



Results of the DIVA-1 Expedition of RV “*Meteor*” (Cruise M48:1): Three new species of Munnopsidae Sars, 1864 from abyssal depths of the Angola Basin (Crustacea: Isopoda: Asellota)*

ANDRE MURSCH^a, NILS BRENKE^b & JOHANN WOLFGANG WÄGELE^c

^aDepartment of Evolutionary Ecology and Animal Biodiversity, Ruhr-Universität Bochum, Universitätsstraße 150, Gebäude NDEF 05/753, D-44780 Bochum, Germany. Email: andre.mursch@rub.de

^bGerman Centre for Marine Biodiversity Research (DZMB), Südstrand 44, D-26382 Wilhelmshaven, Germany.
Email: nbrenke@senckenberg.de

^cZoological Research Museum Alexander Koenig, Adenauerallee 160, D-53113 Bonn, Germany. Email: w.waegle.zfmk@uni-bonn.de

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Abstract

Three new species of Munnopsidae, *Eurycope monodon* sp. nov., *E. denticollis* sp. nov. and *Munneurycope persephone* sp. nov. are described from the deep sea of the Angola Basin in the southeast Atlantic. *E. monodon* and *E. denticollis* closely resemble *E. glabra* Kensley, 1978 in general appearance and in the peculiar shape of the female operculum with an apex shifted far frontally, but with a less pronounced medial lobe of antenna 1 article 1, presence of dorsal tubercles on the pleotelson and uropods with less reduced exopods. *Eurycope monodon* has a rostrum bearing a single anteromedian spinelike seta and a male pleopod 1 with a subapical, hook-like cusp of the distolateral lobe curved anteriolaterally. *Eurycope denticollis* has paired and relatively shorter spine-like setae on the rostrum, and the cusp of pleopod 1 distolateral lobe is curved caudolaterally. *M. persephone* is the first species of the genus recorded from the South Atlantic. It differs from the most similar species, *M. nodifrons* (Hansen, 1916), in antenna 1 with elongated third article, a maxilliped with more distinctly truncate endite, and a different dentation on the retinacula.

Key words: Crustacea; Peracarida; Isopoda; Munnopsidae; Taxonomy; new species, Angola Basin; DIVA-1, deep sea

Introduction

The DIVA-1 expedition (Diversity of the deep Atlantic benthos) took place in summer 2000 in the southeast Atlantic Angola Basin. Its major task is to help to achieve a more realistic estimate of the biodiversity of abyssal benthic communities in the southeast Atlantic and to contribute to the goal of CeDaMar (Census of the Diversity of Abyssal Marine Life) to describe 500 new abyssal species by 2010.

The isopods are one major and important portion of benthic deep-sea communities regarding their diversity and population densities (Harrison 1988). Yet our knowledge on them is still poor. The isopod fauna of the Angola Basin had not been examined before the DIVA-1 expedition. Isopods occur in relatively high abundances in samples of the epibenthic sledge, representing 14% of all individuals collected during the DIVA-1 expedition, 47% of which belong to the Munnopsidae Lilljeborg, 1864 (Brenke and Wägele, unpublished data). Some taxonomic work has already been published, with numerous descriptions of new species (e.g. Brandt 2001, 2004; Brenke *et al.* 2005; Leese and Brenke 2005; Schmid *et al.* 2002). The highly polytypic genus *Eurycope* Sars, 1864 consists of 56 previously described species (Schotte *et al.* 1995 ff.). Most of

them resemble each other to such an extent that a determination is only possible by combining several taxonomic characters. Some of these are obscured *in situ*, e.g. mouth parts and anteriodorsal parts of the head (frons, clypeus and labrum). A few more derived forms were transferred to separate genera since the 1980's (Wilson 1982; Wilson and Hessler 1981, Malyutina and Brandt 2006), leaving the remaining species a conglomerate that is not necessarily monophyletic as no apomorphies for the genus are known so far (Wägele 1989). Wilson and Hessler (1981) and more recently Malyutina and Brandt (2006) excluded *E. glabra* Kensley, 1978 from the genus without transferring it to a new one. The description of two new species that closely resemble the poorly described *E. glabra* may considerably contribute to resolving the phylogenetic position of these three species in the future. The genus *Munneurycope* Stephensen, 1913 in its present constellation is a fairly heterogeneous group, currently classified as Munnopsididae *incertae sedis*, and resembles the *Eurycope* to such an extent that its validity has often been doubted (e.g. Hansen 1916; Barnard *et al.* 1962) and the genus was sunk into *Eurycope* before being re-established by Wolff (1962). There are neither any apomorphies known for Eurycopinae to support their monophyly (Wägele 1989) nor is the general appearance suitable to be considered as apomorphic within Munnopsidae. The presence of a rostrum in Eurycopinae is most probably a symplesiomorphy with other Janiroidea (Wilson 1989). The genera *Amuletta* Wilson and Thistle, 1985, *Betamorpha* Hessler and Thistle, 1975, *Munnicope* Menzies & George, 1972, *Munnopsurus* Richardson, 1912 and *Munneurycope* all lack a rostrum. Both *Betamorpha* and *Amuletta* (Betamorphinae Kussakin, 2003) deviate from the characteristic habitus of Eurycopinae in their natasome resembling an oblong triangle in dorsal view, while in *Eurycope* and *Munneurycope* this outline is caudally rounded. Furthermore, *Amuletta* and *Betamorpha* have expanded uropod sympods with laterally inserting branches while in *Munneurycope* the sympod is more or less cylindrical. In *Munnicope* and *Munnopsurus*, pereonite 1 is the shortest ambulatory pereonite. *Munnicope* has a pleotelson exceeding the length of pereonites 1–7 together. In contrast to the latter two genera, in many species of *Munneurycope*, pereonite 1 is the longest of all ambulatory pereonites and the basis of the pereopod 1 is longer than on all other pereopods.

Material and methods

The DIVA-1 expedition (M48/1 with RV “*Meteor*”) took place from July 6th to August 2nd, 2000 in the southeast Atlantic Angola Basin. Samples were taken at seven stations from depths between 5125 and 5452 m using an epibenthic sledge (EBS; Brenke 2005) along a nearly 700 km long transect directed from south to north. The samples were examined with an Olympus BX 40 stereo microscope. Measurements were taken following Wilson & Hessler (1980) using an object micrometer. Photographic documentations of selected specimens were made using a Zeiss DSM 950 scanning electron microscope. All drawings were made with a *camera lucida*. Drawings of the body and pleotelson were made before dissection with minute insect pins (V2A stainless steel, 0.15 mm diameter) fixed in preparation needle handles (Schultz 1969). Initially antenna 1 and 2 of the body's left side were separated to facilitate lateral drawings of the frons, clypeus and labrum (Wilson 1989). Separated body parts were embedded with MERCK glycerine gelatine dyed with light green. The terminology of the isopod setae refers mostly to Hessler (1970), Wilson (1989) and Watling (1989), although no uniform concept exists at present. “Swimming setae” is used for plumose setae on the carpi and propodi of natatory pereopods with specialized insertion. “Pappose setae” describes setae on medial margins of the maxilliped palp articles 2 and 3 with dense setulation in the distal half but without setulation in the proximal half, both halves demarcated by an annulus. Pereonites are abbreviated “prm”, pereopods are abbreviated “P” with arabic numbers for the segments they refer to.

Type material was loaned from the Zoologisk Museum, University of Copenhagen and examined to compare *Munneurycope persephone* sp. nov. with *Munneurycope nodifrons* (ZMUC: CRU-7232 holotype of *Eurycope* (sic!) *nodifrons*) and *M. menziesi* (ZMUC: CRU-7243 holotype of *M. menziesi*). To compare the

new *Eurycope* species with *E. glabra*, the holotype (A15452) and the paratype (A15453) of *E. glabra* were loaned from the South African Museum, Cape Town. Types of all described new species of this work were deposited in the Zoologisches Museum Hamburg (ZMH), Germany.

Taxonomy

Eurycope Sars, 1864

The recent diagnosis by Malyutina and Brandt (2006) is followed here.

Eurycope monodon sp. nov.

Material examined

Holotype (ZMH K-41791), male (2.14 mm), Angola Basin, 17°06.2' S, 4°41.7' E to 17°07.5' S, 4°42.3' E; Station No. 344, expedition M48:1 RV “*Meteor*”. **Paratype** (ZMH K-41792), female (2.25 mm), same locality.

Additional material: 10 males, 10 females (ZMH K-41793 - K-41796)

Etymology

Named after *Monodon monoceros* Linné, 1758 (narwhal) referring to its long rostral seta.

Diagnosis

Eurycope with overhanging rostrum bearing a shallow frontal depression with a conspicuous long antero-medial spine-like seta. Lateral margins of head almost parallel, only slightly converging anteriorly. Each lateral side with 3 stout spine-like setae nearly forming a horizontal line. Pereonites of ambulosome equally shaped, caudally increasing in width. Pereonites of natasome decreasing in width from pereonite 5 to pereonite 7, pereonite 6 two thirds the length of the subequally long pereonites 5 and 7, the latter with straight posterior margin. Lateral edge of pleotelson straight in lateral view, caudal end not angled ventrally at insertion of uropods. Antenna 1 article 1 with flat distomedial lobe reaching two thirds of the following article's length. Distolateral lobes of male pleopod 1 with large, cranially curved cusp.

Description of male holotype

Body (Fig. 1): Longishly oval, slightly flattened dorsoventrally, length: width = 2.33. Body width evenly increasing from head to pereonite 5. Natasome with roundly triangulate pleotelson, slightly shorter than three quarters of body length. Body height between head and ambulosome almost constant; about 0.2 times body length, at caudal half of pereonite 5 increased (0.24 times body length), flattening posteriorly. Anterodorsal parts of head, tergites of pereonites 1 to 4 and all sternites showing fine texture of parallel cuticular grooves.

Head (Fig. 1; Fig. 2 a): Length : width = 0.55, slightly narrower than pereonite 1, lateral sides with 3 stout spine-like setae nearly forming a horizontal line. Conspicuous anterolateral vault at base of antenna 2. Dorsal surface finely granular. Cuticular grooves on ventral and lateral surface, anterodorsally projecting onto rostrum. Rostrum length : width = 0.5, hanging over, tapering anteriorly, with shallow anteromedian depression. Anterolateral margin of rostrum in apical half with cuticular keel. Apex of rostrum with median seta 1.75 times as long as rostrum, anteriorly almost projecting to anterior tip of medial lobe of antenna 1 article 1. Frons clearly concave due to overhanging rostrum, ventrolateral margin with slightly projecting edge leading towards posterolateral margin of clypeus. Clypeus roughly half-cylindrical. Labrum and clypeus only separated by a fold. Clypeus length : labrum length = 0.4. Body width : cephalic width = 1.6.

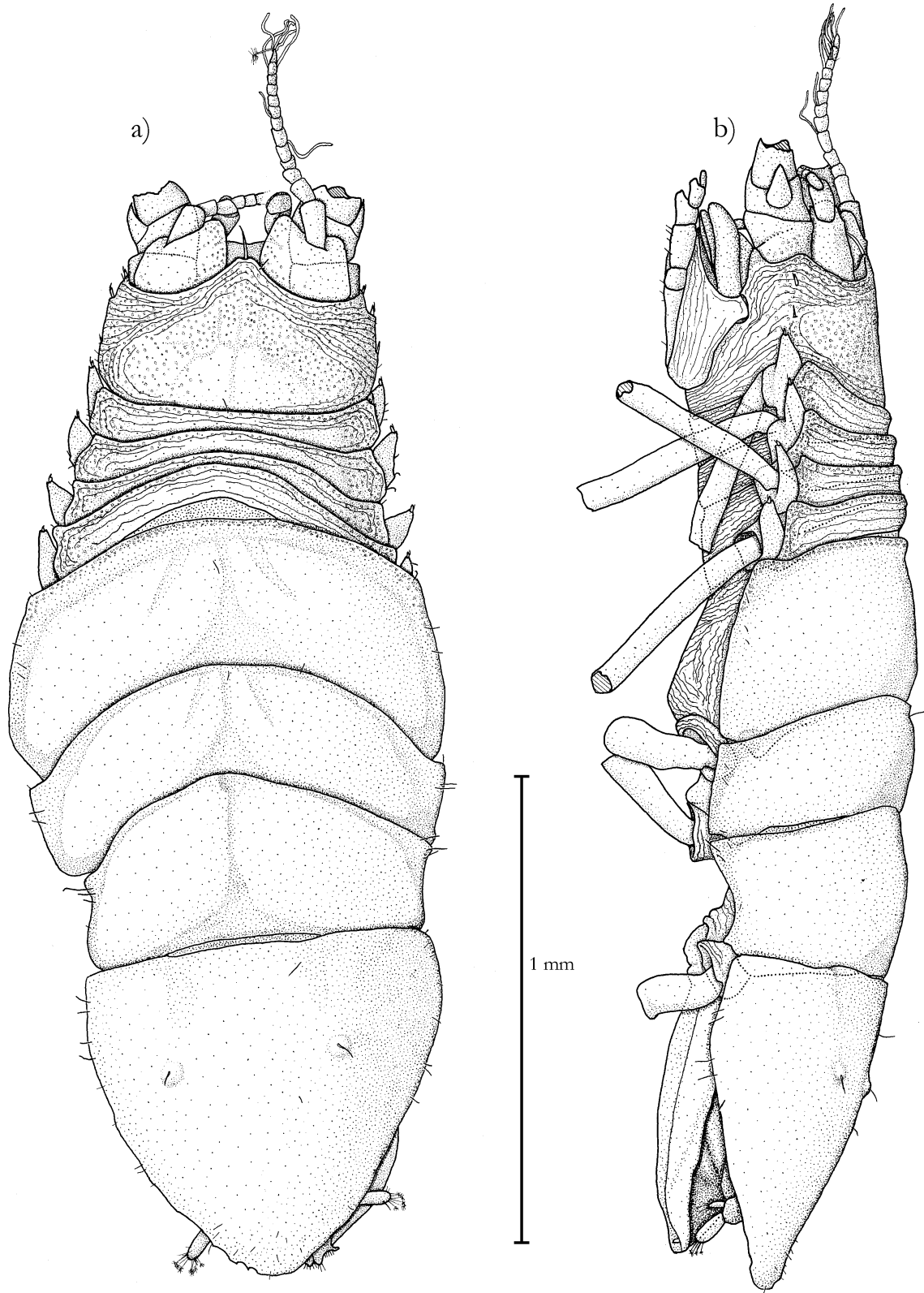


FIGURE 1. *E. monodon* sp. nov., male holotype ZMH K-41791. a) dorsal view; b) lateral view.

Ambulosome (Fig. 1): Width of pereonites increasing from first to fourth: 0.66, 0.72, 0.74, 0.78 times maximum body width. Lengths about equal (0.1–0.11 times of pereonite width). Each pereonite overlapping the preceding one. Anterior margin of pereonite 1 slightly concave, of pereonite 2 to pereonite 4 increasingly more convex. Surface with transversal cuticular grooves, parallel to anterior and lateral margins. Anterodorsal and dorsolateral surface finely granulated. Each anterolateral angle with short seta. Coxal lobes triangular, projecting anteriorly, with stout apical spine-like seta and up to 3 short lateral setae. Sternites more weakly sclerotized with more distinct cuticular grooves.

Natasome (Fig. 1): Posterior margins of pereonites 5 and 6 overlapped by anterior margin of following tergite. Lateral margins in anterior half with up to 4 setae. Posterolateral angles decreasingly acute from pereonite 5 to 7, covered by margin of following pereonite. Pereonite 5 widest, length : width = 0.34, with convex anterior and concave posterior margin. Pereonite 6 and 7 length = 0.74 and 1.13 times length of pereonite 5, respectively, width 0.96 and 0.82 times width of pereonite 5, respectively. Pereonite 6 with margins as in pereonite 5, length : width = 0.26. Pereonite 7 length : width = 0.47. Anterior margin convex, posterior margin nearly straight. Anterior margin of pereonite 5 finely granulated. Coxae and sternites weakly sclerotized, with cuticular grooves. Coxae near posterolateral margin of sternite, without coxal lobes. Posterior margin of sternite of pereonite 7 medially with penes (Wilson 1989) clearly visible as subtriangulate lobes caudally inserting in cavities in the base of fused pleopod 1.

Pleotelson (Fig. 1; Fig. 8 a): 0.33 times body length, roundly triangular, almost as long as broad. Dors-oventrally flattened, width : depth = 2.24. Anterior margin almost straight, laterally slightly overlapping pereonite 7. A pair of dorsolateral tubercles of 0.05 times pleotelson width in diameter, distance to anterior margin of pleotelson 0.34 times pleotelson length, with central broom seta. Tubercles invisible in transmitted light, only detectable by central seta. Lateral margin without angle near insertion of uropods, caudal tip not bent ventrally. Distal two thirds of endopod of uropod visible in dorsal view. Lateroventral surface with cuticular grooves.

Antenna 1 (Fig. 2 b) about one quarter of body length. Peduncular article 1 length : width = 1.06, approximately one third of cephalic width. Medial lobe longer than lateral, dorsally granular, 3 apical spine-like setae. Lateral lobe with 1 spine-like and 1 short seta, 1 subapical spine-like seta. Peduncular article 2 cylindrical, inserting dorsally from distal third of first and half as long. 2.5 times longer than wide, distal margin with 9 setae. Peduncular article 3 two thirds as wide and half as long as second, with 2 small lateral spine-like setae. Flagellum 11-jointed, first article half as long as peduncular article 3, distally with 1 long and 1 short seta. Following articles about a quarter narrower, the second with a short distoventral seta, ninth with 1 short distodorsal, tenth with 2 distolateral longer setae. Articles 3, 5, 8, 9 and 10 with 1 distal aesthetasc, article 11 with 2 aesthetascs and 1 apical broom seta.

Antenna 2 (Fig. 2 c): Basalmost 4 peduncular articles preserved, width = width of antenna 1. Article 1 short, extended to rounded trapezoidal lobe, 1 subapical spine-like seta. Article 2 evenly cylindrical, laterally with 1 long and 2 short spine-like setae. Article 3 slightly longer than preceding articles together, anterior margin sloping. Distomedially 3 spine-like setae and 1 simple seta in a row. Lateral scale acute, triangular, frontally projecting 2 thirds of length of following article, lateral with 2 small setae. Article 4 0.25 times narrower in diameter, distal margin extended into dorsomedial and ventromedial lobe.

Mandibles (Fig. 3 a–d; Fig. 4 a–c): 0.14 times body length, length : width = 1.8. 2 ventrolateral setae on left, 3 on right mandible, on a level with condyle. Palp (Fig. 3 d; Fig. 4 a, b): 0.77 times as long as mandible body. Article 1 basally tapering, on left mandible with long subdistal seta. Article 2 1.5 times as long as first, slightly wider. Distal two thirds of lateral side with numerous short scale setae with 2 to 11 (mostly 5 to 6) short setulae. 3 large distal spine-like setae. Article 3 laterally flattened, apical half twisted clockwise in right, anticlockwise in left mandible. Medial surface with scale setae with 4 to 8 setulae. Ventral margin with row of 8 cleaning setae, subapically 3 strong one-sidedly serrated spine-like setae, basal one 4 times longer than others. Incisor process (Fig. 3 c; Fig. 4 a) on both mandibles with 4 sclerotized cusps, the second most ventral

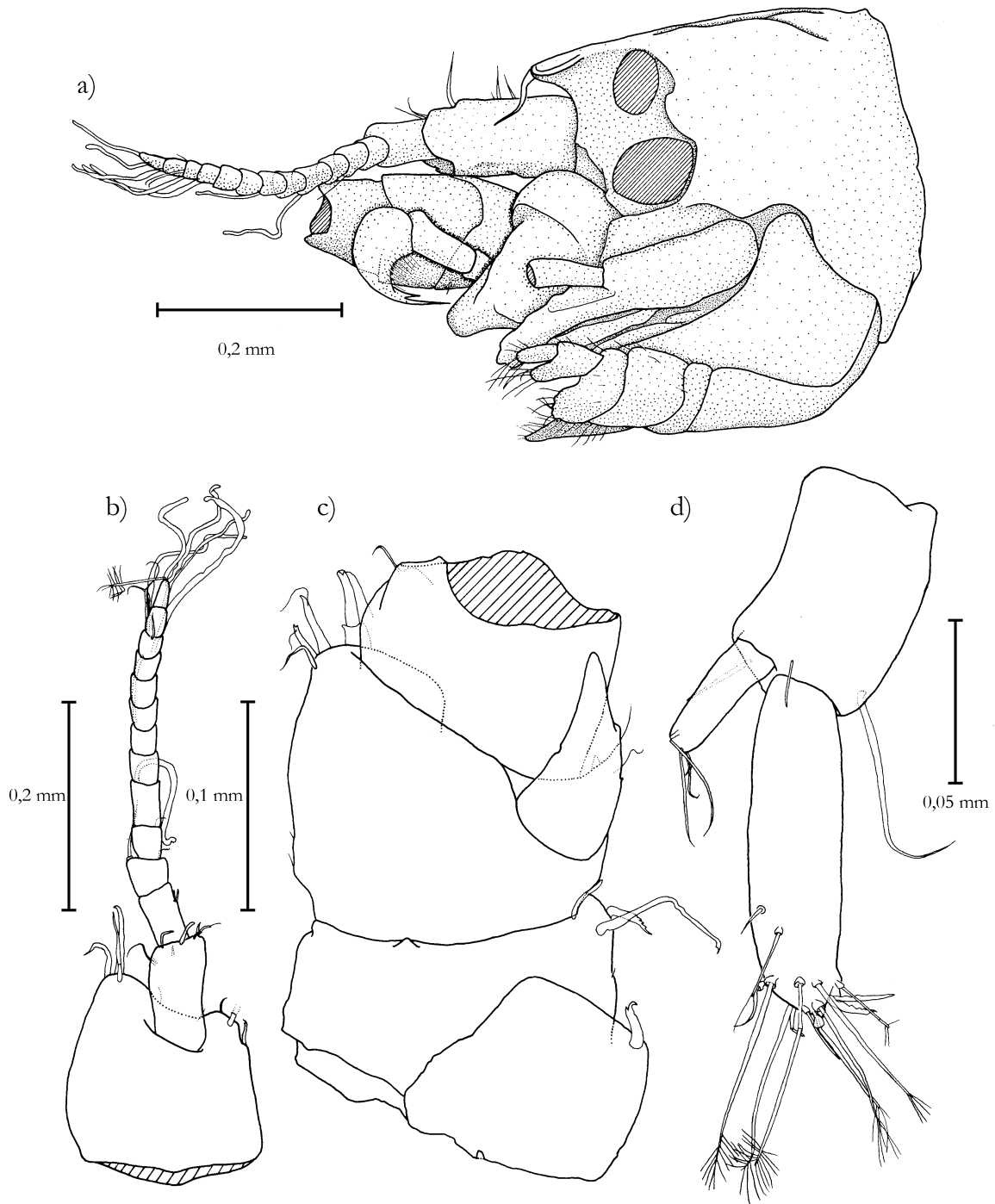


FIGURE 2. *E. monodon* sp. nov., male holotype ZMH K-41791. a) head, lateral view; b) right antenna 1, dorsal view; c) right antenna, basal articles, dorsal view; d) left uropod, dorsal view.

largest, second most dorsal cusp on left mandible shifted basally and inconspicuous, dorsalmost cusp on right mandible smallest. *Lacinia mobilis* (Fig. 3 c) distally with a row of 7 cusps, increasingly larger from dorsal to ventral side. Spine row on left mandible with 2 short, stout setae and further proximally 2 longer, more slender one-sidedly serrated stout setae with recurved distal third. Right spine row with 3 short and robust stout setae, first one with 4 apical teeth, further proximally 3 longer stout setae as on left mandible. Molar process (Fig. 3

b; Fig. 4 c) with oval chewing area, slightly larger on right mandible and with more low tubercles. Left chewing area with 5 sensory cavities. Posterior margin of chewing area more prominent than anterior, with 4 plumose setae on each mandible, on right mandible with 9 cusps, the ventralmost largest, on left mandible 6 cusps. Condyle prominent, slightly shorter than molar process.



FIGURE 3. *E. monodon* sp. nov., male holotype ZMH K-41791. a) left mandible, dorsal view; b) medial view; c) left incisor process and lacinia mobilis, medial view; d) articles 2 and 3 of palp of left mandible, medial view; e) paragnath, dorsal view.

Paragnath (Fig. 3 e): Dorsoventrally flattened, unsclerotized, length : width = 0.71, with narrower pair of inner, wider and more flattened pair of outer lobes with convex lateral margins. Inner lobes 0.25 times shorter in length, half-cylindrical with rounded apices, distal third dorsally with scattered rows of fine setae. Outer lobes ventrally overlapping inner lobes, distal half of dorsal surface with outer area of sparse, fine setation and larger inner area with setae arranged in 4 to 5 transversal rows. Dorsal side with subapical outer row of 4 long setae, single stronger one at the margin, and inner row of 7 to 8 longer setae. Further proximal ridge with 10 longer setae. Lateral margin with 2 short stout setae on left and 1 on right side.

Maxilla 1 (Fig. 4 d–f): Outer endite length : width = 3.4, 1.5 times as long and twice as wide as inner, medial margin with 16, lateral margin in proximal half with 7 setae. Apex bluntly oblique, with 13 strong stout setae, 3 thereof two-sidedly serrated in distal half, 2 others with subapical tooth. 2 simple setae proximodorsal to apex. Inner endite with ventral longitudinal row of 6, medial margin with 4, proximodorsal with 1 long seta. Apex bluntly cone-shaped, with 4 setae and 3 stout setae, proximalmost stronger and approximately twice as long as others.

Maxilla 2 (Fig. 5 a–d): Outer part of outer endite length > inner endite > inner part of outer endite. Inner endite apically rounded, dorsally with 31 setae. Apex with 4 one-sidedly serrated stout setae, proximalmost longest and curved laterally. 11 setae of varying diameter. Both parts of outer endite 0.02 mm wide, apices blunted with small distodorsal lobe. Inner part with 6 proximal setae, 2 subapically on medial margin. Apex with 2 long and 2 shorter one-sidedly serrated stout setae. Outer part of endite with 12 lateral setae, subapically on lateral margin 2 and on medial margin 3 setae. Apex with 3 one-sidedly serrated stout setae.

Maxilliped (Fig. 5 e–g): 0.18 times body length, coxa length : basis length = 0.26. Basis with lateral seam of fine setae, proximally beginning after the first third, distally reaching as far as insertion of palp. Medial margin bent dorsally, distal third with rounded, laterally pointing lobe with 3 setae. Endite spatulate with 2 club-shaped retinacula, distodorsally with 3 pairs of elongated tubercles and a more proximal transversal edge. Apex truncate at an angle of approximately 120° to medial margin, 4 ventral and 1 dorsal fan setae. Lateral margin rounded, 5 to 6 evenly distributed setae. Dorsal surface with subtriangular area of 29 setae, subapically as wide as endite, proximally narrower, dorsomedially reaching on a level with retinacula. Palp article 1 shortest, 1.2 times as wide as proximal end of basis. Lateral seam of setae continued, distally ending in larger seta. Distolateral angle with 1, lateral half with 2 ventrodorsal setae. Article 2 largest, 3 times as long as article 1, distally increasing in width, distal margin truncate, almost straight. Lateral setae continuing on proximal 2 thirds of its length, ending in longer seta. 1 distolateral and 1 ventrolateral seta. Medial margin with 4 pappose setae with bald proximal third, demarcated by annulus. Article 3 nearly trapezoidal, with large distolateral seta. Medial margin up to distally rounded tip with 8 pappose setae as on article 2, but only half as long. Further laterally a longer simple seta. Ventral surface with 4 short setae. Article 4 y-shaped due to distomedial lobe, proximally tapering. 2 lateral and 5 distomedial setae. Article 5 cylindrical, seemingly shifted laterally due to distolateral lobe of article 4, setose apices of both parallel to each other. 7 distal and subdistal setae. Epipodite length : width = 1.7, length : basis length = 1.48, broadly y-shaped due to lateral lobe. Ventral surface with parallel cuticular grooves. Subdistally 1, laterally 4 setae. Lateral lobe rounded, *in situ* covering insertion of mandible.

Pereopods 1–4 (Fig. 6): Uniformly baculiform walking legs. Total length pereopod 1 : pereopod 2 = 0.79. Pereopod 1 basis 0.30, ischium 0.09, merus 0.06, carpus 0.31, propodus 0.17, dactylus 0.07 of pereopod 1 length. Basis elongated, sparsely setose, 2 ventral broom setae. Ischium with 2 setae. Merus distally broadening, with 8 setae. Carpus longest, slender, sparsely setose. Propodus with 1 dorsal and 6 distal setae. Dactylus evenly tapering, scythe-shaped, ventrally curved, apex blunt, medial surface with 1 seta, further distally 2 shorter setae. Pereopod 2 basis 0.25, ischium 0.11, merus 0.05, carpus 0.27, propodus 0.21, dactylus 0.11 of pereopod 2 length. Basis with 1 preserved ventral broom seta, in proximal third 4 bases of broken off broom setae. Ischium with 8, merus with 10 setae. Carpus longest, more densely setose than on pereopod 1. Propodus more densely setose than on pereopod 1, distally with 6 long setae and 1 broom seta. Dactylus 2 times longer

than pereopod 1 dactylus, Medially with 1 seta, laterally with opposing seta. Ventroproximally on medial side row of fine, short setae, further proximally ventral margin with 6 small teeth. Inconspicuous row of small teeth also on dorsal margin proximally of 2 long setae. Pereopod 3 and 4 of holotype and all other examined individuals unknown distally of basis.

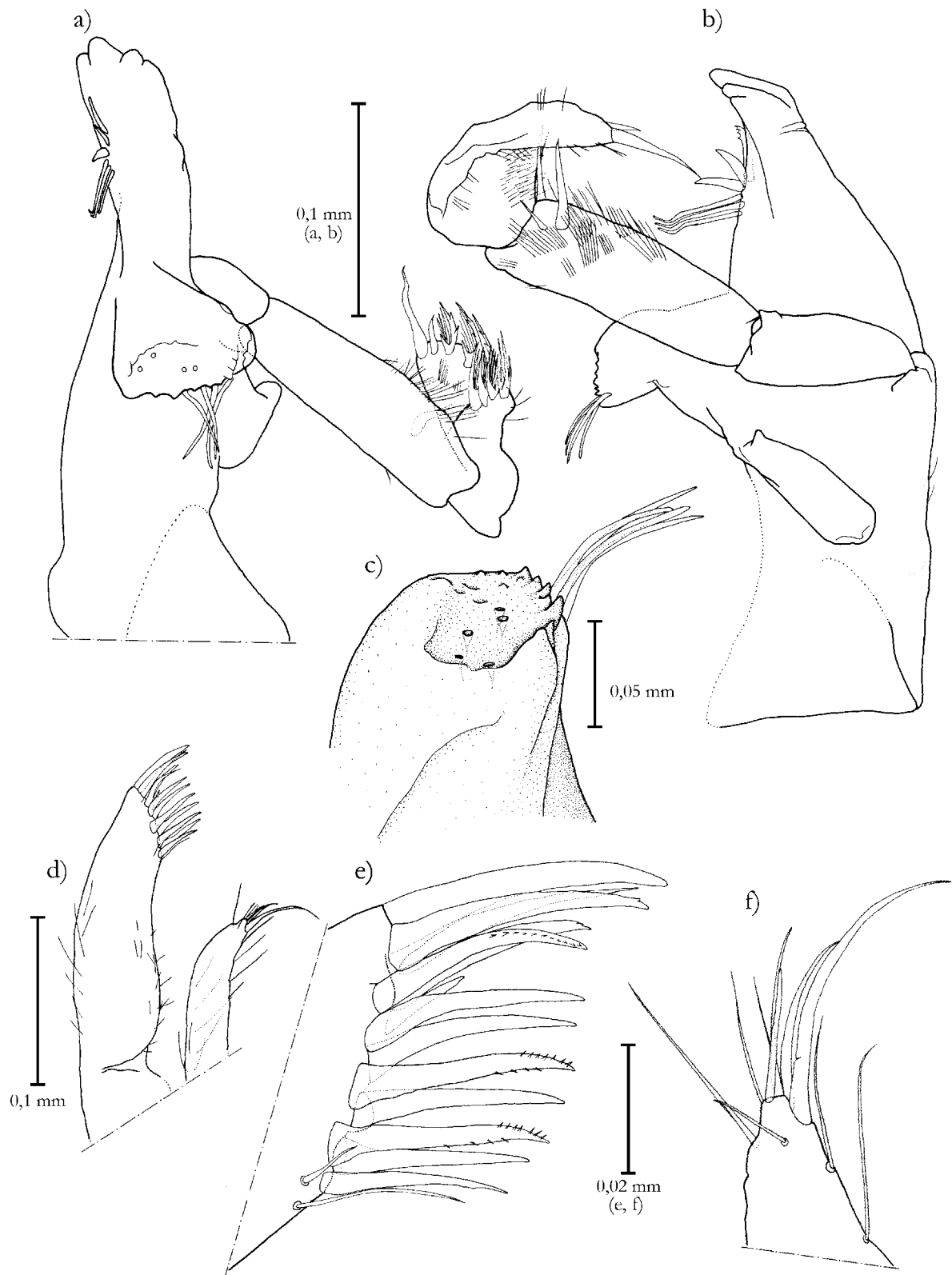


FIGURE 4. *E. monodon* sp. nov., male holotype ZMH K-41791. a) right mandible, medial view; b) dorsal view; c) molar process of right mandible, ventral view; d) left maxilla 1, dorsal view; e) apex of inner endite; f) apex of outer endite

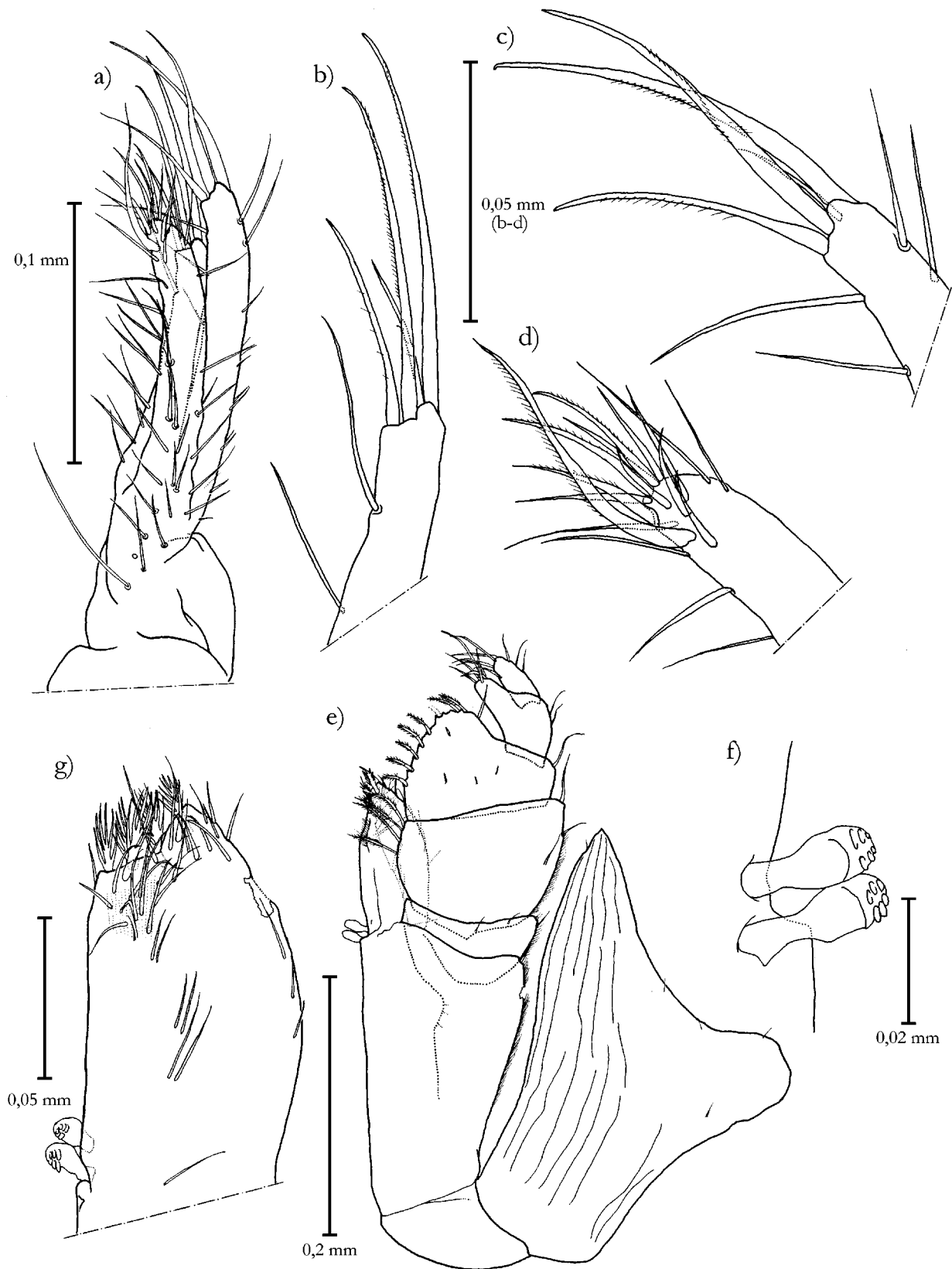


FIGURE 5. *E. monodon* sp. nov., male holotype ZMH K-41791. a) right maxilla 2, dorsal view; b) middle endite; c) outer endite; d) inner endite; e) left maxilliped, ventral view; f) retinacula, dorsal view; g) right maxilliped, endite, dorsal view

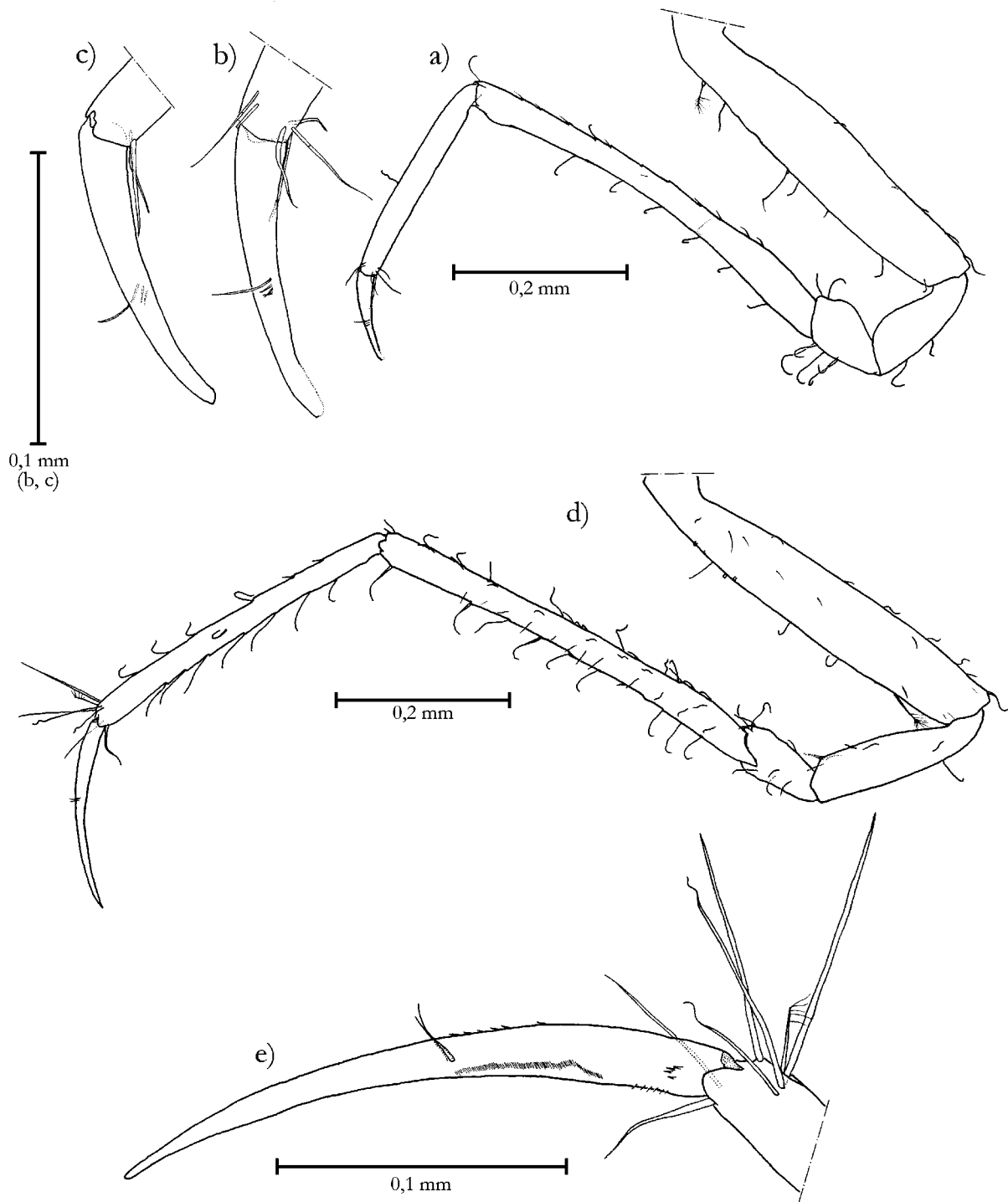


FIGURE 6. *E. monodon* sp. nov., male holotype ZMH K-41791. a) right pereopod 1, medial view; b) dactylus; c) left pereopod 1, dactylus, lateral view; d) left pereopod 2, lateral view; e) dactylus.

Pereopods 5–7 (Fig. 7): Basis cylindrical, stouter and shorter than on ambulatory pereopods. Distally broadening especially on pereopod 7, less distinct on pereopod 6. Pereopod 5 with long broom seta and 7 dorsal shorter, simple setae. Pereopod 6 with 6 simple setae and 1 broom seta. Pereopod 7 with 1 broom seta. Ischium cylindrical, on pereopod 5 as long and on pereopod 6 and 7 two thirds as long as basis. Pereopod 5 with 8, pereopod 6 and 7 with 5 long plumose setae. Merus cylindrical, half as long as ischium, dorsally

rounded and broadest in distal third. Each pereopod with 1 dorsal swimming seta. Merus of pereopod 5 basally about two thirds as wide as ischium, 1 distal and 5 ventral setae, on pereopod 6 nearly as wide as ischium, with 5 ventral setae, on pereopod 7 half as wide, with 1 distoventral, 2 distolateral setae (1 broken off). Distal end of pereopod 6 and 7 at insertion of carpus with membranous seam. Carpus lengths P5 = P6 = P7, length : width = 1.14, 1.57, 1.27, laterally strongly flattened, dorsally convexly enlarged to semi-circular shape, widest in basal half. Ventral margin less enlarged and almost straight, with membranous seam along nearly whole length. Swimming setae inserting on outer side of dorsal and ventral margin, dorsal ones up to 0.29 mm, at least twice as long as ventral ones. On pereopod 5 23 dorsal and 11 ventral swimming setae, on pereopod 6 20 and 10, on pereopod 7 26 and 12. Each with 2 spine-like setae dorsal of insertion of propodus, on pereopod 5 1 broom seta. Propodus length : width = 2, P5 propodus length : carpus length = 0.91, pereopod 7 propodus length : carpus length = 0.76, inserting slightly shifted to outer side of carpus, about two thirds as long and half as wide as carpus, laterally flattened, dorsal margin slightly and ventral margin more strongly convexly enlarged, widest in middle. Pereopod 5 with 14 dorsal and 11 ventral swimming setae. Pereopod 6 propodus unknown. Pereopod 7 with 13 dorsal and 10 ventral swimming setae. Ventral swimming setae slightly longer than dorsal, absent in proximal third of ventral margin. Dorsal and ventral of insertion of dactylus with 1 seta, on pereopod 5 with 1 broom seta. Dactylus lancet-shaped, laterally flattened, about half as long as propodus, insertion slightly displaced to outer side of propodus. Short apical seta, on pereopod 7 additional spine-like seta. Pereopod 5 distal third with short dorsal seta, pereopod 7 subdistal quarter of dorsal margin serrated.

Pleopods (Fig. 8 b–f; Fig. 9 a–c): Pleopod 1 and 2 inserting on a level with coxae of pereopod 7. Pleopod 1 (Fig. 8 b, c) of both sides dorsally fused to sympodite, except for distal quarter. Suture visible along whole length of ventral side. Pleopod 1 0.27 times body length, about 3.5 times longer than wide. Dorsal side of each half elevated cuticular ledge, hanging over in its distal third, with fine, short setae. Further distally on each half a pair of shorter ledges on a level with inner lobe, enclosing a deepened groove, the lateral one with medially overhanging edge. Ventral side of this area on left half with 4, on right with 2 short setae. Distomedial lobes less than half as wide as proximal end of sympodite, with subtriangular tip and shallow, distoventral ridge, distolateral margin with 11 (3 ventral, 4 laterodorsal, 2 distodorsal and 2 distoventral) setae. Distolateral lobes shorter than distomedial lobes, narrow, pointed, ending in conspicuous 0.02 mm long, cranially curved cusp. Pleopod 2 with almost semicircular protopodite, 0.92 times pleopod 1 length. Length : width = 2.28, distal margin acute, slender. Proximolaterally 1 long, distolaterally 7 hemiplumose setae. Exopod rounded, unsclerotized, inserting dorsally in distal quarter of protopodite. Proximal half on caudal side with fine, dense setation. Endopod inserting from distal third of protopodite, bent between basal article and caudally pointing stylet. Stylet 0.5 times as long as protopodite, acute, sperm duct opening after basal third of stylet. Pleopod 3 0.74 times pleopod 1 length, with large lobiform endopod, length : width = 3, distally with 3 long plumose setae. Exopod 2-jointed, width = 0.3 times endopod width, slightly exceeding endopod length. First article nearly 3 times as long as second, the latter lancet-shaped and flattened, with strong apical seta. Margins of both articles framed by seam of fine setae, the longest on lateral margin. Pleopod 4 length : pleopod 1 length = 0.67, with large lobiform endopod, length : width = 2.11, without setation, exopod 0.3 times endopod width, single-jointed, evenly tapering to apex, lateral and medial margin with seam of fine setae. Apex with long plumose seta. Pleopod 5 length : pleopod 1 length = 0.65, length : width = 1.76, delicate, lobiform. Lateral margin rounded, medial straight, surface bald.

Uropods (Fig. 2 d): Biramous, inserting ventrolaterally in shallow cavities in posterior quarter of pleotelson. Protopodite laterally slightly flattened, length : width = 1.4. 3 distal setae, largest as long as protopodite, distomedial at insertion of endopod. Both rami cylindrical with rounded apex, inserting distally on protopodite. Endopod length 1.6 times protopodite length, about 2.5 times as long and twice as wide as exopod, with subapical broom seta. Apex with 7 broom setae, 3 shorter simple setae and 2 spine-like setae. Exopod apex with 2 short and 2 long setae.



FIGURE 7. *E. monodon* sp. nov., male holotype ZMH K-41791. a) left pereopod 5, medial view; b) left pereopod 6, medial view; c) left pereopod 7, lateral view; d) dactylus; e) right pereopod 7 (regenerated), lateral view

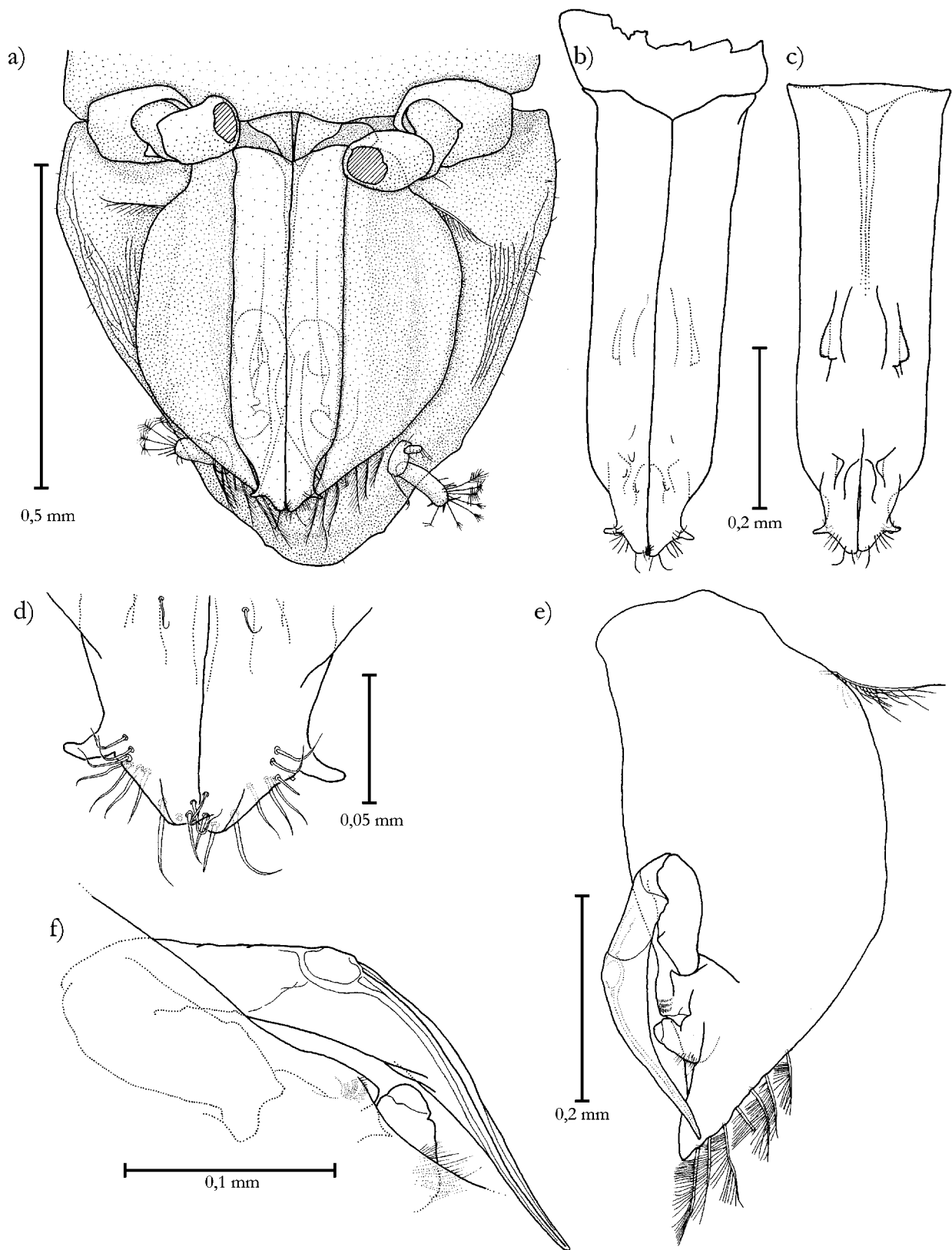


FIGURE 8. *E. monodon* sp. nov., male holotype ZMH K-41791. a) pleotelson, ventral view; b) pleopod 1, ventral view; c) dorsal view; d) apex, ventral view; e) right pleopod 2, dorsal view; f) appendix masculina, ventral view

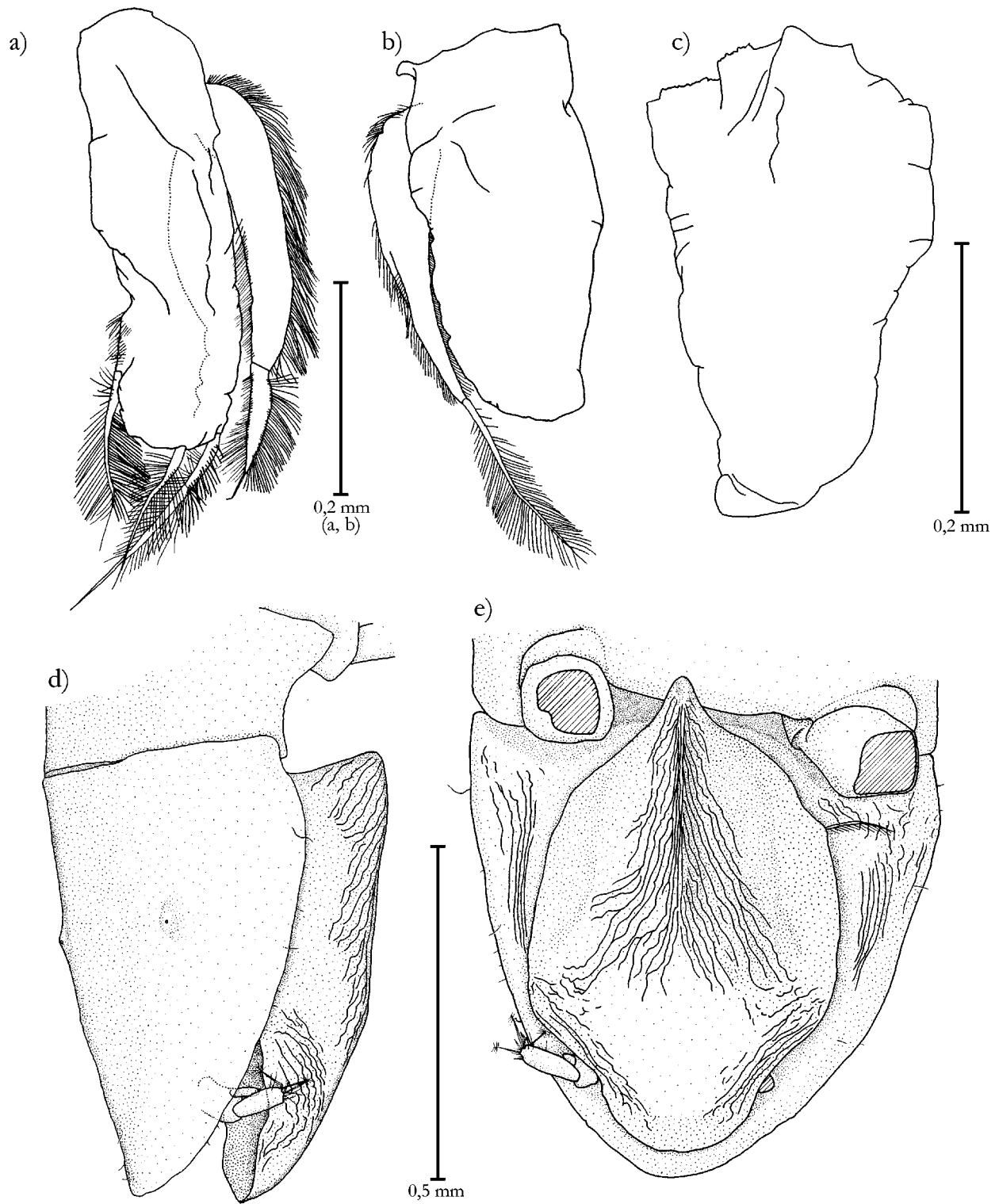


FIGURE 9. *E. monodon* sp. nov., male holotype ZMH K-41791. a) left pleopod 3, ventral view; b) left pleopod 4, dorsal view; c) right pleopod 5, dorsal view; *E. monodon* sp. nov., female paratype ZMH K-41792. d) pleotelson, lateral view; e) ventral view

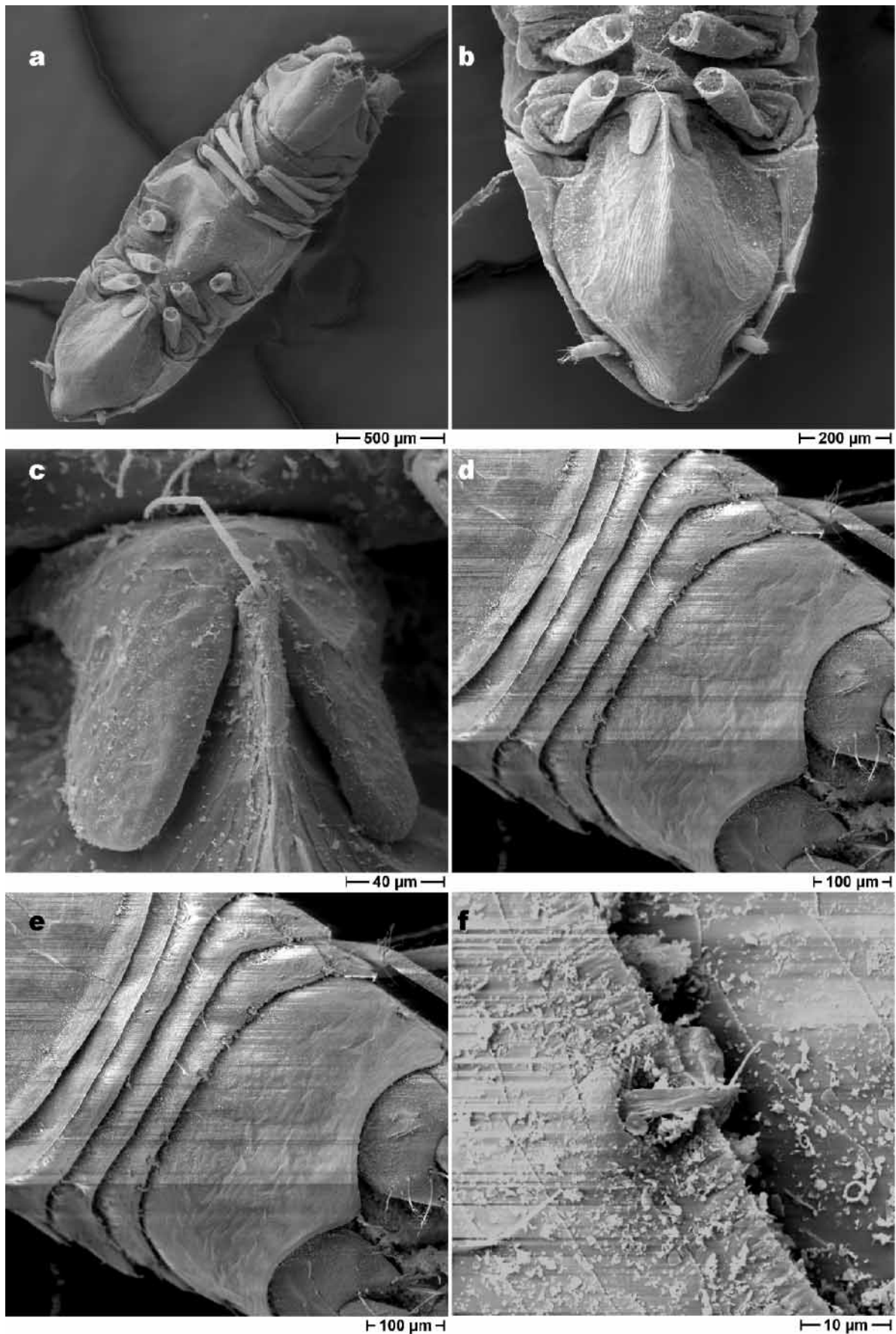


FIGURE 10. *E. monodon* sp. nov., scanning electron microscope photographs. a) stage IV male, ventral view; b) stage IV male pleotelson, ventral view; c) stage IV male, apex of operculum, ventral view; d) male, head and pereonites 1 to 4, dorsal view; e) male, rostrum, dorsal view; f) male, seta on pereonite 1, dorsal view.

Description of female paratype (Fig. 9 d, e; Fig. 19 h)

Length 2.25 mm, body as in male, rostrum with single anteromedial spine-like seta. Pleotelson as in male, dorsal tubercles present, central seta broken off. Sexual dimorphism only in antenna 1 and pleopods. Coxae of pereopods with fully developed oostegites. Antenna 1: Flagellum 5-jointed, 1 aesthetasc on article 4 of flagellum. Pleopods: Operculum length : body length = 0.32, length : width = 1.51, boat-shaped with sharp anteromedial keel, outline of operculum an angulate ellipsoid due to apex shifted further cranially, overlapping posterior margin of sternite 7. Posterior half decreasing in height, medial keel diminishing. Proximolaterally 1 hemiplumose seta. Caudal margin notched on a level with insertion of uropods, the latter uncovered. Cuticular grooves limited to area around these bulges and around medial keel.

Distribution

South-eastern Atlantic: Angola Basin at a depth of 5125–5410 m (22°20.0' S, 3°18.3' E to 22°20.2' S, 3°18.4' E, 5125–5144 m, station 318; 22°19.9' S, 3°17.8' E to 22°20.0' S, 3°17.9' E, 5126–5127 m, station 320; 18°19.4' S, 4°39.7' E to 18°20.8' S, 4°38.6' E, 5397–5398 m, station 338; 18°18.3' S, 4°41.3' E to 18°19.4' S, 4°41.9' E, 5395 m, station 340; 17°06.2' S, 4°41.7' E to 17°07.5' S, 4°42.3' E, 5415 m, station 344; 16°18.1' S, 5°27.2' E to 16°19.3' S, 5°27.2' E, 5387–5390 m, station 348; 16°14.3' S, 5°26.8' E to 16°14.9' S, 5°26.7' E, 5389 m, station 350 of expedition M48:1 RV “*Meteor*”).

***Eurycope denticollis* sp. nov.**

Material examined

Holotype (ZMH K-41797), male (3.23 mm), Angola Basin, 16°14.3' S, 5°26.8' E to 16°14.9' S, 5°26.7' E, 5389 m, Station No. 350, expedition M48:1 RV “*Meteor*”. **Paratype** (ZMH K-41798), female (4.71 mm), same locality.

Additional material: 10 males, 10 females (ZMH K-41799 - K-41802)

Etymology

Lat. *dens*, *déntis* the tooth, lat. *collum* the neck; referring to the spine row on anterior margin of pereonite 1.

Diagnosis

As *Eurycope monodon*, but rostrum with 2 to 7 spine-like setae, the medial pair longest and always present. Anterior margin of pereonite 1 with cone-shaped spine-like setae. Distolateral lobes of male pleopod 1 with caudally pointing cusp.

Description of male holotype

Body (Fig. 11 a, b) length 3.23 mm, length : width = 2.58, longishly oval, dorsoventrally slightly flattened. Only slightly widening from head to pereonite 5. Caudally tapering to roundly triangular pleotelson. Natasome about two thirds of total length. Body height at head and ambulosoma 0.22 times body length, at posterior half of pereomer 5 increasing to 0.25 times body length, caudally evenly decreasing in height.

Head (Fig. 11 a–c; Fig. 12 a) length = 0.18 times body length, width = 0.71 times maximum body width, length : width = 0.66, wider than pereonite 1, anteriorly slightly tapering, as wide as pereomer 1. Lateral side with 3 cone-shaped spine-like setae in a nearly horizontal row. Anterolateral margin with shallow curvature on a level with insertion of antenna 2. Rostrum width 0.15 times cephalic width, length : width = 0.75, overhanging, tapering anteriorly and with rounded tip. Anterolateral margin in apical half with cuticular keel. Distally 5 short spine-like setae pointing anteriorly, median pair about twice as long as outer (Fig. 11 c). Rostral

spine-like setae anteriorly reaching insertion of antenna 1 article 2. Frons clearly concave due to overhanging rostrum. Clypeus swollen dorsomedially, length : labrum length = 0.69. Labrum and clypeus only separated by a fold. Anterior margin of labrum with sparse setation.

Ambulosome (Fig. 11 a, b): Pereonites increasing in width from 1 to 4: 0.69, 0.73, 0.74, 0.79 times maximum body width. Medial length 0.9 to 0.1 times its width. Pereonites dorsally overlapping preceding segment. Anterior margins of pereonite 1 and 2 only slightly curved caudally, of pereonite 3 and 4 curved cranially. Each anterolateral corner with 1 short seta. Coxal lobes prominent and triangular, projecting anteriorly, with stout spine-like seta and 1 to 6 short lateral setae. Sternites less sclerotized with shallow cuticular grooves. Anterior margin of pereonite 1 with 10 cone-shaped spine-like setae of 0.02 mm length (Fig. 12 b, c).

Natasome (Fig. 11 a, b): Entire natasome stiffened by fusion of sternites. Posterior margin of pereonite 5 and 6 overlapped by anterior margin of the following tergite. Anterior margins slightly bent dorsally, especially on pereonite 5. Lateral margins in anterior half with up to 6 setae. Posterolateral angles covered by anterior margin of following pereonite. Pereonite 5 widest, length : width = 0.34, length : body length = 0.13, with nearly straight anterior and concave posterior margin, anterolateral angles rounded, posterior margin with 2 inconspicuous bulges, forming a pair of small cavities. Pereonite 6 shortest, length = 0.93 times pereonite 5 length, width = 0.96 times pereonite 5 width, length : width = 0.33, caudally narrowing, anterior and posterior margin curved anteriorly. Anterolateral angle acute, with short apical seta. Pereonite 7 length = 1.14 times pereonite 5 length, width = 0.87 times pereonite 5 width, length : width = 0.45. Anterior margin convex, posterior margin almost straight. Acute anterolateral angle with short apical spine-like seta. Coxae and sternites less sclerotized, with weakly developed cuticular grooves. Coxae inserting on posterolateral margin of sternites. Posterior margin of sternite of pereonite 7 with a pair of triangular penes, fitting into basal cavities of pleopod 1.

Pleotelson (Fig. 11 a, b; Fig. 17 a) length = 0.30 times body length, width = 0.84 times maximum body width, length : width = 0.92, width : depth = 2.69, dorsoventrally flattened, resembling caudally rounded triangle. Anterior margin separated from pereonite 7 by intersegmental membrane of 0.49 times pleotelson width, nearly straight, seemingly concave when pleotelson is bent ventrally. Anterolateral angles with short setae, slightly overlapping pereonite 7. Dorsolaterally in anterior third a pair of inconspicuous tubercles of 0.04 times pleotelson width with central broom seta (Fig. 11 d). Lateral margin of each side with 17 short setae, in lateral view nearly straight, without angle near insertion of uropods. Dorsum smooth, lateroventral surface with cuticular grooves.

Antenna 1 (Fig. 12 d, e) length : body length 0.31. Peduncular article 1 appearing dorsoventrally flattened due to lateral extension, length : width = 1.16, slightly wider than a quarter of cephalic width. Small dorsomedial broom seta, another and a short spine-like seta close to insertion of second article, 2 dorsolateral simple setae. Distally differentiated into shorter, anterolateral outer lobe and longer, acute, anteromedial inner lobe. Inner lobe distally with 3 long spine-like setae. Outer lobe with 1 broom seta, 3 small simple setae and a spine-like seta. Article 2 slightly more than half as long as article 1, 2.5 times as long as wide, widening to distal margin, distally 2 simple setae, 2 broom setae and 3 short spine-like setae. Article 3 cylindrical, two thirds of length and width of preceding article. 2 short distodorsal setae. Flagellum 17-jointed. First flagellar article as wide as peduncular article 3 but only a third as long. Following articles slightly narrower. Articles 1, 3, 11 and 12 each with 1 short distal seta, article 13 with 1 short and 1 longer seta, article 9 dorsally with 1 short, article 10 lateral with 2 longer setae. Articles 4, 5 and 7 to 16 each with 1 distoventral aesthetasc, article 17 with subapical long seta and apical broom seta.

Antenna 2 (Fig. 12 f, g): 1.12 times body length. 6 peduncular articles and 43-jointed flagellum. Proximal-most 4 peduncular articles short but widest, 0.24 times cephalic width. Article 5 and 6 longest. Article 1 short, extending into rounded lateral lobe, 1 spine-like seta. Article 2 as long as first, evenly cylindrical, with 3 long lateral spine-like setae. Article 3 about as long as 1 and 2 together, distal margin sloping. Distomedial row of 5 spine-like setae. Lateral side with subdistal, acute, triangular scale reaching insertion of article 5, lateral side

with 2 small, 1 larger, and 1 broom seta. Article 4 half as long and 0.75 times as wide as preceding article, distal margin extended to a dorsomedial and ventromedial lobe. Article 5 length 0.24 times total length of antenna 2, with numerous stout spine-like setae. 8 stronger distal spine-like setae, distomedially with 1 simple seta and 1 broom seta. Article 6 length 0.24 times antenna 2 length, numerous spine-like setae as on the preceding article, distally with 3 stronger spine-like setae and 3 broom setae. Length of flagellum 0.38 times length of antenna 2, evenly tapering over entire length, terminal article only about a ninth the diameter of first article of flagellum. Article 1 longest. Article 2 nearly half as long. Following articles evenly increasing in length, only 0.2 to 0.3 times as long as first article. Articles 1, 3, 4, 6 and 23 each with 1 short seta, article 2 with 2 setae, articles 22 and 24 with a longer seta. Distal margin with a row of 3 to 7 long and slender setae on articles 19, 25, 27 and 29 to 43.

Mandibles (Fig. 13 a–k): Left mandible 0.16 times body length, length : width = 2.04. Right mandible 0.15 times body length, length : width = 1.96. Dorsal surface between condyle and insertion of palp with few scale setae, more dense on left mandible. Palp length 0.75 times mandible length. Proximal 2 articles flattened. Article 1 basally tapering, distally with a long seta on both sides. Article 2 about 0.5 times as long and as wide as first. Distal half densely covered with scale setae consisting of 3 to 13 setulae, distally with 3 large stout setae, the largest one-sidedly serrated. Third article strongly flattened, apical half twisted clockwise in right, counter-clockwise in left mandible. Medial surface with numerous scale setae. Ventral margin with a row of 12 cleaning setae, 2 strong apical stout setae, the larger one one-sidedly serrated. Incisor process on each mandible with 3 sclerotized and wrinkled cusps, the middle cusp largest. *Lacinia mobilis* sclerotized, 0.12 times as long as mandible, length : width = 2. Sloping distal edge with a row of 7 cusps, from dorsal to ventral evenly increasing in size, most dorsal much smaller than the following. 3 ventrolateral setae pointing ventrally. Spine row of left mandible with 4 one-sidedly serrated stout setae, from distally to proximally evenly longer and more slender, right mandible with 5 stout setae, distalmost strongest and with 6 teeth (Fig. 13 h, i). Second stout seta one-sidedly serrated, third longest, fifth broken off. Molar process with oval chewing areas about equal size on both mandibles, anterior margin with row of 6 shallow tubercles on left and 5 on right mandible. Posterior margin with elevated cusp row, right mandible with 9, left mandible with 6 cusps. Cusp row of each mandible with 3 strong setae. Right chewing area with 5 sensory cavities. Condylus elevated, about as long as molar process.

Paragnath: Lost during dissection and therefore unknown.

Maxilla 1 (Fig. 14 a–c): Slightly curved medially, larger outer endite inserted dorsally, length : body length = 0.09, length : width = 4. Numerous fine setae in dorsomedial rows. Dorsolateral row of 14 long setae. Apex diagonally truncate with 12 strong stout setae, 3 one-sidedly dentated. Proximomedially to stout seta bases 1, proximovertrally 4 simple setae. Inner endite length : outer endite length = 0.64, width : outer endite width = 0.57, ventrolateral longitudinal row of 8 setae. Medial margin in distal third and lateral margin in distal fifth each with 5 setae. Apex bluntly cone-shaped, with 2 long stout setae, medial one longer and stronger than the other, further dorsally 2 shorter stout setae.

Maxilla 2 (Fig. 14 d–g): Inner endite 0.07 times as long as body, length : width = 4.6. Medial half along entire length with numerous setae. Apex rounded, 14 long stout setae, most caudomedial stout seta longest. 7 distomedial setae. Inner part of outer endite ending on a level with inner endite, width : inner endite width = 0.6. Apex dorsally with rounded lobe and 2 long stout setae, hemiplumose in middle third. Further proximovertrally a one-sidedly serrated stout seta. Outer part of outer endite surpassing inner part, lateral margin with 24, medial margin in distal half with 5 setae in a row. Apex truncate, with rounded lobe and 3 long stout setae and 1 seta. Subapical stout seta on medial margin.

Maxilliped (Fig. 15 a–e): 0.24 times as long as body. Coxa 0.3 times as long as basis. Basis length : maxilliped length = 0.44, length : width = 1.55, with lateral seam of fine setae, beginning after proximal third, distally reaching insertion of palp. Medial margin bent dorsally. 3 distal retinacula on each side, surrounded by 6

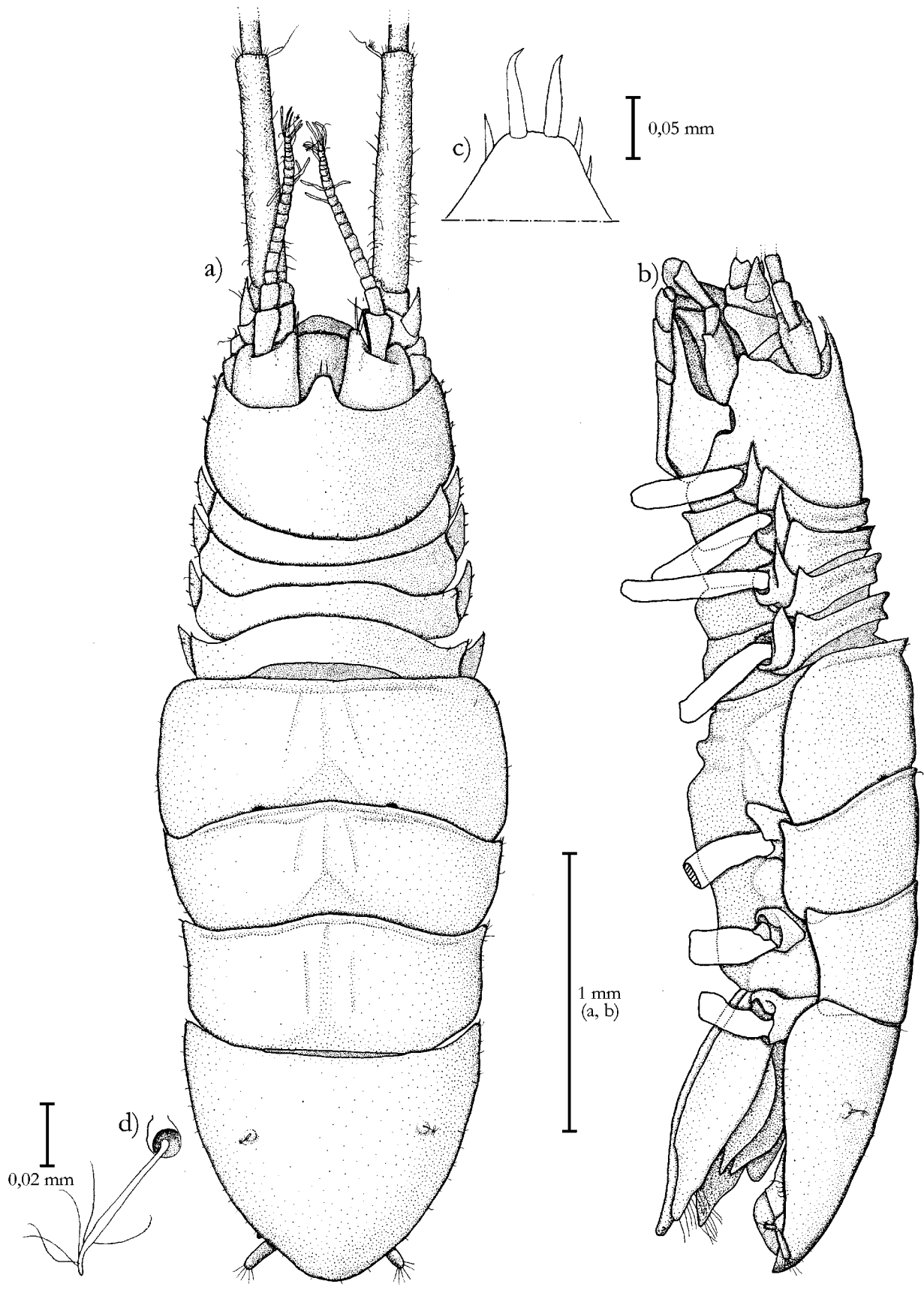


FIGURE 11. *E. denticollis* sp. nov., male holotype ZMH K-41797. a) dorsal view; b) lateral view; c) rostrum, dorsal view; d) broom seta on tubercle of pleotelson.

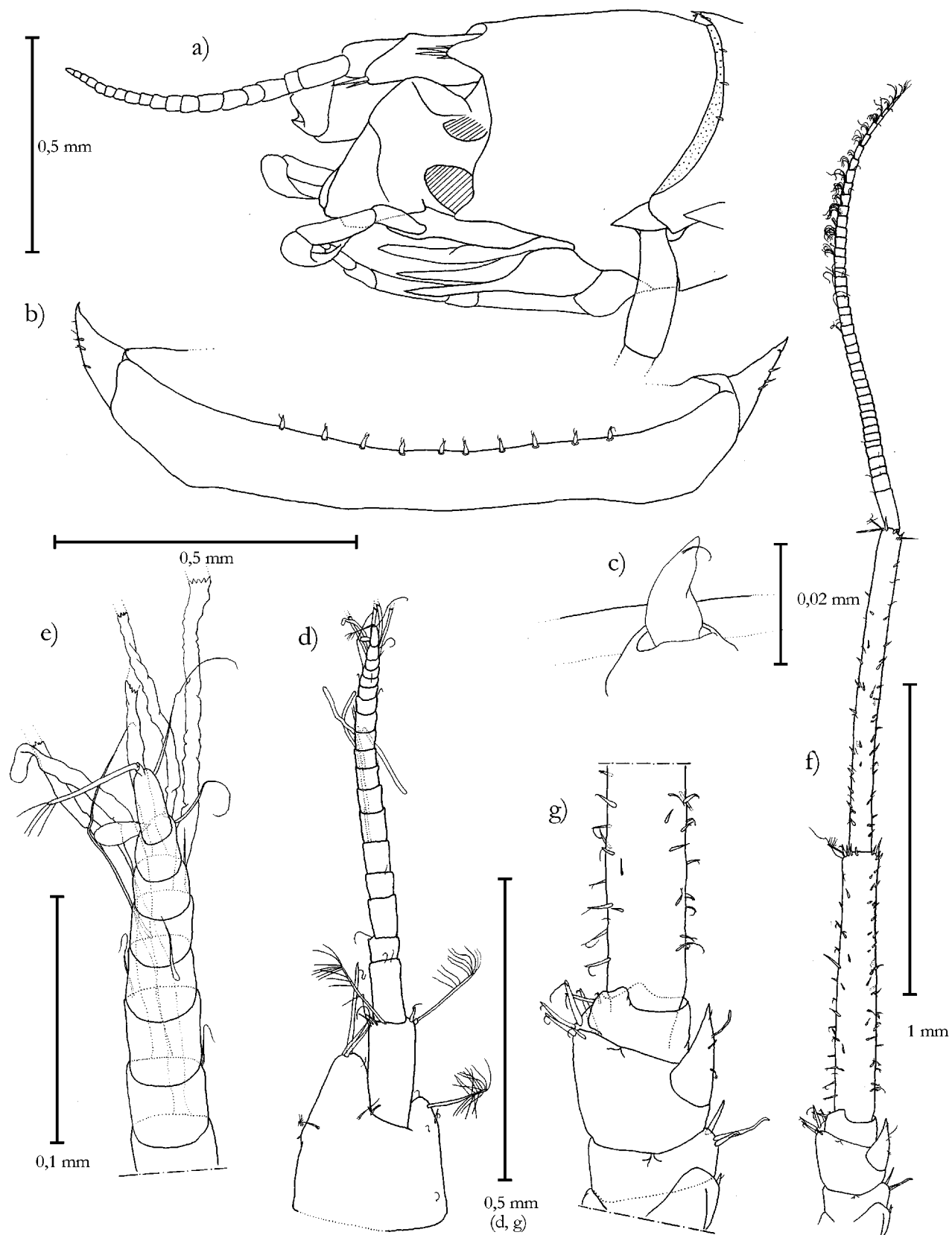


FIGURE 12. *E. denticollis* sp. nov., male holotype ZMH K-41797. a) head, lateral view; b) pereonite 1, dorsal view; c) seta on pereonite 1; d) right antenna 1, dorsal view; e) distal articles of flagellum; f) right antenna, dorsal view; g) detail of basal articles of antenna.

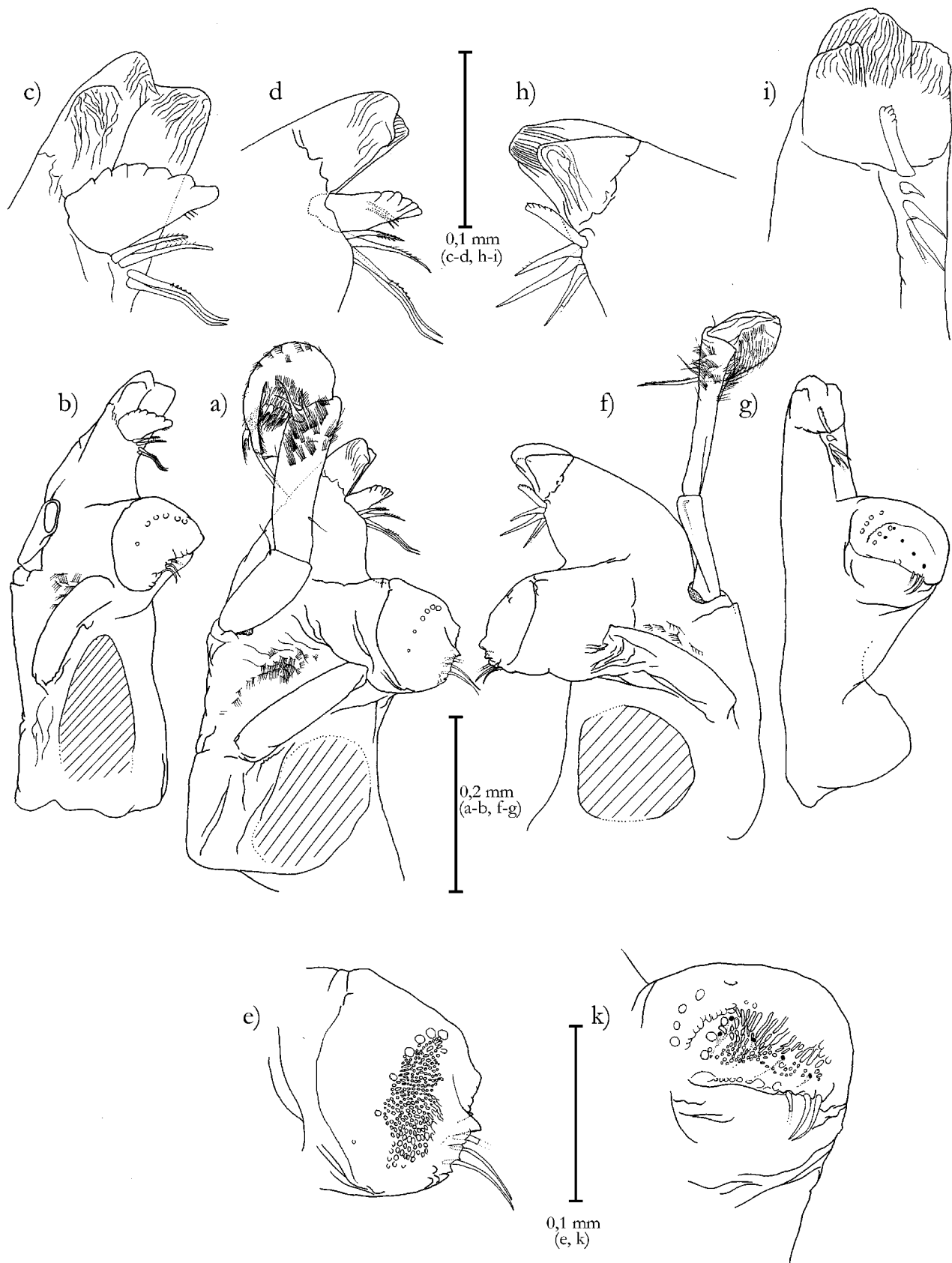


FIGURE 13. *E. denticollis* sp. nov., male holotype ZMH K-41797. a) left mandible, dorsal view; b) medial view; c) left incisor process and *lacinia mobilis*, medial view; d) dorsal view; e) left molar process, dorsal view; f) right mandible, dorsal view; g) medial view; h) right incisor process, dorsal view; i) medial view; k) right molar process, medial view.

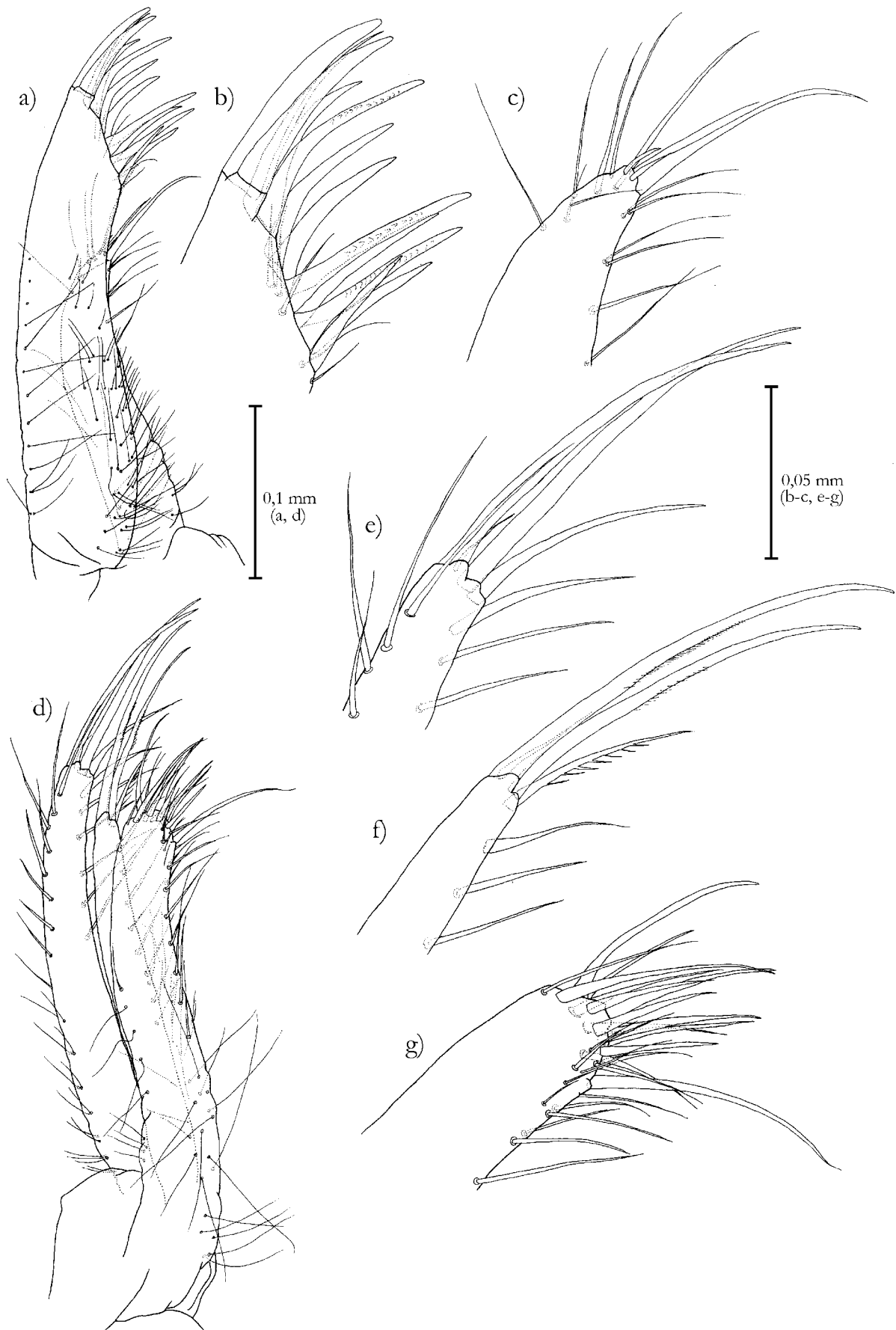


FIGURE 14. *E. denticollis* sp. nov., male holotype ZMH K-41797. a) left maxilla 1, dorsal view; b) distal part of outer endite; c) distal part of inner endite; d) left maxilla 2, dorsal view; e) distal part of outer endite; f) middle endite; g) inner endite.

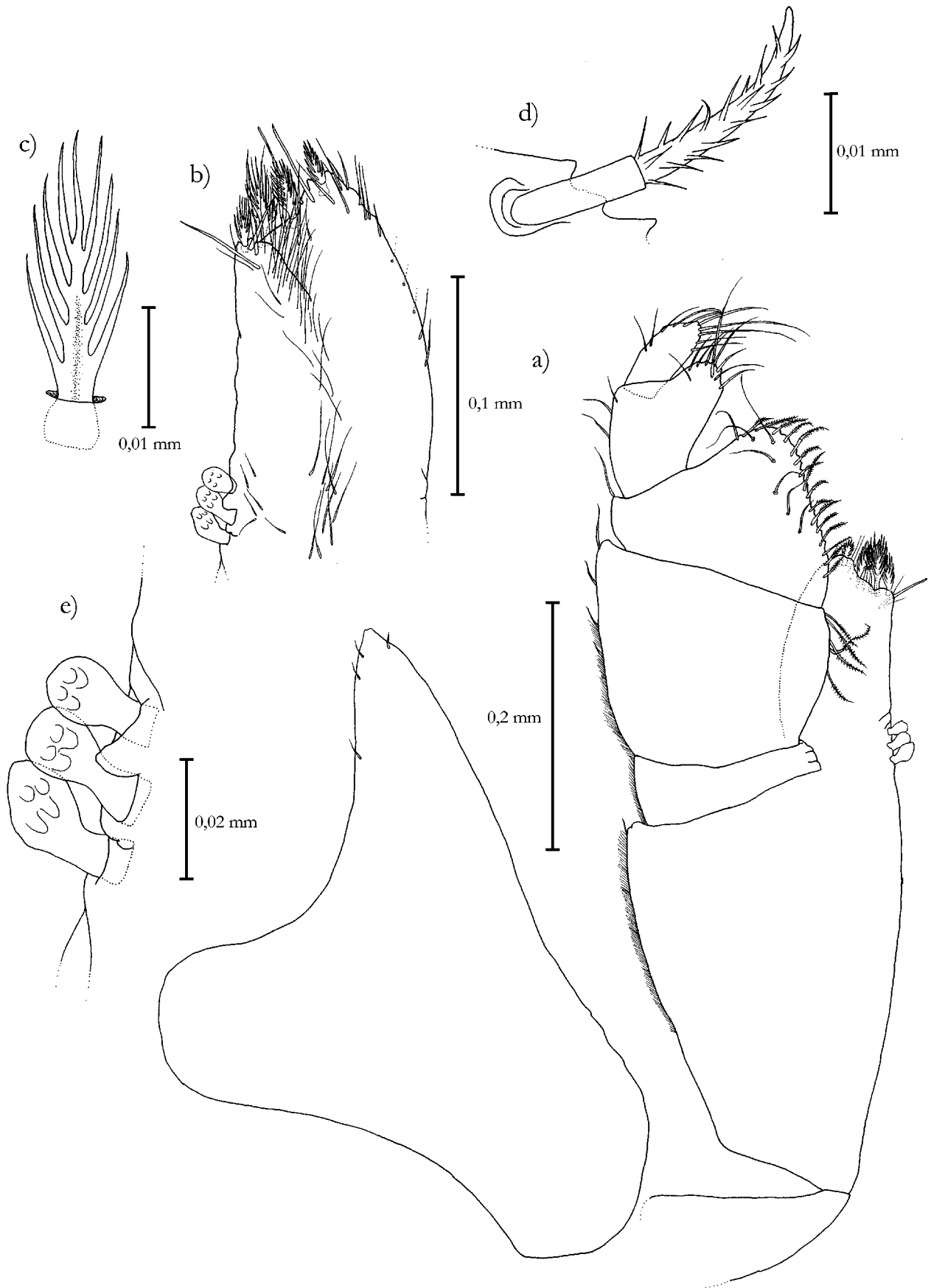


FIGURE 15. *E. denticollis* sp. nov., male holotype ZMH K-41797. a) right maxilliped, ventral view; b) endite, dorsal view; c) fan seta on endite of maxilliped; d) pappose seta on medial margin of third article of palp; e) retinacula, dorsal view.

short setae. Retinacula club-shaped, distodorsally with 2 pairs of elongated tubercles. Endite spatulate, length: basis length = 0.53, length : width = 2, medial margin bent dorsally. Apex truncate, sloping at an angle of approximately 120° to medial margin, 4 ventrally and 1 dorsally inserting fan setae. Lateral margin slightly rounded, with 14 setae. Dorsal surface with area of 48 long setae, subapically as wide as endite, proximally narrower and reaching level of retinacula. Palp 5-jointed. Article 1 shortest, slightly wider than proximal end of basis. Lateral setae continued here. Article 2 largest, length : basis length = 0.56, length : width = 1.06, 3 times as long as article 1, distally increasing in width, distal margin oblique. Lateral setae continued in first 2 thirds of its length, distally followed by 3 larger setae. 1 distolateral and 1 ventrolateral large seta. Medial margin with 5 distomedially pointing pappose setae with bald proximal third, demarcated by an annulus. Article 3 subtrapezoidal, slightly shorter than preceding, lateral margin much shorter than medial, with large distolateral seta. Medial margin up to distally rounded tip with 16 pappose setae shaped as on article 2, and half as long. Ventral surface with 5 short setae. Article 4 nearly y-shaped due to distomedial lobe and broadened insertion of article 5, inserting distolaterally on article 3, proximally tapering to a third of maximum width of article 3. 3 lateral, at distomedial lobe 7 setae, lobe with 2 pappose setae. Article 5 cylindrical, seemingly moved laterally due to distolateral lobe of article 4, setose apices of both lying parallel to each other. Distally and subdistally 10 setae, the 4 distalmost longest. Epipodite length : basis length = 1.56, length : width = 1.66, broadly y-shaped to triangular due to lateral lobe. Apex acute, with 3 short setae, another short seta further subapically. Lateral lobe rounded and slightly bent dorsally, *in situ* covering insertion of mandible.

Pereopods 1–4 (Fig. 16 a, b): Only pereopod 1 preserved distally of basis, length : body length = 0.66. Basis cylindrical, elongate, length : pereopod 1 length = 0.28, length : width = 6, sparsely setose, proximodorsally 1 broom seta and 1 ventrodistal spine-like seta. Ischium proximally slightly tapering, length : pereopod 1 length = 0.1, length : width = 2.75, with 6 setae. Merus proximally tapering, length : pereopod 1 length = 0.06, length : width = 1.86. 4 short and 2 long distal setae. Carpus longest, length : pereopod 1 length = 0.34, length : width = 12, slender and cylindrical, sparsely setose, ventral setae longest. Propodus cylindrical, length : pereopod 1 length = 0.16, length : width = 8.5, with 5 setae, distal end with 8 setae. Dactylus scythe-shaped, length : pereopod 1 length = 0.06, laterally flattened, evenly tapering and ventrally curved with blunt apex. Medially at middle of length with 1 long and 3 short setae.

Pereopods 5–7 (Fig. 16 c–g): Basis cylindrical, stouter and shorter than on ambulatory pereopods. Pereopod 5 with 4 simple, 2 broom setae and 1 spine-like seta. Pereopod 6 with 5 short, 1 long distal seta and 1 broom seta. Pereopod 7 with 3 short setae. Ischium cylindrical, laterally flattened dorsal lobe along entire length, *in situ* pointing caudally, especially distinct on pereopod 6 and 7, with insertions of long swimming setae. On pereopod 5 7 short, simple setae and row of 8 long swimming setae. On pereopod 6 3 short, simple and 1 larger seta, distal margin with 3 bluntly cone-shaped spine-like setae, row of 8 long swimming setae. On pereopod 7 3 simple setae and 2 bluntly cone-shaped spine-like setae, a row of 5 swimming setae. Merus cylindrical, half as long as ischium, distal at insertion of carpus with membranous seam and swimming seta, *in situ* pointing dorsally. Pereopod 5 longest. On pereopod 6 3 simple setae. Pereopod 7 shortest, with 3 simple setae. Carpus on each limb of same length, length : width from pereopod 5 to 7 = 1.13, 1.18, 1.29. Laterally strongly flattened, dorsal margin convexly enlarged to semi-circular shape, widest in basal half. Ventrally less enlarged to almost straight margin, with membranous seam on nearly entire length; on each limb with 3 distodorsal, bluntly cone-shaped spine-like setae. Swimming setae inserting on outer side of dorsal and ventral margin, dorsal at least twice as long as ventral. On pereopod 5 23 dorsal and 15 ventral, on pereopod 6 22 + 16, on pereopod 7 25 + 14 swimming setae. Propodus inserting slightly shifted to outer side of carpus, about two thirds as long and half as wide as carpus, laterally flattened, dorsal margin slightly and ventral margin more strongly convex. On pereopod 5 unknown. Pereopod 6 0.82 times as long as carpus, length : width = 1.76, 17 dorsal and 11 ventral swimming setae. Pereopod 7 0.78 times as long as carpus, length : width = 1.84, 17 + 10 swimming setae, ventral ones more robust and only in distal half, 0.3 times as long as dorsal. Pereopod 6 and 7 with short distoventral seta and long distodorsal broom seta. Dactylus lancet-shaped, laterally

flattened, about a third as long as propodus, pereopod 6 0.41 times as long as propodus, length : width = 3.75, pereopod 7 0.34 times as long as propodus, length : width = 4. Insertion slightly shifted to outer side of propodus. Apex with 1 short seta and 1 spine-like seta. Pereopod 6 distal third with short dorsal seta.

Pleopods (Fig. 17 b–e; Fig. 18 a–c): Pleopods 1 and 2 inserting on a level with coxae of pereopod 7. Fused pleopods 1 0.27 times as long as body, length : width = 3.83, apical quarter unfused. Suture visible on whole length, dorsal side of each half with elevated cuticular ledge, hanging over in distal third, with fine, short setation. Area between ledges with numerous scale setae in distal half. Further distally on each half a pair of similar, shorter ledges on a level with inner lobe, enclosing deepened groove, the lateral one with medially overhanging edge. Ventral side of distal third on left half with 10, on right with 9 setae. Distal fifth differentiated into distomedial and a narrower, less distinct distolateral lobe. Distomedial lobe half as wide as proximal end of sympodite, with rounded triangular tip and inconspicuous, distoventral ridge, apices of both sides separate from each other, margin with 12 setae, medially to cusp of distolateral lobe 2 setae. Distolateral lobes shorter than distomedial lobes, narrow, pointed, ending in protopodite of pleopod 2 almost semicircular, 0.91 times pleopod 1 length, length : width = 2.35, with slender and acute tip, proximolaterally 2 long, distolaterally with 7 short hemiplumose setae and 5 simple setae. Exopod short, rounded and lobiform, inserting dorsally in distal quarter of protopodite. Proximal half on caudal side with fine, dense setation. Endopod inserting from distal third of protopodite, bent between basal article and caudally pointing stylet. Stylet 0.57 times as long as protopodite, acute, strongly curved after proximal third, sperm duct opening after basal fourth of stylet. Pleopod 3 length : pleopod 1 length = 0.64, length : width = 2, with large lobiform endopod, distally with 3 long plumose setae. Exopod 2-jointed, a fifth as wide as endopod, slightly surpassing it in length. First article twice as long as second, the latter lancet-shaped, flattened, with a stronger apical seta. Both articles framed by seam of fine setae, longer on the lateral margin. Pleopod 4 length : pleopod 1 length = 0.6, length : width = 1.71, with large lobiform endopod, without setation, exopod consisting of a single article. Basal width a third of width of endopod, evenly tapering to apex, lateral and distomedial margin with seam of fine setae. Apex with 1 long plumose seta. Pleopod 5 length : pleopod 1 length = 0.66, length : width = 1.71, lobiform, delicate and membranous. Lateral margin convex, medial straight, surface bald.

Uropods (Fig. 18 d): Inserting ventrolaterally in shallow cavities in posterior quarter of pleotelson, length : body length = 0.07. Protopodite rectangular, laterally slightly flattened, length : width = 1.57. Distally with 8 spine-like setae, 3 of which at insertion of endopod and 1 at insertion of exopod. Further proximally 1 simple seta. Rami cylindrical with rounded apex, inserting distally on protopodite. Endopod length : protopodite length = 1.18, length : width = 3.25. At half of its length 1 simple seta, apex with 7 broom setae, 3 longer and 4 shorter setae and 3 spine-like setae. Exopod length : endopod length = 0.46, length : width = 3. Apex with 6 simple setae, 1 slightly longer than endopod.

Description of female paratype (Fig. 17 e; Fig. 19 c)

Length 4.71 mm, body as in male, rostrum with 7 spine-like setae, lateralmost shorter than central. Pleotelson as in male, with dorsal tubercles of 0.07 mm diameter. Sexual dimorphism only in antenna 1 and pleopods. Antenna 1: Flagellum 8-jointed, 1 aesthetasc on article 8 of flagellum. Pleopods: Operculum length 0.3 times body length, length : width = 1.64, boat-shaped with sharp anteromedian keel, apex shifted far cranially, overlapping posterior margin of sternite of pereomer 7. Outline of operculum therefore an angulate ellipsoid. Posterior half rounded, decreasing in height, medial keel diminishing. Proximolateral margin on each side with 2 hemiplumose setae. Caudal margin bulged on a level with insertion of uropods, basis of uropod remaining uncovered. Cuticular grooves limited to area around bulges and medial keel.

Remarks

To decide whether anterior and posterior margins of a pereonite are straight, convex or concave, the angle of view is to be considered, as a truly vertical view is hard to achieve as long as the long pereopods are still

present. The articulation between segments can obviously lead to different angles of view as well. Therefore, anterior margins of pereomer V and pleotelson in dorsal views of *Eurycope monodon* and *E. denticollis* seem to differ a lot from each other without actually doing so. This circumstance makes additional lateral views invaluable.

The two species described here can be easily distinguished from most of the described species by some conspicuous differences. Many species of *Eurycope* have a medially depressed rostrum without overhang, as for example *E. cornuta* Sars, 1864 (Wilson and Hessler 1980). Furthermore, all species with a pleotelson not dorsoventrally flattened and with a caudal end distinctly bent ventrally on a level with the insertion of uropods can be excluded, this is the case for all species belonging to the *Eurycope complanata* complex (Wilson 1983), as well as for *E. tumidicarpus* Schmid Brenke and Wägele, 2002 which has also been collected in the Angola Basin.

The remarkable female operculum of *E. monodon* and *E. denticollis* with an apex shifted far frontally was only known from *E. glabra* Kensley, 1978 (“Operculum of female with strong median crest, forming spine-like process”). It is not figured in that publication, but comparisons with the paratype of *E. glabra* confirm the similarities. Wilson and Hessler (1981) and more recently Malyutina and Brandt (2006) doubt that *E. glabra* belongs to *Eurycope* at all and consider it as *incertae sedis*. Thus, all three species are only provisionally classified as *Eurycope*. Furthermore, the diagnosis of *Eurycope* by Malyutina and Brandt (2006) was not modified here, even though in contrast to them, *E. monodon* and *E. denticollis* have a third article of antenna 1 that is distinctly shorter than the second article.

Most species of *Eurycope* do not show any subapical lateral cusps on the distolateral lobes of the male pleopod 1. The only exceptions are *E. baea* Wilson, 1983 and *E. glabra* with similarly developed apices of pleopod 1. However, a classification as *E. baea* is not accepted due to the completely different shape of the operculum with caudally shifted apex.

Among all previously described species of *Eurycope*, *E. glabra* shares the most similarities with both new species discussed here, especially *E. denticollis*. Besides the general appearance inclusive of length and width ratios of the pereonites, the rostrum of *E. glabra* has spine-like setae in a pair-wise arrangement, decreasing in length from median to lateral like the one of *E. denticollis*. The general shape of the male pleopod 1 with a laterocaudally pointing cusp is similar to that of *E. denticollis* as well. Essential differences are the larger and stronger rounded lateral lobe of the first basal article of antenna 1, the narrower endite of the maxilliped with only one retinaculum, pleopod 2 without proximolateral hemiplumose seta and uropod with an exopod distinctly reduced to less than a quarter of the length of the endopod in *E. glabra*. The pair of tubercles on the pleotelson described for *E. monodon* and *E. denticollis* are absent in the type material of *E. glabra*.

Eurycope monodon and *E. denticollis* have more taxonomic features in common with each other than with any previously described species. These include a similar rostrum, the lateral row of 3 spine-like setae on either side of the head, the dorsal pair of tubercles on the pleotelson, similar pleopods 1 and 2 of the male and the characteristic operculum with an acute apex shifted far anteriorly. Apart from that, there are significant differences remaining which are compared in table 1. One of the most striking characters to distinguish both species is the rostral setation. To exclude the possibility of high intraspecific variability, the rostra of several specimens of each species are compared (Fig. 19). It shows that individuals of *Eurycope monodon* always show the single long anteromedian seta. *E. denticollis* shows shorter setae in pairs already in manca stages (Fig. 19 e); older individuals apparently develop successively additional lateral spine-like setae up to a total of 7. No intermediate conditions were found between both versions. In addition, the anterodorsal elements of the head (compare Fig. 2 a and Fig. 12 a) are shaped differently, with a particularly expanded clypeus in *E. denticollis*. Further differences are the grade of extension of the medial lobe on the first peduncular article of antenna 1 and the subapical lateral dentation of the male pleopod 1.

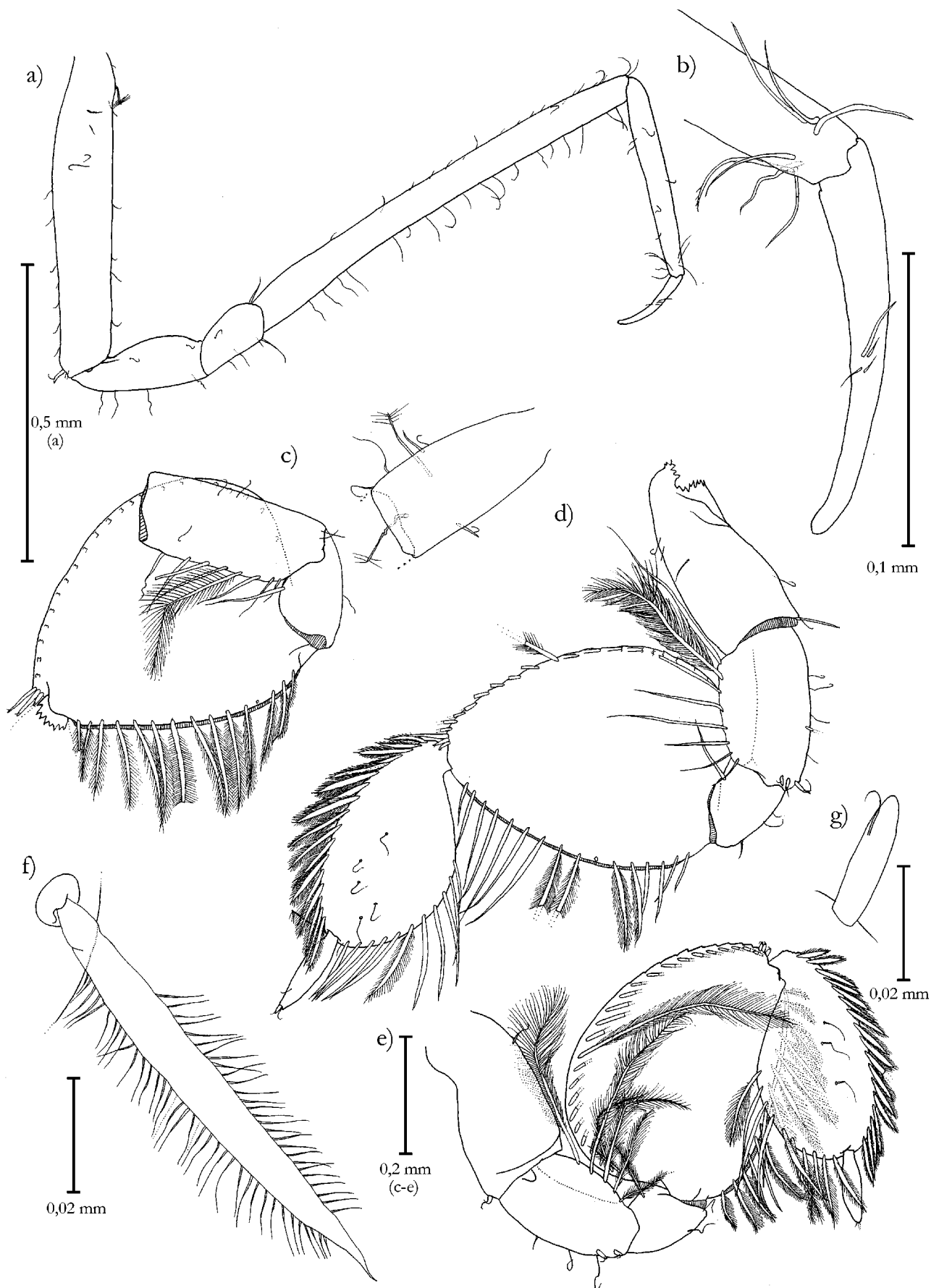


FIGURE 16. *E. denticollis* sp. nov., male holotype ZMH K-41797. a) left pereopod 1, medial view; b) dactylus; c) right pereopod 5, lateral view; d) right pereopod 6, lateral view; e) left pereopod 7, lateral view; f) swimming seta on propodus of pereopod 7; g) distodorsal seta on carpus of pereopod 7

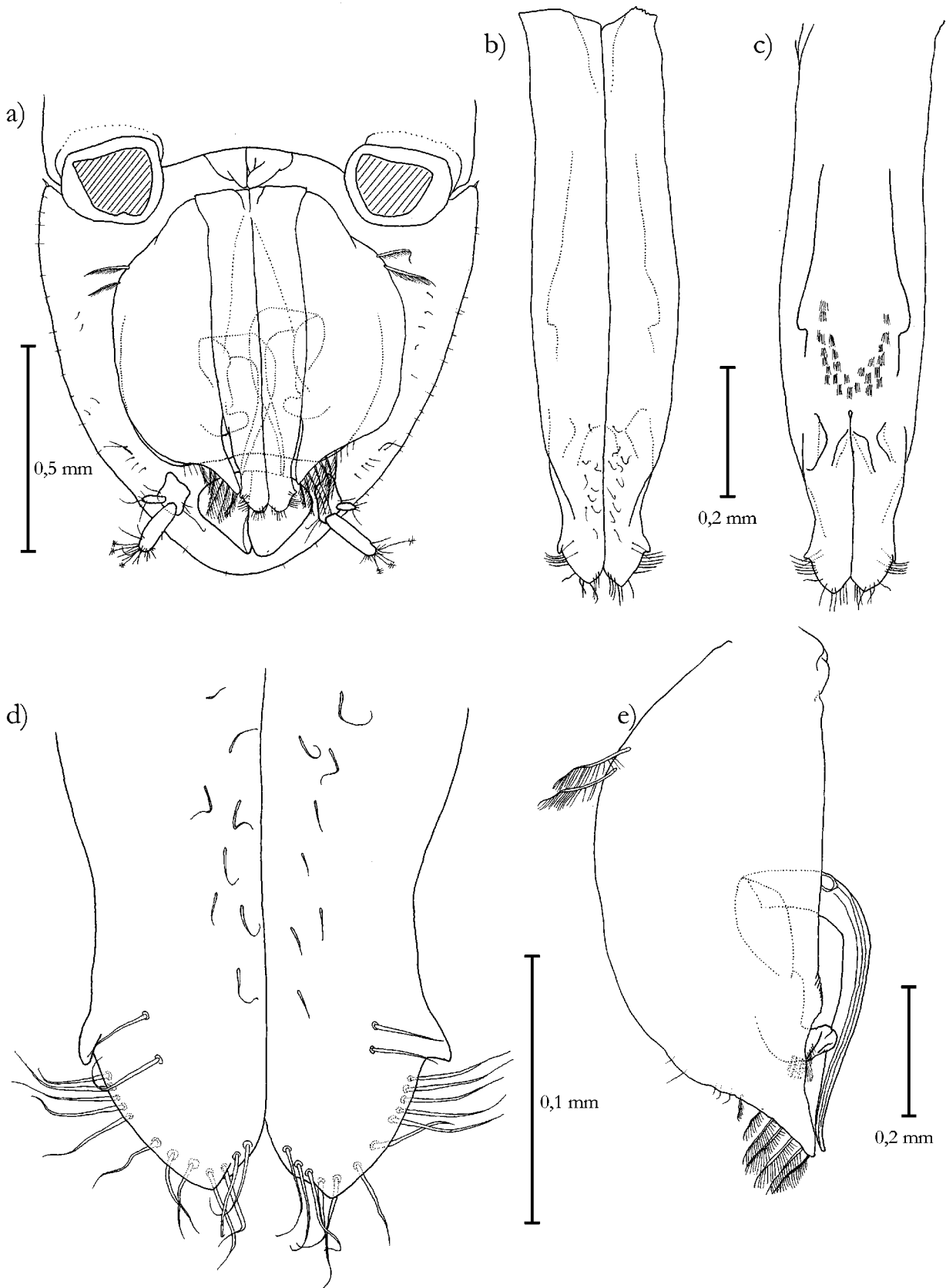


FIGURE 17. *E. denticollis* sp. nov., male holotype ZMH K-41797. a) pleotelson, ventral view; b) pleopod 1, ventral view; c) dorsal view; d) apex, ventral view; e) right pleopod 2, ventral view

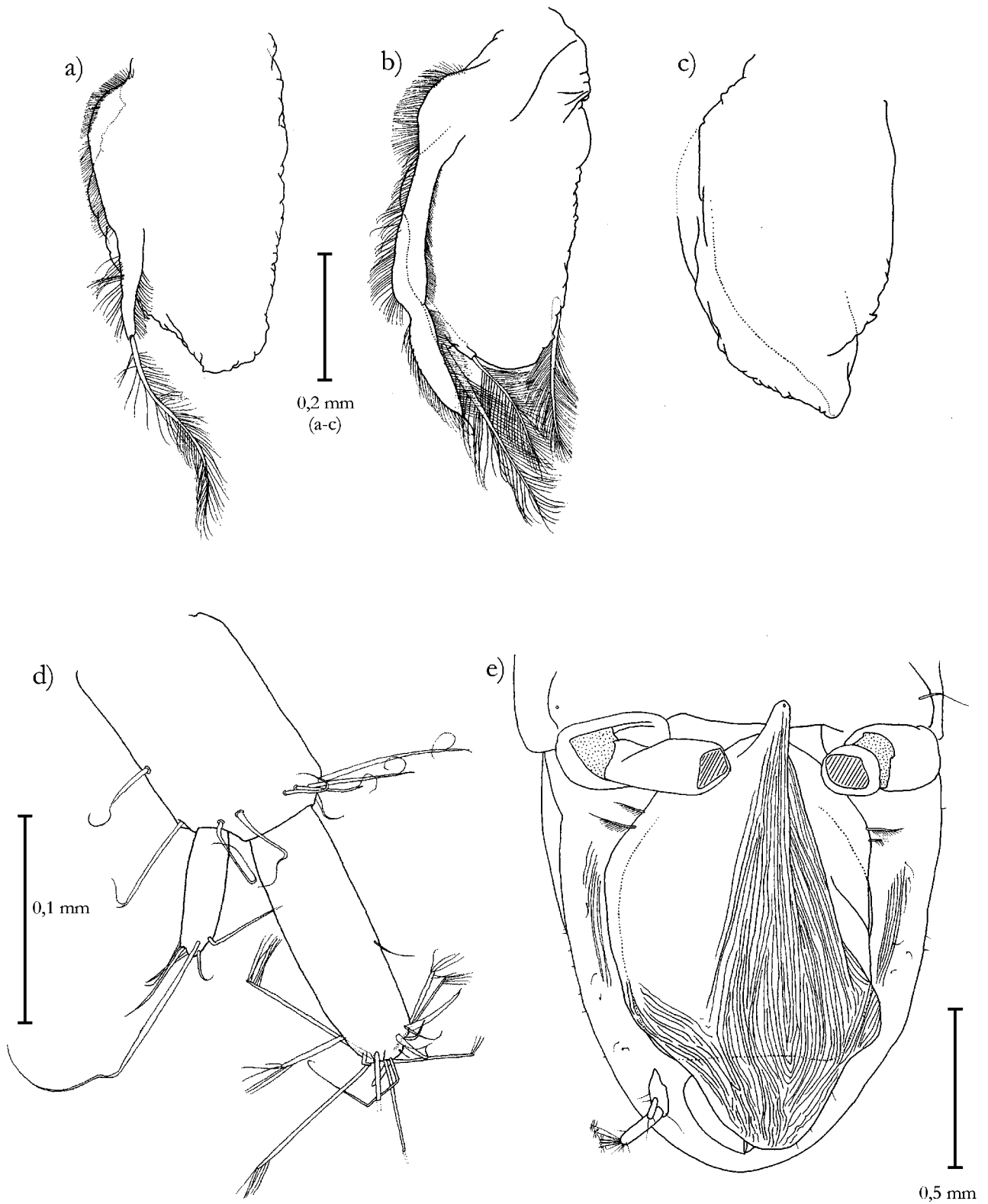


FIGURE 18. *E. denticollis* sp. nov., male holotype ZMH K-41797. a) pleopod 3; b) pleopod 4; c) pleopod 5; d) uropod. *E. denticollis* sp. nov., female paratype ZMH K-41798. e) pleotelson, ventral view

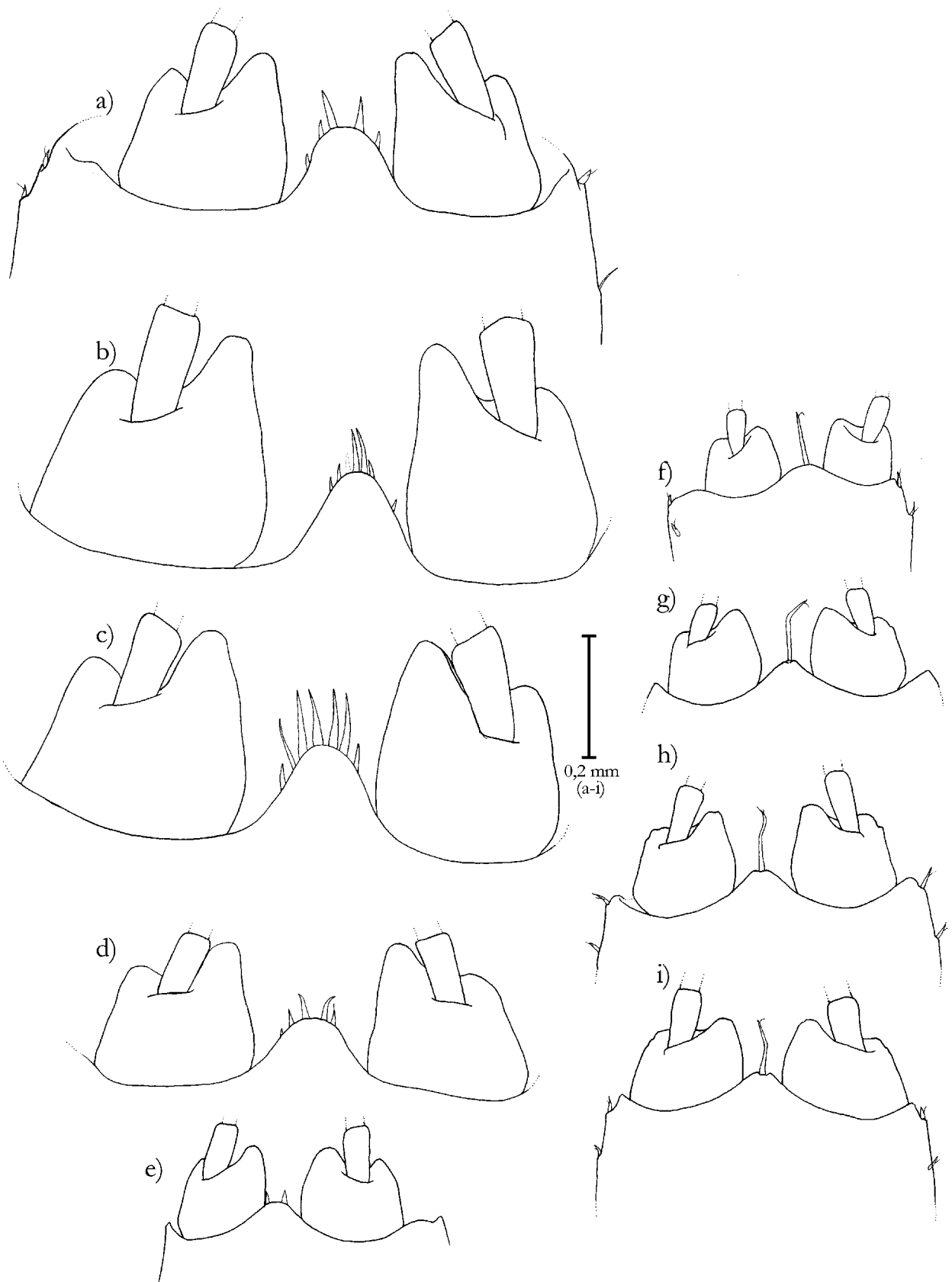


FIGURE 19. *E. denticollis* sp. nov. (a–e) and *E. monodon* sp. nov. (f–i) comparison of rostral setation on different stages. a) male; b) paratype, female; c) male; d) female; e) manca; f) male; g) female; h) paratype, female; i) female

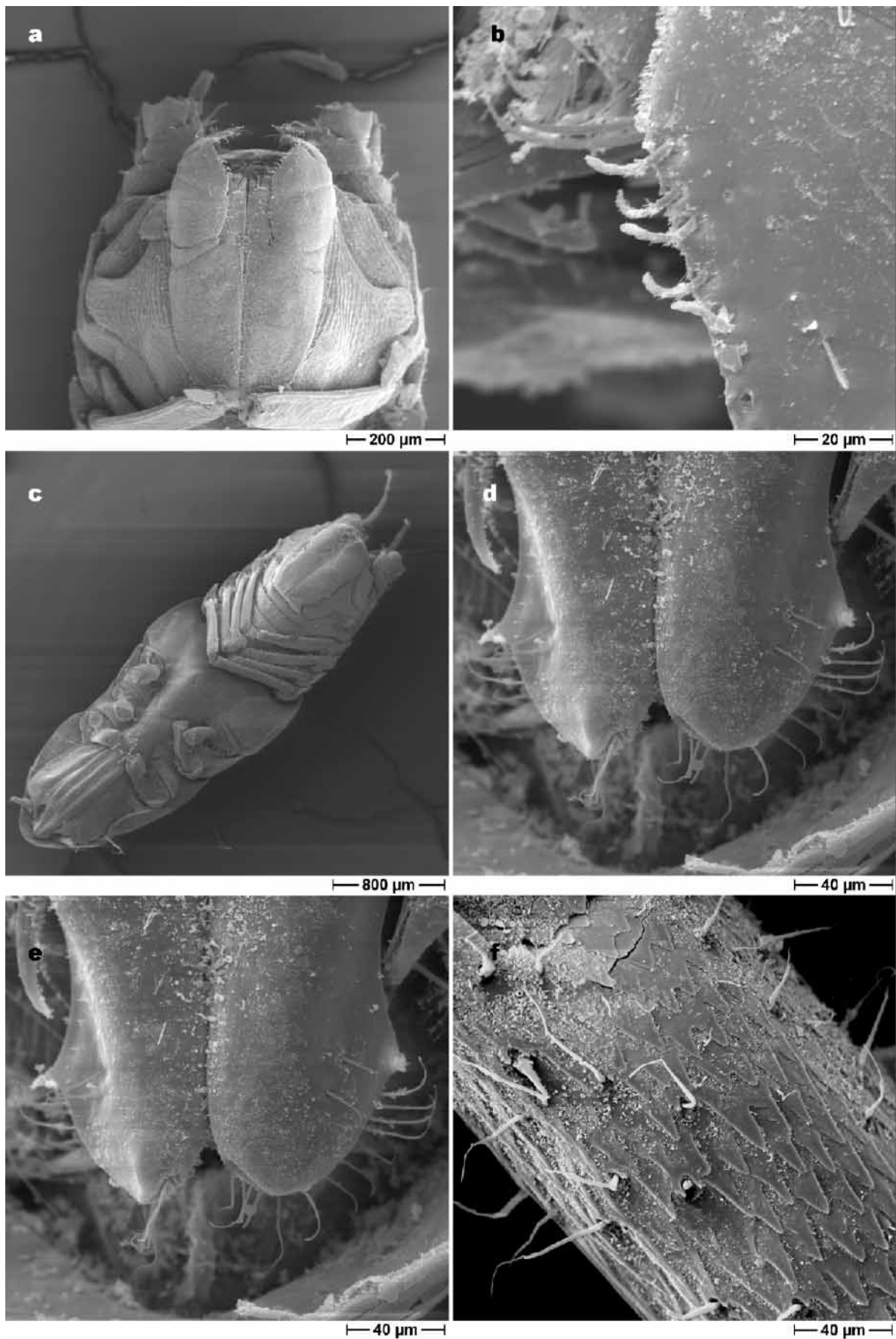


FIGURE 20. *E. denticollis* sp. nov., scanning electron microscope photographs. a) male, head, ventral view; b) pappose setae on medial margin of maxilliped palp article 3; c) male, ventral view; d) male, apex of pleopod 1, ventral view; e) male, head, dorsal view; f) male, scales on fifth joint of antenna 2

TABLE 1: Morphological differences between *E. monodon* sp. nov. and *E. denticollis* sp. nov.

	<i>Eurycope monodon</i> sp. nov.	<i>Eurycope denticollis</i> sp. nov.
Rostral spine-like setae	1 central, nearly as long as medial lobe of antenna 1 article 1	2 - 7, median pair often longer than lateral, much shorter than medial lobe of antenna 1 article 1
Frons	with lateral ledge overlapping clypeus	without lateral ledges
Clypeus	dorsally elevated, half-cylindrical, shorter than labrum	dorsally elevated, as long as labrum
Antenna 1, peduncular article 1	medial lobe rounded	medial lobe acute-angled
Antenna 1, articles in male	14	20
Scale setae on mandible between condylus and palp	absent	present
Spine row on mandible	4 left, 6 right stout setae	4 left, 5 right stout setae
Setae on molar process	4 on each side	3 on each side
Condyle of mandible	slightly shorter than molar process.	slightly longer than molar process.
Cleaning setae on mandibular palp	8	12
Retinacula on maxilliped	2, with 3 pairs of ledges each	3, with 2 pairs of ledges each
Palp article 2 and 3 of maxilliped	4 + 8 pappose setae	5 + 16 pappose setae
Ischium pereopod 5 - 6 - 7	8 - 5 - 5 swimming setae	8 - 8 - 5 swimming setae
Carpus pereopod 5 - 6 - 7 swimming setae (ds = dorsal, vt = ventral)	pereopod 5: ds 23 vt 11 pereopod 6: ds 20 vt 10 pereopod 7: ds 26 vt 12 swimming setae	pereopod 5: ds 23 vt 15 pereopod 6: ds 22 vt 16 pereopod 7: ds 25 vt 14 swimming setae
Propodus (pereopod 5) - (6) - 7 swimming setae (ds = dorsal, vt = ventral)	(pereopod 5: ds 14 vt 11) (pereopod 6: ds ? vt ?) pereopod 7: ds 13 vt 10 swimming setae	(pereopod 5: ds ? vt ?) (pereopod 6: ds 17 vt 11) pereopod 7: ds 17 vt 10 swimming setae
Pleopod 1 subapical cusp	large, pointing anteriolaterally	small, pointing caudolaterally
Pleopod 1 subapical setae	dorsal 4, ventral 3	dorsal 5, ventral 2
Pleopod 1 apical setae	dorsal 2, ventral 2	dorsal 4, ventral 3
Pleopod 1 dorsal scale setae	absent	present
Pleopod 2	1 proximolateral hemiplumose seta	2 proximolateral hemiplumose setae
Uropod	endopod 2.5 times as long as endopod	endopod twice as long as endopod

The head is relatively broader in examined species of *E. denticollis* than in *E. monodon* with a cephalic width : pereonite 1 width ratio > 1 (< 1 in *E. monodon*). As intraspecific variance is to be expected, the diagnostic value of this character is limited. Yet it can help for an initial separation of both species.

However, both species can only be determined with certainty when highly magnified. The conformity of both species even within the scarcely variable genus *Eurycope* may suggest a sister-group relationship. At present neither if this is due to two phylogenetically young taxa shortly after speciation, nor what ecological differences separate both sympatric species, can be answered.

In the regenerated right pereopod 7 of the *E. monodon* holotype (Fig. 7 e), the new cuticle lying under the preceding was drawn to show its relatively larger propodus. The lack of a dactylus is apparently an anamorphic development in contrast to the epimorphic ontogenesis of the pereopod 7 during the post-embryonic stages as described for the genus by Wilson (1981). The naming spine-like setae on the anterior margin of the first pereonite as described for *E. denticollis* are not present on the holotype of *E. monodon*, but were found on a specimen photographed with the scanning electron microscope (Fig. 10 d, f), this feature is therefore unsuitable for separating both species from each other. The distalmost stout seta in the spine row on the right mandi-

ble's incisor process of *E. denticollis* is stronger than the others and has 6 cusps. It resembles in shape the 7-cusped *lacinia mobilis* of the left mandible. The similarities between both parts may possibly be explained by their homology as postulated by Richter *et al.* (2002).

Distribution

South-eastern Atlantic: Angola Basin at a depth of 5125–5410 m (22°20.0' S, 3°18.3' E to 22°20.2' S, 3°18.4' E, 5125–5144 m, station 318; 18°19.4' S, 4°39.7' E to 18°20.8' S, 4°38.6' E, 5397–5398 m, station 338; 18°18.3' S, 4°41.3' E to 18°19.4' S, 4°41.9' E, 5395 m, station 340; 17°06.2' S, 4°41.7' E to 17°07.5' S, 4°42.3' E, 5415 m, station 344; 16°18.1' S, 5°27.2' E to 16°19.3' S, 5°27.2' E, 5387–5390 m, station 348; 16°14.3' S, 5°26.8' E to 16°14.9' S, 5°26.7' E, 5389 m, station 350 of expedition M48:1 RV “*Meteor*”).

***Munneurycope* Stephensen, 1913**

Munneurycope Stephensen, 1913: 99; Wolff, 1962: 154.

Eurycope Sars, 1864 (partim) Hansen, 1916: 138

Diagnosis of Munneurycope (modified from Wolff, 1962)

Streamlined Munnopsidae without sharply defined frontal area or rostrum, frons dorsally projecting between peduncular articles of antenna 1. Pereonite 1 (sometimes pereonite 1 and 2) longest of natasome. Pereonites 5–7 free and moveable and usually with a median furrow. Pleotelson not fused with pereonite 7, half-cylindrical in cross-section, caudally broadly rounded in dorsal view. First peduncular article of antenna 1 distally rounded, longer than wide or length subequal to width, with small or absent medial lobe. Chewing area of molar process strongly excavated, proximal margin with strong, serrated cusps. Epipodite of maxilliped narrow. Basis of pereopod 1 longer and mostly narrower than those of pereopods 2–4. Male pleopods 1 at most very moderately narrowed in the middle; pleopod 2 with robust stylet. Uropod biramous, with slender exopod and endopod.

***Munneurycope persephone* sp. nov.**

Material examined

Holotype (ZMH K-41803), female (5.83 mm), Angola Basin, 17°06.2' S, 4°41.7' E to 17°07.5' S, 4°42.3' E, 5415 m, Station No. 344, expedition M48:1 RV “*Meteor*”. **Paratype** (ZMH K-41804), female (5.50 mm), Angola Basin, 22°20.0' S 3°18.3' E to 22°20.2' S 3°18.4' E, 5125–5144 m, Station No. 318, expedition M48:1 RV “*Meteor*”.

Etymology

Persephone is a mythological Greek goddess and the wife of Hades, referring to the type locality in abyssal depth.

Diagnosis

Frons dorsally strongly arched, forming a quarter circle in lateral view. First article of antenna 1 with small medial lobe, lateral lobe absent. Article 3 of antenna 1 longer than article 2. Epipodite of maxilliped slender, 3.5 times as long as wide. Ambulatory pereonites closely packed. Pereonite 1 1.5 times as long as pereonite 2, length of pereonite 1 > 2 > 3 > 4. Basis of pereopod 1 narrower and slightly longer than on the following limbs, 6 times longer than wide. Exopod of pleopod 3 without plumose setae.

Description of female holotype

Body (Fig. 21; Fig. 22 a): Length 5.83 mm, length : width ratio = 2.66. With weakly sclerotized cuticle, entire surface sculptured by pattern of cuticular grooves (Fig. 22 a). Body nearly circular in cross-section, only ventral side of posterior part (pereonite 6 to pleotelson) flattened, in dorsal view evenly broadening from head to pereonite 3, the latter as wide as pereonites 4 and 5, caudally narrowing to tip of pleotelson. Pereonites 3 and 4 seemingly wider than 5 due to extension of coxal lobes. Natasome slightly less than two thirds of total length. Pleotelson 1.08 times wider than long, less than a fifth of total length, caudal end rounded, bent ventrally. Body height evenly increasing from pereonite 1 to 4 (0.26 to 0.30 times body length), maximum height at pereonite 5 (0.31 times body length), caudally evenly flattening.

Head (Fig. 21; Fig. 22 b): 0.11 times body length, length : width = 0.43, widest at level of insertion of antenna 1. Frons vaulted, strongly arched to a quarter circle in lateral view, projecting dorsally beyond basal articles of antenna 1, width of this elevation 0.5 times width of antenna 1 article 1, almost entirely covering area between bases of antenna 1. Clypeus 1.31 times as long as labrum, separated from frons, less distinct on lateral side on a level with fossa, distal margin convex in dorsal view (Fig. 22b). Labrum separated from clypeus, frontal margin with medial incision (not figured).

Ambulosome: All pereonites with convex anterior and concave posterior margins in dorsal view. Pereonite 1 0.1 times body length, 0.32 times as long as wide, tergite laterally rounded, without anterolateral angles, fused with coxa, trace of suture remaining. Pereonite 2 0.18 times, pereonite 3 0.12 times, pereonite 4 0.1 times as long as wide. Length ratio of prm 1 to 4 = 2.8 : 2.2 : 1.3 : 1. Anterolateral angles of tergites 2 to 4 pointed anteriorly. Coxal lobes prominent, directed anteriorly, separated from rest of coxa by incision also visible in dorsal view.

Natasome: All tergites with convex anterior margin. Posterior margin of prm 5 concave, on prm 6 less distinctly concave, on prm 7 nearly straight. Pereonites with anterolateral projecting angles, most distinct on prm 5. Medial length evenly increasing from prm 5 to prm 7, width evenly decreasing: length : width prm 5 = 0.27, prm 6 = 0.42, prm 7 = 0.571. Length ratio of pereonites 5 to 7 = 1 : 1.5 : 1.9.

Pleotelson (Fig. 21; Fig. 26 a): Length : width = 0.93, medially 1.44 times as long as pereonite 7, lateral margin 1.35 times as long as lateral margin of pereonite 7, ventrally angled in posterior quarter, dorsal view seemingly triangular with rounded caudal end. Insertion of uropods caudomedial to sharp-edged ventral elevation and laterally of anal valves. Left uropod of paratype preserved (Fig. 22 e), exposed and visible in dorsal view, caudally projecting beyond tip of pleotelson.

Antenna 1 (Fig. 22 c): On both sides incomplete. Peduncular article 1 0.37 times as wide as head, length : width = 0.95. Medial lobe inconspicuous, its place indicated by two spine-like setae, lateral lobe absent, a long lateral broom seta and 3 short, simple setae. Article 2 inserting dorsally in distal third of first, 0.45 times as long as article 1, 4 distodorsal spine-like setae, one distomedial and two distolateral long broom setae. Article 3 elongated, 0.63 times as long as article 1, length : width = 5. 4 flagellar articles preserved, nearly as wide as third basal article. Article 1 stout, with one short and one longer seta, length : width = 0.6, second 2.25, third 1.17 and fourth 1.67 times as long as flagellar article 1, all without setae.

Antenna 2 (Fig. 22 d): Only 4 peduncular articles preserved, distal articles lost. Greatest width : head width = 0.33. Article 1 trapezoidal, laterally shifted sclerite, length : width = 0.74. Article 2 widest, length : width = 0.48. Article 3 nearly as wide as 2, medial side 5 times longer than lateral side. Lateral scale on article 3 broad, roundly triangular, anteriorly projecting to middle of fourth article, one distal seta, 4 distal spine-like setae, two medial spine-like setae. Article 4 length : width = 0.95, distal margin with 3 flattened lobes.

Mandibles (Fig. 23 a–k): Dorsoventrally flattened between incisor and molar process. Entire cuticle heavily sclerotized. Palp only on left mandible preserved entirely, 1.04 times as long as body of mandible. First article cylindrical, slightly curved medially, left palp with 9 long distoventral setae, 11 dorsal and 3 lateral short setae. Right palp 8 long distoventral setae, 5 dorsal, one proximolateral and one ventral short setae. Second article about 1.5 times as long as first, anteromedial side with 9 setae, distal ones increasingly longer

and stronger. Two strong distoventral setae of similar size, further proximally numerous scale setae. Postero-lateral side with 3 shorter setae. Third article as long as and slightly wider than first, laterally flattened with torsion around longitudinal axis; left mandible anti-clockwise (supposedly clockwise on right mandible). Dorsomedial surface with numerous scales, distally and laterally gradually replaced by scale setae. Ventromedial margin with 12 cleaning setae in a row. 4 strong subapical, one-sidedly finely serrated stout setae, outermost 3 times as long as innermost. Entire ventromedial margin additionally with numerous long setae. Incisor process of both sides with 5 sclerotized cusps, the second (on ventral side) largest, *lacinia mobilis* of left mandible as long as sclerotized cusps of incisor process. 4 distal cusps, gradually increasing in size from dorsal to ventral side, more proximally an additional cusp pointing laterally. Spine row slightly shifted ventrally and curved caudally, on left mandible consisting of 8 serrated stout setae, further ventrally numerous fine setae, on right mandible 9 serrated stout setae. Molar process oval chewing area 0.45 times as long as wide, posterior margin concave. Chewing area dorsal, posterior and ventral margin of left mandible and posterior margin of right mandible strongly elevated, with numerous cusps and a row of 16 setae: left mandible with 3 simple, 6 serrated and 7 setulate setae, right mandible with 3 simple and 13 setulate setae. Condylus indefinable due to brittle, cracked cuticle.

Maxilla 1 (Fig. 24 a–c): Both endites slightly curved medially. Outer endite (=exopod) 1.25 times as long and twice as wide as inner endite with 13 strong apical stout setae curved medially, 7 of which dentate, one very small. Ventral side of apex with 5 slender setae. Dorsal surface with 23 shorter setae, further proximally 3 scale setae. Proximal half of lateral margin with 37 setae. Medial margin with 20 subdistal setae. Inner endite with one short and two long strong stout setae, the latter ones curved medially, finely serrated in distal half. Distal half of lateral margin with 13 long setae, dorsal and ventral side with numerous further setae sub-apically and along medial margin, here the longest.

Maxilla 2 (Fig. 24 d, e): Inner endite dorsoventrally flattened and apically rounded, slightly shorter and about 1.5 times as wide as both rami of exopod. Apex with 12 simple and 5 one-sidedly pectinate, strong stout setae, from lateral to medial side gradually decreasing in length. Further proximally medial margin with conspicuously long plumose stout seta. Dorsal and ventral side subapically and in medial half with numerous long stout setae. Medial and lateral margin with numerous long setae. Middle endite weakly curved medially, distally evenly narrowing. Apex truncate with 4 pectinate stout setae. Most dorsomedial stout seta shifted slightly proximally, with longer setulae than on the others. Distal third with numerous ventrolateral simple setae. Dorsomedially in distal half 14 stronger, flattened setae in two irregular longitudinal rows, the 4 largest ones pectinate. Further proximally 17 simple setae. Outer endite slightly curved medially, distally evenly narrowing. Apex truncate with 4 pectinate stout setae. Most dorsomedial stout seta from a subapical lobe, longer setulae than on others. Dorsolaterally and along lateral margin numerous simple setae. Dorsomedially in distal half 23 stronger, flattened setae.

Paragnath (Fig. 24 f): With unsclerotized cuticle, subdivided into narrower pair of inner lobes and wider, dorsoventrally flattened pair of outer lobes with rounded lateral margins. Inner lobes half as long as outer lobes, with rounded apex, dorsally densely setose except for bald proximal third. Outer lobes ventrally overlapping inner lobes, with slightly acute apices curved medially. Dorsal surface in distal third with an inconspicuous row of 4 setae on left and 6 stronger setae on right lobe. Distolateral margin with numerous long setae. Medial margin in distal half with dense row of longer setae.

Maxillipeds (Fig. 25 a–e): Coxa more than 1.5 times wider than long, 0.22 times as long as basis. Basis 2.33 times as long as wide, widest at insertion of palp, ventral surface with 20 setae, lateral row of fine setae, continued on lateral third of distal margin, here 3 long and further medially two short setae. Medial margin bent dorsally, distal third with laterally pointing lobe bearing 5 short setae. Row of 5 retinacula on a level with first article of palp. Retinacula club-shaped, each with two distodorsal pairs of elongated tubercles, proximal-most retinaculum with 3 pairs. Endite spatulate, about half as long as rest part of basis, medial margin bent dorsally. Two short proximoventral setae. Truncate apical margin at an angle of about 120° to medial margin,

with a row of 6 fan setae and dorsal row of 5 stout setae. Ventral surface with numerous scale setae. Lateral margin convexly arched, with numerous long setae. Dorsal surface with triangular area of several hundred setae and 4 long stout setae. Palp 0.89 times as long as maxilliped basis. Article 1 shortest, 0.81 times as wide as basis, lateral margin with row of setae as on basis, continued on lateral third of distal margin, here 5 longer and two short setae. Article 2 largest, 3 times as long as article 1, distally increasing in width, distal margin diagonally truncate, lateral margin 1.54 times longer than medial margin, lateral setose row continued in first two thirds of its length, distally replaced by 3 larger setae. Medial margin with 5 distomedially pointing pappose setae with bald proximal third, demarcated by an annulus. 10 short ventral setae. Article 3 slightly shorter than article 2, lateral margin 0.36 times as long as medial margin, two distolateral seta. Medial margin up to distally rounded tip with 16 shorter pappose setae. Ventral surface with 6 short setae. Article 4 proximally tapering, one third as wide as article 3 and inserting distolaterally, 3 lateral, at distomedial lobe 7 long setae and 7 pappose setae. Article 5 cylindrical, twice as long as wide, seemingly shifted laterally due to distolateral lobe of article 4, setose apices of both lying parallel to each other. Distally and subdistally 10 setae, the 4 distalmost longest. Epipodite 1.04 times as long as basis, nearly 3.5 times as long as wide, without conspicuous proximolateral projection. Distomedial margin with 6 cusps, the distalmost acute, 2 short setae, single seta ventrally in proximal third.

Pereopods 1–4 (Fig. 25): All broken off distally of basis, basis described here due to its diagnostic importance. Length ratio of bases: pereopod 1 > 2 > 3 < 4. Basis of pereopod 1 6 times longer than wide, narrowest, one basal broom seta, further proximal insertion of a second one. Basis 2 4 times longer than wide, two dorsal broom setae. Basis 3 2.7 times longer than wide, 3 dorsal broom setae. Basis 4 2.7 times as long as wide, 5 dorsal broom setae.

Pereopods 5–7 (Fig. 25 k–m): Length ratio of bases: pereopod 5 < 6 < 7. Pereopod 5 2.1 times longer than wide, with 5 swimming setae, further proximally 1 long seta. Pereopod 6 2.3 times longer than wide, with short distal seta and two spine-like setae. Pereopod 7 2.4 times longer than wide, one long distal seta.

Pleopods (Fig. 26 a–e): Pleopod 2 (=operculum) inserting on a level with coxae of pereopods 7, slightly wider than long when spread out, *in situ* bent by ventral medial keel and seemingly longer than wide. Cuticular grooves of ventral surface only in distal third. Medial keel distinct, not sharp. Its distal end with a singular insertion of a (lost) seta of 5 µm diameter. Lateral margins with short setae, in distal half 21 hemiplumose setae on each side. Pleopod 3 endopod length : width = 2.03, with 3 plumose setae. Exopod curved medially, width : endopod width = 0.25, slightly shorter than endopod, tip lancet-shaped. Margins with rows of fine setae, apex with stronger simple seta. Pleopod 4 bald, endopod length : width = 1.51, medial margin nearly straight. Lateral margin convexly arched, dorsally partially overlapping exopod. Exopod two-jointed, basal article a third as wide as endopod, lateral margin with seam of fine, short setae. Article 1 3 times as long as wide, proximolateral and distomedial margins slightly rounded. Article 2 half as long and a third as wide as article 1, evenly narrowing, with apical plumose seta. Pleopod 5 uniramous, delicate and lobiform, nearly oval, length : width = 1.17, 0.95 times as long and 1.23 times wider than endopod of pleopod 4. Lateral margin slightly more rounded than medial margin.

Uropods (Fig. 22 e): Lost on holotype, left uropod of paratype ventrolaterally inserting in shallow cavity in posterior third of pleotelson. Protopodite trapezoidal, broadened distally, 1.5 times as long as wide. 9 strong setae in transversal distal row, 5 around exopod, the others around endopod. Both rami slender and cylindrical, with truncate apex. Exopod 1.24 times as long as protopodite, 6 times as long as wide. Ventrolaterally and ventrally 6 setae. Apex with 5 strong setae. Endopod length : width = 5.38, about 1.2 times longer than exopod, 3 very short dorsomedial setae, two lateral broom setae. Apex with one simple seta, 9 broom setae and 3 spine-like setae.

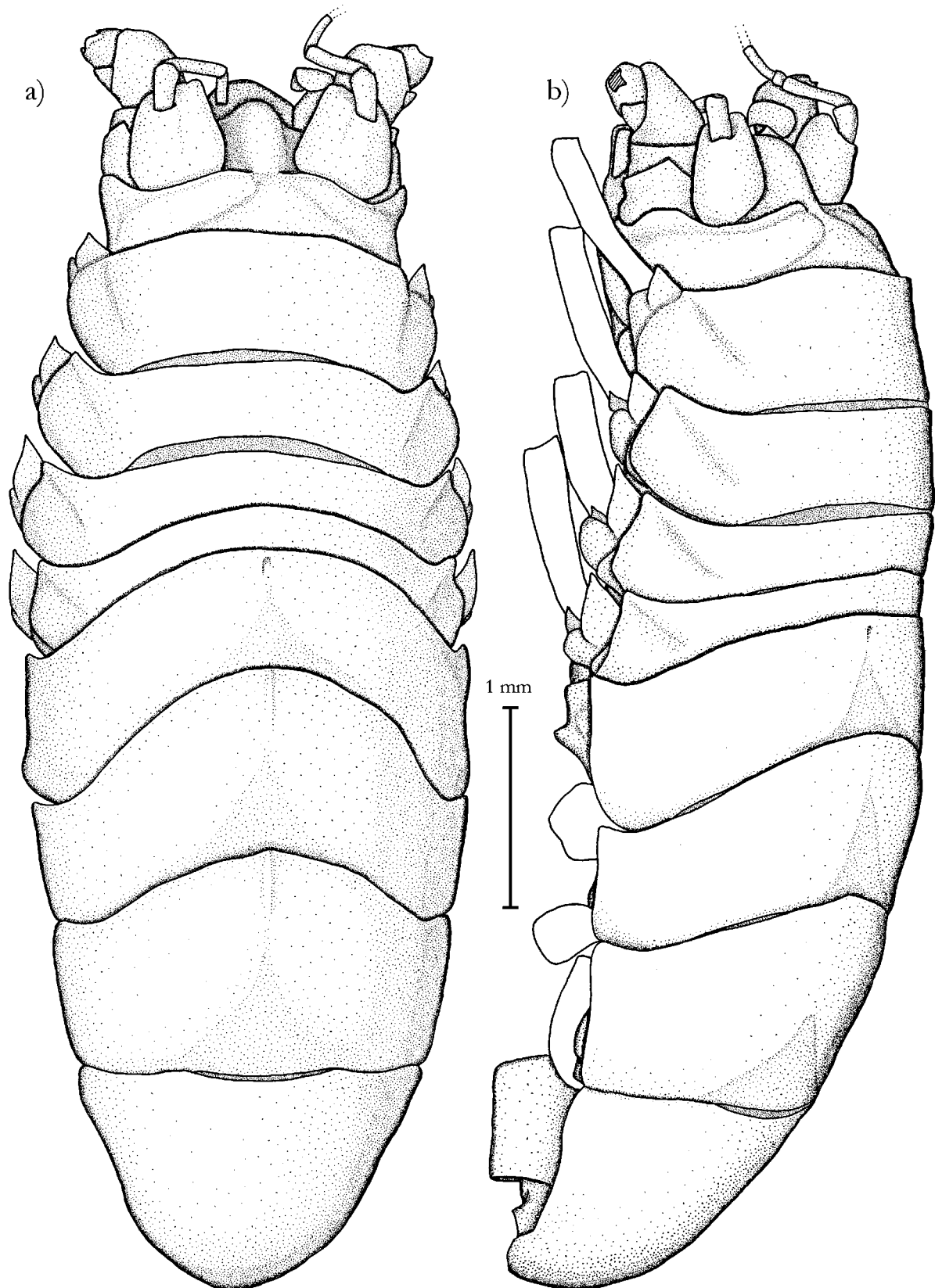


FIGURE 21. *M. persephone* sp. nov., female holotype ZMH K-41803. a) dorsal view; b) lateral view

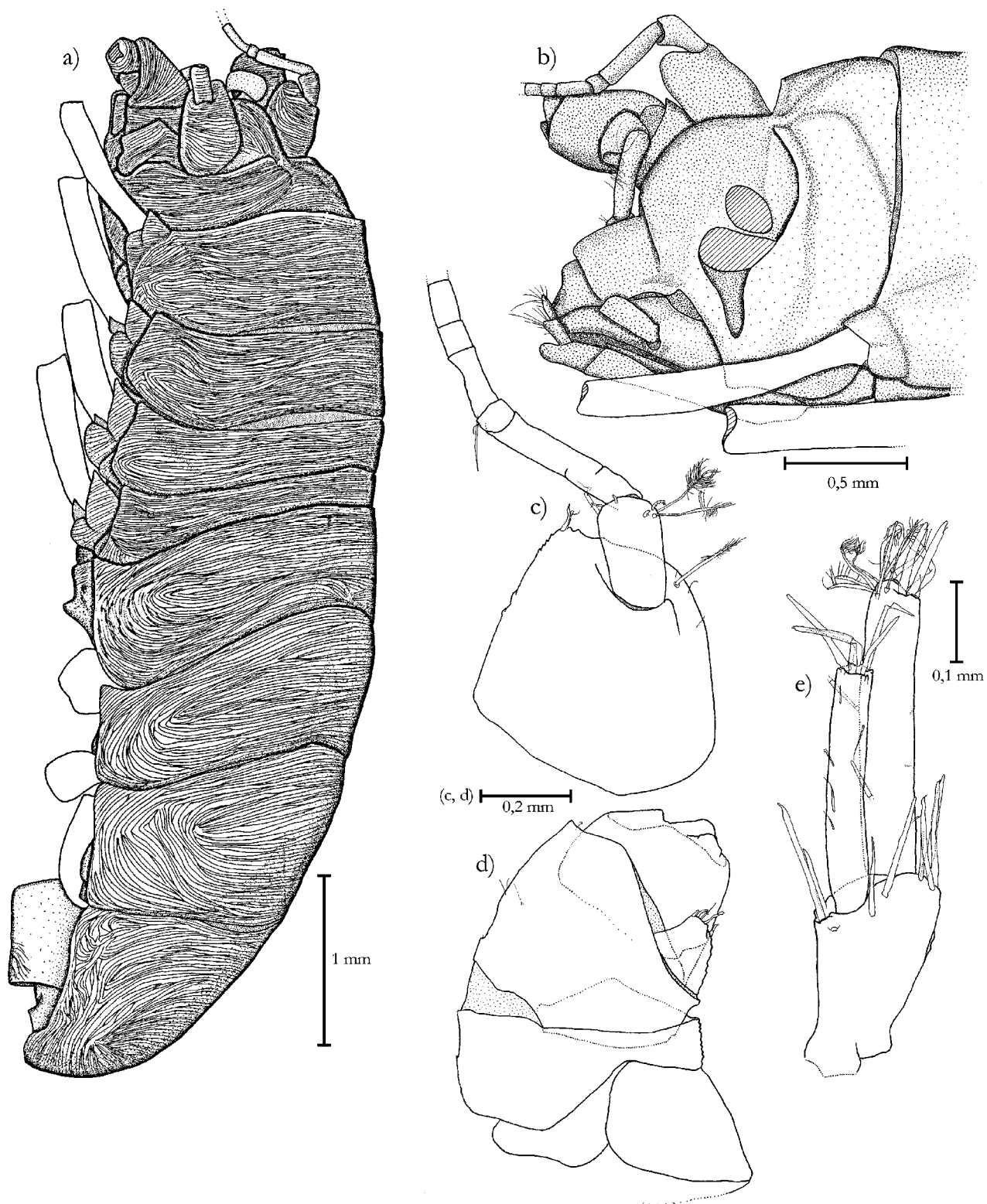


FIGURE 22. *M. persephone* sp. nov., female holotype ZMH K-41803. a) lateral view with cuticular grooves; b) head, lateral view; c) right antenna 1, dorsal view; d) right antenna, dorsal view. *Munneurycope persephone* sp. nov., female, paratype ZMH K-41804. e) left uropod, ventral view

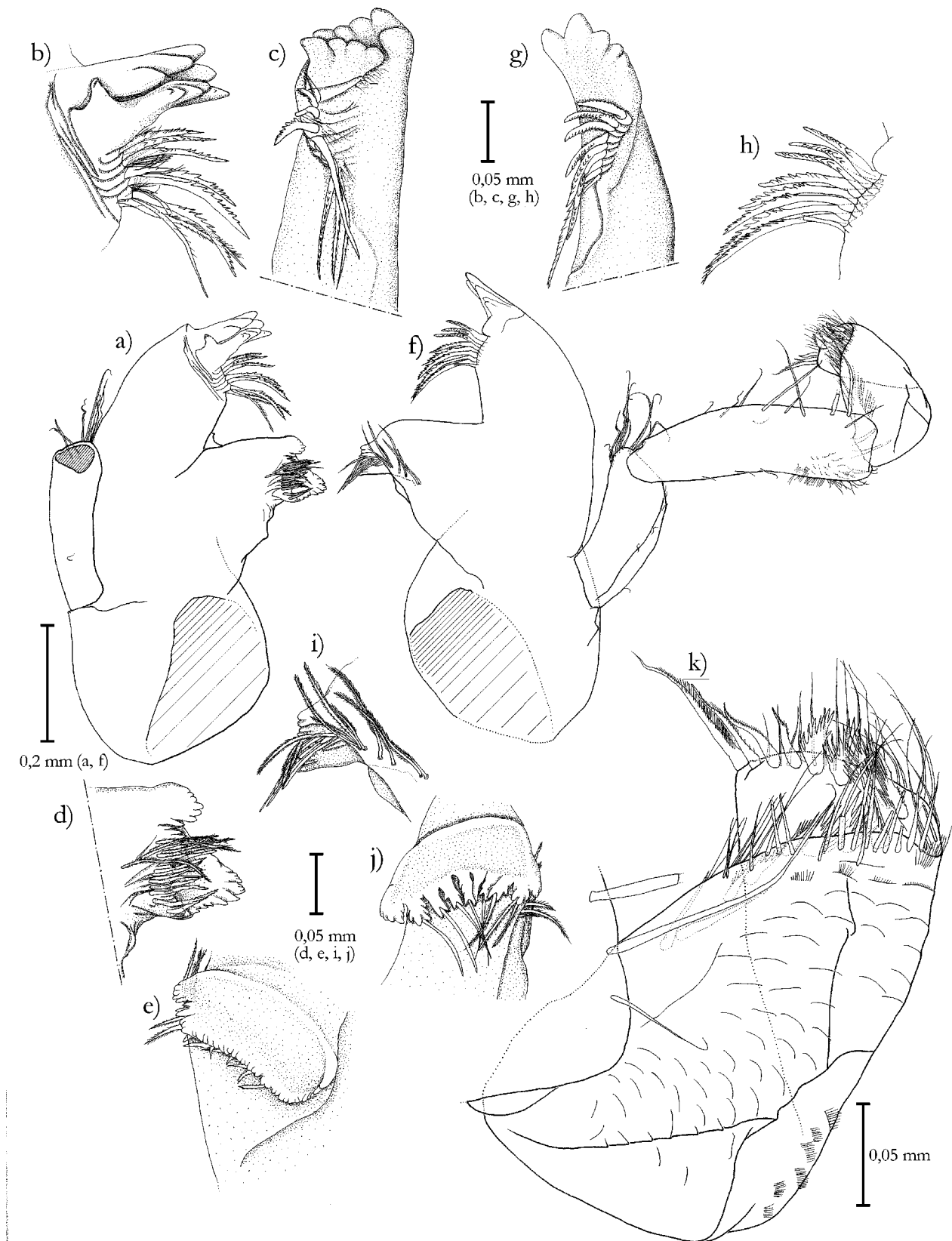


FIGURE 23. *M. persephone* sp. nov., female holotype ZMH K-41803. a) left mandible, dorsal view; b) left incisor process, dorsal view; c) medial view; d) right molar process, dorsal view; e) medial view; f) right mandible, dorsal view; g) right incisor process, medial view; h) spine row on right incisor process, dorsal view; i) right molar process, dorsal view; k) medial view; l) palp of right mandible article 3

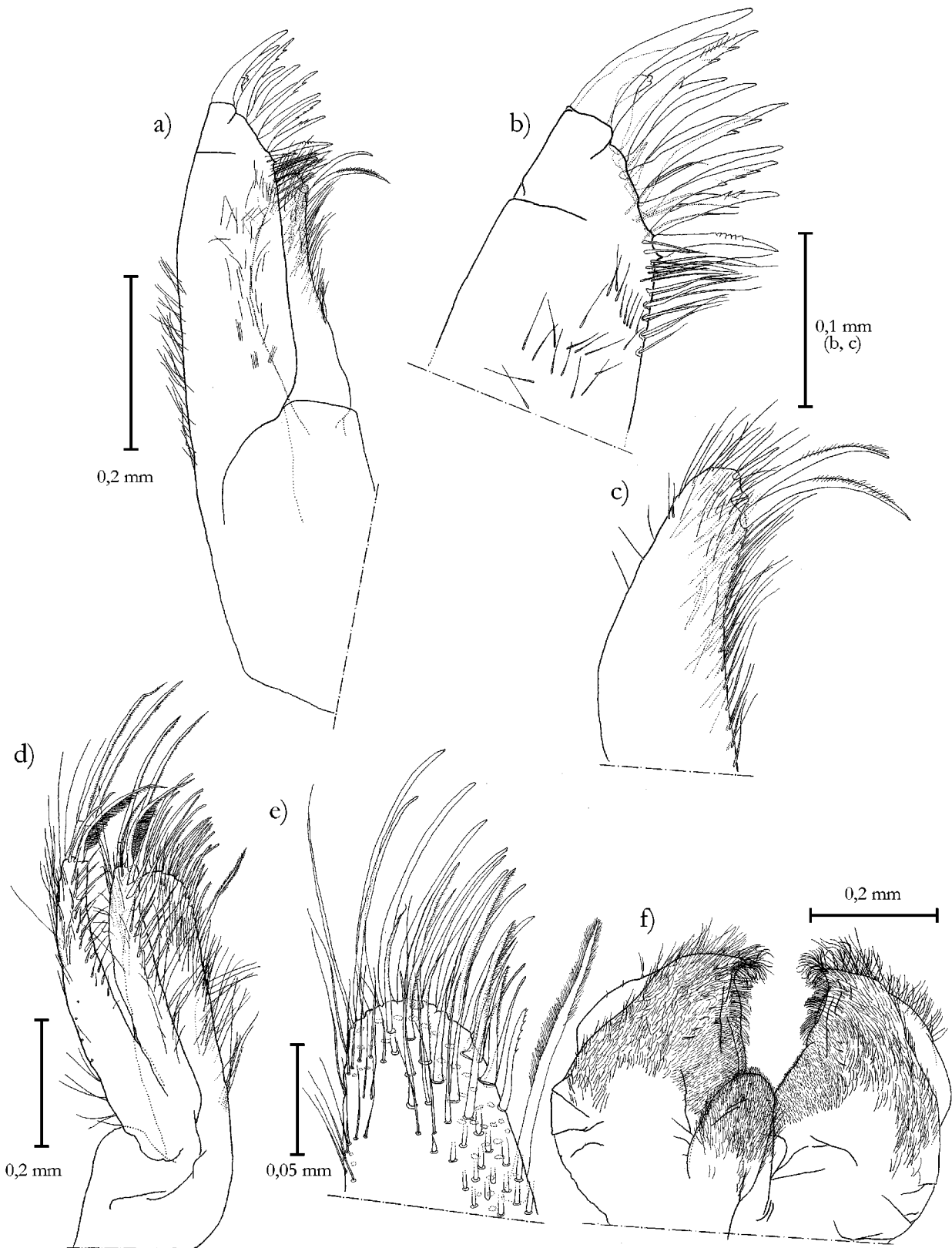


FIGURE 24. *M. persephone* sp. nov., female holotype ZMH K-41803. a) left maxilla 1, dorsal view; b) outer endite; c) inner endite; d) left maxilla 2, dorsal view; e) inner endite; f) paragnath, dorsal view

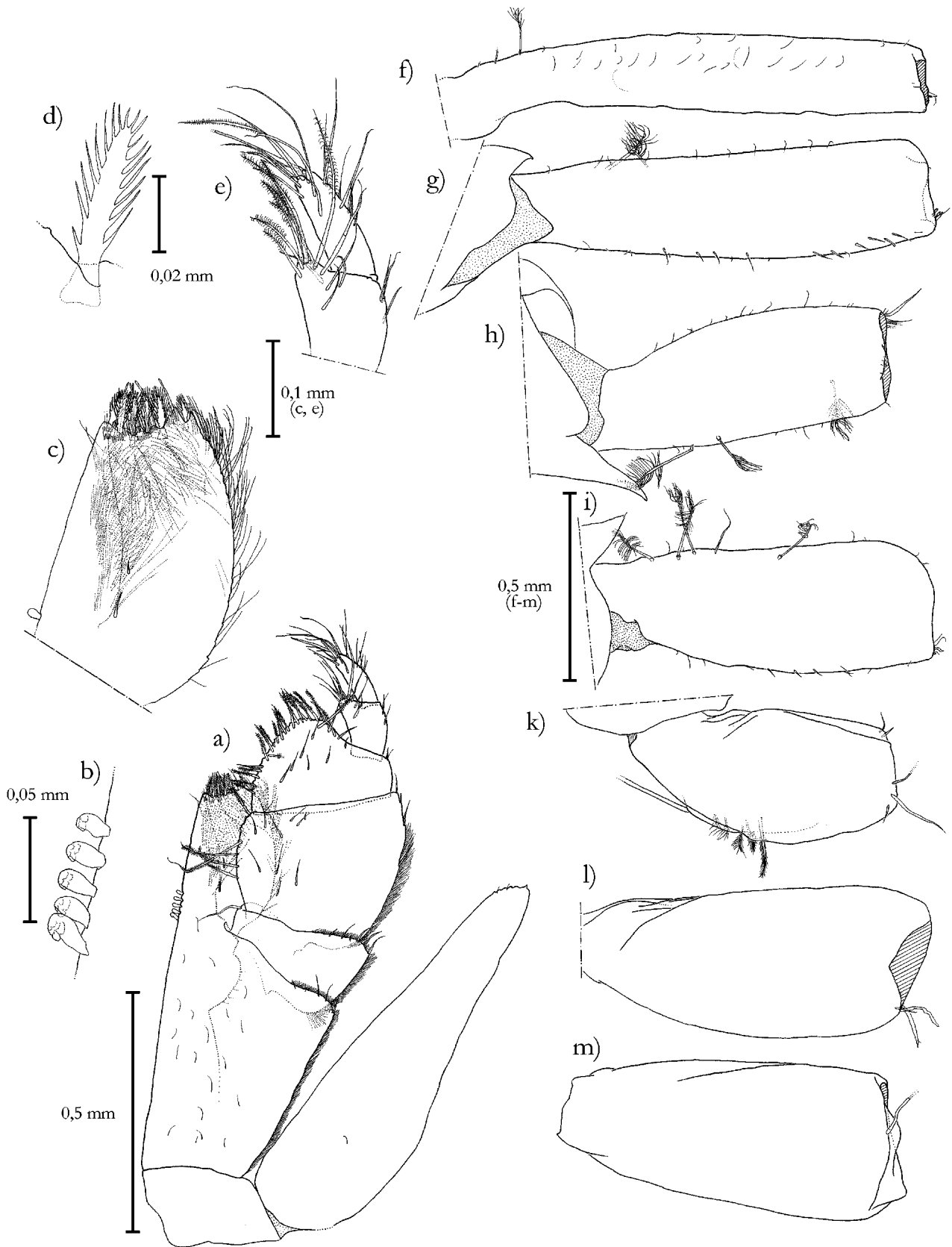


FIGURE 25. *M. persephone* sp. nov., female holotype ZMH K-41803. a) left maxilliped, ventral view; b) retinacula; c) endite; d) cleaning seta on endite; e) palp articles 4 and 5 of left maxilliped; f–m) bases of pereopods 1–7

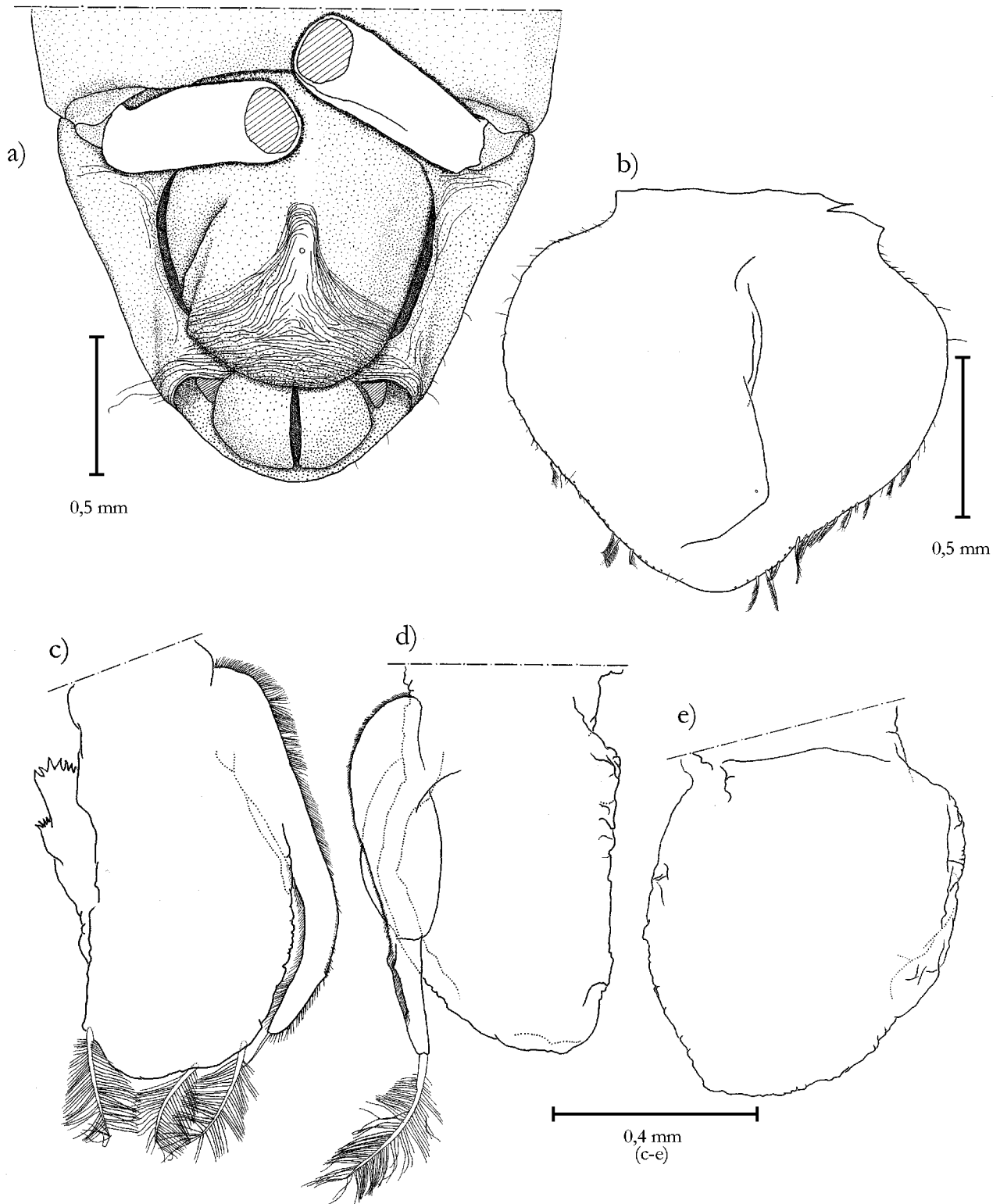


FIGURE 26. *M. persephone* sp. nov., female holotype ZMH K-41803. a) pleotelson, ventral view; b) operculum, ventral view; c) pleopod 3; d) pleopod 4; e) pleopod 5

Remarks

The paratype's head seems to be shorter than that of the holotype as it is further retracted under pereonite 1. Whether the head is actively retractile and if there is a relation to the pereonite 1 being elongated cannot be answered. It is also possible that the retraction is an artifact due to dehydration of specimens stored in ethanol.

There is an articulation of a lost and probably long seta at the apex of the operculum (Fig. 26 a, b) which has to be considered when determining the species.

A taxonomic feature most previously described species of *Munneurycope* have in common is the absence of the lateral and medial lobes on the first peduncular article of antenna 1. The new species still has a remaining – yet small – medial lobe although a distinct reduction compared to the lobes within the genus *Eurycope* is obvious. Therefore, the possible presence of a medial lobe was included in the generic diagnosis of the genus *Munneurycope*.

Comparing the length ratios of the ambulatory pereonites, Aydogan *et al.* (2000) postulate the elongation of pereonite 1 to be a possible autapomorphy of the genus. This is the case for *Munneurycope persephone* as well as for *M. hadalis* Aydogan *et al.*, 2000, *M. nodifrons* (Hansen, 1916), *M. menziesi* Wolff, 1962 and less significantly for *M. curticephala* Birstein, 1963, but not for the other species of the genus. As this feature is not applicable to all species currently included in this genus this may lead to the supposition of *Munneurycope* being a paraphylum until some species are transferred into separate genera (Aydogan *et al.* 2000).

Several species differ highly from the new species in their general appearance: *M. murrayi* (Walker, 1903), *M. harrietae* Wolff, 1962, *M. incisa* (Gurjanova, 1946) and *M. glacialis* Malyutina and Kussakin, 1996 are obviously not conspecific with *M. persephone*; none of them has the tapering pleotelson seen in the latter. The habitus of the present species is similar to that of *M. hadalis*, *M. nodifrons*, *M. menziesi* and *M. curticephala*. A detailed comparison is summarized in table 2.

The new species lacks an anteromedian concavity of the frons typical for *M. hadalis*, described as “prominent rostrum, distally with deep concavity”, the “rostrum” being the medially swollen frons (Aydogan *et al.* 2000). Besides, *M. hadalis* has a relatively longer first pereonite and a pereopod 1 with a wider basis. *M. curticephala* has equally long pereonites 1 and 2 and a different insertion of uropods which are therefore invisible in dorsal view. Both species lack – as *M. menziesi* – the medial lobe of antenna 1. It is described for *M. nodifrons* (Wolff 1962) which has a very similar frons and general appearance compared to the new species. Whereas the new species has an elongated article 3 of antenna 1 which is longer than article 2, in *M. nodifrons* it is shorter than article 2. The truncate tip of the maxilliped endite of *M. nodifrons* forms an angle of ca. 90° with the medial margin and is narrower (Wolff 1962: Fig. 104 a) than in *M. persephone* and *M. menziesi* where the tip forms an angle of ca. 120° with the medial margin. The endite's lateral margin is much more convexly rounded than in the latter two species.

The presence of a plumose seta on the exopod of pleopod 3 has been considered a character that separates *Munneurycope* and other genera from the Eurycopinae that lack this seta (Wägele 1989), however the seta is also reduced in some *Munneurycope* (*M. murrayi*, *M. nodifrons*, *M. hadalis* and *M. persephone*), while it is present in some Eurycopinae: *Eurycope septentrionalis* Malyutina and Kussakin, 1996, *E. vasiinae* Malyutina and Kussakin, 1996, *E. baea* Wilson, 1983, *E. cryoabyssalis* Just, 1980, *E. dahli* Svavarsson, 1987, *E. producta* Sars, 1868 and *Tytthocope megalura* (Sars, 1872) (the latter with two plumose setae, in Wilson and Hessler 1981). Presence or absence of plumose setae on the exopod of pleopod 3 seems to be a useless character for diagnoses of subfamilies within the Munnopsididae. The remaining reason for exclusion of *Munneurycope* from Eurycopinae – the reduction of the rostrum as synapomorphy of the genus – is uncertain, as it is a weak homology. Furthermore, not all species without rostrum were consequently excluded from the genus *Eurycope* (compare *Munneurycope antarctica* Schultz, 1977 and *Eurycope acutiperaeons* Schultz, 1978 which could be a *Munneurycope* due to the absence of a rostrum and the elongation of pereonite 1). So the actual systematic position of *Munneurycope* remains uncertain until revision.

Distribution

Known only from the type locality. *M. persephone* is the first record of *Munneurycope* from the South Atlantic.

TABLE 2: Comparison of morphological features and geographical distribution in *Munneurycope persephone* sp. nov. with similar species of the genus.

	<i>M. persephone</i> n.sp.	<i>M. menziesi</i> Wolff, 1962	<i>M. nodifrons</i> (Hansen, 1916)	<i>M. hadalis</i> Aydoğan <i>et al.</i> , 2000	<i>M. curticephala</i> Birstejn, 1963
Body length	5.50–5.83 mm	13.0–13.5 mm	5 mm	10.0–14.1 mm	10 mm
Frons	prominent, without medial concavity	prominent, without medial concavity	prominent, without medial concavity	prominent, medially depressed	prominent
Pereonite 1 length	1.3 times as long as prm 2; prm 1>2>3>4	1.25 times as long as prm 2; prm 1>2>3>4	1.3 times as long as prm 2; prm 1>2>3>4	twice as long as prm 2; prm 1>2>3>4	as long as Prm 2; prm 1=2>3=4
Basis pereopod 1	longest and narrowest	unknown	unknown	longest and widest	unknown
Medial lobe of article 1 antenna 1	present	absent	present	absent	absent
Article 3 of antenna 1	longer than article 2	unknown	shorter than article 2	longer than article 2	as long as article 2
Lacinia mobilis	4 cusps	5 cusps	5 cusps	5 cusps	undescribed
Left mandible incisor process	5 cusps	6 cusps	5 cusps	8 cusps	undescribed
Right mandible incisor process	5 cusps	4 cusps	4 cusps	4 cusps	undescribed
Left mandible spine row	8 serrated stout setae	5 serrated + 10 simple stout setae	4 serrated + 4 simple stout setae	18 serrated stout setae	undescribed
Right mandible spine row	9 serrated stout setae	10 serrated + 10 simple stout setae	8 simple stout setae	19 serrated stout setae	8 serrated stout setae
Left molar process	16 setae	undescribed	undescribed	15 serrated setae	undescribed
Right molar process	16 setae	undescribed	undescribed	11 serrated setae	undescribed
Retinacula	5	10–11	5–6	10	6
Endite of maxilliped, truncate tip	broad, 6 cleaning setae	broad, amount of cleaning setae undescribed (6 figured)	narrow, amount of cleaning setae undescribed (4 figured)	broad, amount of cleaning setae undescribed	broad, amount of cleaning setae undescribed
Epipodite of mxp	length : width = 3.5	unknown	length : width = 3.5	length : width = 3	length : width = 3
Uropod visible in dorsal view	yes	yes	unknown	yes	no
Distribution, water depth	Angola-Basin, 5125–5415 m	Kermadec Trench, 6960–7000 m	North Atlantic, 2702–7000 m	Atacama Trench, 7800 m	North Pacific, 6675–6710 m

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