

## Three new species of *Fissarcturus* (Isopoda, Antarcturidae) from the Southern Ocean

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*Fissarcturus bathyweddellensis* sp. nov. and *Fissarcturus sandwichi* sp. nov. are described from the abyssal Southern Ocean near the Antarctic Peninsula and *Fissarcturus rossi* sp. nov. is described from the shallow Ross Sea. A list of all described species of *Fissarcturus* is given. The new species differ from recognized species of the genus in the following respects: *F. bathyweddellensis* can be distinguished based on spination on the dorsum of the body, which is described in detail herein. It is most similar to *F. emarginatus* Brandt, 1990, but this has, for example, a shorter and less stout second cephalic spine. *F. rossi* can also be distinguished from *F. bathyweddellensis* based on spine pattern. Whereas all dorsal spines of *F. bathyweddellensis* are smooth, those of *F. rossi* are covered with spinules. *F. sandwichi* can be distinguished from the other species of the genus by the strong frontally bent supraocular spines (females with second cephalic spines) and dorsal body surface, which is covered with flat, cauliflower-like elevations in submedial, lateral and coxal rows. © 2007 The Linnean Society of London, *Zoological Journal of the Linnean Society*, 2007, 149, 263–290.

ADDITIONAL KEYWORDS: deep sea – descriptions – taxonomy.

### INTRODUCTION

The genus *Fissarcturus* was erected by Brandt, 1990 with the type species *Fissarcturus emarginatus* Brandt, 1990.

During the Antarctic expeditions ANDEEP I-II (ANTarctic benthic DEEP-sea biodiversity: colonization history and recent community patterns) with RV *Polarstern* in 2002, specimens of two new species of *Fissarcturus* from the Southern Ocean deep sea were discovered, while during an earlier expedition of the New Zealand Oceanographic Institute to the Pennell Bank, Ross Sea shelf, *Fissarcturus rossi* sp. nov. was sampled. It was investigated at the National Institute for Water and Atmospheric Sciences (NIWA) in October 2004.

Descriptions of the new species will be presented herein together with a species and distribution list of the 16 recognized species of *Fissarcturus* (Table 1). It should be noted that one species group (species group A) of *Fissarcturus* possess the most proximal caudola-

teral spines almost at the tip or at the tip of the pleotelson. These are the type species, *F. emarginatus* Brandt, 1990, *F. rugosus* (Nordenstam, 1933), *F. hirticornis* (Monod, 1926), *F. bathyweddellensis* sp. nov., *F. rossi* sp. nov., *F. stebbingnordenstami* (Brandt, 1990), *F. stephenseni* Wägele, 1991 and *F. poorei* (Kussakin & Vasina, 1998a, b). Another species group (species group B) bears the lateral pleotelsonic spines at about midlength of pleotelson. To this group comprises *F. elongatus* (Brandt, 1990), *F. granulatus* (Nordenstam, 1933), *F. patagonicus* (Ohlin, 1901), *F. minutus* (Brandt, 1990), *F. robustus* (Brandt, 1990), *F. scelerosus* (Brandt, 1990), *F. sandwichi* sp. nov. and *F. mawsoni* (Hale, 1946). At this stage is difficult to present a phylogenetic analysis of these two species groups as only a few phylogenetically informative characters are known.

### METHODS

Specimens were collected during the expeditions ANT XIX/3–4, ANDEEP I & II, in February and March 2002 from onboard the RV *Polarstern* in the Southern Ocean (Table 2). The collections were made by means

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**Table 1.** Zoogeographical distribution of species of *Fissarcturus*

Species	Distribution	Water depth (m)
Species group A		
<b><i>bathyweddellensis</i> sp. nov.</b>	Weddell Sea	1121
<i>emarginatus</i> Brandt, 1990	Antarctic Peninsula	97
<i>hirticornis</i> (Monod, 1926)	Magellan area and Antarctic Peninsula	120–500
<i>poorei</i> (Kussakin & Vasina, 1998a, b)	Elephant Island	3060–3100
<b><i>rossi</i> sp. nov.</b>	Ross Sea	205–220
<i>rugosus</i> (Nordenstam, 1933)	South Georgia	104–160
<i>stebbingnordenstami</i> Brandt, 1990	Falkland Islands to South Georgia	75–310
<i>stephensi</i> Wägele, 1991	Peter Island	86
Species group B		
<i>elongatus</i> Brandt, 1990	Antarctic, South Shetland Islands	219
<i>granulosus</i> (Nordenstam, 1933)	South Georgia	140–281
<i>mawsoni</i> (Hale, 1946)	Kerguelen Island	45–191
<i>minutus</i> Brandt, 1990	Antarctic Peninsula	200–300
<i>patgonicus</i> (Ohlin, 1901)	Argentina	95
<i>robustus</i> Brandt, 1990	Weddell Sea	124
<b><i>sandwichi</i> sp. nov.</b>	South Sandwich	774
<i>scelerosus</i> Brandt, 1990	Weddell Sea	295–300

**Table 2.** Station data

Station	Date	Water depth (m)	Latitude	Longitude
Andeep I				
41–3	26.01.02	2370	59°22.24'S–59°22.57'S	60°04.06 W–60°04.05'W
46–7	30.01.02	3894	60°38.33'S–60°38.06'S	53°57.38 W–53°57.51'W
114–4	17.02.02	2921	61°43.54'S–61°43.51'S	60°44.21 W–60°44.43'W
Andeep II				
133–3	07.02.02	1121	65°20.17 S–65°20.08'S	54°14.30 W–54°14.34'W
143–1	25.03.02	774	58°44.69 S–58°44.45'S	25°10.28 W–25°10.66'W
Ross Sea				
1959–61	08.02.60	220	74°20'S	179°55'W

of an epibenthic sledge (Brandt & Barthel, 1995; Brenke, 2005) in the north-western Weddell Sea at 1121 m depth and off the South Sandwich Islands at 774 m depth. The material was fixed in precooled 80% ethanol to allow future molecular analyses. In the laboratory, the material was sorted and determined using a Wild M5 dissecting microscope and illustrated using a Leitz Dialux microscope, equipped with a camera lucida. Terminology and measurements follow Brandt (1990) and Poore (2001). Total body length was measured medially from the anterior edge of the head to the posterior tip of the pleotelson. Length of segments was measured medially or laterally from the anterior margin to the posterior margin.

All ANDEEP material is deposited in the Zoological Museum, Hamburg; the specimen from the Ross Sea is deposited at NIWA, Wellington.

*Abbreviations used in the text and figures:* ZMH, Zoological Museum, Hamburg; AMNH, American Museum of Natural History; E, epinet; S, supranet; A1, antenna 1; A2, antenna 2; Hy, hypopharynx; lMd, left mandible; rMd, right mandible; Mdp, mandibular palp; Mx1, maxilla 1; Mx2, maxilla 2; Mxp, maxilliped; NIWA, National Institute for Water and Atmospheric Sciences; P1–7, pereopods 1–7; Plp 1–5, pleopods 1–5; Urp, uropod.

## TAXONOMY

VALVIFERA SARS, 1882

ANTARCTURIDAE POORE, 2001

*FISSARCTURUS* BRANDT, 1990

*Fissarcturus*: Brandt, 1990: 129; Wägele, 1991: 174; Poore, 2001: 224.

*Type species: Fissarcturus emarginatus* Brandt, 1990.

***FISSARCTURUS BATHYWEDELLENSIS* SP. NOV.**

(FIGS 1–10)

*Material examined:* holotype, male (9 mm), station ANDEEP 133-3-E, 65°20.17'–20.08'S, 54°14.30'–34'W, 1121 m, north-western Weddell Sea, 7 February 2002, RV *Polarstern* (ZMH K-40890).

*Paratype:* female (7.8 mm), station ANDEEP 133-3, station data as holotype (ZMH K-40891); male (9 mm), station ANDEEP 41-3-E, 59°22.24'–22.57'S, 60°04.06'–34'W, 1121 m, off Elephant Island, 26 January 2002, RV *Polarstern* (ZMH K-40892); 5 manca I stages, station ANDEEP 46-7-E, 60°38.33'–06'S, 53°57.38'–51'W, 3894 m, 30 January 2002, RV *Polarstern* (ZMH K-40893).

*Distribution:* South Shetland Islands, Weddell Sea, Southern Ocean.

*Etymology:* The species name is derived from Latin *bathy-*, which means 'deep' and refers to the depth and location of the type locality in the Weddell Sea. The gender is masculine.

*Diagnosis:* Dorsal pereonal spination with elements in submedial, dorsolateral, lateral and coxal rows, dorsal spines smooth, anterior ones long, prominent, spines on posterior pereonites and on pleotelson shorter, blunt. Proximal last lateral pair of spines inserted almost at caudal tip, at 98% of the pleotelson length. Minute pleotelsonic apex.

*Description of the holotype male:* Body length 9 mm (Fig. 1). Eye large, oval. Eye 0.4 of lateral length of head. Preocular spine long, acuminate, blunt, almost as long as supraocular spine. Supraocular spine blunt, long, directed frontally, slightly more than twice as long as diameter of eye. Second cephalic spine broken off in male. Two lateral smaller spines on head in male. Body long, slender (Fig. 1), pereonites 1–4 of about same length, pereonites 1–3 widest. Pereonite 4 about as wide as pereonites 5–7. All pleonites fused with pleotelson. Pereonal spination comprising elements in submedial, dorsolateral, lateral and coxal rows. Submedial and dorsolateral spines present on pereonites 1–4, submedial spines on pereonites 5–7 similar to 1–4, but smaller than on 1–4. Submedial, dorsolateral and lateral spines present on pereonites 1–7, longer and more stout on pereonites 1–4, on pereonite 4 shorter than on 3, blunt, small and tubercular-like on 5–7. Coxa 1 with 3–4 marginal spines (sexually dimorphic). Four contiguous coxal spines present on pereonite 1, frontally directed. One spine on coxae 2–7 each, longest on pereonites 2 and 3, in male tubercular-like. Ornamentation of coxae of pereonites 1–7

with tubercles, some spine-like. Six major submedial and sublateral spines on pleotelson and 4–5 lateral, last caudolateral one very prominent. Pleotelson length 0.25–0.3 times total body length. Pleotelson width 0.5 total pleotelson length. Position of most posterior lateral spines 98% of pleotelson length. Position of last lateral pair of spines on pleotelson apically. Pleotelson apex minute, convex.

A1 (Fig. 2) first peduncular article broadest and shorter than second, first and second both with medial and lateral feather-like setae, more laterally. Peduncular article 3 0.4 times length of article 2. Antenna 1 flagellum, aesthetascs seven groups of two, terminal simple setae and one short feather-like one.

A2 (Fig. 2) peduncle 0.58 body length, with strong lateral spines on articles 2–4. Peduncular articles 3–5 with lateral and medial short spinules. Antenna 2 flagellum broken off in male.

Mandibles (Fig. 2) without palp, asymmetrical. Pars incisiva of IMd with three teeth.

Mx1 (Fig. 2) of two endites, both slightly narrowing distally, lateral one distally curved medially, apex with 11 strong smooth spines. Medial endite shorter, but lost during dissection.

Mx2 (Fig. 2) consisting of three endites. Outer, lateral, endite with three long setulated setae, medial endite also with three setulated setae, inner endite with two rows of nine shorter setulated setae.

Mxp (Fig. 2) with long-oval epipod, strong endite and a five-segmented palp. Endite distodorsally with four spine-like setulated setae. One coupling hook in male. Third palpal article longest, first and last smallest, dense medial brush of long setae equipped with few setules, especially on third to fifth articles.

P1 (Fig. 3) basis slightly shorter than propodus, carpus trapezoidal, propodus subchelate and slender. Pereopod 1 propodus, length 0.5 times width. Dactylus shorter than propodus, with one long, strong distal claw. Propodus and dactylus densely setose. Ventral surface of propodus with few setae, most on medial part and on palm. Mediodorsal side of propodus forming a concave 'spoon', curved dorsolateral surface with long setae, arranged in six parallel transverse rows of combs, dorsal part of palm bearing many medially directed setae.

P2–4 (Fig. 3) similar. P2 shortest, P4 longest, many long setae on posteromedial margins, some long setae on anterolateral margins, especially on carpus and propodus. Dorsal ornamentation of basis with tuberculated spines, and small blunt spines scattered on ventral side of carpus and propodus of P3 and P4, ischium-carpus of P2–P4 dorsal margin with tuberculated spines. Eight, seven, eight setal groups on carpus. Seven, five, four setal groups on propodus. Pereopods 2–3 dactylus, length 0.5 propodus. Unguis as long or longer than dactylus. Pereopods 2–3, unguis, length 1

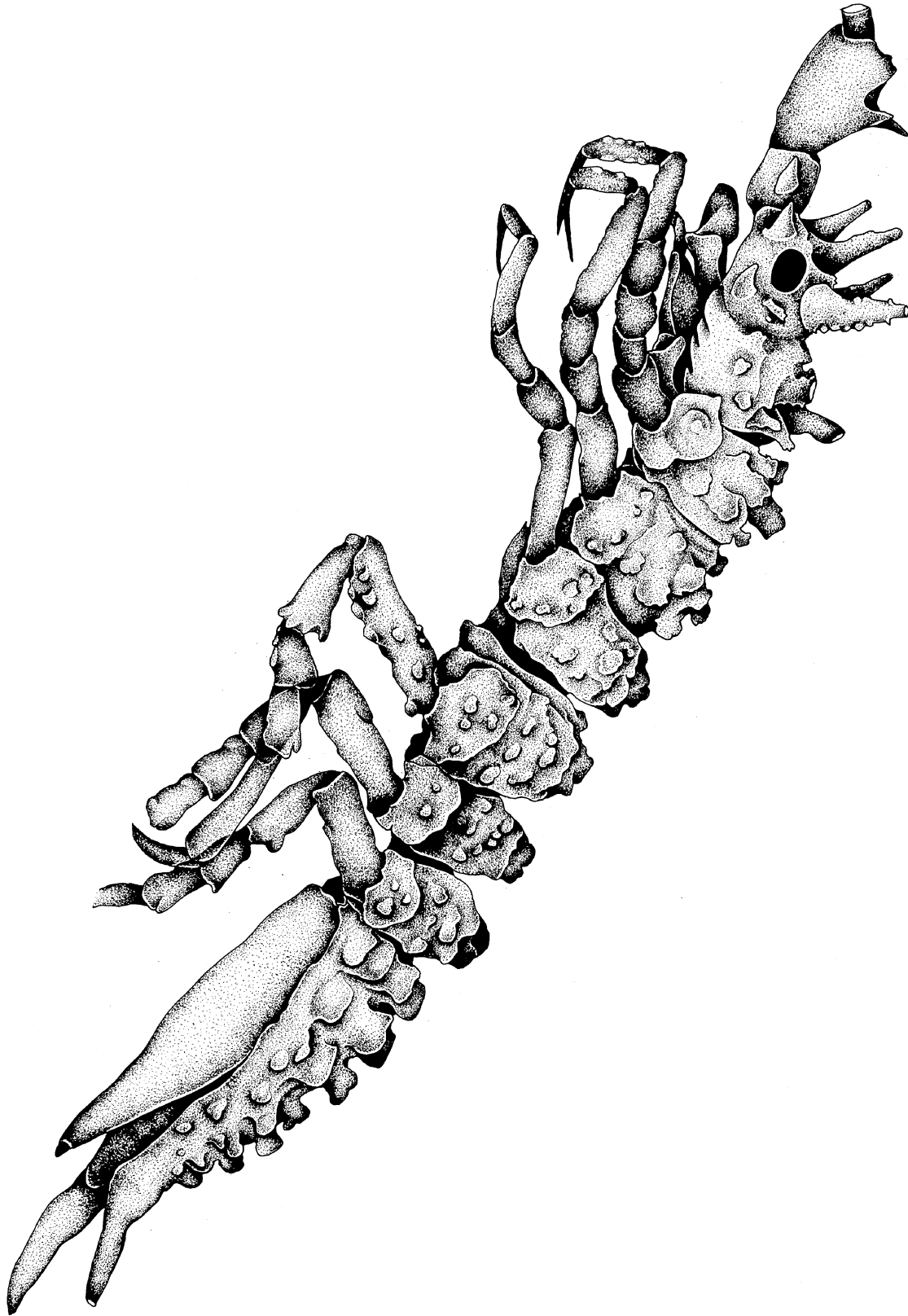
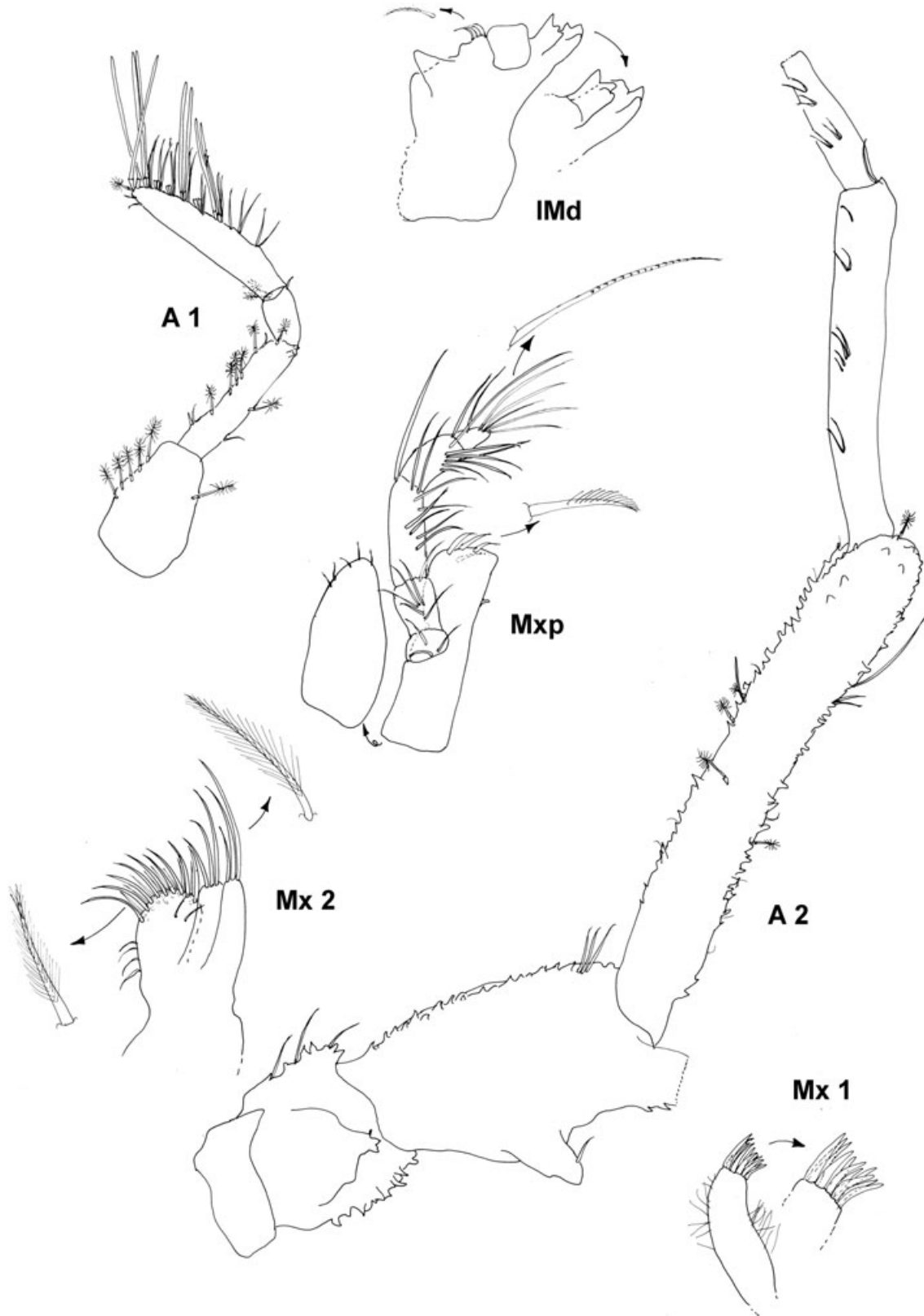


Figure 1. *Fissarcturus bathyweddellensis* sp. nov. Male holotype, lateral view.





**Figure 2.** *Fissarcturus bathyweddellensis* sp. nov. Male holotype, antennula, antenna, left mandible, maxillula, maxilla, maxilliped.

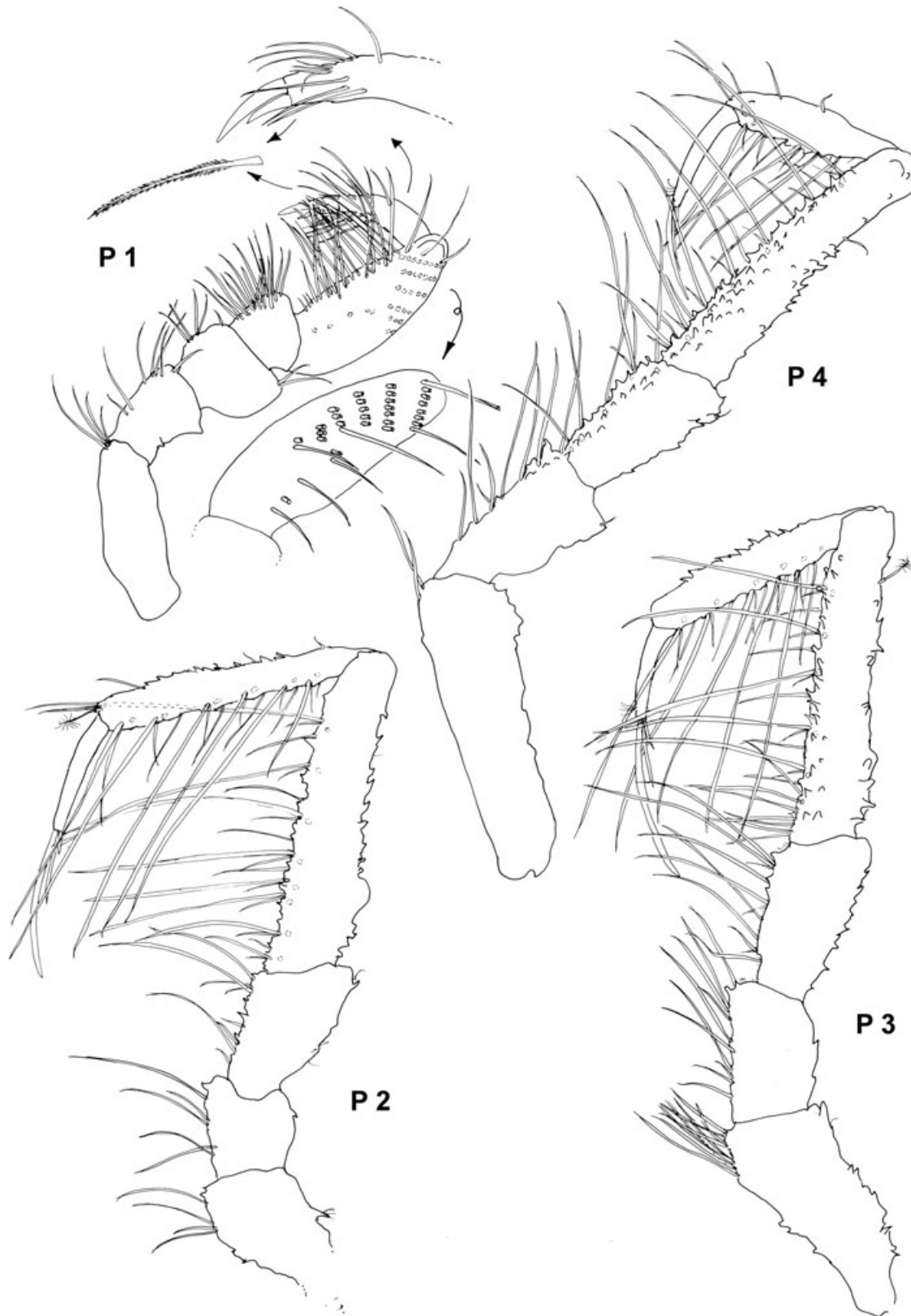


Figure 3. *Fissarcturus bathyweddellensis* sp. nov. Male holotype, pereopods 1–4.

dactylus. Pereopod 4, dactylus, length 0.5 propodus. Pereopod 4, unguis, length 0.5 dactylus.

P5–7 (Fig. 4) similar in shape and setation and shorter and stouter than P2–P4, P7 smallest. Basis of P5 and P6 longest article, of P7 propodus longest. Basis with 1–2 feather-like setae. Merus, carpus and propodus with ventral strong setulated sensory setae, and some additional ventrolateral ones. Propodus dorsally with one feather-like seta and several simple setae. Dactyli all broken off in holotype.

Plp1 (Fig. 4) sympod 0.4 as long as rami, with seven coupling setae. Exopod length 0.9 length and 1 width of endopod. Male pleopod 1 exopod terminally and medially equipped with setae. Male pleopod 1 endopod, groove opening at 80% of length, and groove opening with row of small scales. Endopod with eight distal and 20 lateral setae.

Plp2 (Fig. 4) very similar to Plp1, but with much shorter sympod, about 0.2 as long as rami, without lateral spines, but with three medial coupling setae. Appendix masculina 1.2 length of endopod, simple.

Plp3 (not illustrated) with very short sympod, as following pleopods; exopod with shorter lateral plumose setae, endopod bare.

Plps 4 and 5 (Fig. 5) exopod with two and one plumose seta, respectively.

Urp (Fig. 5) endopod 0.7 length of exopod. Uropod endopod with three distal setae.

*Female paratype (differences to holotype male) of 7.8 mm length:* Preocular spines acute (Figs 6, 7). Second cephalic spine, longer and more robust than supraocular spine, acute in female, three other spines on head. Pereonites, pleonites and pleotelson of female with very similar pattern of spination if compared with male, but spines are generally slightly longer and more acute. Four erect coxal spines on pereonite 1. Antennula (Fig. 8) with two pairs of aesthetascs and fewer feather-like setae on lateral and medial margins. Antenna (Fig. 8), fifth article with few tubercles, flagellum of five articles. Maxilliped (Fig. 8) with long, distally acuminate epipod, strong endite and a five-segmented palp. Endite distodorsally with seven spine-like setulated setae, medially with another three setae, no coupling hooks present. Medial brush of long setae equipped with few setules more dense than in male, especially on third to fifth articles. Pereopods (Figs 9, 10) all very similar, but ischium, merus and carpus of female with distal, blunt, spine-like projections. Endopodite of uropod (Fig. 10) with three setae.

*Remarks:* *F. bathyweddellensis* can easily be distinguished from other species of the genus by the spination on the dorsum of the body. It is similar to *F. emarginatus* Brandt, 1990, but has a longer and stouter second cephalic spine. In addition, its pereonal

spination comprises elements in submedial, dorsolateral, lateral and coxal rows, whereas that of *F. emarginatus* only has submedial, dorsolateral and coxal rows. In contrast to the long and acute spines of *F. emarginatus* on the posterior pereonites and pleonites, those of *F. bathyweddellensis* are shorter, blunt and more tubercle-like on these body segments.

#### *FISSARCTURUS SANDWICHI* SP. NOV. (FIGS 11–20)

*Material examined:* Holotype, male (8.2 mm), Station ANDEEP 143-3, 65°18.55'S, 51°31.95'W, 2893–2894 m, South Sandwich Islands, 6 March 2002, RV *Polarstern* (ZMH K-40894).

*Paratypes:* Female (9 mm – illustrated), station ANDEEP 143-3, same locality as holotype, RV *Polarstern* (ZMH K-40895); further paratype material from the same station: male (juveniles 7, 7.5, adult 10 mm), female (2 ovig: 8 mm), Manca (2.8, 3, 3, 3.8, 4, 4.8, 5, 5.2, 5.2 mm), juveniles (6.3, 6.5, 7 mm).

*Distribution:* Southern Ocean, South Sandwich Islands.

*Etymology:* The species name is derived from the name of the type locality, the South Sandwich Islands. The gender is masculine.

*Diagnosis:* Strong frontally bent supraocular spines (females with second cephalic spines) and dorsum covered with flat, cauliflower-like elevations in submedial, lateral and coxal rows.

*Description of the holotype male:* Body (Fig. 11) length 8.2 mm. Eye rounded. Eye 0.2 of lateral length of head. Preocular spine absent. Supraocular spine long, blunt, strongly curved frontally. Second cephalic spine shorter than supraocular spine, boss-like, with spinules or tubercles. Second cephalic spine hemispherical bosses. Other spines on head absent. Body long, slender (Fig. 11). Pereonites 1–3 of about same length, pereonite 4 longest, anterior pereonites of about same width. Pereonites 5–7 slightly narrowing in width. Pereonal spination comprising elements in submedial, dorsolateral and coxal rows. Submedial spines present on pereonites 1–4, dorsolateral spines present on pereonites 1–3. Submedial spines present on pereonites 5–7 absent in male. Spines present on 1–7, of cauliflower shape (except for supraocular ones), two pairs on pereonites 1–3. Dorsolateral spines present on 1–3, of cauliflower shape. Three or four contiguous marginal spines on coxa 1, frontally directed, pereonites 5–7 only with tubercles in both sexes. Intermediate ornamentation on pereonites absent. All pleonites fused with pleotelson. No submedial spines on pleotelson. Position of lateral spines on pleotelson at half length. Pleotelson length 0.35 body length.

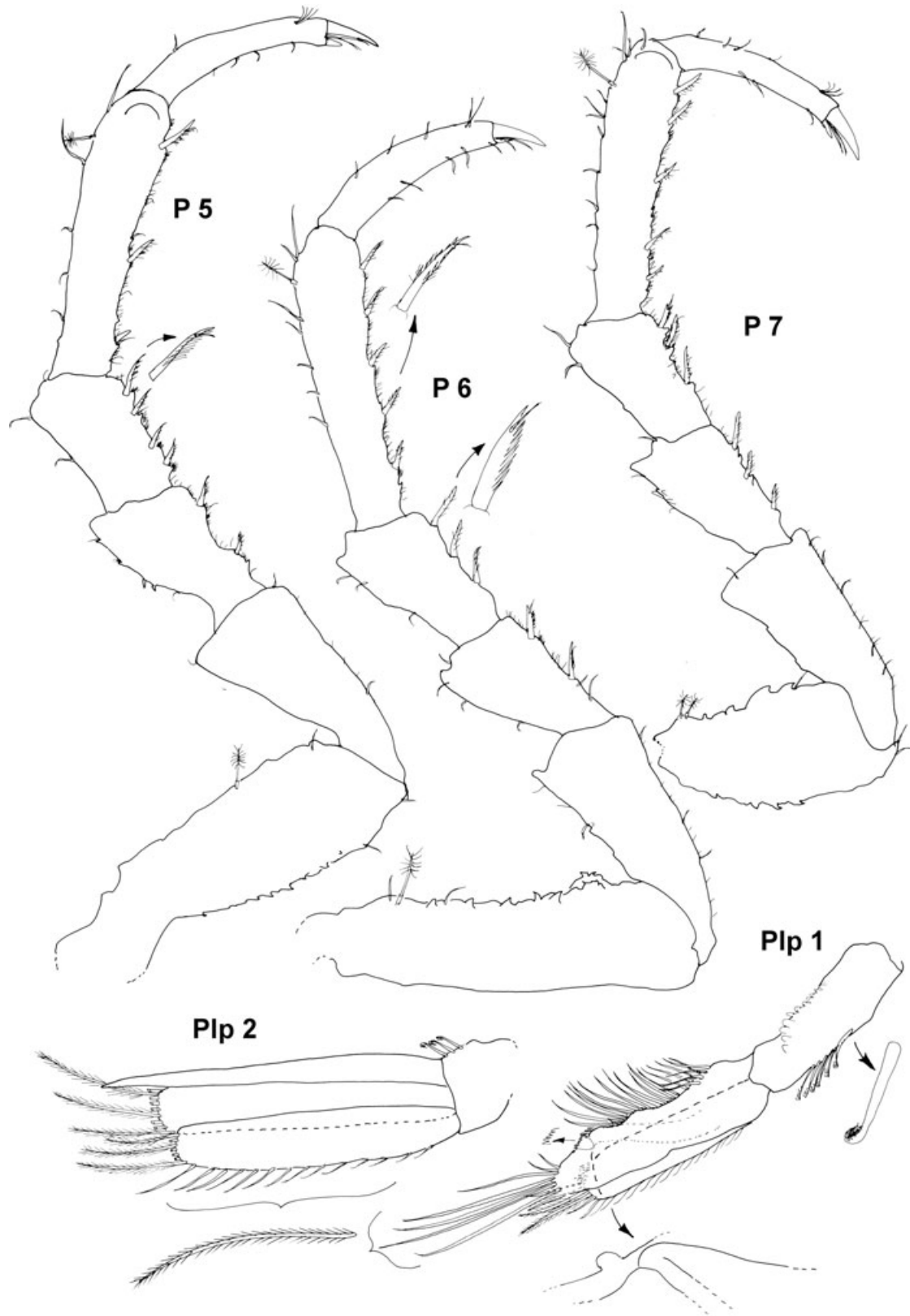


Figure 4. *Fissarcturus bathyweddellensis* sp. nov. Male holotype, pereopods 5–7, pleopods 1–2.



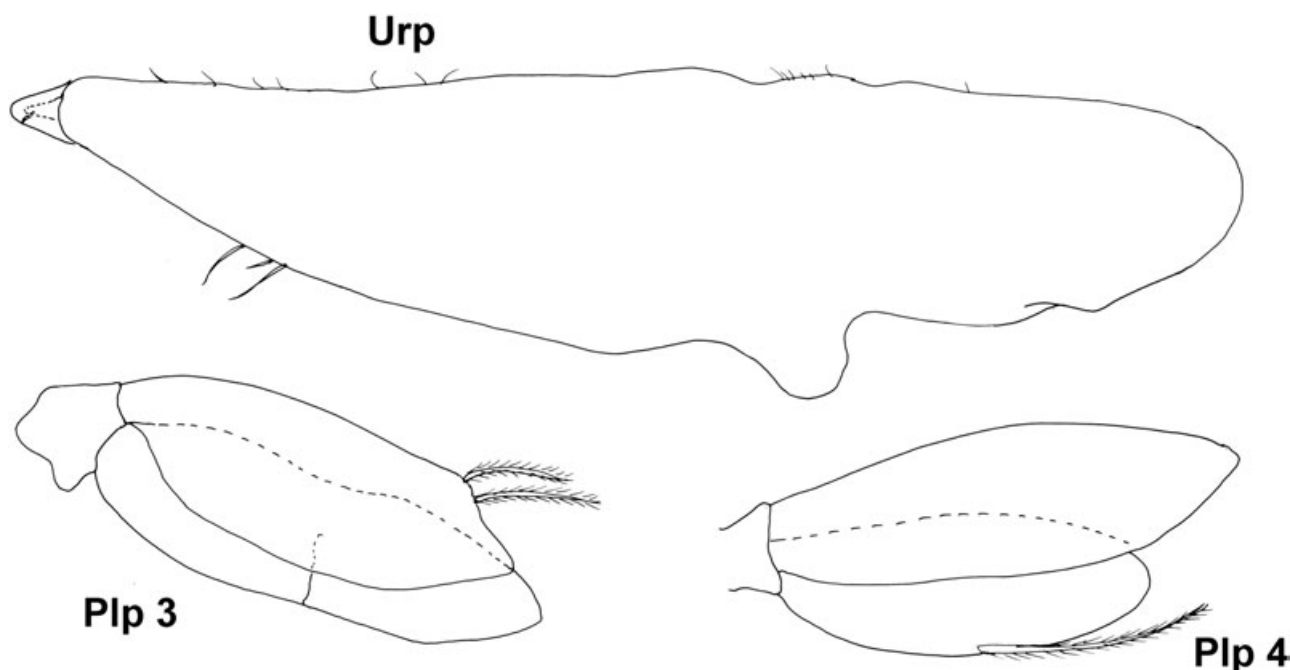


Figure 5. *Fissarcturus bathyweddellensis* sp. nov. Male holotype, pleopods 3–4, uropod.

Pleotelson width 0.3 total pleotelson length. Pleon spination, male only with small scattered tubercles. Position of most posterior lateral spines 55% of pleotelson length in male. Pleotelson apex prominent, triangular, caudally rounded.

A1 (Fig. 12) first peduncular article broadest and shorter than second, first and second both with medial feather-like setae. Peduncular article 3 0.4 length of article 2. Antenna 1 flagellum, one proximal single, six groups of two and three apical ones in male.

A2 (Fig. 12) peduncle 0.8 body length. Antenna 2 peduncle scattered tubercles on articles 2–4 female. Antenna 2 flagellum with five articles.

Mandibles (Fig. 12) without palp, asymmetrical. Pars incisiva and lacinia mobilis of LMd with three teeth.

Mx1 (Fig. 12) of two endites, both slightly narrowing distally, lateral one distally curved medially, apex with 11 strong smooth spines. Medial endite shorter, with three stout setulated setae.

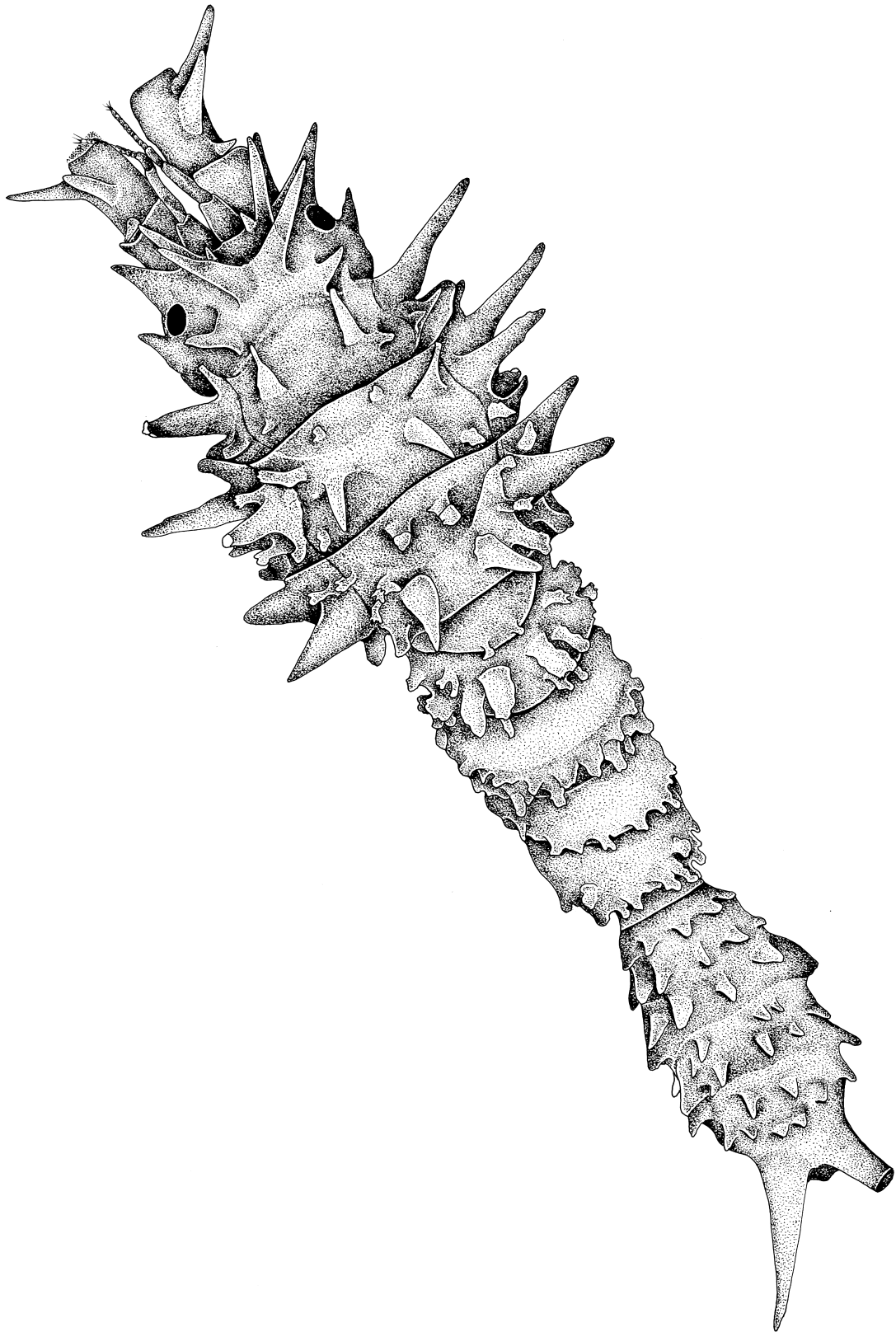
Mx2 (Fig. 12) consisting of three endites. Outer, lateral, endite with three long setulated setae, medial endite also with three setulated setae, inner endite with a rows of eight shorter setulated setae.

Mxp (Fig. 12) with long, oval epipod slightly waisted laterally in distal third, rounded endite and a five-segmented palp. Endite distodorsally with six spine-like setae, one being setulated. No coupling hooks. Third palpal article longest, slightly longer than fourth, first and last smallest, dense medial brush of long sensory setae, especially on third to fifth articles.

P1 (Fig. 13) basis about as long as propodus, carpus trapezoidal, propodus subchelate and slender. Pereopod 1 propodus, length 1–1.4 of total width. Dactylus shorter than propodus, with one long, strong distal claw. Propodus and dactylus densely setose. Ventral surface of propodus with few setae, most on medial part and on palm. Mediodorsal side of propodus forming a concave ‘spoon’, curved dorsolateral surface with long setae, arranged in five parallel transverse rows of combs, dorsal part of palm bearing many medially directed sensory setae.

P2–4 (Figs 13, 14) similar, P2 shortest, P4 longest. Eight, 8, 7–9 setal groups on carpus of pereopods 2–4, and 6–8, 6–7, 5–6 setal groups on propodus of pereopods 2–4. Dorsal ornamentation of basis tubercles and denticulate spines in males. Pereopods 2–4, ornamentation on ischium-carpus tubercles in male only on pereopod 4. Pereopods 2–3 dactylus, length 0.4–0.5 length of propodus. Unguis as long or longer than dactylus. Pereopods 2–3 unguis, length 1.2–1.3 that of dactylus. Pereopod 4, dactylus, length 0.4–0.5 that of propodus, and 0.7–1 length of dactylus. Pereopod 4 dactylus of male without setae.

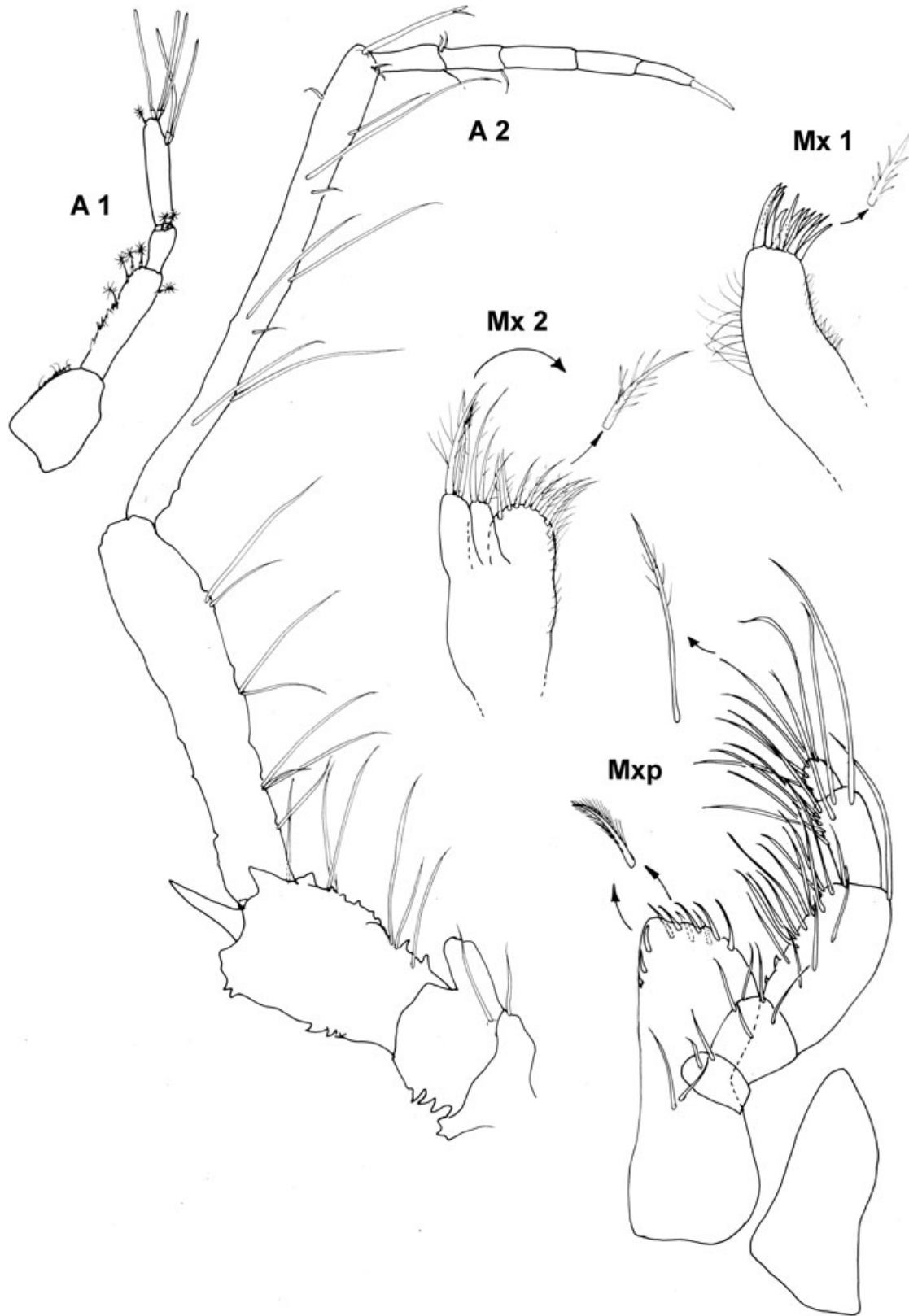
P5–7 (Figs 13, 14) similar in shape and setation and shorter and stouter than P2–P4. Pereopods 5–7 progressively shorter, with tubercles on basis. Basis of P5–P7 longest article. Basis of P6 and P7 with one feather-like seta. Merus, carpus and propodus with ventral strong setulated setae. Propodus dorsally with one feather-like seta and some simple setae of varying



**Figure 6.** *Fissarcturus bathyweddellensis* sp. nov. Female paratype, dorsal view.



Figure 7. *Fissarcturus bathyweddellensis* sp. nov. Female paratype, lateral view.



**Figure 8.** *Fissarcturus bathyweddellensis* sp. nov. Female paratype, antennula, antenna, maxillula, maxilla, maxilliped.



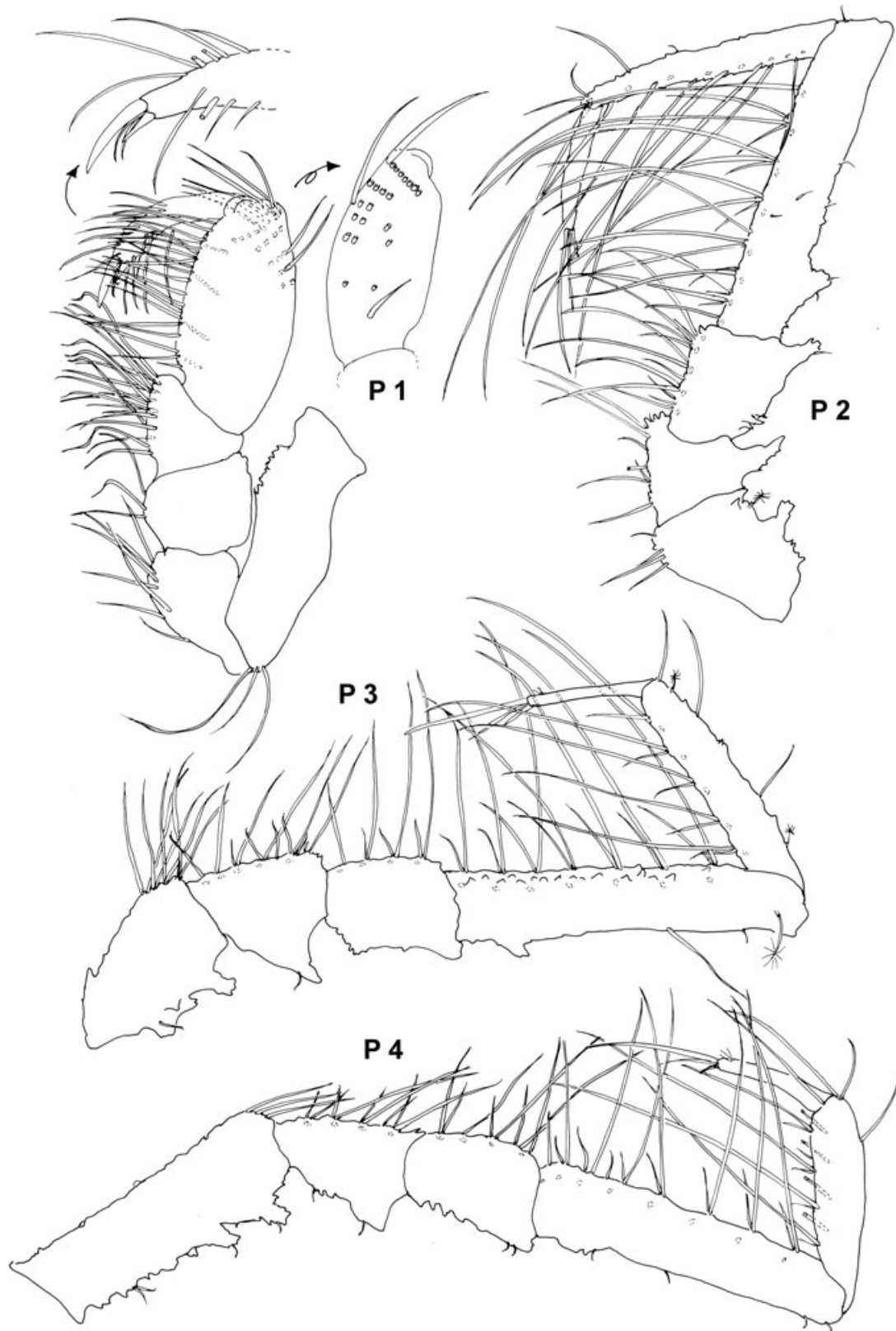
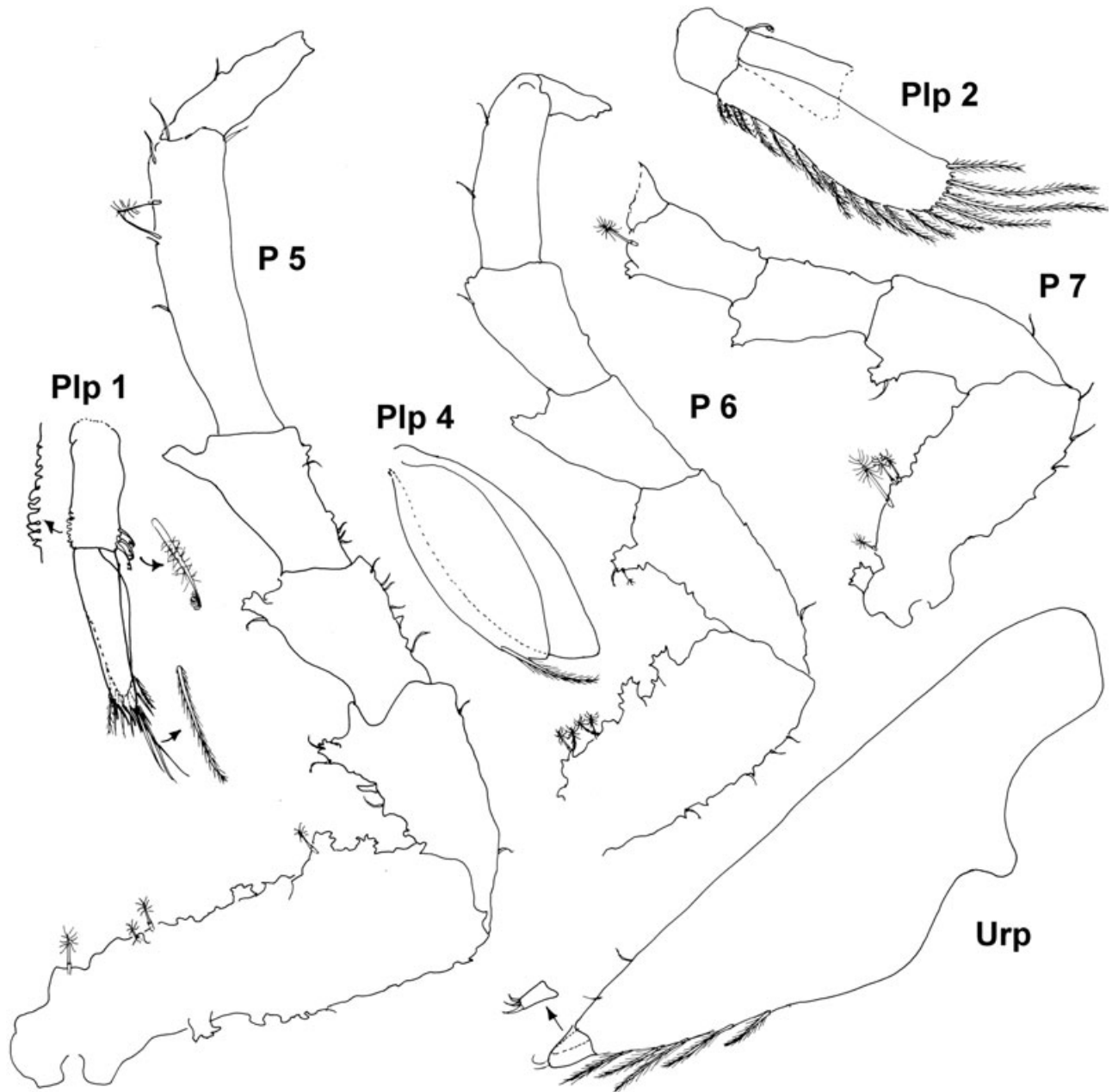


Figure 9. *Fissarcturus bathyweddellensis* sp. nov. Female paratype, pereopods 1–4.



**Figure 10.** *Fissarcturus bathyweddellensis* sp. nov. Female paratype, pereopods 5–7, pleopods 1–2, 4, uropod.

lengths. Dactyli with two short claws, dorsal one much longer than ventral one.

Plp1 (Fig. 15) sympod 0.8 as long as rami, with four coupling setae. Male pleopod 1 exopod length 1 endopod. Male pleopod 1 exopod 1 width of endopod. Male pleopod 1 exopod terminally and medially equipped with setae. Male pleopod 1 endopod, groove opening 60% of length, and groove opening with row of small scales and four stout small setae on proximal lobe. Male pleopod 1 endopod with 19 distal and nine lateral setae.

Plp2 (Fig. 15) very similar to Plp1, but with much shorter sympod, about 0.3 as long as rami, with three medial coupling setae. Appendix masculina 1.1 length of endopod, acute, small denticles on distal part.

Plp3 (Fig. 14) with very short sympod (0.1 length of endopod and exopod), as following pleopods; endopod with four medial and three lateral plumose setae, exopod bare.

Plp 4 (Fig. 14) endopod with two plumose setae.

Urp (Fig. 14) endopod 0.6 length of exopod. Uropod endopod with two distal setae.

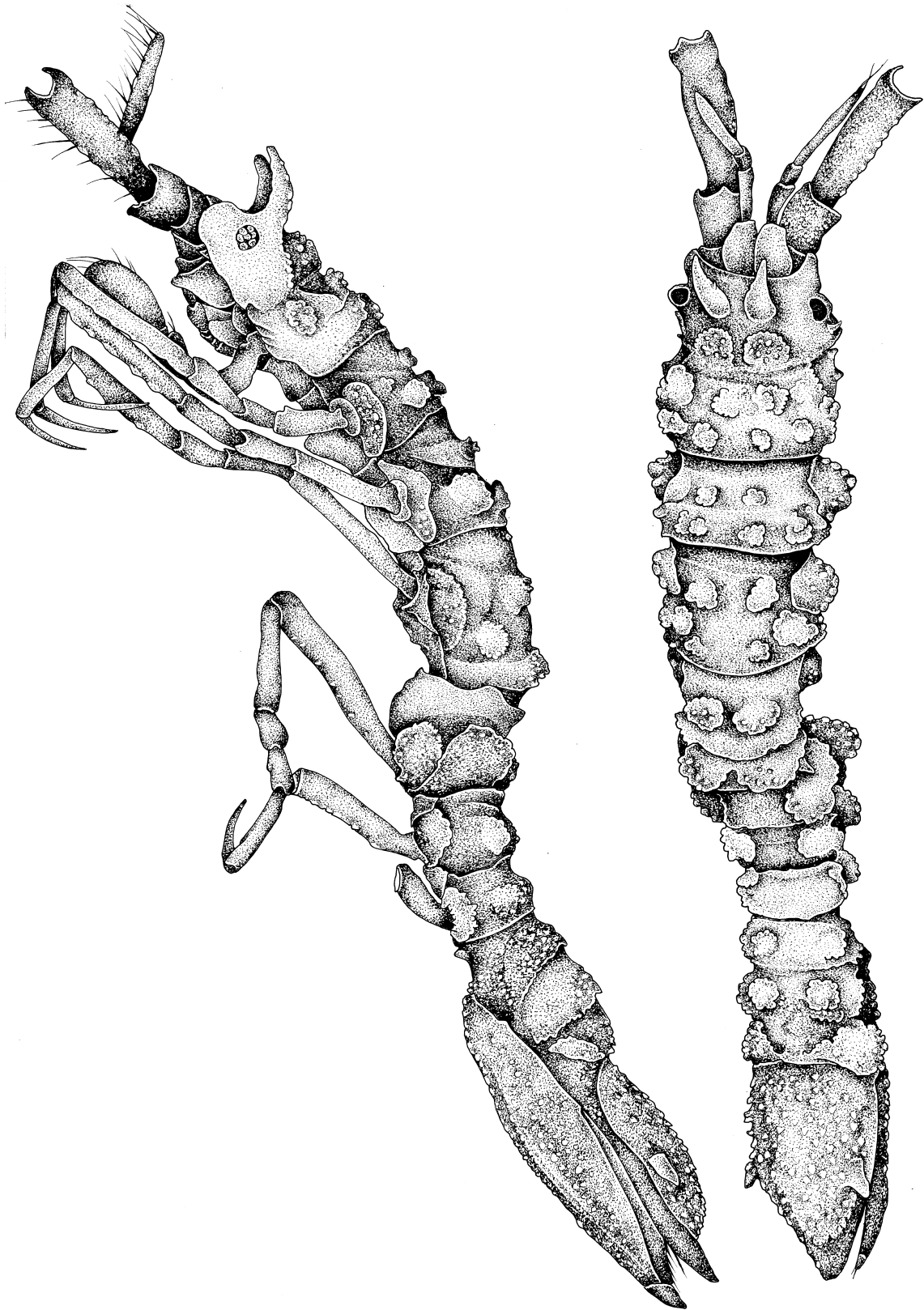
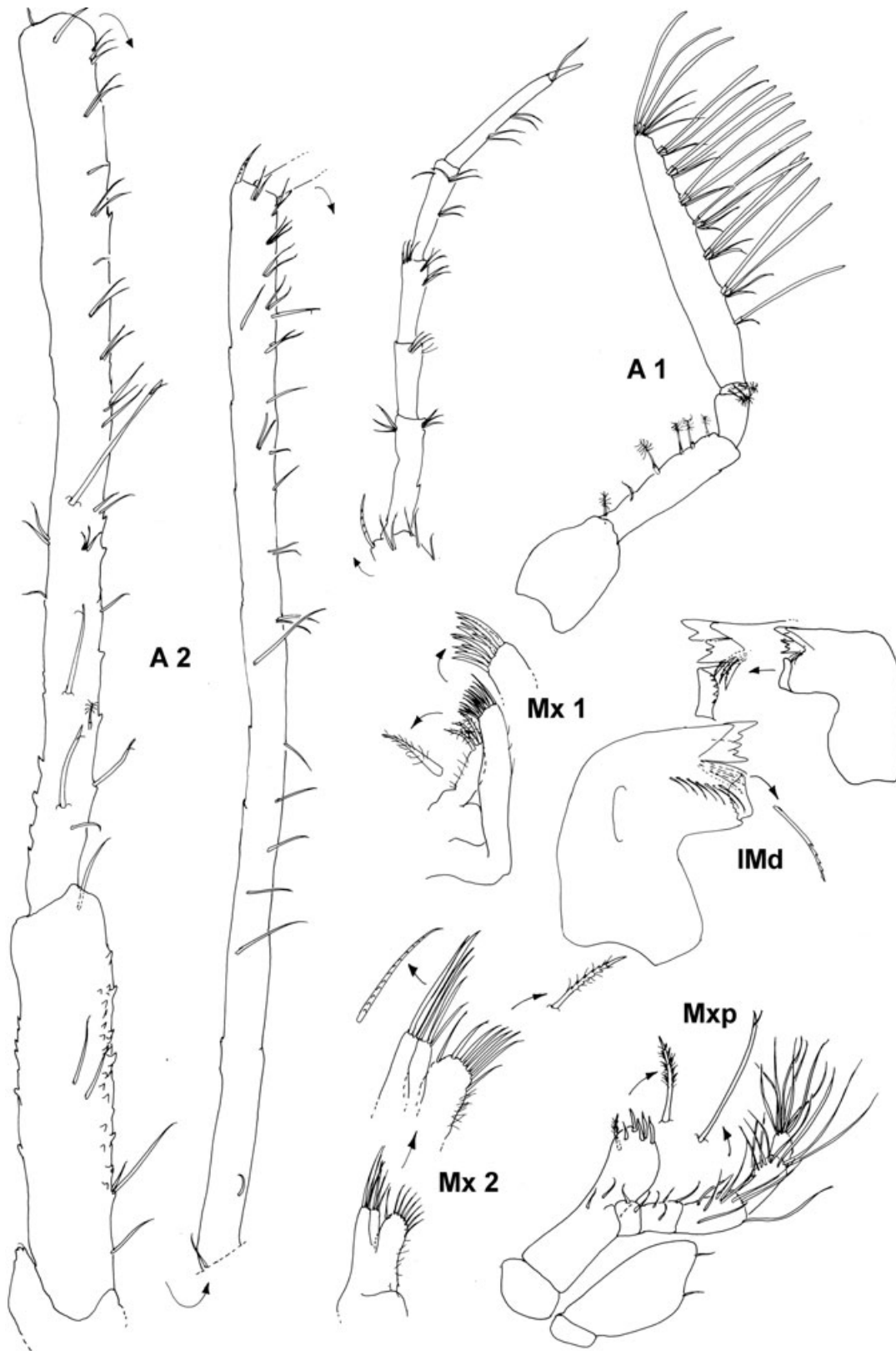


Figure 11. *Fissarcturus sandwichi* sp. nov. Male holotype, dorsal and lateral views.



**Figure 12.** *Fissarcturus sandwichi* sp. nov. Male holotype, antennula, antenna, left mandible, maxillula, maxilla, maxilliped.



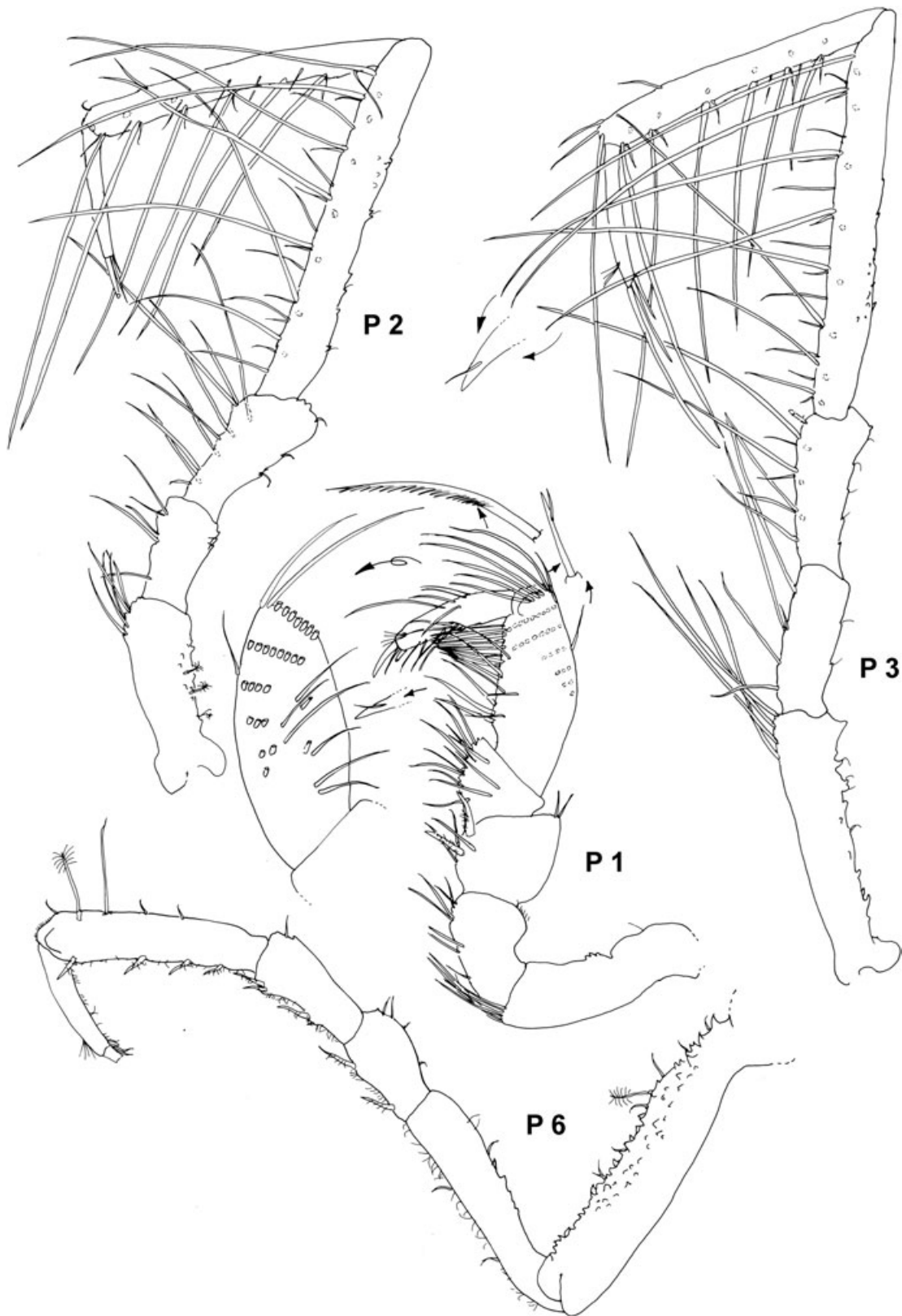


Figure 13. *Fissarcturus sandwichi* sp. nov. Male holotype, pereopods 1–3, 6.

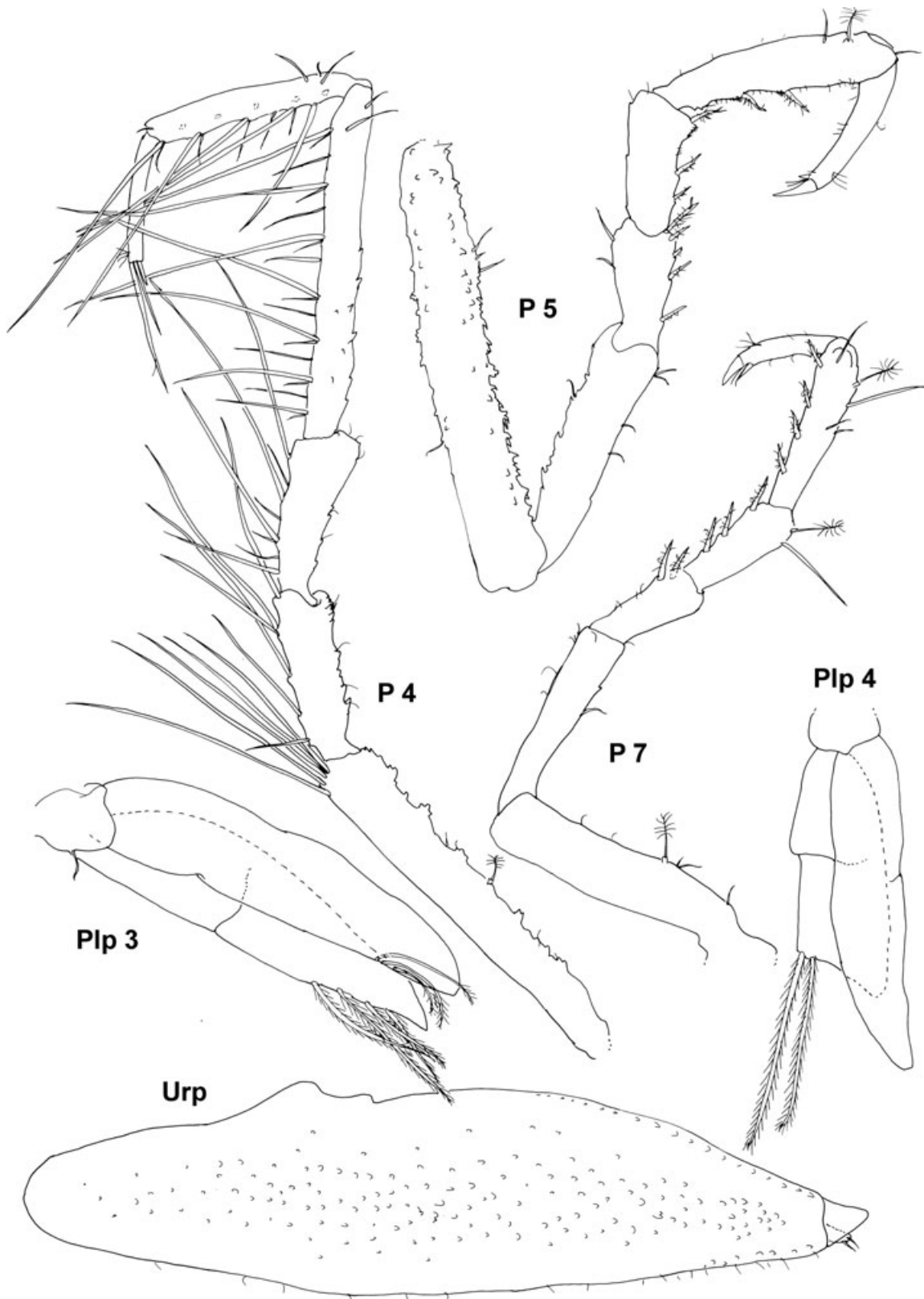
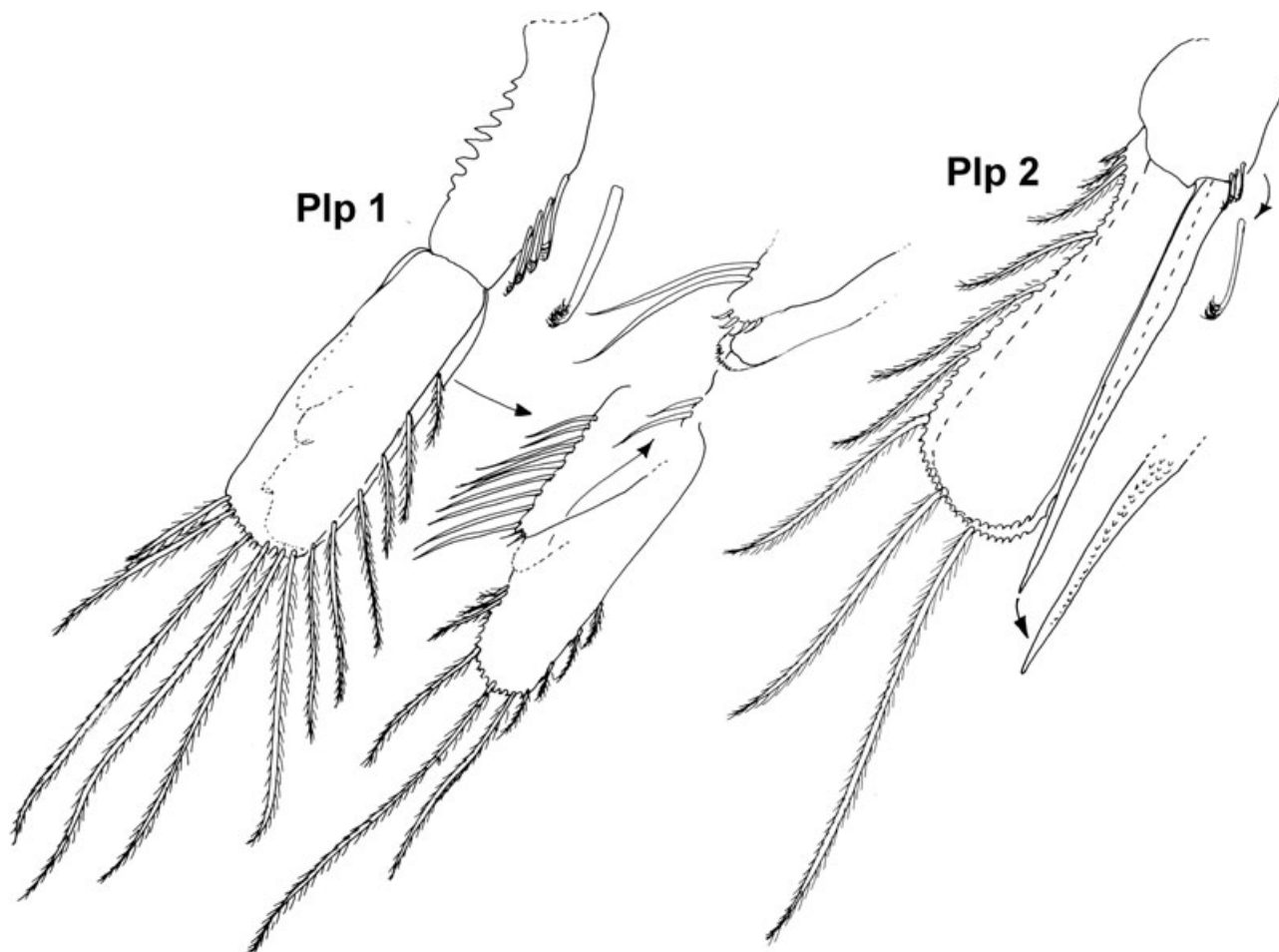


Figure 14. *Fissarcturus sandwichi* sp. nov. Male holotype, pereopods 4–5, 7, pleopods 3–4, uropod.



**Figure 15.** *Fissarcturus sandwichi* sp. nov. Male holotype, pleopods 1–2.

*Female paratype (Figs 16–19) (differences to holotype male) of 9 mm length:* Dorsolateral spines present on 1–3, of cauliflower shape; female with long spines on pereonite 1, almost as long as supraocular ones, frontally curved (Fig. 16). Pereonites, pleonites and pleotelson of female with very similar pattern of spination if compared with male, but cauliflower-like spines are generally slightly more pronounced. Four erect marginal coxal spines present on pereonite 1. Margins of coxae 2 and 3 with anteriorly and posteriorly directed spines in female only. No coxal spine on pereonite 1 of either sex; one spine on coxa 2 of female, coxae 3–4 with cauliflower-like elevations on female, 5–7 only with tubercles in both sexes. Pleon spination of female with submedial and lateral cauliflower-like setae. Position of most posterior lateral spines 70% of pleotelson length in female. Antennular flagellum of female broken off. Antennal flagellum (Fig. 17) of four articles. Maxilliped (Fig. 17) with long, oval epipod, endite with six spine-like setulated setae, medially with another five simple setae, no coupling hooks

present. Pereopods 2–4 (Fig. 18) and 5–7 (Fig. 19), ornamentation with tubercles and denticulate spines in both sexes, but more prominent in female. On ischium-carpus tubercles on pereopods 2–4 in female. Marginal setae of P2–3 dactylus in female only. Pereopod 4 dactylus with few setae in female, none in male. Pleopod 2 (Fig. 20) without appendix masculina. Endopodite of uropod (Fig. 20) with three setae.

*Remarks:* *F. sandwichi* can easily be distinguished from all other species of *Fissarcturus* by its typical ornamentation of the dorsum. It is characterized by a strongly frontally bent supraocular spine, equipped with some tubercular-like pegs (females with another second pair of cephalic spines which are only slightly shorter). All other species of *Fissarcturus* possess more spines on additional pereonites, except for *F. patagonicus* (Ohlin, 1901) and *F. granulatus* (Nordenstam, 1933), which are characterized by minute supraocular spines. Moreover, the dorsum of *F. sandwichi* is covered with flat, cauliflower-like

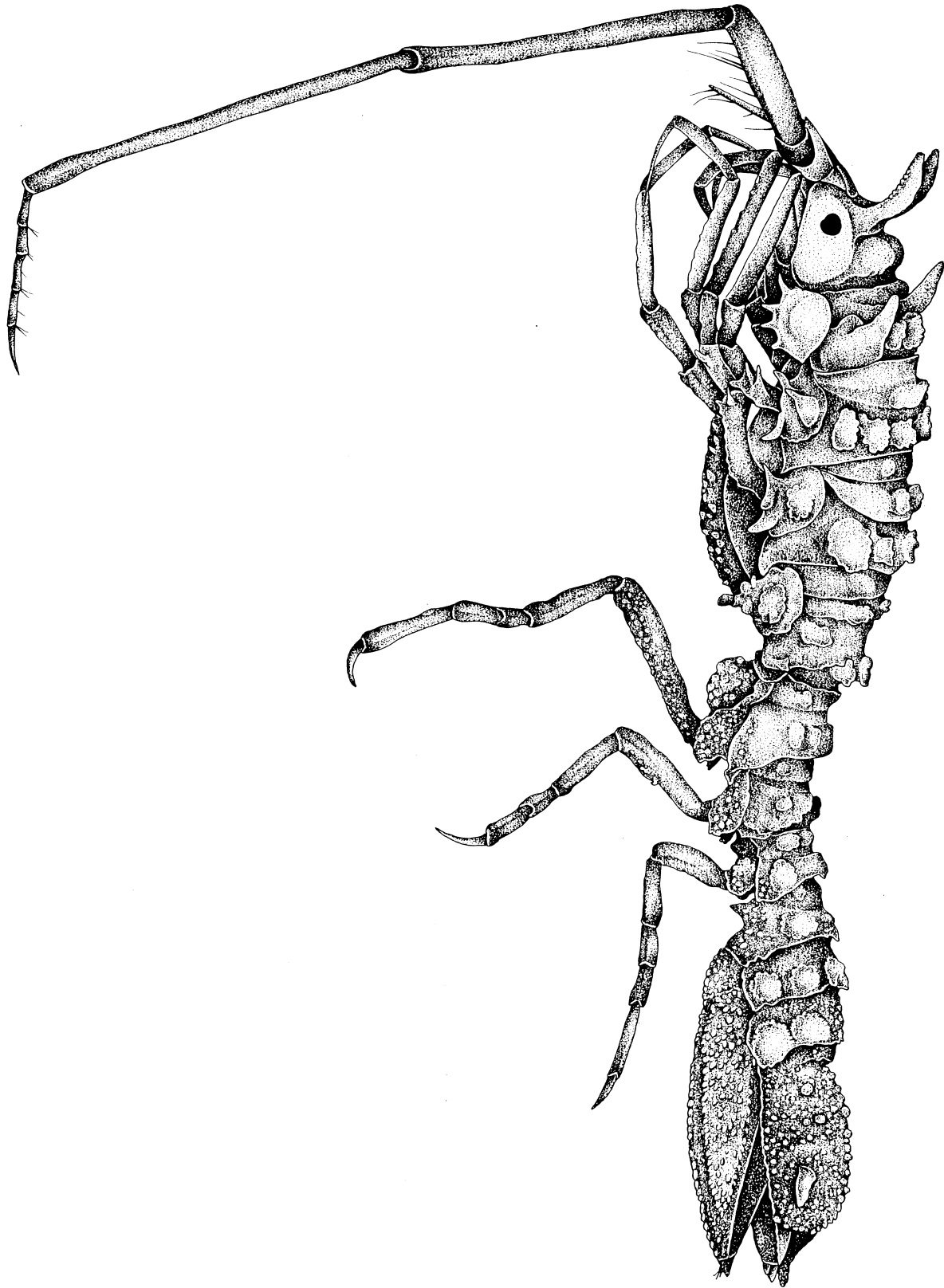
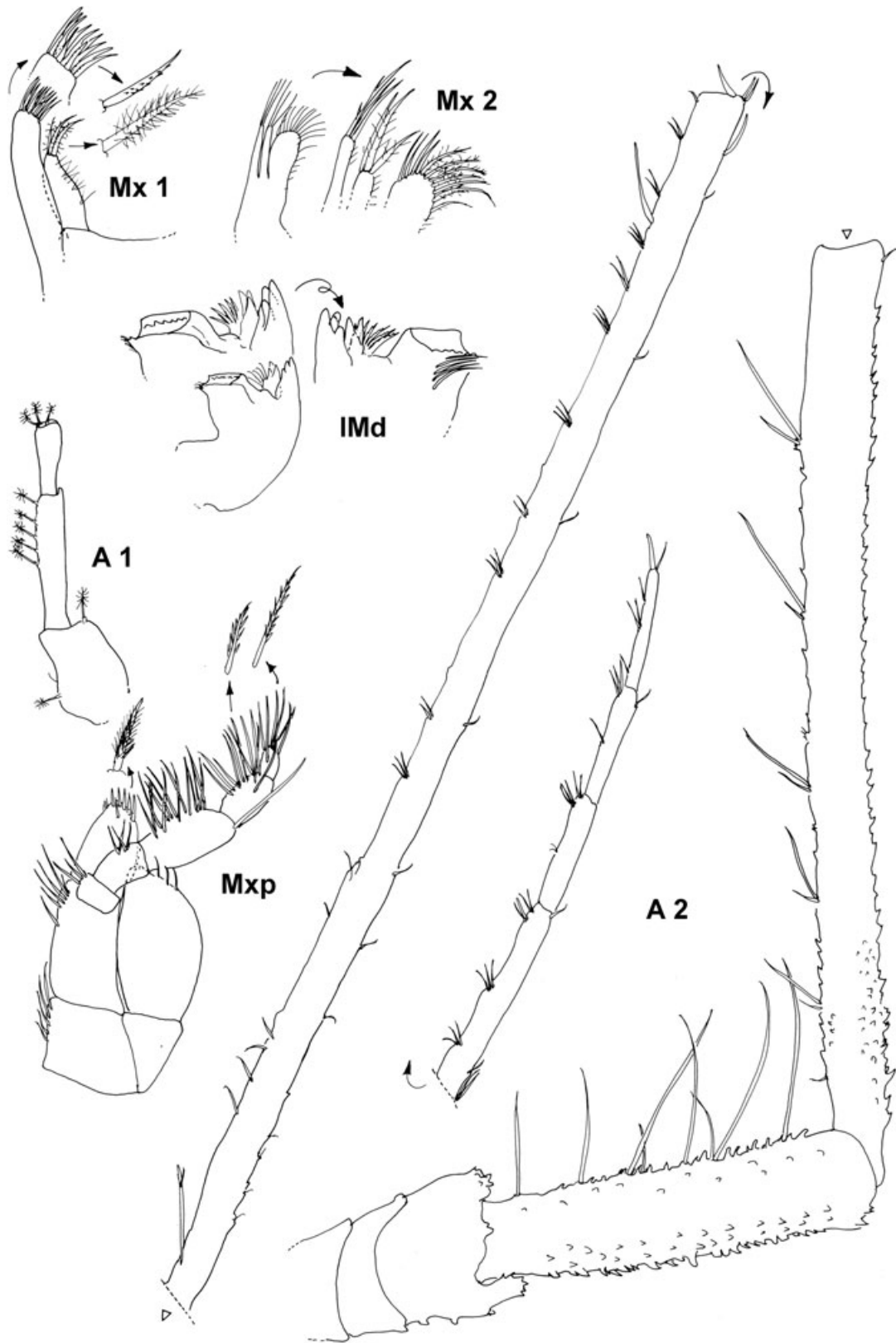


Figure 16. *Fissarcturus sandwichi* sp. nov. Female paratype, lateral view.





**Figure 17.** *Fissarcturus sandwichi* sp. nov. Female paratype, antennula, antenna, maxillula, maxilla, maxilliped.

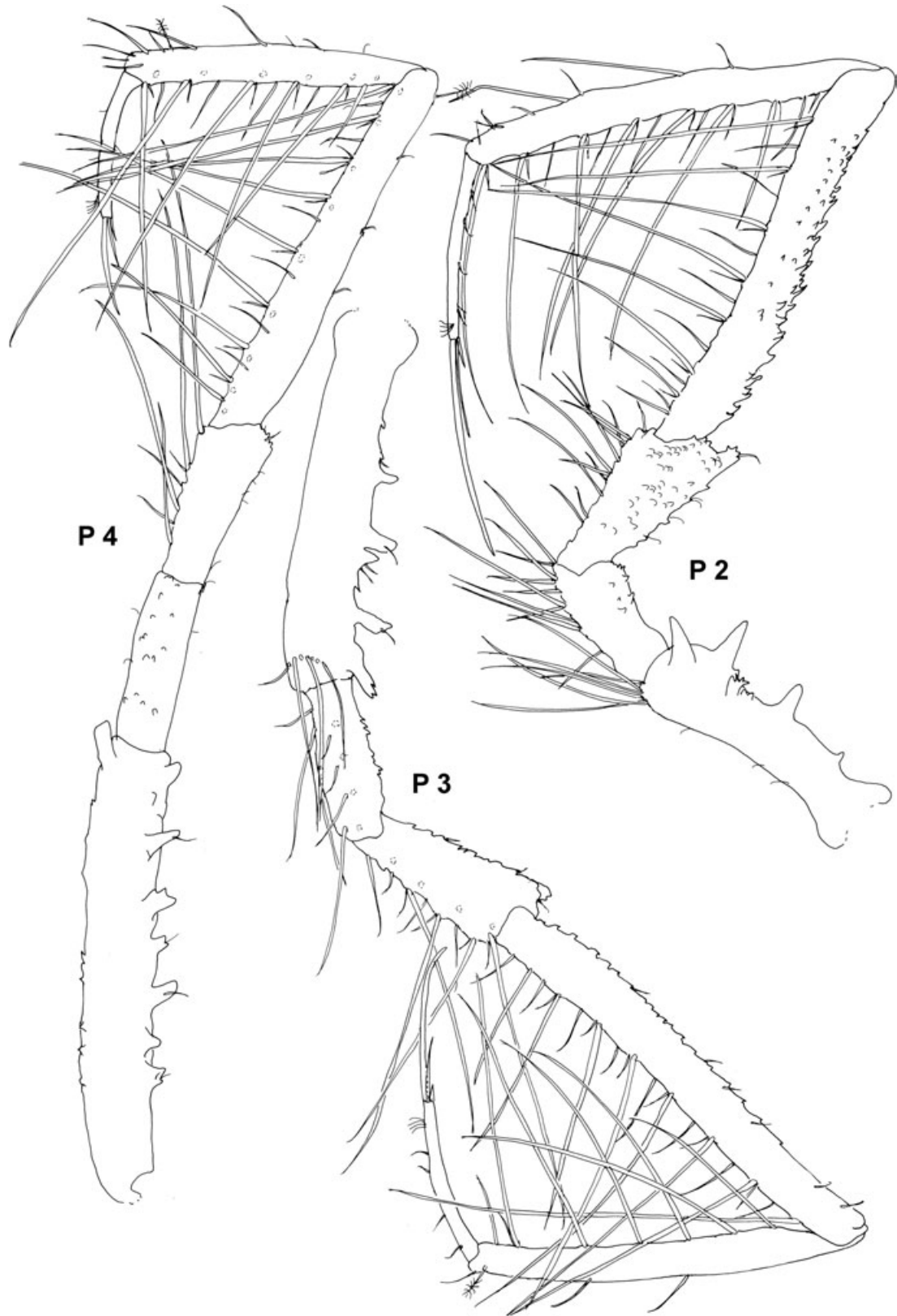


Figure 18. *Fissarcturus sandwichi* sp. nov. Female paratype, pereopods 2–4.

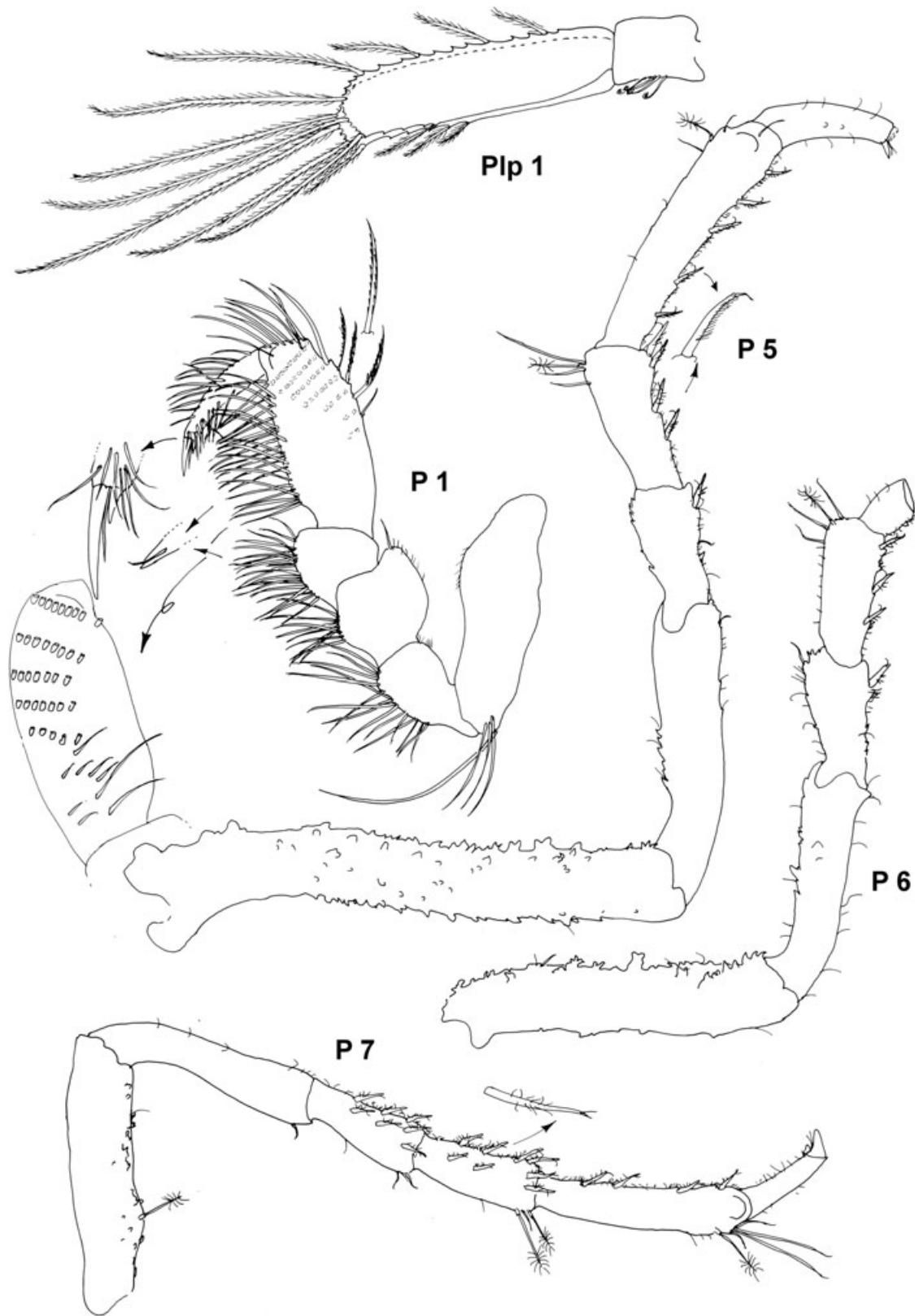
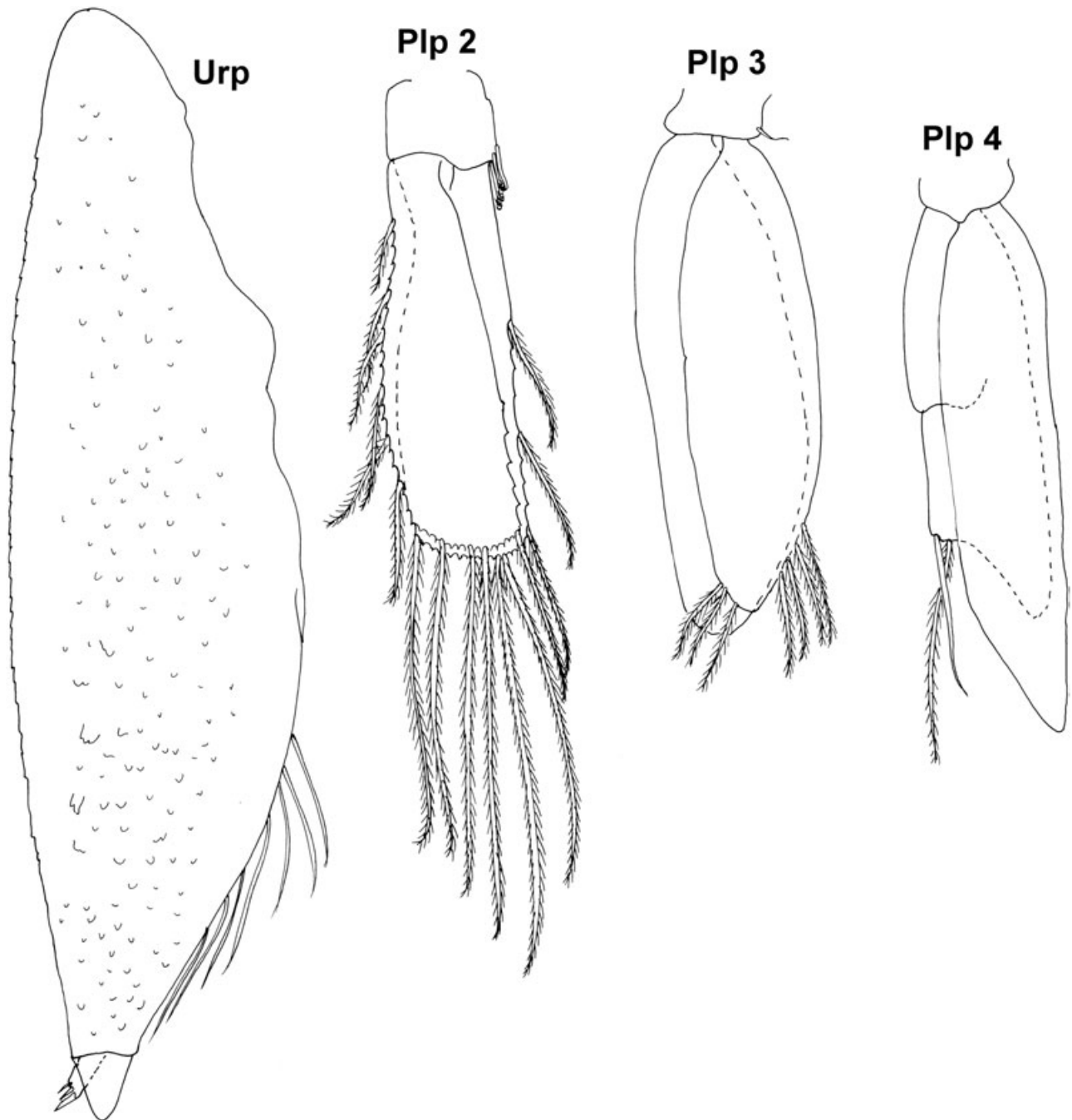


Figure 19. *Fissarcturus sandwichi* sp. nov. Female paratype, pereopods 1, 5–7, pleopod 1.



**Figure 20.** *Fissarcturus sandwichi* sp. nov. Female paratype, pleopods 2–4, uropod.

elevations in submedial, lateral and coxal rows, which are not present in this form in any other species of *Fissarcturus*.

**FISSARCTURUS ROSSI SP. NOV.** (FIGS 21–23)

*Material examined*: Holotype, female (10.5 mm), station, 74°20'S, 179°55'W, 205–220 m, Pennell

Bank, Ross Sea, 8 February 1960, New Zealand Oceanographic NIWA 3926.

*Distribution*: Only known from type locality.

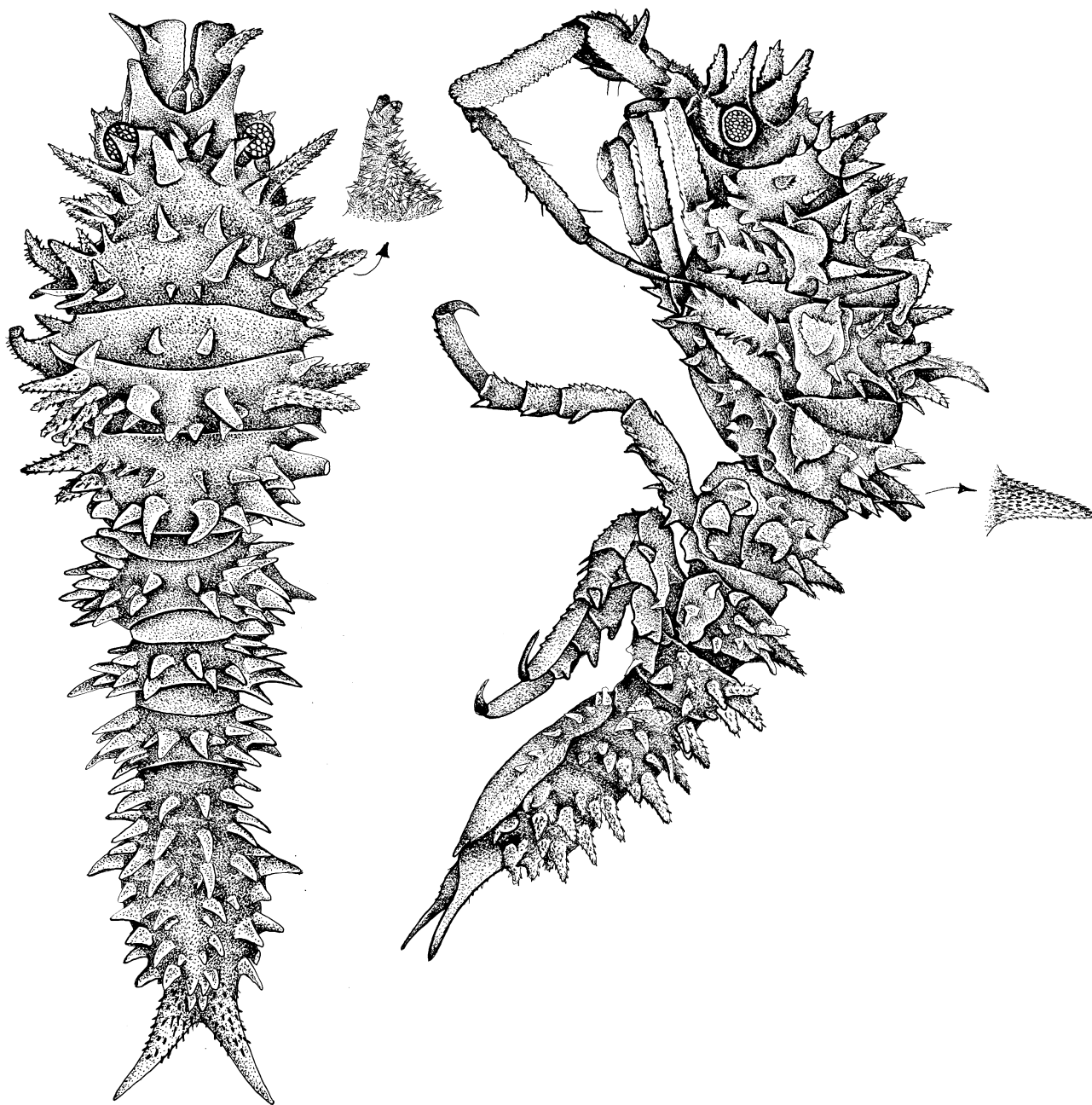
*Etymology*: The species name is derived from the name of the type locality, the Ross Sea. The gender is masculine.



*Diagnosis:* Pereonal spination comprising elements in submedial, dorsolateral, lateral and coxal rows, spines of *F. rossi* are covered with spinules; most posterior lateral spines are positioned 100% at the caudal tip, and the pleotelson apex straight, not extended caudally.

*Description of the holotype male:* Body length 10.5 mm. Eye rounded, 0.3 times lateral length of head. Preocular spine present, small, acute. Supraocular

ular spine long, twice as long as diameter of eye, denticulated. Second cephalic spine slightly longer than supraocular spine, denticulated. Other spines on head, six additional ones on caudal margin. Body long, slender (Fig. 21), except for the anterior pereonites, which are laterally slightly widened. Pereonites 1–4 of about same length, pereonites 1–4 widest. Pereonite 3 widest, pereonites 5–7 slightly acuminate. Pereonal spination comprising elements in submedial, dorsolateral, lateral and coxal rows. Submedial and



**Figure 21.** *Fissarcturus rossi* sp. nov. Female holotype, dorsal and lateral views.

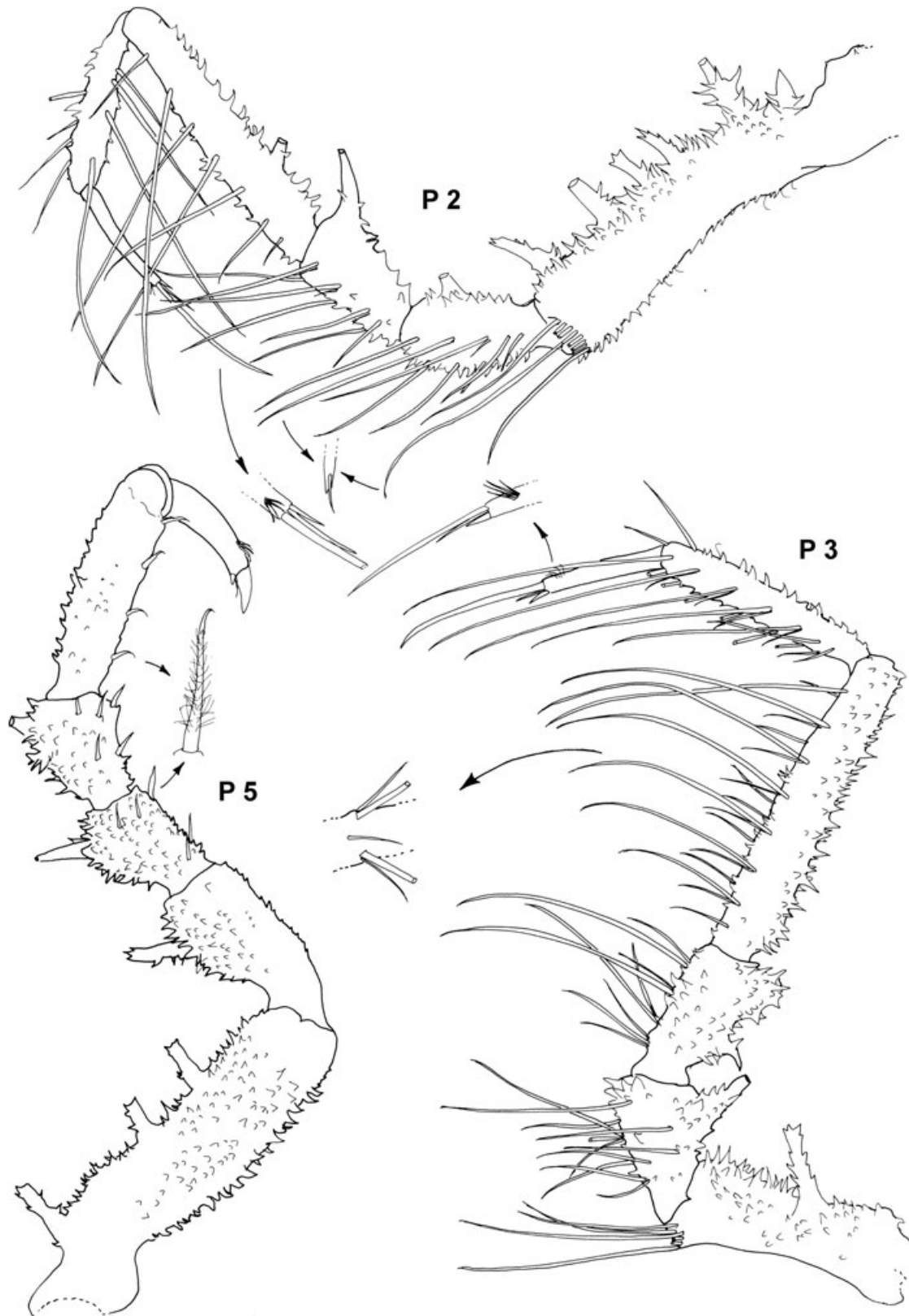
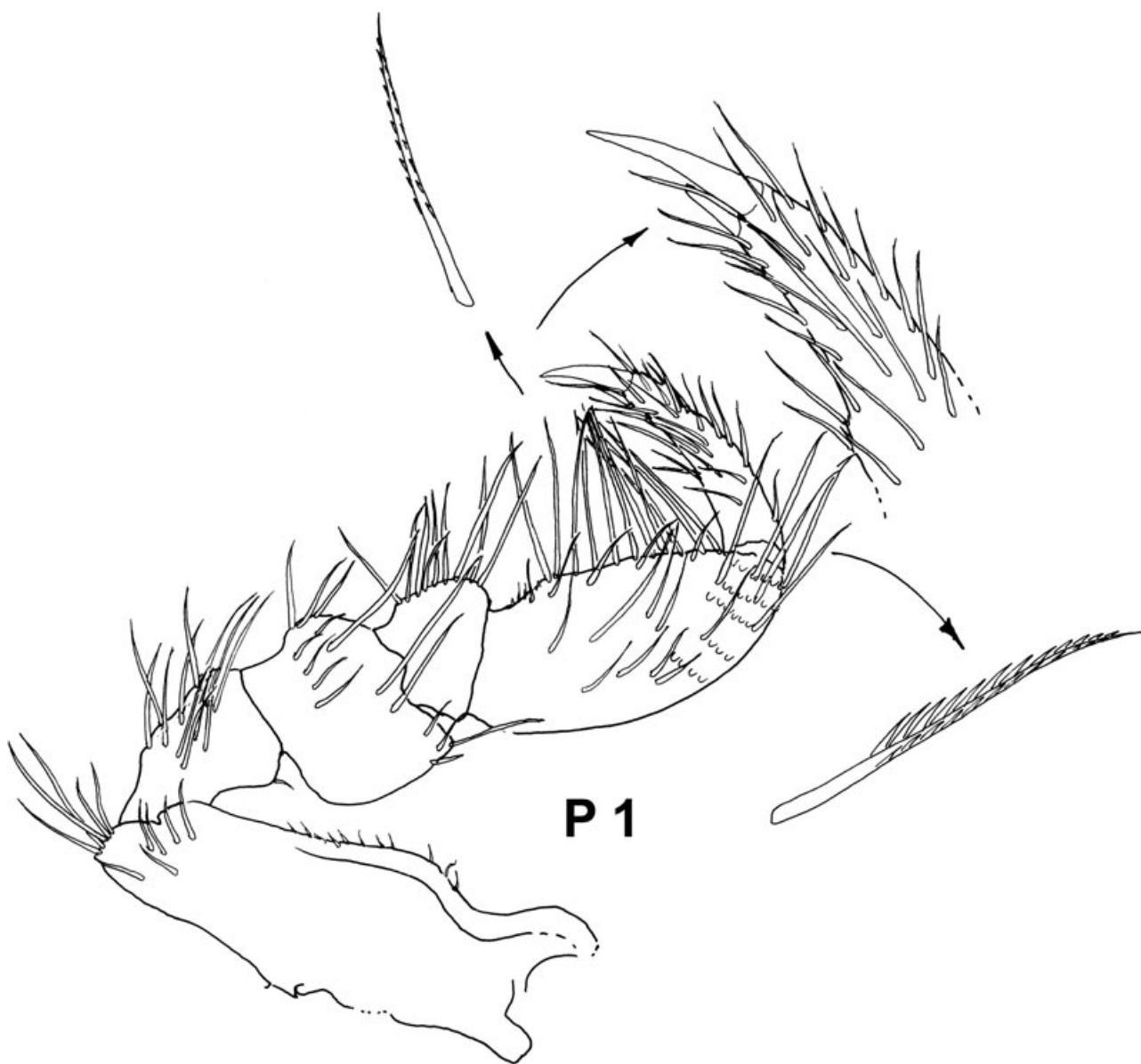


Figure 22. *Fissarcturus rossi* sp. nov. Female holotype pereopods 2–3, 5.

dorsolateral spines present on pereonites 1–4. Submedial spines also present on pereonites 5–7 similar to 1–4, all long, denticulate, longest in pereonite 3, then slightly decreasing in length from 4 to 7, two pairs present on pereonites 2–4. Two pairs of long, denticulate dorsolateral spines present on pereonites 1–7, but lightly shorter than submedial ones, present on segments, longest on pereonite 3, then slightly decreasing in length from 4 to 7. Lateral spines present on pereonites 1–7, all much shorter and smaller than dorsolateral ones, denticulate, three pairs present on pereonites 5–6, two pairs on 7. Coxal spines present on 1–7, all long, denticulate, four on pereonite 1, erect in the female, longest on pereonite 3, then slightly

decreasing in length from 4 to 7. Intermediate ornamentation with small denticulate spines at lateral margin and between large submedial, dorsolateral and lateral spines. All pleonites fused with pleotelson. Position of lateral spines on pleotelson apically. Pleotelson length 0.35 of body length, width 0.38 total pleotelson length. Pleon spination seven submedial, six sublateral and 6–7 lateral denticulated spines. Position of most posterior lateral spines caudolaterally, 100% at caudal tip. Pleotelson apex straight, not extended caudally.

A2 (Fig. 22) Antenna 2 peduncle 0.4 body length, with small denticulate spines scattered over entire articles. Antenna 2 flagellum with three articles.



**Figure 23.** *Fissarcturus rossi* sp. nov. Female holotype, pereopod 1.



P1 (Fig. 23) basis longer than propodus, carpus trapezoidal, propodus subchelate and slender. Pereopod 1 propodus, length 2.3 width. Pereopod 1 propodus with six oblique rows of setulated setae on mesial face. Dactylus only slightly shorter than propodus, with one long and one short distal claw. Propodus and dactylus densely setose. Ventral surface of propodus with few setae, most on medial part and on palm.

P2–4 (Fig. 22) similar. P2 shortest, P4 longest, many long setae on posteromedial margins, some long setae on anterolateral margins, especially on carpus and propodus. Eight, eight, nine setal groups on carpus of pereopods 2–4. Six, six, four setal groups on propodus. Several long and stout denticulated spines on basis of pereopods 2–4. Ornamentation of ischium-carpus of pereopods 2–4 with short denticulated spines and a long, stout distodorsal denticulated spine. Pereopods 2–3 dactylus length 0.4 that of propodus. Unguis as long as or longer than dactylus. Pereopods 2–3 unguis length 1.1 length of dactylus. Pereopod 4 dactylus length 0.4 that of propodus. Pereopod 4 unguis, length 1.1 that of dactylus.

P5–7 (P5 in Fig. 22) progressively shorter, several long denticulate spines on basis, one on ischium, merus and carpus and small denticulate tubercles scattered over entire surface.

*Remarks:* Only the female of *F. rossi* is known. *F. rossi* can most easily be distinguished from other *Fissarcturus* species by the prominent spines on the dorsum of the body which are covered with numerous small spinules. The spines of all other species are either smooth or cauliflower-shaped, but never equipped with spinules. Moreover, the pereopods of *F. rossi* are covered with many spinules and also with long spines on the dorsal side of the bases, which are also equipped with many acute small spinules. Such a strong spination of the pereopods has not been reported for any other species of *Fissarcturus* until now. *F. rossi* is similar to *F. bathyweddellensis*, but can also easily be distinguished from this species by the spine pattern. Whereas all dorsal spines of *F. bathyweddellensis* are smooth, those of *F. rossi* are covered with spinules. Moreover, the eye of *F. bathyweddellensis* is smaller than that of *F. rossi*. The last caudolateral pair of spines is inserted at 98% of the pleotelson length in *F. bathyweddellensis*, showing a convex minute apex of the pleotelson in dorsal view. In *F. rossi*, however, the most posterior lateral spines are positioned terminally at the caudal tip, and the pleotelson apex of *F. rossi* is straight, and not extended caudally. The antennal flagellum of *F. bathyweddellensis* bears six flagellar articles, but that of *F. emarginatus* and *F. rossi* only three. The anterior pereopods of *F. bathyweddellensis* bear some tubercles on the ven-

tral margin, which are absent in *F. emarginatus*, but more numerous in *F. rossi*.

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