



First record and new species of the genus *Hebefustis* Siebenaller & Hessler, 1977 (Isopoda: Asellota: Nannoniscidae) from the deep Weddell Sea Basin*

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Abstract

The ANDEEP (ANTarctic benthic DEEP-sea biodiversity, colonisation history and recent community patterns) cruises contributed immensely to the understanding of the deep Southern Ocean biodiversity, and study of the fauna, in particular the isopod crustaceans, which were revealed to be patchily rich. Most of the species found during the three ANDEEP expeditions were not only new to the region but also new to science. In the current paper a new nannoniscid species, *Hebefustis clareolithis* sp. nov., is described from the deep Weddell Sea Basin (Southern Ocean). Specimens of the new species were sampled during ANDEEP III in Antarctic summer 2004/05 and represent the first Southern Ocean record of the genus *Hebefustis* Siebenaller & Hessler, 1977. The new species closely resembles *Hebefustis cornutus* Siebenaller & Hessler, 1977 but can be distinguished from the latter by the number of flagellar articles of the female antenna, the shape of pleopod 1 and pleotelson in male. A key to the species in the genus *Hebefustis* is provided.

Key words: Isopoda, Nannoniscidae, *Hebefustis clareolithis*, distribution, ANDEEP, deep sea, Antarctic, key

Introduction

After two decades of intensive study, parts of the Antarctic continental shelf (mainly the Weddell Sea, Ross Sea, and west Antarctic Peninsula) have been well sampled, certainly when compared to the deep Southern Ocean (Clarke *et al.* 2004). Some taxa have attracted much more scientific attention than others, such as the rich isopod fauna (see e.g. Vanhoeffen 1914, Wägele, 1989, Brandt 1991, Clarke & Johnston 2003, Brandt *et al.* 2004, Brandt *et al.* 2007a, b). It is therefore surprising that only six nannoniscid species belonging to two genera (*Austroniscus* Vanhoeffen, 1914 and *Nannoniscus* Sars, 1870) have been described since Vanhoeffen (1914) from the Antarctic shelf and slope (Vanhoeffen 1914, Kaiser & Brandt 2007). Furthermore, until now none have been recorded from the deep sea, which comprises more than 80% of the Southern Ocean (Clarke & Johnston 2003). Rather than genuine impoverishment of this family in the deep sea, it is highly likely this is due to the inadequate sampling to date (e.g. poor areal coverage, large mesh sizes). In addition, the family Nannoniscidae has not received much scientific focus, nor are the species easy to separate due to the presence of sibling species (e.g. *Austroniscus chelus*, *A. obscurus* and *A. ovalis*, see Kaiser & Brandt 2007).

Recent studies of the isopod fauna have revealed a high proportion of genera new to the Southern Ocean or species new to science (see Brandt *et al.* 2007b). This and the finding that some genera new to the Southern Ocean (such as *Rapaniscus* or *Hebefustis*) are widely distributed (Kaiser *et al.* 2007) highlights how poorly the deep sea in this region has been sampled to date. The continental shelf covers only 8% of the Southern

Ocean area, yet it has so far commanded almost 90% of the sampling effort while just 2 % of the deep Southern Ocean has been sampled to date (Clarke & Johnston 2003). A recent study by Brandt *et al.* (2007a) identified nearly 600 species new to science, most (76 %) of which were recorded at just one or two stations and thus are thought to be rare (Brandt *et al.* 2007b). To elucidate whether these species are actually rare or even Southern Ocean endemics will require improved sampling and molecular work.

The genus *Hebefustis* Siebenaller & Hessler, 1977 is one of the richest within the family Nannoniscidae and, up to now, comprises eleven species. While the distributional focus is in the North and South Atlantic (Siebenaller & Hessler 1977), two species also occur in the North Pacific (Table 1). During the ANDEEP III expedition in the Weddell Sea, specimens of the genus *Hebefustis* were collected and identified as a new species. The current paper provides a description of *Hebefustis clareolithis* sp. nov. and a key to the species in the genus. It is also a start to describe Southern Ocean deep-sea richness conducted in the framework of CeDAMar (Census of the Abyssal Diversity of Marine life). Whilst it is comparatively easy to collect vast numbers of species and realise these are new, this paper will be one of the many smaller steps that converts such findings into hard science that will gradually enable us to gain better insight into biogeography and biodiversity of the Southern Ocean deep sea.

TABLE 1. Species composition and distribution of the genus *Hebefustis* Siebenaller & Hessler, 1977.

species	locality	position	depth [m]
<i>Hebefustis alleni</i> Siebenaller & Hessler, 1977	Bay of Biscay, N.E.-Atlantic	10°30'N, 17°52'W	1623–1796
<i>Hebefustis clareolithis</i> sp. nov.	Eastern Weddell Sea	70°31.08'S–70°32.23'S, 14°34.82'W–14°34.90'W	4382
<i>Hebefustis cornutus</i> Siebenaller & Hessler, 1977	N.W.-Atlantic	39°37'N, 66°47'W	3806
<i>Hebefustis dispar</i> Siebenaller & Hessler, 1977	S.E.-Atlantic	09°05'S–08°56'S, 12°17'E–12°15'E	1472–1643
<i>Hebefustis hexadentium</i> Siebenaller & Hessler, 1977	S.-Atlantic, Argentine Basin	43°33'S, 48°58.1'W	5208–5223
<i>Hebefustis hirsutus</i> (Menzies, 1962)	S.-Atlantic	38°58.5'S, 41°45'W	5024
<i>Hebefustis mollicellus</i> Siebenaller & Hessler, 1977	Equatorial-, S. Atlantic	07°54'S, 34°17'W	943–1007
<i>Hebefustis par</i> Siebenaller & Hessler, 1977	N.E., Equatorial, S.-Atlantic	50°04.7'N, 15°44.8'W	4426–4435
<i>Hebefustis primitivus</i> (Menzies, 1962)	Caribbean	11°30'N, 75°50'W	2868–2875
<i>Hebefustis robustus</i> (Birstein, 1963)	N.W.-Pacific	37°56'N, 146°24'W, 32°11'N, 146°24'W	5461–5690
<i>Hebefustis vafer</i> Siebenaller & Hessler, 1977	Equatorial, S.W.-Atlantic	08°03'S, 34°24'W	587
<i>Hebefustis vitjazi</i> Mezhov, 1986	Gulf of Alaska	53°43'N, 163°38'W	1550

Methods

Specimens of the new species were sampled during the expedition ANT XXII/3 (ANDEEP III) with RV *Polarstern* in the eastern Weddell Sea (Station 81–8 (70°31.08'S–70°32.23'S, 14°34.82'W–14°34.90'W, 4382 m)). Collection took place in February 2005 by means of an epibenthic sledge (Brenke 2005). Samples were fixed in 96% precooled ethanol and kept for 48 hours at -20°C for later DNA extraction (not reported here). The material was sorted on board and at the Zoological Museum, University of Hamburg. Illustrations were made using a *Leitz Mi 85* compound microscope with a *camera lucida*. For dorsal illustrations methylene green stained glycerine was used. Appendages were dissected and fixed in stained antibacterial glycerine-gelatine (*Merck*).

The material is deposited at the Zoological Museum of Hamburg (ZMH). For comparison, the following type material was examined from the United States National Museum of Natural History, Washington (USNM):

Hebefustis alleni, holotype (female), USNM 169398

Hebefustis dispar, paratype (male), USNM 169405

Hebefustis hexadentium, holotype (female), USNM 169401

Hebefustis mollicellus, holotype (female), USNM 169394

Hebefustis par, holotype (female), USNM 169396

Hebefustis vafer, paratype (male), USNM 169393

The terminology of the setation follows Hessler (1970) and Watling (1989).

Abbreviations: A1—antennula; A2—antenna; lMd—left mandible; rMd—right mandible; Mx1—maxilla; Mx2—maxilla; Mxp—maxilliped; P1–7—pereopods 1–7; Plt—pleotelson; Plp 1–5—pleopods 1–5; Pr 1–7—pereonites 1–7; Urp—uropods.

Taxonomy

Asellota Latreille, 1803

Janiroidea Sars, 1897

Nannoniscidae Hansen, 1916

Synonymy: Desmosomidae Sars, 1899: 118; Vanhoeffen, 1914: 549; Nannoniscini Hansen, 1916: 83.

Type genus: *Nannoniscus* Sars, 1870

***Hebefustis* Siebenaller & Hessler, 1977**

Synonymy: *Nannoniscoides* Menzies, 1962: 134; *Nannoniscus* Menzies, 1962: 137; Birstein, 1963: 83–85.

Type species: *Hebefustis vafer* Siebenaller & Hessler, 1977

Diagnosis

Body slightly broadened, length about 3.8 times pereonite 2 width; dorsal cuticle bearing numerous setules. 5-segmented *antennula* with slightly bulbous, elongated terminal article; article 3 and 4 of similar length, without lateral projection. *Pereopod 1* more robust and shorter than pereopods 2–7; carpus and propodus of pereopod 1 with few (= 4) robust, unequally bifid setae, dactylus with short, robust ventral spine distally. *Pereonites 6–7* medially fused. *Pleotelson* with posterolateral spines. *Uropods* biramous, short, hardly projecting posterior margin; endopod and exopod nearly of same length (modified after Siebenaller & Hessler 1977).

Remarks. The only specimen of *H. hirsutus* (Menzies, 1962) is no longer extant, and the sole specimen of *H. primitivus* (Menzies, 1962) is badly damaged according to Siebenaller & Hessler (1977). Hence, examinations of these two species depended on the illustrations made by Menzies (1962), which do not show all char-

acters/appendices used in the diagnosis. The male paratype of *Hebefustis cornutus* (USNM 169400) was ordered from the USNM, but could not be found in the received vial. Thus, examinations of this species apply to the drawings made by Siebenaller & Hessler (1977).

Species composition (Table 1). *Hebefustis alleni* Siebenaller & Hessler, 1977; *Hebefustis clareolithis* sp. nov.; *Hebefustis cornutus* Siebenaller & Hessler, 1977; *Hebefustis dispar* Siebenaller & Hessler, 1977; *Hebefustis hexadentium* Siebenaller & Hessler, 1977; *Hebefustis hirsutus* (Menzies, 1962); *Hebefustis mollicellus* Siebenaller & Hessler, 1977; *Hebefustis par* Siebenaller & Hessler, 1977; *Hebefustis primitivus* (Menzies, 1962); *Hebefustis robustus* (Birstein, 1963); *Hebefustis vafer* Siebenaller & Hessler, 1977; *Hebefustis vitjazi* Mezhov, 1986

***Hebefustis clareolithis* sp. nov.**

(Figs 1–5)

Material examined

Holotype: female, (preparatory, 1.9 mm), eastern Weddell Sea, 70°31.08'S–70°32.23'S, 14°34.82'W–14°34.90'W, PS ANT XXII/3, Station 81–8, 4382 m, 24.02.2005, ZMH K–41261.

Paratypes: 9 females (7 preparatory, 1 juvenile, 1 damaged), 1 male (juvenile), same station as holotype, ZMH K–41262; 1 male (adult, 1.4 mm), same station as holotype, ZMH K–41263.

Diagnosis. *Pereonite 2* with a robust spine on anterolateral margins. *Pereonites 6* and *7* with acute, distally directed posterolateral margins. Second article of antennula with 4 broom setae distally. Antenna with 12 flagellar articles. Posterolateral spines well developed and acute, halfway along margin. Pleopod 1 widest distally.

Description. *Habitus* of female holotype (Figs 1A–C): *Body* dorsoventrally slightly flattened and broadened, 3.7 times longer than wide. Surface of dorsal cuticle with numerous setules (Fig. 2H). Ventral surface alveolarly structured (Fig. 1B). *Coxae* not visible in dorsal view. *Pereonites 1–3* with frontally directed latero-frontal margins. *Pereonite 1* and *2* nearly of same length and width, *pereonite 2* widest, 4 times longer than wide, with a robust spine anterolaterally. *Pereonite 4* longest, nearly twice as wide as long. *Pereonites 1–4* decreasing, *pereonites 5–7* increasing in width distally. *Body* gradually flattening from *pereonites 1–4* and slightly increasing in height from *pereonites 5–7*. *Pereonites 6* and *7* medially fused, with acute, distally directed posterolateral margins and 2 ventral depressions. *Pleotelson* 0.23 times body length, as long as wide, width 0.9 times *pereonite 2* width, with well-developed posterolateral spines, halfway along margin. Posterior margin strongly convex, anterior dorsal margin straight. *Anus* (Fig. 1B) covered by anus valves laterally. *Uropods* inserting closely to the anus valves, short in relation to *pleotelson*, hardly projecting above posterior margin. *Operculum* about 0.6 times *pleotelson* length (ventrally measured).

Cephalothorax (Fig. 1A, B) as wide as long, *rostral crest* slightly developed, anterior margin of head strongly, posterior margin slightly rounded, lateral margins straight. *Antennae* inserting frontolaterally in a deep fold.

Antennula (Fig. 2B) of female paratype 0.16 times body length, with 5 articles. Basal article short, nearly as long as wide, with 2 broom setae of varying size and 2 slender seta distally. Article 2 slender, 2.1 times longer than wide, with 2 long and 2 shorter broom setae distally, with 1 simple seta distally. Articles 3 and 4 short, almost of same length and width, each about 0.3 times article 2 length. Article 4 with 2 simple setae distally (1 broken off). Article 5 long and slender, nearly 3 times longer than article 4, 3.9 times longer than wide, with 2 long, slender setae and 1 aesthetasc terminally.

Antenna (Fig. 2A) length 0.6 times body length, with 6 peduncular and 12 flagellar articles. Peduncular articles 1–4 short; article 3 with 1 robust spine tipped with a small seta distally, with 2 slender setae of same size and 1 small spine distally and a fringe of short setules laterally. Article 4 with a single small seta distally.

Article 5 nearly as long as articles 1–4 combined, about 3.4 times longer than wide, with 4 simple setae laterally, with 1 small broom seta and 4 simple setae distally. Article 6 length 1.3 times article 5 length, about 4.6 times longer than wide; with 5 short simple setae laterally, with 4 broom setae and 5 slender setae distally. Flagellar article 1 longest, about 0.5 times peduncular article 6 length, 3.6 times longer than wide, with 3 simple setae laterally and 3 simple setae distally. Flagellar articles 2–10 of similar length; width decreasing distally, each article with 1–4 short simple setae distally. Articles 11–12 somewhat shorter; article 11 with 3 simple setae distally, article 12 with 6 long slender setae terminally.

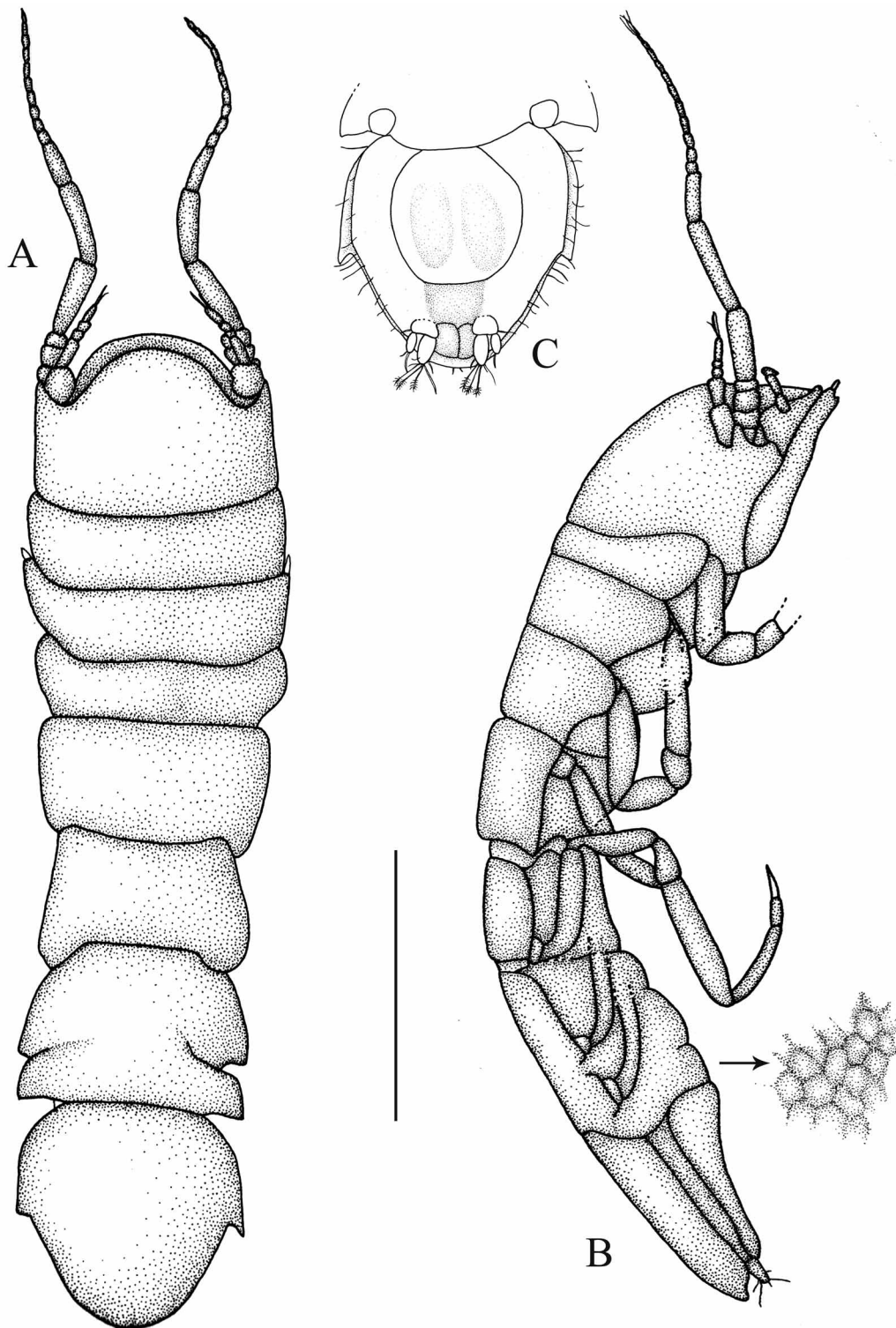


FIGURE 1. *Hebefustis clareolithis* sp. nov.; A–C, holotype female (ZMH K–41261); A, dorsal view. B, lateral view. C, Plt ventrally. Scale bar = 500 μ m.

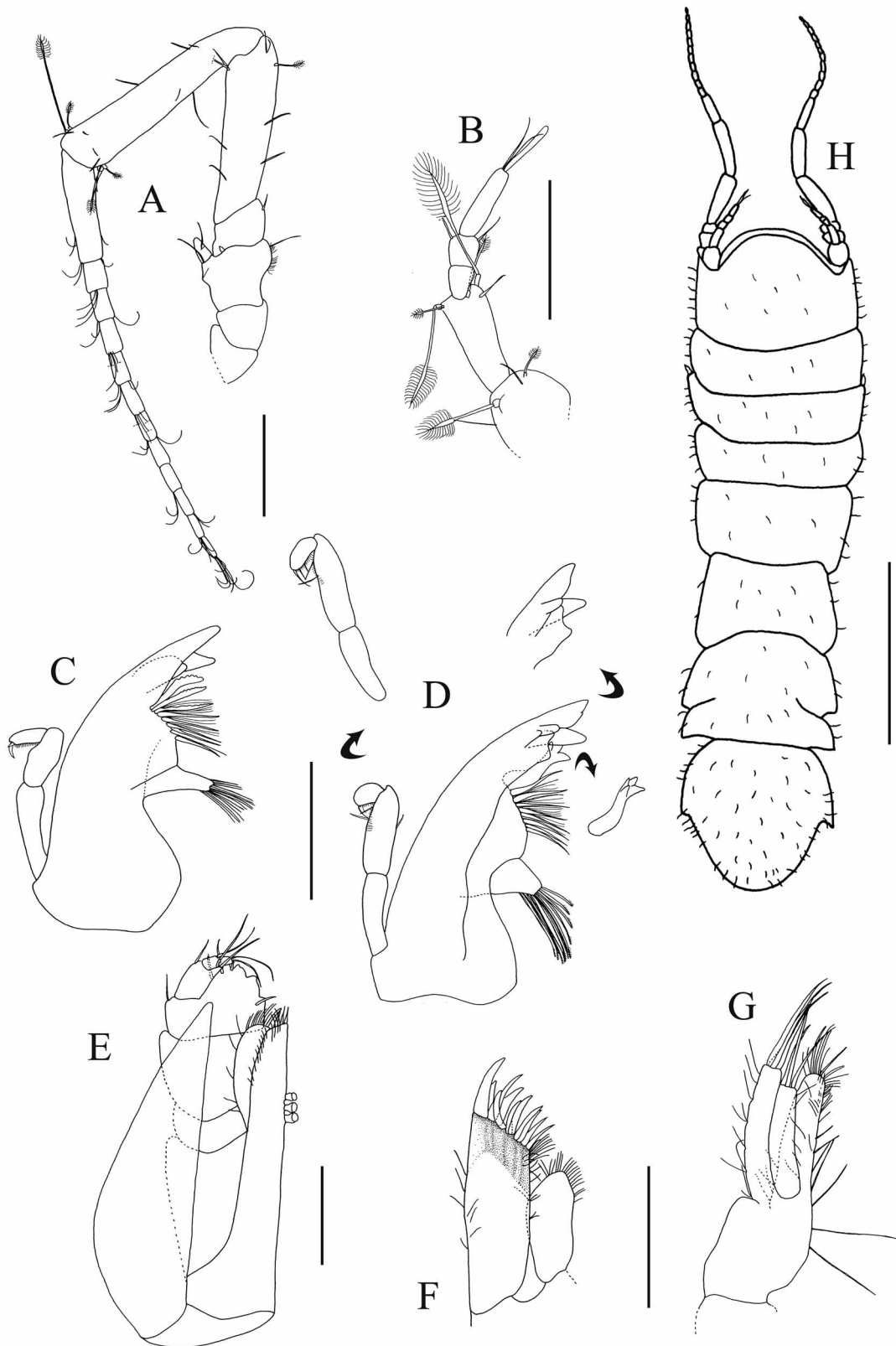


FIGURE 2. *Hebefustus clareolithis* sp. nov.; A–G paratype female (ZMH K–41262); A, A2. B, A1. C, rMd. D, lMd. E, Mxp. F, Mx1. G, Mx2. H, holotype female (ZMH K–41261); habitus, dorsal view. Scale bar: A–G = 100 μ m, H = 500 μ m.

Mandibular palp of left and right *mandible* (Fig. 2C, D) well developed, consisting of 3 articles and almost reaching incisor. Palpal article 1 of right mandible 1.6 times longer than article 2. Terminal article

tapering distally, with a fringe of small setules ventrally and 2 robust setae terminally. Article 1 and 2 of left mandible of similar length, article 2 with fringe of fine setules and 2 simple setae distally; article 3 tapering in width distally, with a fringe of fine setules and 2 longer simple setae ventrally. Incisor of right mandible with 3 teeth, of left mandible with 6 teeth. Lacinia mobilis of left mandible with 4 teeth (Fig. 2D). Setal row of right mandible with 9 robust setae and several slender setae in between; distal robust setae dentate, dentation decreasing proximally. Setal row of left mandible with 8 setae; distal setae 1–3 most robust, proximal setae more slender. Molar of right and left mandible triangular, on right mandible with 15 long, slender setae distally, on left mandible with 11 long, slender serrate setae distally.

Outer endite of maxillula (Fig. 2F) with 11 robust spine-like setae distally. Outer margin with 7 slender setae, inner margin with several (=15) slender setae. Inner endite 0.6 times outer endite length, with numerous (=20) fine setae distally.

Maxilla (Fig. 2G) outer margins of lateral and inner endites with several setae. 3 strong setae on lateral and medial endites. Distal margin of inner endite with numerous long setae of varying size. Surface of inner endite with several short setules.

Left and right *maxilliped* (Fig. 2E) connected by 3 retinacula. Epipodite smooth, triangular, slender, 3.5 times longer than wide, reaching to mid of palpal article 3. Palpal article 1 short, about 2.5 times wider than long. Article 2 longest, 3 times longer than article 1, almost quadrangular. Palpal article 3 length 2.3 times article 1 length, 1.4 times wider than long, with 3 robust sensory setae and 2 more slender setae distally. Article 4 about 1.4 times article 1 length, 1.6 times longer than wide, with a projection reaching to mid of article 5, with 3 slender setae distally. Article 5 about 0.7 times article 4 length, twice as long as wide, with 3 long, slender setae terminally. Endite distal margin with some robust, dentate setae and several fine setae laterally. Protopod nearly triangular, about 3 times wider than long.

Pereopod 1 (Fig. 3D) more robust than pereopods 2–7. Basis 3.6 times longer than wide, with 5 short simple setae dorsally and 4 simple setae ventrally. Ischium length 0.7 times basis length, 2.3 times longer than wide; with 2 simple setae dorsally (one broken off) and 2 simple setae ventrally. Merus length 0.6 times ischium length, 1.3 times longer than wide; with 2 long robust setae distally and a smaller seta on a small projection distodorsally, with 4 setae ventrally. Carpus length 1.5 times merus length, 2.4 times longer than wide; with 2 slender setae dorsally, ventral margin slightly concave, with numerous small setae, membranously embedded, and 3 robust unequally bifid setae in between ventrally and 1 very long simple seta distally. Propodus length 0.9 times carpus length, 3 times longer than wide; with 3 slender simple setae dorsally, with numerous small setae, membranously embedded, 1 robust unequally bifid seta in between ventrally and 2 more slender setae distally. Dactylus nearly half of propodus length, 2.8 times longer than wide; with 3 slender setae medially and with 1 spine-like appendix ventrally. Unguis with 1 robust cuspidate seta dorsally and with 2 slender, longer setae ventrally.

Basis of *pereopod 2* (Fig. 3A) proximally damaged during dissection, about 4.1 times longer than wide; with 3 simple setae (one broken off) dorsally, with 4 long setae ventrally and 2 setae distally. Ischium about half of basis length, 2.5 times longer than wide; with 1 simple seta distodorsally and 3 simple setae ventrally. Merus length 0.6 times ischium length, 1.7 times longer than wide, with 2 robust simple setae distodorsally and with 3 more slender setae ventrally. Carpus length 2.6 times merus length, 4.6 times longer than wide; with 1 slender seta dorsally and 2 simple setae distally, with numerous small setae, membranously embedded, and with 4 stout unequally bifid setae in between ventrally. Propodus length 0.8 times carpus length, 6.6 times longer than wide, with 4 simple setae and 1 small broom seta dorsally, with numerous small setae, membranously embedded, and with 3 stout unequally bifid setae and 1 slender seta ventrally. Dactylus length nearly half of propodus length, 4.3 times longer than wide; with 3 thin, simple setae medially, with numerous small setae, membranously embedded, and 1 spine-like appendix ventrally. Unguis with 1 robust cuspidate seta dorsally and 2 slender setae ventrally.

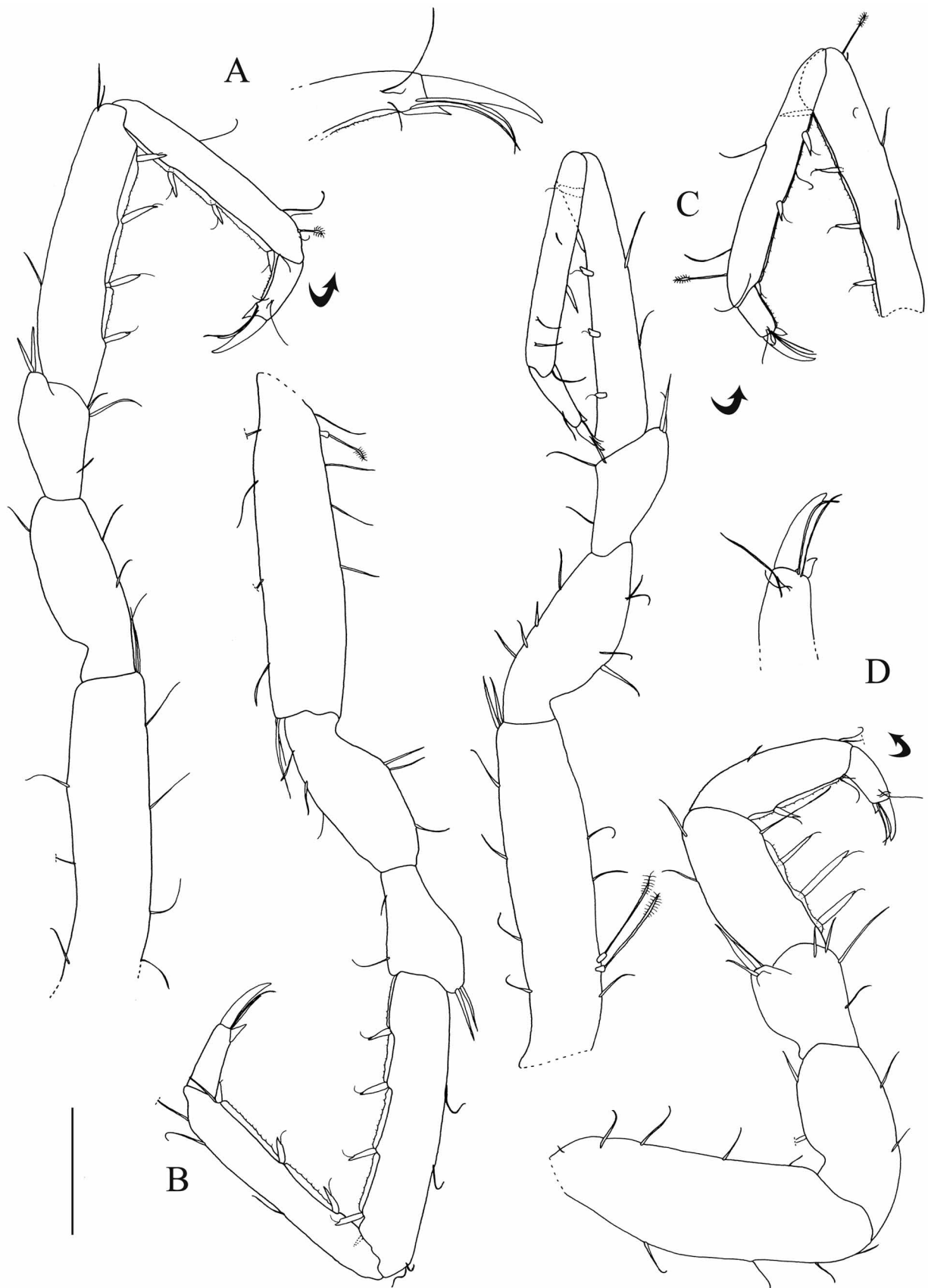


FIGURE 3. *Hebefustis clareolithis* sp. nov., paratype female (ZMH K-41262); A-C, P2-4. D, P1. Scale bar = 100 μ m.

Basis of *pereopod 3* (Fig. 3B) 4.3 times longer than wide; with 1 broom seta and 4 long slender setae dorsally, with 4 long simple setae (2 broken off) setae ventrally, with 2 long, slender setae distally. Ischium length about half of basis length, 2.3 times longer than wide; with 3 simple setae dorsally, and 3 simple setae ventrally. Merus length 0.6 times ischium length, 1.4 times longer than wide; with 2 long setae distodorsally and 2 simple setae of varying size ventrally. Carpus length 2.6 times merus length, 4.6 times longer than wide; with 4 slender setae dorsally, with numerous small setae, membranously embedded, and 4 stout unequally bifid setae in between ventrally, with a small, stout setae distally. Propodus length 0.9 times carpus length, 6.5 times longer than wide, with 3 simple setae dorsally, with numerous small setae, membranously embedded, and 3 stout unequally bifid setae ventrally, with 1 slender longer seta distally. Dactylus length half of propodus length, 4.5 times longer than wide; with 1 spine-like appendix ventrally. Unguis with 1 robust cuspidate seta dorsally and 2 slender setae ventrally.

Basis of *pereopod 4* (Fig. 3C) 4.1 times longer than wide; with 2 long broom setae and 3 smaller simple setae dorsally, with 4 simple setae ventrally and 2 robust setae distally. Ischium length 0.6 times basis length, 2.5 times longer than wide; with 3 simple setae and 1 more robust seta dorsally, with 4 simple setae ventrally. Merus length 0.6 times ischium length, 1.6 times longer than wide; with 2 long setae distodorsally and 2 long setae ventrally. Carpus length 2.6 times merus length, 5.9 times longer than wide, with 2 long simple setae dorsally, 1 simple seta medially and 1 broom seta and 1 small simple seta distally, with numerous small setae, membranously embedded, and 4 stout unequally bifid setae ventrally. Propodus length about carpus length, 7.5 times longer than wide; with 2 long simple setae and 1 broom seta dorsally, with numerous small setae, membranously embedded, and 3 stout unequally bifid setae and 1 slender, simple seta in between ventrally, with 1 long simple seta distally. Dactylus length 0.4 times propodus length, 3.4 times longer than wide; with 3 thin, simple setae medially and 1 spine-like appendix ventrally. Unguis with 1 robust cuspidate seta dorsally and 2 slender setae ventrally.

Pereopods 5–7 more slender and longer than pereopods 1–4, due to comparably increased length of basis, carpus and propodus. Basis of *pereopod 5* (Fig. 4A) 4.6 times longer than wide; with 2 long broom setae and 5 simple setae dorsally and with 4 long simple setae ventrally. Ischium length 0.7 times basis length, 3.6 times longer than wide; with 3 simple setae (1 broken off) dorsally and with 2 simple setae ventrally. Merus length 0.4 times ischium length, 1.6 times longer than wide; with 2 long robust setae distodorsally and with 3 slender setae of different size ventrally. Carpus length 2.3 times merus length, 5 times longer than wide; with 4 simple setae (3 broken off) dorsally and with 5 robust setae ventrally. Propodus length 1.1 times carpus length, 7.7 times longer than wide; with 1 small simple seta dorsally, with 2 long and 1 small simple setae and 1 long broom seta distally, with numerous small setae, membranously embedded, and 3 stout unequally bifid setae in between ventrally and 1 longer simple seta distally. Dactylus length half of propodus length, 6.1 times longer than wide; with 3 slender setae medially and with 1 spine-like appendix ventrally. Unguis with 1 robust cuspidate seta dorsally and 2 slender setae ventrally.

Basis of *pereopod 6* (Fig. 4B) 4.7 times longer than wide; with 5 slender, simple setae and 1 long broom seta dorsally, with 5 long, slender setae ventrally. Ischium length 0.7 times basis length, 3.7 times longer than wide; with 2 slender simple setae dorsally and 2 ventrally. Merus length 0.5 times ischium length, 1.8 times longer than wide; with 1 robust long setae distodorsally and 2 slender setae ventrally. Carpus length 2.5 times merus length, 7.6 times longer than wide; with 3 simple setae dorsally, and 5 simple setae ventrally. Propodus length about carpus length, 8.7 times longer than wide; with 2 long simple setae and 1 broom seta distodorsally, with numerous small setae, membranously embedded, 2 robust unequally bifid setae and 1 slender simple seta ventrally. Dactylus length half of propodus length, 5.4 times longer than wide; with 3 slender setae medially and with numerous small setae, membranously embedded, and 1 spine-like appendix ventrally. Unguis with 1 robust cuspidate seta dorsally and 2 slender setae of similar size ventrally.

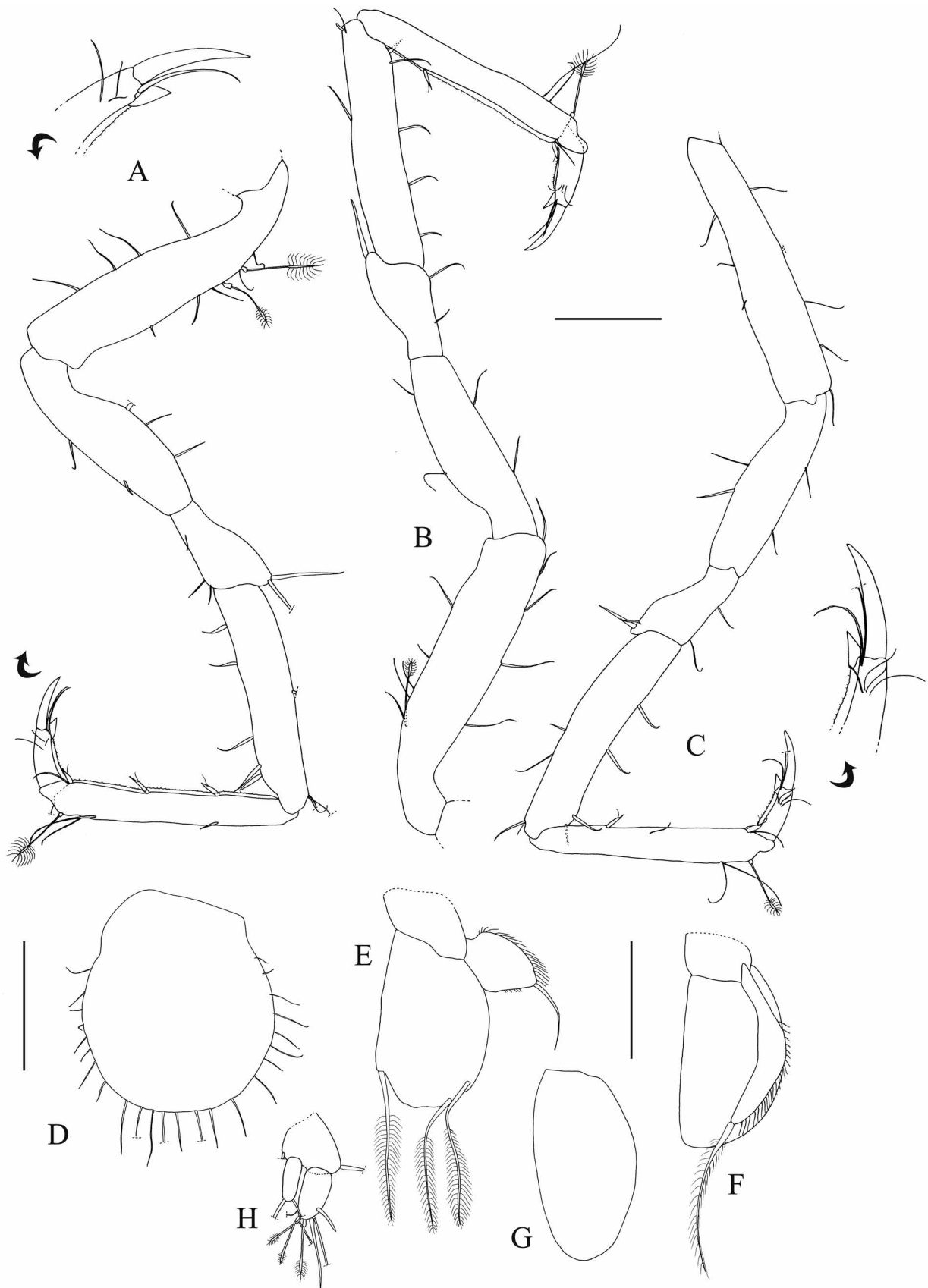


FIGURE 4. *Hebefustis clareolithis* sp. nov., paratype female (ZMH K-41262); A–C, P5–7. D, Plp 2 (operculum). E–G, Plp 3–5. H, Urp. Scale bar: A–C, E–H = 100 µm, D = 200 µm.

Basis of *pereopod* 7 (Fig. 4C) 5 times longer than wide; with 3 simple setae dorsally and 5 simple setae (1 broken off) ventrally. Ischium length 0.7 times basis length, 3.7 times longer than wide; with 2 slender simple setae dorsally and 2 ventrally. Merus length about half of ischium length, 1.8 times longer than wide; with 1 robust long and 1 smaller, slender seta distodorsally and with 2 slender simple setae ventrally. Carpus length 2.4 times merus length, 4.7 times longer than wide; with 4 simple setae dorsally, and 4 more robust simple setae ventrally. Propodus length 1.1 times carpus length, 7.3 times longer than wide; with 2 long slender setae and 1 broom seta distodorsally, with 2 robust unequally bifid setae and 2 simple setae ventrally. Dactylus length half of propodus length, 5.7 times longer than wide; with 4 slender setae medially and with numerous small setae, membranously embedded, and 1 spine-like appendix ventrally. Unguis with 1 robust cuspidate seta dorsally and 2 slender setae (1 broken off) ventrally.

Pleopod 2 (operculum, Fig. 4D) almost as long as wide; ventral surface smooth. Lateral and posterior margins with several (>20) medium-sized slender setae.

Protopodite of *pleopod* 3 (Fig. 4E) almost as long as wide, length 0.6 times endopodite length. Exopodite about half of endopodite length, 1.3 times longer than wide, tapering in width distally; with numerous simple setae laterally and 1 very long, robust seta distally. Endopodite 1.5 times longer than wide, with 3 long plumose setae distally.

Protopodite of *pleopod* 4 (Fig. 4F) rectangular, 1.5 times wider than long. Exopodite slender, about as long as endopodite, 6 times longer than wide; with several thin setules laterally and 1 long robust plumose seta distally. Endopodite ovoid-shaped, 1.7 times longer than wide.

Pleopod 5 (Fig. 4G) small oval lobe, without setation. 1.9 times longer than wide.

Uropods (Fig. 4H) biramous. Protopodite trapezoid, about as long as wide, as long as endopodite; with 2 robust setae (broken off). Exopodite 0.8 times endopodite length. 2.9 times longer than wide, with 2 setae (broken off) terminally. Endopodite twice as long as wide; with 1 robust simple seta laterally, with 4 broom setae (1 broken off) and 2 simple setae (1 broken off) terminally.

Differences in paratype male (Fig. 5). *Habitus* (Fig. 5A) very similar to holotype, dorsal cuticle also with numerous setules, but lateral margins of pereonites 1–3 more frontally directed, anterolateral spines on pereonite 2 more robust and pereonite 4 shorter than in female.

Rostral crests well developed compared to female.

Antenna (Fig. 5E) with 6 peduncular and 9 flagellar articles. Articles 5–7 stouter than in female. Article 5 about 2.7 times longer than wide, with 4 simple setae and two broom setae laterally, with 1 broom seta and 1 simple seta medially. Article 6 length 1.2 times article 5 length, about 3.2 times longer than wide, with 4 simple setae laterally, with 2 broom setae and 2 small simple setae distally. Flagellar article 1 longest, length 1.1 times peduncular article 6 length, 3.2 times longer than wide, with 4 simple setae laterally and 4 long simple setae (1 broken off) distally. Flagellar articles 2–7 of similar length, width decreasing distally, each article with 1–2 short simple setae distally. Articles 8 and 9 somewhat shorter, article 8 with 2 short simple setae distally, article 9 with 6 long, slender setae terminally.

Pleopod 1 (Fig. 5B, C) 1.7 times longer than distal width; tips slightly rounded in ventral view, with a few simple setae.

Sympod of *pleopod* 2 (Fig. 5D) 2.4 times longer than wide; outer margin rounded; with 5 slender simple setae laterally, inner margin slightly concave. Endopod inserting 0.6 from distal tip of sympod; stylet about half of sympod length, slightly curved, distal end reaching tip of sympod. Exopod short and rounded.

Type locality. Eastern Weddell Sea basin.

Distribution. The species is only known from the eastern Weddell Sea basin.

Etymology. *Clareolithis* (masculine) is dedicated to an invaluable friend.

Remarks. *Hebefustis clareolithis* sp. nov. belongs to a cluster of species in the genus *Hebefustis* possessing acute, distally directed posterolateral margins of the sixth and seventh pereonite (see Siebenaller & Hessler 1977:30). This cluster comprises, besides the new species, *Hebefustis cornutus* Siebenaller & Hessler, 1977,

H. dispar Siebenaller & Hessler, 1977, *H. hexadentium* Siebenaller & Hessler, 1977, *H. hirsutus* (Menzies, 1962), and *H. vitjazi* Mezhov, 1986.

H. clareolithis differs from all other species of this cluster by the following characters: robust spine on the anterolateral margins of pereonite 2 in male and female; female antenna bearing 12 flagellar articles; second article of antennula with 4 broom setae; pleopod 1 widest distally.

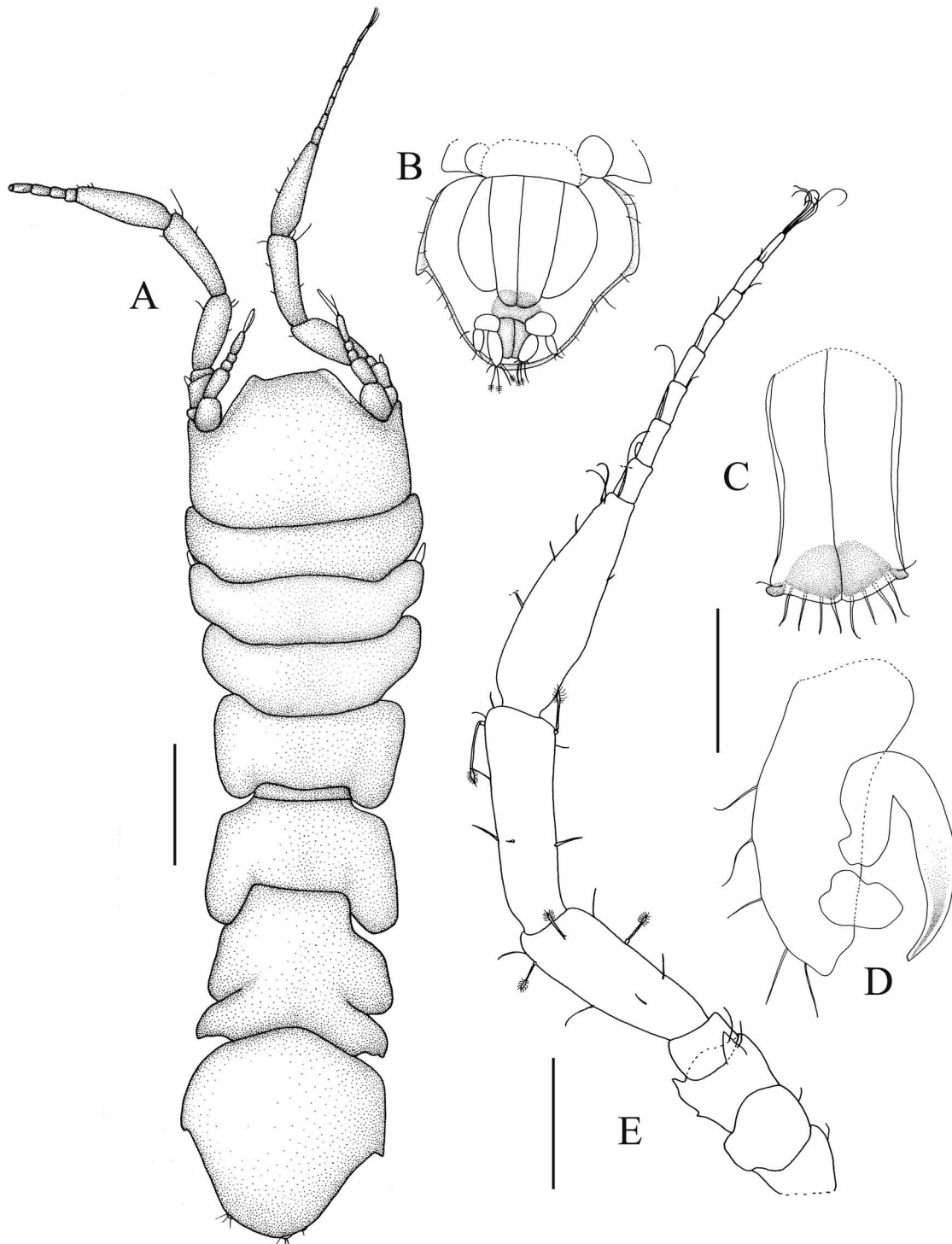


FIGURE 5. *Hebefustis clareolithis* sp. nov., paratype male (ZMH K-41263); A, habitus, dorsal view. B, Plt, ventral view. C, Plp 1. D, Plp 2. E, A2. Scale bar: A = 200 µm, B-E = 100 µm.

H. clareolithis is most similar to *Hebefustis cornutus* Siebenaller & Hessler, 1977; the latter can be distinguished from the new species by the following characters: female antenna with 9 flagellar articles; second article of antennula with just 2 broom setae distally; male antenna more robust: peduncular article 5 about 1.6 times longer than wide, article 6 about 2.3 times longer than wide, first flagellar article 1.8 times longer than wide; posterior margin of male pleotelson with double angles.

The new species also resembles *H. hexadentium* Siebenaller & Hessler, 1977 which can be distinguished from *H. clareolithis* as follows: second article of antennula with 2 broom setae distally; female antenna with 7 flagellar articles, first flagellar article relatively short, about 0.25 times peduncular article 6 length; pereonites 2 and 3 long compared to pereonite 1; male posterior margin of pleotelson softly curved.

Siebenaller & Hessler (1977) pointed out remarkable similarities between *H. hexadentium* and *H. hirsutus* (Menzies, 1962), which were both first recorded from the South Atlantic (Table 1). The male holotype and only specimen of *H. hirsutus* is no longer extant (Siebenaller & Hessler 1977), and the drawings by Menzies (1962) are rudimentary, i.e. appendices were just partly drawn. Therefore, the comparison of this species to both *H. clareolithis* and *H. hexadentium* remains difficult (cf. Key). However, *H. hirsutus* can be distinguished from *H. clareolithis* by the following characters: pereonite 2 with a robust seta on anterolateral margins; maxilliped with 2 coupling hooks, incisor of right mandible with 4 teeth, posterior margin of pleotelson softly curved.

H. dispar can be distinguished from *H. clareolithis* as follows: anterolateral margins of pereonites 6 and 7 more rounded; pleotelson 1.2 times wider than long, posterior margin softly curved, posterolateral spines 0.7 from anterior margin, spines less produced.

H. vitjazi differs from the new species by the following characters: operculum relatively long, length 0.9 times pleotelson length (measured in ventral view), posterolateral spines about 0.8 from anterior margin; sympod of pleopod 1 with numerous setae (>15), endopodal stylet overlapping distal end of sympod about a third.

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Key to the species of *Hebefustis*

1. Pereonite 6 and 7 with acute, distally directed posterolateral margins.....2
- Pereonite 6 and 7 with rounded posterolateral margins.....7
2. Pereonite 2 in female and/or male with a robust seta or spine on the anterolateral corner3
- Pereonite 2 without a seta or spine *Hebefustis hexadentium*
3. Second article of antennula with 4 broom setae, pereonite 2 in female and male with a robust spine on the anterolateral corner, female antenna with 12 flagellar articles, male pleopod 1 widest distally
..... *H. clareolithis* sp. nov.
- Second article of antennula with < 4 broom seta.....4
4. Male pleotelson with double angles*H. cornutus*
- Male pleotelson with rounded posterior margin5
5. Operculum length 0.9 times pleotelson length, posterolateral spines about 0.9 from anterior margin, article 5 of antennula length 4.8 times width, sympod of male pleopod 1 with numerous setae (>15) *H. vitjazi*
- Operculum length < 0.9 times pleotelson length, posterolateral spines less than 0.9 from anterolateral margin6
6. Article 5 of antennula increasing in width distally, male pleopod 1 with distinctive ridges on ventral surface..... *H. dispar*
- Maxilliped with 2 coupling hooks, pereonite 2 just with robust seta in male*H. hirsutus*
7. Posterolateral spines of pleotelson strongly pronounced in female, article 5 of antennula < 2.4 times longer than wide*H. alleni*
- Posterolateral spines only slightly pronounced in female, terminal article of antennula length > 2.4 times width8
8. Posterolateral spines <0.3 from anterior margin, male pleotelson with strongly produced double angles (different to *H. cornutus*), pereonites 1–4 with strongly produced anterolateral margins..... *H. primitivus*
- Posterolateral spines >0.3 from anterior margin, male pleotelson with rounded posterior margin.....9
9. Pleotelson with a distinctive, strongly rounded posterior margin, operculum with a straight distal margin..
..... *H. robustus*
- Pleotelson posterior margin just slightly curved, with a softly rounded distal margin.....10
10. Body length < 3.8 times width, posterolateral spines 0.8 from anterior margin *H. par*
- Body length > 4.3 times width, posterolateral spines < 0.8 times from anterior margin..... 11
11. Article 5 of antennula length 4.5 times width, posterior margin of pleotelson rounded *H. vafer*
- Article 5 of antennula length 3.8 times width, posterior margin sharply tapering distally *H. mollicellus*