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Unciolidae of Deep-Sea Iceland (Amphipoda, Crustacea) †

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Abstract: An overview of North Atlantic *Unciola* Say, 1818 is provided along with the description of two new species, *U. conchicola* sp. nov. and *U. icelandica* sp. nov. Both deep-sea species were collected living sympatrically at an almost 2000 m depth in the Iceland Basin, southwest of Iceland, each showing a vertical distribution of more than 1 km. In addition to the wide depth range, *U. icelandica* sp. nov. also shows a broad geographic distribution of more than 1000 km. *Unciola conchicola* sp. nov. was seen to attach its tubular domicile to the inner cavity of a gastropod shell; however, no specific lifestyle information is known for the species *U. icelandica* sp. nov. Both species present novel characters for the genus: in *U. conchicola* sp. nov., the epimeral plates 1–3 have acute projections angled ventrally, while in *U. icelandica* sp. nov., the male antenna 2 pedunclar article 2 is developed into a distinct phalange. The large amount of unciolid material allowed for ontogentic studies. The material of *U. planipes* Norman, 1867 was investigated. Changes from juvenile to adult specimens of *Neohela monstrosa* (Boeck, 1861) are discussed. A key is provided to the eight North East Atlantic species of *Unciola*.

Keywords: *Unciola*; new species; North Atlantic; benthos; identification key

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1. Introduction

During the IceAGE expeditions I and II (Icelandic Marine Animals: Genetics and Evolution), a total of 155 specimens of the family Unciolidae were recovered from ten stations with a very wide depth range, from 118 to 2749 m [1] (Brix et al., 2018).

There are two genera in the subfamily Unciolinae present in Nordic Seas, *Neohela* S.I. Smith, 1881 and *Unciola* Say, 1818. Currently, 14 species of *Unciola* are known worldwide [2] (Horton et al., 2023), with all species known only from the Northern Hemisphere, including eight species from the North Atlantic/subarctic sea region: (1) *U. crenatipalma* (Spence Bate, 1862), described from the UK, from shallow waters less than 30 m, with a southerly distribution being infrequently reported in Norwegian waters; (2) *U. laticornis* Hansen, 1887 and (3) *U. petalocera* (G.O. Sars, 1879), which have a northern distribution, with a few records within the Barents Sea [3] (Vader et al., 1997);(4) *U. planipes* Norman, 1867, commonly recorded in regions of Norway from Skagerrak to the north of Lofoten [3] (Vader et al., 1997) and considered a deep-water species found below 400 m on the outer parts of the Norwegian shelf [4] (Buhl-Jensen 1986); and (5) *U. crassipes* Hansen, 1887 and (6) *U. leucopes* (Krøyer, 1845), the only two *Unciola* species that are reported from both the eastern and western Atlantic. From the western side of the North Atlantic, (7) *Unciola dissimilis* Shoemaker, 1945 and (8) *Unciola serrata* Shoemaker, 1945 are reported.

The Unciolid genus *Neohela* S.I. Smith, 1881 consists of six species [2] (Horton et al., 2023) and is also known only from North Hemisphere records. One of the largest and most conspicuous species is *N. monstrosa* (Boeck, 1861), which reaches up to 31 mm as adults [5] (Stephensen, 1944). It is common in the cold and deep waters of the Norwegian Sea from 300 to 2000 m, where it forms dense populations in soft deep-sea sediment, where it is

known to create burrows up to 10 cm deep [6] (Buhl-Mortensen et al., 2016). Here we describe a juvenile *N. monstrosa* from the IceAGE collections, providing additional detail on ontogenic change for material of less than 20 mm, contrasting 31 mm adults, which are well described in the literature [5] (Stephensen, 1944).

From the IceAGE material of *Unciola*, we described two species new to science from Icelandic waters and reported the known species *U. planipes* Norman, 1867 (Figure 1).

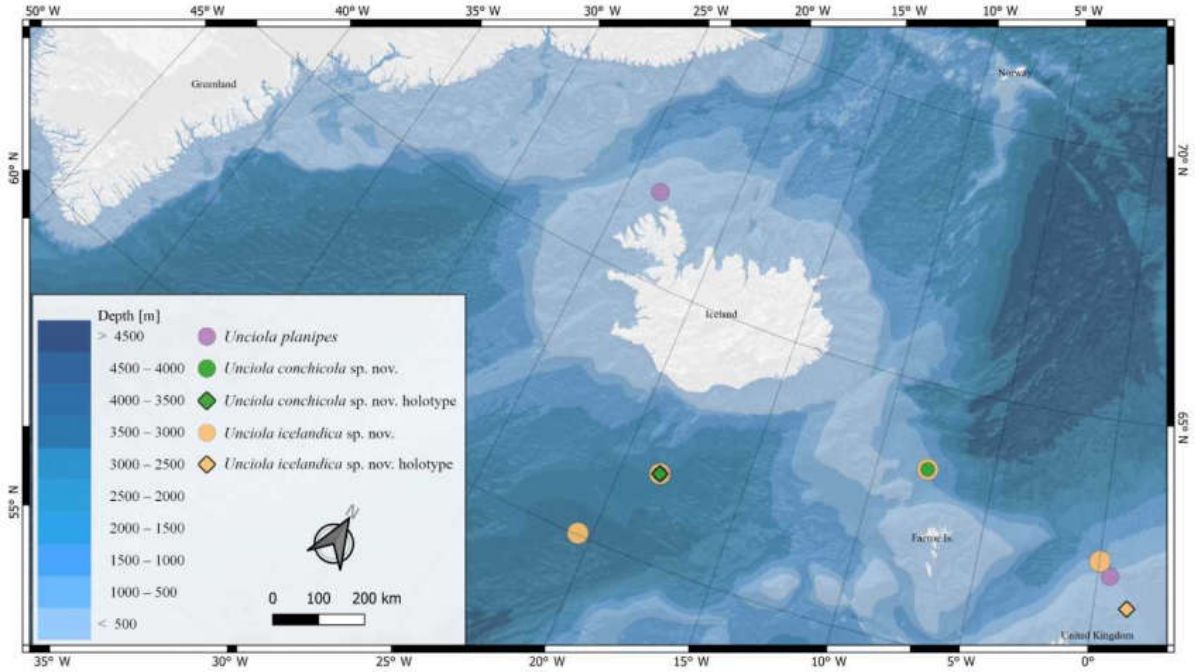

Figure 1. Locations of *Unciola* species found in the North Atlantic based on the material collected during IceAGE expeditions.

The new species, *U. conchicola* and *U. icelandica*, occur sympatrically at close to 2000 m depths. An updated key to the North Atlantic *Unciola* species is provided.

2. Materials and Methods

Samples were taken during the IceAGE expeditions (Icelandic Marine Animals: Genetics and Evolution [7]) via RV Meteor in 2011 and Poseidon 2013 (Table 1). The sampling gear was an epibenthic sledge [8] (Brenke, 2005). All sorting was handled according to Riehl et al. (2014) [9] using an undisturbed cooling chain protocol.

The body length of specimens was measured by tracing the dorsal length from the tip of the rostrum to the end of the telson. To ensure accuracy, telsonicsetal counts were made by mounting whole animals on slides and observing them on a stereomicrosope before returning them to ethanol. Specimens were dissected in an Euparal essence and 96% ethanol solution before being mounted in Euparal as slide preparations. The pencil drawings were conducted with a LeicaM125 and an Olympus BX53 at the laboratories of the University of Hamburg.

In preparation for scanning electron microscope (SEM) imaging, whole animal specimens and appendages were dehydrated through a graduated ethanol series from 80 to 99 percent, acetone dried, mounted on stubs and coated with gold-palladium. Stub mounted material was imaged using a SEM LEO1525.

Abbreviations are used in the following: Antenna 1 (A19, Antenna 2 (A2), Maxilliped (Mxp), Mandible (Md) Maxilla 1(Mx1), Maxilla 2 (Mx2), Gnathopod 1(G1), Gnathopod 2 (G2), Pereopod (P), Telson (T), Uropod (U), Urosome (Ur).

The material of this study is deposited at the Senckenberg Museum Frankfurt, the DZMB Hamburg and the Zoological Museum Hamburg, Germany.

Table 1. Examined material of unciolid genera *Unciola* and *Neohela* collected during IceAGE expeditions.

Species	Type	Number of Specimens	Sex	Latitude [dec]	Longitude [dec]	Depth [m]	Collection ID	Station	Expedition
Unciola conchicola sp. nov.	Holotype	1	m	61.718	−18.44	1921	ZMHK62083	989-3	Me85
Unciola conchicola sp. nov.	Paratype	1	m	61.718	−18.44	1921	ZMHK-62088	989-3	Me85
Unciola conchicola sp. nov.	Paratype	1	m	61.718	−18.44	1921	ZMHK-62089	989-3	Me85
Unciola conchicola sp. nov.	Paratype	1	m	61.718	−18.44	1921	ZMHK-62090	989-3	Me85
Unciola conchicola sp. nov.	Paratype	1	m	61.718	−18.44	1921	ZMHK-56724	989-3	Me85
Unciola conchicola sp. nov.			juv in shell	61.718	−18.44	1921	ZMHK-62085	989-3	Me85
Unciola conchicola sp. nov.		2	1 m, 1 juv	63.393	−7.838	867	SMF 52.175	880-2	POS456
Unciola icelandica sp. nov.	Holotype	1	m	61.418	1.352	169	SMF 52.167	866-3	POS456
Unciola icelandica sp. nov.	Paratype	1	f	61.718	−18.44	1921	ZMHK-62086	989-3	Me85
Unciola icelandica sp. nov.	Paratype	1	m	61.718	−18.44	1921	ZMHK-62084	989-3	Me85
Unciola icelandica sp. nov.	Paratype	2	1 juv	61.718	−18.44	1921	ZMHK-62089	989-3	Me85
Unciola icelandica sp. nov.	Paratype	1	m	61.718	−18.44	1921	ZMHK-62087	989-3	Me85
Unciola icelandica sp. nov.	Paratype	1	f	62.272	0.023	868	SMF 52.171	869-3	POS456
Unciola icelandica sp. nov.	Paratype	1	f	61.718	−18.44	1921	ZMHK-56725	989-3	Me85
Unciola icelandica sp. nov.		4	2 f, 2 juv	63.393	−7.838	687	SMF 55.297	880-2	POS456
Unciola icelandica sp. nov.		24		60.035	−20.533	2749	SMF 55.295	983-3	Me85
Unciola planipes Norman, 1867		4		62.006	0.511	302	SMF 52.169	867-1	POS456
Unciola planipes Norman, 1867		8		62.006	0.511	302	SMF 52.170	867-1	POS456
Unciola planipes Norman, 1867		4		66.650	−23.456	118	SMF 52.258	1104-1	Me85
Neohela monstrosa G.O. Sars, 1885		1	m	67.663	12.233	1826	SMF 52.259	1181-1	Me85
Neohela monstrosa G.O. Sars, 1885		1	intersex	67.663	12.233	1826	SMF 52298	1181-1	Me85

3. Results

Systematics

Amphipoda Latreille, 1816
Aoroidea Stebbing, 1899
Unciolidae Myers and Lowry, 2003
Unciolinae Myers and Lowry, 2003
Neohela S.I. Smith, 1881

Neohela monstrosa (Boeck, 1861)

Hela monstrosa [10–12] Boeck, 1861: 669. —Boeck, 1871: 181. —Boeck, 1876: 643, pl. 32 Figure 1.

Neohela monstrosa. —[13] S.I. Smith, 1881: 450. —[14] Hansen, 1888: 168. —[15] Della Valle, 1893: 343, pl. 55 Figure 19–24. —[16] G.O. Sars, 1894: 624, pl. 224. —[17] Stebbing, 1906: 675. —[18] Shoemaker, 1930: 129. —[19] Stephensen, 1933: 51, Figure 26, not Figure 23 (lapsus for *N. maxima*). —[20] Stephensen, 1942: 404 (? in part). —[21] Enequist, 1949: 381, Figure 67. —[22] Coyle and Mueller, 1981: 11. —[23] Gurjanova, 1951: 959, Figure 667. —[24] Gurjanova, 1953: 240. —[25] Barnard and Karaman, 1991: 215, Figure 39D, 42J, 44F, 45T.

Neohela phasma [13] S.I. Smith, 1881: 448; [17] Stebbing, 1906: 676; [23] Gurjanova, 1951: 959 (key). *Helella monstrosa* [26] G.O. Sars, 1883: 31. —[27] d'Udekemd'Acoz, 2007: 32–35, Figure 11.

Not *Neohela monstrosa*. —? [28] G.O. Sars, 1885: 68 (in part: deep records). —? [29] Chevreux, 1899: 147. —? [30] Chevreux 1900: 130. —? [20] Stephensen, 1942: 404, (in part: deep records). —? [31] Piepenburg et al., 1996: 439 (in part: deep records). —? [32] Węsławski et al., 2003: 81. *Neohela* sp. A. —? [32] Węsławski et al., 2003: 81. (accepted as *Neohela lamina* d'Udekem d'Acoz, 2007 following [27] d'Udekemd'Acoz, 2007).

Material examined.

SMF 52259, one male, 19 mm; SMF 55298 (Figures 2 and 3), one intersex and one juvenile, Norwegian Basin, Norwegian Sea, 1886 m, see Table 1.

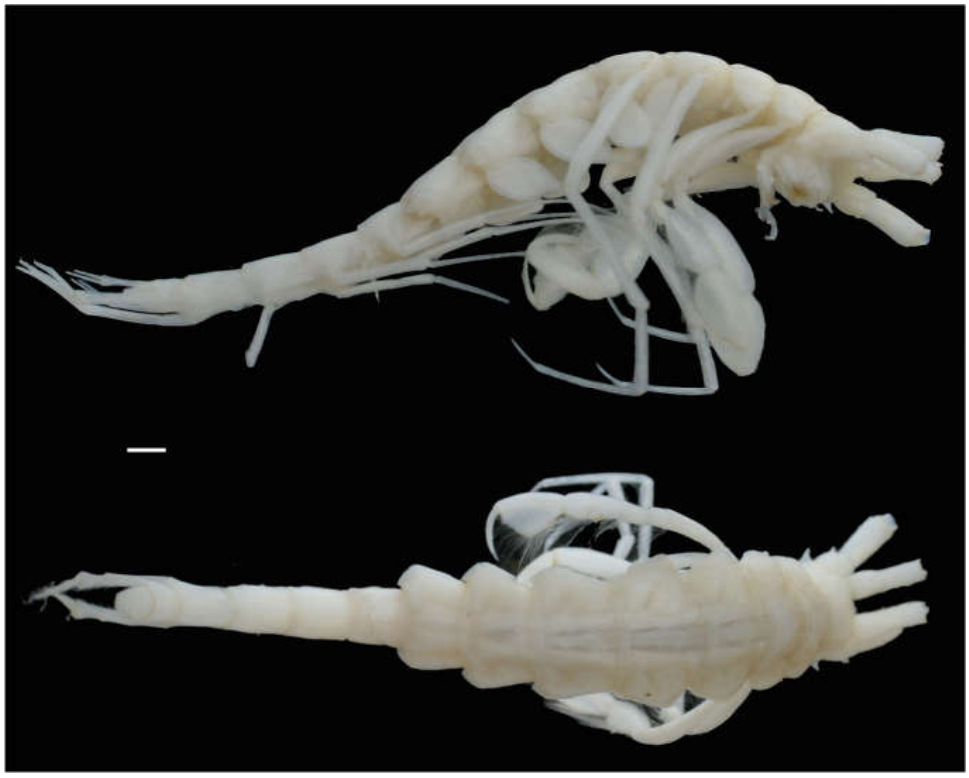

Figure 2. Photo image of *Neohela monstrosa* (Boeck, 1861) male, 19 mm, SMF 52.259, Norwegian Sea, Norwegian Basin, North Atlantic, 1886 m. Scale: 1 mm.

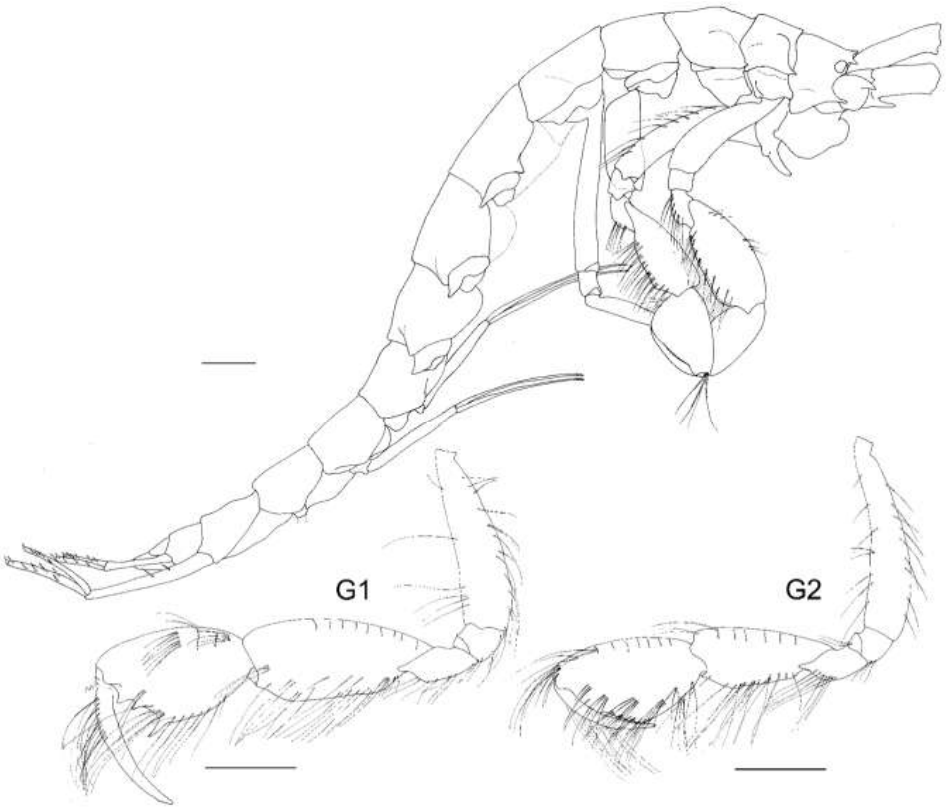

Figure 3. *Neohela monstrosa* (Boeck, 1861) male, 19 mm, SMF 52.259, Norwegian Sea, Norwegian Basin, North Atlantic, 1886 m; scale habitus: 1 mm, gnathopods 1–2 scale: 0.5 mm.

Remark. A *N. monstrosa* juvenile male of 19 mm is presented here via morphological investigation. Previous records document the adult specimens, which achieve a substantial adult size of 31 mm from other North Atlantic samples [5] (Stephensen, 1944). Variation include juveniles with three teeth on the gnathopod 1 palm, being a proximal, medial and distal (in the corner), adults have three teeth projecting from the palm. Other notable species-level characters which remain consistent are length to width ratio of the gnathopod 1 and 2 carpus and propodus.

Unciola Say, 1818
Unciola [33] Say, 1818: 388. —[16] G.O. Sars, 1894: 619. —[17] Stebbing, 1906: 676. —[20] Schellenberg, 1942: 215. —[34] J.L. Barnard, 1969: 197. —[35] J.L. Barnard, 1973: 23. —[36] Karaman, 1981: 14. —[25] Barnard and Karaman, 1991, 237, 238.
Glauconome [37] Kroyer, 1845: 491. (junior homonym)
Dryope [38] Spence Bate, 1862: 276. (junior homonym)

***Unciola conchicola* sp. nov.**
Figures 4–10.
urn:lsid:zoobank.org:act:428FA701-A6FE-4728-A239-BAA5FB06772E

Type Material

Holotype male, 10 mm, whole animal illustrated, ZMHK 62083, South Island, Iceland Basin, (61°42.630′ N, 19°32.960′ W–61°42.170′ N, 19°32.020′ W), epibenthic sledge, 1912–1921 m, 31 August 2011, expedition RV Meteor (St 85-3-989).

Paratypes, all males, same location as holotype: ZMHK 62088, ZMHK 62089, ZMHK 62090 and ZMHK-56724 on SEM stud.

Further material examined: SMF 52175, one male, one juvenile, Faroe Islands Ridge middle, 63°23.360′ N, 008°09.420′ W–63°24.620′ N, 008°11.220′ W, epibenthic sledge, 686–687 m, 31 July 2013, expedition RV Poseidon (St880-2).

Etymology. Named from its domicile lifestyle with molluc shells.
Type locality. South Island, Iceland Basin.
Description. Based on type material.
Head. Eyes absent. Rostrum, well-developed, acute. Lateral cephalic lobes produced into flange engulfing peduncle of antenna 1, anteroventral margin subquadrate. *Antenna 1* peduncle article 1 length twice the width, dorsal margin lined with robust setae; article 2 twice length of article 1, ventral margin lined with short robust and long slender setae; article 3 length five times the width, shorter than article 1, accessory flagellum 2-articulate; primary flagellum 16 articulate. *Antenna 2* peduncle article 1–2 anteroventral corner acute produced; article 3 length 1.1 times as long as it was broad, anteroventral margin with robust seta, ventral margin lined with slender setae; article 5 shorter than article 4; flagellum with nine articles. *Mandible* molar absent; accessory setal row absent; palp article 3 shorter than 2, length 5.5 times the width, lined with long slender setae. *Maxilla 1* inner plate unknown; outer plate with ten robust setae; palp 2-articlulate, article 2 with five robust and five slender setae. *Maxilliped* inner plate with three robust setae; outer plate apex with line with setae progressing from longer to more stout robust setae; palp article 4 proximally narrow and distally broad, dactylus with unguis present.
Pereon. *Pereonites* cuticle rugosely textured. *Pleonite 3* sternal process well-developed, directed anteriorly, apically acute. *Pleonite 4* sternal process moderately developed, directed anteriorly, apically subacute. *Pereonite 5* sternal process minutely developed, anteriorly developed, subacute. Coxa subrectangular, depth less than half of pereonites. *Gnathopod 1* larger than gnathopod 2, coxa anteroventral corner acutely produced; basis stout, anterodistal margin subacute; ischium much broader than it was long; merus twice as long as it was broad, posterior margin lined with slender setae; carpus compressed between merus and propodus, posterior margin with single robust and sparse slender setae; propodus length twice the width, anterior and posterior margins with a few slender setae, posterior margin straight, palm subacute to acute, length two thirds of posterior margin, with weak distal

sinus, defined by rounded corner with three robust setae; dactylus closing along palm, unguis present, anterior margin lined with rows of setae, inner margin serrate. *Gnathopod 2* subchelate; basis anterior and posterior margin weakly convex without setae, anterodistal corner subacute; ischium length 1.2 times the width; merus unknown; carpus length 2.4 times the width, longer than propodus length; propodus anterior and posterior lined with rows of long slender setae, length 2.4 times the width, palm transverse, defined by subquadrate corner. *Pereopods 5 to 7* basis rectilinear; posterior margins with plumose setae; dactylus unguis present.

Pleon. *Epimeron* 1 posteroventral margin acutely produced, lined with plumose setose. *Epimera 2–3* ventral margin with acute tooth in middle of margin, posterior margin straight, corner evenly rounded. *Urosomites 1–3* not coalesced. *Urosomite 1* ventral margin lined with plumose setae. *Uropod 1* biramous, peduncle much longer than it was broad, distoventral interramal spine shorter than peduncle; rami subequal; inner ramus with apical robust setae only. *Uropod 2* biramous; peduncle with distoventral interramal spine. *Uropod 3* uniramous, ramus shorter than peduncle, with apical robust setae. *Telson* hemiacitabulate, dorsally concave, apical margin rounded.

Remark. *Unciola conchicola* sp. nov. is most similar to *Unciola planipes* Norman, 1867.

Via the dorsoventrally flattened body form and rugose cuticle, these species can be readily separated by the shape of the Epimera 1 to 3, where the acute projection is directed ventrally in *U. conchicola* sp. nov. and posteriorly in *U. planipes*.

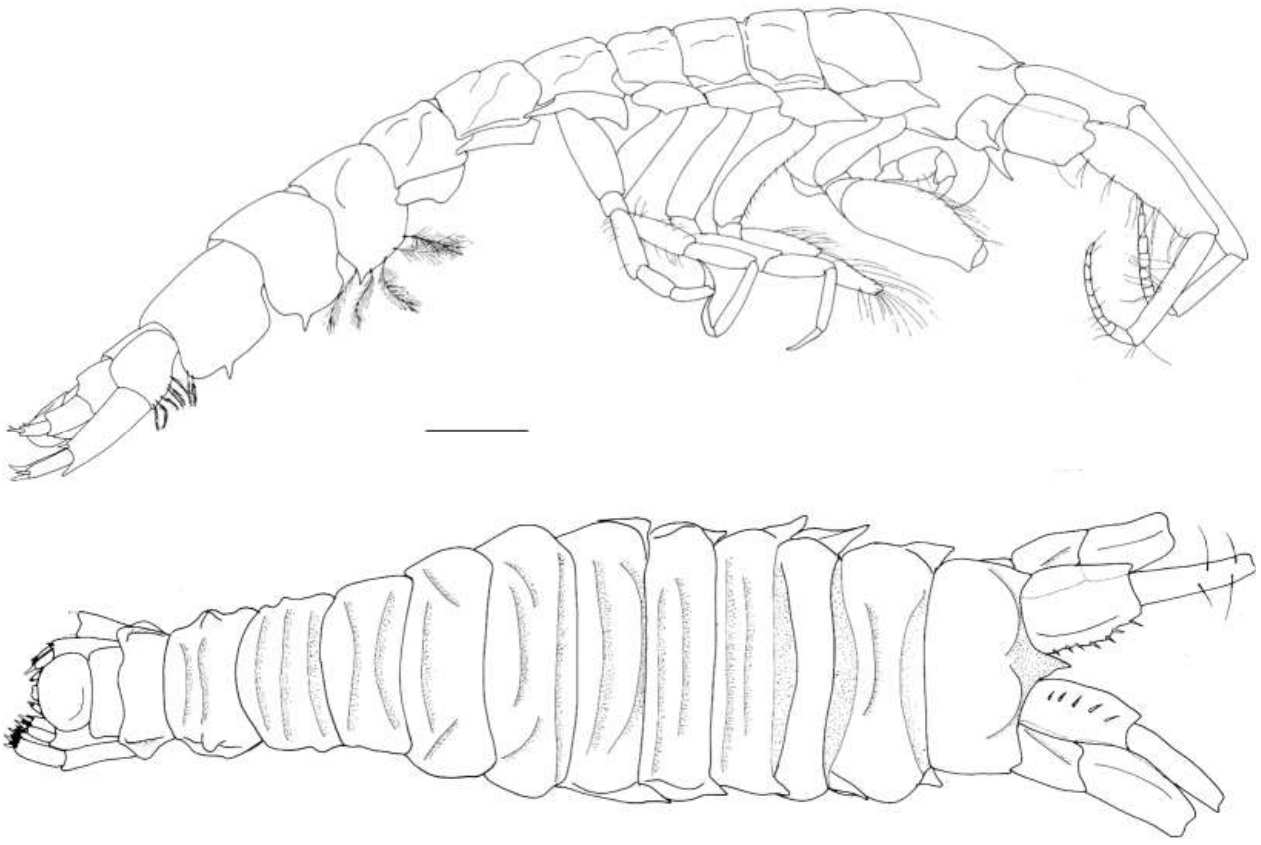

Figure 4. *Unciola conchicola* sp. nov. holotype male, 10 mm, ZMHK-62083, South Island, Iceland Basin, 1921 m. Scale: 0.5 mm.

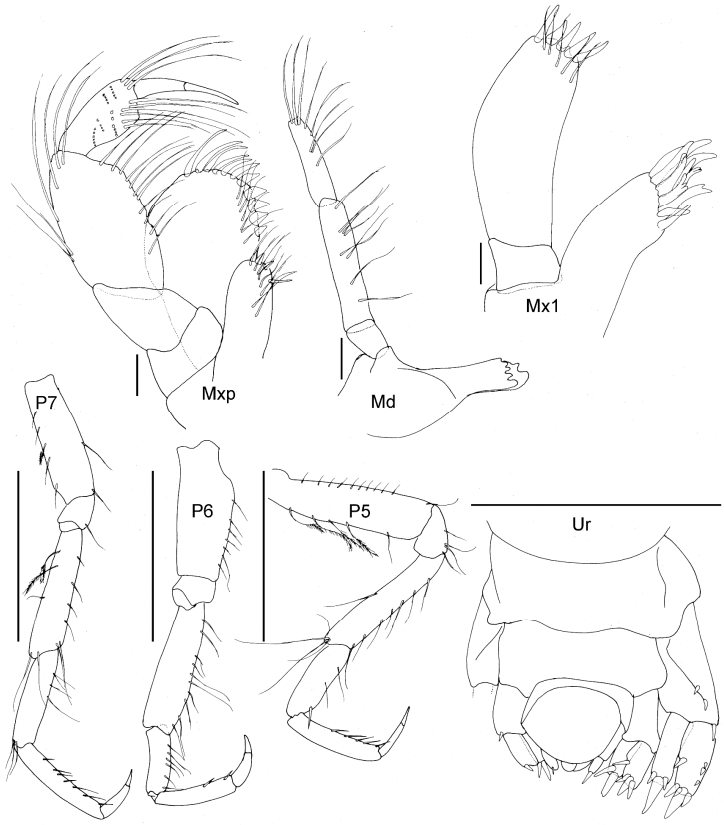

Figure 5. *Unciola conchicola* sp. nov. holotype male, 10 mm, ZMHK-62083, South Island, Iceland Basin, 1921 m. Scale: 0.5 mm.

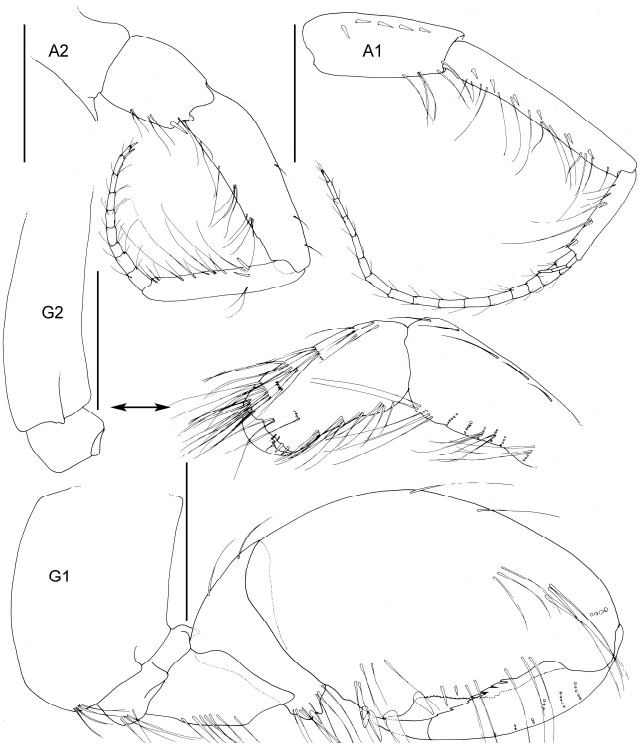

Figure 6. *Unciola conchicola* sp. nov. holotype male, 10 mm, ZMHK-62083, South Island, Iceland Basin, 1921 m. Scale: 0.5 mm.

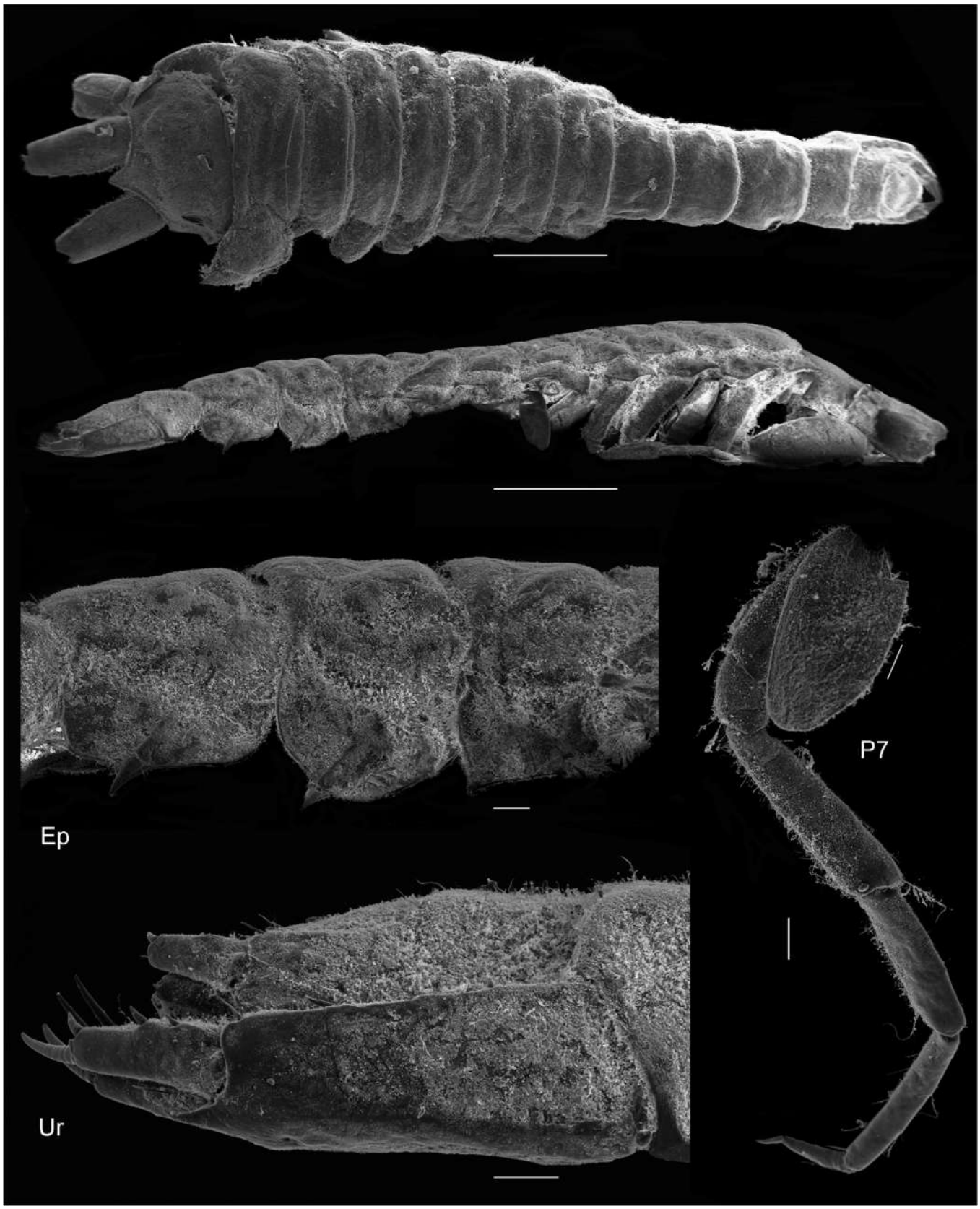

Figure 7. *Unciola conchicola* sp. nov. SEM image, paratype male, 7 mm, ZMHK-56724, South Island, Iceland Basin, 1921 m. Scales: habitus 1 mm, urosomites, uropod and pereopod 7 0.1 mm.

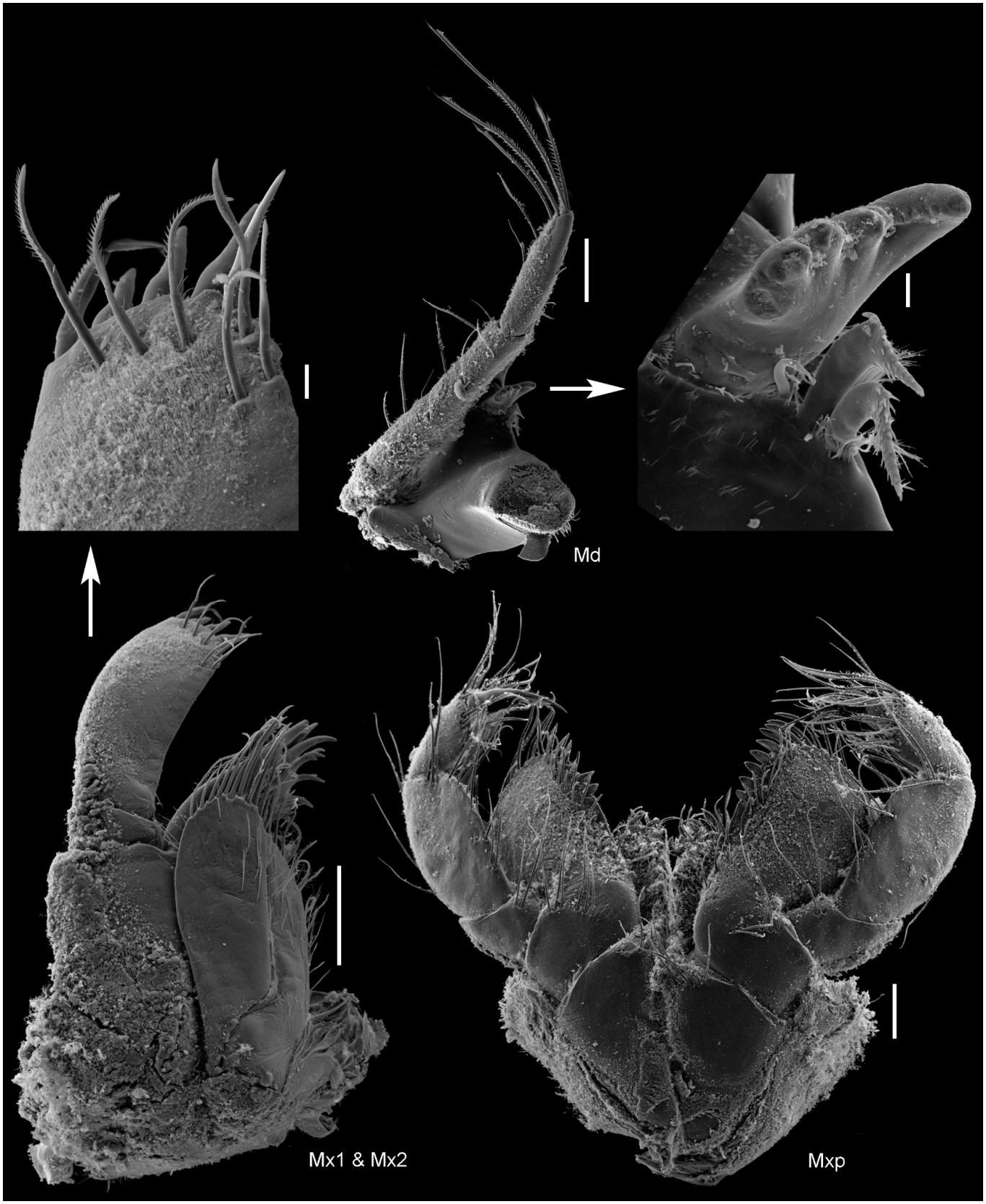

Figure 8. *Unciola conchicola* sp. nov. SEM image, paratype male, 7 mm, ZMHK-56724, South Island, Iceland Basin, 1921 m. Scales: 0.1 mm, details of terminal end of maxillar plate and mandibular incisor 10 μm.

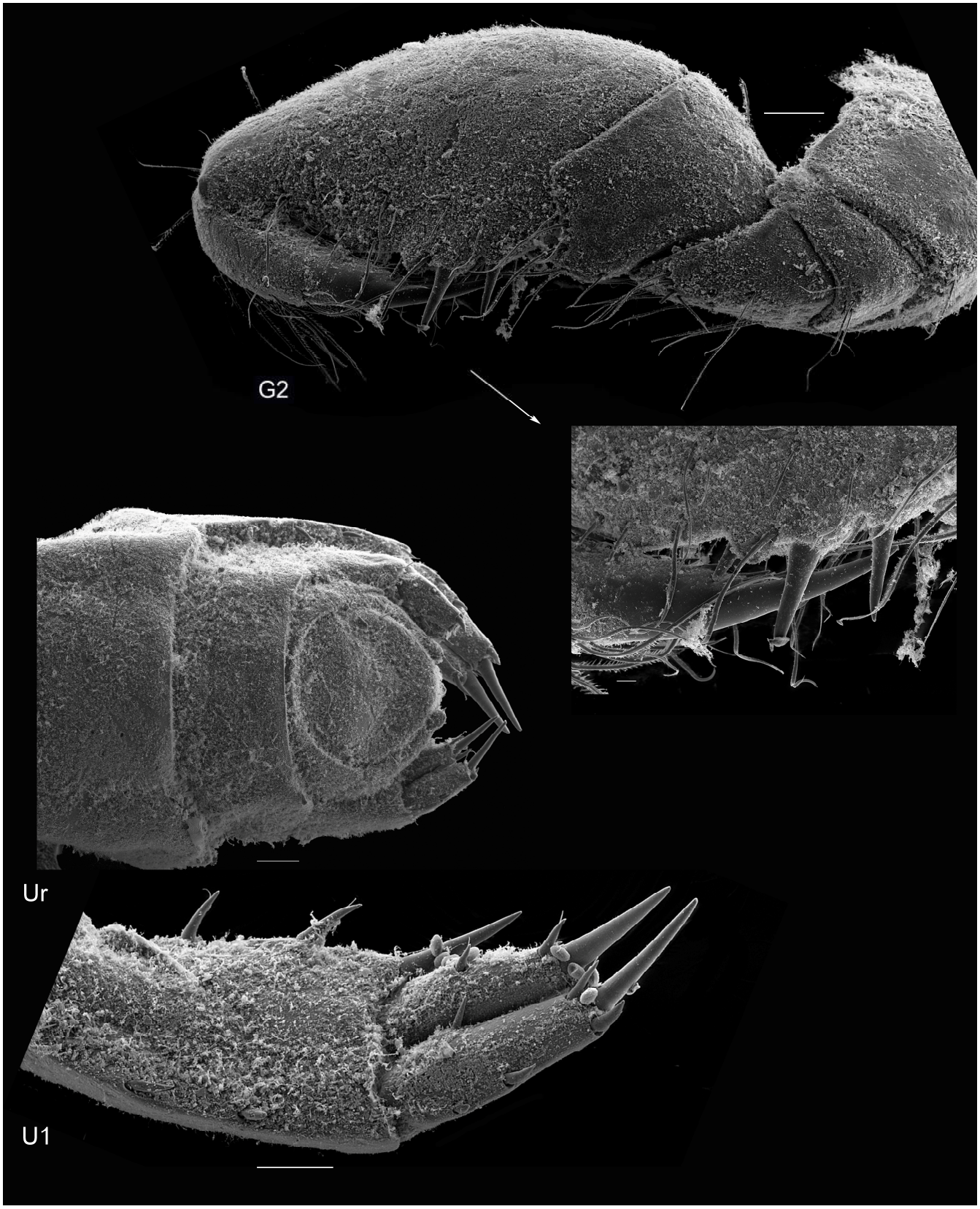

Figure 9. *Unciola conchicola* sp. nov. SEM image, paratype male, 7 mm, ZMHK-56724, South Island, Iceland Basin, 1921 m. Arrow pointing to detail of palm and dactylus. Scales: 100 μm, detail tip of dactylus 20 μm.

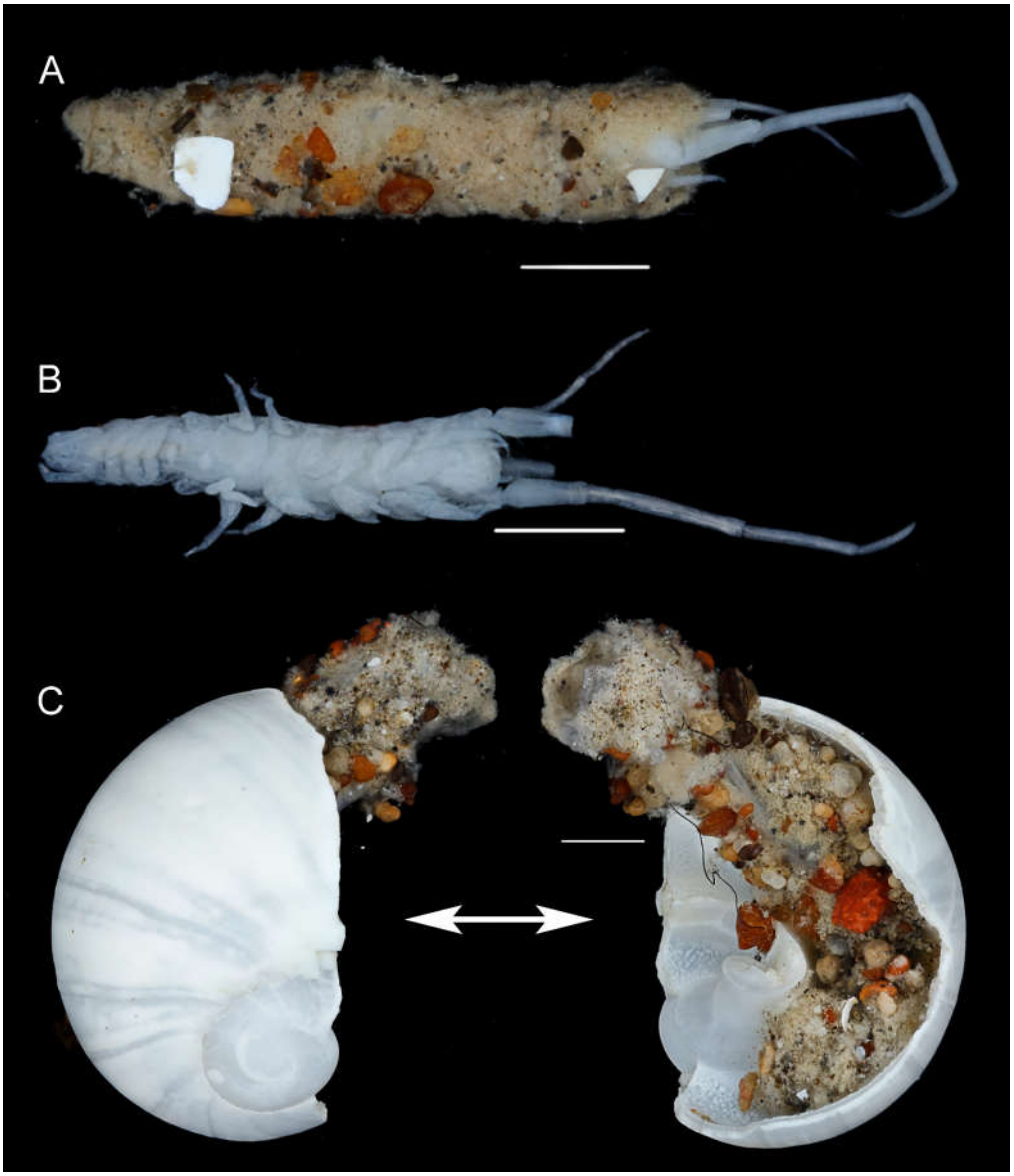

Figure 10. *Unciola conchicola* sp. nov., juvenile, ZMHK 62085, South Island, Iceland Basin, 1921 m. (**A**) in tube made of sand; (**B**) removed from tube; (**C**) tube in pteropod shell, Scale: 1 mm.

***Unciola icelandica* sp. nov.**
Figures 11–18.
urn:lsid:zoobank.org:act:7E1C249F-8F0A-4CF2-A238-346A316DEDF3

Type material. Holotype, 11 mm, SMF 52167, North Shetland Islands, (61°25.63′ N, 1°21.07′ E–61°25.05′ N, 21.66′ E), epibenthic sledge, 169 m, 24 July 2013, expedition RV Poseidon (st 456/3-866).

Paratype female, 6 mm, (dissected, illustrated), ZMHK-62086 South Island, Iceland Basin, (61°42.630′ N, 19°32.960′ W–61°42.170′ N, 19°32.020′ W), epibenthic sledge, 1912–1921 m, 31 August 2011, expedition RV Meteor (St 85-3-989).

The following paratypes were the same locality as the first paratype: male, ZMHK 62084, juvenile 62089, male 62087 and on SEM stud ZMHK-56725.

Paratype female, one specimen, SMF 52.171 Norwegian Channel, 62°16.200′ N, 000°01.210′ E–62°16.450′ N, 000°01.810′ E, epibenthic sledge, 846–868 m, 25 July 2013, expedition RV Poseidon (St 869-3).

Further material examined: SMF 55297, two females, two juveniles, Faroe Islands Ridge middle, 63°23.360′ N, 008°09.420′ W–63°24.620′ N, 008°11.220′ W, epibenthic sledge, 686–687 m, 31 July 2013, expedition RV Poseidon (St880-2).

SMF 55295, 24 specimens, Iceland Basin, 60°2.73′ N, 21°28.06′ W–60°2.73′ N, 21°29.88′ W, epibenthic sledge, 2568–2749 m, 28 August 2011, RV Meteor (Me85/3 st 983).

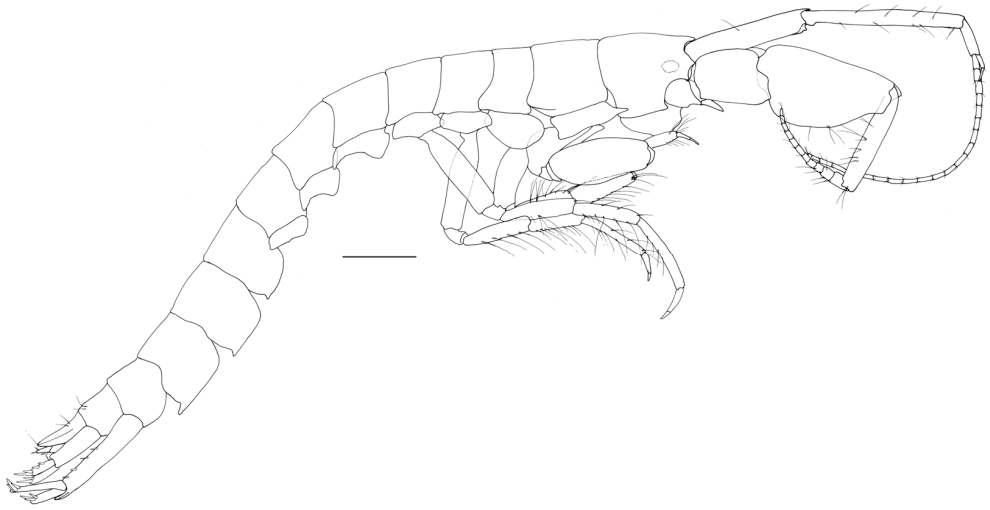

Figure 11. *Unciola icelandica* sp. nov. holotype male, 11 mm, SMF 52167, North Shetland Islands, 169 m. Scale: 1 mm.

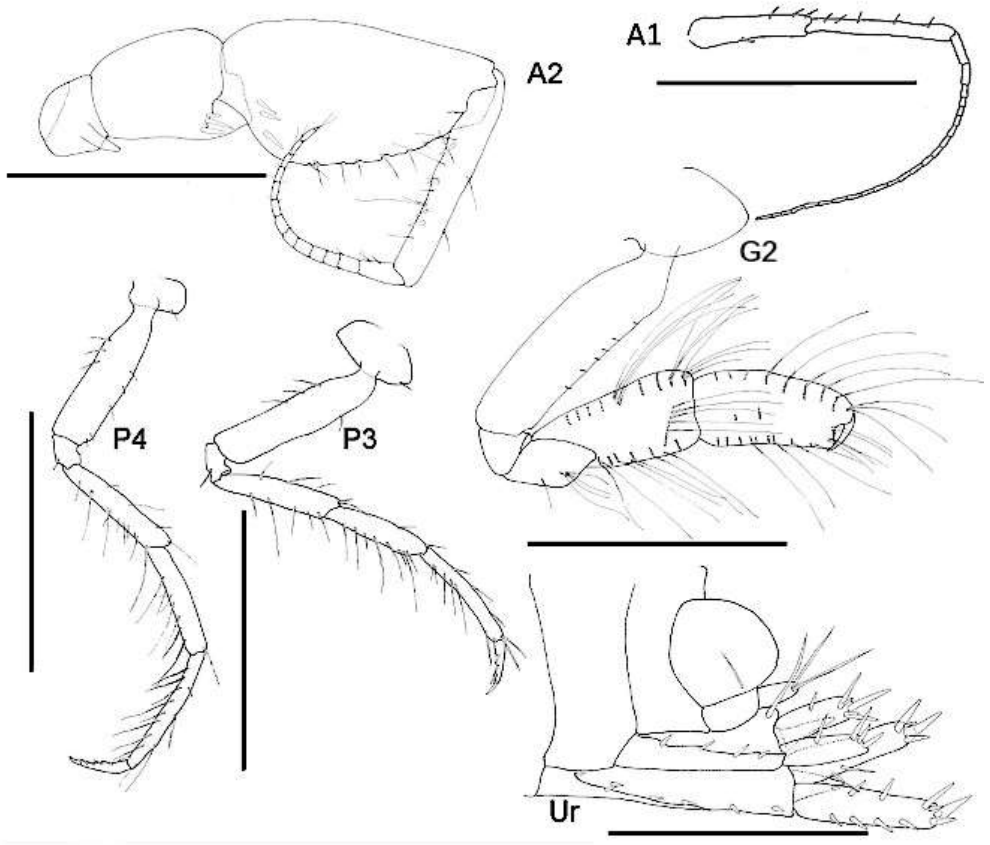

Figure 12. *Unciola icelandica* sp. nov. holotype male, 11 mm, SMF 52167, North Shetland Islands, 169 m. Scale: 0.5 mm.

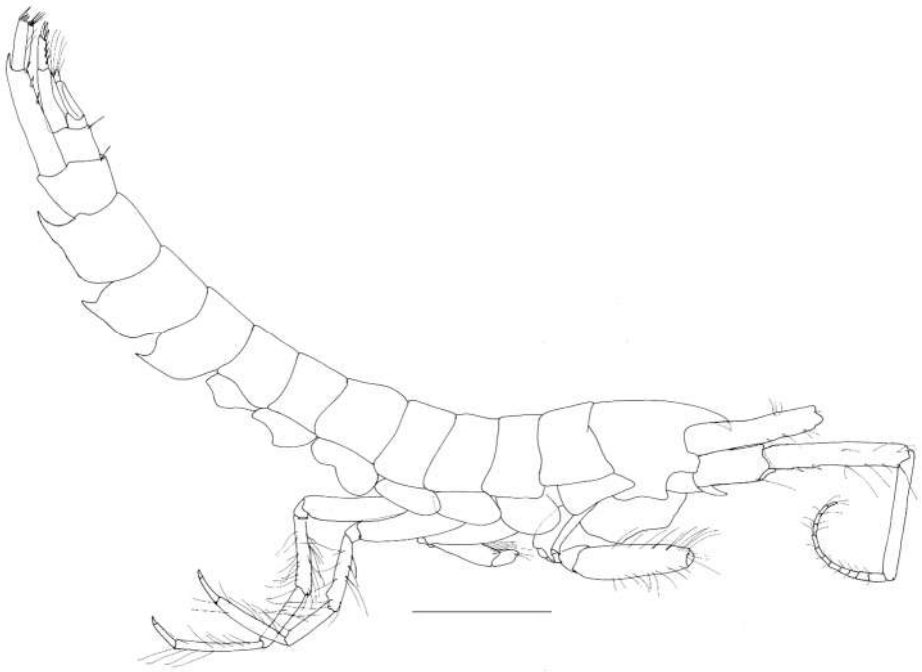

Figure 13. *Unciola icelandica* sp. nov. paratype female, 6 mm, ZMHK 62086, South Island, Iceland Basin, 1921 m. Scale: 1 mm.

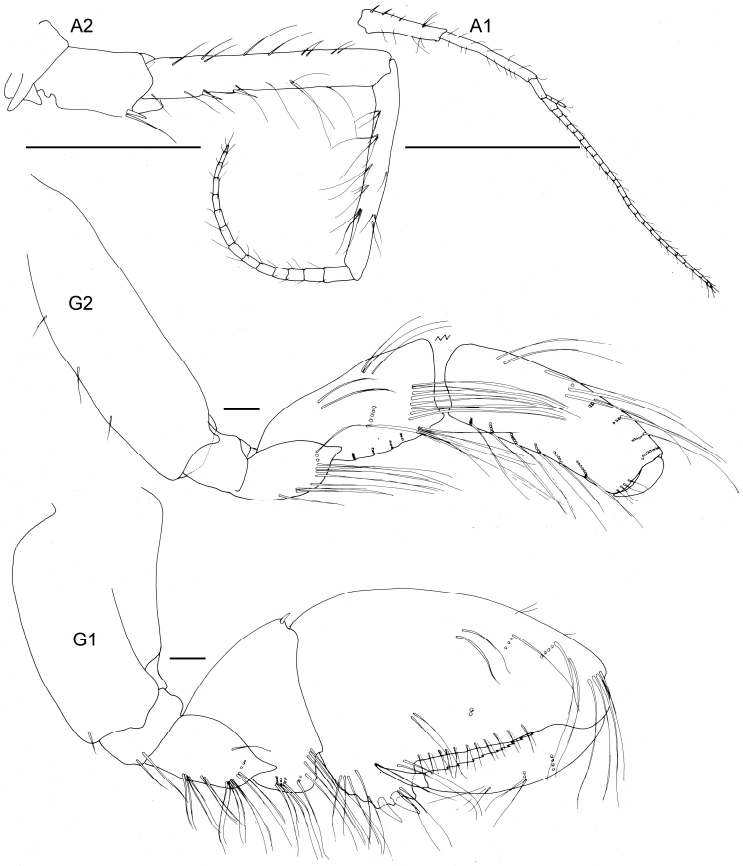

Figure 14. *Unciola icelandica* sp. nov. paratype female, 6 mm, ZMHK 62086, South Island, Iceland Basin, 1921 m. Scales: Antennae 1 and 2 1 mm, gnathopods 1 and 2 0.1 mm.

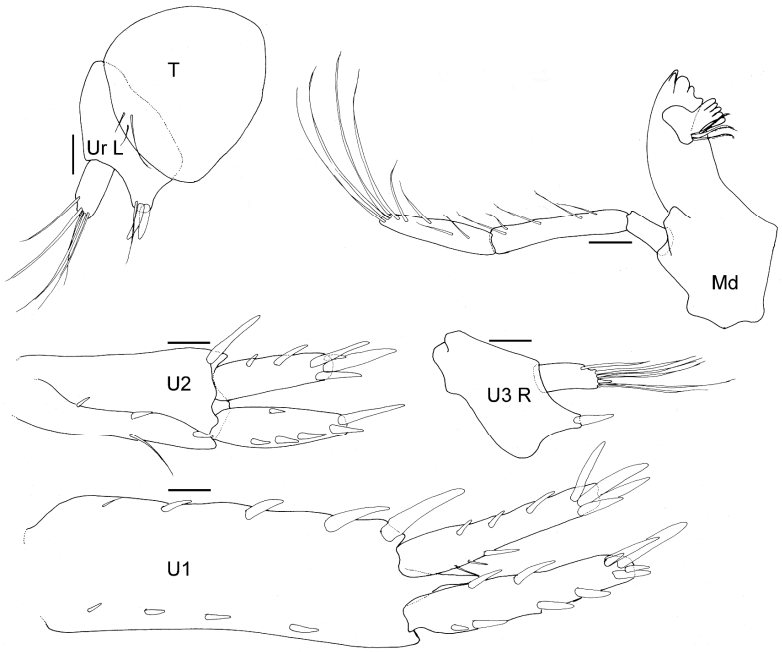

Figure 15. *Unciola icelandica* sp. nov. paratype female, 6 mm, ZMHK 62086, South Island, Iceland Basin, 1921 m. Scales: 0.1 mm.

Figure 16. *Unciola icelandica* sp. nov. SEM image, paratype female, 6 mm, ZMHK-56725, South Island, Iceland Basin North 1921 m. Scales: habitus 1 mm, urosome 100 µm.

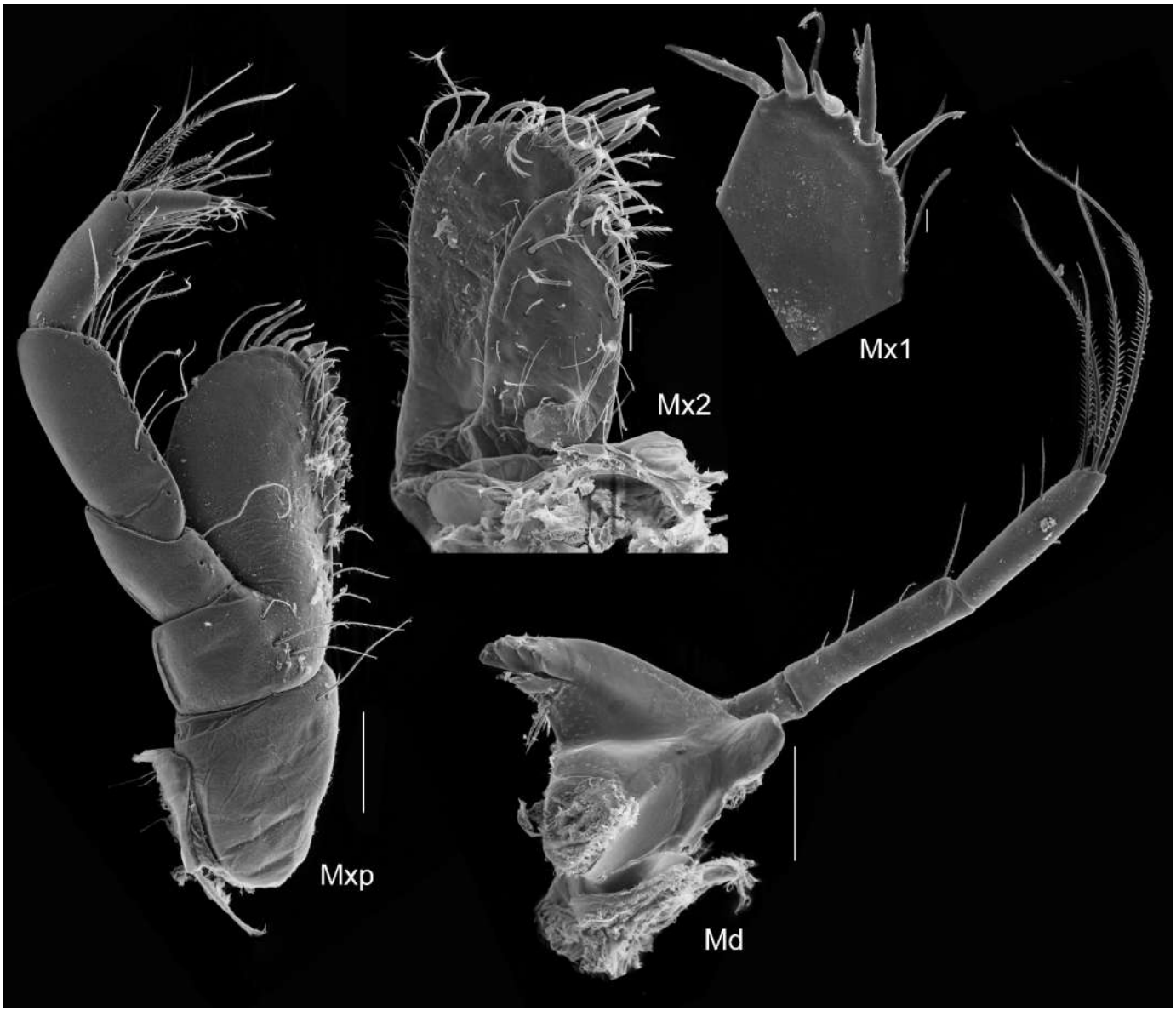

Figure 17. *Unciola icelandica* sp. nov. SEM image, paratype female, 6 mm, ZMHK-56725, South Island, Iceland Basin, 1921 m. Scales: mandible and maxilliped 100 μm, maxilla 2 20 μm, tip of maxilla 1–10 μm.

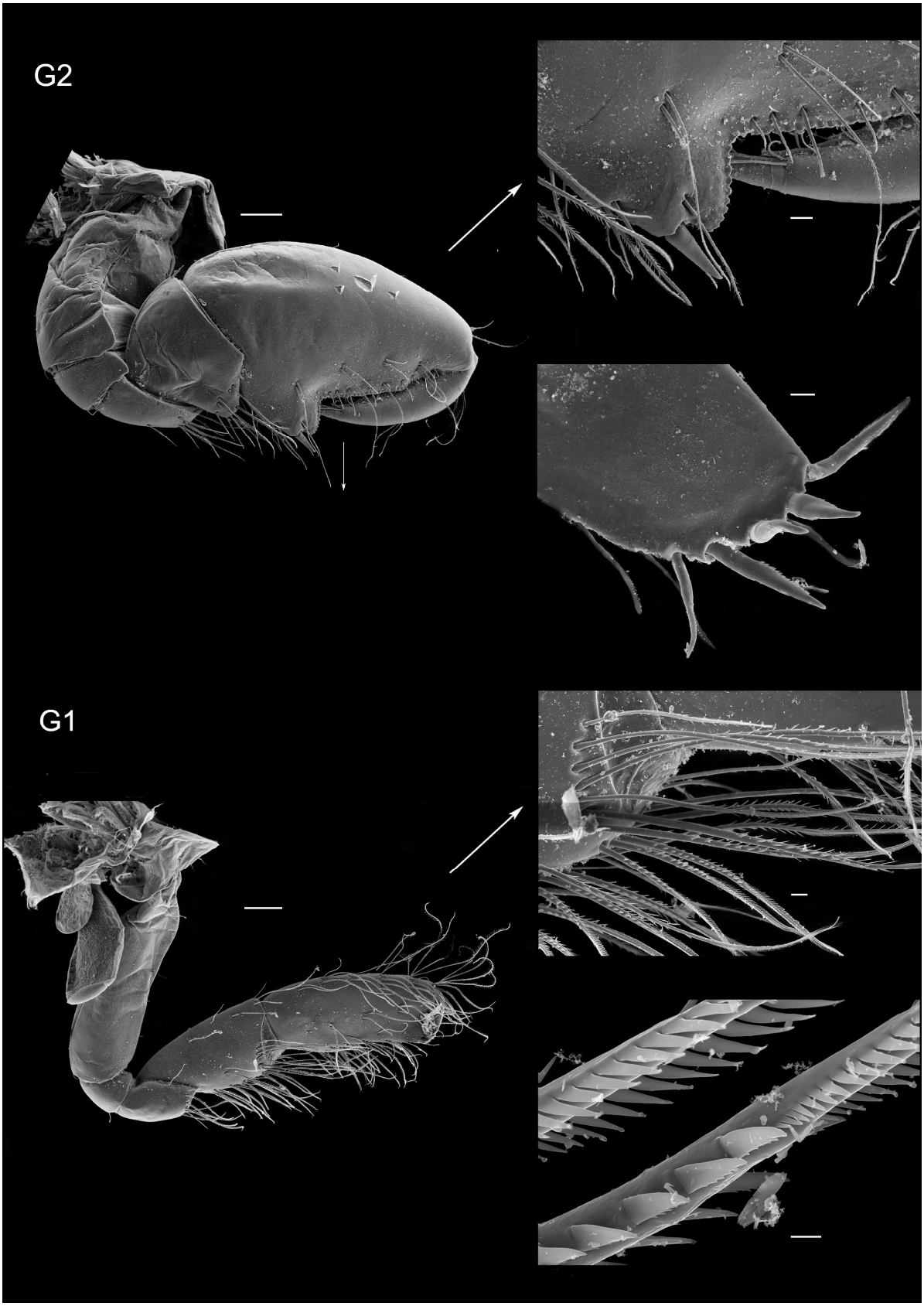

Figure 18. *Unciola icelandica* sp. nov. SEM image, paratype female, 6 mm, ZMHK-56725, South Island, Iceland Basin, 1921 m. Scales: gnathopod 1 and 2–100 μm, dactylus tip 20 μm.

Etymology. Named from the locality of the new species.
Type locality. North Shetland Islands
Description. Based on type material.
Head. Eyes absent. Rostrum, well-developed, acute, deflexed. Lateral cephalic lobes produced, subquadrate. *Antenna 1* peduncle article 1 length 5 times the width, margins lined with slender setae; article 2 twice the length of article 1; article 3 length 5 times the width, shorter than article 1, accessory flagellum 3-articulate; primary flagellum with 16 articles. *Antenna 2* peduncle articles 1–2 anteroventral corner acute produced; article 3 length 1.4 times as long as it was broad, anteroventral margin with robust seta; article 4, ventral margin lined with slender setae; shorter than article 5; flagellum with 14 articles. *Mandible* molar absent; accessory setal row with three setae; palp article 3 shorter than 2, length 5.5 times the width, lined with long slender setae and longer apical setae. *Maxilla 1* unknown. *Maxilliped* unknown.
Pereon. *Pereonites* cuticle smooth. *Pleonite 3* sternal process well-developed, directed anteriorly, apically acute. *Pleonite 4* sternal process moderately developed, directed anteriorly, apically subacute. *Pereonite 5* sternal process minutely developed, anteriorly developed, subacute. *Coxa* subrectangular to rounded, depth less than half of pereonites. *Gnathopod 1* larger than gnathopod 2, coxa anteroventral corner acutely produced; basis stout, length 3 times the width, anterodistal margin rounded; ischium much broader than it was long; merus twice as long as it was broad, posterior margin lined with slender setae; carpus compressed between merus and propodus, posterior margin with sparse slender setae and without robust setae; propodus length twice the width, anterior and posterior margins with a few slender setae, posterior margin straight, palm subacute to acute, length two thirds of posterior margin, defined by rounded corner with two robust setae; dactylus closing along palm, unguis present, anterior margin lined with rows of setae, inner margin serrate. *Gnathopod 2* subchelate; basis anterior and posterior margin straight without setae, anterodistal corner produced, acute; ischium length 1.2 times the width; merus length 1.5 times the width; carpus length 2.4 times the width, shorter than propodus length; propodus anterior and posterior margins lined with rows of long slender setae, length 5 times the width, palm transverse, defined by subquadrate corner. *Pereopods 5 to 7* basis rectilinear; posterior margins with plumose setae; dactylus unguis present.
Pleon. *Epimeral plates 1–2* posterior margin concave, ventral margin without plumose setose, posteroventral corner acutely produced. *Epimera 3* prosterior margin concave, corner produced as spine. *Urosomites 1–3* not coalesced. *Urosomite 1* ventral margin without plumose setae. *Uropod 1* biramous, peduncle much longer than it was broad, distoventral interramal spine shorter than peduncle; rami subequal; inner ramus with marginal and apical robust setae. *Uropod 2* biramous; peduncle with marginal and apical robust setae. *Uropod 3* uniramous; peduncle with flange with one or two apical robust setae; ramus shorter than peduncle, with long slender apical setae. *Telson* dorsally concave, apical margin rounded.

Remark. *Unciola icelandica* sp. nov. aligns with *Unciola planipes* in the shape of the Epimeron 3 with an excavate posterior margin with acute projection. These species can be separated based on the gnathopod 1 and 2. The gnathopod 1 carpus is rectilinear in *U. icelandica* sp. nov., in contrast to *U. planipes*, where the carpus is proximally broad and distally narrow. In the gnathopod 2 of *U. icelandica* sp. nov., the palm is straight, defined by a palm corner, while the palm in *U. planipes* has a proximal extension not seen in the former.

Unciola icelandica sp. nov. has subchelate second gnathopods, while the second gnathopods of *U. planipes* are simple. Lastly, *U. icelandica* sp. nov. has subovate coxae 2 to 3, while *U. leucopis* has more rectilinear coxae 2 and 3.

***Unciola planipes* Norman, 1867**

Unciola planipes [39] Norman, 1867a p. 14. —[16] Sars, 1894: 621, pl. 223. —[17] Stebbing, 1906: 679. —[40] Chevreux and Fage, 1925: 356. —[41] Schellenberg, 1942: 215. —[42] Lincoln, 1979: 538, Figure 257a–h.

Unciola leucopes [43] Spence Bate and Westwood, 1868: 518.

Material Examined

SMF 52169, four specimens; SMF 52170, eight specimens, Norwegian Channel, 61°59.830′ N, 000°30.400′ E-61°59.260′ N, 61°59.260′ N, epibenthic sledge, 290–302 m, 24 July 2013 RV Poseidon (ST867-1).

SMF 52258, four specimens, North West Iceland Denmark Strait, 66°38.600′ N, 024°31.970′ W–66°38.700′ N024°31.350′ W, epibenthic sledge, 118 m, 13 September 2011, RV Meteor (St 1104-1).

Remark. *Unciola planipes* has a remarkable distribution, described from relatively shallow waters from north of Scotland to much deeper records in the Norwegian Channel. Several sampling attempts in Scotland in 2021 failed to obtain fresh material of this species for genetic comparison.

Updated key to the North East Atlantic species of *Unciola*

1. Epimeral plates 1 to 3 projection pointing posteriorly 2
   Epimeral plates 1 to 3 projections directed ventrally . . . . . *Unciola conchicola* sp. nov.
2. Gnathopod 2 subchelate 3
   Gnathopod 2 simple . . . . . *U. planipes* Norman, 1867
3. Rostrum present, well developed 4
   Rostrum absent or short (not well developed) . . . . . *U. petalocera* (G.O. Sars, 1879)
4. Antenna 1 shorter or same length as body 5
   Antenna 1 longer than body, peduncle with four robust setae, ... *U. laticornis* Hansen, 1887
5. Epimeral plate 3 posterior margin excavate, posterodistal corner with acute projections, gnathopod 2 carpus and propodus similar in length 6
   Epimeral plate 3 posterior margin entire, posterodistal corner with minute project ions, gnathopod 2 carpus shorter than propodus . . . . . *U. crassipes* Hansen, 1887
6. Head lateral cephalic lobe distinctly truncate . . . . . *U. icelandica* sp. nov.
   Head lateral cephalic lobe rounded or acute 7
7. Telson subovate 8
   Telson triangular . . . . . *U. petalocera* (Sars, 1876)
8. Epimeral plates acute projection increasing in size; gnathopod 2 carpus length sub equal to propodus, ... *U. leucopis* (Krøyer, 1845)
   Epimeral plates projections subequal in size; gnathopod 2 carpus length shorter than propodus . . . . . *U. crenatipalma* (Spence Bate, 1862)

4. Discussion

While it is established that corophioid amphipods build tubes and many genera are associated with commandeering empty shells [44,45] (Myers and Lowry, 2003; Vader, 1972), the present study is the first record for the genus *Unciola* (Figure 14). Barnard et al. (1991) [46] distinguish 12 kinds of tube-building behaviour. Observations of how the tube building is achieved in live organisms were not possible, as these benthic amphipods were collected at a 2000 m depth. Other detailed studies of silk production in corophiideans have shown that silk is produced in the glandular systems in the third and fourth pereopods, which secrete a mucous substance that solidifies as a kind of silken thread that can trap and aggregate particles from the environment [47–49] (Bellan-Santini, 2015; Kroenenberger et al., 2013; Neretin, 2016).

Unciola conchicola sp. nov. specimens were removed from the tubes built within a gastropod shell (Figure 10). We conclude that *Unciola conchicola* sp. nov. belongs to category

six of the twelve tube-building behaviours suggested by Barnard et al. (1991) [46], namely: "(6) cementation of a silk tube inside a gastropod shell or into or on the surface of other environmentally available substrates which are more or less portable and can be carried or moved by the amphipod (such as in *Siphonoecetes* spp.)" [38,50–52] (Gauthier, 1941; Just, 1977, 1984; Richter, 1978). As a secondary user dependent on shell material in the environment, these small deep-sea organisms are directly impacted by climate change, where thinning of calcium carbonate will make their domiciles a less protective barrier from predation and the amphipod may generally have less access to suitable domiciles, as thinner shells are more likely to break and fragment in the sediment system.

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