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A new isopod species from the Southern Ocean: *Disparella maiuscula* sp. nov. (Isopoda: Asellota: Desmosomatidae)

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ABSTRACT. – *Disparella maiuscula* sp. nov. from the Southern Ocean is the second record of this genus from the region besides *Disparella longimana* (VANHÖFFEN, 1914). The new species can be distinguished from all other species of *Disparella* HESSLER, 1970 by the length of the cephalic spines and the longer uropods. Further differences are the setation of the first pereopod: seven small setae on the ventral margin of the carpus; and the strongly concave posterior margin of the fifth pereonite.

KEYWORDS: Isopoda, Desmosomatidae, *Disparella maiuscula*, new species, taxonomy, ANDEEP, deep sea, Antarctic Ocean.

Introduction

The Asellota are characteristic faunal elements of the deep sea, and the family Desmosomatidae SARS, 1897 has a global distribution and a bathymetric range between 0 and 5500 meters (KUSSAKIN 1973; KUSSAKIN 1999). The Desmosomatidae are small benthic macrofaunal isopods with a slender body (HESSLER 1970; SVAVARSSON 1993; WÄGELE 1989). Today, 115 species belonging to 18 genera are known.

The Desmosomatidae are widespread, especially in the North Atlantic Ocean (HESSLER 1970; SVARVARSSON 1988, 1993). They are also abundant in the Angola Basin (South Atlantic Ocean) and the equatorial Pacific (PARK 2000), southeastern Australia (POORE et. al. 1994) and New Zealand (BRIX, work in progress). Few desmosomatids were described from the deep Southern Ocean (BRANDT 1991). *Disparella longimana* (SCHULTZ 1978) was sampled at the base of the continental shelf in 2735 m depths. KUSSAKIN (1982) describes *Desmosoma antarcticum* from the shelf region in shallow waters (25 m depths), BRANDT (1992) *Reductosoma gunnera* from 3981 m depths. During *ANDEEP I & II* (ANT XIX3/4) (ANtarctic benthic DEEP-sea biodiversity, colonisation history and recent community patterns) with RV *Polarstern* in spring 2002 48 desmosomatid species belonging to 10 genera were collected.

In this paper, we describe a new species *Disparella maiuscula* from the depths of the Southern Ocean.

Material and methods

Samples were taken with a modified epibenthic sledge (EBS) during the cruises ANDEEP I & II (ROTHLISBERG & PEARCY 1977; BRANDT & BARTHEL 1995) and fixed in precooled 96% ethanol and kept at least for 48 hours in 20°C for later DNA extraction for taxonomic and genetic research.

For the drawings, a 'Leitz Mi 85' compound microscope with a camera lucida was used. The dorsal and lateral habitus drawings were made from the holotype (ZMH K 40674) in glycerin. All appendages were dissected from a paratype (St. 140-8, ZMH K 40680) and deposited in stained (methylene green), water-free glycerin jelly, stained and finally sealed. Male characters were drawn from 3 different paratypes (habitus lateral and dorsal: K 40677; pleopods I & II: K 40680; antennula & antenna: K 40678). The species description, measurements and nomenclature for setae and anatomical characters follows HESSLER (1970) and WATLING (1989).

The material is lodged in the Zoological Museum of the University of Hamburg (ZMH).

Systematics

Desmosomatidae SARS, 1897

Due to the chelate first pereopod the specimens were assigned to the genus *Disparella* of the subfamily Eugerdellatinae using the following characters (HESSLER 1970): by the cephalic spines laterally to the antennae, a row of small setae at the ventral margin of the first pereopod and posterolateral spines at the pleotelson.

Eugerdellatinae HESSLER, 1970
Disparella HESSLER, 1970

D i a g n o s i s (modified and extended after HESSLER 1970). – Head without frons clypeal furrow, with cephalic spines lateral to antennae. Mandible incisor process with shelf-like tooth. Pereopod I chelate, carpus not produced at base of robust seta, lacking well-defined proximal accessory setae, with small setae on ventral margin. Pereopod II, carpus and propodus bearing numerous robust setulate setae (> 20, > 8 in adult, respectively). Pereopod IV similar to pereopod III. Pleotelson with posterolateral spines. Uropods reaching one third or more of length of pleotelson; exopod present, much longer than wide.

T y p e s p e c i e s: *Disparella valida* HESSLER, 1970

G e n e r i c C o m p o s i t i o n: *Disparella valida* HESSLER, 1970; *D. pachythrix* HESSLER, 1970; *D. longimana* (VANHOEFFEN, 1914); *D. neomana* (MENZIES & GEORGE, 1972); *D. funalis* (MENZIES & GEORGE, 1972); *D. maiuscula* sp. nov.

R e m a r k s. – Three species of the genus *Disparella* are known: *D. valida, D. pachythrix* (North Atlantic at depths from 3459-4680 m) and *D. longimana* from the Antarctic shelf in the Weddell Sea. To these, we transfer two species: *D. neomana* and *D. funalis* from the Peru-Chile Trench, which were originally described as members of the genus *Desmosoma* SARS, 1897 (MENZIES & GEORGE 1972). *Disparella neomana* and *D. funalis*

will be redescribed within a revision of all desmosomatid species described by MENZIES & GEORGE (1972) (BRIX, work in progress). Both species belong to the genus *Disparella* due to the cephalic spines and a first pereopod that is chelate, carpus not produced at base of "claw", only with small setae.

Disparella maiuscula sp. nov.
(Figs 1-5)

H o l o t y p e. – Female, preparatory, 5.5 mm; 05 March 2002; ZMH 40674; ANGELIKA BRANDT leg.

T y p e l o c a l i t y. – Antarctic Ocean, north-western Weddell Sea, start position: 65°19.83 S - 51°31.61 W, end position: 65°19.96 S - 51°31.39 W, RV *Polarstern* ANT XIX-4 (PS 61); station 131-3; depth 3050-3053 m; gear: EBS.

P a r a t y p e s (all from the northwestern Weddell Sea and the South Sandwich Islands.). –

Allotype – 1 male, adult, 3.8mm; ZMH, No. K 40675. – Locality as for holotype. – One female, preparatory, St.131-3: 65°19.83 S - 51°31.61 W, depth 3050-3053 m, ZMH, No. K 40675. – One female, preparatory, St.132-2: 65°17.75 S - 53°22.81 W, depth 2086 m; ZMH, No. K 40676. – One male, adult, and two females, one manca, one damaged, St.136-4: 64°01.54 S - 39°06.88 W, depth 4741-4747 m; ZMH, No. K 40678. – Four females, three preparatory, one damaged, St.138-6: 62°58.08 S - 27°54.10 W, depth 4541 m; ZMH, No. K 40679. – One male, adult, and six females, St.140-8: 58°15.98 S - 24°53.73 W, depth 2951-2970 m; ZMH, No. K 40680. – One female, preparatory, St.141-10: 58°25.07 S - 24°00.78 W, depth 2951-2970 m; ZMH, No. K 40682.

E t y m o l o g y. – 'Maiuscula' (Latin, feminine) meaning 'somewhat larger' refers to the remarkable size of this specimen, which is larger than the other species of the genus.

D i a g n o s i s. – Body length approximately 4 times longer than width of pereonite 2. Cephalic spines present, (0.25 of cephalon length) overlapping proximal margin of deep fold (insertion of antennae). Posterior margin of pereonite 5 strongly concave. Antennula article 2 slender (8 times longer than wide), articles 3-5 lengths together subequal article 2 length. Pereopod I carpus ventral margin slightly concave with 7 short, slender setae, distal accessory plumose seta at base of distal robust seta longest. Female pleopod II operculum posterior margin slightly concave. Pleopod III exopod hirsute, tipped with 1 long seta. Uropods nearly as long as pleotelson.

D e s c r i p t i o n. – Holotype: body length 5.5 mm (measured without appendages), 4 times longer than width of pereonite 2 (Fig. 1C). Surface of dorsal cuticle smooth. Pereonites 1-4 gradually decreasing in length (from lateral and dorsal view), pereonite 5 nearly twice as large as pereonite 4. Body flattening gradually from pereonites 1 to 7.

Head (Fig. 1B): free, as long as wide. Pereonite 1 width 1.5 times cephalon width in dorsal view. Frontal margin of cephalothorax strongly convex, without frons clypeal furrow, transverse ridge on frons slightly indicated, moderately curved; insertions of antennula and antenna in a deep fold; cephalic spines well developed: 0.24 of cephalon length. Region of mouthparts half of size of head; maxilliped overlapping all other parts except mandible.

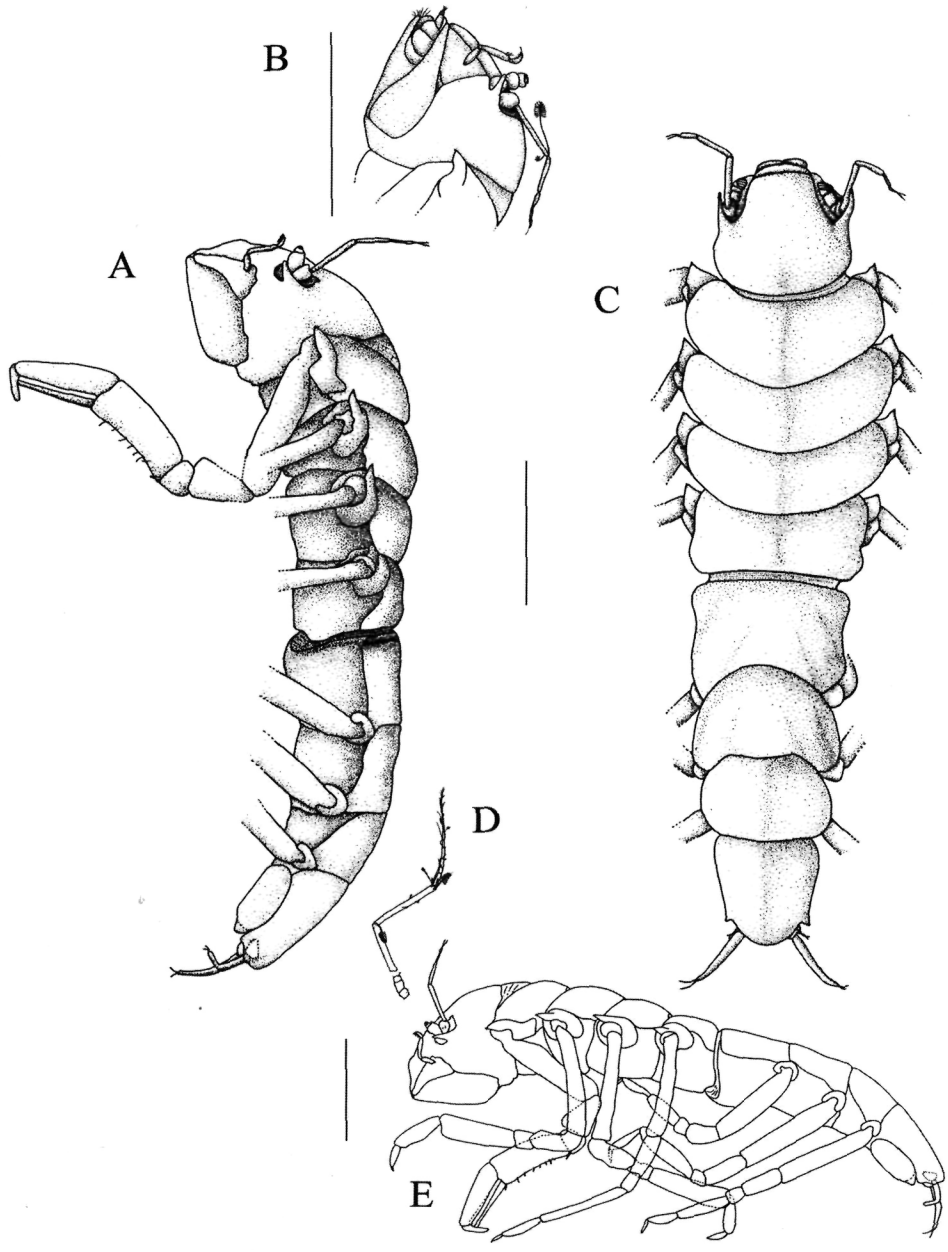

Fig. 1: *Disparella maiuscula* sp. nov.; **A)** holotype female in lateral view; **B)** cephalothorax (Ceph); **C)** dorsal view; **D)** antenna (A2) from paratype; **E)** habitus. Scale bar A-E = 1mm.

Pereon (Fig. 1): pereonite 1 length 1.4 pereonite 2 length, pereonite 2 wider than pereonite 1. Pereonite 4 length 1.3 pereonite 3 length, 0.8 pereonite 3 width. Anterior margins of pereonites 1-4 concave, lateral margins of pereonite 1-3 rounded. Pereonite 5

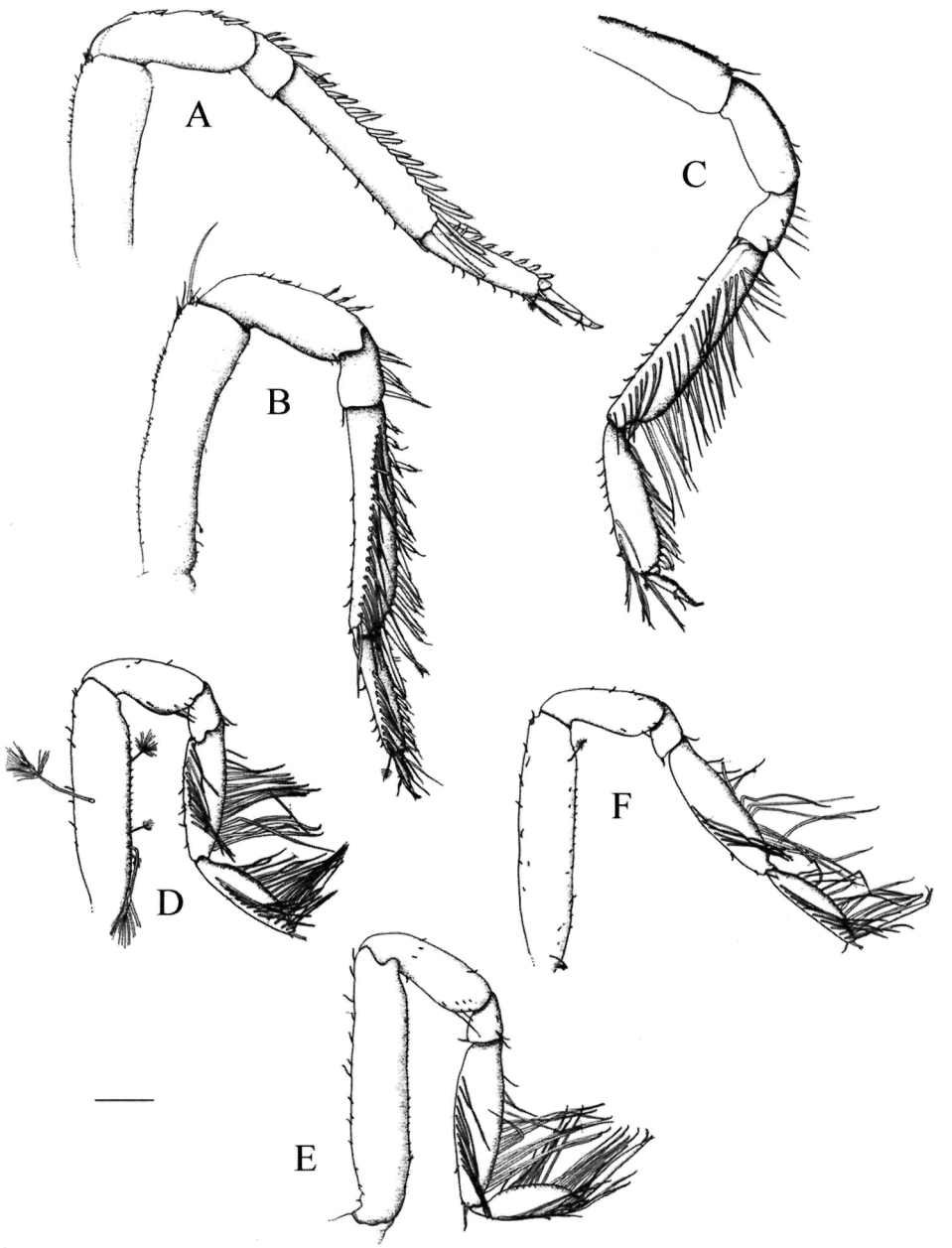

Fig. 2: *Disparella maiuscula* sp. nov., paratype female; **A-C)** pereopods II-IV; **D-F)** pereopods V-VII. Scale bar A-F = 200 μm.

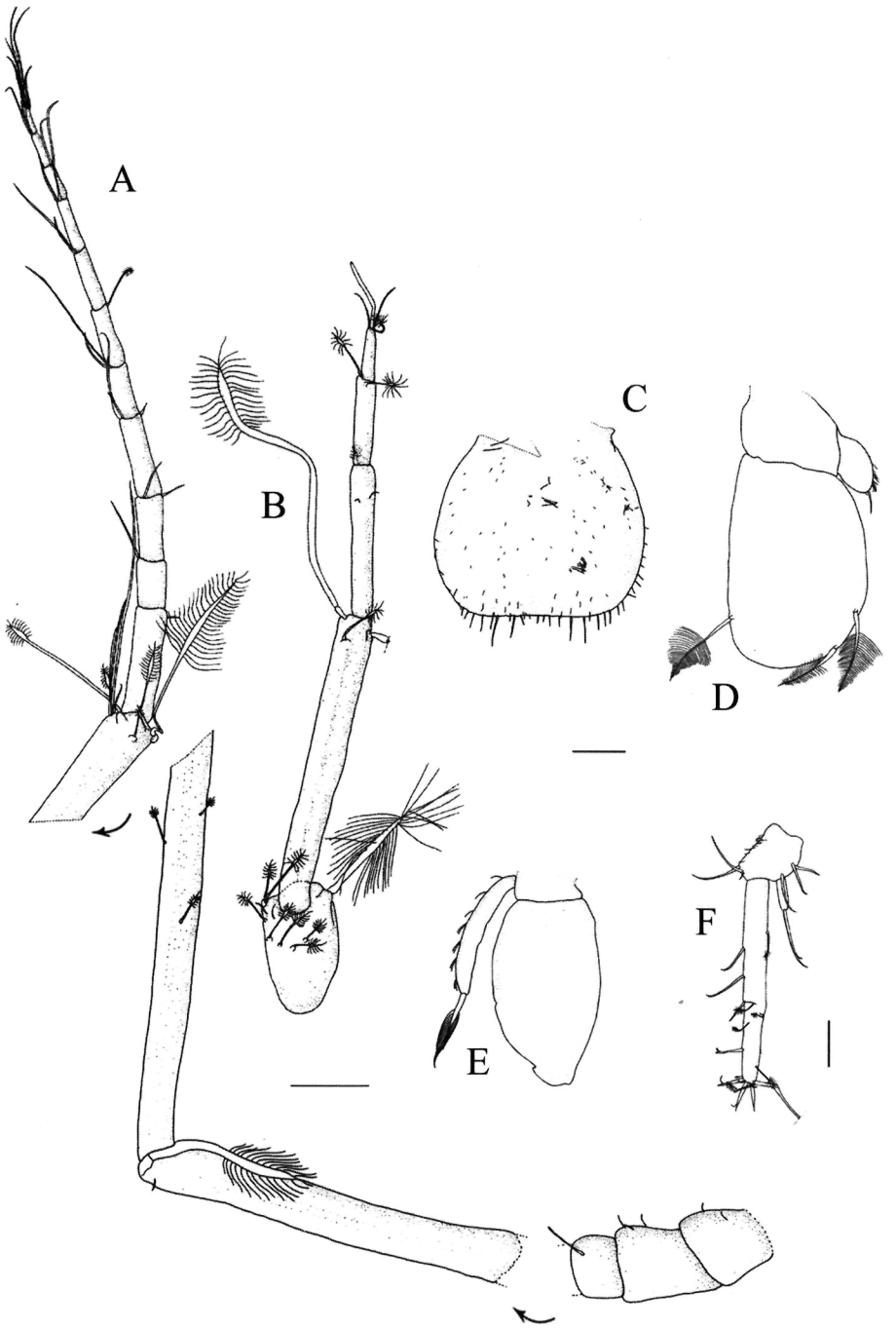

Fig. 3: *Disparella maiuscula* sp. nov., paratype female; **A)** antenna; **B)** antennula; **C)** pleopod II (operculum) **D)** pleopod III; **E)** pleopod IV; **F)** uropod. Scale bar A-F= 100µm.

width 1.25 length, anterior margin nearly straight, lateral margins of pereonites 4 and 5 slightly concave. Pereonites 6 and 7 width approximately 1.5 length, lateral margins rounded, anterior margin of pereonite 7 slightly concave. Coxae 1-4 produced anteriorly, elongation overlapping posterior margin of proximal segment, slightly bilobed, tipped with small, stout setae.

Pleotelson: smooth, length 1.1 width, with well-developed subterminal posterolateral spines, slightly angled. Posterior margin slightly rounded.

Antennula (Fig. 3B): 0.93 mm long, length 0.17 body length, with 5 articles. Article 1 broader than 2, width nearly 2.0 length, distally with 7 small and 1 long setae and 2 slender short setae. Article 2 length 8.0 width, 2.3 article 1 length; distally with three broom setae. Article 3 with 2 fine distal hairs and 1 short broom seta, article 4 distally with 2 broom setae, article distally with 1 aesthetasc, 2 long slender setae and 1 short broom seta. Articles 2-5 decreasing in length distally. Articles 2-5length relative to article 1: 1: 2.3: 1.2: 0.7: 0.4. – Antenna (description of antenna from paratype, ZMH K 40680; Fig. 3A): about 2.4 mm long, length approximately 0.4 body length, with 17 articles. Articles 1-3 with short, fine setae, article 3 with single long, slender seta distally. Article 4 missing, lost during dissection.. Length of article 5 almost twice of total length of articles 1-3, 6.7 times longer than wide, distally with short fine seta and long broom seta. Article 6, 1.4 times longer than fifth, nearly 11 times longer than wide, medially with 3 small broom seta, distally with 4 slender setae and 5 broom setae. Flagellar articles with up to 2 slender setae distally, sixth flagellar article additionally with 1 broom seta. Last article with five long slender setae. Relative lengths of articles: 1: 1.17: 0.65: missing: 5.37: 7.53: 1.67: 0.67: 0.92: 1.18: 0.77: 0.83: 0.85: 0.78: 0.52: 0.50: 0.38.

Mandible (Fig. 4A, B): first article of palp with several slender setae, second article of palp distally with rows of fine hairs and 2 slender setae, apical article terminally with few slender setae and row of fine plumose hairs ventrally and some fine hairs dorsally. Incisor process well developed, with 3 faint lobes. Lacinia mobilis of left mandible with four teeth, in which four fine hairs are inserted midway; lacinia mobilis of right mandible clearly smaller: 1 lateral margin towards spine row smooth, lateral margin towards incisor process with 10 fine lobes. Spine row containing 13 spines: 3 saw bristles, others plumose with 2 fine long hairs inserted between each of them. Right mandible with row of 18 spines of varying structure: first 10 strong and denticulate with 2 fine hairs inserted between each of them, distal 8 setae slender and longer than proximal setae, with several fine hairs inserted between each of them. Molar process triangular with 28 slender setae. Dorsal condyles extremely small. – Maxillula (Fig. 4C): inner lobe slightly smaller than outer lobe (0.88 of outer lobe length), with several thin setae distally. Outer lobe over five times longer than wide; marginally with some thin setae, terminally with 11 strong spines (five of them bearing short setules) and five fine short setae. – Maxilla (Fig. 4D): with 3 lobes. Inner lobe shortest and broader than medial and outer lobe, marginally with many fine setae, on dorsal margin proximally with eight long, slender setae of varying size, on lateral surface 11 rows, each with five short, fine setae. Medial lobe slightly longer than inner, as broad as outer lobe. Terminally with four strong setae of varying size, laterally with some fine and somewhat shorter setae. Outer lobe longest, with 3 strong setae, laterally with numerous fine setae of varying size. – Maxilliped (Fig. 4E):

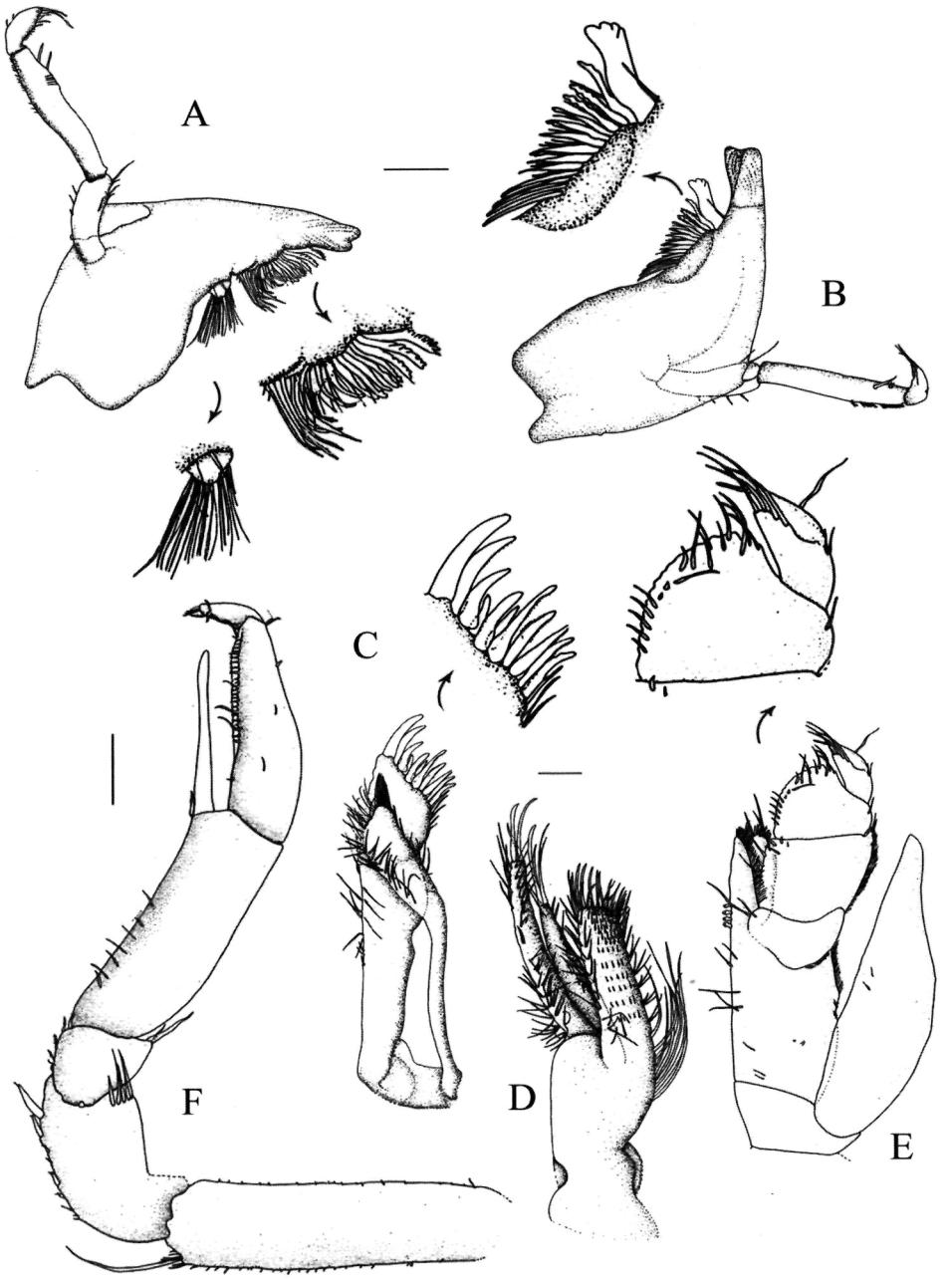

Fig. 4. *Disparella maiuscula* sp. nov., paratype female; **A)** right mandible; **B)** left mandible; **C)** maxillula; **D)** maxilla; **E)** maxilliped; **F)** pereopod I. Scale bar A- E = 100 µm; F = 200 µm.

base short, somewhat wider than long. Epipodite length 3.6 width, reaching one fourth of third article, length 1.2 endite length. Endite with 4 coupling hooks and 22 distolateral rows of small setae, proximally with few long and slender setae and on lateral margin row of small setae. Palp with five articles. Second and third articles elongated, second article approximately as wide as base, third article 1.4 times longer than second. Fourth and fifth articles short. Edge of palp with row of small setae. Fourth article with four slender and 2 small setae, fifth with 2 long slender setae. Third article withrow of 18 slender setae. Lateral margin of second article with row of small hairs. First article with 2 long slender setae.

Pereopod I (Fig. 4F): basis length 3.9 width, dorsally and ventrally with fine hairs, distoventrally with one long slender seta surrounded by seven shorter setae. Ischium 1.5 times longer than wide, distoventrally with 5 long stout setae. Dorsal margin with five long setae distally. Ventral margin with row of five unequally bifid setae interrupted by one single short seta, midway with 3 thin setae. Merus somewhat wider than long, distodorsally with 2 setae, long, stout seta and shorter, slender seta. Ventral margin with four plumose setae, midway 2 slender setae. Carpus somewhat shorter than propodus, three times longer than wide. Ventral margin faintly concave with row of seven slender setae and distoventrally one accessory plumose seta at base of "claw". "Claw"-length 0.7 of propodus length. Propodus 3.3 times longer than wide. Dorsal margin slightly convex with 3 fine setae. Ventral margin with row of 21 short and 3 longer setae inserted in hyaline cuticular membrane, distoventrally with 3 thin setae of varying size, proximal with single short seta. Propodus and dactylus form movable counterpart to large flexible spine ("claw-spine") on distal end of carpus. Dactylus 2.6 times longer than wide and 0.27 times longer than propodus length. Ungius of dactylus with 3 cuspidate and one conate setae as well as 3 slender setae medially.

Pereopods II-IV (Fig. 2A-C): basis approximately 3 times longer than wide, distoventrally with slender setae, surrounded by slender setae, proximally with row of several fine hairs; dorsally with row of several fine hairs. Ischium dorsal margin with few small seta, ventral margin with robust distally setulate setae and few small setae. Merus slightly wider than long, distodorsally with 2 slender setae, ventrally with 5 robust distally setulate setae decreasing in length proximally. Dorsal margin of carpus with small setae in regular distances, distally one stout seta; ventral margin with row of robust distally setulate setae decreasing in length proximally (pereopod IV with slender setae). Pereopods III and IV carpus with dorsolateral row of slender setae. Propodus II and III dorsally with small evenly-spaced setae and dorsolateral row of slender setae with 1 distal broom seta; ventral margin with robust distally setulate setae and triangular spine at articulation of propodus with dactylus. Dactylus II and III with 3 fine setae medially. Pereopod IV propodus ventral margin with robust distally setulate and slender setae.

Pereopods V-VII (Fig. 2D-F): basis about 4 times longer than wide, with numerous fine hairs, additionally with broom setae of varying size. Ischium about 2 times longer than wide, dorsally with slender and several small setae, ventrally with small setae. Merus slightly longer than wide, dorsally with small setae, distoventrally with small setae of varying size. Carpus about 3.5 times longer than wide, dorsally with few small setae,

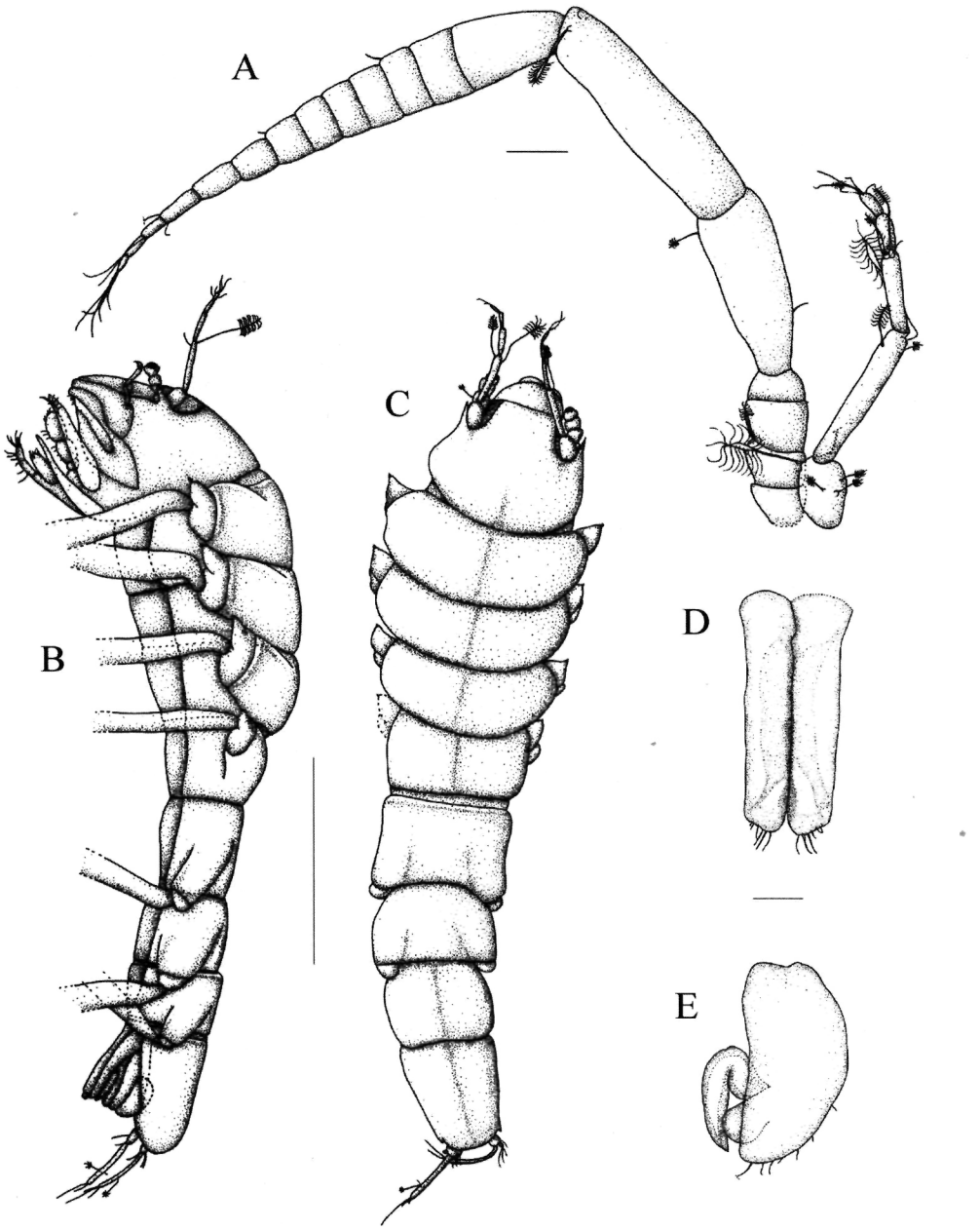

Fig. 5. *Disparella maiuscula* sp. nov., paratype male; **A)** antenna, antennula; **B)** habitus in lateral view and **C)** in dorsal view; **D)** pleopod I; **E)** pleopod II. Scale bar A-E = 100 µm.

dorsolateral row of long slender distally hairy setae, laterally with row of long slender distally hairy setae, decreasing in length proximally, last setae smooth. Propodus about 4 times longer than wide, dorsally with row of slender distally hairy setae, distodorsally with stout unequally bifid seta.; ventral margin with row of long, slender setae, decreasing in length proximally. Dactylus almost as long as propodus.

Pleopod II (operculum) (Fig. 3C): slightly wider than long. Lateral margins convex, distal margin nearly straight. Ventral surface with several fine hairs. Lateral and distal margins with 38 slender setae of varying size. – Pleopod III (Fig. 3D): endopod approximately 1.4 times longer than wide, distally with 3 long plumose setae. Base nearly rectangular, 1.4 times wider than long, 0.7 of endopod width. Exopod length almost one-fourth of endopod length, outer margin hirsute, tipped with single slender seta. – Pleopod IV (Fig. 3E): endopod oval and bare, 1.7 times longer than wide. Base rectangular, 2.6 times wider than long. Exopod nearly seven times longer than wide, outer margin with paired hairs, tipped with long plumose seta.

Uropods (Fig. 3F): biramous. Endopod length 3.3 protopod length, 8.6 times longer than wide, bearing 3 slender setae, 5 broom setae and 1 unequally bifid setae laterally; distal tip with 2 broom setae, one long broom seta, one long and 2 short simple setae and 2 unequally bifid setae. Exopod length 0.16 endopod length, 3.2 width with 2 slender setae. Protopod length 1.2 width, with 5 slender setae and 13 fine hairs.

Differences in paratype male (three paratype specimens were used for description of the male characters)

Habitus (Figs 5B, C; description from paratype, ZMH K 40677): very similar to female, but pereonites 4-7 more flattened, first pereonite wider than second and posterior margin of pleotelson less rounded than in female.

Antennula (Fig. 5A; description from paratype, ZMH K 40678): first article with only 4 broom setae., third article with 2 broom setae and fourth article without any seta. Relative lengths of articles: 1: 2.3: 1.3: 0.64: 0.42. – Antenna (Fig. 5A), description from paratype, ZMH K 40678: 19 articles, fifth and sixth articles stouter and shorter than in female, peduncular articles 5 and 6 and flagellar articles stouter than in female with few small setae.

Relative length of articles: 1: 0.88: 1.38: 0.75: 4: 6.6: 2.9: 1: 0.88: 0.88: 0.75: 0.88: 0.88: 1.13: 1.13: 0.63: 0.63: 0.38

Pleopod I (Fig. 5D; description from paratype, ZMH K 40680): 2.7 times longer than distal width, tips triangular with few simple setae, lateral. – Pleopod II (Fig. 5E), description from paratype, ZMH K 40680: sympod length 2.4 times of width, lateral margin slightly rounded with few small simple setae distally. Endopod inserting 0.6 of sympods length. Stylet half as long as sympod length, exopod short and rounded.

Discussion

Characters that distinguish *Disparella maiuscula* sp. nov. from all other species are the remarkable length of the cephalic spines (0.25 of cephalon length) and the concave posterior margin of the fifth pereonite. Furthermore the species can be identified by the

number and the length of seven small setae on the ventral margin of carpus of the first pereopod as well as by the long uropods relatively to pleotelson length. Sexual dimorphism not clearly pronounced: second antenna more stout in male, pereonites 4-7 are more flattened in male from lateral view, posterior margin of pleotelson more rounded in female.

Disparella maiuscula resembles *D. valida*. This species differs from *D. maiuscula* by following characters: antennula with 6 articles, cephalic spines small (not reaching proximal margin of deep fold), anterior margins of the pereonites one to four straight, lateral margins of the fourth and fifth pereonite straight, margins of the sixth and seventh pereonites rounded, maxilliped with 3 coupling hooks in the adult.

Disparella pachythrix differs from the new species by five characters: antennula with 6 articles, maxilliped with 3 coupling hooks in the adult, left lacinia mobilis with five teeth, pleotelson bearing small setae.

The comparison of *D. longimana* to *D. maiuscula* is difficult, because not all appendages were drawn. The species, however, can be distinguished by a few characters: *D. longimana* has an antennula with 6 articles, the third pereonite is wider than second, the uropodal endopod is short compared to *D. maiuscula* and four times longer than the exopod, the posterolateral spines of the pleotelson are not as strong produced as in *D. maiuscula.*

Based on an examination of the holotype, *D. neomana* differs from *D. maiuscula* by following characters: head longer than wide; body more slender: about 4.3 times longer than wide; pereonite 5 wide compared to pereonite 2 in both sexes of *D. maiuscula*; antennula, article 1 without long broom seta, article 4 with long slender setae, and article 5 with 3 long setae, including aesthetasc; antenna with 16 segments; maxilliped epipodite length subequal to endite length, 4.5 width, endite with 2 coupling hooks in adult; female pleopod II longer than wide, posterior margin clearly concave, with 11 long setae; pleopod III exopod is long in relation to the endopod.

Disparella maiuscula is most similar *D. funalis*, based on an examination of the holotype. Both species share following characters that differ from all other species: antennula article 2 more than twice longer than first article, maxilliped with 4 coupling hooks in the adult.

Disparella funalis can be distinguished from *D. maiuscula* as follows: pereonite 5 lateral margin straight, pereonite 3 wider than pereonite 2. Antennula article 2 is not as slender as in *D. maiuscula* and articles 3-5 together are 1.3 times longer than article 2. Antenna with 18 flagellar articles, left lacinia mobilis bears 3 teeth and the spine row has eleven members. In *D. funalis*, the uropods, being the shortest compared of all other species, is only one third of the pleotelson length. Finally, the pleotelson bears a row of five or six small seta on the lateral margin.

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