

RESULTS OF THE DIVA-1 EXPEDITION OF RV “METEOR” (CRUISE M48/1)

A new deep-sea isopod species from the Angola Basin: *Prochelator angolensis* sp. nov. (Asellota: Desmosomatidae)

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Abstract

A new isopod of the genus *Prochelator* (Desmosomatidae) is described from the abyssal plain of the South East Atlantic Ocean. This is the first record of *Prochelator* in the Angola Basin. The new species differs from all other species particularly in antennular setation, the shape of pereonite four and operculum, and the presence of very small posterolateral spines. Furthermore, the species *Desmosoma serratum* is transferred to the genus *Prochelator*.

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Keywords: *Prochelator angolensis*; Isopoda; Asellota; Desmosomatidae; Taxonomy; Deep sea; Atlantic ocean

Introduction

During the international expedition *Diversity of the abyssal Atlantic benthos (DIVA 1)* with RV “Meteor” (voyage M48/1) 6.7.–2.8.2000, a large number of abyssal isopods was collected. Beside the Munnopsidae SARS, 1897 (45.7% of all caught Asellota) the Desmosomatidae SARS, 1897 were the most abundant family with 23.8%. For comparison: in samples from the equatorial Pacific (Peru Basin), the Desmosomatidae dominated with nearly 37% of the individuals (Park 2000). Hessler and Sanders (1967) also mentioned that the Desmosomatidae were a dominant element of the isopods in samples from the North-West Atlantic (Gay Head-

Bermuda Transect) fauna. Only Harrison (1988) found a small share of only 2.52% for the Desmosomatidae in the Rockall Trough (North-East Atlantic).

Hessler (1970) divided the family into two subfamilies: Desmosomatinae and Eugerdelatinae. Today, 115 species belonging to 18 genera are known. The new species was assigned to the subfamily Eugerdelatinae and the genus *Prochelator*. Until now, nine species (excluding *Prochelator angolensis*) have been described within the genus *Prochelator*. The family Desmosomatidae has a global distribution and a bathymetric range between 0 and 5500 m (Kussakin 1973, 1999). Most of the species (seven) are found in the deep sea of the North Atlantic Ocean or in the Mediterranean. Only *P. kussakini* Mezhev, 1986 was found in the North-west Pacific off Kurile Islands in 290 m depth and *Prochelator* sp. A Wetzer et al., 1997 is from the Santa Maria Basin off San Francisco in the North-East Pacific Ocean between 99 and 2955 m.

P. angolensis n. sp. is the first species of the genus sampled from the Angola Basin and in the southern hemisphere.

Abbreviations: ♀, Female; A1, First antenna; Antennula; A2, Second antenna; antenna; Md l/r, Mandible left or right; Mx 1, First maxilla, maxillula; Mx 2, Second maxilla, maxilla; Mxp, Maxilliped; Op, Operculum; P 1–7, Pereopods 1–7; Plt, Pleotelson; Plp 3, Pleopod 3; Urp, Uropods

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Material and methods

Samples were taken with a modified epibenthic sledge (Rothlisberg and Percy 1977; Brandt and Barthel 1995) in six areas (12 stations) along a transect of about 700 km in the Angola Basin at depths between 5125 and 5452 m. Desmosomatidae were sampled at seven of the 12 stations. The net of the epibenthic sledge had a mesh size of 500 µm in the front and 300 µm in the tail. Isopods were fixed in cold 70% ethanol for taxonomic and genetic research.

For the drawings an Olympus Microscope with a Camera Lucida was used. After finishing the drawings of the dorsal and lateral views the appendages were dissected and transferred onto slides with water-free glycerine–gelatine and finally sealed (Platt and Warwick 1988). The nomenclature for setae and anatomical characters follows Hessler (1970), Schultz (1969) and Watling (1989).

Taxonomy

Genus: *Prochelator* HESSLER, 1970

Type species: *Prochelator lateralis* (G.O. SARS, 1899)

Diagnosis of the genus

Modifications of the diagnosis proposed by Hessler (1970): Pereopod 1 large, carpo-euchelate. Dactylus and propodus form movable counterpart to a large immovable spine (claw-spine) on distal ventral edge of carpus. Lower margin of carpus of pereopod 1 with a short stout seta, located centrally, and a somewhat longer slender seta, located distally, just proximally to the large immovable spine. *Lacinia mobilis* of left mandible with three to five teeth. Pleotelson with or without posterolateral spines. Uropods mostly biramous (nine of 11 species).

Desmosoma serratum Fresi & Schiecke, 1969 is transferred to *Prochelator* Hessler, 1970. The pereopod 1 is large, carpo-euchelate and bears two “accessory setae” on the ventral margin of the carpus as Hessler (1970) defines for the genus *Prochelator*.

Prochelator angolensis sp. nov.

Holotype: Non-ovigerous female, 3.4 mm long. *DIVA I* Expedition, South Atlantic Ocean, Angola Basin; Station 344, trawl from: 17°06.2'S–004°41.7'E to 17°07.5'S–004°42.3'E, depth 5415 m.

Deposited in the Zoological Museum Hamburg (ZMH), Germany, No.: K 40331 A–K.

Paratypes: Two females, 2.1 mm (K 40322) and 2.7 mm (K 40333); Station 344.

Diagnosis

Body about five times longer than wide. Dorsal cuticle smooth, without setae. Anterior margin of pereonite IV strongly concave, with rounded anterolateral projections. Pereonite V posteriorly narrow. Antennula with three pronounced broom setae. Lateral margins of maxilliped basis, as well as first and second palp articles bearing row of fine setae. Palm of propodus of pereopods 2 and 3 distally with dense crest of very small and simple setae. Female pleopod 2 (operculum) approximately rectangular and with rounded corners. Posterolateral spines of pleotelson located ventrolaterally, close to insertion of uropods, very small and inconspicuous (Fig. 1).

Description of holotype female (Figs. 2–6)

Habitus (Fig. 2) 3.4 mm long (measured without appendages), about 5 times longer than wide. Dorsal cuticle smooth. Pereonites I–IV without setae and 1.5 times wider than pereonites V–VII. In lateral view characteristically arched, cephalothorax and pereonites I–IV higher, because pereonites V–VII and pleotelson dorsoventrally flattened.

Cephalothorax (Fig. 2) free, anteriorly rounded, about two times wider than long. Frontal margin strongly convex, insertions of antennula and antenna in a deep fold. Eyes absent.

Pereon (Fig. 2) Pereonite I longer than pereonite II, anterior margin concave. Pereonites II and III of

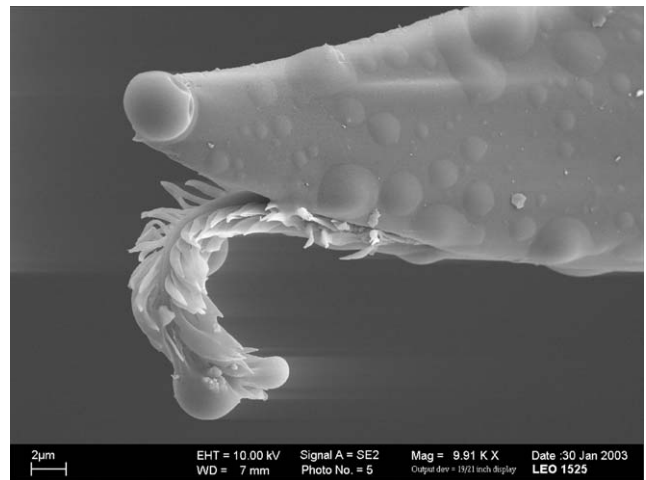


Fig. 1. SEM picture of the tip of the claw-spine of pereopod 1 (Photo: S. Brix).

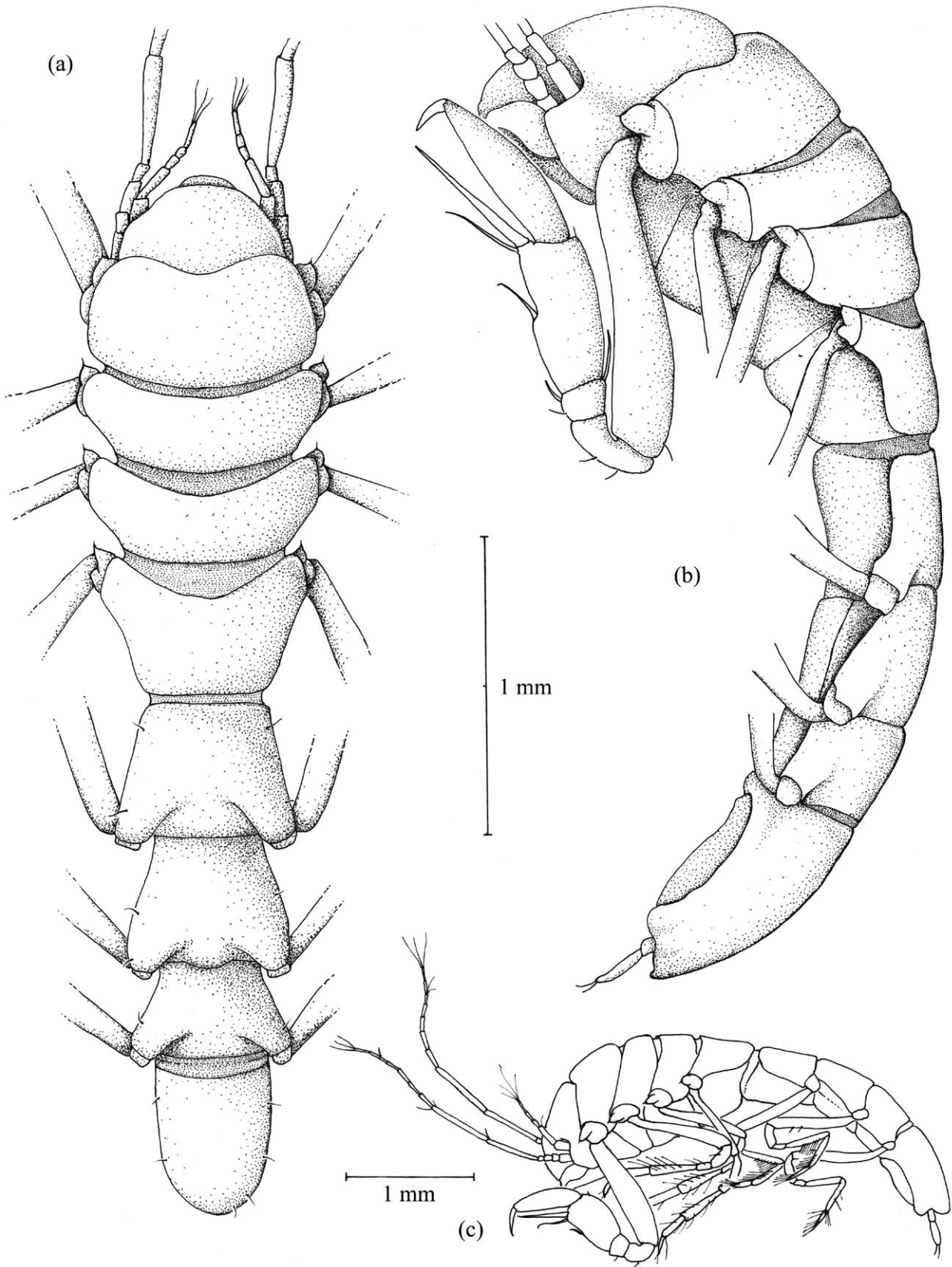


Fig. 2. *Prochelator angolensis* sp. nov. (♀) (a) dorsal view; (b) lateral view; (c) habitus.

comparable size, about 3.5 times wider than long, lateral margins rounded. Anterior margin of pereonite IV strongly convex with slender projections, posteriorly narrowed. Pereonites V–VII almost as wide as long, posteriorly somewhat broader, with slender posterolateral lobes. Lateral margins with fine hairs. Relative lengths of pereonites: 1:0.6:0.6:1:1.2:1:0.6. Coxae visible in dorsal view, smooth, with short anterior spine tipped with small seta.

Pleotelson (Figs. 2 and 6) 0.48 mm long, with small setae, posterior margin oval, truncated, lateroventrally with very small posterolateral spines. Anus caudally and laterally covered with cavernous anal valves. Insertion of uropods located medial of posterolateral spines, close to anal valves.

Antennula (Fig. 3) 0.35 mm long, peduncle two-segmented, flagellum three-segmented, relative lengths of articles: 1:2:0.5:0.5:1. First article of peduncle with single seta on lateral margin and one plumose seta. Second article of peduncle distally with one large plumose seta and two simple setae. First flagellar article with simple seta, second with one aesthetasc and one plumose broom seta, last article of flagellum terminally with one short aesthetasc and three long setae and one long aesthetasc.

Antenna (Fig. 3) about three-quarters of body length, six peduncular and seven flagellar segments. Peduncular articles one to three of comparable size, four shorter, with few simple setae, peduncular articles five and six slender and 5.5–6.5 times longer than the first, terminally several small simple setae. All flagellar articles of comparable size with simple setae at distal margin, segments five and six with two, segment seven with three long setae.

Mandibles (Fig. 3) left and right comparably compact. *Pars incisiva* of mandibles showing three well-developed teeth. Left *L. mobilis* with three strong teeth, right *L. mobilis* serrated, bearing eight small teeth. Subjacent to *L. mobilis* four tapered spines, the dorsal one enlarged. *Pars molaris* compact, without grinding surface, bearing numerous terminal setae. Mandible palp with three articles, first almost invisible, second long, terminal article short, with row of four setae.

Maxillula (Fig. 4) inner endite much smaller than outer, distally with one long and one stout seta, laterally with several simple setae. Outer endite well developed, lateral margin bearing seven rows composed of three setae, distal margin with paired or single simple seta. Endite terminally bearing eleven strong spines.

Maxilla (Fig. 4) with three endites. Outer and inner endites of comparable size, medial endite shorter. Tip of outer endite with four long setae, lateral margin with four pairs of setae. Medial endite distally bearing only three long and two short setae. Inner endite with a dense comb of six distal setae and several fine hairs on lateral margin.

Maxilliped (Fig. 4) epipodite oblong-oval and flat, a distolateral concave area, lateral margin with a row of fine hairs. Endite medially with two coupling hooks (retinacula) and two distolateral rows of small setae. Lateral margin of maxilliped basis bearing row of fine setae. Palp with five articles. First, fourth and fifth article short, second and third article longer, medially expanded. Lateral margin of first and second article with row of fine hairs. Last three articles with several long and strong setae.

Pereopods (Figs. 4 and 5) unequal. Pereopod 1 prehensile, pereopods 2–4 ambulatory, pereopods 5–7 simple swimming legs. Pereopods 2–7 decreasing in length.

Pereopod 1 (Fig. 4, Pereopod 1a-d) well-developed, carpo-euchelate. Basis five times longer than wide, with several fine hairs and distally one clearly visible seta. Ischium with one small seta. Merus compact with three conspicuous setae and dorsally with two fine hairs. Carpus muscular, enlarged. Ventral margin of carpus with three setae and a large flexible spine (0.325 mm; claw-spine only slightly movable). A long, slender seta located distally, just proximally to claw-spine, a somewhat shorter, stout seta, located midway and proximally very small fine seta. Between these ventral setae two inconspicuous combs of fringing setae. End of claw-spine with terminal sensory hair (Figs. 1 and 4(c)). Propodus 3.5 times longer than wide, dorsal margin slightly curved, smooth, with one fine seta midway and two fine apical setae. Ventral margin with row of 15 slightly arcuate short setae, attached to a hyaline cuticular membrane (Fig. 4d), distoventrally with three long setae (Fig. 4a). Dactylus four times longer than wide, proximally one inconspicuous comb of fringing setae, distally four fine setae, two of them bifid. Unguis of dactylus composed of three cuspidate and one conate setae (Fig. 4b).

Pereopod 2 (Fig. 5) 1.2 mm in length. Basis, ischium and merus with several isolated setae. Carpus with two medioventral lines of long and slender simple setae, distally one bifid seta. Propodus with two longer dorsal setae, ventral margin midway with one fine seta, a comb of fringing setae and three long hairs. Dactylus with 3 fine distomedial hairs. Unguis with three terminal setae.

Pereopods 3 and 4 (Fig. 5) generally similar to pereopod 2, decreasing in length from pereopods 2 to 4. Carpus and propodus with several isolated setae. Ventral margin of propodus of pereopod 3 with comb of fringing setae. Propodus of pereopod 4 without comb of fringing setae. Both pereopods with short stout spine on posterior margin of propodus. Unguis of dactylus with two terminal setae.

Pereopods 5–7 (Fig. 5) legs of similar shape, decreasing in length from pereopods 5 to 7. Carpus of pereopods 5 and 6 with one ventral row of long and slender simple setae, propodus with two rows of long

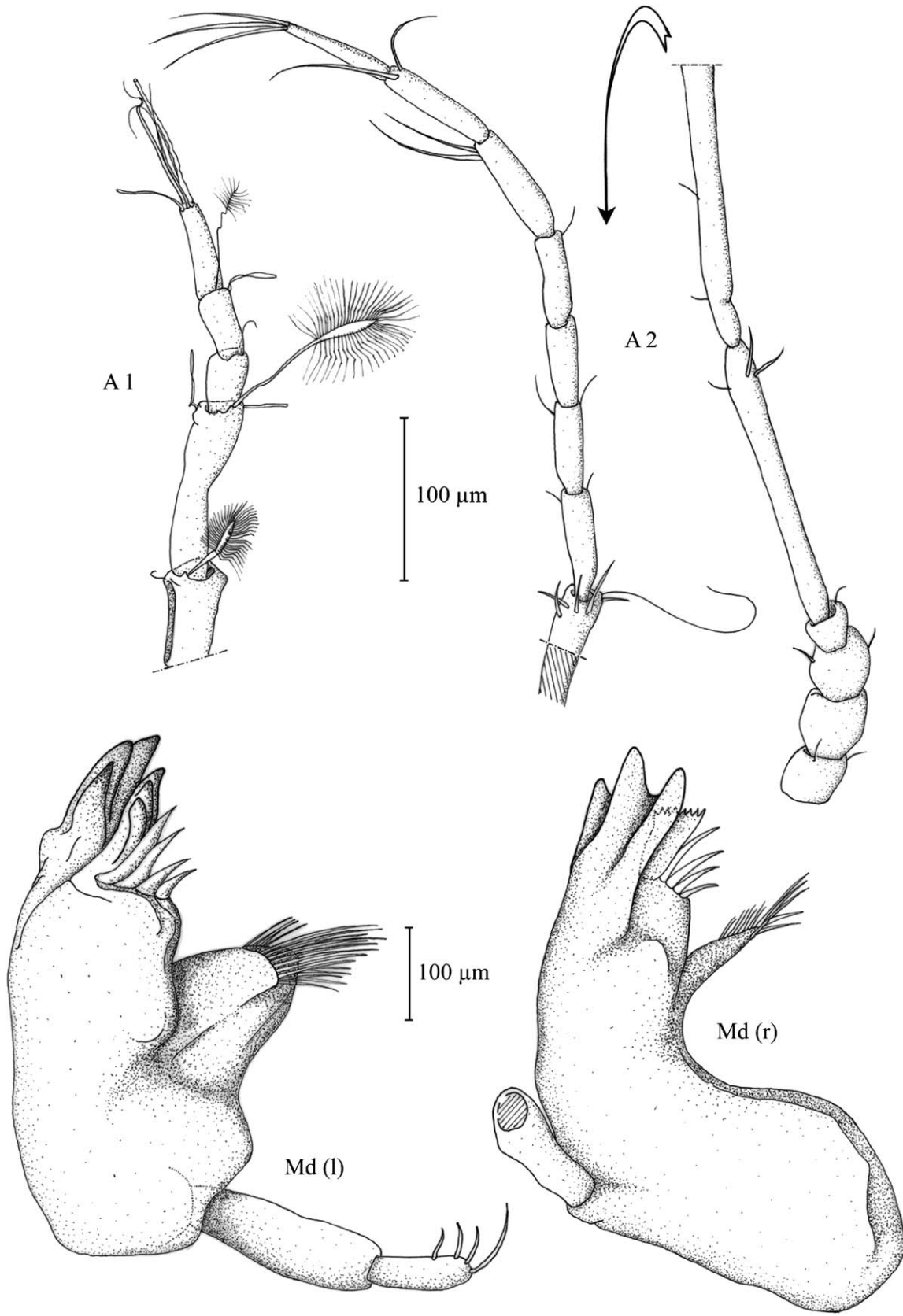


Fig. 3. *Prochelator angolensis* sp. nov. (♀), right antennula; left antenna; left mandible (dorsal view) and right mandible (ventral view).

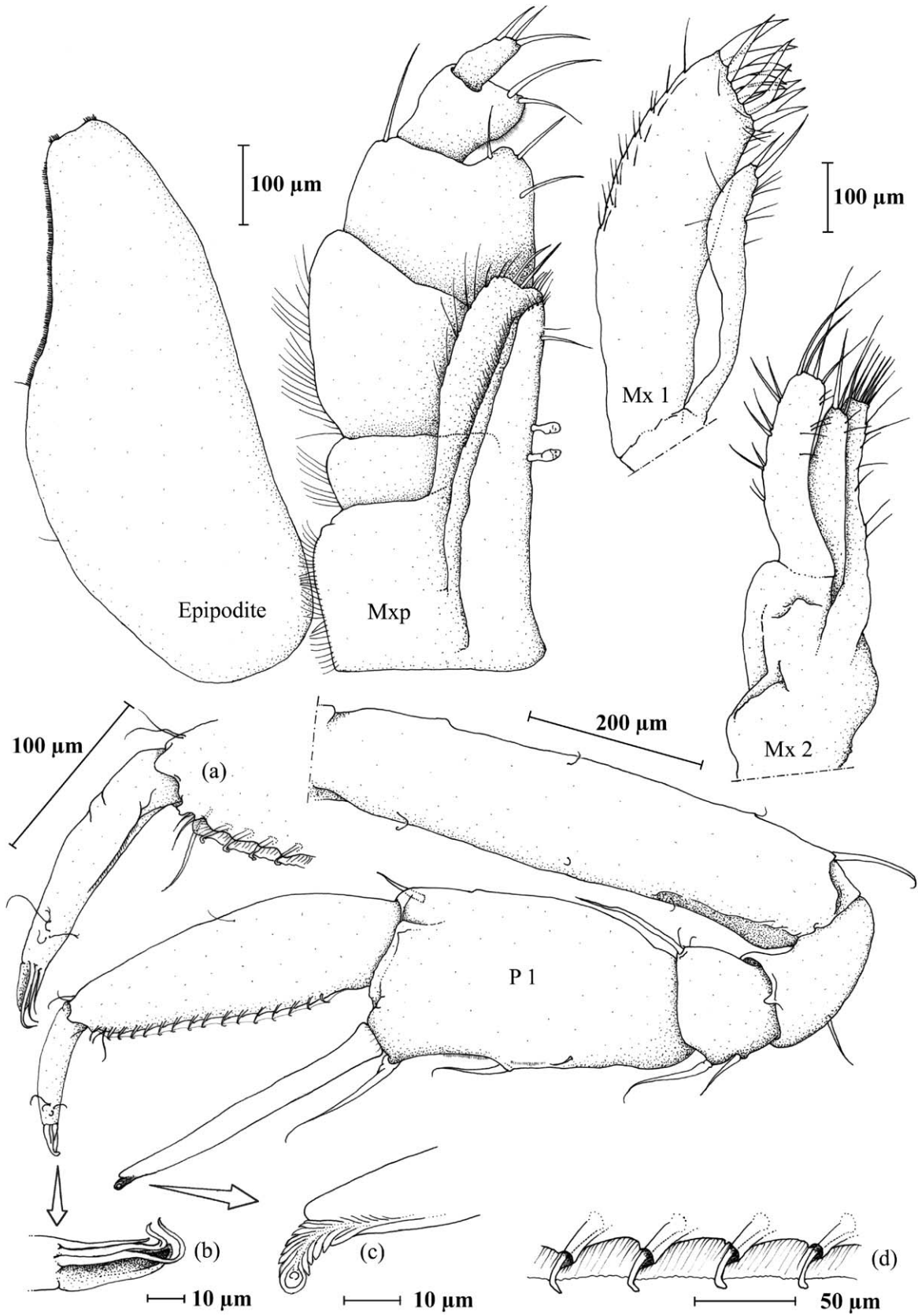


Fig. 4. *Prochelator angolensis* sp. nov. (♀), left maxilliped with epipodite; left maxillula, left maxilla, right pereopod 1; detail (a) dactylus; (b) unguis; (c) tip of claw-spine; and (d) ventral propodus membrane.

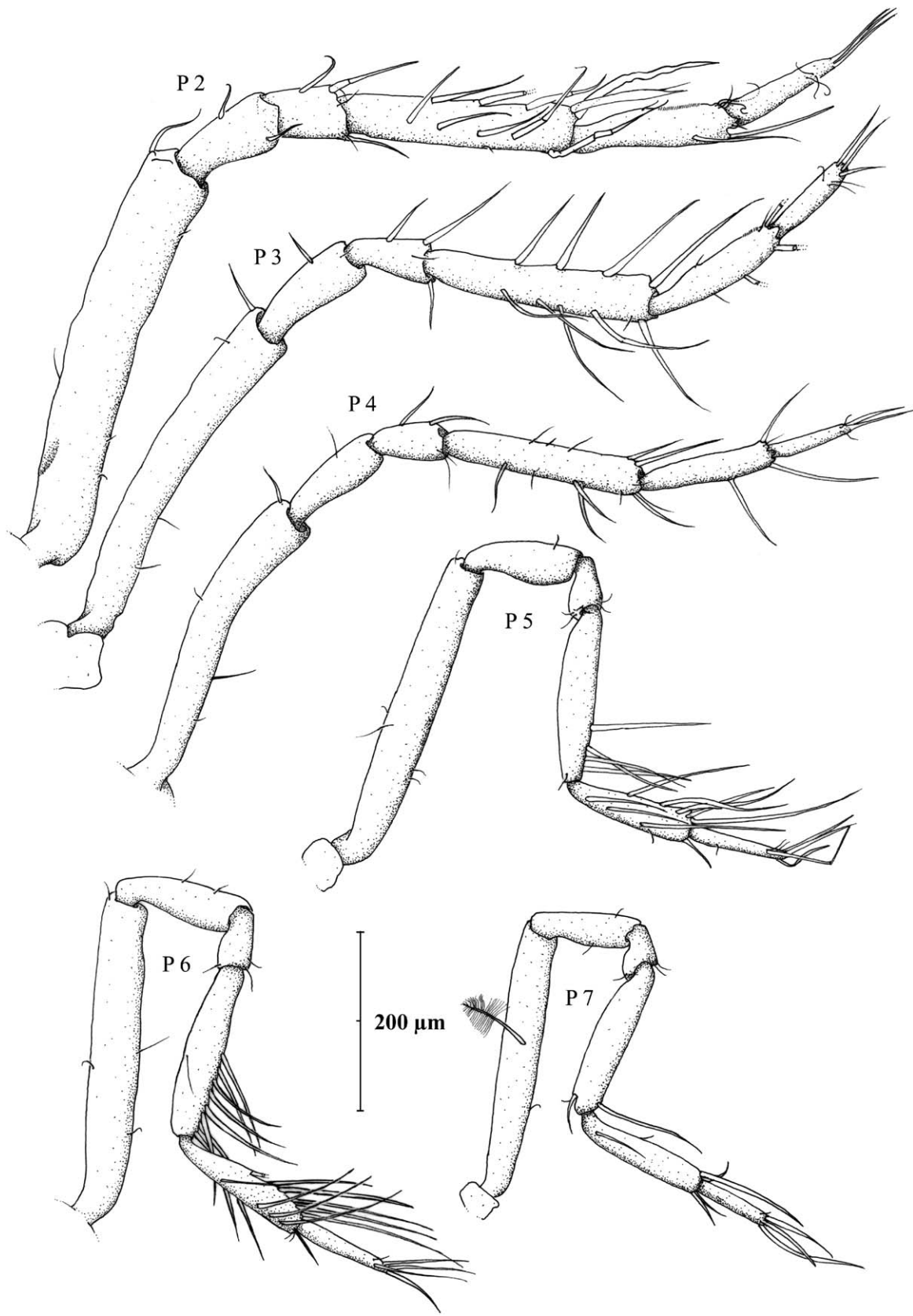


Fig. 5. *Prochelator angolensis* sp. nov. (♀), left pereopods 2–7.

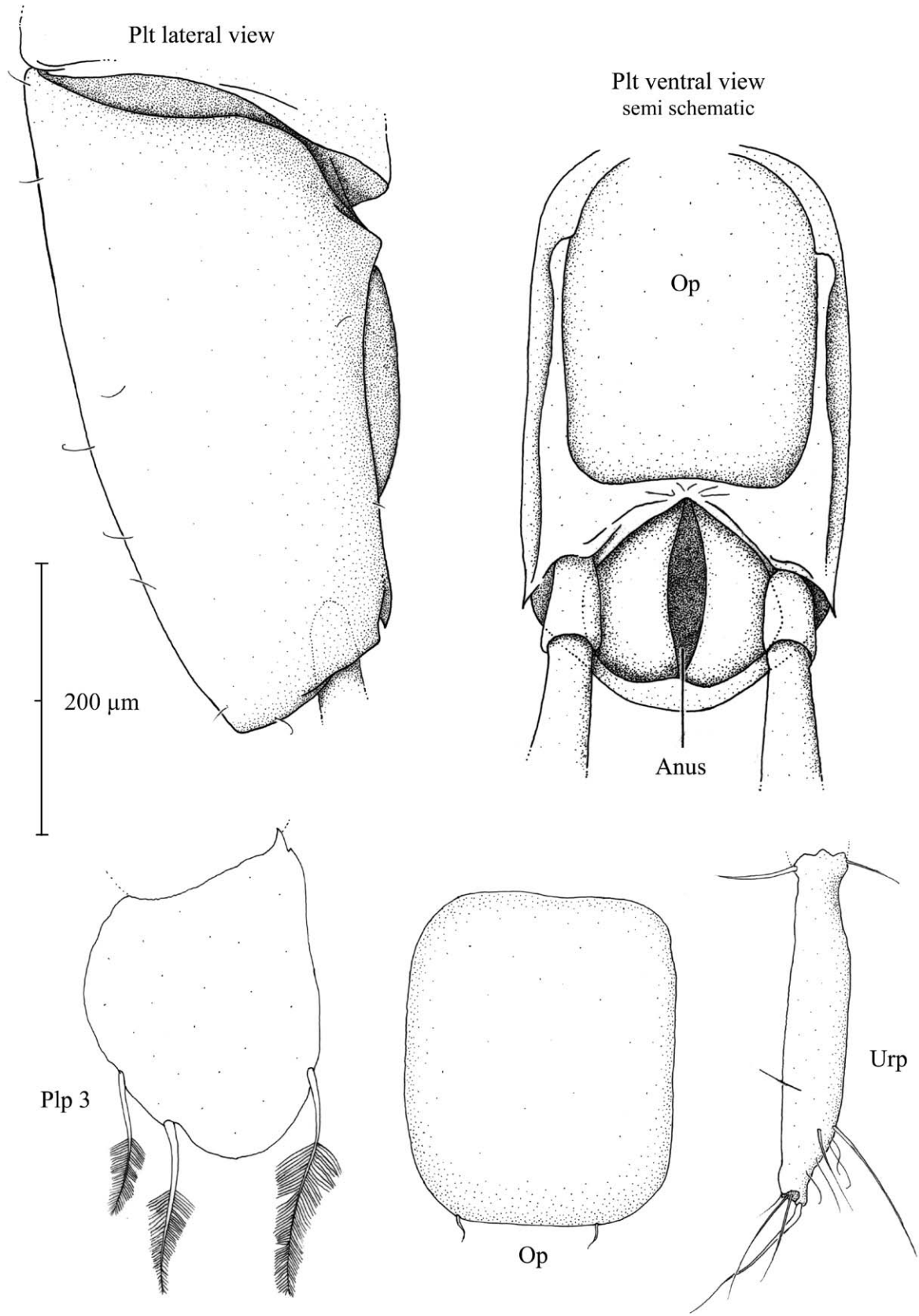


Fig. 6. *Prochelator angolensis* sp. nov. (♀), pleotelson, lateral and ventral view with posterolateral spines; pleopod 3; operculum; left uropod.

and slender simple setae. Basis of pereopod 7 with conspicuous single plumose seta. Carpus and propodus of pereopod 7 with comparatively few setae.

Pleopod 2 (Fig. 6, operculum) smooth and rectangular, little longer than wide, posterior margin with two small setae.

Pleopod 3 (Fig. 6) transparent and oval, longer than wide, posteriorly with three long plumose setae.

Uropods (Fig. 6) simple, uniramous, a short and a longer distal article, 5.5 times longer than wide, basally on second article two slender setae, distally with five setae and six fine hairs.

Remarks

The pereopod 1 is carpo-euchelate (*sensu*: Wägele 1989, p. 68). The “large flexible claw-spine”, a cuticular spine (Brandt 1988, p. 221; Wägele 1992), bears a small, terminal sensory hair which resembles a membranous peacock feather (Figs. 1 and 4c). Furthermore, the claw-spine of the carpus is not immovable. The basis of this spine decreases in diameter, so there is a possibility that the claw-spine forms a flexible (or movable) counterpart to the propodus. Pleopods 4 and 5 were lost during dissection.

Discussion

The new species *P. angolensis* differs from all other species particularly in the shape of pereonites. The pereonites are more slender and the anterior margin of pereonites I–IV is more strongly concave. *P. angolensis* also differs in the existence of a row of fine setae on the lateral margin of the maxilliped basis and in the presence of a row of fine hairs on the lateral margins of the first and second article of the maxilliped palp.

Prochelator angolensis sp. nov. is most similar to *P. incomitatus* Hessler, 1970, distributed in the North Atlantic (5100 m), the only other species in the genus with uniramous uropods. The posterolateral spines on the pleotelson of *P. angolensis* are clearly smaller and lying more ventral than those of *P. incomitatus*. Moreover, *P. incomitatus* bears only three setae on the mandible palp (four in *P. angolensis*), the operculum shows four small simple setae (two in *P. angolensis*) and pereopods 2 and 5 bear more setae on ventral and dorsal margins of carpus and propodus. *P. incomitatus* bears no fine setae on the lateral margins of the maxilliped basis, on first and second palp articles.

All other species (*P. abyssalis* Hessler, 1970; *P. hamptoni* Hessler, 1970, *P. kussakini* Mezhov, 1986; *P. lateralis* (G.O. Sars, 1899); *P. litus* Hessler, 1970; *P. sarsi* George, 2001, *P. serratum* (Fresi and Schiecke 1969), *P.*

uncatus Hessler, 1970 and *Prochelator* sp. A Wetzer et al., 1997) have biramous uropods.

Etymology

Named after the type locality: The Angola Basin, south Atlantic Ocean, off Namibia, Africa.

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