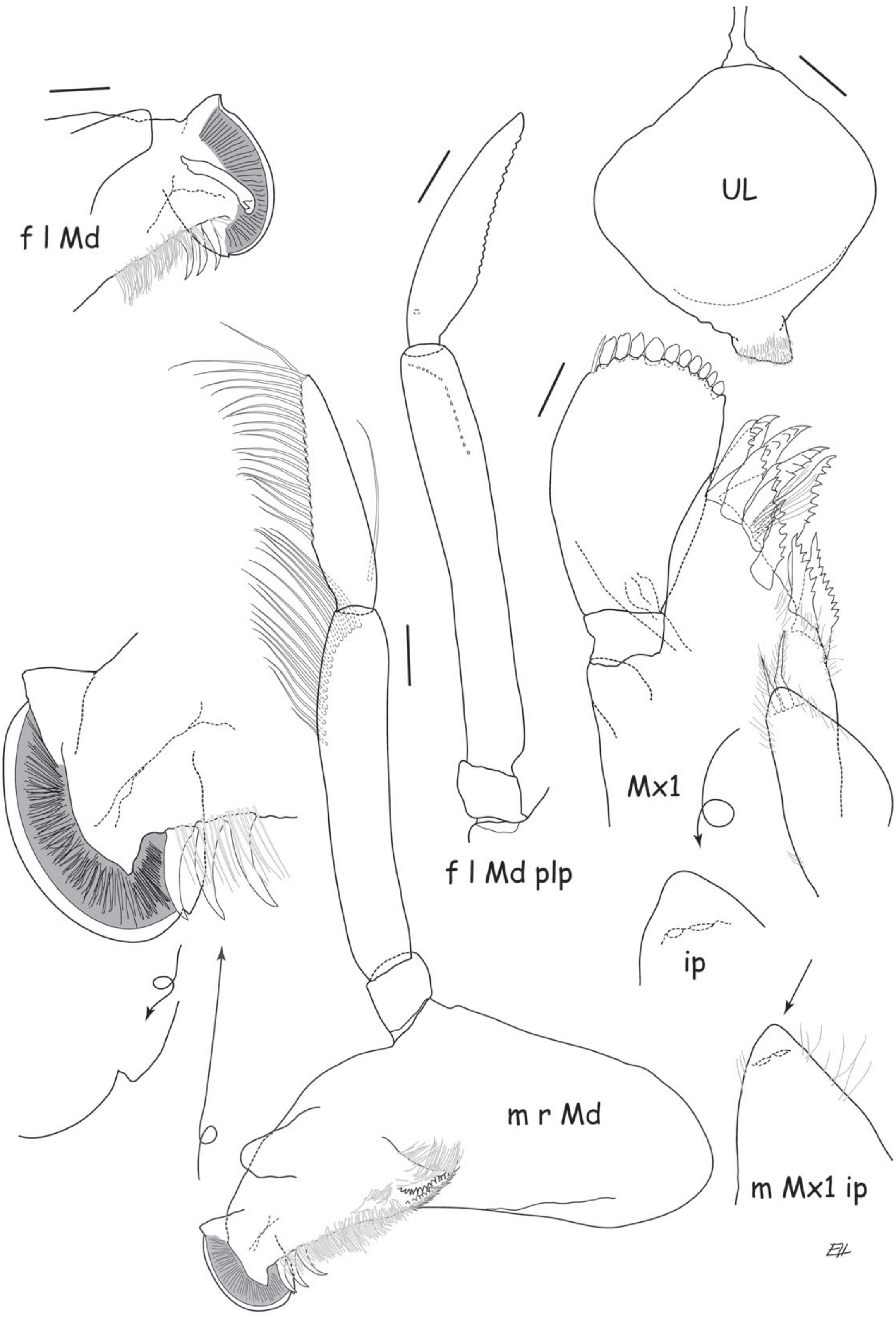

Fig. 12. *Abyssorchomene patriciae* sp. nov., holotype, ♀, 10.5 mm (NHM UK 2022.6); allotype, ♂, 7.5 mm (NHM UK 2022.7). Setae omitted on female left Md palp. Figures with sex not indicated are of female. Scale bars = 0.1 mm.

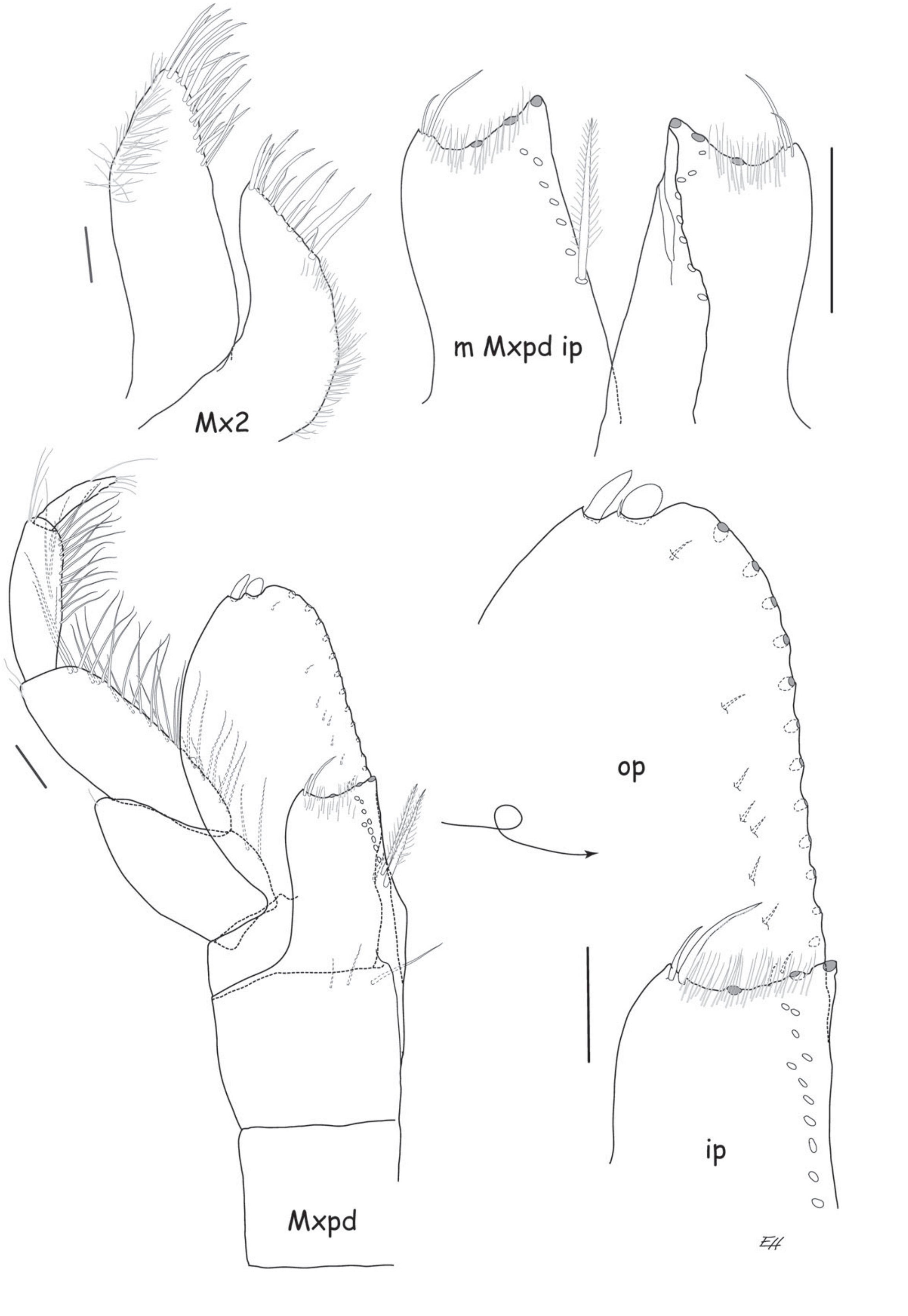

Fig. 13. *Abyssorchomene patriciae* sp. nov., holotype, ♀, 10.5 mm (NHM UK 2022.6); allotype, ♂, 7.5 mm (NHM UK 2022.7). Figures with sex not indicated are of female. Scale bars = 0.1 mm.

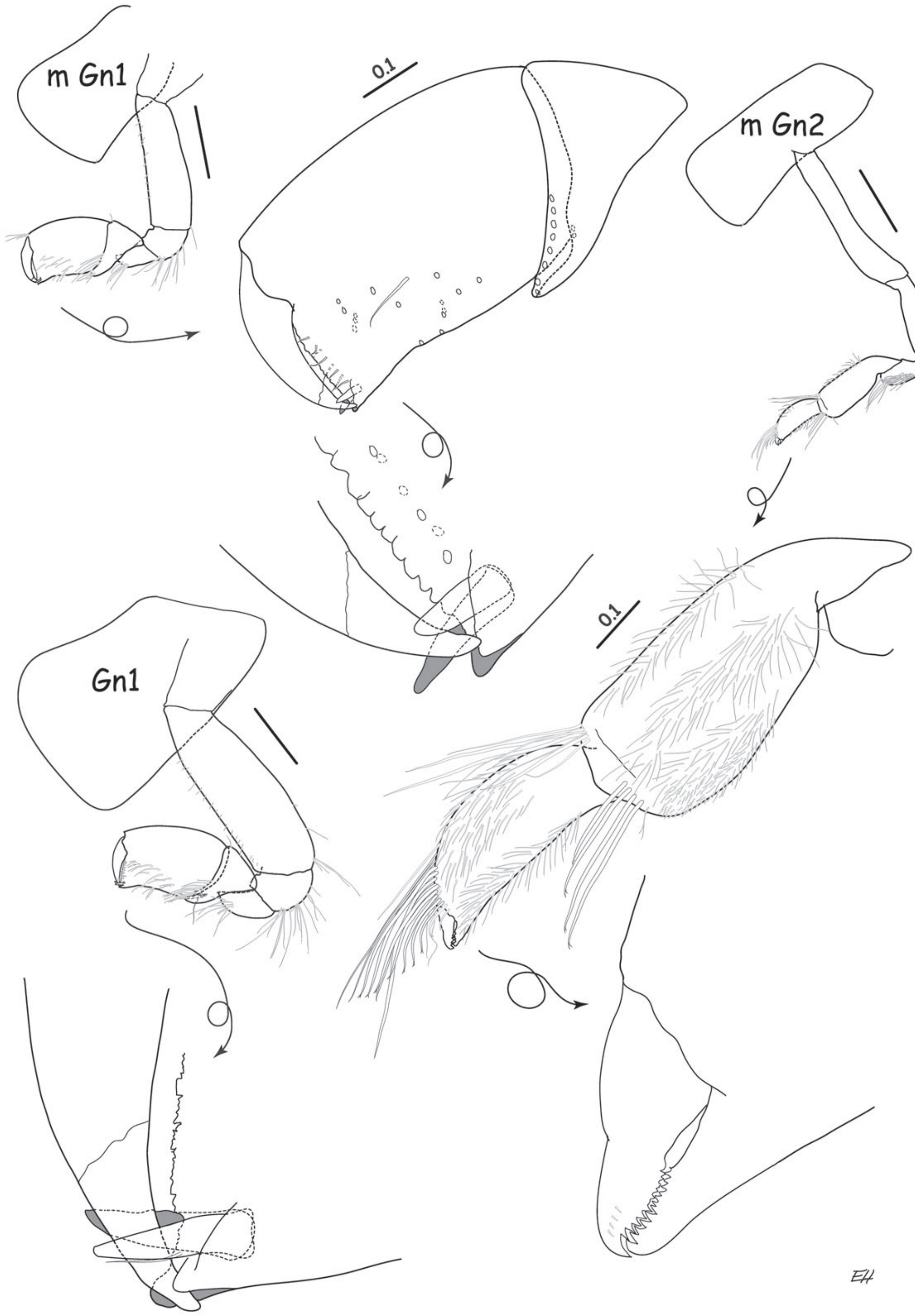

Fig. 14. *Abyssorchomene patriciae* sp. nov., holotype, ♀, 10.5 mm (NHM UK 2022.6); allotype, ♂, 7.5 mm (NHM UK 2022.7). Setae omitted on Gn1–2 details. Figures with sex not indicated are of female. Scale bars = 0.5 mm unless indicated otherwise.

Fig. 15. *Abyssorchomene patriciae* sp. nov., holotype, ♀, 10.5 mm (NHM UK 2022.6). Setae omitted on Gn2 propodus outline and dactylus detail. Scale bars = 0.1 mm unless indicated otherwise.

Pleonite 3 (Fig. 11). With a rounded, posterodorsal elevation slightly overhanging urosomite 1.

Coxae 1–2 (Fig. 10). Slightly shorter than corresponding pereonites (in lateral view) (note: Fig. 10 is of male, but female is similar).

Coxae 3–4 (Fig. 10). Slightly longer (~1.2 ×) than corresponding pereonites (note: Fig. 10 is of male, but female coxae are slightly deeper).

Epimeron 3 (Fig. 11). Subquadrate, with posterodistal angle very slightly obtuse, posterior margin weakly but regularly convex, ventral margin convex.

Urosomite 1 (Fig. 11). With a deep, narrow dorsal concavity in front of the strongly projecting, slightly unequally rounded, dorsal boss, slightly overhanging urosomite 2.

Head (Fig. 11). Slightly longer (1.13 ×) than pereonite 1.

Lateral cephalic lobe (Fig. 11). Broadly rounded, dorsal and ventral margin not similar in shape, dorsal margin strongly convex, ventral margin nearly straight with a slight concavity.

Eye (Fig. 11). Non ommatidial, formed of pigment granules; long, narrow, L-shaped, extending parallel to the front head margin, length about 63% of the head height (note: eye shape and size are best observed with fresh specimens, as over time in preservation the labile components of the eye pigments can be lost, causing the eyes to become extremely difficult to ascertain- see eye of freshly collected male, Fig. 10).

Antenna 1 (Fig. 11). Peduncular article 1 dilated (length 1.3 × width), without small dorsal keel projecting distally over article 2; flagellum broken after the sixth article (likely with 9–10 articles counted from 6 other females), length 1.5 × peduncle, first article of flagellum callynophorate, densely furnished medially with double row of aesthetascs; accessory flagellum 5-articulate, first article slightly broader and longer than remaining articles combined, calceoli absent.

Antenna 2. Slightly longer (less than 1.3 ×) than antenna 1; geniculate between peduncular articles 3–4, peduncular articles 4–5 lined with anteromedial brush setae; flagellum 12-articulate, calceoli absent.

Epistome (Fig. 11). Level with and scarcely differentiated from upper lip, forming long anterior cephalic ridge, weakly concave.

Upper lip (Fig. 12). Not protruding, with an asymmetrical midventral, angular projection.

Mandible (Fig. 12). Incisor strongly convex and widened; left lacinia mobilis curved, with 2 strong apical teeth, right lacking; accessory spine row with 3 strong spines, interspersed with fine setae; molar forming a narrow crest, somewhat falciform, acutely produced on proximal end, setose with mixed ornamentation, distal half or third setiferous, proximal half or two-thirds forming a reduced, ridged triturative surface, hairy process attached proximal to molar; palp attached proximal to molar, article 2 1.65 × length of article 3, with 17 A2 setae, article 3 falciform, 0.61 × length of article 2, with 1 A3-seta, 20 D3-pectinate setae and 3 E3-setae.

Lower lip. Outer lobes broad with inner margins strongly setose, distal inner margins excavated; without inner lobes, mandibular lobes narrow, rounded.

Maxilla 1 (Fig. 12). Inner plate with small, distal subtriangular projection surpassing the basal insertion of the 2 subapical plumose setae; outer plate with 11 elongated spine-teeth in 7⁄4 crown arrangement;

palp article 2 strongly widened at distal two-thirds, with 10 (left side) or 9 (right side) contiguous conical apical spines, and one apical strong seta on outer corner.

Maxilla 2 (Fig. 13). Outer and inner plates tapering distally, both with strong rows of pectinate medial marginal spines and setae; inner plate much shorter and distinctly narrower than outer plate, with marginal setae on the distal third of the inner margin, distal end of inner plate not reaching the proximal end of setal row of outer plate.

Fig. 16. *Abyssorchomene patriciae* sp. nov., holotype, ♀, 10.5 mm (NHM UK 2022.6). Scale bars = 1 mm.

Maxilliped (Fig. 13). Inner plate subrectangular, extending slightly past the distal end of the inner margin of palp article 1 and reaching about 0.34 × length of outer plate, distal margin shallowly but distinctly concave, with very weak mediodistal extension, not surpassing the level of the weak outer extension, with 3 strongly embedded nodular spines, the two mediodistal marginal nodular spines situated close to each other, the third one located in about the middle of the plate, medial margin strongly setose; outer plate elongated, subovate, length 1.83 × width, reaching the distal end of palp article 2, with two dissimilar apical spines and numerous (12) embedded, medial nodular spines, medial margin very slightly scalloped; palp strongly setose medially, article 4 well developed, about 0.56 × length of article 3, inner margin with 2–3 distal setae.

Gnathopod 1 (Fig. 14). Coxa distinctly widened, distal width 1.3 × proximal width and about 76% of length, anterior margin concave, anterodorsal corner rounded, posterior margin nearly straight, distal margin strongly convex in anterior half, weakly convex in posterior half, posteroventral corner not narrowly rounded; basis stout, width about one third of the length and similar to propod width, anterior margin with very short setae; ischium subequal to merus, both with posterior margins setose; carpus short, about half the length of the propodus, with produced narrow posterodistal lobe, not guarding the hind margin of propodus; propodus subchelate, subrectangular, slightly narrowing distally, with anterior margin regularly convex, posterior margin slightly concave, with a distinct inflexion at distal two-thirds, palm transverse, microcrenulate, palmar corner with 2 blunt protrusions and defined by 1 medial and 1 lateral spine; dactylus subequal to palm or barely overriding palm corner.

Gnathopod 2 (Fig. 15). Coxa subrectangular, length 2.2 × width; basis elongated, distal third slightly curved, length 7.3 × width; ischium length 2.7 × width; carpus stout, length 2 × width, about 1.6 × propodus; propodus chelate, subovate, length 1.72 × width, widest subproximally and about 75% of the carpus width, surface finely setose with distal groups of long pectinate setae, dorsal margin strongly convex, hind margin weakly convex, nearly straight; dactylus large, inserted at the top of the distal margin and occupying most of the length (~ 85%) of the distal margin, forming a distinct, small gap on the palm.

Pereopod 3 (Fig. 16). Coxa with anterior margin very slightly convex, posterior margin nearly straight, length 2.3 × width; posterior margins of ischium-merus with clusters of long setae; rest of pereopod as in pereopod 4.

Pereopod 4 (Fig. 16). Coxa length 1.4 × width, width 0.7 × length, anterior margin strongly convex, posterior margin deeply excavate, with wide subtriangular, posterodistal lobe, ventral margin straight, angle subrectangular with rounded apex, located at distal 70% of the coxa length; posterior margins of ischium-merus with clusters of long setae; propodus with 4–5 short spine groups; dactylus 0.43 × length of propodus.

Pereopod 5 (Fig. 16). Coxa slightly but distinctly posterolobate, posterior lobe narrowly rounded, irregularly convex, with distal half of posterior margin straight, width slightly exceeding (1.12 ×) length; basis slightly longer (1.1 ×) than wide, regularly narrowing distally from halfway along the posterior margin, with 4 weak serrations, posterodistal lobe extending to distal margin of ischium; merus weakly expanded (width 0.66 × length), longer than carpus and bearing anterior and posterior long setae; carpus with anterior marginal setae; propodus narrow, length equal to merus-carpus, with 4–5 anterior marginal short spine groups; dactylus short, length 0.34 × propodus.

Pereopod 6 (Fig. 16). Basis long, length 1.5 × width, posterior margin with 8 weak serrations, posterodistal lobe not reaching distal margin of ischium; merus slightly expanded (slightly narrower than in P5) and bearing anterior marginal long setae and few short slender posterior spines; propodus equal in length to merus-carpus, anterior margin with 4–5 clusters of short spines; dactylus 0.33 × length of propodus.

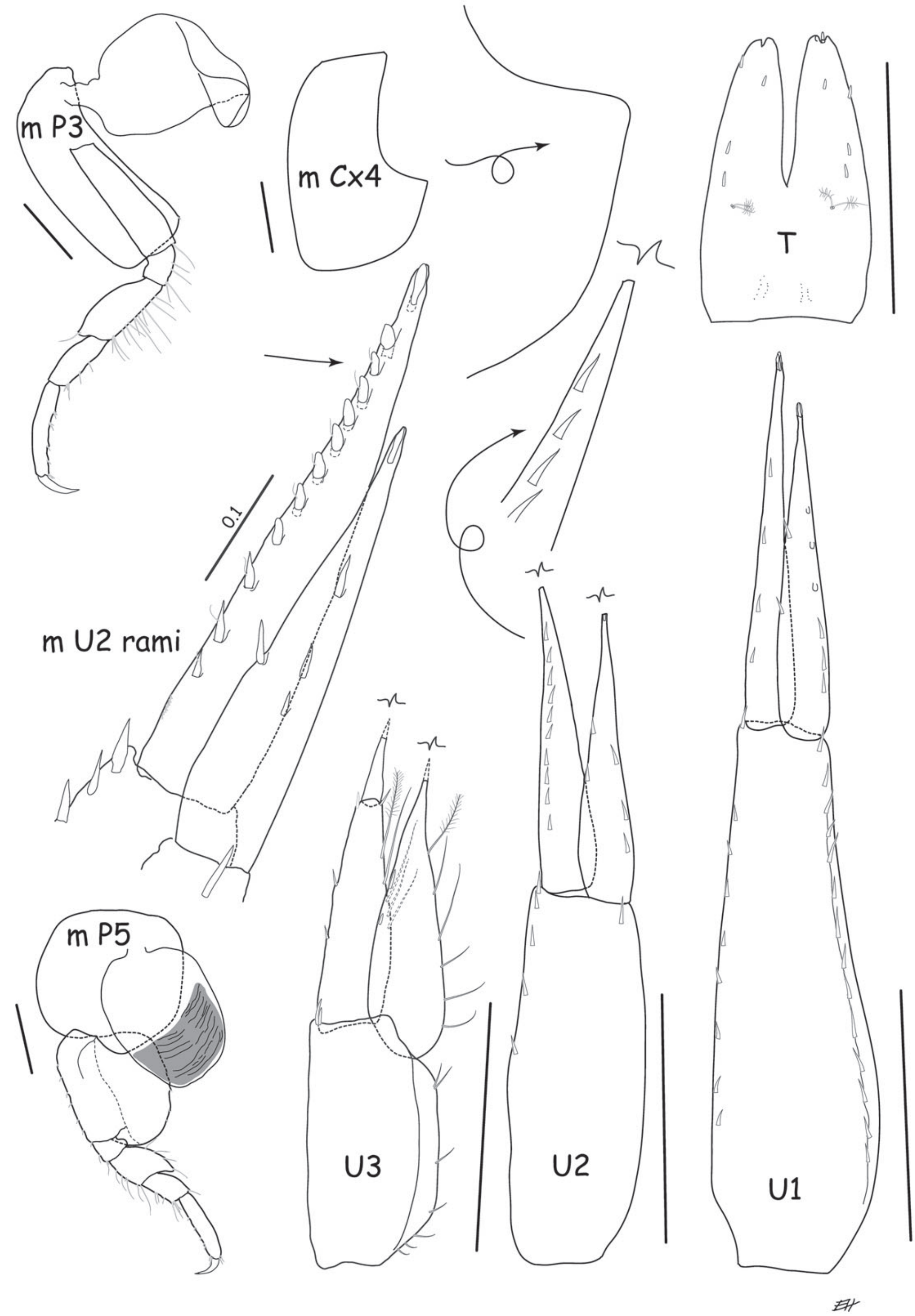

Fig. 17. *Abyssorchomene patriciae* sp. nov., holotype, ♀, 10.5 mm (NHM UK 2022.6); allotype, ♂, 7.5 mm (NHM UK 2022.7). Figures with sex not indicated are of female. Scale bars = 0.5 mm unless indicated otherwise.

Pereopod 7 (Fig. 16). Coxa subovate, length slightly shorter than width; basis proximal two-thirds subrectangular, anterior margin slightly concave, distal third of posterior margin with a relatively strongly angled bevel, with about 9 weak serrations, posterodistal lobe not extending to distal margin of ischium; merus not expanded (narrower than in P6), anterior margins of merus-carpus with short spine groups, posterior margin bearing few short slender spines; propodus about equal to merus-carpus; dactylus 0.33 × length of propodus.

Uropod 1 (Fig. 17). Peduncle about 1.45 × length of outer ramus and 1.64 × inner ramus, dorsolateral and dorsomedial margins spinose; inner ramus shorter and more spiniferous than outer ramus; outer ramus medial margin lacking spines.

Uropod 2 (Fig. 17). Peduncle length 1.2 × outer ramus, dorsolateral and dorsomedial margins with 5 and 1 spine respectively; inner ramus slightly shorter than outer ramus, outer ramus with 10 closely spaced slender spines on dorsolateral margin; inner ramus margins with 2 and 3 slender spines.

Uropod 3 (Fig. 17). Peduncle 0.77 × length of biarticulate outer ramus; second article of outer ramus 0.38 × length of article 1; inner ramus extends past distal end of article 1 of outer ramus and reaches 0.63 × length of article 2 of outer ramus, inner margins of rami with long plumose setae and outer margins with a few slender spines.

Telson (Fig. 17). 1.7 × longer than wide, cleft (52%), lobes tapering distally with 2–3 lateral, submarginal spines and 1 distal spine set in middle of lobe tip.

Gills 5 and 6 (Fig. 16). With 1 long, tubular accessory lobe on gill 5 and 2 lobes on gill 6.

Gill 7 (Fig. 16). Present, well developed.

Brood plates (Figs 15–16). Present on gnathopod 2 and pereopods 3–5, long, slender and curved distally, largest on gnathopod 2 and pereopods 3–4, smallest on pereopod 5, with long curved brood setae ranging in number from 11–24.

Stomodeum. Extending to the 7th pereonite.

Male (Allotype 7.5 mm, NHM UK 2022.7).
Similar to female, but differing as follows:

Body (Fig. 10). Smaller and generally less robust.

Head (Figs 10–11). Slightly longer (1.27 ×) than pereonite 1.

Lateral head lobe (Figs 10–11). Narrower distally and dorsal margin not as strongly convex.

Antenna 1 (Fig. 11). Longer relative to body length than female, peduncle 1 stouter, length very slightly greater than width; callynophore stronger, flagellar articles shorter, with calceoli.

Antenna 2 (Fig. 11). Longer relative to body length than female, flagellum 14-articulate, with calceoli.

Mandible (Fig. 12). Palp article 2 shorter, length 1.5 × article 3.

Maxilla 1 (Fig. 12). Inner plate, distal projection more acute.

Maxilliped (Fig. 13). Inner plates, distal margin more deeply excavated.

Pereopods (Figs 14, 17). Coxae narrower; rest of pereopods slightly more gracile.

Gnathopod 1 (Fig. 14). Coxa slightly less widened, anteroventral corner more narrowly rounded; basis distinctly narrower than propodus.

Gnathopod 2 (Fig. 14). Coxa narrower and slightly widened distally; propodus distinctly narrower, length 2.48 × width and about 61% of carpus width, with straight hind margin, palm without a gap.

Coxa 4 (Fig. 17). Distinctly narrower, with posterodistal lobe more regularly convex.

Pereopod 5 (Fig. 17). Merus more strongly expanded (width 0.7 × length).

Uropod 2 (Fig. 17). Distolateral marginal spines of peduncle grouped closely together; inner ramus distinctly shorter than outer; outer ramus distolateral spines much stouter, bluntly rounded and more closely spaced, proximal ones are slender and sharp (see comment, p. 24).

Urosomite 1 (Fig. 10). Boss slightly more protruding.

Distribution

Northeast and Central North Atlantic: Porcupine Abyssal Plain (Thurston 1990); Biscay Abyssal Plain? Cape Verde Basin? (Thurston 1990: identifications to be confirmed); Mid-Atlantic Ridge vicinity (Horton *et al.* 2013)

Depth range

Bottom records: 2340 m (Horton *et al.* 2013) to 4849 m (Thurston 1990).

Pelagic records: 0–20 to 500–1000 m above bottom (Thurston 1990, identifications to be confirmed).

Remarks

In many subtle ways, the new species *Abyssorchomene patriciae* sp. nov. appears to be a pseudocryptic species, with a facies very superficially similar to both the north and southwest Atlantic species *A. abyssorum* (Stebbing, 1888) and the southwest Atlantic-Antarctic new species *A. shannonae* sp. nov. (this paper). For instance, these three species all possess the slight, but distinct dorsoposterior rounded hump on pereonites 1–7 and pleonites 1–2, which is unique among *Abyssorchomene*. As well, the uropod 3 inner ramus extends past the distal end of article 1 of the outer ramus of uropod 3. These characters easily differentiate *A. abyssorum*, *A. patriciae* and *A. shannonae* from the Southern Ocean endemic *A. scotianensis* (Andres, 1983).

In general body shape and form, they are all extremely similar. However, upon critical examination, we have found several detailed morphological characters that differentiate *A. patriciae* sp. nov. as follows (character of *A. abyssorum* in brackets). From *A. abyssorum*, it differs in the shape of the lateral head lobe, with dorsal and ventral margins not similar, dorsal margin strongly convex, ventral margin nearly straight with slight concavity (vs dorsal and ventral margins more similar, dorsal margin weakly convex and ventral margin straighter); coxa 1 is distinctly widened distally and the anterodorsal corner is broadly rounded in the female (vs only very slightly widened and the anterodorsal corner is narrowly rounded in the female); the mature female gnathopod 2 propodus broadened, subovate, length ~ 1.7 × width, dactylus large, inserted at the top of the distal margin and occupying most of the distal margin, with a small palmar gap (vs propodus very slender, similar to male, length ~ 2.5 × width, dactylus tiny, without a palmar gap); the shorter uropod 1 peduncle, which is 1.45 × the length of the outer ramus (vs longer uropod 1 peduncle, which is 1.5–1.7 × the outer ramus) and the length of the uropod 3 inner ramus, which reaches to ~ 63%

of article 2 of uropod 3 outer ramus (vs reaching to ~ 70% of article 2 of outer ramus). The broadened gnathopod 2 propodus of mature females is not found in smaller, immature females and is likely a terminal growth stage character which presents at maturity, when brood plates are fully formed with long brood setae. Immature females possess a gnathopod 2 propodus which approximates the condition found in males. These are slender and lack the palmar concavity. This makes these taxa difficult to separate without mature females; however, we give other characters which, in total, aid in identifying these species without mature females. Several of these small differences are found in the mouthparts, especially maxilla 2 and the maxilliped and these are outlined in the descriptive text for this species.

The characters that differentiate *A. patriciae* sp. nov. and *A. shannonae* sp. nov. are outlined in the Remarks section under *A. shannonae* (p. 67) and in the key (p. 68).

Abyssorchomene scotianensis (Andres, 1983)
Figs 18–25

Orchomene scotianensis Andres, 1983: 205–212, figs 10–12.
Orchomenopsis chilensis f. *abyssorum* Schellenberg, 1926: 291–292, fig. 27.

Orchomenella abyssorum – Barnard K.H. 1932: 69, figs 27b, 28 (= *Abyssorchomene* cf. *scotianensis,* except fig. 27b = *Abyssorchomene abyssorum*). — Nicholls 1938: 35, fig. 15 (= *Abyssorchomene* cf. *scotianensis*). — Dahl 1954: 282 (= *Abyssorchomene* cf. *scotianensis*). — Birstein & Vinogradov 1962: 41 (= *Abyssorchomene* cf. *scotianensis*).

Fig. 18. *Abyssorchomene scotianensis* (Andres, 1983). Habitus, ♂, size unrecorded (specimen not isolated) (RBINS I.G. 31.070), *RV Polarstern* ANT XXIII-8 (IPY-CAML), station PS69-706-7, Weddell Sea, off East Peninsula, Larsen B, 65°27′ S, 61°27′ W, 828 m, 15–17 January 2007 (photo taken by Cédric d'Udekem d'Acoz, permission granted).

Orchomene abyssorum – Arnaud 1974: 572 (ecology). — Lowry & Bullock 1976: 94–95 (in part). — Lowry 1982: 320. — Wakabara *et al.* 1990: 2, 4, 6 (= *Abyssorchomene* cf. *scotianensis*). — Barnard & Karaman 1991: 508 (in part).

Abyssorchomene abyssorum – De Broyer 1983: 142–144 (in part). — De Broyer & Jażdżewski 1993: 64. — De Broyer *et al.* 1999: 166; 2001: 746, 749 (ecology); 2004: 1742, table 4 (ecology); 2007: 163. — Havermans *et al.* 2010: 204–207; 2011: 232, 235. — Havermans 2012: 96, 99–101, 104, 106–107, 116, 122, 156, 181, 195–196, 215, 226, 250–251, 260, 262.

Orchomene (*Abyssorchomene*) *abyssorum* – Barnard & Ingram 1990: 26 (in discussion = in part).

Orchomene sp. "L-shaped eye" – d'Udekem d'Acoz & Robert 2008: 51, 54.

Abyssorchomene "L-shaped eye", *Abyssorchomene* cf. *scotianensis* – Havermans *et al.* 2012: 36, 39.

Abyssorchomene sp. n. aff. *scotianensis* – d'Udekem & Havermans 2012: fig. 31.

New diagnosis

Pereonites 1–7 and pleonites 1–2 smooth, without any dorsoposterior humps. Lateral cephalic lobe broadly rounded, dorsal and ventral margins regularly and nearly equally convex. Antennae 1–2 of male with calceoli, female without. Epistome weakly but distinctly protruding in front of upper lip (or level with upper lip). Maxilla 1 palp distal end strongly convex, with conical distal spines not contiguous. Maxilliped inner plate, distal margin regularly beveled, very slightly concave, with mediodistal extension slightly surpassing the level of the outer corner; outer plate inner margin weakly scalloped. Coxa 1 distinctly widened, distal width ~ 1.4 × proximal width. Gnathopod 2 propodus of female slender, length ~ 3 × width (similar in form to male), dactylus small, inserted in the middle of the distal margin, lacking a palm concavity. Coxa 5 slightly but distinctly posterolobate, posterior lobe irregularly convex, with distal half of posterior margin nearly straight. Pereopod 7 basis, distal third of posterior margin with a straight bevel. Uropod 1 peduncle length ~ 1.6 × length of outer ramus. Uropod 3 inner ramus barely reaches (or very slightly exceeds) distal end of article 1 of uropod 3 outer ramus. Telson cleft ~ 50% in female, more deeply cleft (up to 60%) in male.

Material examined

Paratypes

SCOTIA SEA • 1 ♀ (9.0 mm), 1 juvenile (2.7 mm); *FFS Walther Herwig*, station 210, Hol 239; 63°22′ S, 054°10′ W; depth 0–223 m (bottom depth 235 m); gear, Rectangular Midwater Trawl (RMT) 1+ 8; 13 Jan. 1978; A. Baker and F. Nast leg.; ZMH K 32 401.

Additional material

WESTERN WEDDELL SEA • 1 ♀ (mature, 12 mm, figured, appendages on 2 slides); off East Peninsula, Larsen B; *RV Polarstern* ANT XXIII-8 (IPY-CAML), station PS69-706-7; 65°26.57′ S, 061°26.82′ W; depth 828 m; gear, fish traps; 15 Jan. 2007; C. d'Udekem d'Acoz and H. Robert leg.; CMNC 2022-0005 • 1 ♀ (9.5 mm, head figured); same collection data as for preceding; CMNC 2022-0006 • ♂ (12.4 mm, figured, appendages on 2 slides); same collection data as for preceding; CMNC 2022-0007 • 9 ♂♂ (8–11 mm); same collection data as for preceding; RBINS INV. 138.498 • 2 ♂♂, 2 ♀♀, 2 juveniles; same collection data as for preceding; RBINS INV. 138.490 • 1 ♂, 1 ♀; same collection data as for preceding; RBINS INV. 138.493 • 51 specs (♀ up to 11.4 mm); same collection data as for preceding; RBINS INV. 138.494 • 50 specs (♀ up to 11.0 mm); same collection data as for preceding; CMNC 2022-0008.

ROSS SEA • 2 ♂♂ (8.6 mm, 5.5 mm), 2 ♀♀ (5.8 mm, 5.5 mm); Ross Ice Shelf, station J9; 82°22′30″ S, 168°37′33″ E; depth 600 m (under ice 415 m thick); gear, baited traps; 7–29 Dec. 1977; T. DeLaca and W.L. Stockton leg.; RBINS INV. 138.495. See Stockton & DeLaca (1982).

SOUTHERN OCEAN • 3 ♂♂ (10–13.1 mm); Oates Coast, off Oates Land; *RV Ob*, 3rd Soviet Antarctic Expedition. (SAE 3), station 337; 69°48′ S, 161°49′ E; depth 1040 m; 10 Feb.1958; A.P. Andriashev (Zoological Institute Russian Academy of Sciences, St. Petersburg).

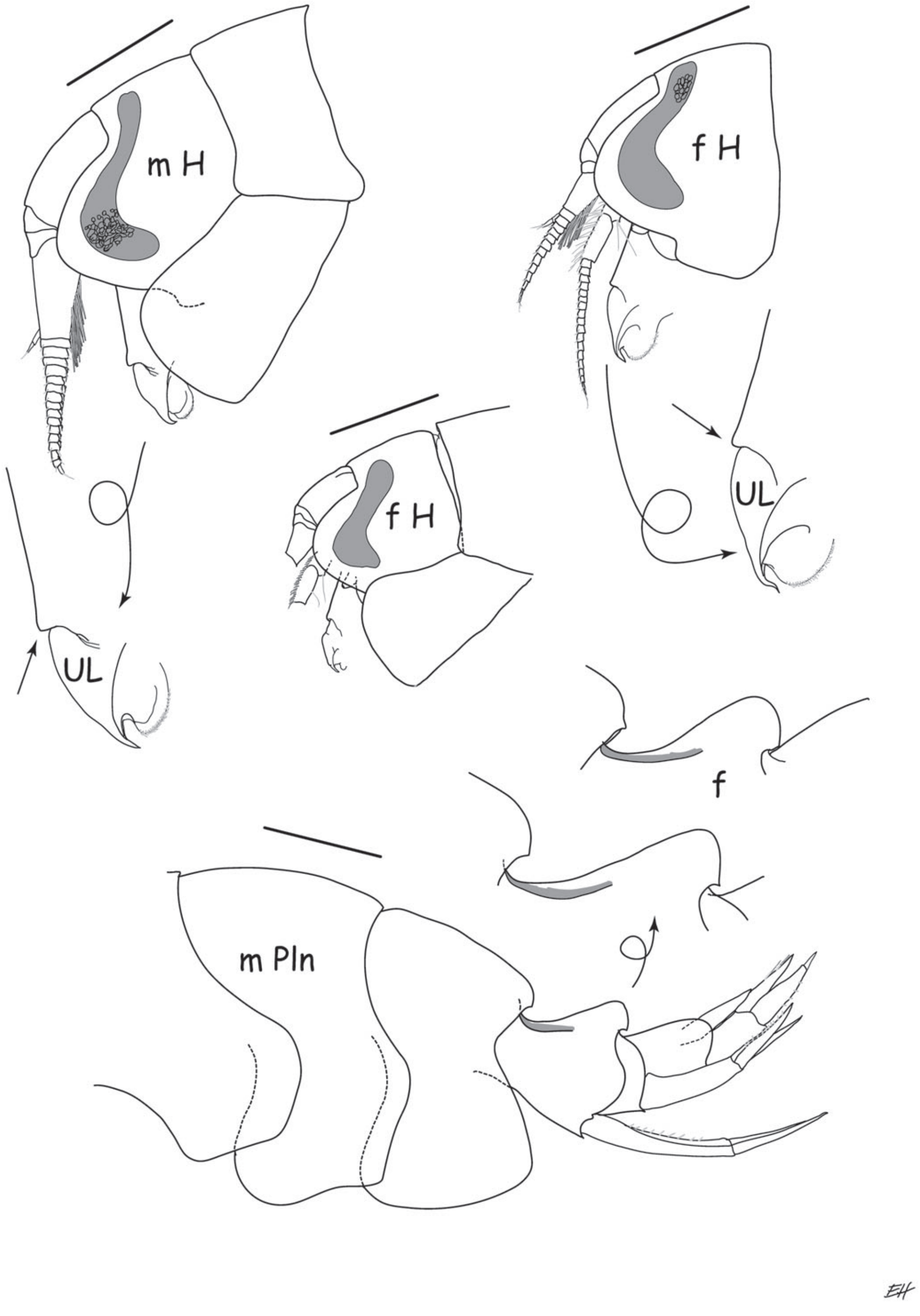

Fig. 19. *Abyssorchomene scotianensis* (Andres, 1983), ♀, 12 mm (CMNC 2022-0005); ♀, 9.5 mm (CMNC 2022-0006); ♂, 12.4 mm (CMNC 2022-0007), *RV Polarstern* ANT XXIII-8 (IPY-CAML), station PS69-706-7, Weddell Sea, off East Peninsula, Larsen B, depth 828 m, 15 January 2007. Female head shown in middle of figure is the 9.5 mm specimen. Scale bars = 1 mm.

AMUNDSEN SEA • 1 ♀ (10 mm, with 13 advanced stage embryos), 1 ♀? (5.7 mm), ♂ (5.8 mm); *RRS James Clark Ross*, JR 179, BIOPEARL II, station BIO5-EBS-2A; 73°52'55" S, 106°18'33" W; depth 1113 m; gear, epibenthic sledge; 9 Mar. 2008; K. Linse (British Antarctic Survey, Cambridge).

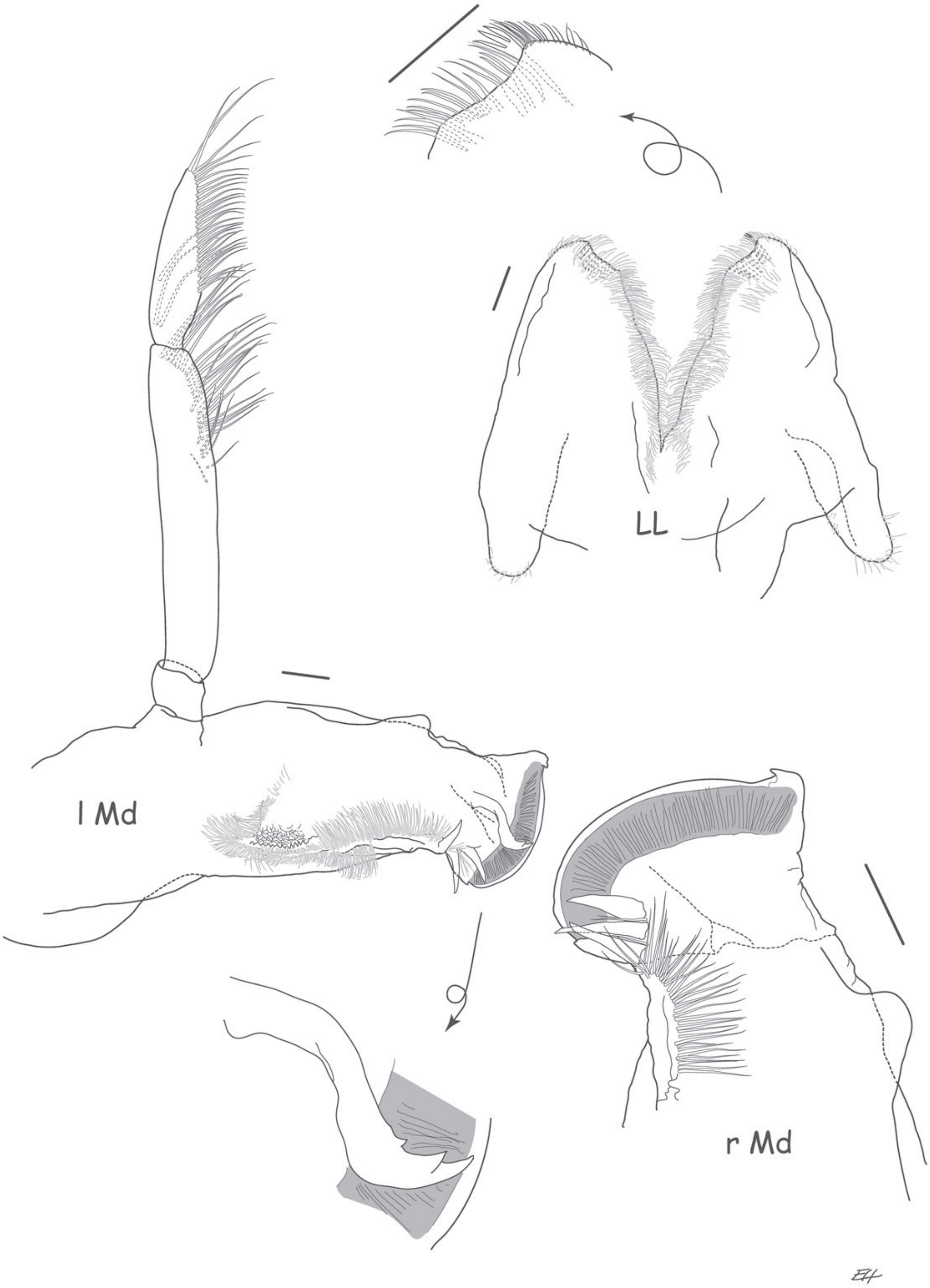

Fig. 20. *Abyssorchomene scotianensis* (Andres, 1983), ♀, 12 mm (CMNC 2022-0005). Scale bars = 0.1 mm.

Description

Based on female (mature), 12 mm (CMNC 2022-0005); paratype female, 9 mm, (not illustrated, ZMH K 32 401) and on remaining material described by Andres (1983).

Pereonites 1–7 and pleonites 1–2 (Fig. 18). Body smooth, without dorsoposterior hump on each segment.

Pleonite 3 (Figs 18–19). With a distinct, rounded posterodorsal elevation slightly overhanging urosomite 1.

Coxae 1–2 (Figs 18–19). Subequal to slightly longer (1.1 ×) than corresponding pereonites.

Coxae 3–4 (Fig. 18). Slightly longer (1.2 ×) than corresponding pereonites.

Epimeron 3 (Figs 18–19). Subquadrate, with posterior margin weakly convex, posteroventral corner broadly rounded, with angle slightly obtuse, ventral margin regularly convex.

Urosomite 1 (Fig. 19). With a deep, dorsal concavity in front of the strongly, regularly rounded upright dorsal boss, convex on posterior margin, and slightly overhanging urosomite 2.

Head (Fig. 19). About equal in length to pereonite 1.

Lateral cephalic lobe (Fig. 19). Broadly rounded, dorsal and ventral margins regularly and nearly equally convex.

Eye (Fig. 19). Non ommatidial, formed of pigment granules; large, crescent-shaped or L-shaped, parallel to front head margin, length about 70% of the head height (note: see p. 26, 34 for comments on evaluating eye size/shape).

Antenna 1 (Fig. 19). Peduncular article 1 dilated (length 1.2 × width), without anterodistal lobe; flagellum article 1 about half length of peduncular article 1, callynophorate, densely furnished medially with double row of aesthetascs; accessory flagellum 5-articulate, first article long, about equal to the remaining articles combined; flagellum 13-articulate, calceoli absent.

Antenna 2 (Fig. 19). Slightly longer (1.2 ×) than antenna 1; geniculate between peduncular articles 3–4, peduncular articles 4–5 lined with anteromedial brush setae, peduncular article 5 short, length 0.66 × article 4; flagellum 18-articulate, calceoli absent.

Epistome (Fig. 19). Level with or very slightly protruding in front of weakly rounded upper lip, forming straight anterior margin and cephalic ridge, separated from upper lip by a small slit.

Mandible (Fig. 20). Incisor strongly convex, slightly widened; left lacinia mobilis curved, with 2 strong apical teeth and 1 subapical tooth, right lacking; accessory spine row with 3 strong spines, interspersed with fine setae; molar forming a narrow crest, somewhat falciform, acutely produced on proximal end, setose with mixed ornamentation, distal half or third setiferous, proximal half or two-thirds forming a reduced, ridged triturative surface, hairy process located proximal to molar; palp attached proximal to molar, article 2 1.8 × length of article 3, with 24–25 A2-pectinate setae, article 3 weakly falciform, 0.55 × length of article 2, with 3 A3-seta, 26 D3-pectinate setae and 2 E3-setae.

Lower lip (Fig. 20). Outer lobes broad with inner margins strongly setose, distal margins excavate, without inner lobes, mandibular lobes narrow.

Maxilla 1 (Fig. 21). Inner plate with short, rounded, apical projection slightly surpassing the basal insertion of two (or three) apical plumose setae of unequal size; outer plate with 11 strong spine-teeth in

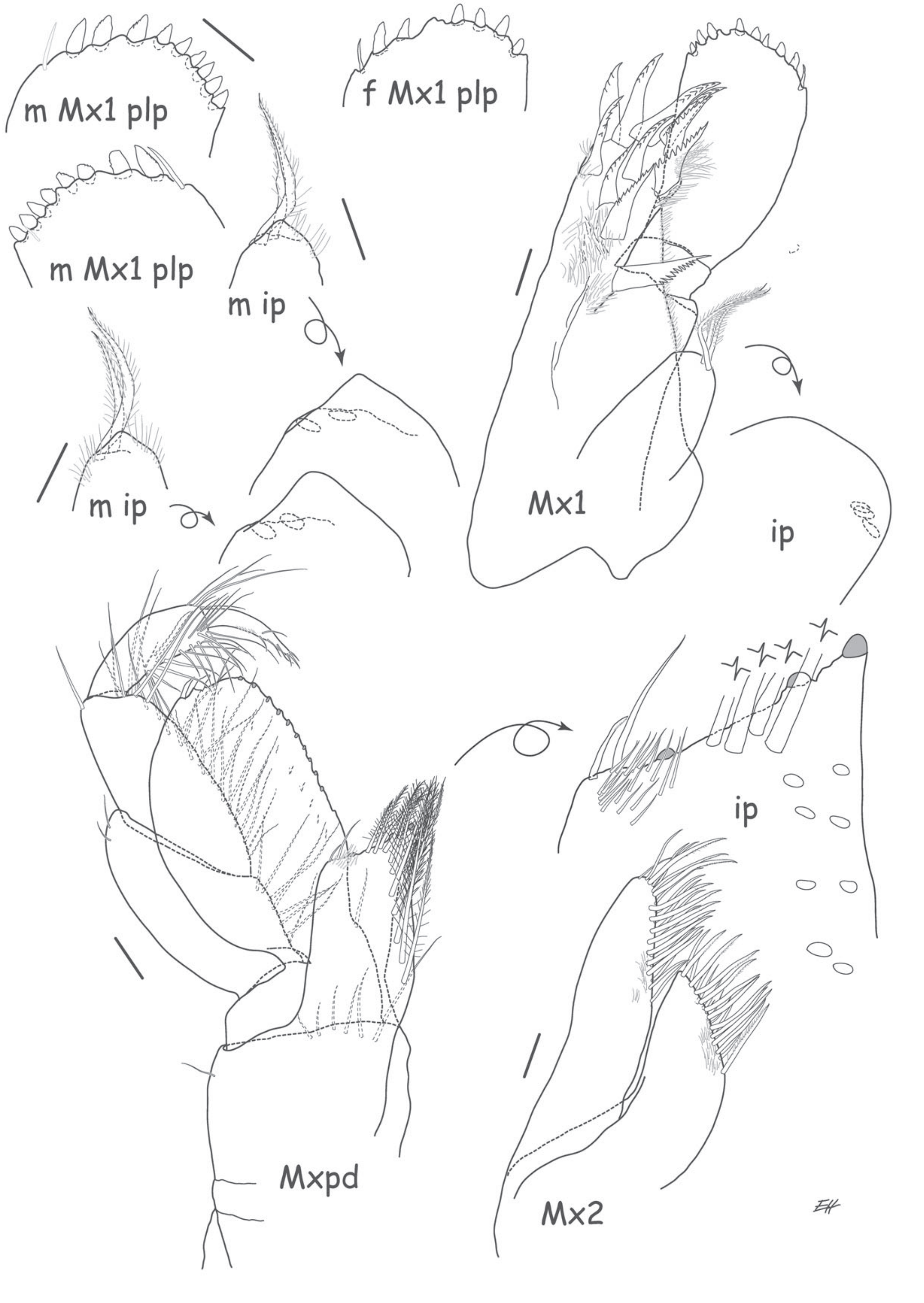

Fig. 21. *Abyssorchomene scotianensis* (Andres, 1983), ♀, 12 mm (CMNC 2022-0005); ♂, 12.4 mm (CMNC 2022-0007). Figures with sex not indicated are of female. Scale bars = 0.1 mm.

7/4 crown arrangement; palp article 2 slightly widened at distal two-thirds, distal margin strongly convex, with 7–9 non-contiguous conical apical spines, and a thin spine on outer corner.

Maxilla 2 (Fig. 21). Outer and inner plates not slender, tapering distally, both with strong rows of pectinate medial marginal spines and setae; inner plate much shorter than outer plate, with marginal setae on the distal third of the inner margin, distal end of inner plate slightly surpassing the proximal end of setal row of outer plate.

Maxilliped (Fig. 21). Inner plate subrectangular, extending slightly past the distal end of the inner margin of palp article 1 and reaching about one-third length of outer plate, distal margin regularly bevelled, very slightly concave, with mediodistal extension slightly surpassing the level of the outer corner; with 3 embedded nodular spines unequally spaced, the two mediodistal marginal nodular spines situated close to each other with the corner one more protruding, the third one located closer to the outer margin corner, plumose setae inserted along medial margin and inner part of distal margin; outer plate subovate, length 1.66 × width, not reaching distal end of palp article 2, with two dissimilar apical spines and numerous (11) embedded, medial nodular spines, medial margin weakly scalloped; palp 4-articulate, strongly setose medially, dactylus well developed, about 0.7 × length of article 3, distal inner margin with 2–3 short setae.

Gnathopod 1 (Fig. 22). Coxa distinctly widened, distal width 1.43 × proximal width and about 78% of length, anterior margin weakly concave, anterodorsal corner broadly rounded, posterior margin nearly straight, distal margin strongly convex in anterior half, slightly convex in posterior half, posteroventral corner not narrowly rounded; basis moderately stout, width about one third of the length and slightly narrower than propodus, anterior margin with numerous long and short setae; ischium subequal to merus, both with posterior margins setose; carpus short, compressed, length about 0.5 × propodus, with narrow, setose posterodistal lobe, not guarding the hind margin of propodus; propodus subchelate, subrectangular, with anterior margin weakly convex, posterior margin nearly straight; palm transverse, very slightly convex, microcrenulate and adorned with small setae, palm corner with 2 blunt protrusions and defined by 1 medial and 1 lateral spine; dactylus subequal to palm or barely overriding palmar corner.

Gnathopod 2 (Fig. 23). Coxa subrectangular, length 2.4 × width; basis elongated, distal third slightly curved, length 6.8 × width; ischium length 3 × width; carpus about 2 × length of propodus, distoventrally with subtriangular scales; propodus chelate, slender, slightly widened distally, length 3 × width, and much narrower, about 60% of the carpus width, surface finely setose with distal groups of long pectinate setae, dorsal margin convex, hind margin weakly concave, palm not excavate, with a narrow gap, with a small setal basket on distal third and ending in a tooth-like denticulate projection and a strong subapical seta; dactylus fitting palm, inner margin bearing distally a spiny protuberance fitting to the palm and weakly denticulate projection.

Pereopod 3 (Fig. 24). Coxa subrectangular, with anterior margin slightly convex, posterior margin slightly concave, ventral margin very slightly convex, length 2.45 × width; posterior margins of ischium-merus with clusters of long setae, rest of pereopod like pereopod 4.

Pereopod 4 (Fig. 24). Coxa length 1.42 × width, width 0.7 × length, anterior margin convex, posterior margin deeply excavate, with wide subtriangular, posterodistal lobe, corner with subquadrate angle, located at distal 63% of the coxa length; ventral margin evenly convex; posterior margins of ischium-carpus with clusters of long setae; propodus with about 7 short spine groups; dactylus 0.4 × length of propodus.

Pereopod 5 (Fig. 24). Coxa slightly but distinctly posterolobate, posterior lobe irregularly convex, with distal half of posterior margin nearly straight, width 1.14 × length; basis longer (1.2 ×) than wide, slightly narrowing distally, anterior margin nearly straight, with small spines, posterior margin convex, very

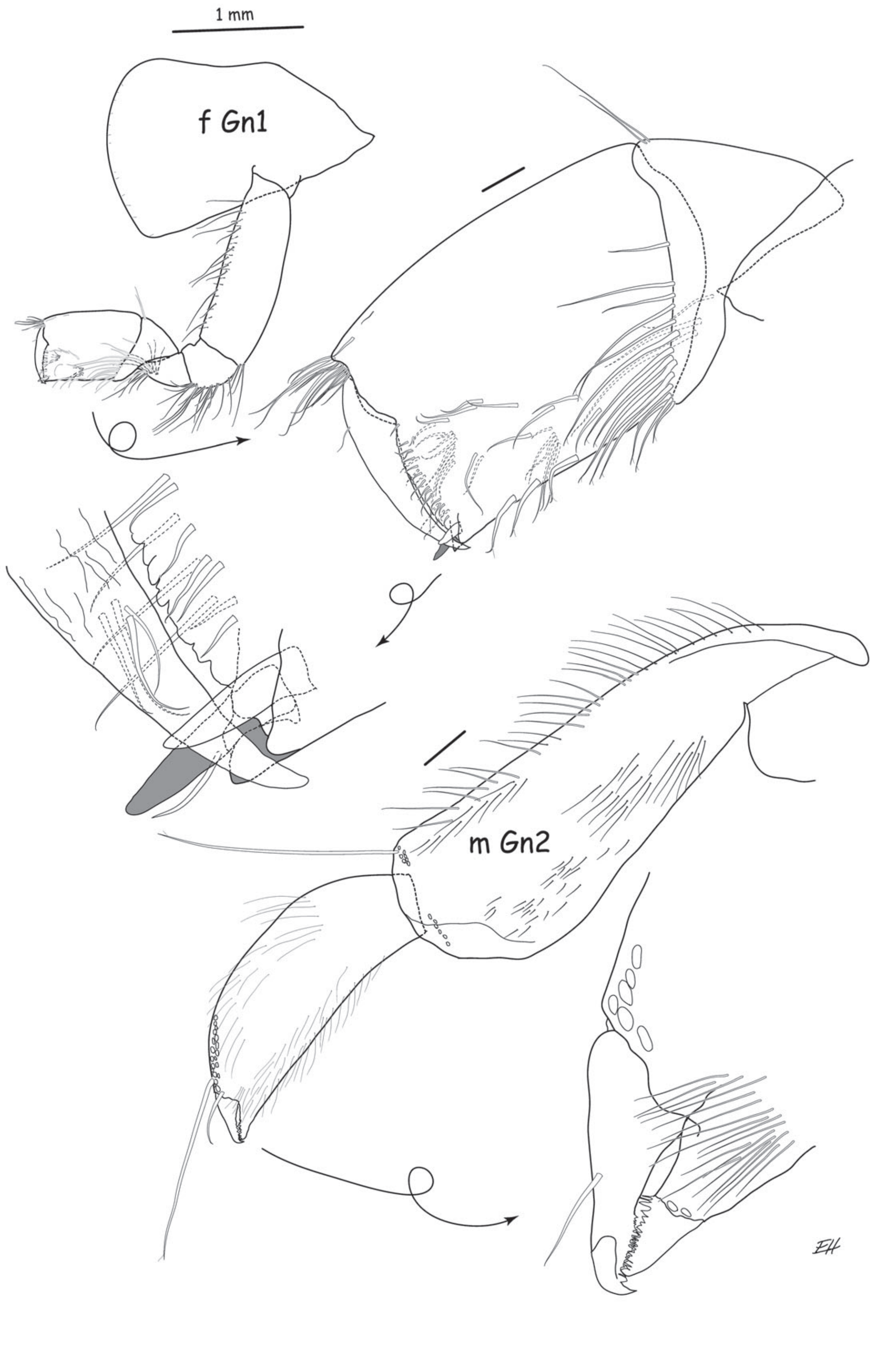

Fig. 22. *Abyssorchomene scotianensis* (Andres, 1983), ♀, 12 mm (CMNC 2022-0005); ♂, 12.4 mm (CMNC 2022-0007). Rows of distal pectinate setae omitted on Gn2 propodus of male. Scale bars = 0.1 mm unless indicated otherwise.

weakly serrate, posterodistal lobe surpassing distal margin of ischium; merus weakly expanded (width 0.65 × length), longer than carpus and bearing anterior and posterior long setae; carpus with anterior marginal setae; propodus narrow, shorter than merus-carpus, with 6–7 anterior marginal short spine groups; dactylus short, 0.36 × length of propodus.

Pereopod 6 (Fig. 24). Basis long, length 1.45 × width, anterior margin nearly straight, with small spines, posterior margin hardly serrate, slightly narrowing distally, posterodistal lobe not reaching distal margin of ischium; merus very weakly expanded (width 0.48 × length) and bearing anterior marginal long setae and few short slender posterior spines; propodus shorter than length of merus-carpus, anterior margin with 7–8 clusters of short spines, dactylus 0.34 × length of propodus.

Pereopod 7 (Fig. 24). Coxa subovate, rounded behind; basis proximal two-thirds subrectangular, anterior margin slightly concave, with small spines, distal third of posterior margin with a straight bevel, with about 9 weak serrations, posterodistal lobe not extending to distal margin of ischium; merus not expanded (narrower than in P6), anterior margins of merus-carpus with short spine groups, posterior margin bearing few short slender spines; propodus shorter than merus-carpus, dactylus broken.

Uropod 1 (Fig. 25). Peduncle about 1.57 × length of outer ramus and 1.73 × inner ramus, dorsolateral and dorsomedial margins spinose; inner ramus shorter and more spiniferous than outer ramus; outer ramus medial margin lacking spines.

Uropod 2 (Fig. 25). Peduncle about 1.2 × length of outer ramus, dorsolateral and dorsomedial margins each with 4 spines; inner ramus slightly shorter than outer ramus, length 0.92 ×, with 2 dorsolateral and 6 dorsomedial marginal spines; outer ramus with 7 closely spaced slender spines on dorsolateral margin, dorsomedial margin lacking spines.

Uropod 3 (Fig. 25). Peduncle 0.94 × length of biarticulate outer ramus; second article of outer ramus 0.4 × length of article 1; inner ramus barely reaching or very slightly extends past distal end of article 1 of outer ramus, inner margins of rami with long plumose setae and outer margins with a few slender spines.

Telson (Fig. 25). Length subequal to uropod 3 peduncle, 1.5 × longer than wide, cleft (50%), lobes tapering distally with 3–4 submarginal spines and 1 distal spine set in middle of lobe tip.

Gills 5–6 (Fig. 24). With 1 long, tubular accessory lobe on gill 5 and 2 lobes on gill 6, both inserted basally.

Gill 7 (Fig. 24). Present, small.

Brood plates (Figs 23–24). Present on gnathopod 2 and pereopods 3–5, long, slender and curved distally, largest on gnathopod 2 and pereopods 3–4, smallest on pereopod 5, with long curved brood setae ranging in number from ~ 10–20.

Stomodeum. Extending to the 7th pereonite.

Male (based on: Andres (1983), ANT XXIII-8, station 706 and SAE 3 material)
Similar to female, but differing as follows:

Body (Fig. 18). Larger but slightly less robust.

Lateral head lobe (Fig. 19). Slightly narrower distally, subtriangular, ventral margin less convex.

Eye (Figs 18–19). More strongly developed, extending to 66–80% of the head height.

Fig. 23. *Abyssorchomene scotianensis* (Andres, 1983), ♀, 12 mm (CMNC 2022-0005). Setae omitted on Gn2 carpus-propodus detail at top left corner of figure. Scale bars = 1 mm unless indicated otherwise.

Fig. 24. *Abyssorchomene scotianensis* (Andres, 1983), ♀, 12 mm (CMNC 2022-0005); ♂, 12.4 mm (CMNC 2022-0007). P3 incomplete, P4 missing brood plate and gill. Figures with sex not indicated are of female. Scale bars = 1 mm.

Fig. 25. *Abyssorchomene scotianensis* (Andres, 1983), ♀, 12 mm (CMNC 2022-0005); ♂, 12.4 mm (CMNC 2022-0007). Outer ramus is oriented on the left side of the uropods. Figures with sex not indicated are of female. Scale bars = 0.1 mm.

Antenna 1 (Figs 18–19). Callynophore much stronger, subequal in length to peduncular article 1, flagellum 12–17-articulate, articles broader, calceoli present (callynophore size is related to maturity of male, terminal males have the largest callynophore and greater number of flagellar articles).

Antenna 2 (Fig. 18). Peduncular articles 4–5 slightly broader; flagellum 15–23-articulate, with calceoli.

Mandible. Palp article 3 proportionally longer, length 0.65 × article 2.

Maxilla 1 (Fig. 21). Inner plate, distal projection subacute; palp article 2 strongly widened at distal two-thirds, with (according to size) 5–12 non-contiguous, conical apical spines.

Gnathopod 1. Coxa slightly less widened distally than in female, length 1.34 × width, anteroventral corner more narrowly rounded, posterior margin slightly concave; basis, anterior margin with scattered short setae.

Gnathopod 2 (Fig. 22). Propodus similar to female, except anterodistally narrower and merging smoothly with dactyl insertion on dorsal margin.

Coxa 4 (Fig. 24). Distinctly narrower than in female, length about 1.76 × width, posterior excavation shallower, posterior lobe smaller with subquadrate angle located at about 60% of the length.

Pereopod 5. Merus slightly more expanded.

Uropod 2 (Fig. 25). Inner ramus distinctly shorter than outer; outer ramus with 15 lateral marginal spines of differing morphology, distolateral spines stouter, bluntly rounded and more closely spaced than proximal ones, which are thin and acute (number of spines is size related, but males of equal size to females have greater number of spines and always possess the two different types of spines, see p. 24).

Uropod 3 (Fig. 25). Inner ramus slightly longer than peduncle; second article of outer ramus about 0.33–0.5 × the length of article 1.

Urosomite 1 (Figs 18–19). Boss strong, anterodorsal and posterior margins straighter, slightly more pointed and slightly more projecting backward.

Telson. Slightly narrower and longer, length 1.75 × width; cleft slightly deeper, about 55–60% of its length.

Ontogenic variations

Andres (1983) collected a very large male (16 mm) and noticed on maxilla 1 that the width of palp article 2 increases in size as well as the number (as usual) of apical spines (from 5 in the holotype male, 9.5 mm, to 8 in the 13 mm female and 12 in the 16 mm male; see Andres' 1983: fig. 10). On the maxilliped outer lobe of the 16 mm male, he noted the presence of 4 apical stout spines instead of the usual 2 stout spines, as well as the presence of setae on the inner margin of the dactylus in the palp of larger specimens. As well, he remarked on the stronger development of the gnathopod 2 palm and dactylus spines and setae in the largest specimens. He also showed that the length of the second article of uropod 3 outer ramus reaches 0.34 × the length of article 1 in the largest male, instead of about 0.5 × the length in the smaller, 9.5 mm holotype (see Andres' 1983: fig. 12).

Distribution

Southern Ocean: Scotia Sea (Andres 1983); Wilhelm II coast (Schellenberg 1926); Weddell Sea (De Broyer *et al.* 1999, 2001, 2004, 2006, 2007; d'Udekem d'Acoz & Robert 2008; d'Udekem d'Acoz & Havermans 2012); Amundsen Sea (this paper); Ross Sea (this paper); off Oates Land (this paper).

Depth range

Bottom records: possibly 60 m? (Wakabara *et al.* 1990), depth 385 m (Schellenberg 1926) to 3070 m (De Broyer *et al.* 2004).

Pelagic records: possibly 0 to 430 m above bottom (Andres (1983). See remark (p. 24) on pelagic occurrence under *A. abyssorum*.

Remarks

As discussed by Andres (1983), the juvenile Antarctic specimens identified as *Orchomenopsis chilensis* f. *abyssorum* by Schellenberg (1926) may be attributed to *Abyssorchomene scotianensis*. The peculiar shape of the maxilla 1 palp article 2 figured by Barnard (1932) (Fig. 28) also indicates that this material may belong to *A. scotianensis,* but the presence of the "large yellowish brown pear-shaped" eyes should be confirmed first. Andres (1983) also described "extended pear-shaped" ("*gestreckt birnenförmige Augen*") and Nicholls (1938) (Fig. 15) illustrated a "large, faded brown", typically pear-shaped eye, although he recognized that his material had undergone a considerable degree of maceration. We never noticed pear-shaped eyes among the abundant material we identified. Indeed, specimens we examined showed the typical, large "L-shaped eyes", with larger males having larger eyes (see Figs 18–19). As previously noted (p. 34), eye shape and size are best recognized in freshly collected specimens. Over long periods of time in alcohol preservation, colour pigments fade and are lost, causing the eyes to become extremely difficult to ascertain. This problem may be a contributing factor in the discrepancies seen in eye morphology described by the authors above.

Concerning male body size in this species, it is interesting to note that this is the only species in the *A. abyssorum* complex where males can reach or exceed female body length; in the other species terminal males are always much smaller than females (Andres 1983; Duffy *et al.* 2013). Our material examined also confirm this anomaly in size difference. Possible reasons for this size discrepancy will require future investigation.

The Southern Ocean endemic *A. scotianensis* can be easily distinguished from the three other species of the *A. abyssorum* complex by the following combination of characters: the absence of small dorsal humps on pereonites 1–7 and pleonites 1–2; the short uropod 3 inner ramus, which just reaches (or very slightly exceeds) the distal end of article 1 of uropod 3 outer ramus; the epistome usually slightly protruding in front of the upper lip; the maxilla 1 palp, with distal margin strongly convex and distal spines not-contiguous and by the nearly straight (female) distal margin of maxilliped inner plate. Further, *A. scotianensis* is also distinguished from *A. shannonae* sp. nov. and *A. patriciae* sp. nov. by the absence of an excavated palm in the gnathopod 2 propodus of mature females.

Abyssorchomene shannonae sp. nov.
urn:lsid:zoobank.org:act:EEBF5622-BB6E-4CA5-9767-4CFE71A4ED9F
Figs 26–34

Diagnosis

Pereonites 1–7 and pleonites 1–2 with a weak but distinct dorsoposterior hump on each segment. Lateral cephalic lobe broadly rounded, dorsal and ventral margins nearly equally convex. Antennae 1–2 of male with calceoli, female without. Epistome level with the upper lip. Maxilla 1 palp, distal end weakly convex with distal conical spines contiguous. Maxilliped inner plate, distal margin nearly straight, strongly beveled, with a very slight concavity on outer half, with mediodistal extension surpassing outer corner; outer plate with strongly scalloped inner margin. Coxa 1 strongly widened distally, ~ 1.5–1.7 × proximal width. Gnathopod 2 propodus of female broad, anterodistal margin slightly expanded and protruding, length ~ 1.5 × width, (different in form to narrow male propod), dactylus very small, inserted on the

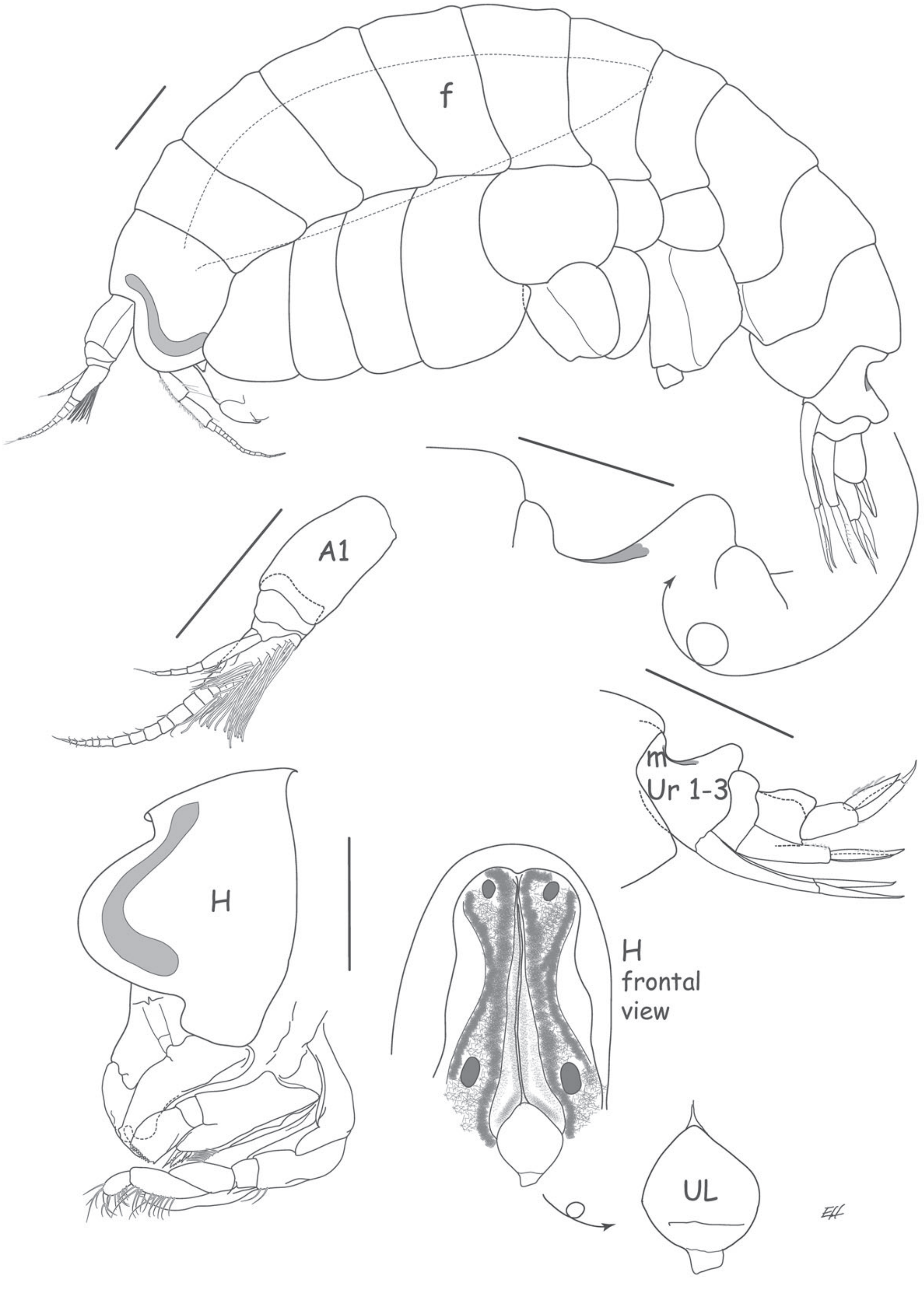

Fig. 26. *Abyssorchomene shannonae* sp. nov., holotype, ♀, 12 mm (ZMH K-61209); allotype, ♂, 7 mm (ZMH K-61210), *RV Polarstern* ANT XXII-3 (ANDEEP III), station PS67-78-1, eastern Weddell Sea, depth 2194 m., 21 February 2005. Dotted line on habitus shows approximate stomodeum position. Figures with sex not indicated are of female. Scale bars = 1 mm.

posterodistal one-third of the distal margin, palm with a distinct concavity. Coxa 5 distinctly posterolobate, posteroventral lobe broadly rounded, posterior margin evenly rounded. Pereopod 7 basis with anterior margin slightly concave, distal half of posterior margin with a steep, strong bevel. Uropod 1 peduncle

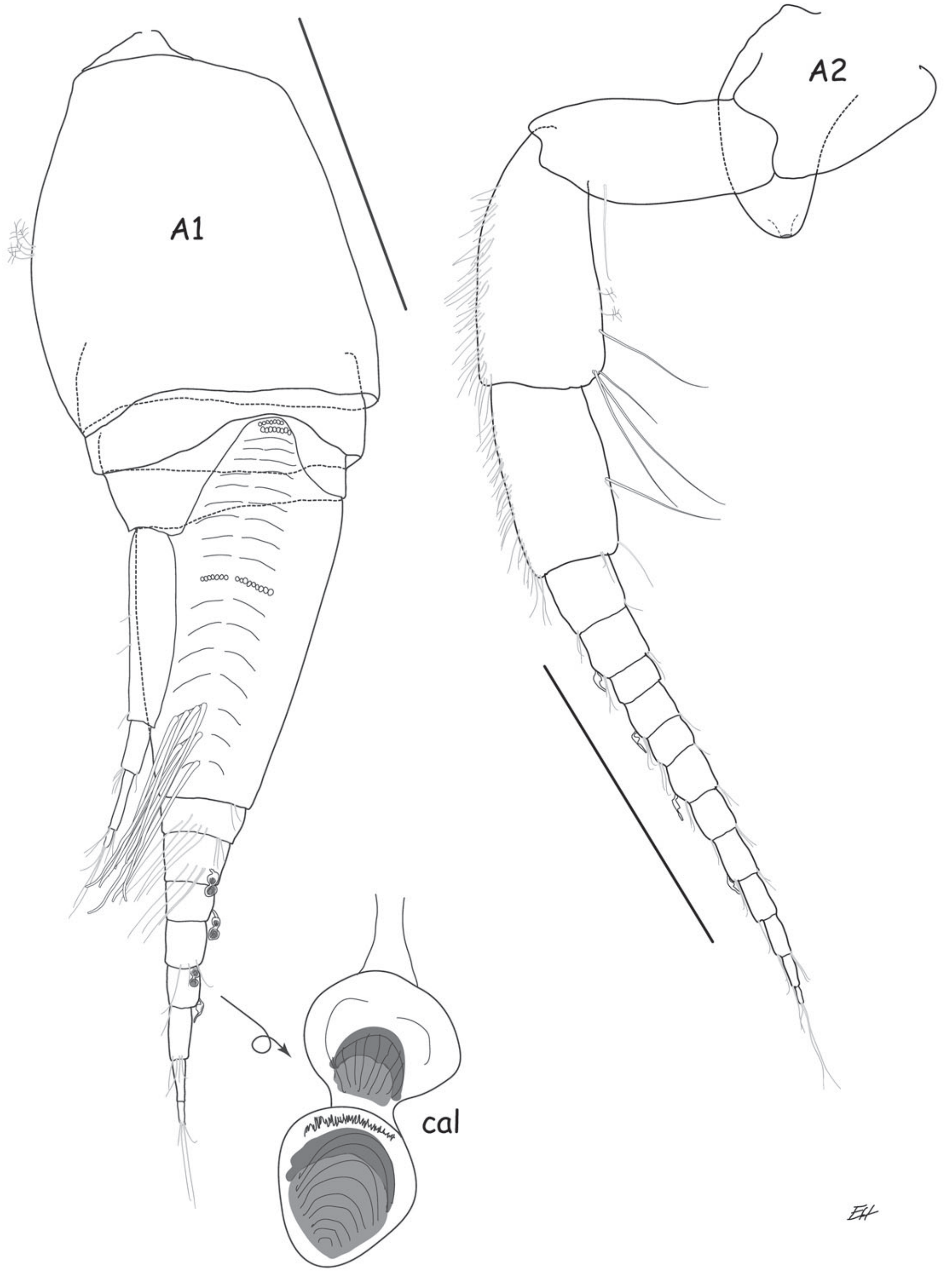

Fig. 27. *Abyssorchomene shannonae* sp. nov., allotype, ♂, 7 mm (ZMH K-61210). Most aesthetascs omitted from A1 callynophore. Scale bars = 0.5 mm.

long, about 1.6× length of outer ramus. Uropod 3 inner ramus extends past distal end of article 1 and reaches 20–25% length of article 2 of outer ramus. Telson cleft 55% of length, deeper in males.

Etymology

The species name is dedicated to Shannon Hendrycks, the wife of the first author for her continued enthusiasm and support over the many years of this and other amphipod studies.

Material examined

Holotype

EASTERN WEDDELL SEA • ♀ (12 mm, mature, figured, appendages on 7 slides); *RV Polarstern* ANT XXII-3 (ANDEEP III), station PS67-78-1; 71°9.91′ S, 014°4.80′ W; depth 2194 m; gear, baited traps; 21 Feb. 2005; C. De Broyer and B. Danis leg.; ZMH K-61209.

Allotype

EASTERN WEDDELL SEA • ♂ (7 mm, figured, appendages on 6 slides); same collection data as for holotype; ZMH K-61210.

Paratypes

EASTERN WEDDELL SEA • 2 ♀♀ (8.4 mm, with dissected Gn1–2, 9.5 mm); same collection data as for holotype; RBINS INV. 138.491 • 2 ♀♀ (8.4 mm, 11.8 mm); same collection data as for holotype; CMNC 2022-0009 • 2 ♀♀ (mature, 10 mm), 4 ♀♀ (immature, 7.5 mm), 4 ♂♂ (~ 6 mm); same collection data as for holotype; CMNC 2022-0010.

Additional material

EASTERN WEDDELL SEA • 6 specs (6–8 mm); *RV Polarstern* ANT XXII-3 (ANDEEP III), station PS67-80-1; 70°40.78′ S, 014°41.24′ W; depth 2928 m; gear, baited traps; 22 Feb. 2005; C. De Broyer and B. Danis leg.; RBINS INV. 138.492 • 2 ♀♀ (immature, 8.0 mm, 9.0 mm), 2 ♂♂ (5.6 mm, 7.0 mm); *RV Polarstern* ANT XXII-3 (ANDEEP III), station PS67-81-1; 70°31.63′S, 014°35.00′W; depth 4412 m; gear, baited traps; 23 Feb. 2005; C. De Broyer and B. Danis; RBINS INV. 138.496.

NORTHWEST WEDDELL SEA • 1 ♀ (12.4 mm, mature); Powell Basin; *RV Polarstern* ANT XXII-3 (ANDEEP III), station PS67-142 AT; 62°12.40′ S, 049°31.67′ W; depth 3411 m; gear, baited traps; 18 Mar. 2005; C. De Broyer and B. Danis leg.; RBINS INV. 138.497.

SCOTIA SEA • 1 ♀ (12 mm, mature); US Antarctic Research Program, *Eltanin* 9, station 696; 56°53′ S–56°59′ S, 037°27′ W–037°17′ W; depth 3001 m; gear, Isaac-Kid Midwater Trawl; 28 Aug.1963; Smithsonian Oceanographic Sorting Centre, Washington, D.C.

SOUTHWEST ATLANTIC • 2 ♀♀ (7 and 8 mm, immature), 1 ♂ (6 mm); Argentine Basin; *RV Meteor*, DIVA 3 M79/1 expedition, station 531; 35°56.49′ S, 048°53.85′ W; depth 4586 m; gear, baited traps; 15 Jul. 2009; E. Hendrycks leg.; ZMH K-61211.

Description

Holotype

Mature female, 12 mm, ZMH K-61209.

PEREONITES 1–7 AND PLEONITES 1–2 (Fig. 26). With a slight but distinct dorsoposterior hump on each segment.

PLEONITE 3 (Fig. 26). With a rounded, posterodorsal elevation slightly overhanging urosomite 1.

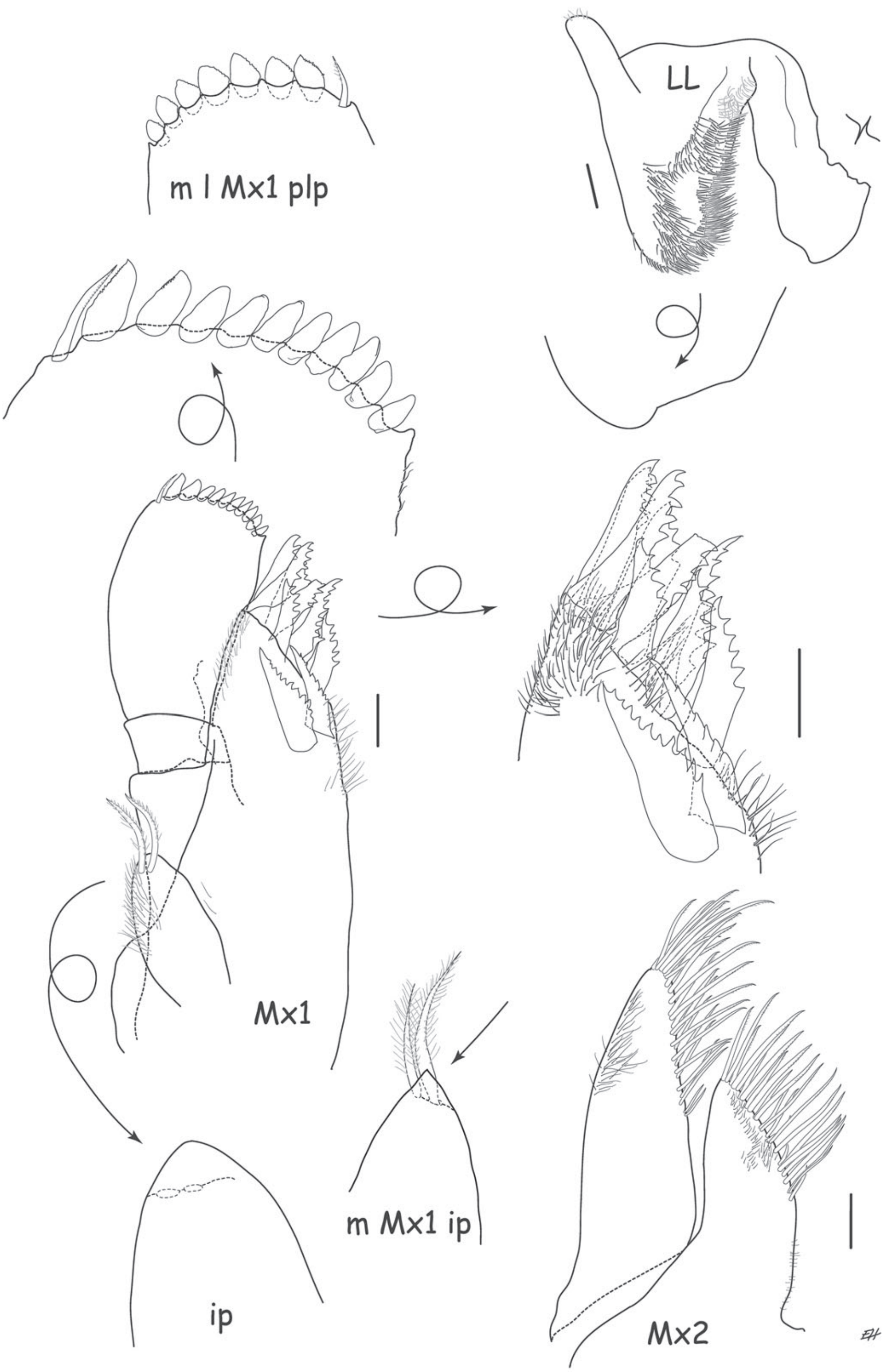

Fig. 28. *Abyssorchomene shannonae* sp. nov., holotype, ♀, 12 mm (ZMH K-61209); allotype, ♂, 7 mm (ZMH K-61210). LL partially broken. Figures with sex not indicated are of female. Scale bars = 0.1 mm.

Coxae 1–2 (Fig. 26). Slightly shorter to nearly subequal to corresponding pereonites (in lateral view).

Coxae 3–4 (Fig. 26). Subequal to slightly longer (1.15×) than corresponding pereonites.

Epimeron 3 (Fig. 26). Subquadrate, with posterodistal angle narrowly rounded and slightly obtuse, posterior margin very weakly convex, nearly straight, ventral margin convex.

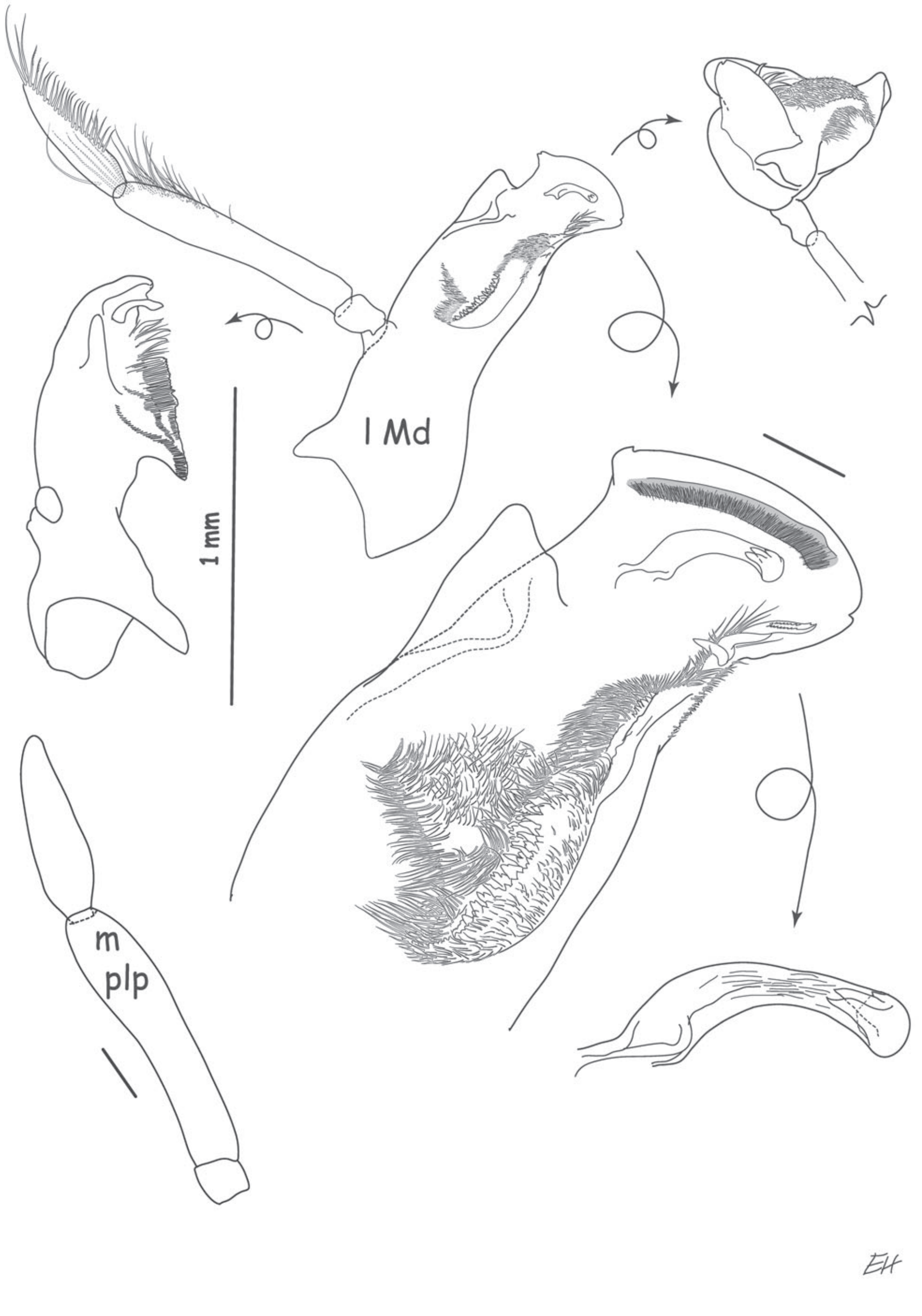

Fig. 29. *Abyssorchomene shannonae* sp. nov., holotype, ♀, 12 mm (ZMH K-61209); allotype, ♂, 7 mm (ZMH K-61210). From left to right: dorsolateral, medial and frontal aspects of Md. Setae omitted on male Md palp. Figures with sex not indicated are of female. Scale bars = 0.1 mm unless indicated otherwise.

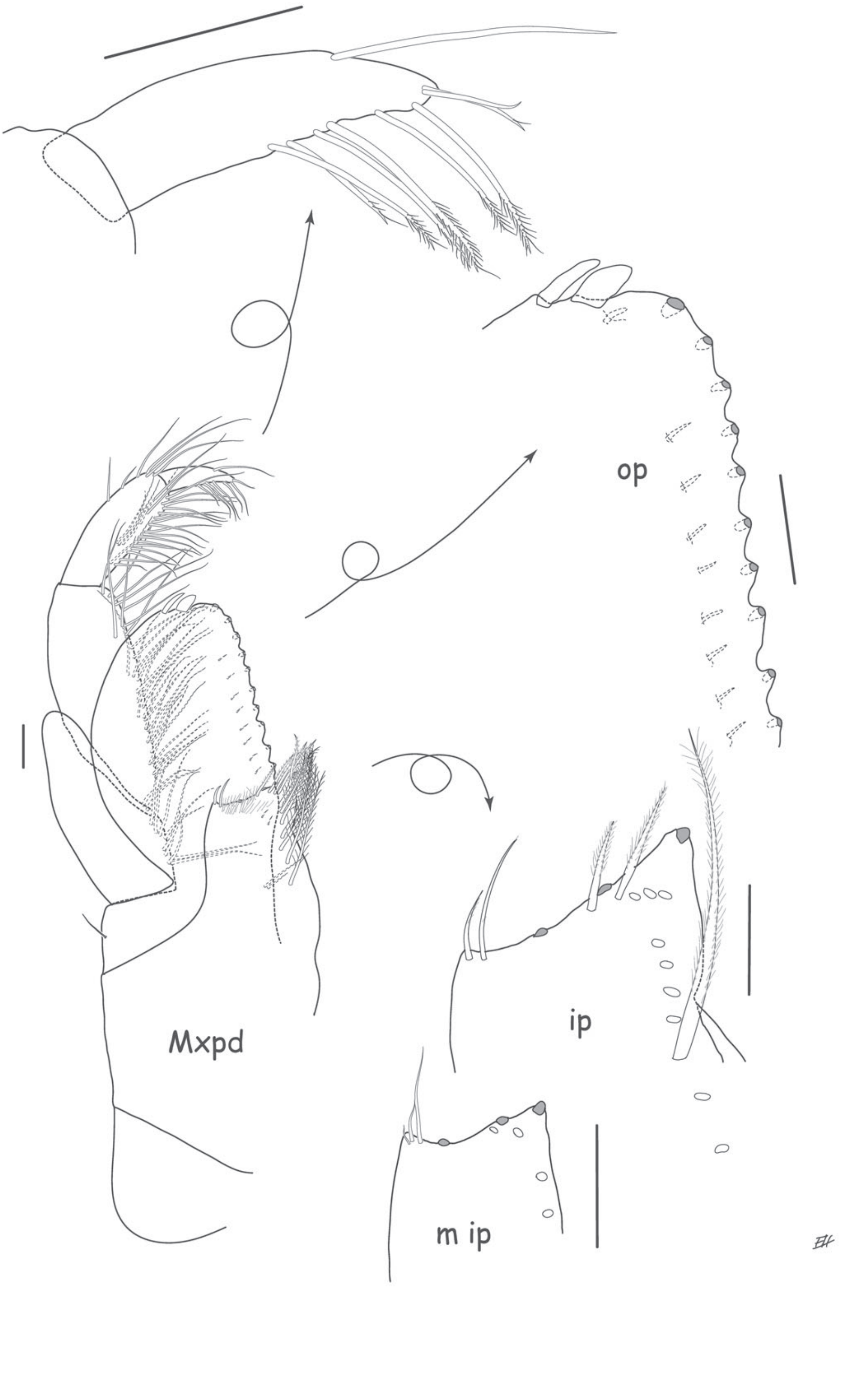

Fig. 30. *Abyssorchomene shannonae* sp. nov., holotype, ♀, 12 mm (ZMH K-61209); allotype, ♂, 7 mm (ZMH K-61210). Figures with sex not indicated are of female. Scale bars = 0.1 mm.

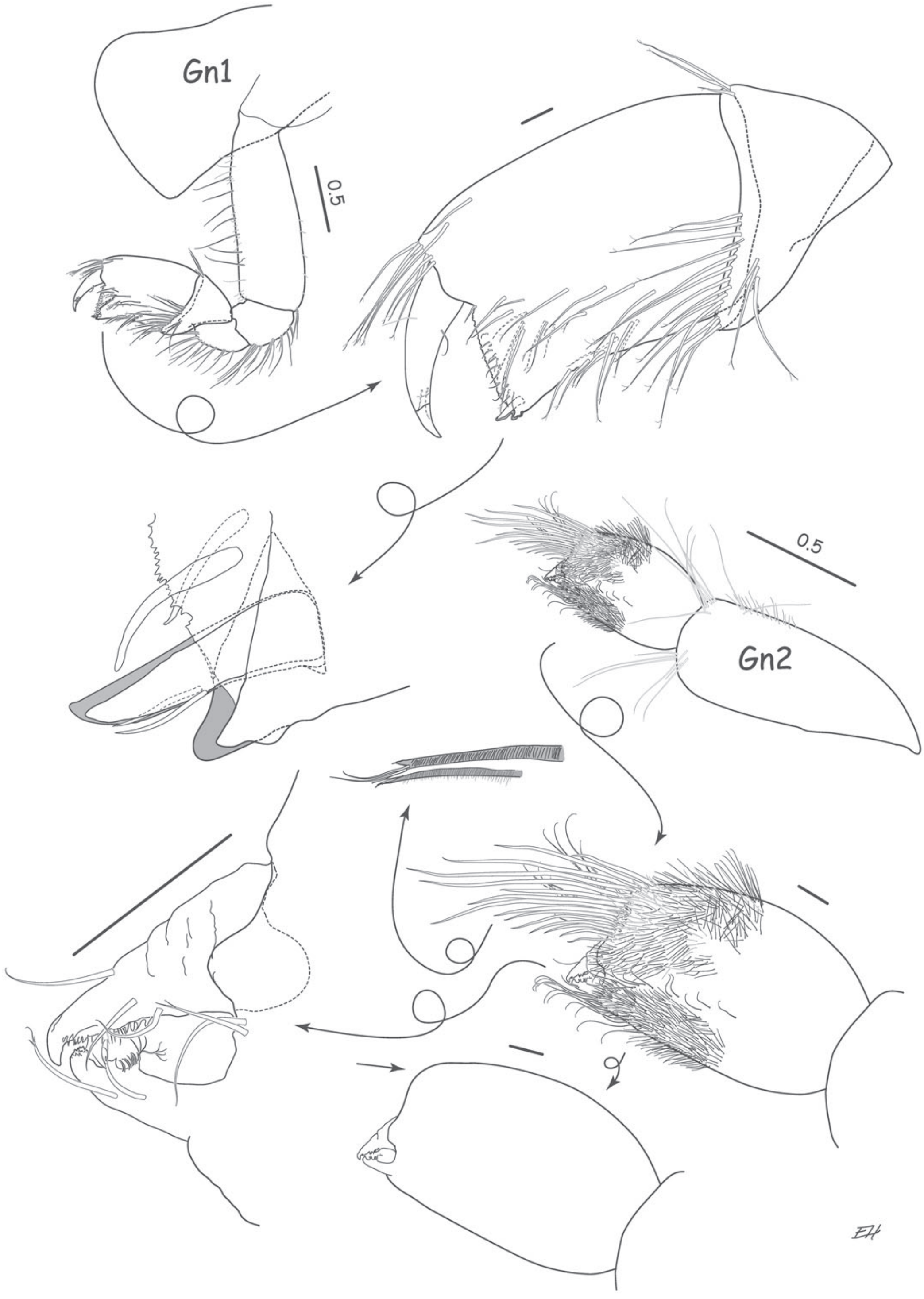

Fig. 31. *Abyssorchomene shannonae* sp. nov., holotype, ♀, 12 mm (ZMH K-61209). Setae omitted on Gn2 propodus outline. Scale bars = 0.1 mm unless indicated otherwise.

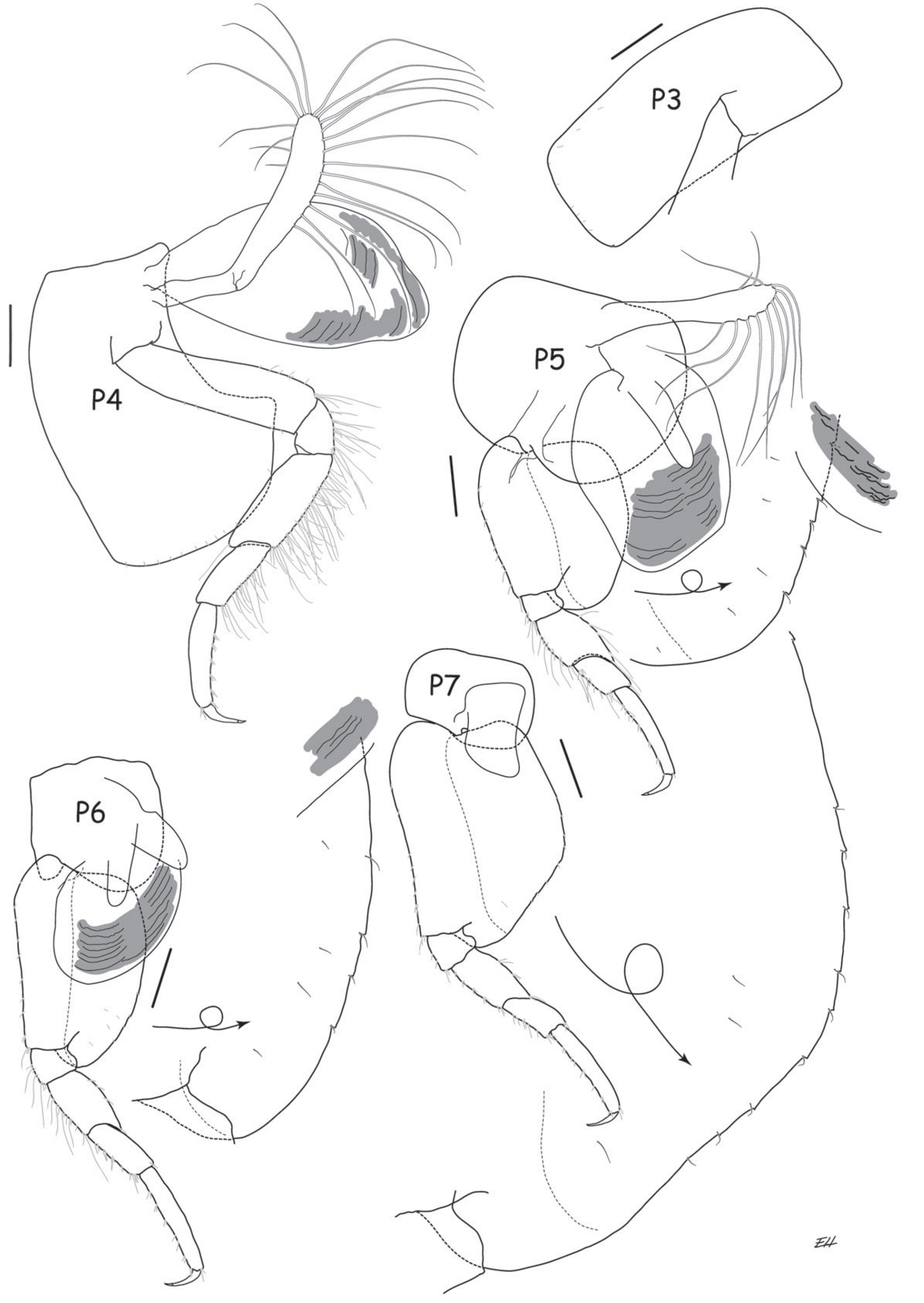

Fig. 32. *Abyssorchomene shannonae* sp. nov., holotype, ♀, 12 mm (ZMH K-61209). Scale bars = 0.5 mm.

Urosomite 1 (Fig. 26). With a deep, broadly rounded dorsal concavity in front of the strong, regularly rounded, dorsal boss, slightly overhanging urosomite 2.

Lateral cephalic lobe (Fig. 26). Broadly rounded, dorsal and ventral margin nearly equally convex.

Eye (Fig. 26). Non ommatidial, formed of pigment granules; long, relatively narrow, crescent shaped; extending parallel to the front head margin, length about two-thirds of the head height.

Antenna 1 (Fig. 26). Peduncular article 1 dilated, length 1.3 × width; flagellum 13-articulate, length 1.5 × peduncle, first article of flagellum callynophorate, densely furnished with double row of aesthetascs medially; accessory flagellum 5-articulate, first article wider and longer than remaining articles combined; calceoli absent.

Antenna 2 (Fig. 26). Slightly longer (less than 1.3 ×) than antenna 1; geniculate between peduncular articles 3–4, peduncular articles 4–5 lined with anteromedial brush setae; flagellum 16-articulate, calceoli absent.

Epistome (Fig. 26). Level with the slightly rounded upper lip, from which it is separated by a minute slit; forming long anterior cephalic ridge, weakly concave upward.

Upper lip (Fig. 26). Anterior margin weakly convex, not protruding; midventral margin with a small, angular projection.

Mandible (Fig. 29). Incisor smoothly convex and slightly widened; left lacinia mobilis curved, with 2 strong and 1 weak apical teeth, right lacking; accessory spine row with 3 strong spines, interspersed with fine setae; molar forming a narrow crest, somewhat falciform, acutely produced on proximal end, setose with mixed ornamentation, distal half or third setiferous, proximal half or two-thirds forming a reduced, narrow, triturative surface, hairy process attached proximal to molar; palp attached proximal to molar, article 2 1.56 × length of article 3, with 27 A2 setae, article 3 falciform, 0.63 × length of article 2, with 1 A3-seta, 22 D3-pectinate setae and 3 E3 setae.

Lower lip (Fig. 28). Outer lobes broad, slightly truncated medially and strongly setose, without inner lobes, mandibular lobes narrow.

Maxilla 1 (Fig. 28). Inner plate ovate, with small blunt distal projection surpassing the basal insertion of the 2 plumose apical setae; outer plate with 11 elongated spine-teeth in 7⁄4 crown arrangement; palp article 2 slightly widened at distal two-thirds, with 10 (left side) or 9 (right side) contiguous (or nearly contiguous) conical apical spines.

Maxilla 2 (Fig. 28). Outer and inner plates strongly tapering distally, both with strong rows of pectinate medial marginal spines and setae; inner plate much shorter than outer plate, with marginal setae on the distal half of the inner margin; apex of inner plate slightly surpassing the proximal end of setal row of outer plate.

Maxilliped (Fig. 30). Inner plate short, subrectangular, just reaching the distal end of the inner margin of palp article 1 and reaching about 0.3 × length of outer plate, distal margin not excavate, very weakly concave on outer half and sloped, with weak medio-distal extension, with 3 equally spaced, strongly embedded nodular spines, medial margin strongly setose; outer plate well developed, subovate, length 1.58 × width, not reaching inner distal end of palp article 2, with two dissimilar apical spines and numerous (10–11) embedded, medial nodular spines, medial margin distinctly scalloped; palp strongly setose

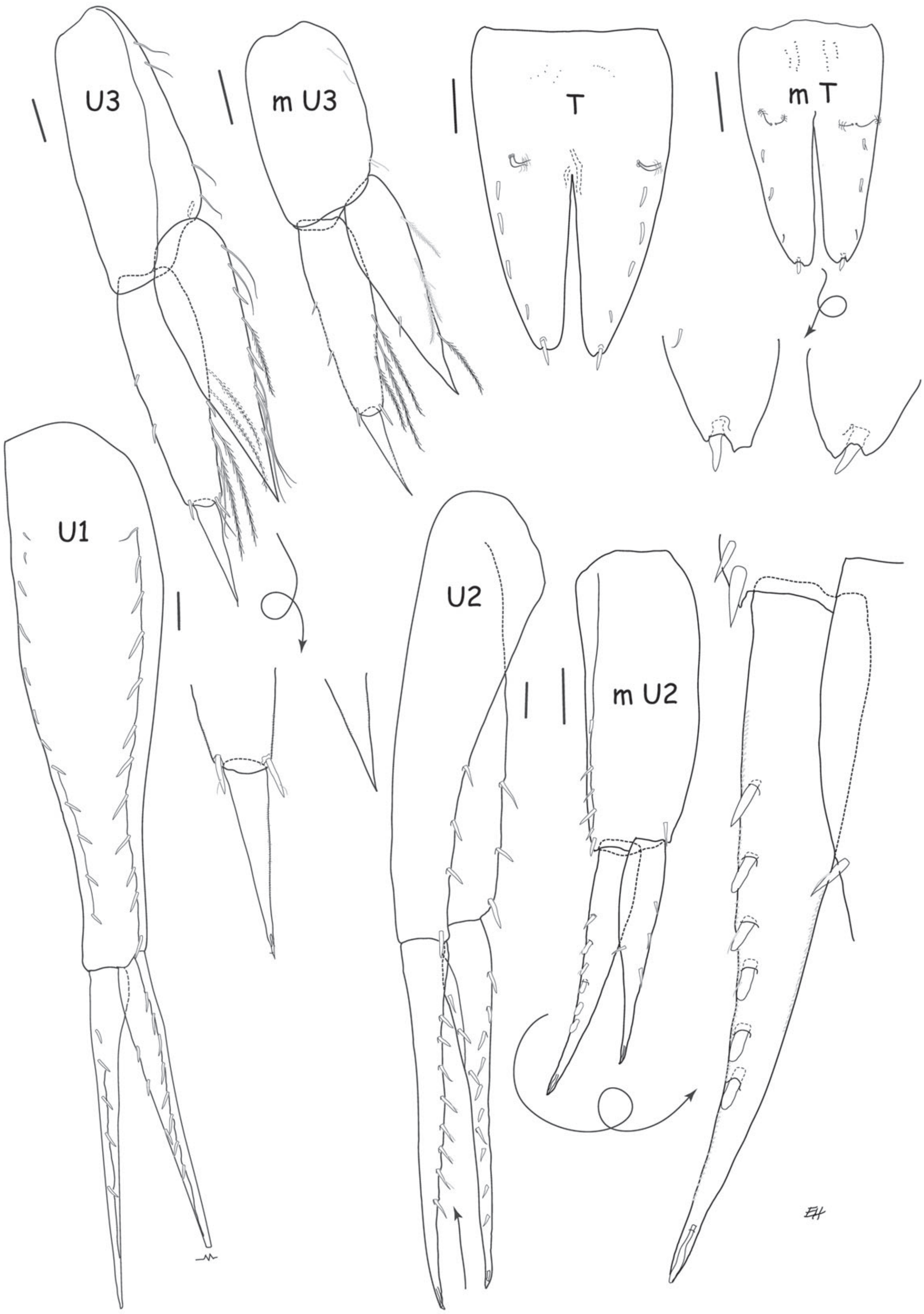

Fig. 33. *Abyssorchomene shannonae* sp. nov., holotype, ♀, 12 mm (ZMH K-61209); allotype, ♂, 7 mm (ZMH K-61210). Outer ramus is oriented on the left side of the uropods. Figures with sex not indicated are of female. Scale bars = 0.1 mm.

medially, article 4 well developed, about half the length of article 3, with 6 apically plumose setae on distal inner margin.

Gnathopod 1 (Fig. 31). Coxa distinctly widened, distal width 1.53 × proximal width and about 80% of length, anterior margin slightly concave, anterodorsal corner broadly rounded, posterior margin slightly sinuous, the distal half weakly concave, slightly convex in posterior half, posteroventral corner nearly right angled, narrowly rounded; basis stout, not expanded, width one-third of the length, slightly narrower than propod, anterior margin with long setae; ischium subequal to merus; carpus short, about half the length of the propodus, with produced narrow posterodistal lobe, not guarding the hind margin of propodus; propodus subchelate, subrectangular, with anterior margin regularly convex, posterior margin distinctly concave, with inflexion point at distal two-thirds, palm transverse, microcrenulate, palm corner with 2 blunt protrusions and defined by 1 medial and 1 lateral spine; dactylus subequal to palm or barely overriding palm corner.

Gnathopod 2 (Fig. 31). Carpus stout, length 2 × propodus; propodus chelate, suboval, anterodistal margin broadly expanded and slightly protruding, surface finely setose with distal groups of long pectinate setae, broad, length 1.48 × width, slightly narrower (about 90%) than carpus, hind margin weakly but distinctly convex; dactylus very small, inserted on the posterodistal one-third of distal margin, forming a distinct, curved cavity with the slightly excavate palm.

Pereopod 3 (Fig. 32). Coxa with anterior margin slightly convex, posterior margin slightly concave, length 2.3 × width; rest of pereopod like pereopod 4.

Pereopod 4 (Fig. 32). Coxa with posterodistal lobe broadly rounded distally, angle subquadrate, located slightly more distally (55%) than half of the coxa length; posterior margins of ischium-merus with clusters of long setae; propodus with 6 short spine groups; dactylus ~ 0.4 × length of propodus.

Pereopod 5 (Fig. 32). Coxa distinctly posterolobate, posterior lobe broad and regularly convex, coxa width slightly greater than length; basis length 1.13 × width, posterior margin with small serrations and setules, posterodistal lobe extending to distal margin of ischium; merus slightly expanded (0.63 × length), longer than carpus and bearing anterior and posterior setae; carpus with anterior marginal setae; propodus narrow, length equal to merus-carpus.

Pereopod 6 (Fig. 32). Coxa with posterodistal lobe broadly rounded; basis length 1.54 × width, posterior margin with 3–4 weak serrations, posterodistal lobe not reaching distal margin of ischium; merus slightly expanded (narrower than in P5) and bearing anterior long setae and few short slender posterior spines only; propodus slightly shorter than merus-carpus, with 6–7 clusters of short spines; dactylus 0.3 × length of propodus.

Pereopod 7 (Fig. 32). Coxa small, subovate; basis with anterior margin slightly concave, distal half of posterior margin strongly beveled, nearly straight, with very weak concavity and 9 weak serrations, posterodistal lobe not extending to distal margin of ischium; merus not expanded (narrower than in P6), anterior margins of merus-carpus with short spine groups, posterior margin bearing few short slender spines; propodus slightly shorter than merus-carpus; dactylus 0.3 × length of propodus.

Uropod 1 (Fig. 33). Peduncle long, about 1.6 × length of outer ramus and 1.74 × length of inner ramus, dorsolateral and dorsomedial margins spinose; inner ramus slightly shorter than outer, margins of rami with slender spines except medial margin of outer ramus, which lacks spines.

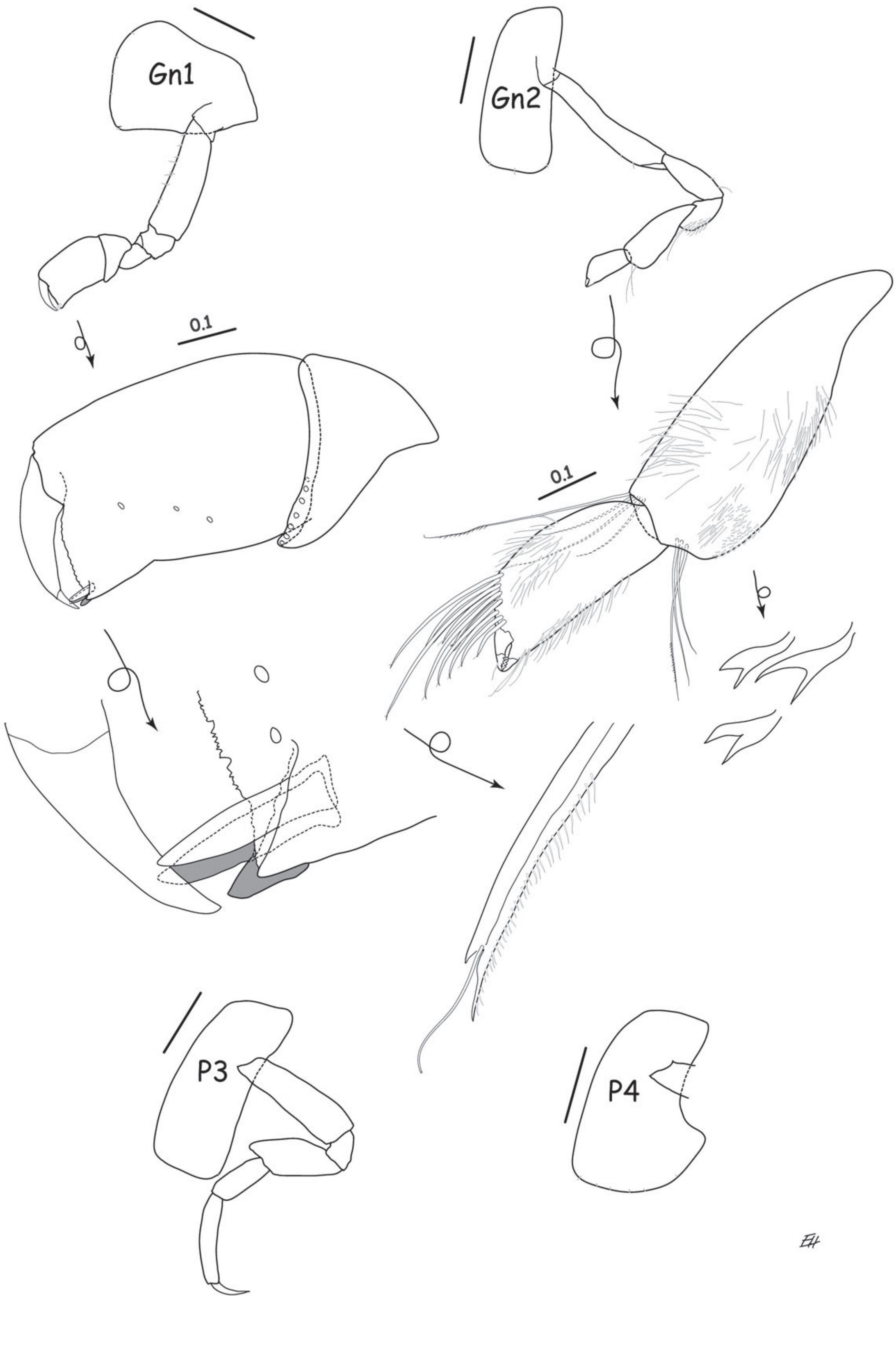

Fig. 34. *Abyssorchomene shannonae* sp. nov., allotype, ♂, 7 mm (ZMH K-61210). Setae omitted on Gn1 detail and P3. Scale bars = 0.5 mm unless indicated otherwise.

Uropod 2 (Fig. 33). Peduncle about 1.2 × length of outer ramus, dorsolateral and dorsomedial margins with 4 and 3 spines respectively; inner ramus very slightly shorter than outer ramus; outer ramus with closely spaced slender spines on dorsolateral margin; inner ramus margins with slender spines.

Uropod 3 (Fig. 33). Peduncle long, 0.8 × length of biarticulated outer ramus; second article of outer ramus 0.46 × length of article 1; inner ramus extends past distal end of article 1 and reaches 20–25% of article 2 of outer ramus; inner margins of rami with long plumose setae and slender spines.

Telson (Fig. 33). 1.6 × longer than wide, relatively deeply cleft (55%), lobes tapering distally with 4 lateral, submarginal spines and 1 distal spine.

Gills 5–6 (Fig. 32). With 1 long tubular accessory lobe on gill 5 and 2 on gill 6.

Gill 7 (Fig. 32). Present, well developed.

Brood plates (Fig. 32). On gnathopod 2 and pereopods 3–5, long, slender and curved distally, largest on gnathopod 2 and pereopods 3–4, with long curved brood setae, 20 setae on pereopod 4 plate and 12 on pereopod 5.

Stomodeum (Fig. 26). Extending to the 7th pereonite.

Male (Allotype 7 mm, ZMH K-61210).
Similar to female, but differing as follows:

Body. Smaller than female, and slightly less robust.

Lateral head lobe. Slightly narrower.

Antenna 1 (Fig. 27). Peduncular article 1 stouter, more compact; callynophore stronger, flagellum 8-articulate, articles shorter, with calceoli.

Antenna 2 (Fig. 27). Flagellum 12-articulate with calceoli.

Maxilla 1 (Fig. 28). Palp with 7 distal, conical spines; inner plate, distal projection acute.

Maxilliped (Fig. 30). Inner plate, distal margin slightly more excavate.

Pereopods (Fig. 34). Slightly more slender.

Gnathopod 1 (Fig. 34). Coxa more strongly widened, distal width about 1.7 × proximal width; basis distinctly narrower than propodus, anterior margin lacking long setae.

Gnathopod 2 (Fig. 34). Coxa slightly narrower and distally widening; propodus slender, length 2.5 × width, about ⅔ of carpus width, slightly expanded anteriorly, with straight hind margin, palm lacking concavity.

Coxa 3 (Fig. 34). Slightly narrower and widening distally.

Coxa 4 (Fig. 34). Slightly narrower, ventral margin more evenly convex and posteroventral lobe slightly smaller.

Coxa 5. Slightly more posterolobate.

Uropod 2 (Fig. 33). Peduncle shorter, about 1.13 × length of outer ramus, distolateral marginal spines of peduncle grouped at distal end; inner ramus distinctly shorter than outer; outer ramus distolateral spines stouter, bluntly rounded and more closely spaced distally, proximal spine acute (see p. 24).

Uropod 3 (Fig. 33). Peduncle shorter, 0.68 × length of biarticulated outer ramus.

Telson (Fig. 33). Cleft deeper (60%) than female.

Urosomite 1 (Fig. 26). Dorsal boss more unevenly rounded and slightly more protruding upward.

Epimeron 3 (Fig. 26). Posteroventral corner slightly more subquadrate.

Distribution

Southern Ocean: Eastern Weddell Sea (De Broyer *et al.* 2006); Northwestern Weddell Sea: Powell Basin (De Broyer *et al.* 2006); Scotia Sea (this paper). Southwest Atlantic: Argentine Abyssal Basin (this paper).

Depth range

Bottom records: 2194 m (De Broyer *et al.* 2006) to 4586 m (this paper).

Pelagic records: 3001 m (this paper).

Remarks

Abyssorchomene shannonae sp. nov. is easily differentiated from the smooth bodied Antarctic species *A. scotianensis* (Andres, 1983) in possessing a slight, but distinct dorsoposterior rounded hump on pereonites 1–7 and pleonites 1–2. The new species also differs from *A. scotianensis* by the very steeply angled, truncate bevel of the basis of pereopod 7 (vs weakly angled bevel) and the uropod 3 inner ramus length, which greatly exceeds the distal end of article 1 of the outer ramus (vs just reaching the distal end).

Abyssorchomene shannonae sp. nov. is superficially very similar to *A. abyssorum* and *A. patriciae* sp. nov., as these species also possess the dorsoposterior hump on the pereonites and pleonites. However, *A. shannonae* differs from both these species in many characters. From *A. abyssorum*, it differs in the much greater distally widened coxa 1 (1.4–1.7 × proximal width vs 1.2 ×); the (mature) female gnathopod 2 propodus which is broad, with a palm concavity (length less than 1.5 × width vs narrow, ~ 2.4 × width and lacking concavity); the coxa 5 posteroventral lobe which is broadly rounded (vs narrowly rounded); the very strongly, steeply angled truncated bevel of the basis of pereopod 7 (vs weakly angled bevel) and the shorter uropod 3 inner ramus, which extends to about 20–25% of the length of article 2 of the outer ramus (vs extends to 70% of the length of article 2 of the outer ramus).

Lastly, from *A. patriciae* sp. nov. it differs in the shape of the lateral head lobe, with dorsal and ventral margins nearly similar (vs dorsal and ventral margins not similar, dorsal margin strongly convex, ventral margin nearly straight); the female gnathopod 2 propodus with anterodistal margin broadly expanded and protruding, dactylus tiny, inserted near the bottom of the distal margin (vs anterodistal margin not expanded and protruding, dactylus large, inserted at the top of the distal margin); the coxa 5 posteroventral lobe which is broadly and evenly rounded (vs narrowly rounded, posterior margin straight posterodistally); the longer uropod 1 peduncle, which is 1.6 × the length of the outer ramus (vs 1.45 ×) and the length of the uropod 3 inner ramus, which reaches to 20–25% of article 2 of uropod 3 outer ramus (vs reaching to ~ 63% of article 2 of outer ramus).

Key to the species of the Abyssorchomene abyssorum complex

1. Pereonites 1–7 and pleonites 1–2 with weak but distinct dorsoposterior rounded hump; epistome level with upper lip; uropod 3 inner ramus extends well past distal end of article 1 of uropod 3 outer ramus; maxilla 1 palp distal end weakly convex, with distal spines contiguous 2
– Pereonites 1–7 and pleonites 1–2 lacking dorsoposterior rounded hump; epistome weakly but distinctly protruding in front of upper lip (or level with upper lip); uropod 3 inner ramus just reaches (or very slightly exceeds) distal end of article 1 of uropod 3 outer ramus; maxilla 1 palp distal end strongly convex, with distal spines not contiguous ....***A. scotianensis*** (Andres, 1983)

2. Coxa 1 slightly widened distally, ~ 1.2 × proximal width; gnathopod 2 propodus of female narrow, (similar in form to male), length ~ 2.5 × width, palm lacking concavity; uropod 3 inner ramus extends to ~ 70% of the length of article 2 of uropod 3 outer ramus.............***A. abyssorum*** (Stebbing, 1888)
– Coxa 1 strongly widened distally, ~ 1.3–1.7 × proximal width; gnathopod 2 propodus of female broad, (different in form to narrow male propod), length < 2 × width, palm with small concavity; uropod 3 inner ramus extends to 63% or less of the length of article 2 of uropod 3 outer ramus 3

3. Coxa 5 posteroventral lobe broadly rounded, posterior margin evenly rounded; lateral head lobe, dorsal and ventral margins similar; gnathopod 2 propodus of female with anterodistal margin broadly expanded and protruding, dactylus tiny, inserted near the bottom of the distal margin; gnathopod 2 propod of male slightly expanded anteriorly; pereopod 7 basis posteroventral corner steeply and strongly beveled; uropod 3 inner ramus extends to ~ 20–25% of article 2 of uropod 3 outer ramus..***A. shannonae*** sp. nov.
– Coxa 5 posteroventral lobe narrowly rounded, posterior margin with distinct straight section; lateral head lobe, dorsal margin strongly convex, ventral margin nearly straight with slight concavity at the midpoint; gnathopod 2 propodus of female with anterodistal margin not expanded and protruding, dactylus large, inserted at the top of the distal margin; gnathopod 2 propod of male not expanded, narrow, dorsal margin smoothly convex; pereopod 7 basis posteroventral corner shallowly and weakly beveled; uropod 3 inner ramus extends to ~ 63% of article 2 of uropod 3 outer ramus...................... ....***A. patriciae*** sp. nov.

Discussion

One of our aims was to revise and clarify the status of the wide ranging, but poorly known uristid scavenging amphipod, *Abyssorchomene abyssorum* (Stebbing, 1888). The long overdue and clearly needed redescription was initiated by examining the male holotype specimen and providing new, detailed illustrations of both the male and female. Further, a comprehensive account of the female is provided, previously not described in detail. This was facilitated by recovering specimens in baited trap collections from the DIVA-3 (2009) campaign in the southwest Atlantic, very close to the type locality of *A. abyssorum*. During detailed examinations of these collections and other North Atlantic material, we have also discovered and described two new species in the complex, *A. patriciae* sp. nov. and *A. shannonae* sp. nov. A key to the species of the *A. abyssorum* complex is also presented.

This study also attempted to verify the numerous previous identifications of *A. abyssorum* in the literature by borrowing and examining the specimens when possible. An extensive list of published records of *A. abyssorum* sensu lato (see Table 1) is given, with the most likely identification based on our study. These identifications will require confirmation, as we have not been able to examine all listed specimens. Given the very similar morphologies of the new species described here, all *A. abyssorum* identifications not verified in this paper remain to be carefully checked and assessed. It is apparent to us that the numerous reports of *A. abyssorum* may contain several undescribed, morphologically similar species, two of which are described herein. Material of *A. abyssorum* from the Pacific and Indian Oceans await critical analysis.

Recent material from ANDEEP expeditions gave us the opportunity to provide new illustrations and descriptions of the Southern Ocean endemic *A. scotianensis* (Andres, 1983) to complement the original description. As the species had not been figured since, these new illustrations provide more clarity to the species, especially regarding the morphology of females.

As an obvious next step, there is a need for a genetic confirmation of our morphology-based hypotheses. Recent molecular studies (Havermans *et al.* 2010, 2011; Havermans 2012; Corrigan *et al.* 2014; Ritchie *et al.* 2015) have drawn attention to some issues concerning the taxonomic status of several species of *Abyssorchomene*, originating from traditional morphology-based taxonomy. Havermans (2012: chapter 8) emphasized that an *Abyssorchomene* clade (comprising *A. chevreuxi*, *A. scotianensis* and *A.* sp. n. 1 = *A. shannonae* sp. nov.) formed a well-supported monophyletic unit. However, molecular analyses of other species of *Abyssorchomene* are currently too limited to allow delineating the genus phylogeny (see Havermans 2012: tables 9–10).

On the other hand, our results bring a new confirmation that many so-called deep-sea 'cosmopolitan' species are in fact often composed of several cryptic or pseudocryptic species with more restricted distributions (e.g., Brandt *et al.* 2012; Havermans *et al.* 2013; Krapp-Schickel & De Broyer 2014; d'Udekem d'Acoz & Havermans 2015; Bribiesca-Contreras *et al.* 2021; Jażdżewska *et al*. 2021). This emphasizes the need to carefully revise the existing identifications of all species of *Abyssorchomene* (see Horton *et al.* 2021), as other potential species may still await critical recognition within the complex.

Acknowledgements

There are a multitude of persons we would like to thank for providing specimens crucial for our study. A huge thank you goes to Captain Pahl, the officers and crew of the *RV Meteor*, Chief Scientist Pedro Martinez Arbizu (Forschungsinstitut Senckenberg, DZMB) and the scientific personnel of DIVA-3 for a very successful sampling expedition of which one of us (EH) was collecting baited trap material. The Alfred Sloan Foundation provided funding through the Census of Marine Life (CoML) and is gratefully thanked.

CDB wishes to thank Prof. Dr Angelika Brandt (Senckenberg, Frankfurt) for her invitation to take part in the *RV Polarstern* ANDEEP campaigns, as well as the captains and crews of *RV Polarstern* for their professional help during the cruises.

Thanks are extended to Dr Tammy Horton (NOC, UK) for providing the specimens of *Abyssorchomene patriciae* sp. nov. from the many *RRS James Cook* ECOMAR and Porcupine Abyssal Plains cruises during 2007–2011, and for her extensive review of Table 1. We are particularly grateful to the collection staffs of NHM (London), ZMH (Hamburg), MNHN (Paris) and ZMUC (Copenhagen) who kindly loaned us various *Abyssorchomene* material. Catalogue numbers for type material were provided by the following persons: Philippe Ste-Marie (CMN), Dr Saskia Brix and Nancy Mercado Salas (ZMH), Dr Yves Samyn and Linda Meurisse (RBINS) and Dr Lauren Hughes/Miranda Lowe (NHM). Dr Lauren Hughes personally examined material at the NHM for us and we thank her for her assistance.

Study support over the years was given to the first author through CMN Research Advisory Committee grants and was highly appreciated. David Shale and Cedric d'Udekem d'Acoz provided an image of freshly collected *Abyssorchomene patriciae* sp. nov. and *A. scotianensis*, respectively (Figs 10, 18) and are gratefully acknowledged.

The first author also takes this opportunity to personally thank his good friend, mentor and co-author Claude De Broyer, who has graciously hosted and generously supported his many working trips to his lab at RBINS, Brussels, where much of our study was performed. Finally, we appreciate all the suggestions and comments given by the reviewers that greatly improved an earlier version of the manuscript.

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Manuscript received: 7 October 2021
Manuscript accepted: 21 February 2022
Published on: 21 June 2022
Topic editor: Tony Robillard
Section editor: Fabio Stoch
Desk editor: Marianne Salaün

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Zeitschrift/Journal: European Journal of Taxonomy

Jahr/Year: 2022

Band/Volume: 0825

Autor(en)/Author(s): Hendrycks Ed A., de Broyer Claude

Artikel/Article: New deep-sea Atlantic and Antarctic species of Abyssorchomene De Broyer, 1984 (Amphipoda, Lysianassoidea, Uristidae) with a redescription of A. abyssorum (Stebbing, 1888) 1-76