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A redescription of the type species of *Oedicerina* Stephensen, 1931 (Crustacea, Amphipoda, Oedicerotidae) and the description of two new species

Charles Oliver Coleman[1], Michael H. Thurston[2]

1 *Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Invalidenstraße 43, 10115 Berlin, Germany*
2 *National Oceanography Centre, European Way, Southampton SO14 3ZH, UK*

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Corresponding author: *Charles Oliver Coleman* (oliver.coleman@mfn-berlin.de)

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Abstract

The poorly known species *Oedicerina ingolfi* Stephensen, 1931 (Crustacea: Amphipoda: Oedicerotidae) is redescribed, based on new material from the Norwegian Sea. *Oedicerina vaderi* sp. n. from the northeast Atlantic Ocean and *Oedicerina loerzae* sp. n. from New Zealand waters are described raising the number of species in the genus to five. The three species treated here together with *Oedicerina megalopoda* Ledoyer, 1986 and *Oedicerina denticulata* Hendrycks & Conlan, 2003 are separated by characters of the rostrum, maxilliped, gnathopods, epimera, and by the dorsal armature of pleonites and urosomites. The genus is recorded from the Atlantic, Indian and Pacific Oceans, mainly at bathyal depths.

Introduction

Participants in a workshop organised by Professor Wim Vader at the University of Tromsø field station at Skibotn in 2009 sorted and identified amphipods from the Natural History Collections of the University Museum of Bergen collected from the Norwegian Sea. Among the extensive material in these collections were specimens of the poorly known oedicerotid genus *Oedicerina* Stephensen, 1931. The genus was based on a single individual collected from the Norwegian Sea by The Danish-Ingolf Expedition (Stephensen 1931). Although the specimen consisted of just the head and pereonites 1–4 and was lacking gnathopods, the new genus was created for *O. ingolfi* Stephensen, 1931 to recognise the unique nature of the huge posterior lobe of coxa 4. The genus remained monotypic and unreported until Ledoyer (1986) described ?*Oedicerina megalopoda* from the Mozambique Channel, western Indian Ocean, also based on a single anterior fragment. This species was defined by the characteristic shape of coxa 4 and by the strongly developed carpal articles of gnathopods 1 and 2. The description of a third species, *O. denticulata* Hendrycks & Conlan, 2003 from the northeast Pacific Ocean, was the first to record complete specimens and was accompanied by a more detailed appraisal of the genus.

The new material from the Bergen Museum has made possible a re-description of *O. ingolfi*. Specimens belonging to *Oedicerina* from the northeast Atlantic Ocean and

from New Zealand waters demonstrate further diversity within the genus and require the recognition of two new species which are described below.

This paper is the third to utilize material sorted at Skibotn in 2009, following d'Udekem d'Acoz (2010) and Krapp-Schickel and Vader (2013).

Material and methods

Norwegian Sea material assigned to *O. ingolfi* from the Natural History Collection of the University Museum of Bergen (ZMBN) was collected with an RP sledge (Rothlisberg and Pearcy 1977) by Torleiv Brattegard (Brattegard and Fosså 1991) in the period 1981–1986. Additional material from the Norwegian and Greenland Seas from the Museum of Zoology, Lund University was collected during the NORBI expedition (Dahl et al. 1976) using an epibenthic sledge (drague Sanders) (Guennegan and Martin 1985).

Specimens from the Discovery Collections at the National Oceanography Centre, Southampton were obtained in the East Iceland Basin on an RRS *Discovery* cruise that contributed to the Institute of Oceanographic Sciences investigations of mid-water and benthic faunas in the eastern North Atlantic Ocean (1965–1977). The material, from an epibenthid sledge, was fixed in 4% formaldehyde and later transferred to 70% Industrial Methylated Spirits. These specimens have been deposited in the Amphipoda collections at The Natural History Museum, London.

The New Zealand material was collected during the Ocean Survey 2020 expeditions with RV *Tangaroa* to the Chatham Rise and the Challenger Plateau (Knox et al. 2012) by means of a "Brenke" epibenthic sledge (Brenke 2005). The material was sorted on board, fixed in 96% ethanol and later transferred into 70% ethanol. It has been deposited in the National Institute of Water and Atmosphere Research (NIWA) Marine Invertebrate Collection in Wellington, New Zealand.

For habitus drawings the specimens were transferred into glycerol on a cavity slide. Specimens were then dissected under a stereomicroscope (Leica M205 or Wild M5) using dissecting needles. Mouthparts and appendages were mounted temporarily in glycerol on slides for microscopic examination and drawing. Appendages were later mounted as permanent slides with glycerol jelly, or transferred into small glass microvials. Microvials were stoppered with a cotton ball wrapped in Japan paper to avoid the appendages being entangled in the cotton fibres.

After dissection, mouthparts and appendages of Discovery Collection material were made directly into permanent mounts using Polyvinyl-lactophenol stained with lignin-pink. Drawings of habitus and appendages were made using a *camera lucida* attached to a compound microscope (Leica DMLB or Wild M20). Pencil drawings were scanned, inked digitally and arranged to plates using the methods described in Coleman (2003, 2009).

Body lengths were measured along the dorsal outline from the tip of the rostrum to the end of the telson. Lengths of individual articles of gnathopods and pereopods measured along anterior or posterior margins can vary depending on the degree of flexure of the appendage. All articulations except those between coxae and tergites and between merus and carpus of gnathopods are bicondylar. Measurements made between condyles gives a length that is not affected by limb flexure. Length ratios herein have been derived using this principle.

Systematics

Amphipoda Latreille, 1816
Oedicerotidae Lilljeborg, 1865

Oedicerina Stephensen, 1931

Oedicerina Stephensen, 1931: 250. — Barnard and Karaman 1991: 561, — Ledoyer 1986: 832. — Hendrycks and Conlan 2003: 2359.

Diagnosis (key characters embolded). Rostrum well-developed, moderately to strongly deflexed. Antennae sexually dimorphic or not, length medium. Antenna 1 about as long as head and pereonites 1–4 combined, peduncle article 1 longer than articles 2 and 3. Antenna 2 subequal to or weakly longer than antenna 1; peduncle article 4 longer than article 5. Lower lip, inner lobes prominent, separate. Mandible, molar triturative; incisor 5-dentate. Maxilla 1, outer plate 9-dentate; palp slender, article 2 subequal to or longer than article 1. Maxilla 2, plates short, inner broader than outer. Maxilliped, palp article 2 sub-triangular, breadth greatest at half-length, inner margin strongly convex; article 3 produced mediodistally; article 4 longer than article 3.

Coxal plates 1–4 deep, as long or longer than height of corresponding pereonite. **Gnathopod 1**, coxa expanded distally; **carpus and propodus** subequal in length, **strongly expanded posterodistally**. Gnathopod 2, **carpus longer than propodus, both strongly expanded posterodistally**. Pereopods 3 and 4 fossorial (setose); **coxa 4 deeply excavate posteriorly, posterodistal lobe strong, subrectangular**. Pereopod 5, coxa bilobate, posterior lobe as long as coxa 4. Pereopod 6, coxa bilobate, posterior lobe strong. Pereopod 7, basis expanded.

Pleonites, some or all carinate or toothed. Epimera 1–3, 1 and 3 rounded, 2 obtusely rounded, posterior margin convex or sinuous. Uropods 1–2, outer ramus subequal to or shorter than inner ramus. Uropod 3, peduncle short; rami subequal, not extending as far as apices of uropods 1–2. Telson notched 30–40%, apices acute.

Type species. *Oedicerina ingolfi* Stephensen, 1931

Species composition. *Oedicerina denticulata* Hendrycks & Conlan, 2003; *Oedicerina ingolfi* Stephensen, 1931; *Oedicerina loerzae* sp. n.; *Oedicerina megalopoda* Ledoyer, 1986; *Oedicerina vaderi* sp. n.

Key to the species of *Oedicerina*

1 Rostrum massive, spatulate, longer than peduncle article 1 of antenna 1 ..... *O. megalopoda* Ledoyer, 1986
– Rostrum at most as long as article 1 of antenna 1 2
2 Pleonites 1–2 carinate, pleonite 3 with small tooth ..... *O. ingolfi* Stephensen, 1931
– Some pleonites smooth dorsally 3
3 Pleonite 1 smooth 4
– Pleonite 1–2 carinate, pleonite 3 smooth ..... *O. loerzae* sp. n.
4 Pleonite 1–2 smooth ..... *O. vaderi* sp. n.
– Pleonite 2 carinate, pleonite 3 with short process ..... *O. denticulata* Hendrycks & Conlan, 2003

Oedicerina ingolfi Stephensen, 1931

Figs 1–5

Oedicerina ingolfi Stephensen, 1931, p. 250, fig. 72.
Oedicerotidae gen. et sp. n. Dahl 1979, p. 60 (ecology).

Material examined. 3 ovig. females, 6 females, 3 males, 2 unknown sex, 4 juveniles, ZMBN 95143, St. 81.08.14.5, 64°16.9‘N, 00°11.7‘W, 2630 m, F/F *Håkon Mosby*, RP-sledge, T. Brattegard, 14 August 1981.

1 female, 1 male, 1 juvenile, ZMBN 95144, St. 81.08.14.1, 65°19.7‘N 01°02.7‘E, 2908 m, F/F *Håkon Mosby*, RP-sledge, T. Brattegard, 14 August 1981.

1 ovig. female, 4 females, 7 males, 3 unknown sex, 12 juveniles, ZMBN 95145, St. 82.11.24.1 64°48.2‘N 01°33.0‘W, 3000 m, F/F *Håkon Mosby*, RP-sledge, T. Brattegard, 24 November 1982.

1 male, 1 juvenile, ZMBN 95146, St. 81.06.03.5, 67°47.0‘N 07°43.9‘E, 2025 m, F/F *Håkon Mosby*, RP-sledge, T. Brattegard, 3 June 1981.

1 female, ZMBN 95147, St. 86.07.26.1, 69°36.4‘N 09°54.6‘W; 2212 m, F/F *Håkon Mosby*, RP-sledge, T. Brattegard, 26 July 1986.

2 adult females, 1 female, 2 juveniles, NORBI St. 2, DS05, 65˚22.9‘N 00˚02.1‘E–65˚22.4‘N 00˚02.2‘E; 2970 m, N.O. *Jean Charcot*, 21 July 1975.

1 ovig. female, 1 adult male, NORBI St. 6, DS12, 76˚54.4‘N 01˚44.6‘E–76˚54.0‘N 01˚46.3‘E; 3200 m, N.O. *Jean Charcot*, 2 August 1975.

Description. Based on ovigerous female, 10.3 mm, St. 81.08.14.5.

Head (Fig. 1a): longer than high, longer than pereonites 1–2 combined; no eyes or ocular pigment visible; rostrum strongly deflexed, ventral margin weakly convex. *Antenna 1* (Fig. 1b): about as long as antenna 2; length ratios of peduncle articles 1–3 1:0.9:0.6; flagellum 10-articulate; accessory flagellum 1-articulate, minute, slender, less than half length of first flagellum article. *Antenna 2* (Fig. 1c): peduncle setose; length of article 4 1.6 × article 5; flagellum shorter than peduncle article 5, 7-articulate. *Upper lip* (labrum) (Fig. 1d): wider than long, rounded apically. *Mandible*: molar triturative, with one associated seta; incisors and laciniae mobiles 5-dentate; palp (Fig. 1i) 3-articulate, article 2 swollen proximally, article 3 tapered, length ratios of articles 1–3 1:4.1:4.5. *Lower lip*: inner lobes prominent and broad, hypopharyngeal gap wide, outer lobe mandibular processes short and rounded. *Maxilla 1* (Fig. 1e, f, g): inner plate oval, with two distal setae; outer plate with nine acute setal-teeth; palp 2-articulate, article 2 3.6 × length of article 1. *Maxilla 2* (Fig. 2a): inner plate 1.2 × wider than outer plate; both plates with relatively sparse apical setation. *Maxilliped* (Fig. 2b): inner plate short, extending just beyond base of palp article 1; outer plate extending 50% along palp article 2, concave medially; palp 4-articulate; article 1 tapered; article 2 broad, strongly expanded medially, lobe subtriangular; article 3 narrow proximally,expanded mediodistally; article 4 acute, weakly falcate: length ratios of articles 1–4 1:1.7:0.7:1.3.

Pereon. *Pereonite* 1 (Fig. 1a): longer than 2; pereonites 3–5 successively longer; pereonites 6 and 7 subequal in length to 5. *Gnathopod 1* (Fig. 2c): coxa subtriangular, posterior margin straight, anterodistal corner rounded, posterodistal corner rectangular, distal margin straight, strongly setose; basis straight, weakly expanded, posterior margin with a row of plumose setae; merus, posterodistal lobe rounded, setose; carpus strongly expanded, subacute posterior lobe with posterior and distal margins setose; propodus strongly expanded, as long and wide as carpus, anterior margin convex, palm transverse, convex, crenellate and setose; dactylus curved, just longer than palm. *Gnathopod 2* (Fig. 3a): coxa as long as coxa 1, weakly tapering distally, apex rounded, setose; basis subrectangular, with a row of plumose setae near posterior margin; merus, posterodistal lobe narrow, setose; carpus strongly expanded, wider than propodus, posterodistal lobe subacute, distal margin oblique; propodus shorter than carpus, expanded distally, palm strongly convex, crenellate; dactylus slender, falcate, as long as palm. *Pereopod 3* (Fig. 3b): coxa subequal to coxa 2; basis shorter than coxa, with very long slender setae on posterior margin and plumose setae close to anterior margin; merus weakly expanded distally; carpus 1.3 × length and about as wide as merus, posterior margin setose; propodus oval, setose; dactylus 1.2 × length of propodus. *Pereopod 4* (Fig. 4a): coxa wider than long, distal margin rounded, posterodistal lobe very strong, subrectangular; basis shorter than coxa; merus weakly expanded; carpus shorter than merus, but subequal in width, setose posteriorly and anterodistally; propodus with anteromarginal rows of slender setae; dactylus rather stout, short and straight. *Pereopod 5* (Fig. 4b): coxa about as deep as coxa 4, bilobed, posterior lobe

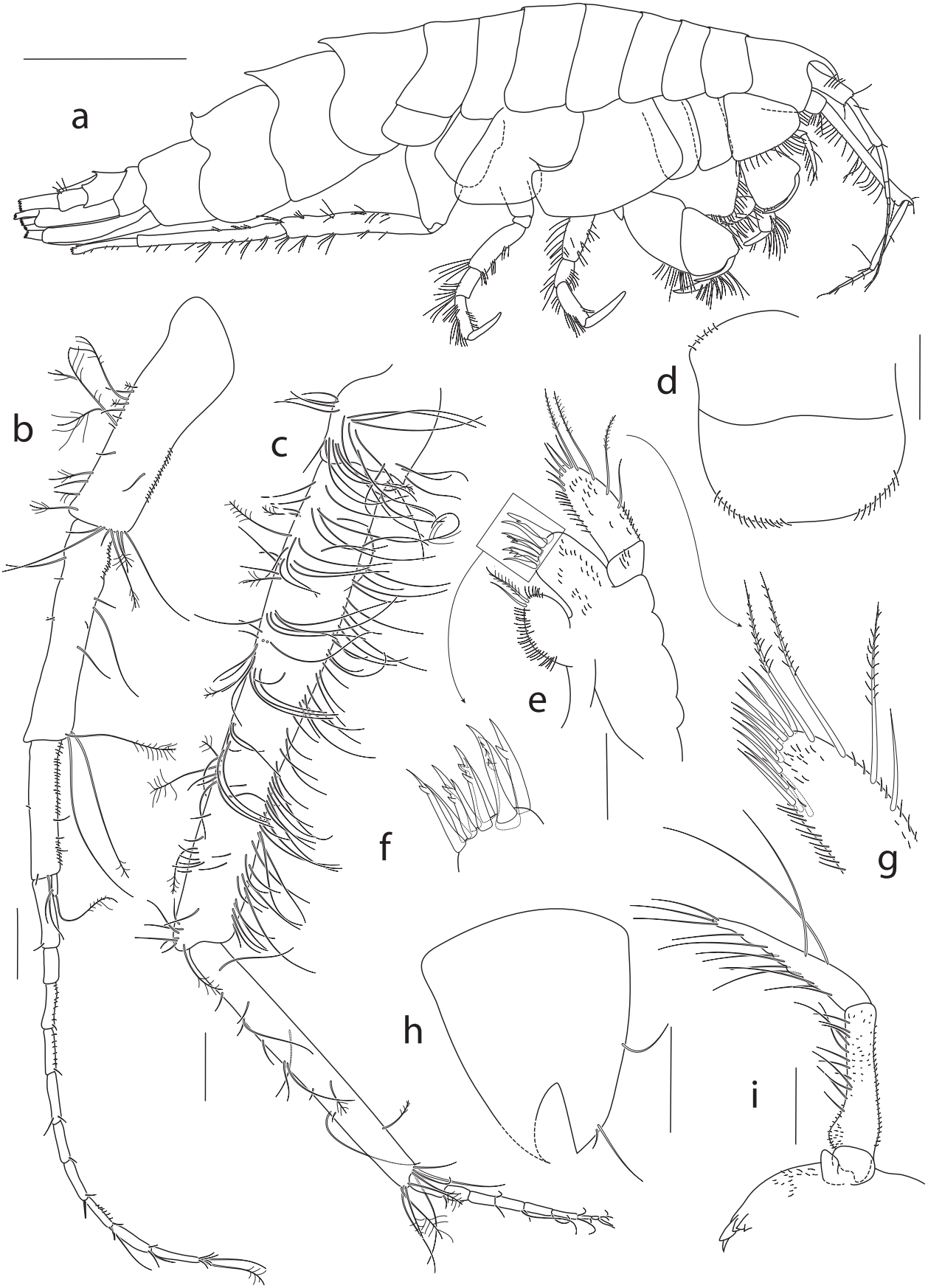

Figure 1. *Oedicerina ingolfi*, ovig. female, 10.3 mm; Norwegian Sea, ZMBN 95143, St. 81.08.14.5. **a)** habitus (uropods rolled up, not illustrated); **b)** antenna 1; **c)** antenna 2; **d)** upper lip; **e)** maxilla 1; **f)** maxilla 1, setal teeth of outer plate; **g)** maxilla 1, distal setation of palp article 2; **h)** telson; **i)** mandibular palp. Scale bars: a; 2 mm: b, c, e, h; 200 µm: d, i; 100 µm.

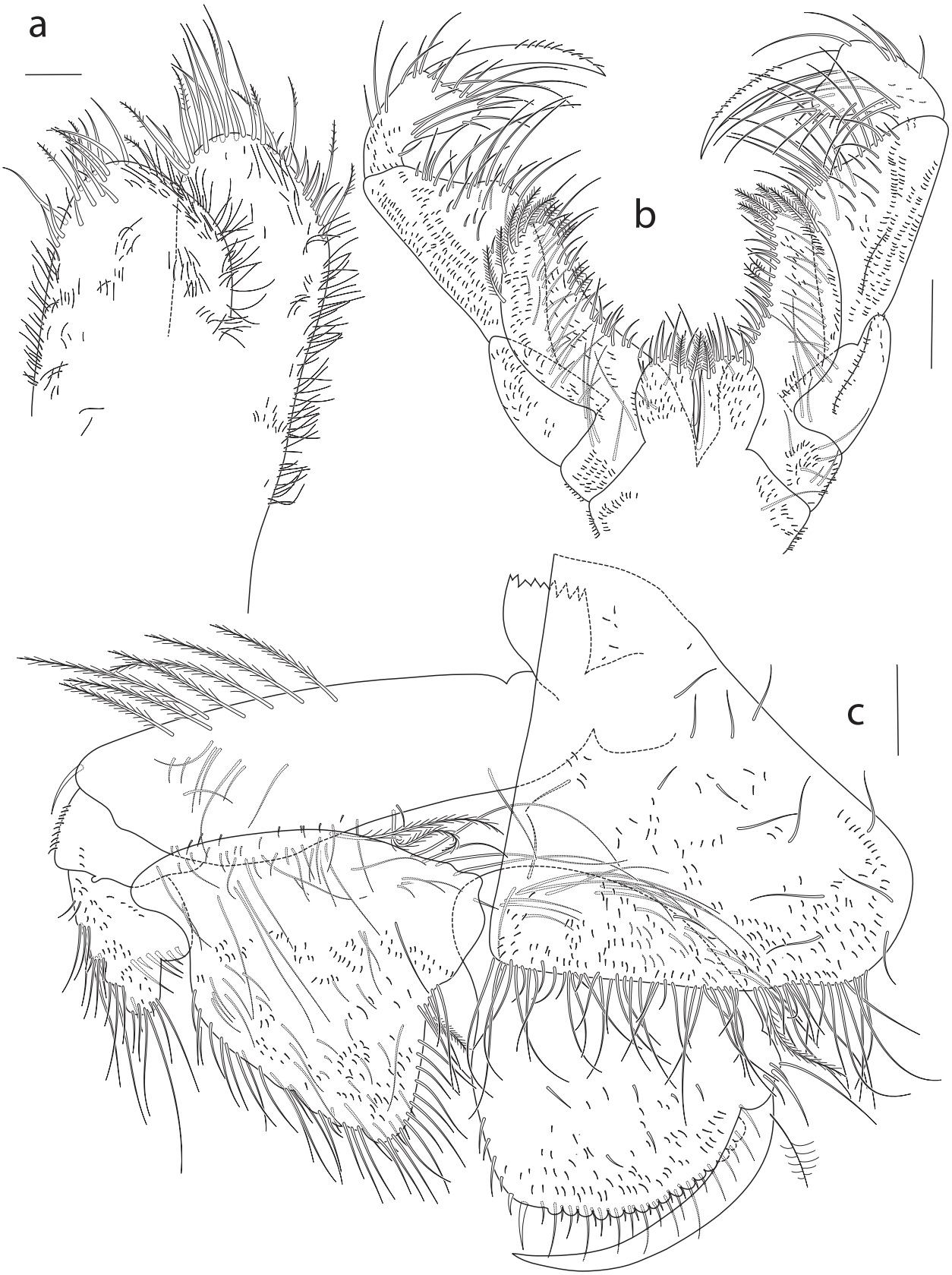

Figure 2. *Oedicerina ingolfi*, ovig. female, 10.3 mm; Norwegian Sea, ZMBN 95143, St. 81.08.14.5. **a)** maxilla 2; **b)** maxillipeds; **c)** gnathopod 1. Scale bars: a; 100 µm: b, c; 200 µm.

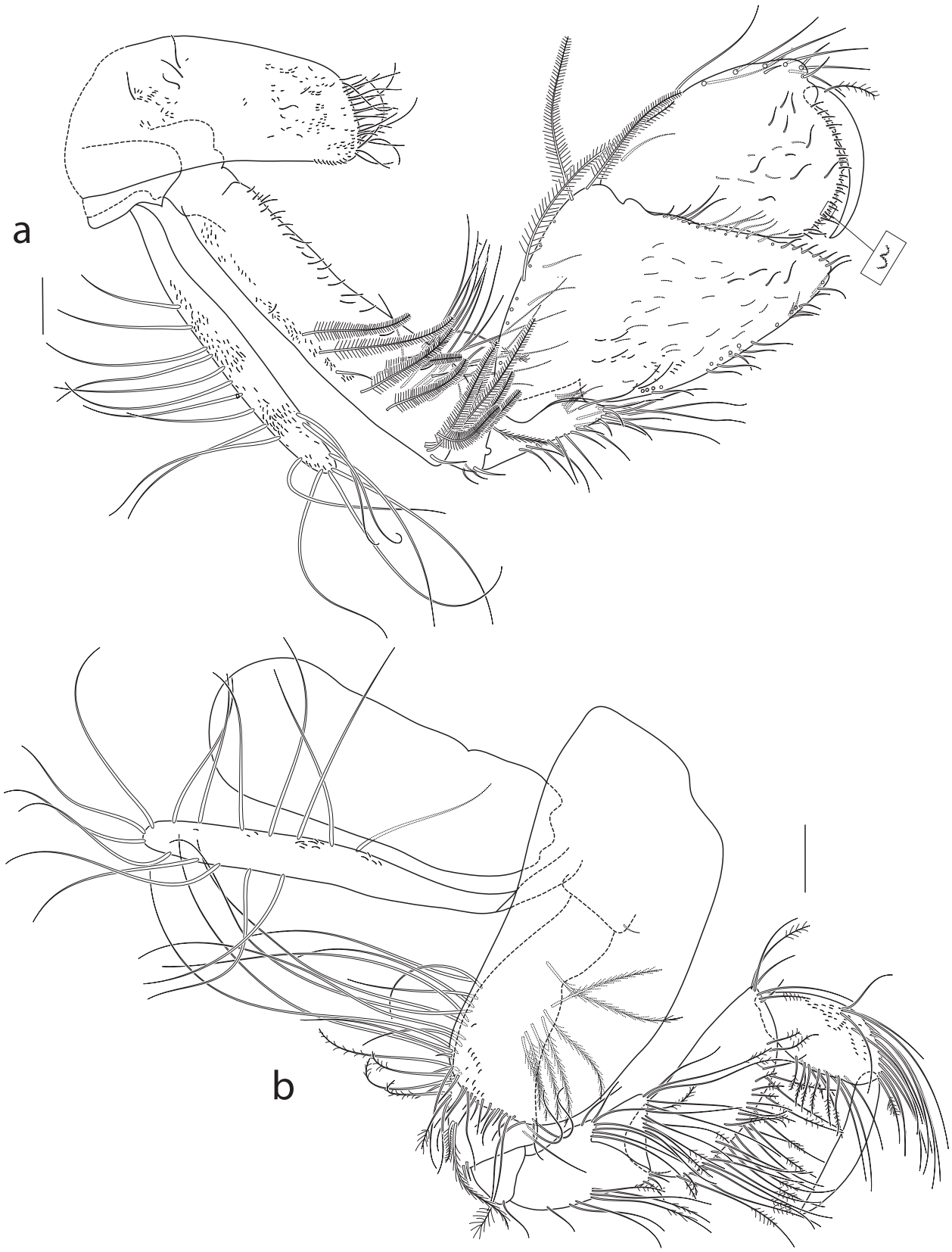

Figure 3. *Oedicerina ingolfi*, ovig. female, 10.3 mm; Norwegian Sea, ZMBN 95143, St. 81.08.14.5. **a)** gnathopod 2; **b)** pereopod 3. Scale bars: a, b; 200 µm.

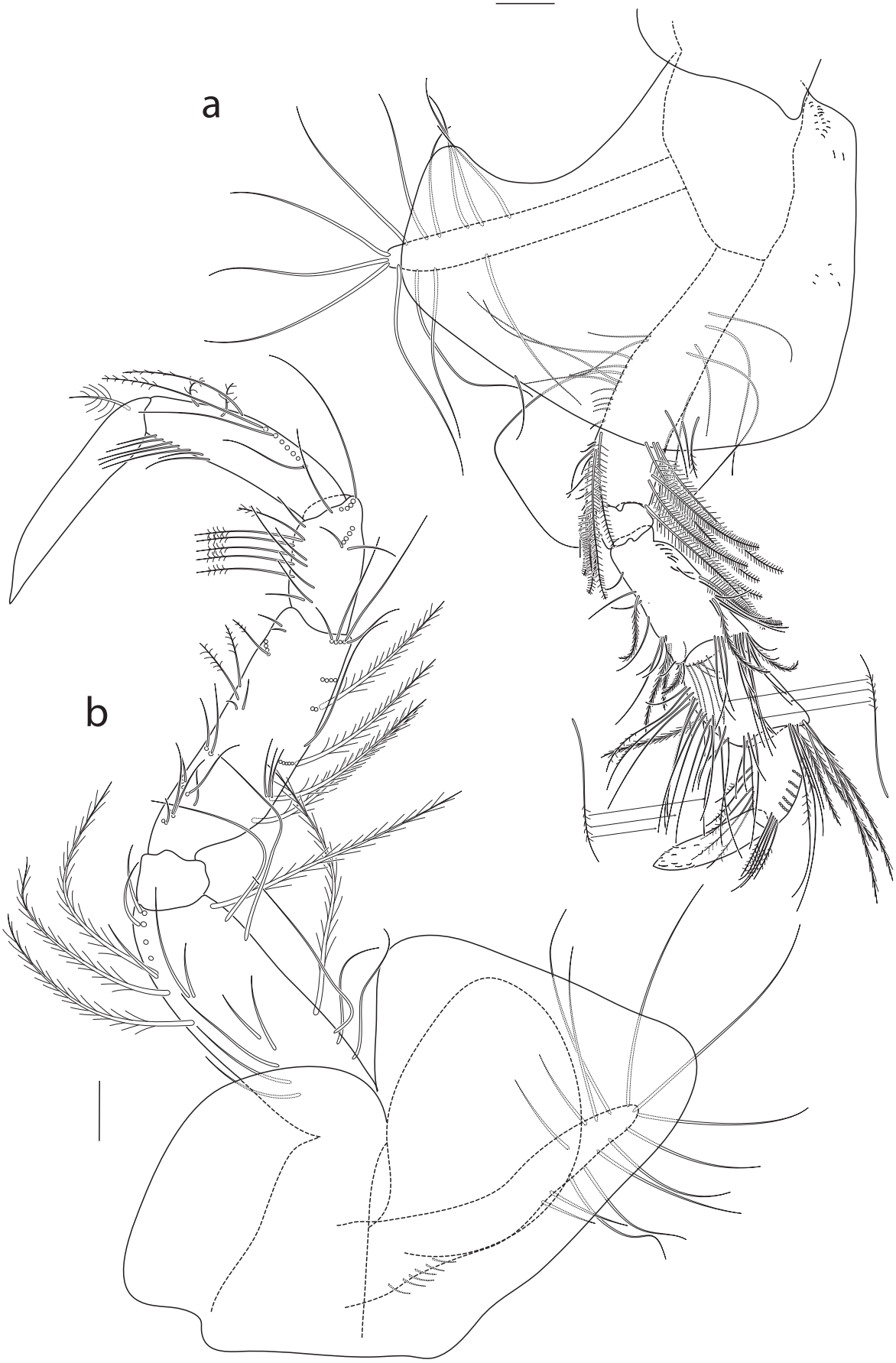

Figure 4. *Oedicerina ingolfi*, ovig. female, 10.3 mm; Norwegian Sea, ZMBN 95143, St. 81.08.14.5. **a)** pereopod 4; **b)** pereopod 5. Scale bars: a, b; 200 μm.

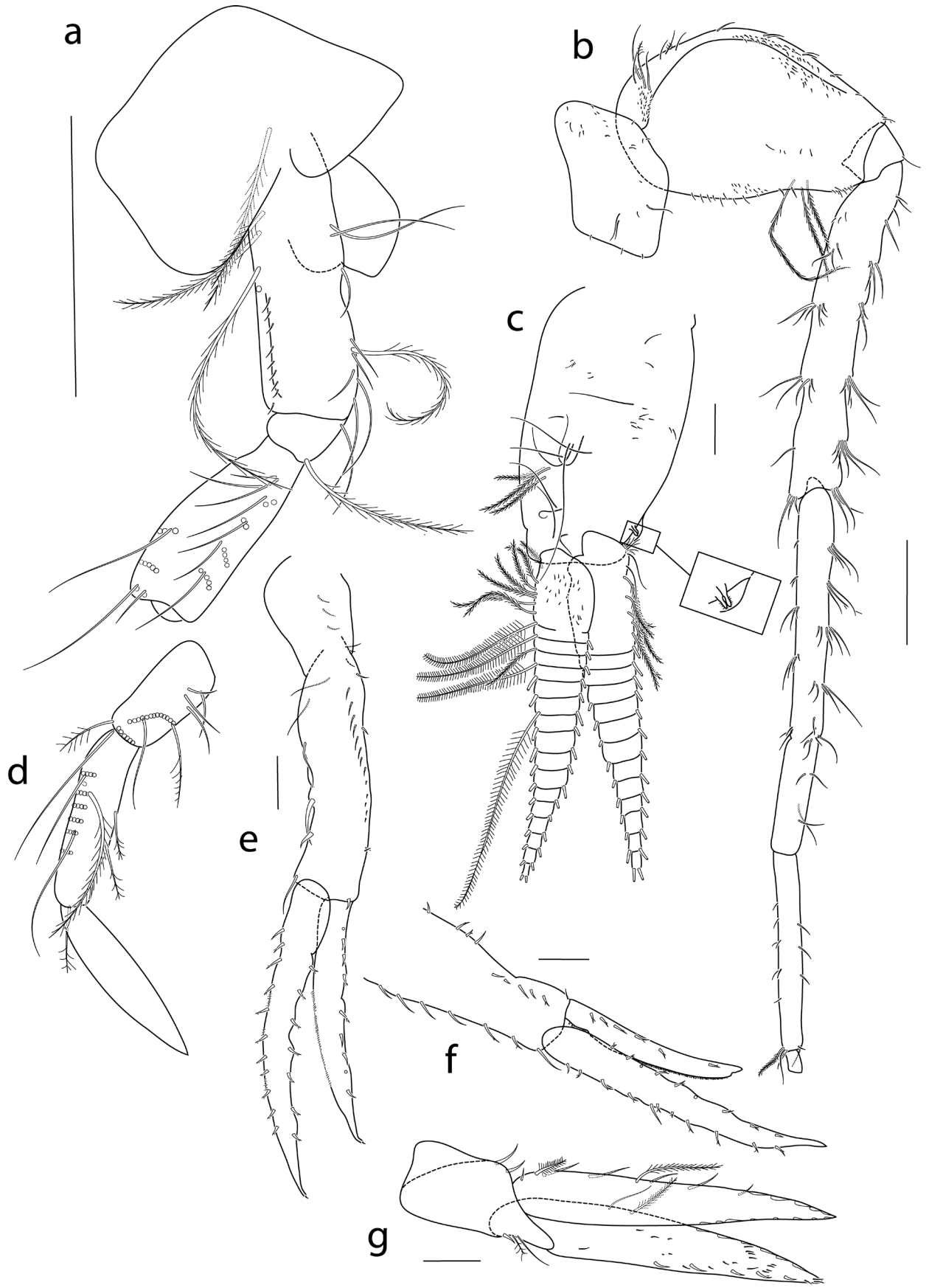

Figure 5. *Oedicerina ingolfi*, ovig. female, 10.3 mm; Norwegian Sea, ZMBN 95143, St. 81.08.14.5. a, **d)** pereopod 6; **b)** pereopod 7; **c)** pleopod 1; **e)** uropod 1; **f)** uropod 2; **g)** uropod 3. Scale bars: a, b; 1 mm: c, e, f, g; 200 µm.

expanded distally, distal margin straight, anterior lobe 0.7 × length of posterior lobe, rounded distally; basis shorter than coxa; merus as long as basis, carpus 0.5 × length of merus; propodus slender, subrectangular, 0.8 × length of merus, about as long as straight lanceolate dactylus; articles 2–6 variously setose. *Pereopod 6* (Fig. 5a): coxa almost as deep as coxa 5, bilobed, posterior lobe long, distal margin straight, oblique, anterior lobe short, rounded distally; basis subrectangular; merus posterior margin weakly convex; carpus tapering weakly, 0.5 × length of merus; propodus with several rows of setae along anterior margin, 0.9 × length of merus; dactylus lanceolate; articles 2–6 variously setose. *Pereopod 7* (Fig. 5b): long, exceeding apices of uropods; coxa wider than long, posterodistal corner subrectangular; basis, posterior margin weakly sinuous, anterior margin strongly convex; merus and carpus with groups of short slender setae on anterior and posterior margins; carpus 1.2 × length of merus; propodus narrow, subrectangular, 0.6 × length of merus; [dactylus unknown].

Pleon. *Pleonites* 1–2 (Fig. 1a) with mid-dorsal, relatively long posteriorly directed carinate teeth; pleonite 3 with short, slender, upright tooth. *Epimera*:1 and 3 evenly rounded; epimeron 2 subrectangular. *Pleopod 1* (Fig. 5c): peduncle stout, 0.8 × length of rami.

Urosome. *Urosomite* 1 (Fig. 1a) longest, with an inconspicuous boss close to the posterior margin; urosomite 3 longer than 2, with short, acute mid-dorsal projection. *Uropod 1* (Fig. 5e): peduncle about as long as outer ramus, margins with short setae; inner ramus 1.3 × length of outer ramus, with small setae on both margins; outer ramus with setae on lateral margin only. *Uropod 2* (Fig. 5f): peduncle slightly tapering, with short setae on both margins; inner ramus 1.7 × length of outer ramus, with short setae on both margins; outer ramus with setae on lateral margin only. *Uropod 3* (Fig. 5g) peduncle short, about as long as telson, with ventral subacute projection; rami subequal, plumose setae on lateral margins. *Telson* (Fig. 1h) tapered, notched 30%.

Sexual dimorphism. Male antenna 1 with shorter peduncle articles in the ratio 1:0.7:0.3 and more numerous flagellum articles compared to female. Article 1 of the flagellum is elongate, about as long as peduncle article 3. Subsequent proximal articles are shorter than wide. The 1-articulate slender accessory flagellum is about 1/3 as long as article 1 of the primary flagellum.

Distribution. Between the Faroes and Jan Mayen (Stephensen 1931); Norwegian Sea, Greenland Sea (this study), 1802–3200 m.

Remarks. Stephensen's (1931) specimen was damaged and incomplete. Only the head and pereonites 1–4, pereopods 3–4 and coxae and bases of pereonites 1–2 on one side were available for study. The material from the Bergen Museum used for this description consists of numerous specimens of all sizes, both female and male, and was collected relatively close to the type locality of *O. ingolfi*, but nevertheless we cannot be absolutely sure that our material represents Stephensen's species (see discussion below).

***Oedicerina vaderi* sp. n.**

http://zoobank.org/0CBB4731-9908-43F5-83E5-BCF9C83ED4C6
Figs 6–10

Type material. Male holotype, 7.3 mm; NHMUK 2014. 398, Discovery Stn 7709#73.

Type locality. North Atlantic, East Iceland Basin: 60°07.1'N 19°30.3'W – 60°06.1'N 19°24.8'W, 5 May 1971, BN 2.4, 2636–2646 m.

Paratypes. 1 female, 6.3 mm; 2 specimens of unknown sex, 4.2 mm and 5 mm; NHMUK 2014. 399-401, Discovery Stn 7709#73, from the type locality.

Etymology. The specific name *vaderi* recognises the important contributions to amphipod studies made by Professor Wim Vader.

Description. Holotype male, 7.3 mm. **Head** (Fig. 6c): longer than high, longer than pereonites 1–2 combined; no eyes or ocular pigment visible; rostrum (Fig. 6c) strongly deflexed, the ventral margin concave. *Antenna 1* (Fig. 6f): length ratios of peduncle articles 1–3 1:0.5:0.3; flagellum [broken], proximal flagellum articles wider than long; accessory flagellum 1-articulate, slender, about half the length of peduncle article 3. *Antenna 2* (Fig. 6g): peduncle weakly setose; length of article 4 1.5 × article 5; flagellum shorter than peduncle article 5, 9-articulate. *Upper lip* (labrum) (Fig. 6d): wider than long, apically rounded. *Mandible* (Fig. 7a, e): incisors and laciniae mobiles 5-dentate; palp 3-articulate, article 2 swollen proximally, article 3 tapered, length ratios of articles 1–3 1:4.3:6.1. *Lower lip*: inner lobes prominent and broad, hypopharyngeal gap wide, outer lobe mandibular processes short and rounded. *Maxilla 1* (Fig. 7d): inner plate tapered, with two distal setae; outer plate with nine acute setal-teeth; palp 2-articulate, article 2 5 × length of article 1. *Maxilla 2* (Fig. 7b): inner plate 1.3 × wider than outer plate; both plates with relatively sparse apical setation. *Maxilliped* (Fig. 7c): inner plate short, extending just beyond base of palp article 1; outer plate extending 30% along palp article 2; concave medially; palp 4-articulate; article 1 tapered; article 2 broad, strongly expanded medially, lobe broadly rounded; article 3 narrow proximally and expanded mediodistally; article 4 curved, acute; length ratios of articles 1–4 1:2.2:0.8:1.3.

Pereon. *Pereonite* 1 (Fig. 6a): longer than 2; pereonite 2 shortest. *Gnathopod 1* (Fig. 8a): coxa subtriangular, posterior margin straight, anterodistal corner broadly rounded, posterodistal corner rectangular, distal margin straight, weakly setose; basis curved, posterior margin with a row of plumose setae; merus, posterodistal lobe rounded, setose; carpus strongly expanded, subrectangular posterior

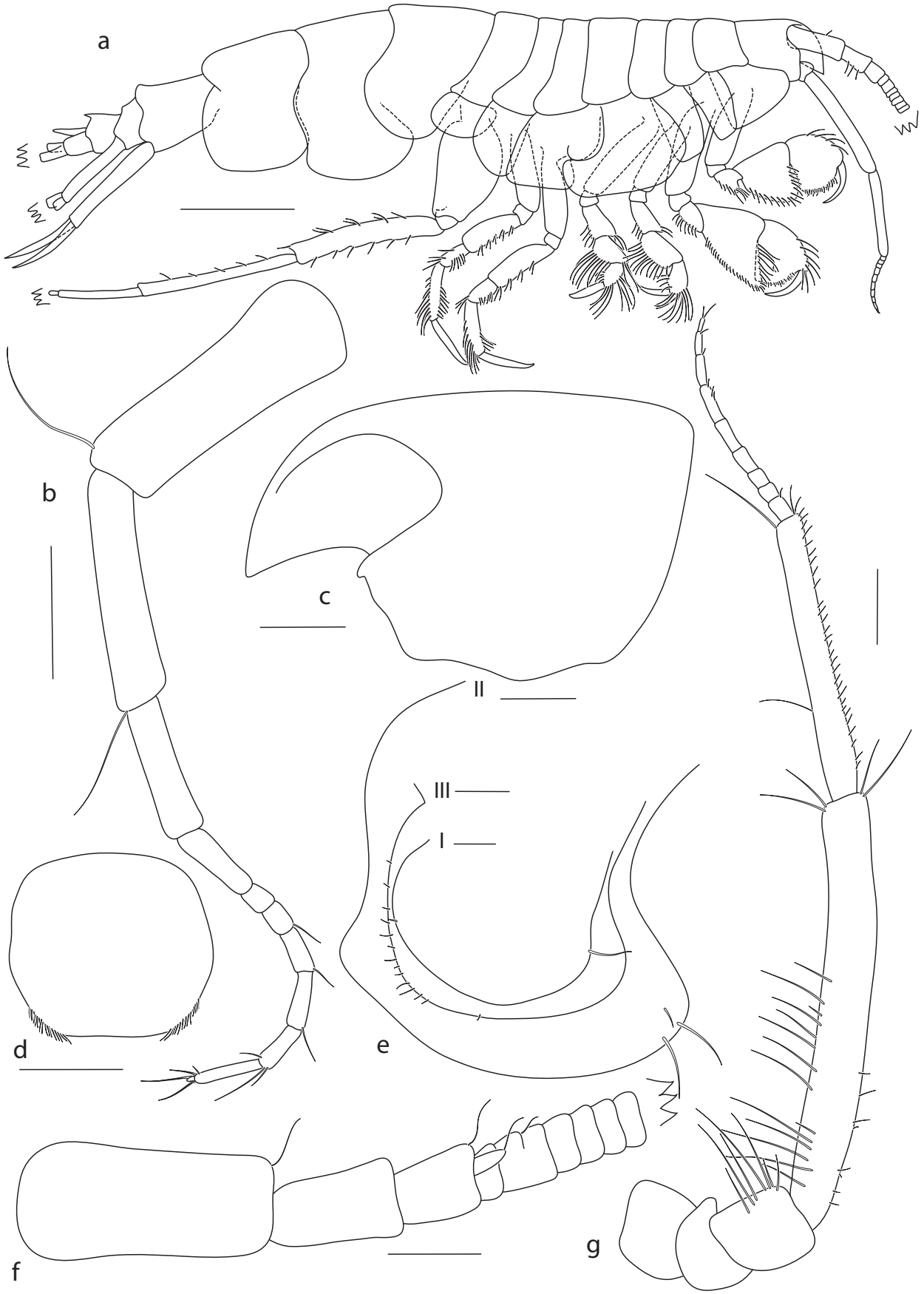

Figure 6. a, c–g) *Oedicerina vaderi* sp. n., male holotype, 7.3 mm; northeast Atlantic Ocean, NHMUK 2014. 398, Discovery Stn 7709#73. **a)** habitus; **c)** head; **d)** upper lip; **e)** epimeral plates 1-3; **f)** antenna 1; **g)** antenna 2. Female paratype, 6.3 mm; same locality. **b)** antenna 1. Scale bars: a; 1 mm: b–g; 200 μm.

Figure 7. *Oedicerina vaderi* sp. n., male holotype, 7.3 mm; northeast Atlantic Ocean, NHMUK 2014. 398, Discovery Stn 7709#73. **a)** right mandible; **b)** maxilla 2; **c)** maxilliped; **d)** maxilla 1; **e)** left mandible. Scale bars: a, c; 200 µm: b, d, e; 100 µm.

lobe with posterior and distal margins setose; propodus strongly expanded, as long and as wide as carpus, anterior margin convex, palm convex, transverse, crenellate, setose; dactylus falcate, as long as palm. *Gnathopod 2* (Fig. 8b): coxa as long as coxa 1, tapering distally, apex truncate with few setae at the distal margin; basis subrectangular, with a posterodistal group of plumose setae and an anterodistal group of simple setae; merus, posterodistal lobe narrow, setose; carpus strongly expanded, wider than propodus, posterodistal lobe subacute, posterior and distal margins setose; propodus as long as carpus, expanded distally, palm convex, crenellate; dactylus slender, curved, as

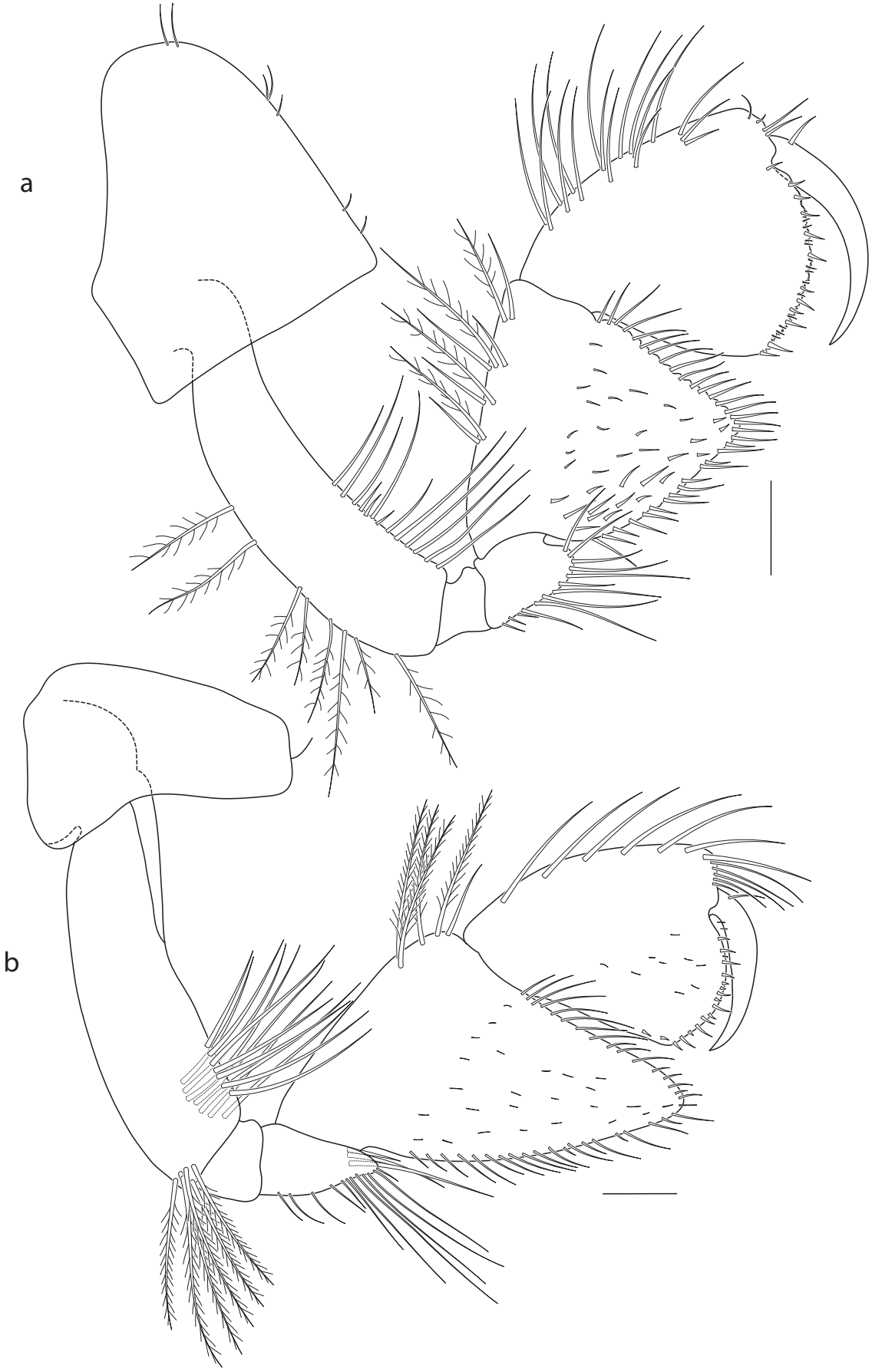

Figure 8. *Oedicerina vaderi* sp. n., male holotype, 7.3 mm; northeast Atlantic Ocean, NHMUK 2014. 398, Discovery Stn 7709#73. **a)** gnathopod 1; **b)** gnathopod 2. Scale bars: a, b; 200 μm.

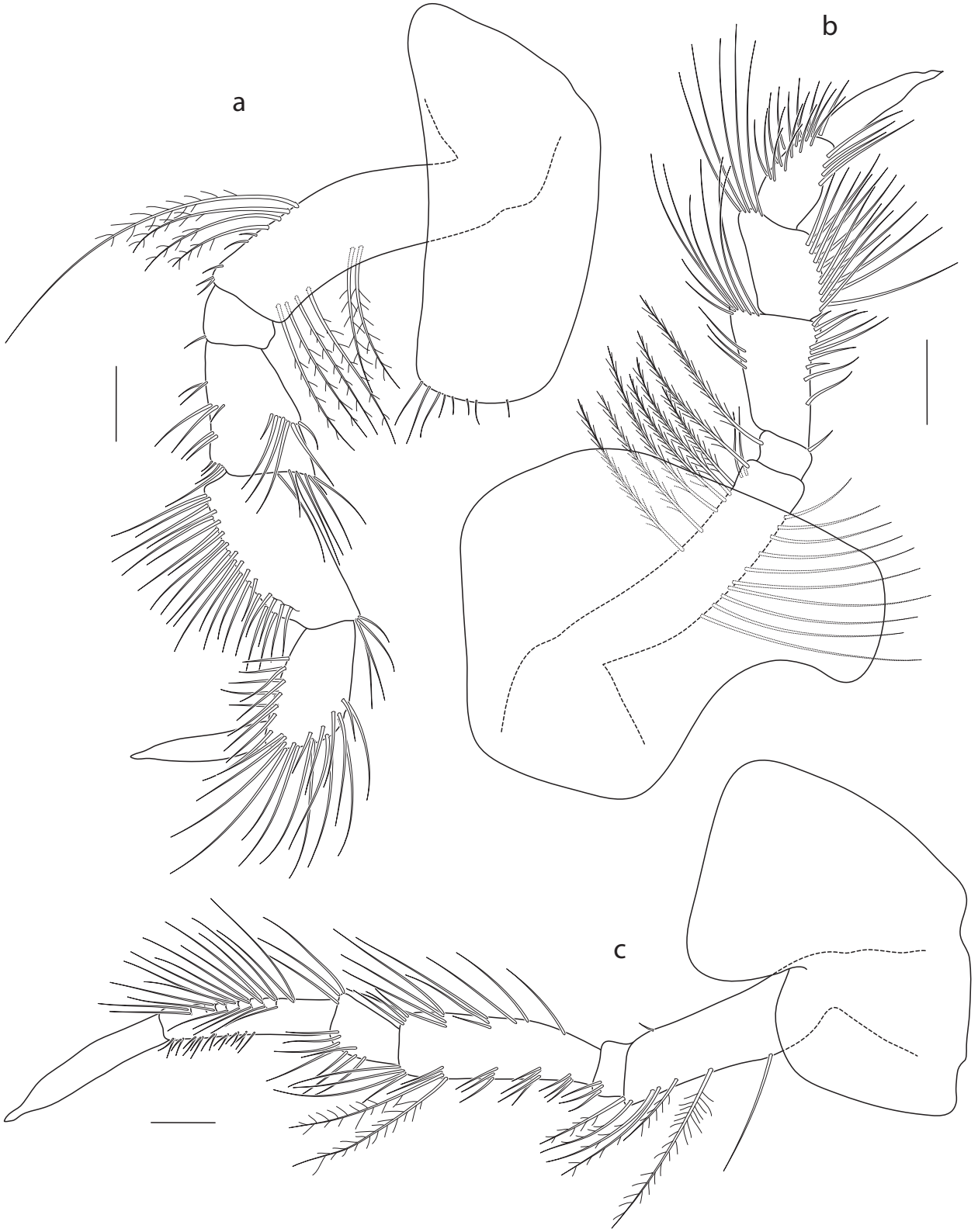

Figure 9. *Oedicerina vaderi* sp. n., male holotype, 7.3 mm; northeast Atlantic Ocean, NHMUK 2014. 398, Discovery Stn 7709#73. **a)** pereopod 3; **b)** pereopod 4; **c)** pereopod 5. Scale bars: a–c; 200 μm.

long as palm. *Pereopod 3* (Fig. 9a): coxa subequal to coxa 2, apex rounded, weakly setose; basis shorter than coxa, long plumose setae distally along posterior and anterior margins; merus expanded anterodistally, setose; carpus 1.3 × length and about as wide as merus, posterior margin densely setose; propodus oval, anterodistal and posterior margins setose; dactylus lanceolate, subequal to propodus. *Pereopod 4* (Fig. 9b): coxa wider than long, anterior mar-

Figure 10. a–d, f) *Oedicerina vaderi* sp. n., male holotype, 7.3 mm; northeast Atlantic Ocean, NHMUK 2014. 398, Discovery Stn 7709#73. **a)** pereopod 6; **b)** pereopod 7; **c)** uropod 3; **d)** uropod 2, peduncle; **f)** telson; **g)** uropod 1. Female paratype, 6.3 mm; same locality. **e)** pleonite 3 and urosome with telson, uropods not shown, Scale bars: a–d; 200 μm: e; 1 mm.

gin broadly rounded, distal margin straight, posterodistal lobe very strong, subrectangular; basis shorter than coxa, anterior and posterior margins setose distally; merus expanded anterodistally, setose; carpus 0.8 × merus, but subequal in width, posterior margin strongly setose, long setae anterodistally; propodus, anterior margin setose; dactylus, straight, lanceolate, 1.5 × propodus. *Pereopod 5* (Fig. 9c): coxa about as deep as coxa 4, bilobed, posterior lobe expanded distally, distal margin straight, anterior lobe 0.7 × length of posterior lobe, rounded distally; basis shorter than coxa; merus as long as basis; carpus 0.3 × length of merus; propodus slender, subrectangular, 0.9 × merus, about as long as straight lanceolate dactylus; articles 2–6 variously setose. *Pereopod 6* (Fig. 10a): coxa 0.8 × length of coxa 5, bilobed, posterior lobe long, distal margin rounded, anterior lobe subrectangular, 0.4 × length of posterior lobe; basis subrectangular; merus, posterior margin weakly convex; carpus subrectangular, 0.4 × length of merus; propodus and straight dactylus as long as merus; articles 2–6 variously setose. *Pereopod 7* (Fig. 10b): long; coxa wider than long, oval, posterodistal corner rounded; basis posterior margin weakly convex, anterior margin strongly convex; merus elongate; carpus, 0.9 × merus; merus and carpus with groups of short setae on anterior and posterior margins; [propodus and dactylus unknown].

Pleon. *Pleonites* 1–3 (Fig. 6a): smooth, lacking carinae or teeth. *Epimera* (Fig. 6e): 1 and 3 evenly rounded; epimeron 2, posterodistal angle produced, rounded, posterior margin sinuous. *Pleopod 1*: peduncle stout, 0.8 × length of rami; rami subequal in length.

Urosome. *Urosomite* 1 (Fig. 10e): longest, with low boss close to the posterior margin; urosomite 3 longer than 2, with short, acute mid-dorsal projection. *Uropod 1*: peduncle elongate, lateral margin with robust setae, mesial margin setose; inner ramus, [broken], both margins setose; outer ramus 0.7 × length of peduncle, setae on lateral margin only. *Uropod 2* (Fig. 10d): peduncle not tapering, both margins with short setae; [rami damaged], inner ramus, both margins setose; outer ramus, lateral margin setose. *Uropod 3* (Fig. 10c): peduncle short, about as long as telson, with ventral subacute projection; outer ramus just longer than inner ramus. *Telson* (Fig. 10f) tapered, notched 40%.

Variability. The paratypes bear a small posteriorly directed tooth on pleonite 3. It may be that this process has been present and is worn down in the holotype. Antenna 1 of the female (Fig. 6b) has a longer and more slender peduncle and fewer and more elongate flagellum articles compared to the male.

Distribution. North Atlantic, south of Iceland, 2636–2646 m.

Oedicerina loerzae sp. n.

http://zoobank.org/34665247-D04C-4354-9314-13E38286AA04
Figs 11–16

Holotype. Male, 8.5 mm; NIWA 84727, TAN 0705-41, Chatham Rise, 43°50‘10.8“S 176°42‘33.0“E, 478–479 m, 5 April 2007. **Paratypes.** Male?, 7.7 mm; NIWA 89970, TAN 0705-251, Chatham Rise, 42°59‘45.0“S 178°59‘44.4“E, 520–530 m, 24 April 2007; ovig. female, 7 mm; NIWA 84740, TAN0705-83, Chatham Rise, 43°50‘10.8“S 176°42‘33.0“E, 529–530 m; 9 April 2007.

Etymology. The species is named for Dr. Anne-Nina Lörz to acknowledge her significant contributions to amphipod systematics.

Description. Holotype male, 8.5 mm. **Head** (Fig. 11a): longer than high, somewhat longer than pereonites 1–2 combined; no eyes or ocular pigment visible; rostrum (Fig. 11c) strongly deflexed, the ventral margin weakly convex. *Antenna 1* (Fig. 12a): shorter than antenna 2; length ratios of peduncle articles 1–3 1:0.5:0.3; flagellum 19-articulate, first article as long as peduncle article 3, proximal articles wider than long; accessory flagellum 1-articulate, minute, 0.3 × length of primary flagellum article 1. *Antenna 2* (Fig. 12c): peduncle setose; length of article 4 1.2 × article 5; flagellum 23-articulate, 1.9 × length of peduncle article 5. *Upper lip* (labrum) (Fig. 11b): wider than long, truncate apically. *Mandible* (Fig. 12b, d): incisor 5-dentate; left lacinia mobilis wide and multidentate, right narrower; palp 3-articulate, article 3 tapered, length ratios articles 1–3 1:3.9:4.9. *Lower lip* (Fig. 11d): inner lobes short and broad, hypopharyngeal gap wide, outer lobe mandibular processes acute. *Maxilla 1* (Fig. 11e): inner plate tapered, with one distal seta; outer plate with nine acute setal-teeth; palp 2-articulate, article 2 2.6 × length of article 1. *Maxilla 2* (Fig. 12f): inner plate 1.1 × wider than outer plate; both plates with relatively sparse apical setation. *Maxilliped* (Fig. 13a): inner plate (Fig. 12g) short, extending just beyond base of palp article 1; outer plate (Fig. 12e) extending 30% along palp article 2; concave medially; palp (Fig. 13b) 4-articulate; article 1 tapered; article 2 broad, strongly expanded medially, lobe broadly rounded; article 3 narrow proximally, expanded mediodistally; article 4 acute, weakly curved: length ratios of articles 1–4 1:1.7:0.7:1.2.

Pereon. *Pereonite* 1 (Fig. 11a) longer than 2; pereonite 2 subequal to 3; pereonite 7 longest. *Gnathopod 1* (Fig. 13c): coxa subtriangular, posterior margin straight, anterodistal corner rounded, posterodistal corner subrectangular, distal margin straight, setose; basis expanded distally, posterior margin with scattered setae, anterior margin distal half with a row of long setae; merus, posterodistal lobe rounded, setose; carpus subtriangular, strongly expanded distally, anterior, distal and posterior margins setose; propodus strongly expanded distally, as wide and as long as carpus, anterior and posterior margin convex, palm transverse, convex, crenellate, setose; dactylus slightly curved, just longer than palm. *Gnathopod 2* (Fig. 14a, b): coxa as long as coxa 1, anterior and posterior margins subparallel, apex truncate, weakly setose; basis a little expanded, with some plumose setae near posterior and distal margins and an

Figure 11. *Oedicerina loerzae* sp. n., male holotype, 8.5 mm; southwest Pacific Ocean, NIWA 84727, TAN 0705-41. **a)** habitus; **b)** upper lip; **c)** rostrum; **d)** lower lip; **e)** maxilla 1. Scale bars: a; 1 mm: b–e; 100 µm.

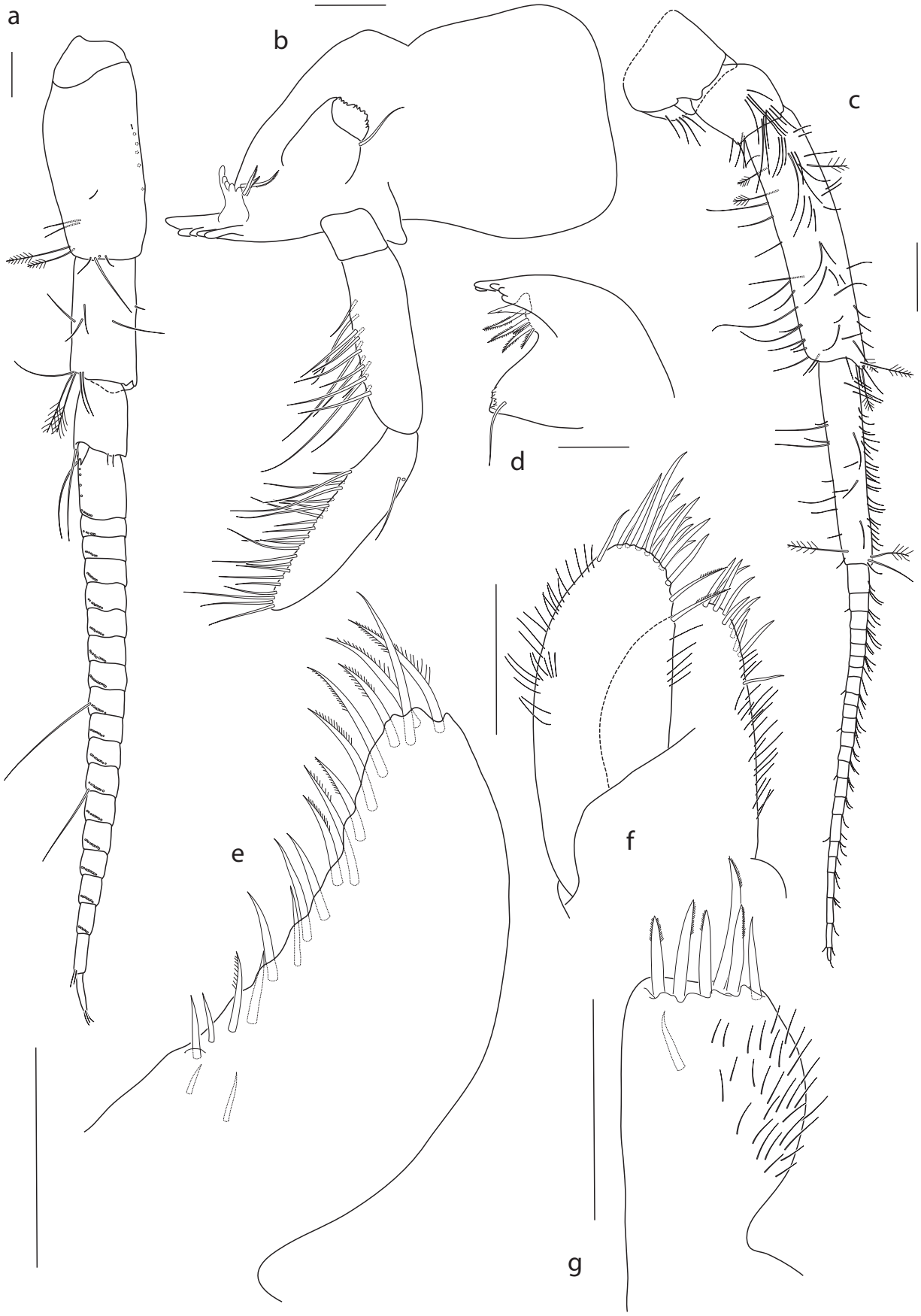

Figure 12. *Oedicerina loerzae* sp. n., male holotype, 8.5 mm; southwest Pacific Ocean, NIWA 84727, TAN 0705-41. **a)** antenna 1; **b)** left mandible; **c)** antenna 2; **d)** right mandible; **e)** maxilliped, outer plate; **f)** maxilla 2; **g)** maxilliped, inner plate. Scale bars: a, b, d–g; 100 µm: c; 200 µm.

Figure 13. *Oedicerina loerzae* sp. n., male holotype, 8.5 mm; southwest Pacific Ocean, NIWA 84727, TAN 0705-41. **a)** outline of maxilliped; **b)** maxilliped palp; **c)** gnathopod 1. Scale bars: a–c; 200 µm.

Figure 14. *Oedicerina loerzae* sp. n., male holotype, 8.5 mm; southwest Pacific Ocean, NIWA 84727, TAN 0705-41. **a)** gnathopod 2; **b)** gnathopod 2, detail of palm; **c)** pereopod 3, setation of carpus and propodus omitted; **d)** pereopod 4. Scale bars: a, c, d; 200 μm.

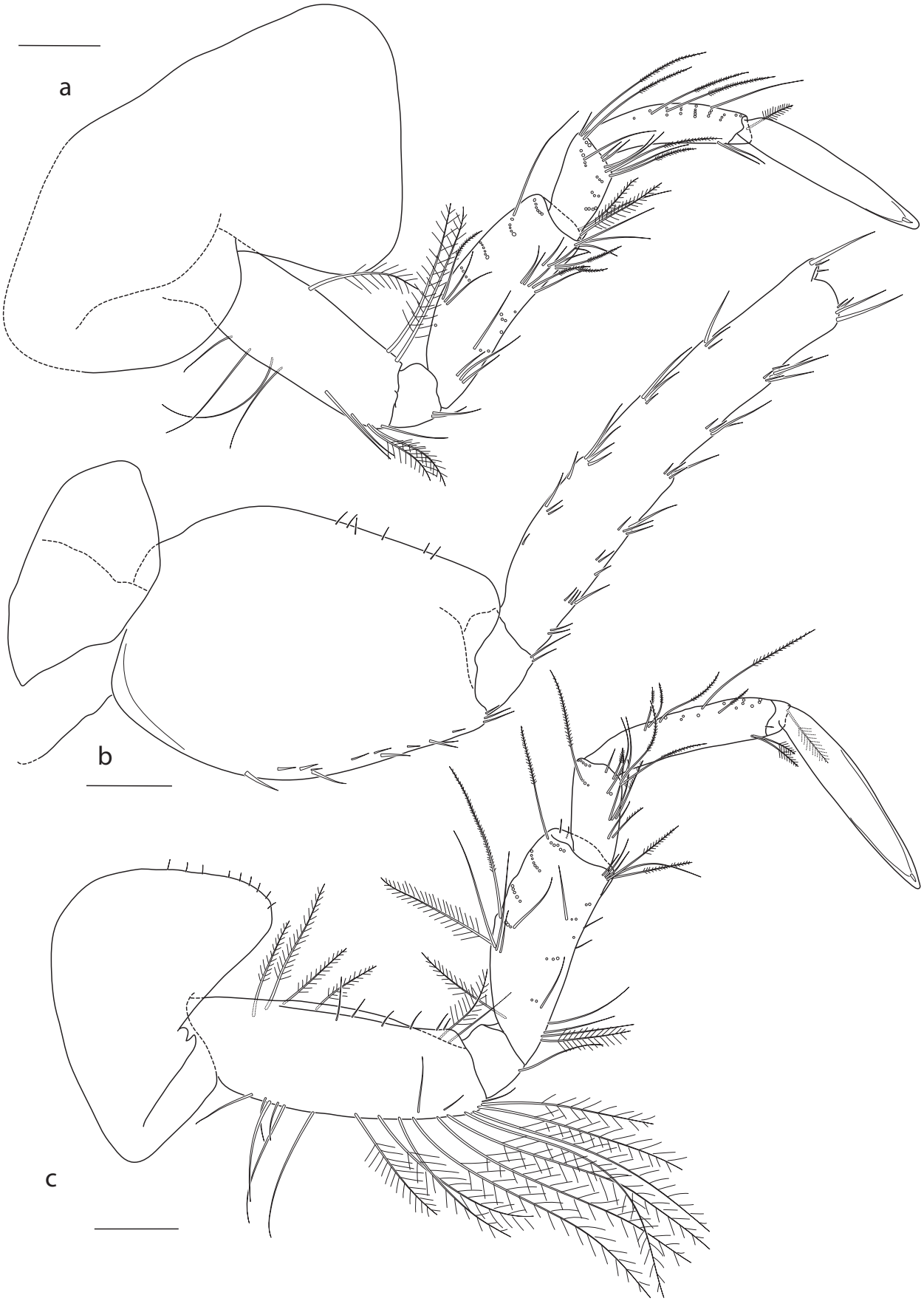

Figure 15. *Oedicerina loerzae* sp. n., male holotype, 8.5 mm; southwest Pacific Ocean, NIWA 84727, TAN 0705-41. **a)** pereopod 5, **b)** pereopod 7; **c)** pereopod 6. Scale bars: a–c; 200 μm.

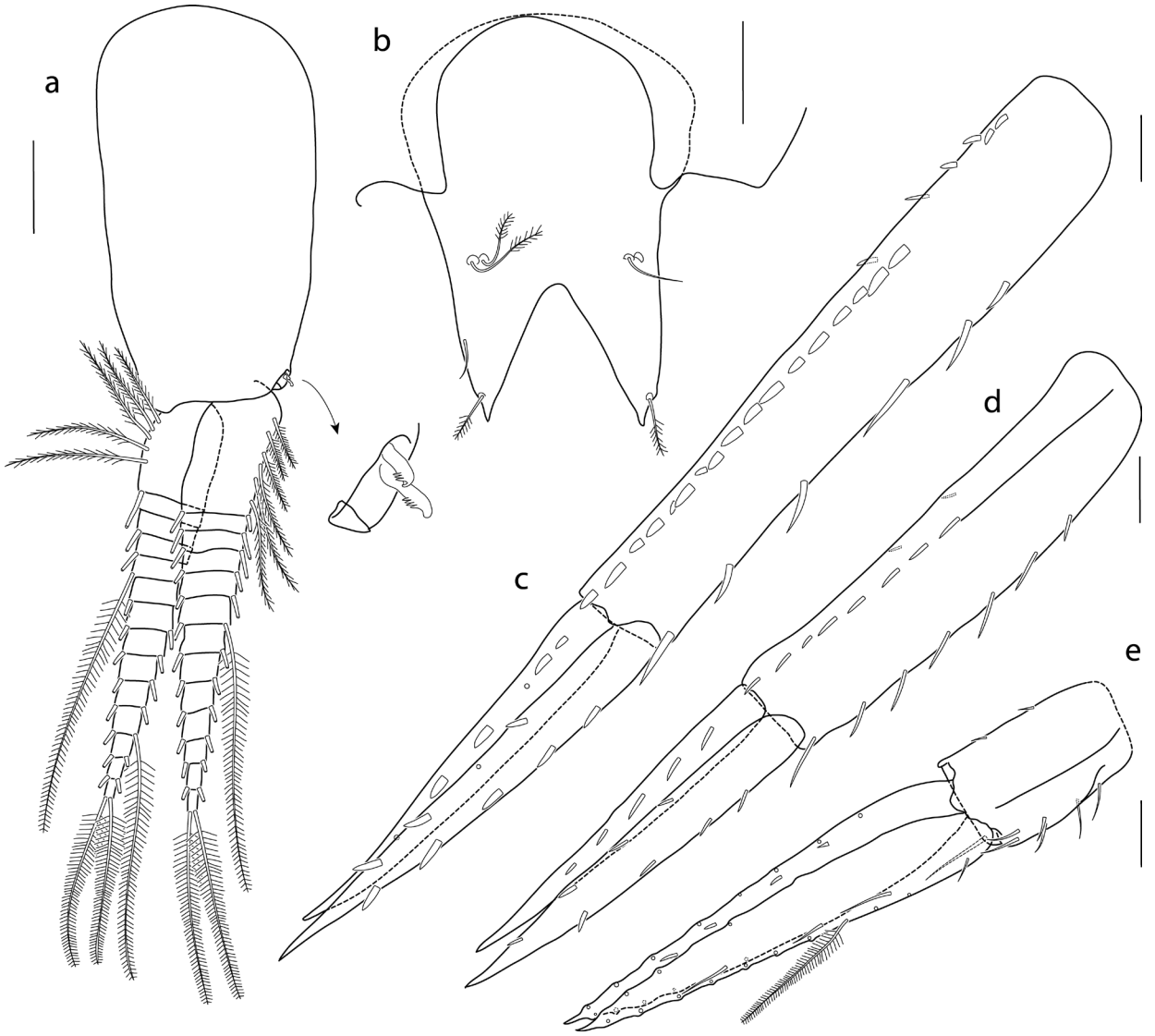

Figure 16. *Oedicerina loerzae* sp. n., male holotype, 8.5 mm; southwest Pacific Ocean, NIWA 84727, TAN 0705-41. **a)** pleopod 1; **b)** telson; **c)** uropod 1; **d)** uropod 2; **e)** uropod 3. Scale bars: a; 200 μm; b–e; 100 μm.

anterodistal group of long simple setae; merus, with angular posterodistal lobe short, narrow, setose; carpus strongly expanded, wider than propodus, posterodistal lobe subacute, distal margin oblique; propodus shorter than carpus, expanded distally, palm straight, crenellate; dactylus curved, just longer than palm. *Pereopod 3* (Fig. 14c): coxa subequal to coxa 2, apex truncate; basis shorter than coxa, long plumose setae on posterior margin and close to anterior margin; merus weakly expanded anterodistally; carpus, length and breadth subequal to merus; propodus subrectangular, anterodistal and posterior margins setose; dactylus 1.4 × length of propodus. *Pereopod 4* (Fig. 14d): coxa wider than long, anterior margin weakly convex, distal margin broadly rounded, anterodistal angle subrectangular, posterodistal lobe very strong, posterodistal angle rounded; basis shorter than coxa, anterior and posterior margins setose; merus weakly expanded anterodistally, setose; carpus 0.9 × merus, posterior margin convex, strongly setose, long setae anterodistally; propodus, anterodistal margin strongly setose, posterior margin setose; dactylus stout, straight, 1.8 × propodus. *Pereopod 5* (Fig. 15a): coxa 0.9 × length of coxa 4, bilobed, posterior lobe expanded distally, distal margin straight, anterior lobe 0.6 × length of posterior lobe, rounded distally; basis shorter than coxa, few plumose setae on each margin; merus as long as basis, carpus 0.4 × length of merus; propodus slender, 0.7 × length of merus, shorter than the straight lanceolate dactylus; articles 2–6 variously setose. *Pereopod 6* (Fig. 15c): coxa 0.7 × length of coxa 5, bilobed, posterior lobe subtriangular, anterior lobe 0.5 × length of posterior lobe; basis subrectangular, long plumose setae anterodistally; merus posterior margin convex; carpus subrectangular, 0.5 × length of merus; propodus 0.9 × length of merus; dactylus straight, lanceolate, as long as merus; articles 3–6 variously setose. *Pereopod 7* (Fig. 15b): long; coxa wider than long, rounded posterodistally; basis, margins convex, posterodistal lobe nearly

as long as ischium; merus with groups of short setae on anterior and posterior margins [distal articles unknown].

Pleon. *Pleonites*: 1–2 (Fig. 11a) with mid-dorsal, posteriorly directed carinate teeth; pleonite 3 lacking carina and tooth. *Epimera*: 1 and 3 broadly rounded posterodistally, epimeron 2 weakly angular. *Pleopod 1* (Fig. 16a): peduncle and rami subequal.

Urosome. *Urosomite* 1 (Fig. 11a): longest, with inconspicuous short boss close to the posterior margin; urosomites 2 and 3 subequal in length, lacking dorsal projections. *Uropod 1* (Fig. 16c): peduncle elongate, lateral margin with dense row of short setae, inner margin with fewer and longer setae; inner ramus 0.7 × length of peduncle, both margins setose; outer ramus 0.9 × inner ramus, lateral margin setose. *Uropod 2* (Fig. 16d): peduncle not tapering, both margins with short setae; inner ramus 0.9 × length of peduncle, both margins setose; outer ramus 0.9 × length of inner ramus, lateral margin setose. *Uropod 3* (Fig. 16e): peduncle short, about as long as telson; rami subequal, 2.4 × length of peduncle, outer ramus with plumose setae on the lateral margin. *Telson* (Fig. 16b) tapered, notched 34%.

Distribution. Chatham Rise, east of New Zealand.

Remarks. The female specimen has the same antenna 1 morphology as the male: short peduncle articles and numerous flagellum articles. The proximal articles of the flagellum are shorter than wide.

***Oedicerina* sp. indet.**

Material examined. 1 incomplete female; NHMUK 2014.402, Discovery Stn 7845: north-eastern Atlantic, off the coast of Western Sahara: 23°50.5‘N 17°05.9‘W – 23°51.0‘N 17°05.4‘W, 24 March 1972, BN 2.4, 947–958 m.

Remarks. Only the head and pereonites 1–2 are present. Coxae 1–2 bear long setae along the distal margins. The animal appears similar to *O. ingolfi*, but as a result of incompleteness it is impossible to attribute it to any species.

Discussion

The three species described herein are morphologically very similar. Mouthparts and appendages show only minor and subtle differences and the species are best discriminated by habitus characters. Two of the species, *O. ingolfi* and *O. loerzae* sp. n. have mid-dorsal carinae on pleonites 1–2. *Oedicerina ingolfi* differs from *O. loerzae* sp. n. in having a small, slender, acute, upright tooth on pleonite 3 and a small pointed process on the posterior margin of urosomite 3 both of which are absent in *O. loerzae* sp. n. *Oedicerina vaderi* sp. n. has a small pointed process on the posterior margin of urosomite 3, as found in *O. ingolfi*, but pleonites 1–2 are evenly vaulted lacking any trace of a carina. Pleonite 3 of the holotype of *O. vaderi* sp. n. appears to be dorsally unarmed, but the paratypes have a small acute process (see female paratype, 6.3 mm in Fig. 10e). Coxa 5 of *O. ingolfi* is longer than wide, that of *O. vaderi* sp. n. is about as wide as long, and that of *O. loerzae* sp. n. much wider than long.

Oedicerina sp. indet. was collected from the warm-temperate east Atlantic Ocean off Western Sahara. The unique specimen is incomplete, only the head and pereonites 1 and 2 are present, preventing a full identification.

Apart from the type species *O. ingolfi*, two other species had been described in the genus prior to this study: *Oedicerina megalopoda* Ledoyer, 1986, collected close to Mayotte, Mozambique Channel, western Indian Ocean (200–500 m) and *Oedicerina denticulata* Hendrycks & Conlan, 2003 from the northeast Pacific Ocean off California (4050 m). Knowledge of *O. megalopoda* is limited as the unique specimen is incomplete, but the massive rostrum of this species differs markedly from all other species of the genus. The palm of gnathopod 2 of *O. megalopoda* is straight, similar to that of *O. loerzae* sp. n., and thus different from the convex pattern seen in both North Atlantic species. In *Oedicerina denticulata* pleonite 1 is smooth and pleonites 2 and 3 have a posteromarginal process. The process on pleonite 3 is directed posteriorly and is reminiscent of that seen in paratype material of *O. vaderi* sp. n. thus contrasting with the upright condition found in *O. ingolfi*. The posterior margin of urosomite 3 bears a small process (as do all species except for *O. loerzae* sp. n.) and urosomite 1 has a small upright process in the male but not the female, a character unique within the genus. Coxa 5 appears to be longer than wide, as in *O. ingolfi*.

The mouthparts and appendages of all species of this genus are remarkably similar to each other. Examination of the extensive Norwegian Sea material which we attribute to *O. ingolfi* indicates that intraspecific variability is minimal, except for sexual dimorphism in antenna 1. In females of both Atlantic species peduncle articles of antenna 1 are longer and more slender than in males. Flagellum articles in females are uniformly much longer than wide and relatively few in number, whereas in males they are more numerous and proximally wider than long, forming an incipient callynophore. This sexual dimorphism is not apparent in *O. loerzae* sp. n. where the structure of antenna 1 is very similar in males and the one ovigerous female paratype.

Because of minimal differences among appendages and mouthparts in *Oedicerina* species, differentiation within the genus relies significantly on patterns of ornamentation of pleonites and urosomites. As the posterior segments of the type material of *O. ingolfi* are missing, the question remains as to which of the two Atlantic species represents the species that Stephensen described. We allocate the material from the museums in Bergen and Lund studied herein to *O. ingolfi* on geographical grounds in that it was collected much closer to the type locality of that species, and on the morphological grounds of the dense fringe of setae on the distal margins of coxae 1 and 2 and the shape of the rostrum that our material shares with Stephensen‘s original description.

Acknowledgments

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