Memoirs of the Museum of Victoria 59(2): 439–455 (2002)

FIVE ARTOTROGIDS (CRUSTACEA: COPEPODA: SIPHONOSTOMATOIDA) FROM EASTERN ANTARCTICA

R. JOHNSSON AND C. E. F. ROCHA

Universidade de São Paulo, Instituto Biociências, Departamento Zoologia,
Caixa Postal 11461, CEP: 05422-970 São Paulo, SP, Brazil
(e-mail: johnsson@ib.usp.br)

Abstract

Johnsson, R. and Rocha, C.E.F., 2002. Five artotrogids (Crustacea: Copepoda: Siphonostomatoida) from Eastern Antarctica. *Memoirs of Museum Victoria* 59(2): 439–455

Five species of Artotrogidae are reported from Enderbyland, Eastern Antarctica. Four are new species belonging to the genera *Sestropontius, Bradypontius, Arctopontius* and *Neobradypontius*; *Pseudotrogus uncinatus* (Brady, 1910) is redescribed. The new species of *Sestropontius* differs from its only congener in the armature of P1, P2 and P4. In *Bradypontius* the new species differs from other species in the armature of P1 and the setation of the maxillule. The number of segments in the antennule and modifications on the distal element of the antenna distinguish the new species of *Neobradypontius* from its congeners. In *Arctopontius* the number of segments in the antennule is the key difference between species.

Introduction

The family Artotrogidae was revised by Eiselt (1961) and since then new species have been added from Korea (Kim, 1996), the Arctic Ocean (Eiselt, 1986), Madeira I. (Johnsson, 2001) and southern Australia (McKinnon, 1988). McKinnon (1988) treated Artotrogidae in the sense of Sars, 1915, i.e. taxa possessing only three pairs of swimming legs, while the species studied in the present paper deals with Artotrogidae in the broader sense, those with four pairs of swimming legs. A second species of *Sestropontius* Giesbrecht is described, more than a century after the first. A new species is added to *Bradypontius* Geisbrecht, increasing the number of known species to 21. *Neobradypontius*, erected by Eiselt (1961) with species belonging to other genera has its first new species described. The genus *Arctopontius* Sars has now three species and *Pseudotrogus uncinatus* (Brady, 1910) is redescribed.

Due to the rarity of Artotrogidae most of the species were partially dissected and these appendages were clarified with lactic acid, stained with Chlorazol Black and mounted on slides with CMC-9 mounting medium. The drawings were made with an Olympus CM30 microscope equipped with a camera lucida.

Armature formulae for swimming legs are shown with outer margin first and Roman numerals indicating spines and Arabic numerals setae, according to Huys and Boxshall (1991). Armature for caudal setae: I – anterolateral accessory seta, II – anterolateral seta, III – posterolateral seta, IV – outer terminal seta, V – inner terminal seta, VI – terminal accessory seta and VII – dorsal seta, according to Huys and Boxshall (1991). Given the fact that the material is taken from sled samples some elements from the armature of the antennules may have been lost. All material is deposited in Museum Victoria, Melbourne, Australia (NMV).

Artotrogidae Brady

Sestropontius Giesbrecht

Sestropontius mckinnoni Johnsson, sp. nov.

Figures 1–2

Material examined. Holotype. Southern Ocean, off Enderbyland, Antarctica (65˚56.40S, 50˚52.10E), 365 m, silt and bryozoan shell, M. Norman, 15 Nov 1985, WHOI epibenthic sled (stn HRD 10), NMV J47289-a (female).

Description. Female: Body length (excluding caudal setae) 2.41 mm, greatest body width 1.17 mm, and 2.1 times as long as wide (fig. 1a). Body shape cyclopiform, cephalosome and pedigerous somite 2 with pointed epimera. Pedigerous somite 3 with lateral margins bearing sensilla and

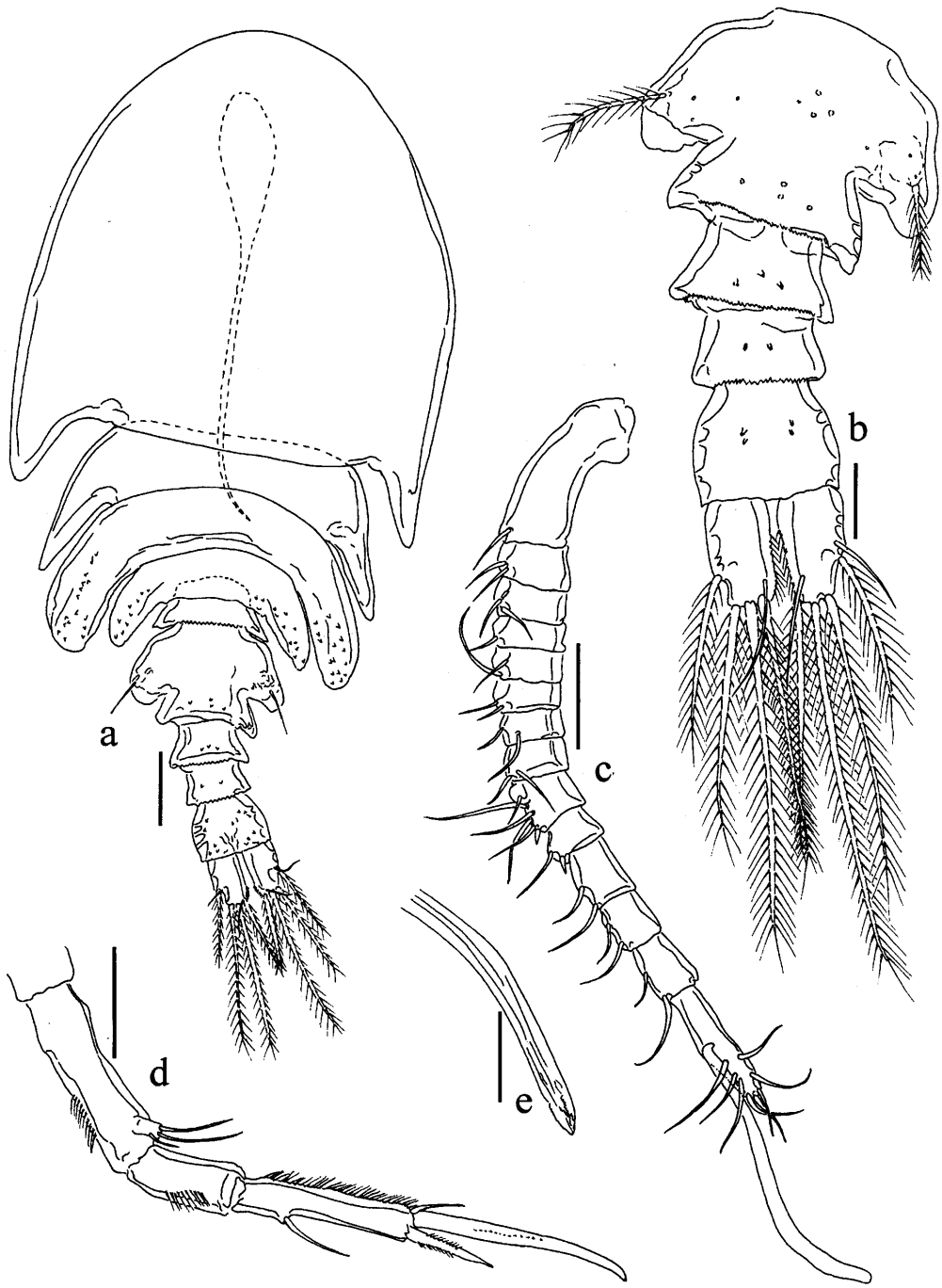

Figure 1. *Sestropontius mckinnoni* sp. nov.; female holotype, a: habitus dorsal showing siphon (dotted line), b: urosome (not showing first somite), c: antennule, d: antenna, e: distal part of mandible. Scale bars: a: 200 μm; b–d: 100 μm; e: 50 μm.

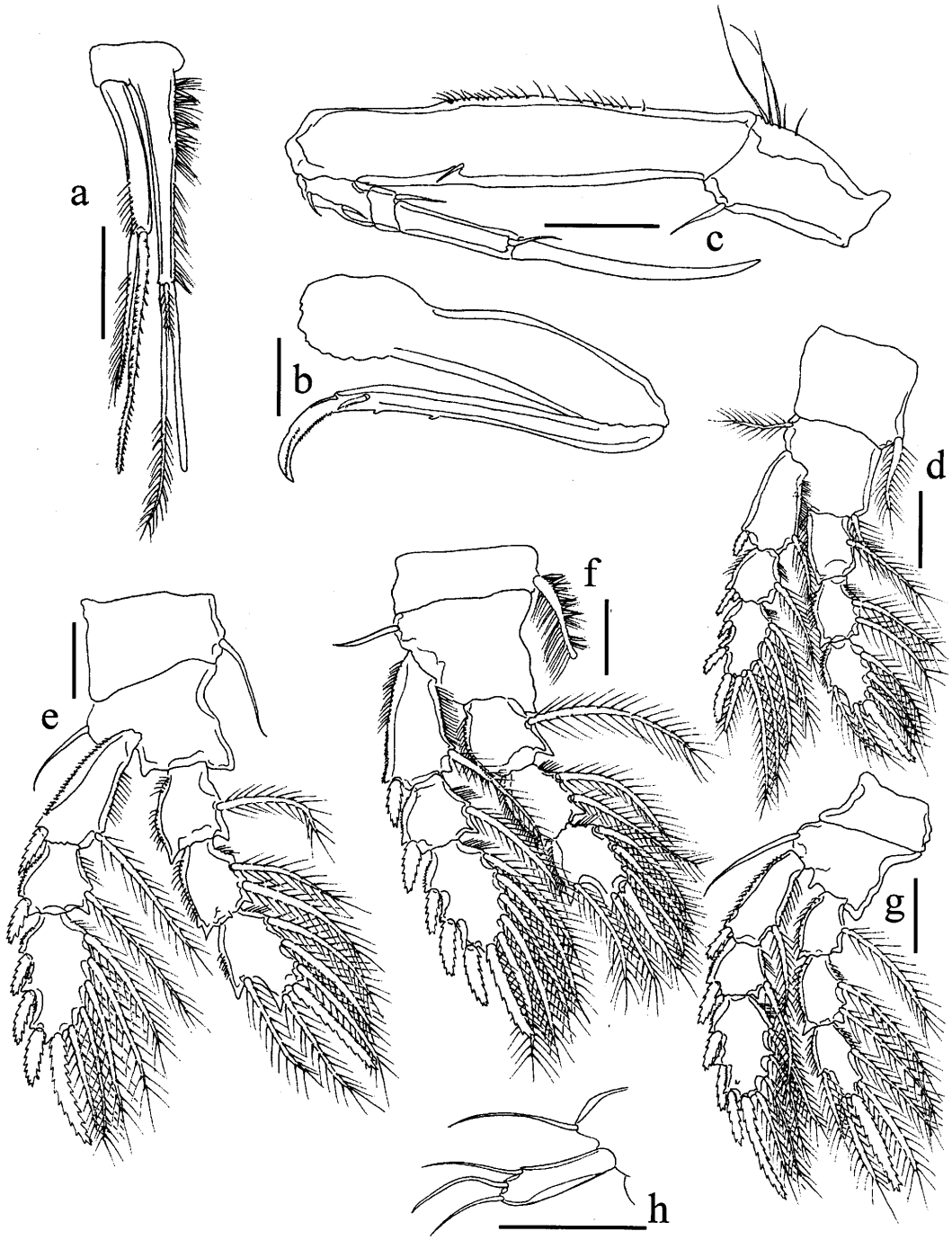

Figure 2. *Sestropontius mckinnoni* sp. nov.; female holotype, a: maxillule, b: maxilla, c: maxilliped, d: P1, e: P2, f: P3, g: P4, h: P5. Scale bars: 100 μm.

reaching genital double-somite. Pedigerous somite 4 also with sensilla on projected margins. Length:width ratio of prosome 1.3. Ratio of length prosome:urosome 1.8.

Urosome (fig. 1b) with 5 somites, all with sensillae. Genital double-somite 296 x 429 µm, length:width ratio 0.7, rounded anterolaterally, armed with plumose seta near laterally projected genital opening. Posterior margin serrated. Three postgenital somites 117 x 229 µm, 117 x 208 µm and 167 x 200 µm, length:width ratios 0.5, 0.6 and 0.8 respectively. First and second postgenital somites with posterior margins serrated. Caudal rami, 154 x 92 µm, 1.7 times as long as wide, with row of hairs on inner margin and armed with 6 setae. Setae I absent. Lengths of setae II–VII, 117, 217, 308, 521, 354 and 162 µm respectively. Setae III–VI plumose, setae II and VII smooth. Setae II and III located medially.

Antennule (fig. 1c) 906 µm long, 14-segmented. Lengths of segments measured along their posterior margins 189 µm (117 µm along anterior margin) 43, 46, 39, 29, 26, 31, 34, 49, 34, 63, 57, 57 and 117 respectively. Segmental homologies and setation as follows: I-1; II-2; III-2; IV-2; V-2; VI-2; VII-2; VIII-2; IX-XIII-5+spine; XIV-1+spine; XV-XVI-2; XVII-XVIII-2; XIX-XX-2; XXI-XXVIII-8+ae. All setae smooth. Aesthetasc on segment XXI 278 µm long.

Antenna (fig. 1d) 647 µm long (including distal seta), with basis 178 µm long. Endopod 2-segmented; first segment 100 µm long, unarmed; second segment 167 µm long and armed with 1 smooth seta proximally and 2 setae distally close to a claw-like element, 203 µm long. Exopod 1-segmented, 25 µm long, bearing 3 setae.

Oral cone (fig. 1a) produced into long siphon-like distal portion, 1.2 mm long, 0.5 times body length. Mandible (fig. 1e) comprising stylet bearing distally many small teeth, palp absent. Maxillule (fig. 2a) bilobed, inner lobe 189 µm long, armed with a smooth stout seta, a short plumose seta and a distally plumose seta, inner lateral margin covered with setules. Outer lobe 139 µm long, armed with a pinnate seta and a plumose and pinnate seta.

Maxilla (fig. 2b) syncoxa 521 µm long; claw 588 µm long, curved distally, bearing seta subdistally, 2 small teeth on outer margin and claw tip serrated. Maxilliped (fig. 2c) 5-segmented; syncoxa 144 µm long and bearing short seta on inner margin and long setules on outer margin; basis 417 µm long, with small seta subdistally on inner margin. Endopod 3-segmented, segments 1 to 3 measuring 72, 19 and 111 µm long respectively. First endopod segment with 2 setae; second and third segments with short seta distally; third segment with claw 225 µm long.

Swimming legs 1–4 (P1–P4, figs 2d–g) biramous, with 3-segmented rami. Armature formula of P1–P4 shown in Table 1.

Fifth leg (fig. 2h) with smooth seta near insertion of free segment which bears 2 distal, 1 subdistal seta.

Male: Unknown.

Etymology. The species is dedicated to Dr David McKinnon (Australian Institute of Marine Sciences) who studied artotrogids from southern Australia.

Remarks. The genus *Sestropontius* has, so far, a single species, *Sestropontius bullifer* Giesbrecht, 1899, described from the Mediterranean Sea from a single male. More recently, Stock (1965) described the female. It is possible to find many differences between this and the new species.

Sestropontius mckinnoni shows the third endopod segment of P1 and P2 with the armature 1, 1+I, 3 and the third exopod segment of P4 with eight segments. In *Sestropontius bullifer* the third endopod segment of P1 and P2 shows 1, 2, 3 as armature, and the third exopod segment of P4 has nine segments (Giesbrecht, 1899). *Sestropontius mckinnoni* has three setae on the third exopod of the antenna instead of two as in *S. bullifer*. In *S. bullifer* the antennule is 8-segmented without the aesthetasc while the new species has 13 segments with an aesthetasc on the last one.

Bradypontius Giesbrecht

Bradypontius poorei Johnsson, sp. nov.

Figures 3–4

Material examined. Holotype. Southern Ocean, off Enderbyland, Antarctica (65˚56.40´S, 50˚52.10´E), 365 m, silt and bryozoan shell, M. Norman, 15 Nov 1985, WHOI epibenthic sled (stn HRD 10), NMV J48687 (female).

Description. Female: Body length (excluding caudal setae) 1.65 mm, greatest body width 0.80 mm, and twice as long as wide (fig. 3a). Body shape cyclopiform, prosome covered with sensilla, cephalosome with rounded epimera. Pedigerous somites 2–4 with lateral margins projected. Length:width ratio of prosome 1.4. Ratio of lengths of prosome:urosome 2.1.

Table 1. Armature formulae of P1–P4 of five species of Artotrogidae.

Sestropontius mckinnoni sp. nov.	coxa	basis	exopod	endopod
P1	0-1	1-1	I-1; I-1; III,1,4	0-1; 0-2; 1,1+I,3
P2	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-2; 1,1+I,3
P3	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-2; 1,2,3
P4	0-0	1-0	I-1; I-1; III,I,4	0-1; 0-2; 1,1+I,2
Bradypontius poorei sp. nov.				
P1	0-1	1-1	I-1; I-1; III,1,3	0-1; 0-2; 1,2,3
P2	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-2; 1,1+I,3
P3	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-2; 1,1+I,3
P4	0-0	1-0	I-1; I-1; III,I,5	0-1; 0-2; I
Neobradypontius akanthakontus sp. nov				
P1	0-1	1-1	I-1; I-1; III,1,4	0-1; 0-2; 1,2,3
P2	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-2; 1,2,3
P3	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-2; 1,2,3
P4	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-2; 1,2,2
Arctopontius novenarius sp. nov.				
P1	0-1	1-1	I-1; I-1; III,2,3	0-1; 0-2; 1,2,3
P2	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-2; 1,2,3
P3	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-2; 1,2,3
P4	0-1	1-0	I-1; I-1; III,1,4	0-1; 0,2,3
Pseudotrogus uncinatus (Brady, 1910)				
P1	0-1	1-0	I-1; I-1; III,2,3	0-1; 0-2; 1,2,3
P2	0-1	1-0	I-1; I-1; III,1,2	0-1; 0-2; 1,2,3
P3	0-1	1-0	I-1; I-1; III,I,5	0-1; 0-2; 1,2,3

Urosome (fig. 3b) with 5 somites. Genital double-somite 174 x 254 µm, length:width ratio 0.7, rounded anterolaterally, smooth seta near genital opening. Three postgenital somites 58 x 143 µm, 71 x 125 µm and 116 x 161 µm, length:width ratios 0.4; 0.6 and 0.7 respectively. Anal somite, caudal rami bearing sensilla. Caudal rami elongate, 134 x 71 µm, almost twice as long as wide, armed with 6 setae. Setae I absent. Lengths of setae II–VII, 89, 98, 281, –, 134 and 62 µm respectively. Setae V broken on both rami. Setae III–VI plumose, setae II and VII smooth. Setae III located subdistally.

Antennule (fig. 3c) 419 µm long not including setae, 8-segmented. Lengths of segments measured along posterior margins 94 µm (69 µm along anterior margin) 119, 31, 19, 29, 25, 32 and 70 respectively. Segmental homologies and setation as follows: I-1; II-VIII-8; IX-XIII-1+spine; XIV-1+spine; XV-XVI-1; XVII-XVIII-2; XIX-XX-2; XXI-XXVIII-12+ae. All setae smooth. Aesthetasc on segment XXI 162 µm long.

Antenna (fig. 3d) 240 µm long (including distal seta), with basis 52 µm long. Endopod 2-segmented; first segment 44 µm long, unarmed; second segment 56 µm long and armed with 1 plumose seta proximally, 1 seta subdistally and 2 distal plumose setae. None modified as a claw-like element. Exopod 1-segmented, 7 µm long, bearing 2 setae.

Oral cone (fig. 3a) produced into siphon-like distal portion, 615 µm long, 0.4 times body length. Mandible (fig. 3e) comprising stylet bearing distally many teeth, palp absent. Maxillule (fig. 3f) bilobed, both lobes thin and nearly equal in size. Inner lobe 116 µm long, armed with 2 long smooth setae and a short smooth seta, inner margin covered with setules. Outer lobe 100 µm long, armed with 2 long pinnate setae and a short smooth seta.

Maxilla (fig. 3g) with syncoxa 275 µm long; claw 400 µm long, curved distally, armed

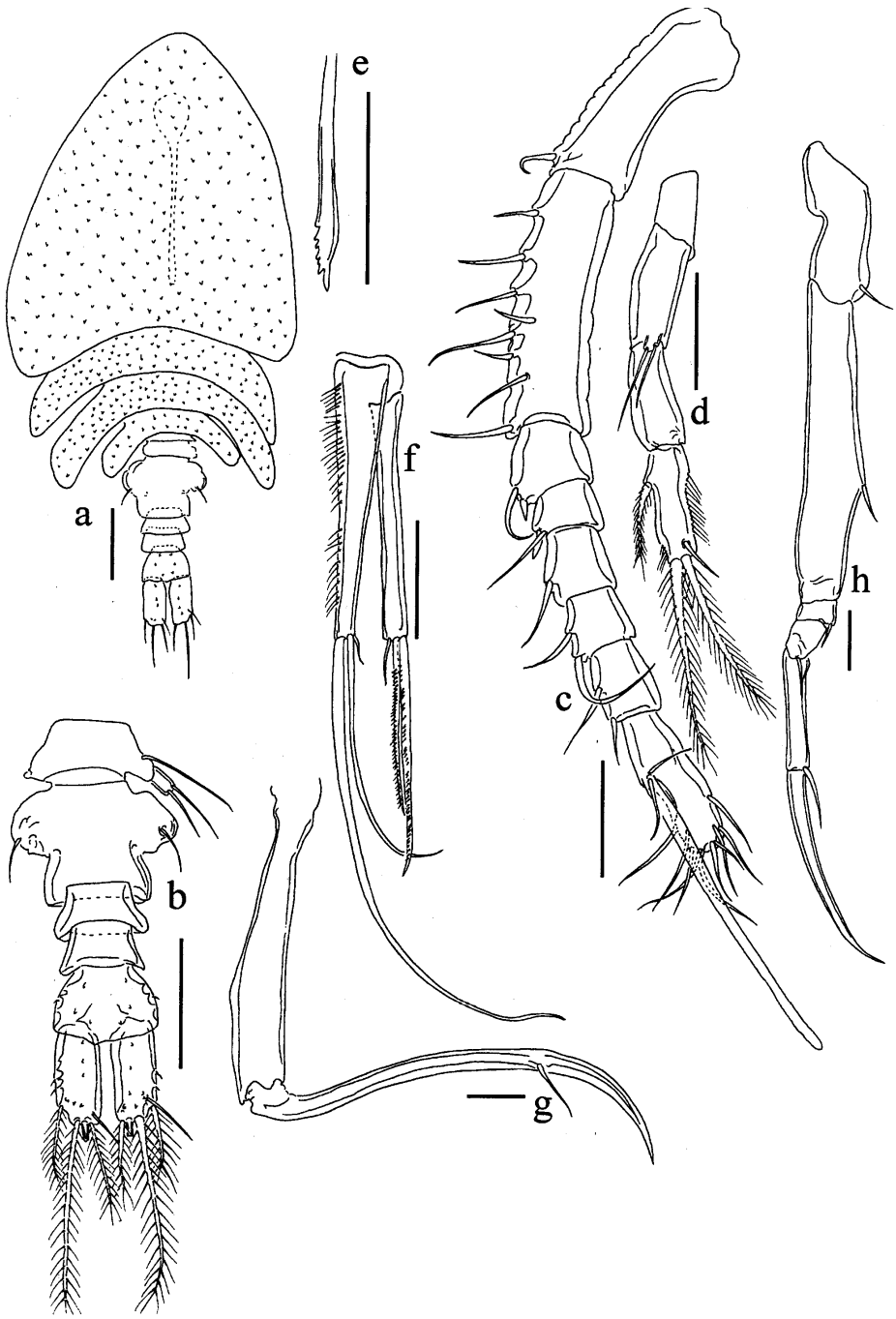

Figure 3. *Bradypontius poorei* sp. nov.; female holotype, a: habitus dorsal showing siphon (dotted line), b: urosome, c: antennule, d: antenna, e: distal part of mandible, f: maxillule, g: maxilla, h: maxilliped. Scale bars: a–b: 200 μm; c–h: 100 μm.

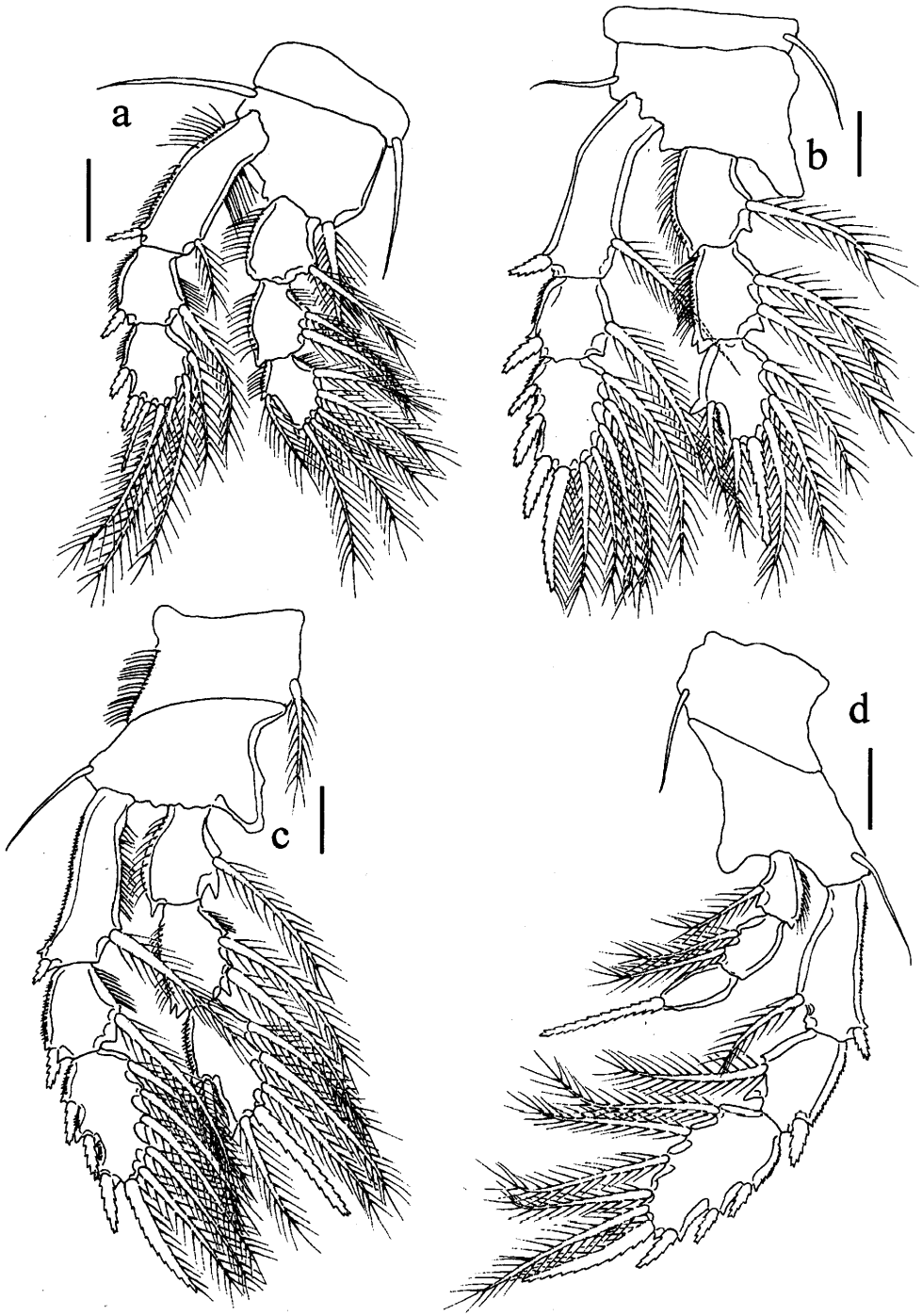

Figure 4. *Bradypontius poorei* sp. nov.; female holotype, a: P1, b: P2, c: P3, d: P4. Scale bars: 50 µm.

with seta subdistally. Maxilliped (fig. 3h) 5-segmented; syncoxa 130 µm long, bearing short seta on inner margin; basis 275 µm long, with small seta medially on inner margin. Endopod 3-segmented, segments 1–3 measuring 30, 42 and 105 µm long respectively. Each endopod segment armed with single seta. Third segment with claw 190 µm long and curved distally.

Swimming legs 1–4 (P1–P4, figs 4a–d) biramous, with 3-segmented rami. Armature formula of P1–P4 shown in Table 1. Third endopodal segment of P4 with setation extremely reduced, bearing single spine.

Fifth leg (fig. 3b) with free segment armed with 2 setae distally.

Male: Unknown.

Etymology. This species is named after Dr Gary Poore, carcinologist of Museum Victoria who has been contributing significantly to the knowledge of the Australian crustacean fauna.

Remarks. The 21 species of *Bradypontius* can be divided according to the number of segments in the antennule which can vary from 8, 9 or more than 10. *Bradypontius poorei* has an 8-segmented antennule as seen in *B. pichoni* Stock, 1966; *B. papillatus* (Scott, 1888) (Sars, 1915); *B. magniceps* (Brady, 1880) (Sars, 1915) and *B. crassisetus* Kim, 1996.

Bradypontius pichoni shows the third endopod segment of P4 armed with two short setae (Stock, 1966) while in *B. poorei* there is only a spine. The remaining segments of the endopod of *B. pichoni* are unarmed while in the new species they have the normal armature of 0-1; 0-2. *Bradypontius pichoni* has the third endopod segment of P2 and P3 with two distal spines instead of one spine and one seta as observed in *B. poorei*. The new species also has three setae on each maxillule lobe while *B. pichoni* has two setae on each. *Bradypontius inermis* Nicholls, 1944 also has the third endopodal segment of P4 with a single element, but the remaining segments of the leg are unarmed (Nicholls, 1944) as in *B. pichoni* and not as in *B. poorei*.

The most distinguishing feature of *Bradypontius poorei* is the third endopod segment of P1 with 7 elements (III-4) instead of 8 (III-5) as seen in all other species of the genus. This feature is one of the characteristics of the genus *Arctopontius*, together with the 2-segmented endopod of P4, according to Eiselt (1961). However in *A. expansus* Sars, 1915 there are two spines and five setae (II-5) (Sars, 1915) and *A. hanseni* Eiselt, 1986 has eight elements (III-5) (Eiselt, 1986).

Neobradypontius Eiselt

Neobradypontius akanthakontus Johnsson, sp. nov.

Figures 5–6

Material examined. Holotype. Southern Ocean, off Enderbyland, Antarctica (65˚56.40´S, 50˚52.10´E), 365 m, M. Norman, 15 Nov 1985, silt and bryozoan shell, WHOI epibenthic sled (stn HRD 10), NMV J12791 (female).

Description. Female: Body length (excluding caudal setae) 1.80 mm, greatest body width 1.39 mm, and 1.3 times as long as wide (fig. 5a). Body dorsoventrally flattened, prosome covered with sensilla, cephalosome and pedigerous somites 2–4 with lateral margins projected. Pedigerous somite 4 projected beyond the posterior margin of the genital double somite. Length:width ratio of prosome 1. Ratio of length of prosome:urosome 3.1.

Urosome (fig. 5b) with 5 somites. Genital double-somite 108 x 196 µm, length:width ratio 0.6, slightly rounded laterally and bearing smooth seta near genital opening, posterior margins posterolaterally projected, reaching second postgenital somite. Three postgenital somites 13 x 88 µm, 21 x 87 µm and 83 x 106 µm, length:width ratios 0.1, 0.2 and 0.8 respectively. Anal somite bearing sensilla. Caudal rami 52 x 42 µm, 1.2 as long as wide and armed with 6 setae. Setae I absent. Lengths of setae II–VII, 42, 54, –, 204, 83 and 38 µm respectively. Setae IV broken in both rami. Setae III–VI plumose, setae II and VII smooth.

Antennule (fig. 5c) 692 µm long, not including setae, 9-segmented. Lengths of segments measured along their posterior margins 139 µm (111 µm along anterior margin) 44, 125, 56, 33, 56, 58, 61 and 119 respectively. Segmental homologies and setation as follows: I-1; II-1; III-VIII-12; IX-XIII-6+spine; XIV-1+spine; XV-XVI-2; XVII-XVIII-2; XIX-XX-2; XXI-XXVIII-13+ae. Third segment showing a subdivision. All setae smooth. Aesthetasc on segment XXI 444 µm long.

Antenna (fig. 5d) 333 µm long (including distal seta), with basis 89 µm long. Endopod 2-segmented; first segment 59 µm long, unarmed; second segment 109 µm long and armed with 1 plumose seta proximally, 1 smooth seta subdistally and 1 distal plumose setae near insertion of short straight claw 76 µm. Exopod 1-segmented, 28 µm long, bearing 2 setae distally.

Oral cone (fig. 5a) produced into siphon-like distal portion, 478 µm long, 0.3 times body length. Mandible (fig. 5e) comprising stylet

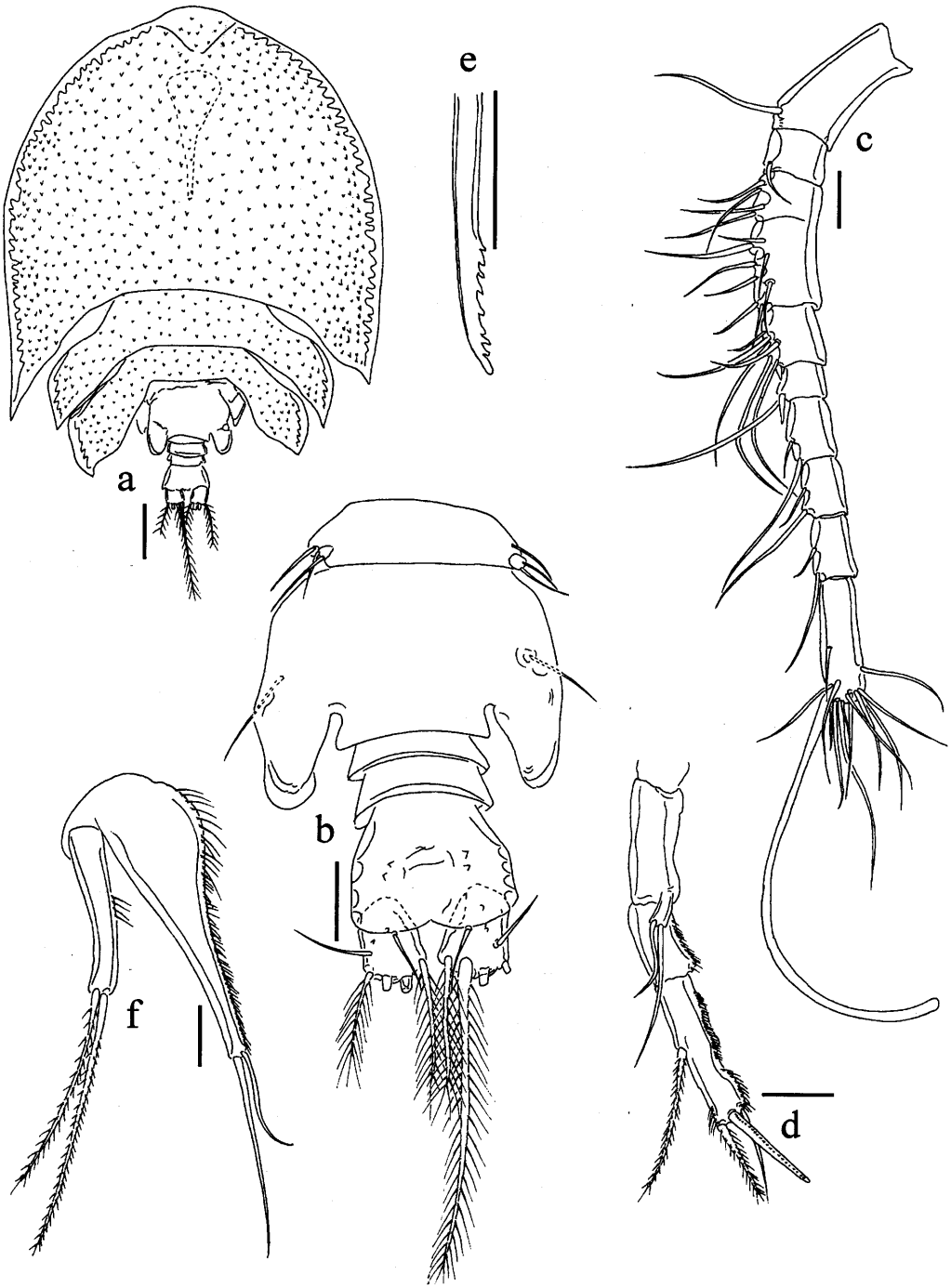

Figure 5. *Neobradypontius akanthakontus* sp. nov.; female holotype, a: habitus dorsal showing siphon (dotted line), b: urosome, c: antennule, d: antenna, e: distal part of mandible, f: maxillule. Scale bars: a: 200 µm; b–f: 50 µm.

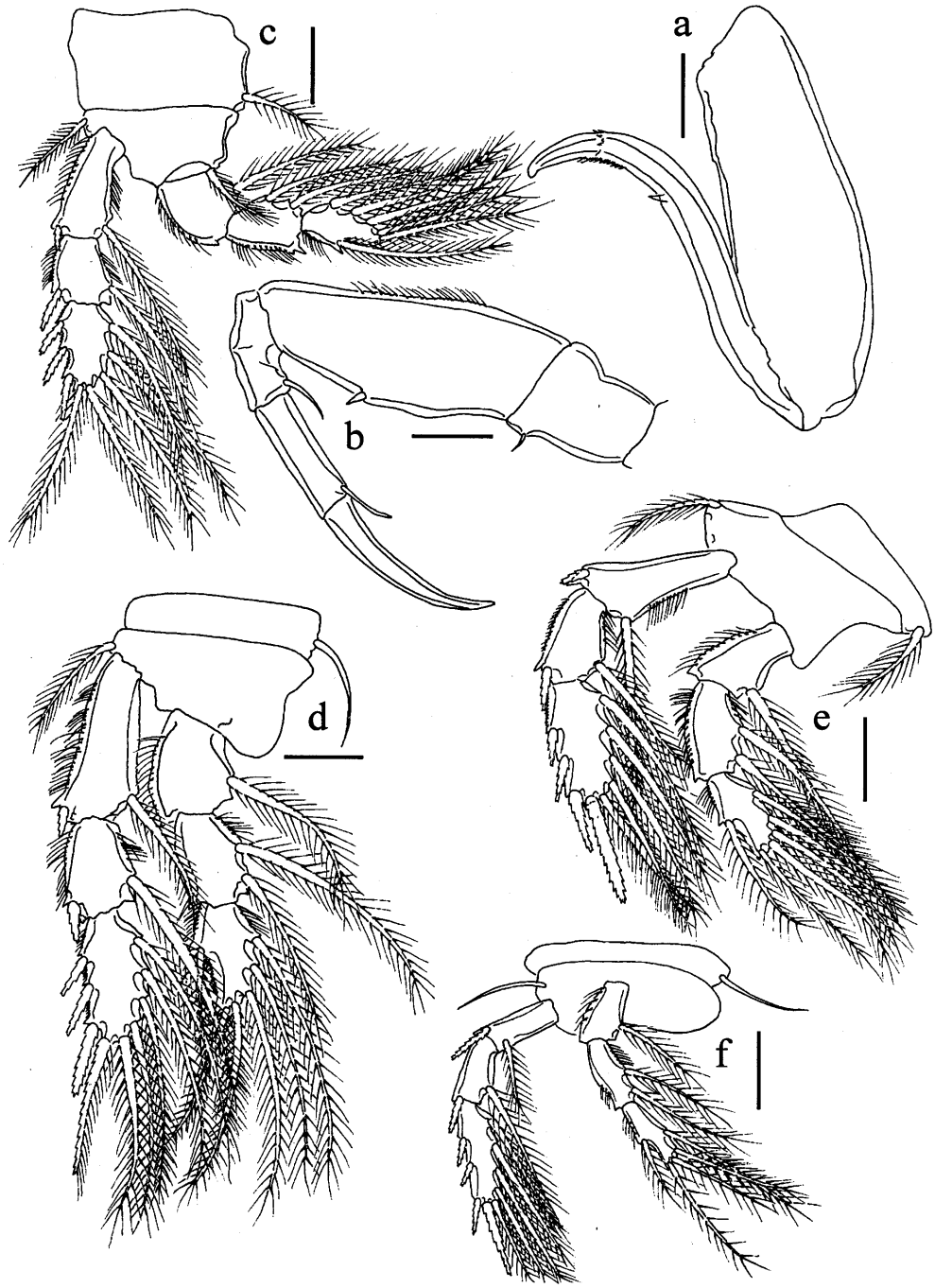

Figure 6. *Neobradypontius akanthakontus* sp. nov.; female holotype, a: maxilla, b: maxilliped, c: P1, d: P2, e: P3, f: P4. Scale bars: 50 µm.

bearing distally many teeth, palp absent. Maxillule (fig. 5f) bilobed. Inner lobe 196 µm long, proximal part enlarged, armed with 2 smooth setae, inner margin covered with setules. Outer lobe 117 µm long, armed with 2 long plumose setae.

Maxilla (fig. 6a) with strong syncoxa 248 µm long; claw 254 µm long, curved distally, bearing denticles subdistally. Maxilliped (fig. 6b) 5-segmented; syncoxa 75 µm long, bearing short seta on inner margin; basis 176 µm long, with small spiniform seta medially on inner margin and setules on outer margin. Endopod 3-segmented, segments 1–3 measuring 50, 37 and 78 µm long respectively. First endopod segment unarmed. Second and third endopod segments armed with single seta. Third segment with claw 120 µm long, curved distally.

Swimming legs 1–4 (P1–P4, figs 6c–f) biramous, with 3-segmented rami. Armature formula of P1–P4 shown in Table 1.

Fifth leg (fig. 5b) with small free segment armed with 2 setae distally.

Male: Unknown.

Etymology. From the greek *akantha*, spine or thorn and *kontus*, reduced, referring to the distal short spine from the second endopod segment of the antenna (noun in apposition).

Remarks. Neobradypontius was erected by Eiselt (1961) to accomodate a group of species which were previously placed in other genera of Artotrogidae but have pleura of the third pedigerous somite extending backwards, at least to the front edge of the first postgenital somite. *Neobradypontius akanthakontus* is the only species of the genus with a 9-segmented antennule. All other species have at least a 10-segmented antennule, except *N. scaber* (Brady, 1910) which has eight segments. No other species of the genus has the second endopod segment of the antenna with the distal element modified into a spine of similar length to the distal and the subdistal setae.

Arctopontius Sars

Arctopontius novenarius Johnsson, sp. nov.

Figures 7–8

Material examined. Holotype. Southern Ocean, off Enderbyland, Antarctica (65˚56.40´S, 50˚52.10´E), 365 m, silt and bryozoan shell, M. Norman, 15 Nov 1985, WHOI epibenthic sled (stn HRD 10), NMV J47290 (female).

Description. Female: Body length (excluding caudal setae) 2.32 mm, greatest body width 1.25 mm, and 1.9 times as long as wide (fig. 7a). Body with prosome covered with sensilla, cephalosome and pedigerous somites 2–4 with lateral margins rounded and slightly projected. Length:width ratio of prosome 1.3. Ratio of lengths of prosome:urosome 2.1.

Urosome (fig. 7b) with 5 somites. Genital double-somite 231 x 323 µm, length:width ratio 0.7, slightly rounded anterolaterally, with smooth seta, posterior margin laterally serrated. Three postgenital somites 100 x 173 µm, 73 x 158 µm and 142 x 192 µm, length:width ratios 0.6; 0.5 and 0.7 respectively. First postgenital somite with posterior margin of somite serrated, second postgenital and anal somites with posterior margin serrated. Anal somite bearing sensilla. Caudal rami, 138 x 85 µm, 1.6 as long as wide and armed with 6 setae. Setae I absent. Lengths of setae II–VII: 96, 162, 481, 731, 235 and 81 µm respectively. Setae III–VI plumose, setae II and VII smooth. Caudal rami with posterior margin serrated and bearing sensilla.

Antennule (fig. 7c) 631 µm long, not including setae, 9-segmented. Lengths of segments measured along their posterior margins 125 µm (71 µm along anterior margin) 135, 27, 52, 31, 50, 46, 50 and 115 respectively. Segmental homologies and setation as follows: I-1; II-VII-11; VIII-1; IX-XIII-7+spine; XIV-1+spine; XV-XVI-2; XVII-XVIII-2; XIX-XX-2; XXI-XXVIII-11+ae. Aesthetasc on segment XXI 260 µm long.

Antenna (fig. 7d) 377 µm long (including distal seta), with basis 82 µm long. Endopod 2-segmented; first segment 55 µm long, unarmed; second segment 93 µm long and armed with 1 naked seta proximally, 2 short smooth setae subdistally and 1 distal plumose seta near insertion of long straight claw 148 µm. Exopod 1-segmented, 18 µm long, bearing 2 setae distally and 1 subdistally.

Oral cone (fig. 7a) produced into siphon-like distal portion, 950 µm long, 0.4 times body length. Mandible (fig. 7e) comprising stylet bearing 2 groups of teeth distally, palp absent. Maxillule (fig. 7f) bilobed. Inner lobe 198 µm long, armed with long, distally plumose seta and short naked seta, inner margin covered with setules. Outer lobe 112 µm long, armed with 2 stout setae, one pinnate.

Maxilla (fig. 7g) with strong syncoxa 535 µm long; claw 538 µm long, slightly curved distally. Maxilliped (fig. 8a) 5-segmented; syncoxa 150 µm long, bearing short seta on inner margin; basis 362 µm long, with small seta medially on inner margin. Endopod 3-segmented, segments 1–3 measuring 42, 96 and 123 µm long respectively.

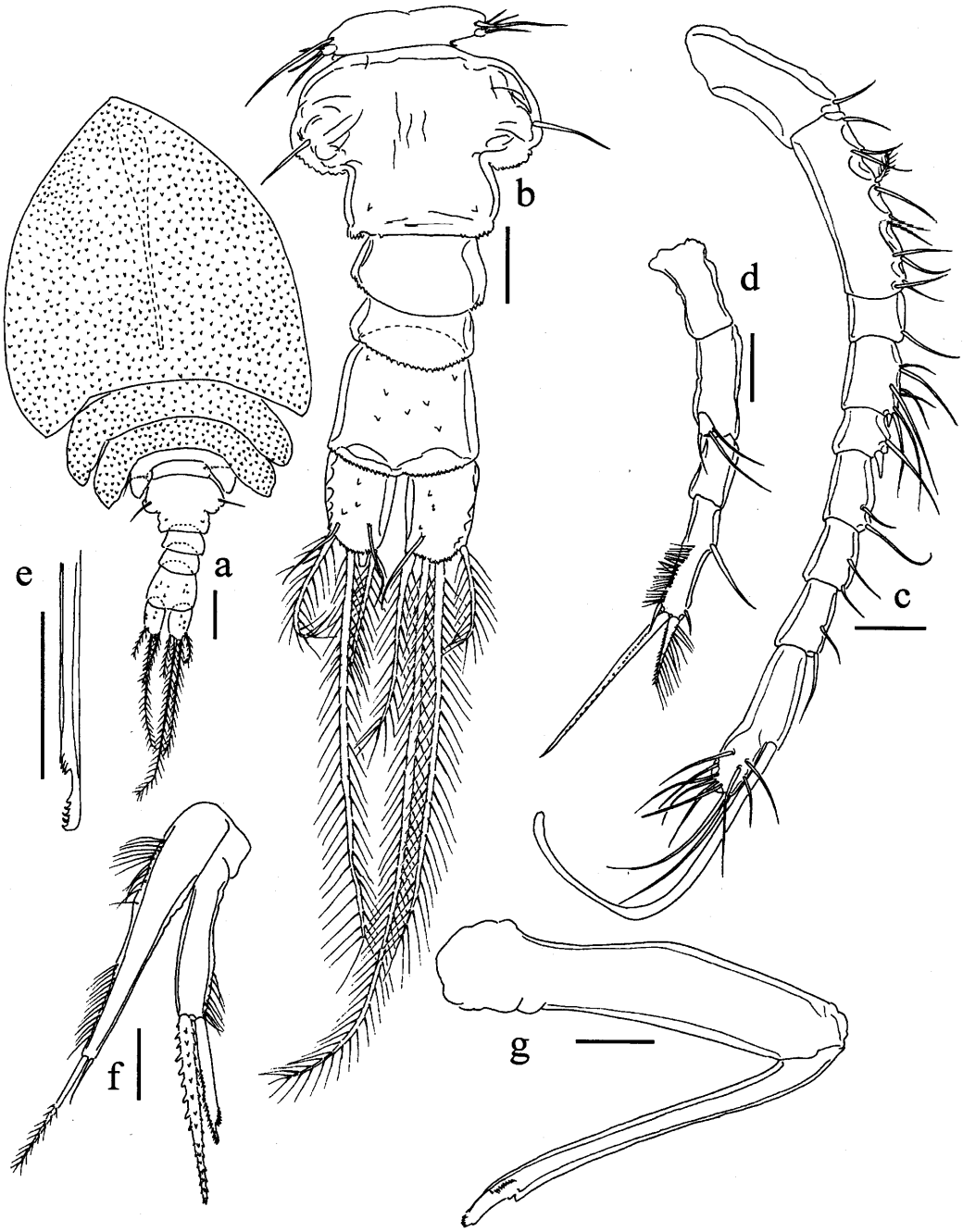

Figure 7. *Arctopontius novenarius* sp. nov.; female holotype, a: habitus dorsal showing siphon (dotted line), b: urosome, c: antennule, d: antenna, e: distal part of mandible, f: maxillule, g: maxilla. Scale bars: a: 200 μm; b, g: 100 μm; c–f: 50 μm.

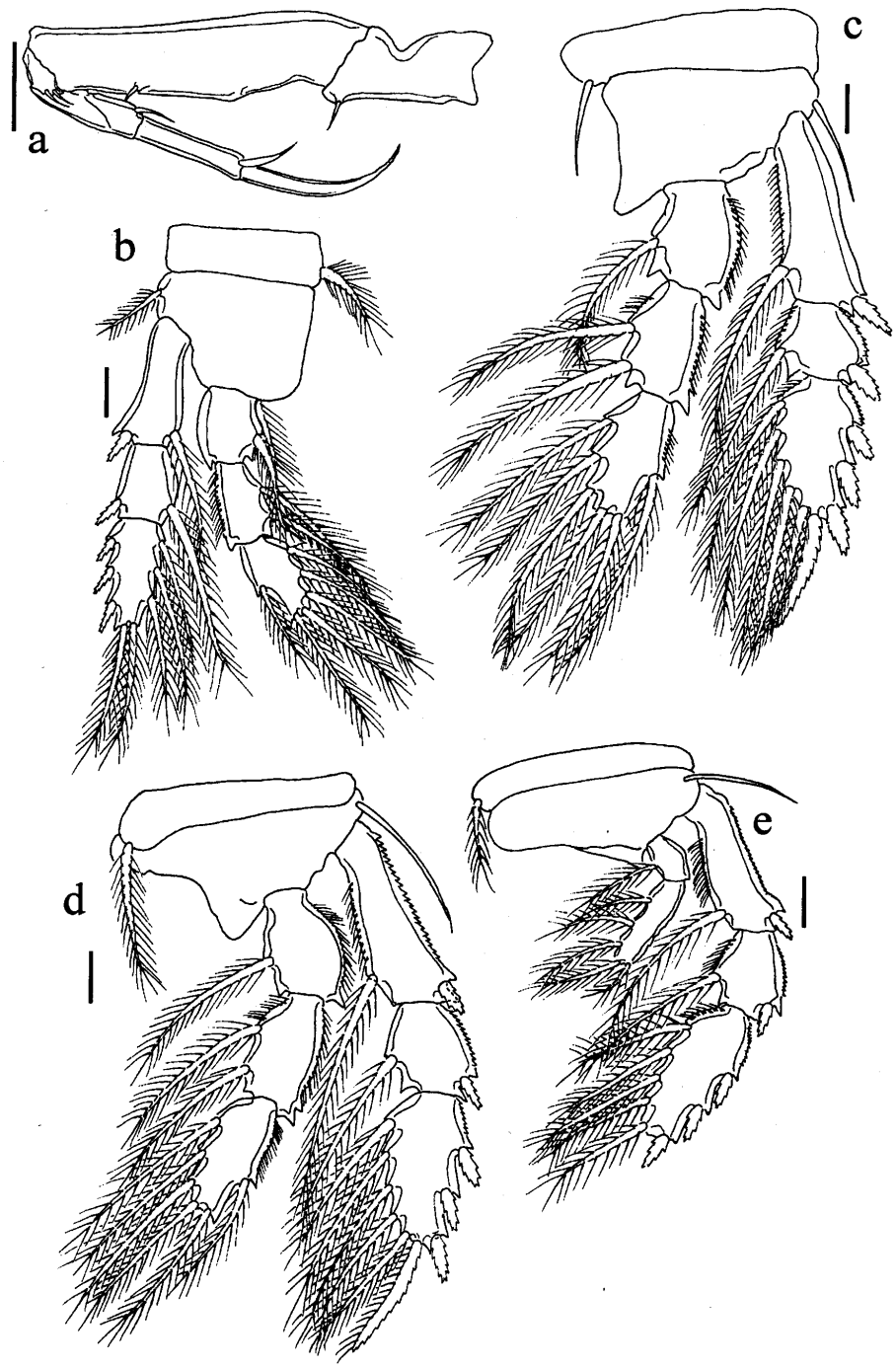

Figure 8. *Arctopontius novenarius* sp. nov.; female holotype, a: maxilliped, b: P1, c: P2, d: P3, e: P4. Scale bars: a: 100 µm; b–e: 50 µm.

First endopod segment bearing 2 setae. Second and third endopod segments armed with single seta. Third segment with claw 200 µm long, curved distally.

Swimming legs 1–4 (P1–P4, figs 8b–e) biramous, P1–P3 with 3-segmented rami. P4 with 3-segmented exopod and 2-segmented endopod. Armature formula of P1–P4 shown in Table 1.

Fifth leg (fig. 7a) with small free segment armed with 2 setae distally, and one subdistally on outer margin.

Male: Unknown.

Etymology. The specific name *novenarius* means "consisting of nine", an allusion to the 9-segmented antennule (noun in apposition).

Remarks. The most distinguishing features of *Arctopontius* are the 2-segmented endopod of P4, the third exopod segment of P1 bearing three setae on the inner margin and only two spines on the outer margin (Sars, 1915). These characteristics were confirmed by Eiselt (1961), but *Arctopontius hanseni* Eiselt, 1986, the second species described for the genus, only shows a 2-segmented endopod and the third endopod of P1 has armature of III,5. *Arctopontius novenarius* shows the same pattern as *A. hanseni* in P1 but the second endopod segment of P4 has setation of 0,2,3, instead of a single seta as in the case of the other two species. *Arctopontius novenarius* differs from its congeners because it has a 9-segmented antennule instead of 8-segmented. This difference originates from the ancestral segment VIII, which is not fused with the previous segment in the new species.

Pseudotrogus Eiselt

Pseudotrogus uncinatus (Brady)

Figures 9–10

Dystrogus uncinatus Brady, 1910: 583, pl. LX figs 1–8 (partim).

Pseudotrogus uncinatus.—Eiselt: 1961: 324, fig. 4.

Material examined. Southern Ocean, off Enderbyland, Antarctica (65˚56.40´S, 50˚52.10´E), 365 m, silt and bryozoan shell, M. Norman, 15 Nov 1985, WHOI epibenthic sled (stn HRD 10), NMV J47288 (2 females).

Description. Female: Body length (excluding caudal setae) 2.07 mm, greatest body width 1.83 mm, and 1.1 times as long as wide (fig. 9a). Body dorsoventrally flattened, prosome covered with sensillae, cephalosome and pedigerous somites 2–4 with lateral margins rounded and projected. Pedigerous somite 3 with lateral margin reaching caudal rami. Length:width ratio of prosome 1. Ratio of lengths of prosome:urosome 6.1.

Urosome (fig. 9b) with 5 somites. Genital double-somite 208 x 308 µm, length:width ratio 0.7, slightly rounded anteriorly and bearing small smooth seta, posterolateral projections unequal, however both projected. Right posterolateral projection reaching distal margin of second postgenital somite, left posterolateral projection reaching caudal rami. Left side bearing an empty ovigerous sac. Three postgenital somites 80 x 176 µm, 52 x 184 µm and 184 x 256 µm, length:width ratio 0.5, 0.3 and 0.7 respectively. All somites of urosome bearing sensillae. Caudal rami slightly as long as wide, 164 x 156 µm, and armed with 6 setae. Setae I absent. Setae III–VI broken. Lengths of setae II and VII: 44 and 76 µm respectively, both smooth.

Antennule (fig. 9c) 668 µm long, not including setae, 9-segmented. Lengths of segments measured along their posterior margins 150 µm (80 µm along anterior margin) 48, 145, 57, 29, 36, 36, 48 and 118 respectively. Segmental homologies and setation as follows: I-1; II-1; III-VIII-6; IX-XIII-5; XIV-1+spine; XV-XVI-2; XVII-XVIII-2; XIX-XX-2; XXI-XXVIII-10+ae. Aesthetasc on segment XXI 170 µm long.

Antenna (fig. 9d) 367 µm long (including distal seta), with basis 105 µm long. Endopod 2-segmented; first segment 68 µm long, unarmed; second segment 97 µm long and armed with 1 plumose seta proximally, 1 smooth seta subdistally and 1 distal seta near insertion of straight claw 97 µm long. Exopod 1-segmented, 27 µm long, bearing 2 setae distally.

Oral cone (fig. 9a) produced into siphon-like distal portion, 556 µm long, 0.3 times the body length. Mandible (fig. 9e) comprising stylet bearing distally a group of teeth, palp absent. Maxillule (fig. 10a) bilobed. Inner lobe 292 µm long, armed with 2 long setae, one distally plumose and short naked seta, inner margin covered with setules. Outer lobe 169 µm long, armed with 2 plumose setae.

Maxilla (fig. 10b) with strong syncoxa 575 µm long; claw 621 µm long, slightly curved distally and bearing short seta subdistally. Maxilliped (fig. 10c) 5-segmented; syncoxa 233 µm long, bearing short seta on inner margin; basis 479 µm long, unarmed. Endopod 3-segmented, segments 1–3 measuring 87, 96 and 150 µm long respectively. All endopod segments bearing a seta. Third segment with claw 233 µm long and curved distally.

Swimming legs 1–3 (P1–P3, figs 10d–f) biramous. P4 reduced to single process bearing 2

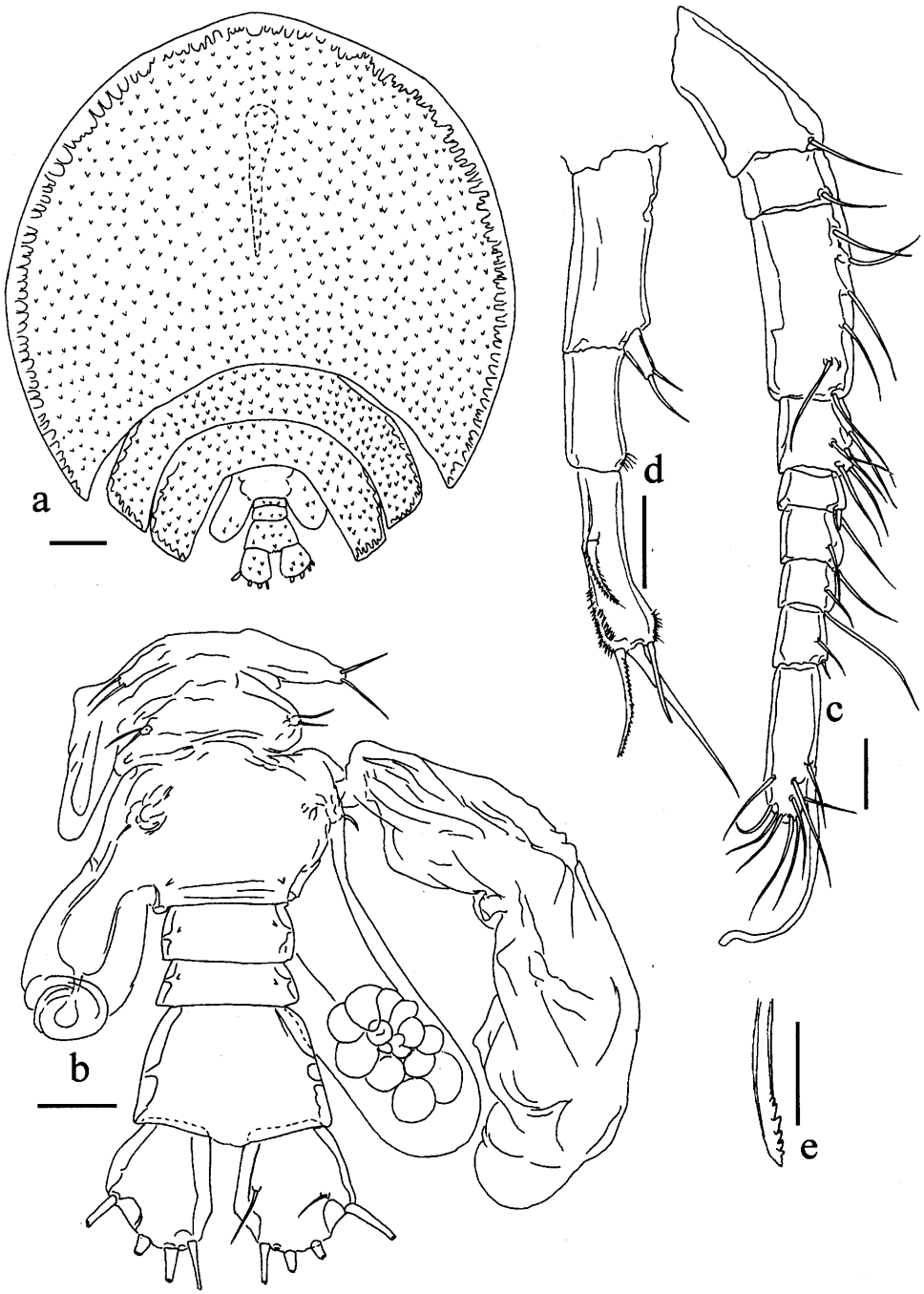

Figure 9. *Pseudotrogus uncinatus* (Brady, 1910); female, a: habitus dorsal showing siphon (dotted line), b: P4 and urosome, c: antennule, d: antenna, e: distal part of mandible. Scale bars: a: 200 μm; b: 100 μm; c–e: 50 μm.

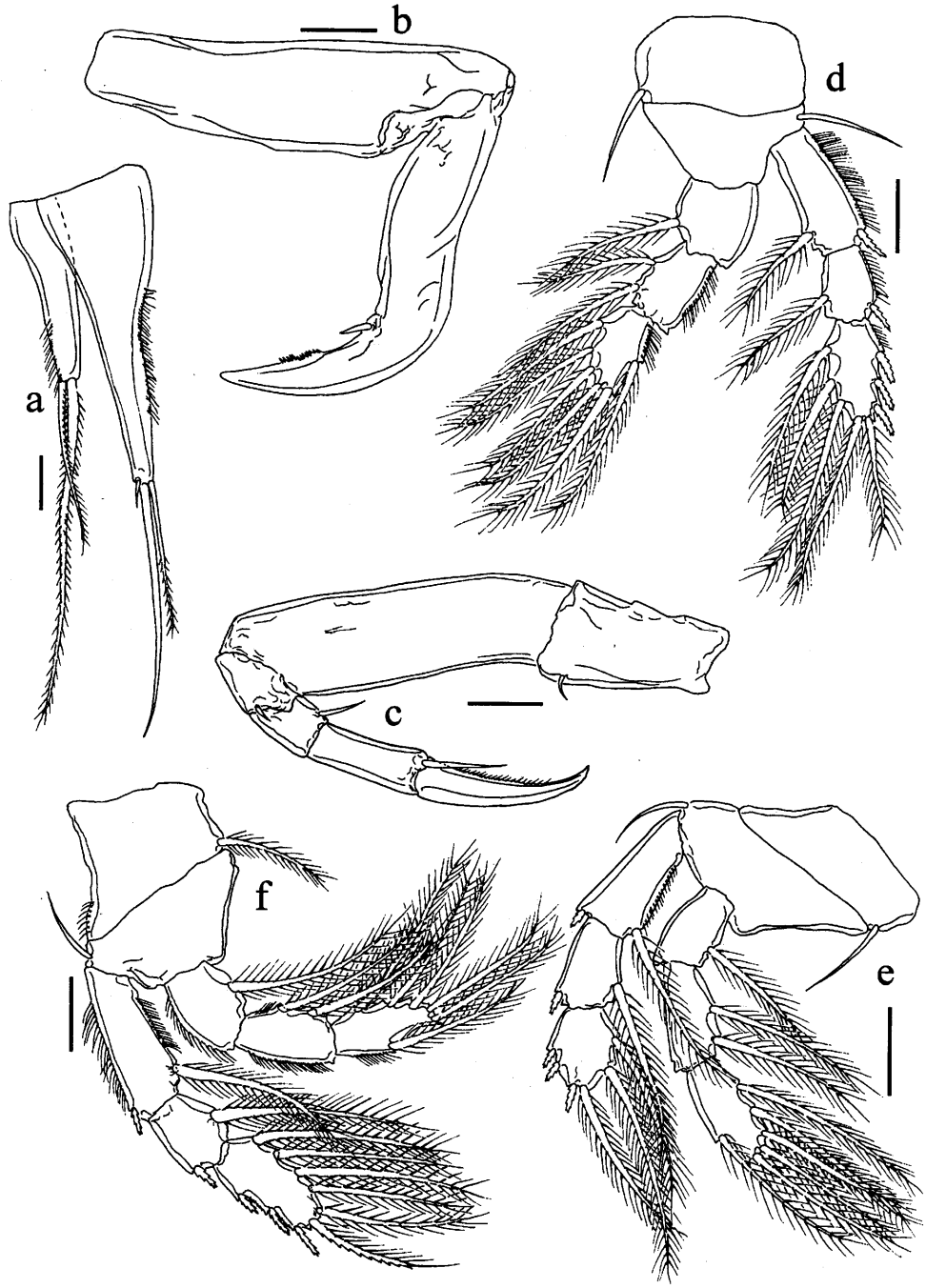

Figure 10. *Pseudotrogus uncinatus* (Brady, 1910); female, a: maxillule, b: maxilla, c: maxilliped, d: P1, e: P2, f: P3. Scale bars: 100 μm.

setae distally (fig. 9b). Armature formula of P1–P3 shown in Table 1.

Fifth leg (fig. 9b) with small free segment armed with 2 setae distally.

Male: Unknown.

Remarks. Pseudotrogus uncinatus was described by Brady (1910) based on a specimen recorded from the Gauss-Station during the Deutschen Südpolar-Expedition in 1902. Later, Eiselt (1961) redescribed the species but many characteristics such as P2, the endopod of P1 and the antennule setation remained unknown. This single species shows the same body shape as *P. uncinatus*, and is similar to *P. sphaericus* (Brady, 1910). In *P. sphaericus* the margins of the third pedigerous somite are parallel to the urosome, and cover the genital somite projections, unlike *P. uncinatus*. Only one minor difference has been observed between the present material and the original description of *P. uncinatus*. The distal seta of the antenna is not as long as described by Eiselt (1961) and Brady (1910). However, this difference is not considered specifically significant.

Acknowledgements

I wish to thank Dr G.C.B. Poore (Museum Victoria) for providing the specimens and the opportunity to study this material; Dr G. A. Boxshall (The Natural History Museum) who kindly offered his opinion about *Pseudotrogus uncinatus*; and Dr D. McKinnon (Australian Institute of Marine Sciences) who provided valuable comments. This study was supported by a grant from the Fundação de Amparo a Pesquisa do Estado de São Paulo (FAPESP - 98/15333-3).

References

Brady, G.S., 1910. Die marinen Copepoden der Deutschen Südpolar-Expedition 1901-1903. *Deutschen Südpolar-Expedition* 11: 499–593.

Eiselt, J., 1961. Neubeschreibungen und Revision siphonostomer Cyclopoiden (Copepoda, Crust.) von der Südlichen Hemisphäre nebst Bemerkungen über die Familie Artotrogidae Brady 1880. *Sitzungsberichte Oesterreichusche Akademie der Wissenchaften Mathematisch-Naturwissenchaftliche klasse Abteilung I Biologische Wissenchaften und Erdwissenschaften* 170: 315–366.

Eiselt, J., 1986. Siphonostomatoide copepoden aus der Aktis. *Crustaceana* 50(3): 295–311.

Giesbrecht, W., 1899. Die Asterocheriden des Golfes von Neapel und der angrenzenden Meeres-Abschnitte. *Fauna und Flora des Golfes von Neapel, Monographie* 25: 1–217.

Huys, R. and Boxshall, G.A., 1991. *Copepod evolution.* Ray Society: London. 468 pp.

Johnsson, R., 2001.Two new artotrogids (Copepoda: Siphonostomatoida) from Madeira Island, Portugal. *Hydrobiologia* 453/454: 431–440.

Kim, I.H., 1996. Copepoda of Artotrogidae (Siphonostomatoida) from the Sea of Japan. *Korean Journal of Systematic Zoology* 12(4): 397–466.

McKinnon, A.D., 1988. Five artotrogid copepods (Siphonostomatoida) from southern Australia. *Invertebrate Taxonomy* 2: 973–993.

Nicholls, A.G., 1944. Littoral Copepoda from South Australia, 2. Calanoida, Cyclopoida, Notodelphyoida, Monstrilloida and Caligoida. *Records of the South Australia Museum* 8: 1–62.

Sars, G.O., 1915. *An account of the Crustacea of Norway, 6. Copepoda Cyclopoida – parts IX–X.* Bergen Museum: Bergen. Pp. 105–140, pls 65–80.

Stock, J.H., 1965. Copépodes associés aux invertebrés des côtes du Roussillon. V. Cyclopoides Siphonostomes spongicoles rares et nouveaux. *Vie et Millieu* 16 (1B): 295–324.

Stock, J. H., 1966. Cyclopoida Siphonostoma from Mauritius (Crustacea, Copepoda). *Beaufortia* 159(13): 145–194.