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SIX NEW SPECIES OF THE GENUS *Asterocheres* (COPEPODA; SIPHONOSTOMATOIDA) ASSOCIATED WITH SPONGES IN BRAZIL

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ABSTRACT

Six new species of siphonostomatoid asterocherid copepods, *Asterocheres abrolhensis* n. sp.; *A. crenulatus* n. sp.; *A. lunatus* n. sp.; *A. paraboecki* n. sp.; *A. spinopaulus* n. sp.; and *A. tetrasetosus* n. sp. are described from Abrolhos (off Bahia coast), Rasinho do Coiceiro (off Pernambuco coast) and Cagarras Islands (off Rio de Janeiro coast) associated with sponges. These species are the first records of the genus from Brazil and also from the South Atlantic. Complete keys to the females and males of the genus are also presented.

Keywords: Copepoda, Siphonostomatoida, Asterocheridae, Sponges, Brazil

INTRODUCTION

Many siphonostomatoid copepods are associated with invertebrates around the world and the genus *Asterocheres* presents the greatest diversity, comprising 46 known species, mainly associated with sponges (Ho, 1984; Malt, 1991 and Boxshall & Huys, 1994). However no species of this genus has ever been recorded from Brazil. The purpose of this work is to describe six new asterocherid copepods living in association with sponges and to provide a key to the genus.

Order Siphonostomatoida Thorell, 1859
Family Asterocheridae Giesbrecht, 1899
Genus *Asterocheres* Boeck, 1860
Asterocheres abrolhensis n. sp. (Figs. 1 - 3)

MATERIAL EXAMINED: Holotype, 1 female MNRJ 7293 from Viçosa Reefs, Abrolhos, Bahia, Brazil, collected by P. S. Young et al. on 28/II/1994 associated with sponges. Paratypes, 21 females and 13 males MNRJ 8521, 4 females and 3 males BMNH 1997.186-192, 4 females and 3 males USNM 282796 from the same locality, and 22 females and 23 males MNRJ 8522 collected at the same locality by P. S. Young, R. Johnson and A. O. Bustamante on 26/VIII/1996 associated with Haplosclerida sponge.

DESCRIPTION: Female - Body (fig. 1a) cyclopidiform, with dorso-ventrally flattened prosome and cylindrical urosome. Length 701 μ m (626 - 768 μ m) (excluding caudal setae) and greatest width 433 μ m (394 - 485 μ m) based on 52 specimens. Leg 1 somite fused with cephalosome and with moderately pointed epimera. Pedigerous somites 2

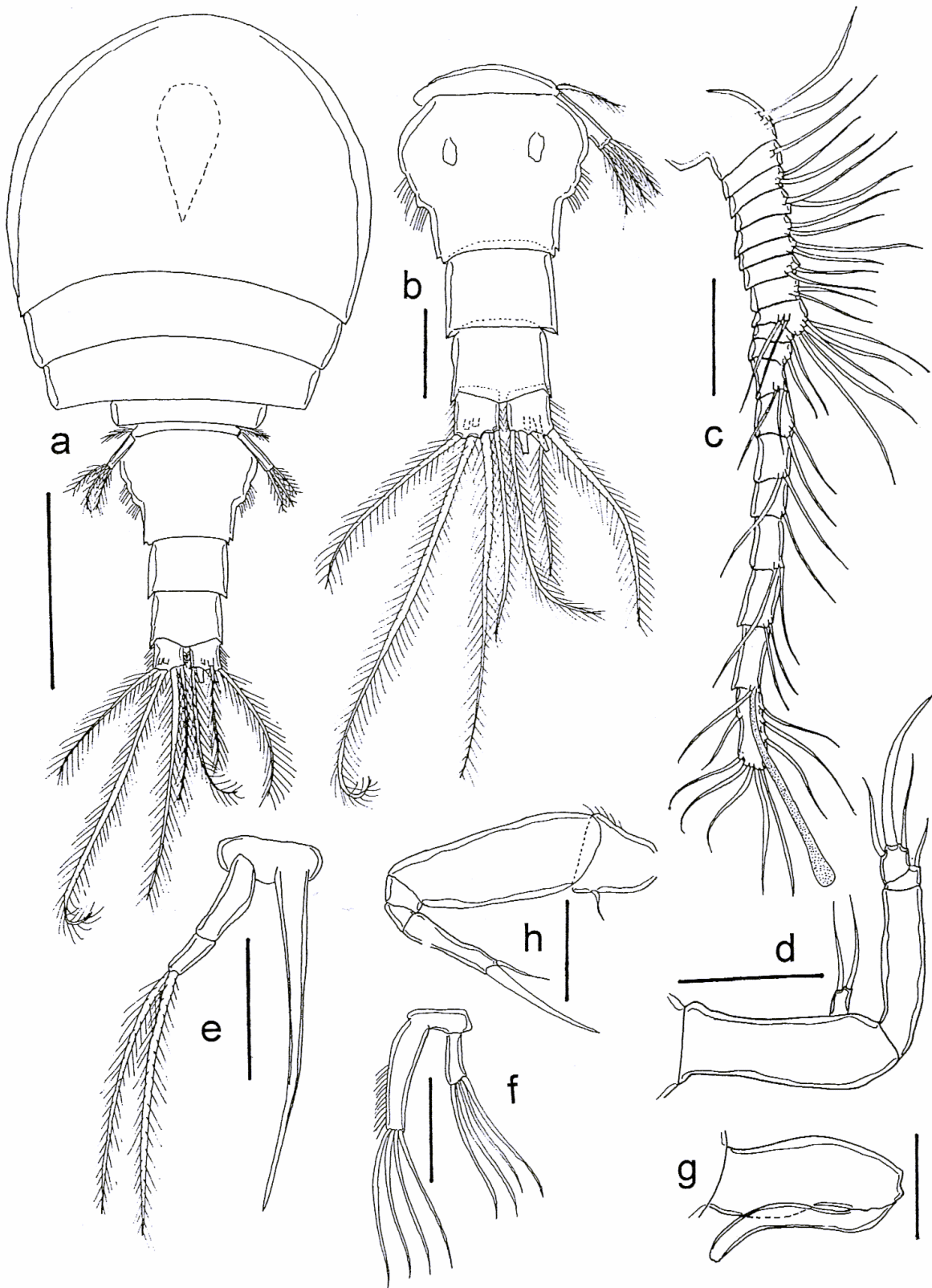


Figure 1. *Asterocheres abrolhensis* n. sp. Female Holotype, MNRJ 7293 a) dorsal view; b) urosome; c) antennule; d) antenna; e) mandible; f) maxillule; g) maxilla; h) maxilliped. Scale bars: a: 0.2 mm; b - h: 0.05 mm.

and 3 with same length and slightly rounded epimera. Pedigerous somite 4 narrower than preceding somite, with rounded epimera and partially covered by preceding somite. Somite of leg 5 partially covered by fourth somite. Ratio of length to width of prosome 1.2 : 1. Ratio of length of prosome to that of urosome 2.1 : 1.

Genital double-somite (fig. 1b), 91 x 113 μm , wider than long, ratio of length to width 0.8 : 1, rounded anterolaterally, with lateral row of setules. Posterior corner with 2 teeth. Postgenital somite, 46 x 64 μm , wider than long, ratio of length to width 0.7 : 1; posterior corner pointed. Anal somite, 43 x 66 μm , also wider than long, ratio of length to width 0.8 : 1; posterior corner pointed. Caudal rami square, 25 x 25 μm , armed with 6 setae. Setae II to VII with 76, 118, 193, 246, 114 and 77 μm respectively. All setae plumose.

Antennule slender (fig. 1c) 347 μm long, not including setae, 19-segmented. Basal part 9-segmented, rather broad, distal part slender. Length of segments measured along posterior margins 34 (40 μm along anterior margin); 11; 8; 13; 10; 8; 10; 11; 13; 6; 10; 10; 23; 18; 18; 23; 24; 27 and 31 μm respectively. Segmental homologies and setation as follows: I-2; II-1; III-2; IV-2; V-2; VI-2; VII-2; VIII-2; IX-XII-7; XIII-1; XIV-1; XV-2; XVI-2; XVII-2; XVIII-1; XIX-2; XX-2; XXI-1+ae; XXII-XXVIII-9. All setae smooth. Aesthetasc on segment XXI 91 μm long.

Antenna (fig. 1d) 222 μm long (including claw) with basis 78 μm long. Exopod 1-segmented, 9 μm long with 2 equal distal setae. Endopod 3-segmented, first segment unarmed and 60 μm long; second segment 7 μm armed with small seta apically. Third segment, almost twice as long as second segment, armed with 2 setae, one apically and the other subapically; terminal claw, 53 μm long, curved distally. Oral cone (fig. 1a) 148 μm long, reaching insertion of maxilliped. Mandible (fig. 1e) comprising stylet and slender 2-segmented palp. Stylet 117 μm long. First segment of mandibular palp, 31 μm , more than twice as long as second segment and unarmed. Second segment, 14 μm , armed with 2 unequal apical plumose setae.

Maxillule (fig. 1f) bilobed; inner lobe, 53 μm , more than twice as long as outer lobe, medial margin covered by row of setules and armed apically with 4 equal smooth setae. Outer lobe, 24 μm , armed with 4 apical setae. All setae smooth. Maxilla (fig. 1g) with syncoxa, 88 μm long and claw, 98 μm long, curved and with blunt extremity.

Maxilliped (fig. 1h) 5-segmented, comprising a very short syncoxa, 39 μm , armed with 1 inner and row of outer setules; long and wide basis, 103 μm ; first and second endopodal segments with almost same length, 12 and 14 μm respectively, and both unarmed; third endopodal segment 46 μm long, bearing 1 seta apically; claw-like element 62 μm long, almost straight.

Swimming legs 1-4 (fig. 2a - 2d) biramous, with 3 segmented rami throughout. All coxae with one median plumose seta, each basis with one lateral plumose seta. First exopodal segment of P1 with long spine, almost reaching third segment. First endopodal segment of P1 with tooth on inner corner, near insertion of seta. Rows of setules present on outer margins on coxa of P2, endopod of P2, P3 and P4 and exopod of P2 and P4. Second endopodal segment of P4 presenting only one tooth on posterior corner of outer margin, other legs with 2 teeth. Setal formula as follows:

| | coxa | basis | exo. | end. |
|----|------|-------|---------------|-----------------|
| P1 | 0-1 | 1-1 | I-1;I-1;III-4 | 0-1;0-2;1-5 |
| P2 | 0-1 | 1-0 | I-1;I-1;IV-4 | 0-1;0-2;1-5 |
| P3 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-2;1-5 |
| P4 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-2;1-1+I-2 |

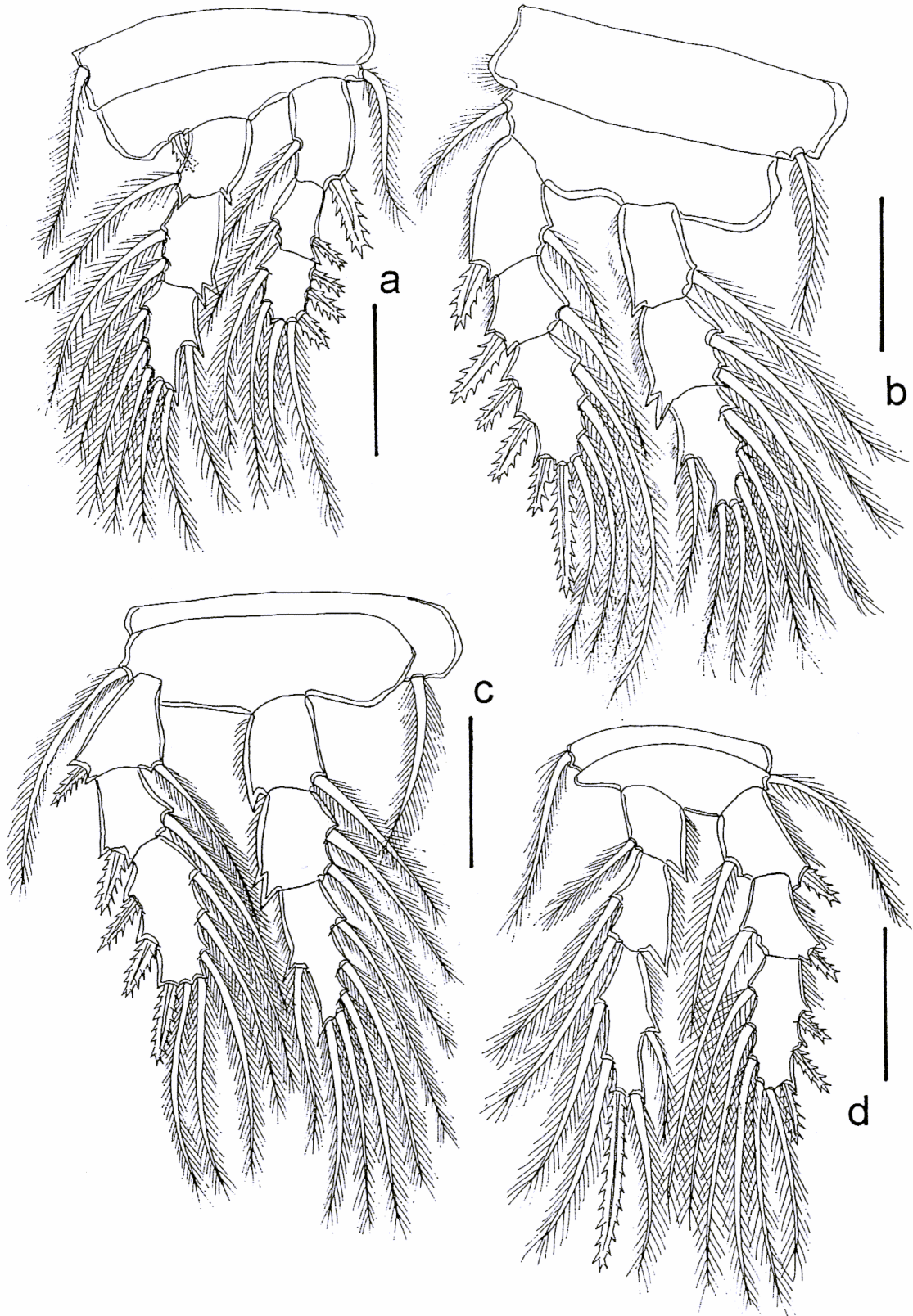


Figure 2. *Asterocheres abrolhensis* n. sp. Female Holotype, MNRJ 7293 a) P1; b) P2; c) P3; d) P4. Scale bars: a - d: 0.05 mm.

Fifth leg (fig. 1b) with free segment $51 \times 16 \mu\text{m}$ with row of setules on inner and outer margins. Distally with 3 plumose setae of different length. Somite 5 bearing plumose seta near insertion of P5.

DESCRIPTION: Male - Body (fig. 3a) cyclopiform, with dorso-ventrally flattened prosome. Length $603 \mu\text{m}$ ($546 - 657 \mu\text{m}$) (excluding caudal setae) and greatest width $336 \mu\text{m}$ ($303 - 384 \mu\text{m}$) based on 42 specimens. Leg 1 somite fused with cephalosome and with weak epimeral angles. Pedigerous somite 2 slightly longer than third one. Pedigerous somite 4 partially covered by preceding somite. Somite of leg 5 partially covered by fourth somite. Ratio of length to width of prosome 1.2 : 1. Ratio of length of prosome to that of urosome 2.1 : 1.

Genital somite (fig. 3b) $96 \times 129 \mu\text{m}$, wider than long, ratio of length to width 0.7 : 1, rounded anterolaterally, posterior corner pointed and bearing seta. First postgenital somite $22 \times 63 \mu\text{m}$, wider than long, ratio of length to width 0.3 : 1, posterior corner pointed. Second postgenital somite proportionally smaller than preceding somite, $18 \times 54 \mu\text{m}$, but also wider than long, ratio of length to width 0.3 : 1, posterior corner pointed. Anal somite as wide as second postgenital somite, $30 \times 54 \mu\text{m}$, ratio of length to width 0.6 : 1, posterior corners slightly pointed. Caudal rami $16 \times 22 \mu\text{m}$ slightly wider than long, armed with 6 setae. Seta I absent and setae II to VII with 82, 98, 216, 275, 104 and $102 \mu\text{m}$ respectively. All setae plumose.

Antennule slender (fig. 3c) $260 \mu\text{m}$ long, not including setae, 18-segmented. Basal part 9-segmented rather broad, distal part slender. Length of segments measured along posterior margins 15 ($26 \mu\text{m}$ along anterior margin); 11, 9, 6, 9, 8, 6, 11, 11, 3, 11, 17, 25, 14, 15, 39, 25 and $15 \mu\text{m}$ respectively. Segmental homologies and setation as follows: I-2, II-2, III-2, IV-1, V-1, VI-2, VII-2, VIII-2, IX-XII-6, XIII-1, XIV-1, XV-2, XVI-2, XVII-2, XVIII-1, XIX-XX-2, XXI-1+ae and XXII-XXVIII-6. Most of basal setae plumose and all distal ones smooth. Aesthetasc on segment XXI $68 \mu\text{m}$.

All other characteristics as for female.

ETHYMOLOGY: The specific name refers to Abrolhos, the type-locality of this species.

REMARKS: *Asterocheres abrolhensis* n. sp. has a short siphon, 148 μm , extending up to the maxilliped insertion and the free segment of P5 is armed with 3 setae. The following species share these characters: *A. aesthetes* Ho (Ho, 1984); *A. bacescui* Marcus (Marcus, 1965); *A. bulbosus* Malt (Malt, 1991); *A. dentatus* Giesbrecht (Giesbrecht, 1899); *A. echinicola* (Norman) (Giesbrecht, 1899; Gotto, 1993); *A. halichondriae* Stock (Stock, 1966a); *A. hongkongensis* Malt (Malt, 1991); *A. lilljeborgi* Boeck (Sars, 1918 as *Ascomyzon asterocheres*); *A. major* Thompson & Scott (Thompson & Scott, 1903); *A. manaarensis* Thompson & Scott (Thompson & Scott, 1903); *A. maxillatus* Stock (Stock, 1987); *A. minor* Thompson & Scott (Thompson & Scott, 1903); *A. minutus* (Claus) (Bocquet *et al.*, 1963); *A. mucronipes* Stock (Stock, 1960); *A. orientalis* Sewell (Sewell, 1949); *A. reginae* Boxshall & Huys (Boxshall & Huys, 1994); *A. rotundus* Malt (Malt, 1991); *A. scutatus* Stock (Stock, 1966b); *A. simulans* (Scott) (Sars, 1918 as *Ascomyzon simulans*); *A. suberitis* Giesbrecht (Giesbrecht, 1899); *A. tenuicornis* Brady (Eiselt, 1965) and *A. violaceus* (Claus) (Bocquet *et al.*, 1963).

A. reginae and *A. minor* have very pointed epimera on the cephalosome (Thompson & Scott, 1903 and Boxshall & Huys, 1994) while in the new species they are broad.

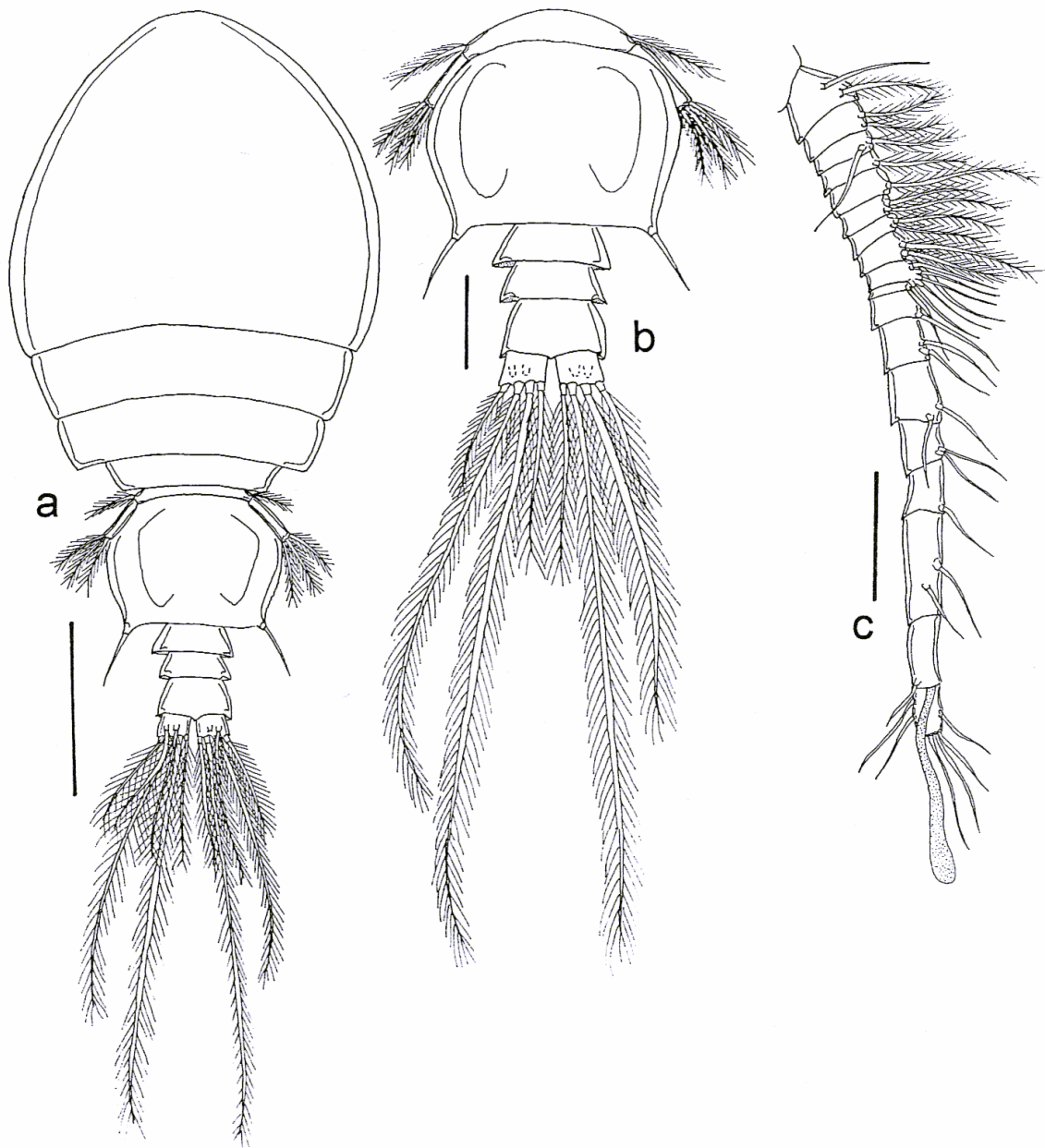


Figure 3. *Asterocheres abrolhensis* n. sp. Male Paratype, MNRJ 8521 a) dorsal view; b) urosome; c) antennule. Scale bars: a: 0.2 mm; b - c: 0.05 mm.

In *A. abrolhensis* n. sp. the caudal rami are square while in *A. aesthetes*, *A. bulbosus*, *A. dentatus*, *A. halichondriae*, *A. manaarensis*, *A. orientalis*, *A. rotundus*, *A. scutatus*, and *A. simulans* they are wider than long (Giesbrecht, 1899; Thompson & Scott, 1903; Sars, 1918; Sewell, 1949; Stock, 1966a, b; Ho, 1984 and Malt, 1991) and in *A. bacescui*, *A. echinicola*, *A. lilljeborgi*, *A. maxilatus*, and *A. tenuicornis* they are at least 1.5 times longer than wide (Giesbrecht, 1899; Sars, 1918; Eiselt, 1965; Marcus, 1965 and Stock, 1987).

A. hongkongensis, *A. major*, and *A. mucronipes* have the postgenital somite at least 1.5 times longer than the anal somite (Thompson & Scott, 1903; Stock, 1960 and Malt, 1991) and in *A. abrolhensis* n. sp. the postgenital somite is only slightly longer than the anal somite, with ratio of length of postgenital somite to that of anal somite 1.1 : 1.

A. abrolhensis n. sp. has the antennal exopod armed with 2 setae, this characteristic does not occur in *A. bacescui*, *A. lilljeborgi* and *A. suberitis* (Giesbrecht, 1899; Sars, 1918 and Marcus, 1965). In the former there is only one seta and in the remaining species there are 3 setae. In addition, *A. bacescui*, *A. minutus*, *A. suberitis* and *A. violaceus* have a 1-segmented mandibular palp (Giesbrecht, 1899; Bocquet *et al.*, 1963 and Marcus, 1965) while in *A. abrolhensis* n. sp. it is 2-segmented.

Among all species of the genus *Asterocheres* only *A. abrolhensis* n. sp has the second endopodal segment of P4 with one tooth distally.

Asterocheres crenulatus n. sp. (Figs. 4 - 5)

MATERIAL EXAMINED: Holotype, 1 female MNRJ 8483 from Viçosa Reefs, Abrolhos, Bahia, Brazil, collected by P. S. Young *et al.* on 28/II/1994, associated with sponges. Paratypes, 1 female MNRJ 8484, 1 female BMNH 1997.185 and 1 female USNM 282795 from the same locality; 3 females MNRJ 8498 from Rasinho do Coiceiro, Porto de Galinhas, Pernambuco, Brazil, collected by P. S. Young and C. S. Serejo on 20/II/1995, associated with sponges.

DESCRIPTION: Female - Body (fig. 4a) with very broad prosome and short urosome. Mean body length 626 μm (596 - 679 μm) (excluding caudal setae) and greatest width 460 μm (424 - 505 μm) based on 7 specimens. Leg 1 somite fused with cephalosome and with pointed epimera. Pedigerous somite 2 with lateral margin slightly concave. Third pedigerous somite longer than second and covering pedigerous somites 4 and 5 entirely. Epimera of pedigerous somites 2 and 3 pointed. Ratio of length to width of prosome 1.1 : 1. Ratio of length of prosome to that of urosome 3.6 : 1.

Genital double-somite (fig. 4b), 64 x 93 μm , wider than long, ratio of length to width 0.7 : 1, rounded laterally, greatest width posteriorly with patch of setules present laterally. Posterior corner with large tooth and 4 small teeth. Postgenital somite, 15 x 51 μm , wider than long, ratio of length to width 0.3 : 1, posterior corner pointed. Anal somite, 30 x 46 μm , wider than long, but twice as long as preceding somite, ratio of length to width 0.6 : 1, with tooth-like anal operculum, posterior corner pointed. Caudal rami square, 22 x 22 μm , armed with 6 setae. Setae I absent, setae II to VII with 83, 104, 132, 144, 113 and 75 μm respectively. All setae plumose.

Antennule slender (fig. 4c) 326 μm long, not including setae, 19-segmented. Basal part 9-segmented, rather broad, distal part slender. Length of segments measured along posterior margins 19 (60 μm along anterior margin); 10; 6; 8; 10; 6; 8; 11; 10; 3; 8; 16; 21; 23; 19; 23; 24; 29 and 31 μm respectively. Segmental homologies and setation as follows: I-2; II-2; III-2; IV-1; V-1; VI-2;

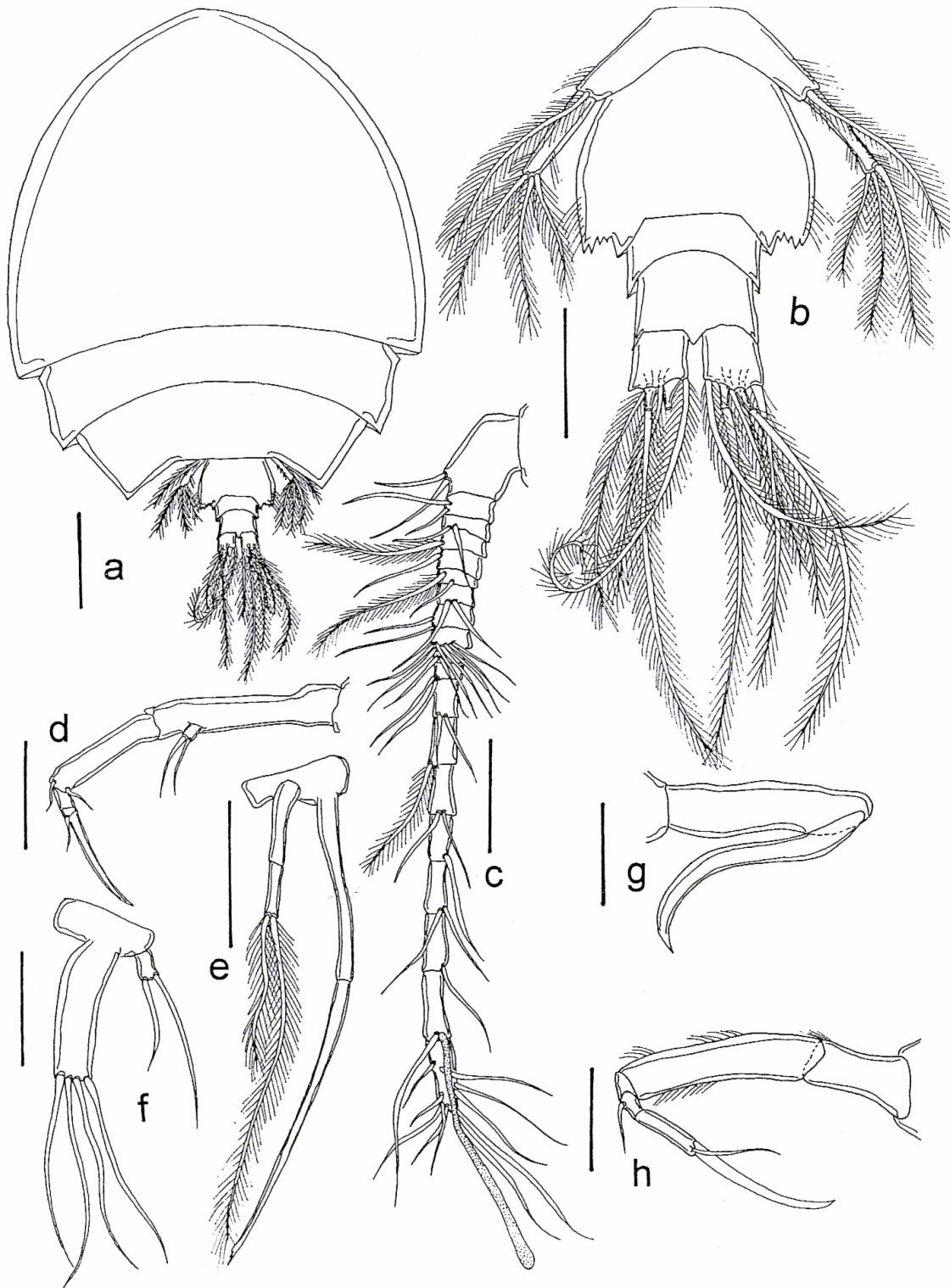


Figure 4. *Asterocheres crenulatus* n. sp. Female Holotype, MNRJ 8483 a) dorsal view; b) urosome; c) antennule; d) antenna; e) mandible; f) maxillule; g) maxilla; h) maxilliped. Scale bars: a) 0.1 mm; b - h) 0.05 mm.

VII-2; VIII-2; IX-XII-7; XIII-2; XIV-2; XV-2; XVI-1; XVII-2; XVIII-1; XIX-2; XX-1; XXI-1+ae; XXII-XXVIII-10. Antennule with one seta each on segments IV, VI and XVI plumose, remaining setae smooth. Aesthetasc on segment XXI 114 μm long.

Antenna (fig. 4d) 220 μm long (including claw) with basis 89 μm long. Exopod 1-segmented, 7 μm long with 2 equal apical setae. Endopod 3-segmented, first segment 58 μm long armed with 2 apical setae, second segment 14 μm , twice as long as third segment, 6 μm long and armed with small seta apically. Terminal claw 53 μm , almost as long as first endopodal segment and curved distally.

Oral cone produced into short siphon-like distal portion, 81 μm , almost reaching maxilliped. Mandible (fig. 4e) comprising stylet and slender 2-segmented palp. Stylet 169 μm long and with denticulate margin subapically. First segment of palp, 28 μm , longer than second segment and unarmed. Second segment, 20 μm armed with 2 unequal apical plumose setae.

Maxillule (fig. 4f) bilobed, inner lobe 48 μm , considerably longer than outer lobe and armed with 4 setae. Outer lobe 9 μm long, armed with 2 unequal smooth setae. Maxilla (fig. 4g) with syncoxa, 101 μm long, and curved claw 103 μm long.

Maxilliped (fig. 4h) 5-segmented, comprising short syncoxa, 54 μm , presenting row of setules distally; basis elongate 101 μm , presenting rows of setules along inner and outer margins. First and second endopodal segments almost same length, 17 and 14 μm respectively but second segment armed with short seta. Third endopodal segment, 30 μm long, bearing curved claw-like element, 79 μm long, plus additional apical smooth seta.

Swimming legs 1-4 (figs. 5a - 5d) biramous, with 3-segmented rami throughout. Setal formula as follows:

| | coxa | basis | exo. | end. |
|----|------|-------|---------------|-----------------|
| P1 | 0-1 | 1-1 | I-1;I-1;III-4 | 0-1;0-2;1-5 |
| P2 | 0-1 | 1-0 | I-1;I-1;IV-4 | 0-1;0-2;1-5 |
| P3 | 0-1 | 1-0 | I-1;I-1;IV-4 | 0-1;0-2;1-1+I-3 |
| P4 | 0-1 | 1-0 | I-1;I-1;IV-4 | 0-1;0-2;1-1+I-2 |

All Coxae bear plumose seta. Basis of all legs carrying plumose lateral seta except in P2. P4 with coxa covered by small denticles. Outer margin of endopod of P2 to P4 presenting setules.

Fifth leg (fig. 5e) with elongate free segment, 41 x 7 μm with both margins carrying rows of setules. Apically with 3 plumose setae. Somite 5 (fig. 4b) bearing seta near insertion of free segment together with row of setules and patch of denticles.

Male: Unknown.

ETHYMOLOGY: The specific name refers to the outer margin of the exopods of P2 to P4 that are crenulated.

REMARKS: *Asterocheres crenulatus* n. sp. presents two major characteristics, a short siphon, 81 μm long, and the free segment of P5 armed with 3 setae, which place it in a group together with the following species: *A. abrolhensis* n. sp.; *A. aesthetes*; *A. bacescui*; *A. bulbosus*; *A. dentatus*; *A. echinicola*; *A. halichondriae*; *A. hongkongensis*;

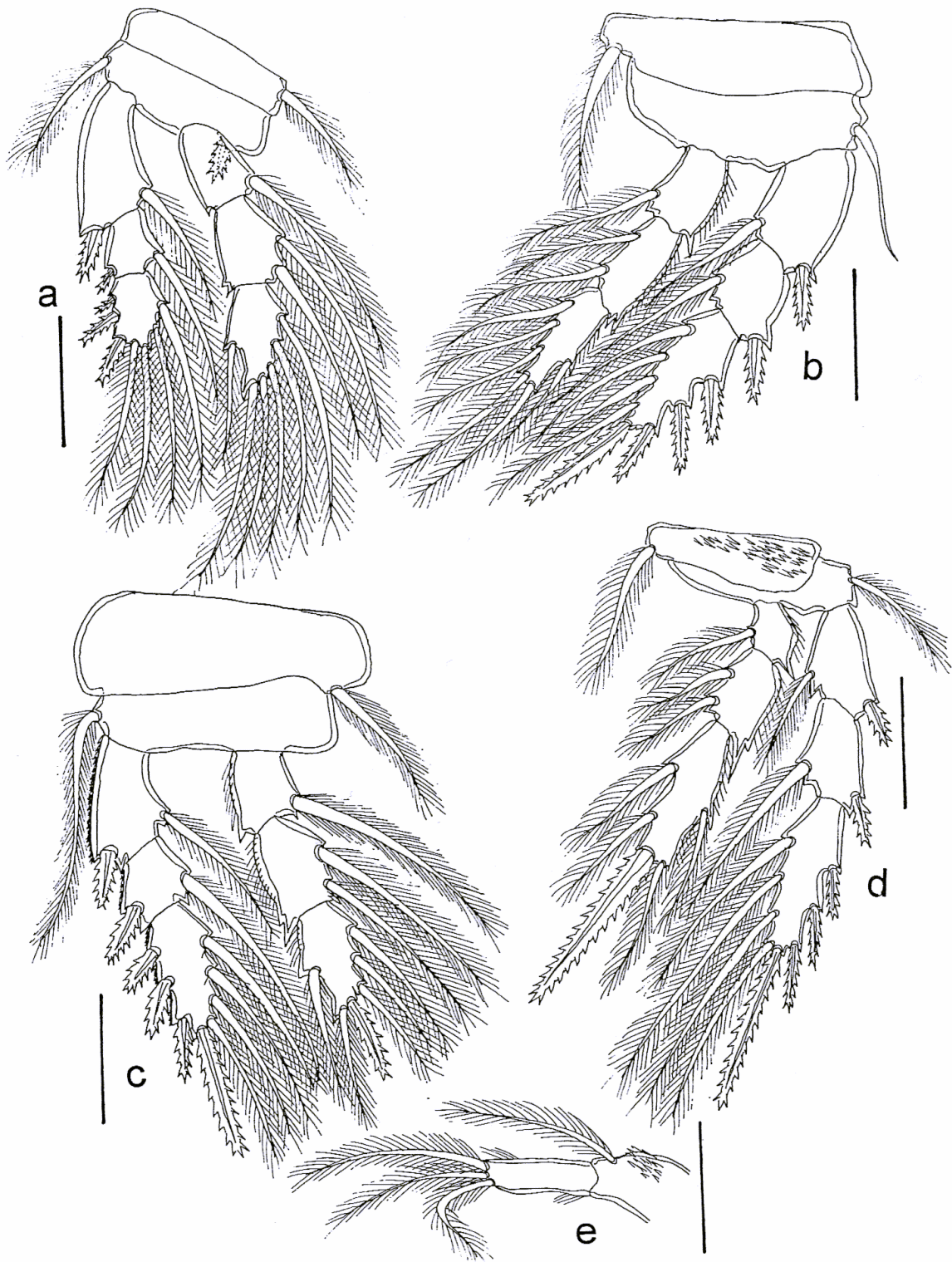


Figure 5. *Asterocheres crenulatus* n. sp. Female Holotype, MNRJ 8483 a) P1; b) P2; c) P3; d) P4; e) P5. Scale bars: a - e: 0.05 mm.

A. lilljeborgi; *A. major*; *A. manaarensis*; *A. maxillatus*; *A. minor*; *A. minutus*; *A. mucronipes*; *A. orientalis*; *A. reginae*; *A. rotundus*; *A. scutatus*; *A. simulans*; *A. suberitis*; *A. tenuicornis* and *A. violaceus* (Giesbrecht, 1899; Thompson & Scott, 1903; Sars, 1918; Sewell, 1949; Stock, 1960; Bocquet *et al.*, 1963; Eiselt, 1965; Marcus, 1965; Stock, 1966a, b; Ho, 1984; Stock, 1987; Malt, 1991 Boxshall & Huys, 1994).

A. crenulatus n. sp. also has caudal rami that are wider than long and the anal somite is longer than the postgenital somite. Only *A. orientalis*; *A. scutatus*; *A. rotundus*; *A. aesthetes* and *A. simulans* share these characteristics (Sars, 1918; Sewell, 1949; Stock, 1966b, Ho, 1984 and Malt, 1991). However only *A. scutatus* has a genital double-somite 1.5 times wider than long, as in the new species (Stock, 1966b).

A. crenulatus n. sp. has plumose setae on segments IV, VI and XVI of the antennule while in *A. scutatus* they are all smooth (Stock, 1966b). In *A. scutatus* the antennal exopod has a proximal setula which is absent in *A. crenulatus* n. sp. The first endopodal segment of the antenna has two setules and the third endopodal segment has one seta in *A. crenulatus* n. sp. but in *A. scutatus* the first endopodal segment is unarmed and the third has two setules (Stock, 1966b).

In *A. crenulatus* n. sp. the coxa of P4 is covered by many small denticles and presents a patch of setules distally on the outer margin of the third endopodal segment. These characteristics do not occur in *A. scutatus*.

A. crenulatus n. sp. has the pedigerous somite 2 with lateral margins slightly concave while in *A. scutatus* they are rounded. In *A. crenulatus* n. sp. the third pedigerous somite covers pedigerous somites 4 and 5 entirely and in *A. scutatus* it covers partially pedigerous somite 4 that covers entirely pedigerous somite 5 (Stock, 1966b).

A. scutatus has the greatest width of the genital double-somite at its middle, whereas in *A. crenulatus* n. sp. the greatest width is to the posterior; the posterior corners are also armed with a large tooth and four small denticles which are absent in *A. scutatus*.

Asterocheres lunatus n. sp. (Figs. 6 - 7)

MATERIAL EXAMINED: Holotype, 1 female MNRJ 8453 from Viçosa Reefs, Abrolhos, Bahia, Brazil, collected by P. S. Young *et al.* on 28/II/1994, associated with sponges. Paratypes, 37 females and 13 males MNRJ 8454, 5 females and 4 males BMNH 1997.177-184 and 5 females and 4 males USNM 282794 from the same locality; 26 females and 21 males MNRJ 8499 from Rasinho do Coiceiro, Porto de Galinhas, Pernambuco, Brazil, collected by P. S. Young and C. S. Serejo on 20/II/1995, associated with sponges.

DESCRIPTION: Female - Body (fig. 6a) with very broad prosome. Length 847 μm (768 - 919 μm) (excluding caudal setae) and greatest width 585 μm (535 - 647 μm) based on 48 specimens. Leg 1 somite fused with cephalosome and with extended pointed epimera. Pedigerous somite 2 also with extended epimera. Third pedigerous somite longer than second, epimera rounded. Pedigerous somite 4 narrower and dorsally partially covered by third pedigerous somite. Somite of leg 5, 54 x 134 μm , entirely covered by preceding somite and with posterior margin serrated. Ratio of length to width of prosome 1.1 : 1. Ratio of length of prosome to that of urosome 2.8 : 1.

Genital double-somite (fig. 6b), 93 x 114 μm , wider than long, ratio of length to width 0.8 : 1, rounded anterolaterally. Proximal third with group of six well developed setules, anterior to narrow posterior section. Large setule and 2 small spinules present ventrally on each side. Posterior margin serrated.

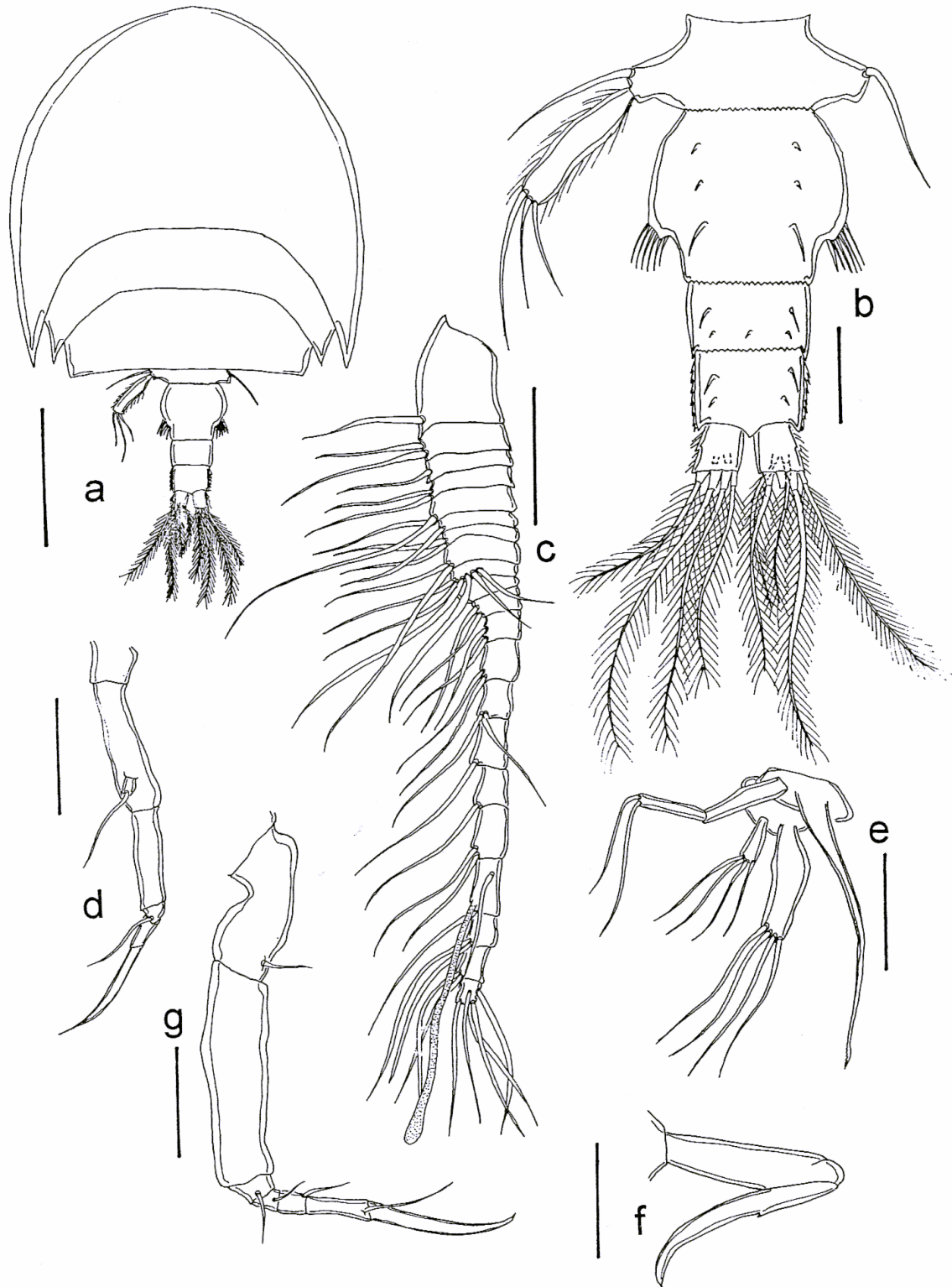


Figure 6. *Asterocheres lunatus* n. sp..Female Holotype, MNRJ 8453 a) dorsal view; b) urosome; c) antennule; d) antenna; e) mandible and maxillule; f) maxilla; g) maxilliped. Scale bars: a: 0.2 mm; b - g: 0.05 mm.

Postgenital somite, 39 x 70 μm , wider than long, ratio of length to width 0.6 : 1, posterior margin serrated, with tooth at postero-lateral angle and 5 spinules ventrally, 3 of them very small. Anal somite, 48 x 63 μm , also wider than long, ratio of length to width 0.8 : 1, with tooth at postero-lateral angle, 4 spinules ventrally, 2 of them small, and setules along lateral margins.

Caudal rami, 30 x 25 μm , ratio of length to width 1.2 : 1, armed with 6 setae and tooth in middle of spinulose outer margin. Seta I absent, setae II to VII with 79, 89, 171, 157, 123 and 75 μm respectively. All setae plumose.

Antennule slender (fig. 6c), 261 μm long, not including setae; 21-segmented. Basal part 9-segmented, rather broad, distal part slender. Length of segments measured along posterior margins: 25 (50 μm along anterior margin), 11, 7, 9, 11, 5, 4, 9, 7, 4, 11, 13, 16, 14, 18, 14, 18, 20, 11, 13 and 7 μm respectively. Segmental homologies and setation as follows: I-1; II-2; III-1; IV-2; V-2; VI-1; VII-2; VIII-2; IX-XII-6; XIII-0; XIV-2; XV-2; XVI-2; XVII-1; XVIII-1; XIX-1; XX-2; XXI-2+ae; XXII-XXIII-2; XXIV-XXV-2; XXVI-XXVIII-5; all setae smooth. Aesthetasc on segment XXI 86 μm long.

Antenna (fig. 6d) 175 μm long (including claw) with basis, 57 μm long, carrying short exopod and well developed endopod. Exopod 1-segmented, 6 x 4 μm , longer than wide, with single distal seta. First endopodal segment 45 μm long, shorter than basis; second endopodal segment 10 μm long, wedge shaped, armed with long seta; third endopodal segment almost twice as long as second one, 18 μm . Terminal claw curved and as long as first and second endopodal segments, 54 μm .

Oral cone produced into short siphon-like distal portion, 121 μm , reaching insertion of maxilliped. Mandible (fig. 6e) with stylet 129 μm long and slender 2-segmented palp, bearing 2 unequal setae. Maxillule (fig. 6e) comprising outer lobe 21 μm long, distally armed with 4 setae of similar length and longer inner lobe, 57 μm , armed with 4 long setae apically. Maxilla (fig. 6f) with syncoxa, 82 μm , and curved claw 102 μm long. Maxilliped (fig. 6g) with syncoxa 71 μm long and with seta on inner margin, basis 121 μm long, unarmed. Endopod 4-segmented, first three segments very similar in length, 13; 11 and 13 μm respectively, each bearing small seta distally; last segment longest, 30 μm , presenting seta and curved claw 66 μm long.

Legs 1 to 4 biramous (figs. 7a - 7d), with three-segmented rami throughout. Setal formula as follows:

| | coxa | basis | exp. | end. |
|----|------|-------|---------------|-----------------|
| P1 | 0-1 | 1-0 | I-1;I-1;III-4 | 0-1;0-2;1-5 |
| P2 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-2;1-5 |
| P3 | 0-1 | 1-0 | I-1;I-1;IV-4 | 0-1;0-2;1-5 |
| P4 | 0-1 | 1-0 | I-1;I-1;IV-4 | 0-1;0-2;1-1+I-2 |

All coxae with median plumose seta; each basis with lateral seta. Second exopodal segment of P1 (fig. 7a) with distal tooth. Second endopodal segment of P1 with single tooth posteriorly in outer margin, same segment of other legs with two close teeth. Exopodal spines of P2 small. Third endopodal segment of P2 large and curved tooth; similarly on P3 (fig. 7c), although tooth smaller. P4 (fig. 7d) with small tooth on basis near insertion of endopod.

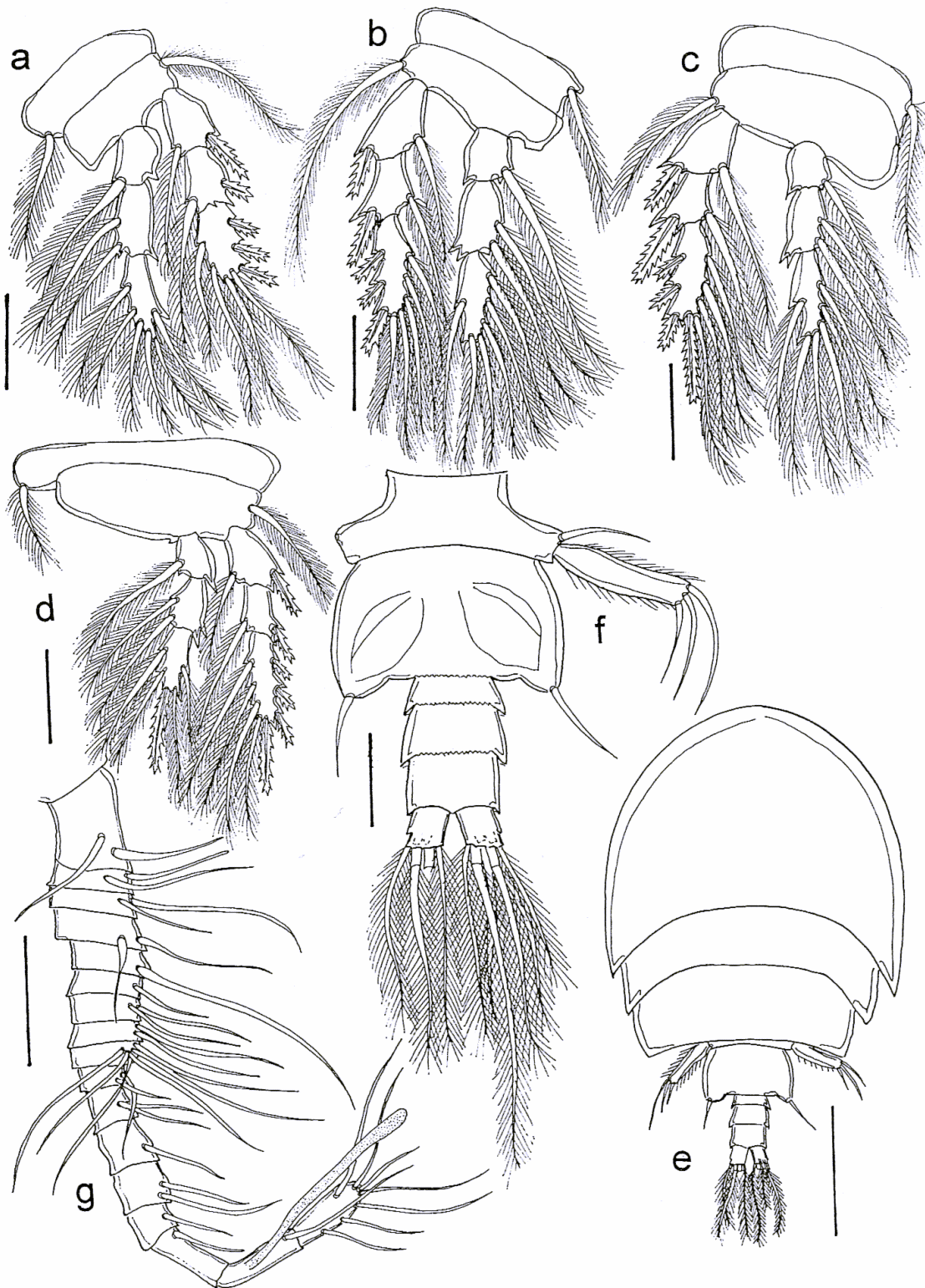


Figure 7. *Asterocheres lunatus* n. sp. Female Holotype, MNRJ 8453 a) P1; b) P2; c) P3; d) P4. Male Paratype MNRJ 8454 e) dorsal view; f) urosome; g) antennule. Scale bars: e: 0.2 mm; a - d, f - g: 0.05 mm.

Fifth leg (fig. 6b) with elongate free segment, 80 x 20 μm , with both margins setulate; armed with 3 smooth setae of different length apically. Somite 5 with seta near insertion of free segment of P5.

DESCRIPTION: Male - Body (fig. 7e) with broad prosome, length 745 μm , (717 - 788 μm) and greatest width 497 μm (475 - 515 μm) based on 21 species. Ratio of length of prosome to that of urosome 2.9 : 1. Leg 1 somite fused with cephalosome and with pointed epimera, forming an angle of 32°. Pedigerous somite 2 with epimera forming an angle of 55°. Third pedigerous somite longer than preceding but with rounded epimera. Pedigerous somite 4 dorsally partially covered by third pedigerous somite. Somite of leg 5, 51 x 131 μm , totally covered by the preceding somite.

Genital somite (fig. 7f), 79 x 138 μm , wider than long, ratio of length to width 0.6 : 1. Lateral margins rounded, produced posteriorly bearing seta 46 μm long. First postgenital somite 16 x 61 μm , wider than long, ratio of length to width 0.3 : 1. Second postgenital somite twice as long as anterior somite but equal in width, 30 x 61 μm ; ratio of length to width 0.5 : 1. Both somites with 3 small spinules ventrally. Anal somite longer than preceding somite, but narrower, 36 x 55 μm , presenting 2 spinules ventrally; ratio of length to width 0.6 : 1. Caudal rami rectangular, 30 x 23 μm , longer than wide, ratio of length to width 1.3 : 1, as long as second postgenital somite.

Antennule (fig. 7g) 307 μm long not including setae, 17-segmented. Basal part 9-segmented, rather broad, distal part slender. Length of segments measured along posterior margin 21 (36 μm along anterior margin), 11, 7, 13, 11, 9, 11, 13, 4, 11, 14, 18, 14, 16, 29, 36 and 32 μm respectively. Segmental homologies and setation as follows: I-2; II-2; III-2; IV-2; V-1; VI-1; VII-2; VIII-2; IX-XIII-6; XIV-2; XV-2; XVI-1; XVII-2; XVIII-1; XIX-XX-1; XXI-XXIII-1+ae; XXIV-XXVIII-7. All setae smooth.

All other characteristics as for female.

ETHYMOLOGY: The specific name refers to the shape of the cephalosome.

REMARKS: *Asterocheres lunatus* n.sp. has a relatively short siphon, 121 μm , extending as far as the insertion of the maxilliped and the free segment of P5 is armed with 3 setae. These characteristics place *A. lunatus* n.sp. in a group formed by the following other species *Asterocheres*: *A. abrolhensis* n. sp.; *A. aesthetes*; *A. bacescui*; *A. bulbosus*; *A. crenulatus* n. sp.; *A. dentatus*; *A. echinicola*; *A. halichondriae*; *A. hongkongensis*; *A. lilljeborgi*; *A. major*; *A. manaarensis*; *A. maxillatus*; *A. minor*; *A. minutus*; *A. mucronipes*; *A. orientalis*; *A. reginae*; *A. rotundus*; *A. scutatus*; *A. simulans*; *A. suberitis*; *A. tenuicornis* and *A. violaceus* (Giesbrecht, 1899; Thompson & Scott, 1903; Sars, 1918; Sewell, 1949; Stock, 1960; Bocquet *et al.*, 1963; Eiselt, 1965; Marcus, 1965; Stock, 1966a, b; Ho, 1984; Stock, 1987; Malt, 1991 and Boxshall & Huys, 1994).

Asterocheres lunatus n. sp. has a very different shape of the cephalosome due to its pointed epimera (figs. 6a and 7e). Such epimera are only observed in *A. reginae* and in *A. minor* but in these species they are not so pointed (Thompson & Scott, 1903 and Boxshall & Huys, 1994).

There are many other differences between *Asterocheres lunatus* n. sp., *A. reginae* and *A. minor*. In *Asterocheres lunatus* n. sp. the second pedigerous somite has pointed epimera and the third pedigerous somite has square epimera (fig. 6a and 7e). In *A. minor* both somites have rounded epimera (Thompson & Scott, 1903) and in *A. reginae* the first is pointed and the second is rounded (Boxshall & Huys, 1994). Additionally in

A. lunatus n. sp. the third pedigerous somite partially covers the fourth pedigerous somite which totally covers the fifth. In *A. minor* and *A. reginae* the third somite partially covers the fourth but that somite does not cover the fifth (Thompson & Scott, 1903 and Boxshall & Huys, 1994). In *A. minor* the postgenital somite is 1.5 times longer than the anal somite (Thompson & Scott, 1903) while in *A. lunatus* n. sp. the anal somite is longer than the postgenital (fig. 6b) and in *A. reginae* the postgenital somite is slightly longer than the anal somite (Boxshall & Huys, 1994).

In *A. lunatus* n. sp. the caudal rami are longer than wide (fig. 6b) and in *A. reginae* they are wider than long (Boxshall & Huys, 1994). The antennal exopod in *A. lunatus* n. sp. is armed with one seta (fig. 6d) instead of 3 as in *A. reginae* (Boxshall & Huys, 1994). *A. reginae* also has a flaccid element medially on the syncoxa of the maxilla (Boxshall & Huys, 1994), whereas in *A. lunatus* n.sp. this element is absent.

Asterocheres paraboecki n. sp. (Figs. 8 - 10)

MATERIAL EXAMINED: Holotype, 1 female MNRJ 7473 from Cagarras Islands, Rio de Janeiro, Brazil, collected by C. S. Serejo on 14/1/1994, associated with sponges. Paratypes, 13 females and 7 males MNRJ 8502, 4 females and 2 males BMNH 1997.202-207 and 4 females and 2 males USNM 282799 from the same locality.

DESCRIPTION: Female - Body (fig. 8a) with prosome not especially broad. Length 806 μm (798 - 810 μm) (excluding caudal setae) and greatest width 455 μm (451 - 458 μm) based on 22 specimens. Leg 1 somite fused with cephalosome, pedigerous somites large, reducing gradually in width and with rounded epimera. Pedigerous somite 4 partially covered by third pedigerous somite. Somite of leg 5, 12 x 45 μm , not covered by preceding somite. Ratio of length to width of prosome 1.2 : 1. Ratio of length of prosome to that of urosome 1.9 : 1.

Genital double-somite (fig. 8b), 113 x 102 μm , longer than wide. Ratio of length to width 1.1 : 1, rounded anterolaterally, with hexagonal shape and dorsolateral genital openings, near widest part of somite. Ornamentation of 5 setules near genital openings. Postgenital somite, 43 x 70 μm , wider than long, ratio of length to width 0.6 : 1. Anal somite, 50 x 70 μm , wider than long. Caudal rami, 36 x 30 μm , longer than wide, but shorter than anal somite, with small tooth in middle of outer margin; armed with 6 setae. Seta I absent, setae II to VII with 121, 113, 214, 340, 79 and 116 μm respectively. All setae plumose.

Antennule (fig. 8c), 318 μm long, not including setae, 20-segmented. Basal part 9-segmented, rather broad, distal part slender. Length of segments measured along posterior margins 14 μm (28 μm along anterior margin); 14; 7; 7; 9; 7; 9; 11; 14; 5; 14; 21; 25; 18; 25; 29; 32; 7; 14 and 11 μm , respectively. Homology and setation as follows: I-2; II-1; III-1; IV-1; V-1; VI-2; VII-2; VIII-2; IX-XIII-5; XIV-1; XV-2; XVI-0; XVII-2; XVIII-0; XIX-1; XX-1; XXI-1+ae; XXII-XXIII-1; XXIV-XXV-1; XXVI-XXVIII-4. All setae smooth. Aesthetasc on segment XXI 89 μm long.

Antenna (fig. 8d) 264 μm long (including claw) with basis 78 μm long. Exopod 1-segmented, 11 μm long, wider than long, armed with 2 setae, one long and distal, one short and lateral. Endopod 3-segmented, first segment 57 μm long, shorter than basis and unarmed, second segment 7 μm and armed with seta. Third segment 14 μm , longer than second and armed with 2 setae. Terminal claw curved, 86 μm , longer than all endopodal segments together.

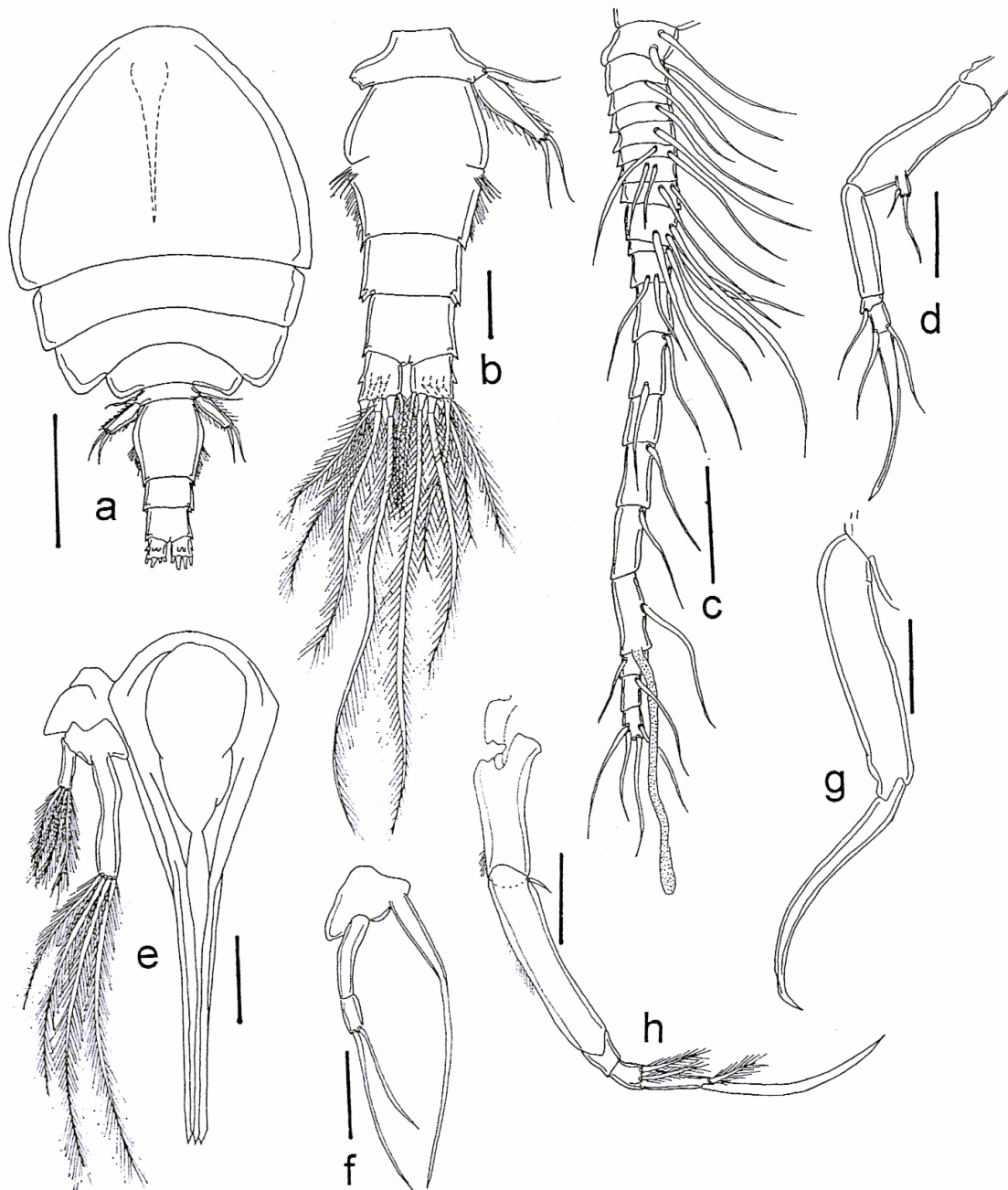


Figure 8. *Asterocheres paraboecki* n. sp. Female Holotype, MNRJ 7473 a) dorsal view; b) urosome; c) antennule; d) antenna; e) siphon and maxillule; f) mandible; g) maxilla; h) maxilliped. Scale bars: a: 0.2 mm; b - h: 0.05 mm.

Oral cone (fig. 8e) produced into siphon-like distal portion, 243 μm reaching insertion of P1. Mandible (fig. 8f) comprising pointed stylet, 146 μm long, and 2-segmented palp, armed with 2 setae distally. Maxillule (fig. 8e) bilobed, inner lobe 64 μm long, 3 times longer than outer lobe and armed with four plumose setae of unequal length; outer lobe 21 μm long, short and narrow, armed with 4 plumose setae. Maxilla (fig. 8g) with syncoxa 143 μm long, curved claw as long as syncoxa. Maxilliped (fig. 8h) 5-segmented, comprising syncoxa, 84 μm long, with row of setules distally on outer margin and short seta on inner margin. Basis 116 μm long with group of setules in middle of outer margin. Endopod 3-segmented, 18, 18, 29 μm respectively, second segment armed with 2 setae and third with single seta. Curved claw 93 μm long.

Swimming legs 1-4 (figs. 9a - 9d) biramous with 3-segmented rami throughout. Setal formula as follows:

| | coxa | basis | exo. | end. |
|----|------|-------|---------------|-----------------|
| P1 | 0-1 | 1-1 | I-1;I-1;III-4 | 0-1;0-2;1-5 |
| P2 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-2;1-5 |
| P3 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-2;1-5 |
| P4 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-2;1-1+I-2 |

All coxae armed with plumose seta and each basis with lateral seta. P1 with basis presenting tooth close to seta.

Pedigerous somite 5 with seta close to insertion of free segment. P5 (fig. 8b) presenting rectangular free segment, 68 x 21 μm , armed with 2 smooth setae distally and setules on both margins.

DESCRIPTION: Male - Body (fig. 10a) with prosome dorsoventrally flattened. Mean body length 535 μm (512 - 543 μm) (excluding caudal setae) and greatest width 289 μm (281 - 295 μm) based on 11 specimens. Leg 1 somite fused with cephalosome. Pedigerous somites 2 and 3 large and reducing gradually in width. Epimera of all somites rounded. Ratio of length to width of prosome 1.3 : 1. Pedigerous somite 5, 36 x 102 μm , partially covered by preceding somite.

Genital somite (fig. 10b) 48 x 90 μm , wider than long. Ratio of length to width 0.6 : 1. Anterior margin rounded, posterior corners with seta. Two postgenital somites 25 x 70 μm and 25 x 65 μm respectively. Anal somite 34 x 64 μm , longer than preceding somites. Caudal rami square, 27 x 27 μm , shorter than anal somite.

Antennule (fig. 10c) 289 μm long, not including seta, 17-segmented. Length of segments measured along posterior margins 21 μm (32 μm along anterior margin); 7; 9; 7; 9; 11; 5; 9; 11; 7; 18; 21; 25; 14; 39; 29 and 25 μm respectively. Segmental homologies and setation as follows: I-2; II-2; III-1; IV-2; V-1; VI-2; VII-2; VIII-2; IX-XIII-5; XIV-0; XV-1; XVI-1+ae; XVII-1; XVIII-1; XIX-XX-0; XXI-1+ae; XXII-XXVIII-6. All setae smooth. Aesthetasc on segment XVI 75 μm long and on segment XXI 86 μm long. All other characteristics as for female

ETHYMOLOGY: The specific name refers to the similarity between the new species and *A. boeckii* (Brady, 1880).

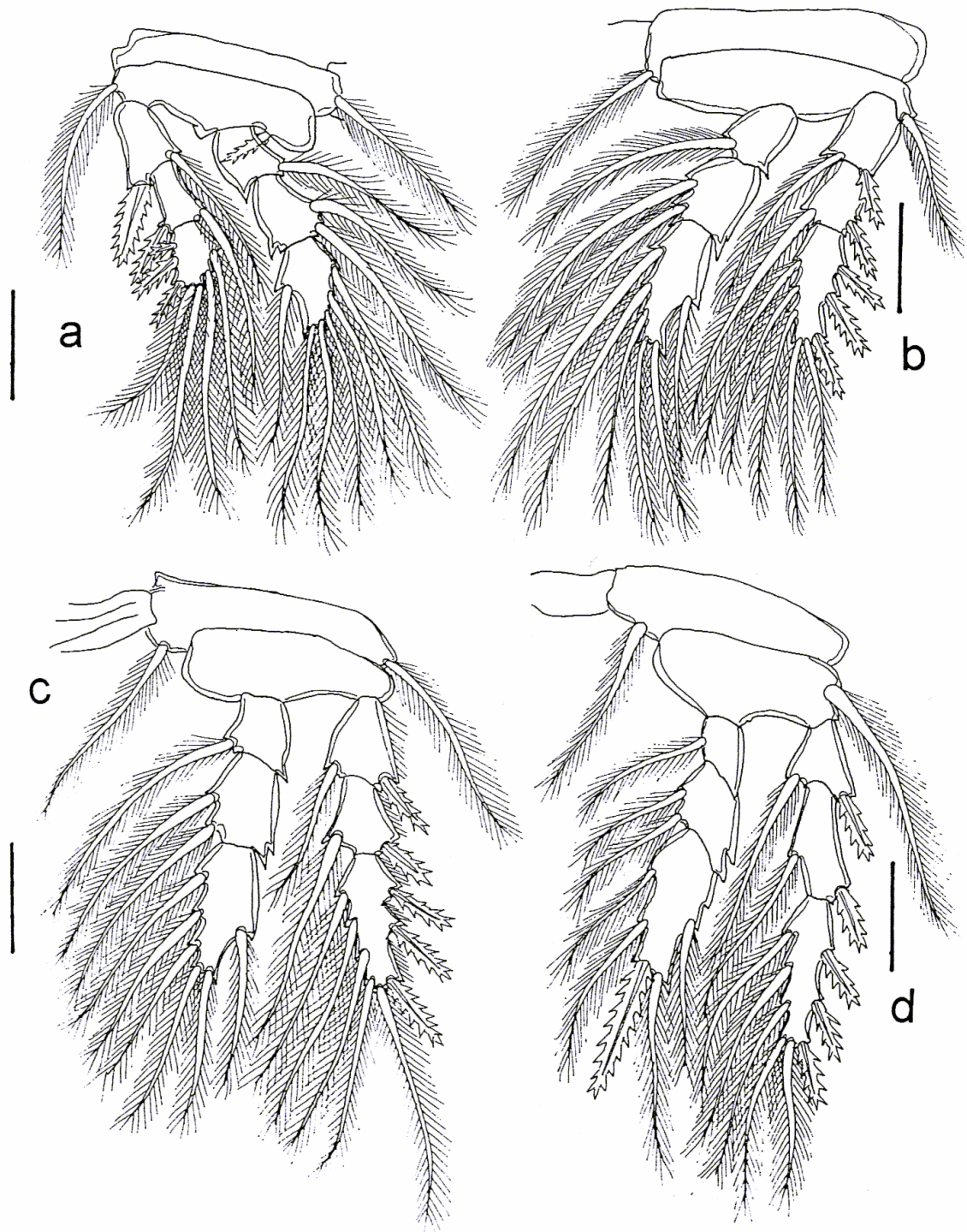


Figure 9. *Asterocheres paraboecki* n. sp. Female Holotype, MNRJ 7473 a) P1; b) P2; c) P3; d) P4. Scale bars: a - d: 0.05 mm.

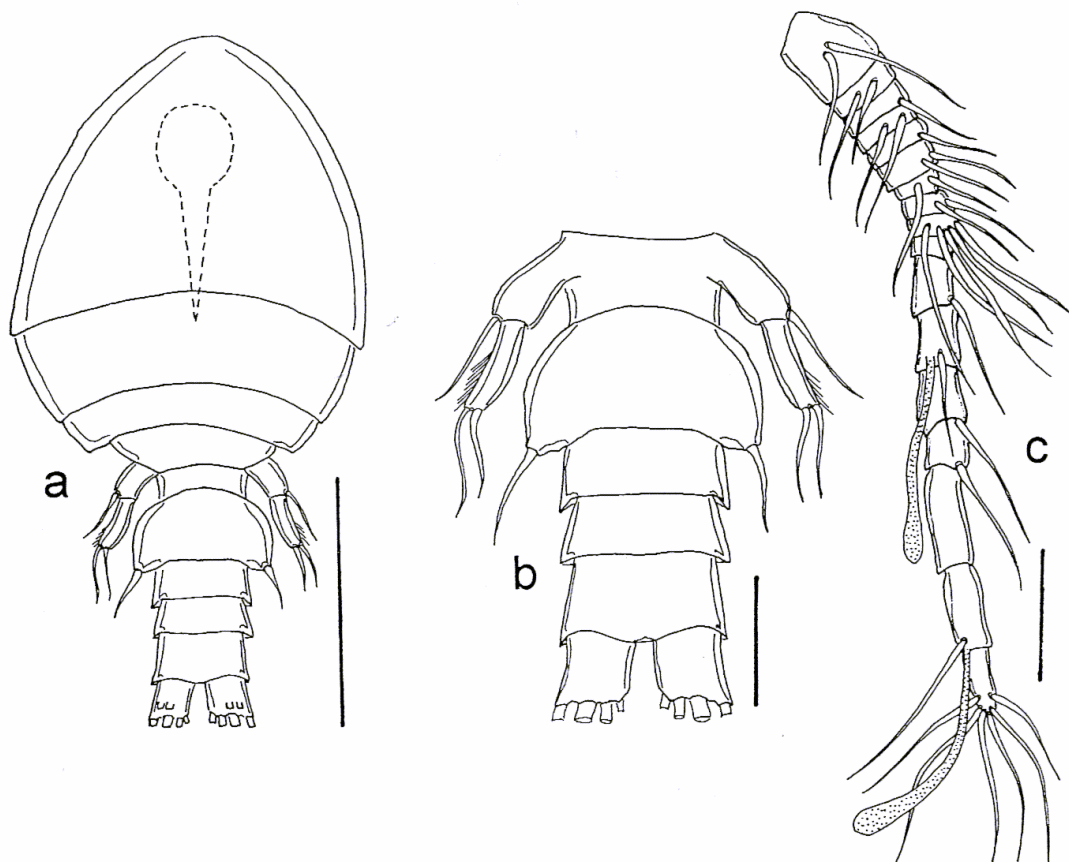


Figure 10. *Asterocheres paraboecki* n. sp. Male Paratype, MNRJ 8502 a) dorsal view; b) urosome; c) antennule. Scale bars: a: 0.2 mm; b - c: 0.05 mm.

REMARKS: *Asterocheres paraboecki* n. sp. has a siphon that reaches the insertion of P1 and can be grouped with the following species: *A. boeckii* (Brady) (Sars, 1918 as *Ascomyzon boeckii*); *A. complexus* Stock (Stock, 1960 and Giesbrecht, 1899 as *Asterocheres boeckii*); *A. corneliae* Schirl (Schirl, 1973); *A. ellisi* Hamond (Hamond, 1923); *A. intermedius* (Hansen) (Hansen, 1923 as *Ascomyzon intermedium*); *A. latus* Brady (Stock, 1960 and Gotto, 1993); *A. micheli* (Gurney) (Gurney, 1927); and *A. parvus* Giesbrecht (Giesbrecht, 1899 and Gotto, 1993). Among these species only *A. latus* and *A. boeckii* have the free segment of P5 armed with 2 setae (Gotto, 1993). In *A. intermedius* this characteristic is not mentioned.

In *A. intermedius* the width of the genital double-somite is $\frac{1}{4}$ of the total length and the maxillule outer lobe is only $\frac{1}{4}$ the length of the inner lobe (Hansen, 1923), while in *A. paraboecki* n. sp. the ratio of length to width in the genital double-somite is 1.1 : 1 and the maxillule outer lobe is $\frac{1}{3}$ length of the inner lobe. In addition, that the antennal claw of *A. paraboecki* n. sp. is longer than that of *A. intermedius*.

In *A. latus* the epimera of the pedigerous somites are pointed and the anal somite is as long as the caudal rami (Stock, 1960 and Gotto, 1993) while in *A. paraboecki* n. sp. the epimera are rounded and the anal somite is longer than the caudal rami.

A. paraboecki n. sp. differs from *A. boeckii* because the second endopodal segment of P2 has 2 setae, instead of 1 and the anal somite is longer than the postgenital somite while in *A. boeckii* the relative lengths are reversed (Sars, 1918). *A. paraboecki* n. sp. has unique characteristics, such as setules near the genital area and small tooth in the outer margin of the caudal rami.

Asterocheres spinopaulus n. sp. (Figs. 11 - 13)

MATERIAL EXAMINED: Holotype, 1 female MNRJ 8471 from Viçosa Reefs, Abrolhos, Bahia, Brazil, collected by P. S. Young et al. on 28/II/1994, associated with sponges. Paratypes, 8 females and 4 males MNRJ 8472. 8 females and 5 males MNRJ 8473; 3 females and 1 male BMNH 1997.193-196 and 3 females and 1 male USNM 282797 from the same locality but collected by P. S. Young, R. Johnsson and A. O. Bustamante on 26/VIII/95 associated with Haplosclerida sponges.

DESCRIPTION: Female - Body (fig. 11a) with broad prosome and cylindrical urosome. Mean body length 630 μm (586 - 697 μm) (excluding caudal setae) and greatest width 444 μm (404 - 515 μm) based on 22 specimens. Leg 1 somite fused with cephalosome and with slightly pointed epimera. Pedigerous somites 2 and 3 with small projecton on anterior corner and pointed epimera. Third pedigerous somite longer than second and covering pedigerous somite 4 entirely plus pedigerous somite 5 partially. Ratio of length to width of prosome 1.2 : 1. Ratio of length of prosome to that of urosome 3.0 : 1.

Genital double-somite (fig. 11b) 61 x 97 μm , wider than long, ratio of length to width 0.6 : 1, anterolateral margin straight, followed by notch with patch of setules. Postgenital somite 14 x 51 μm , wider than long, ratio of length to width 0.3 : 1. Anal somite 29 x 49 μm , wider than long, narrower than preceding somite, but twice as long, ratio of length to width 0.6 : 1. Caudal rami 17 x 21 μm slightly wider than long, armed with 6 setae. Seta I absent, setae II to VII with 76, 77, 187, 270, 64 and 91 μm respectively. All setae plumose.

Antennule slender (fig. 11c) 270 μm long, not including setae, 19-segmented. Basal part 9-segmented, rather broad, distal part slender. Length of segments measured along posterior margin 17 μm (39 μm along anterior margin); 5; 7; 4; 7; 5; 5; 9; 9; 5; 7; 16; 20; 21; 18; 20; 22; 24 and 26 μm respectively. Segmental

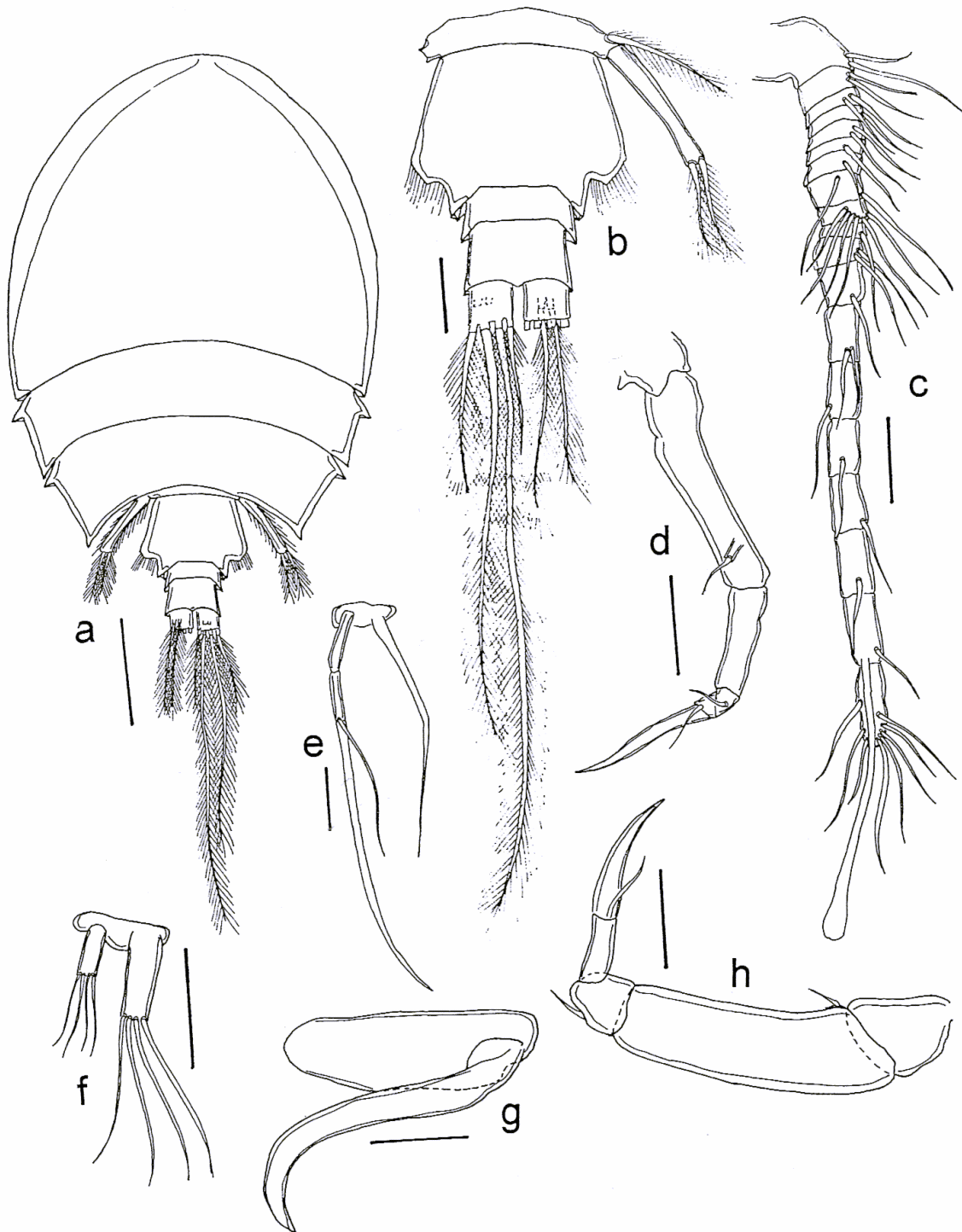


Figure 11. *Asterocheres spinopaulus* n. sp. Female Holotype, MNRJ 8471 a) dorsal view; b) urosome; c) antennule; d) antenna; e) mandible; f) maxillule; g) maxilla; h) maxilliped. Scale bars: a: 0.1 mm; b - h: 0.05 mm.

homologies and setation as follows: I-2; II-2; III-2; IV-1; V-2; VI-1; VII-1; VIII-2; IX-XII-6; XIII-1; XIV-2; XV-1; XVI-2; XVII-1; XVIII-1; XIX-1; XX-1; XXI-1+ae; XXII-XXVIII-8. All setae smooth. Aesthetasc on segment XXI 95 µm long.

Antenna (fig. 11d) 165 µm long (including claw) with basis 69 µm long. Exopod 1-segmented, 6 µm long with single seta apically. Endopod 3-segmented, first segment 30 µm long and unarmed, second and third segments 9 and 10 µm respectively, both armed with distal seta. Terminal claw 41 µm, longer than first endopodal segment and slightly curved distally.

Oral cone produced into very short siphon-like distal portion, 89 µm reaching the maxilla. Mandible (fig. 11e) comprising pointed stylet, 85 µm long, and 2-segmented palp, with first and second segments measuring 31 and 22 µm respectively; second segment armed with 2 setae. Maxillule (fig. 11f) bilobed, inner lobe 23 µm, longer than outer lobe and armed with four smooth setae of equal length; outer lobe, 13 µm long and also armed with 4 smooth setae. Maxilla (fig. 11g) with syncoxa, 75 µm long and curved claw 107 µm long.

Maxilliped (fig. 11h) 4-segmented, syncoxa short, 31 µm long, basis 81 µm long. First and second endopodal segments with almost same length, 19 and 20 µm respectively. First segment bearing small seta. Second segment bearing seta and short curved claw-like element, 41 µm long.

Swimming legs 1-4 (figs. 12a - 12d) biramous with 3-segmented rami throughout. Setal formula as follows:

| | coxa | basis | exo. | end. |
|----|------|-------|---------------|-----------------|
| P1 | 0-1 | 1-1 | I-1;I-1;III-4 | 0-1;0-2;1-5 |
| P2 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-2;1-5 |
| P3 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-2;1-5 |
| P4 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-2;1-1+1-2 |

First exopodal segment of P2 crenulated. First and second exopodal segments of P4 also crenulated. Coxa of P4 covered with small denticles. All spines of swimming legs very short, except that on first exopodal segment of P1. Pedigerous somite 5 (fig. 11b) 20 x 116 µm, wider than long, presenting long seta near insertion of free segment. Free segment, 10 x 64 µm, more than 6 times wider than long, armed with 2 plumose setae distally.

DESCRIPTION: Male - Body (fig. 13a) with broad prosome and cylindrical urosome. Mean body length 525 µm (495 - 596 µm) (excluding caudal setae) and greatest width 323 µm (293 - 374 µm) based on 9 specimens. Leg 1 somite fused with cephalosome and with slightly pointed epimera. Pedigerous somite 2 and 3 with denticles on anterior corners and pointed epimera. Third pedigerous somite covering pedigerous somite 4 entirely and pedigerous somite 5 partially. Ratio of length to width of prosome 1.1 : 1. Ratio of length of prosome to that of urosome 2.8 : 1.

Genital somite (fig. 13b) 55 x 69 µm, wider than long, ratio of length to width 0.8 : 1. Greatest width posteriorly; genital somite covering almost entirely covering first postgenital somite; posterior corner rounded and armed with single seta. First postgenital somite 22 x 51 µm, wider than long, ratio of length to width 0.4 : 1. Second postgenital somite 17 x 46 µm, wider than long, ratio of length to width 0.4 : 1, smaller than preceding somite. Posterior corners

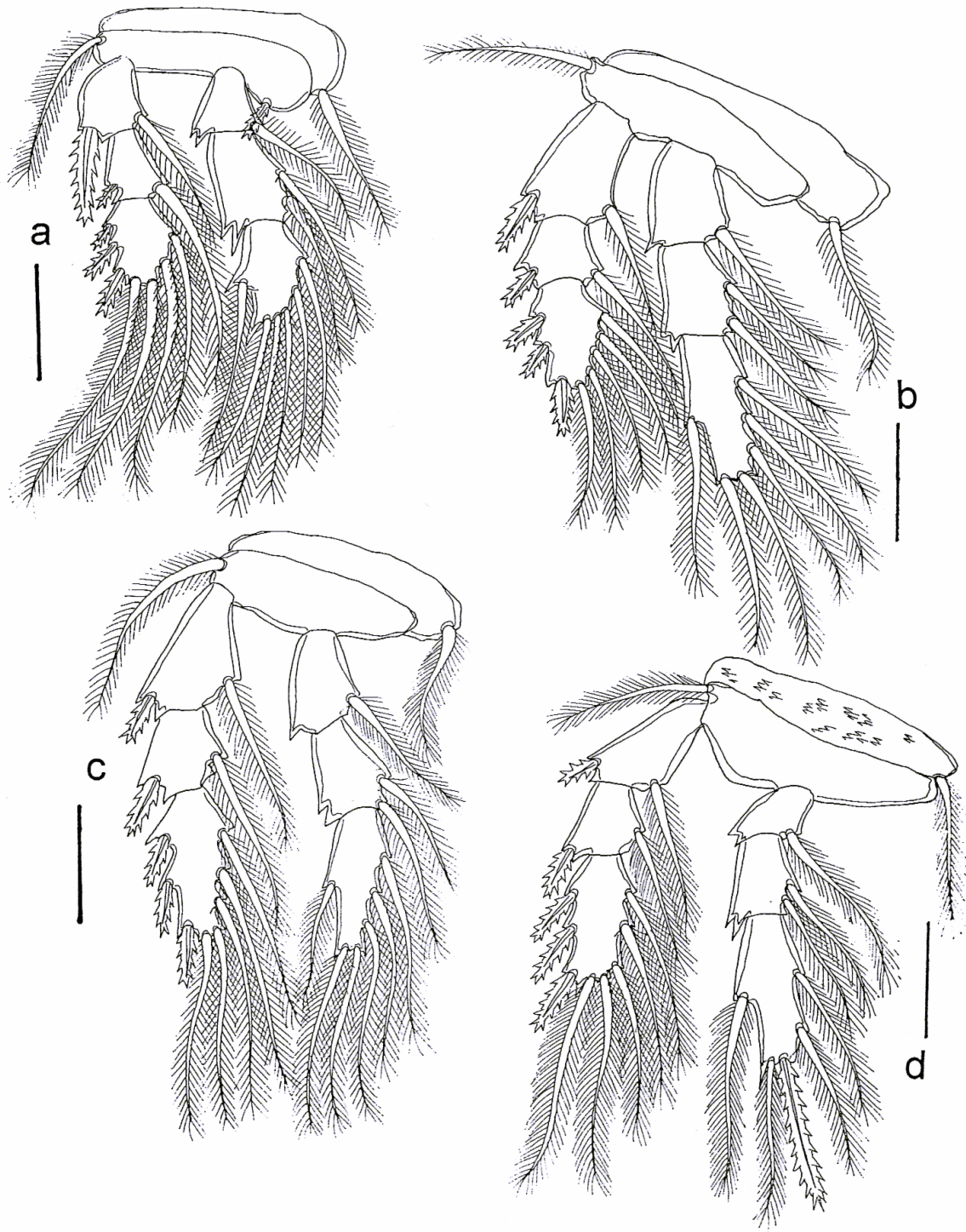


Figure 12. *Asterocheres spinopaulus* n. sp. Female Holotype, MNRJ 8471 a) P1; b) P2; c) P3; d) P4. Scale bars: a - d: 0.03 mm.

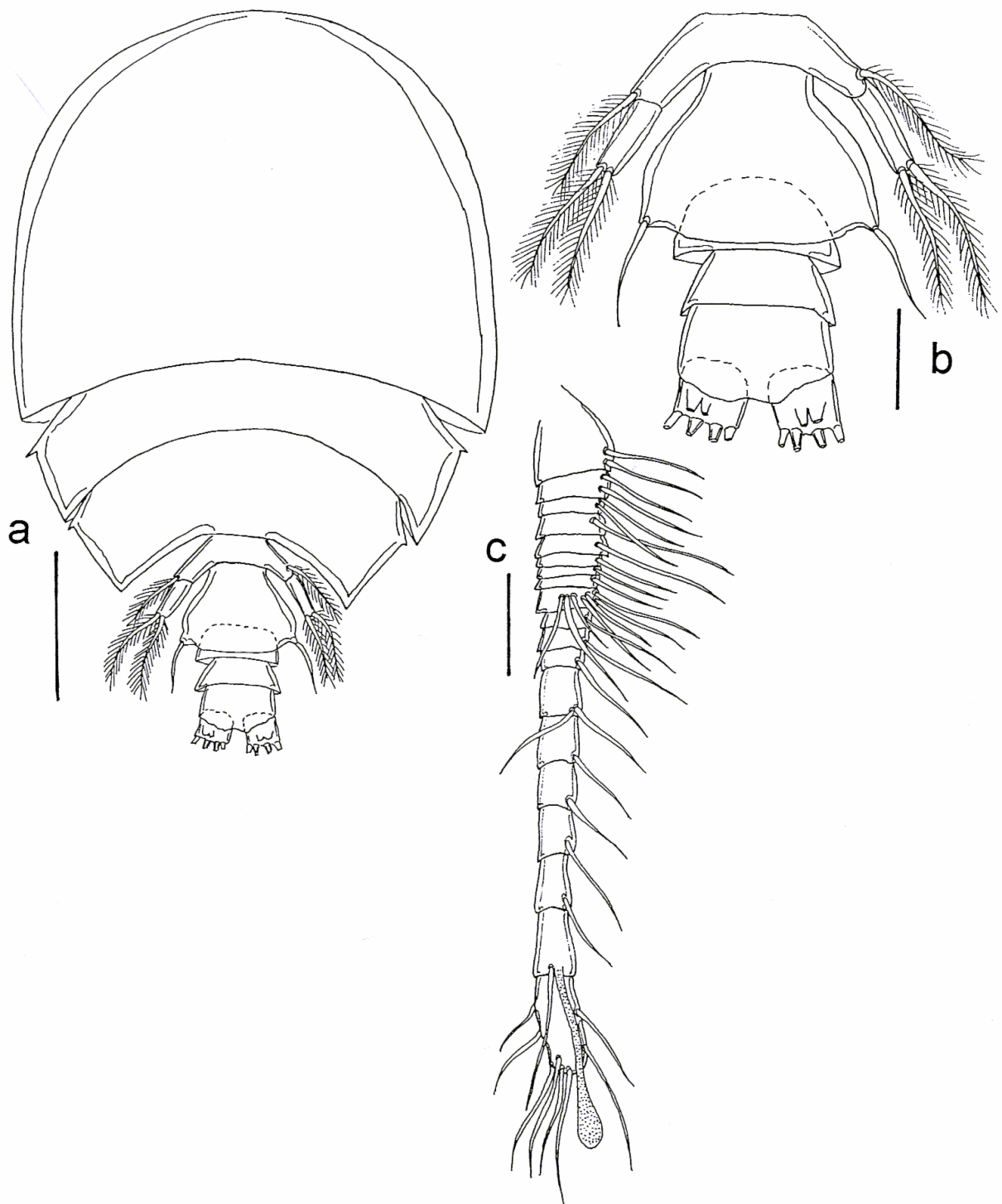


Figure 13. *Asterocheres spinopaulus* n. sp. Male Paratype, MNRJ 8472 a) dorsal view; b) urosome; c) antennule. Scale bars: a: 0.1 mm; b - c: 0.03 mm.

pointed. Anal somite 29 x 46 μm , wider than long, ratio of length to width 0.6 : 1, as wide as preceding somite, covering caudal rami partially. Caudal rami 18 x 20 μm , wider than long, armed with 6 plumose setae, as in female.

Antennule slender (fig. 13c) 201 μm long, not including setae, 19-segmented. Basal part 9-segmented, rather broad, distal part slender. Length of segments measured along posterior margin 20 μm (37 μm along anterior margin); 9; 5; 6; 6; 4; 3; 3; 6; 4; 5; 6; 15; 13; 15; 14; 18; 21 and 27 μm respectively. Segmental homologies and setation as follows: I-2; II-2; III-2; IV-1; V-1; VI-1; VII-1; VIII-1; IX-XII-7; XIII-1; XIV-1; XV-1; XVI-2; XVII-1; XVIII-1; XIX-1; XX-1; XXI-1 +ae and XXII-XXVIII-8. All setae smooth. Aesthetasc on segment XXI-47 μm long. All other characteristics as for female

ETHYMOLOGY: The specific name refers to "*spina + paulus*" (short - spine), a reference to the short spines on P1 to P4.

REMARKS: *Asterocheres spinopaulus* n. sp. is another Brazilian species with a siphon that does not reach beyond the insertion of P1. Also the free segment of P5 presents only 2 setae, so this new species may be grouped together with the following species: *A. abyssi* (Hansen) (Hansen, 1923 as *Ascomyzon abyssi*); *A. canui* Giesbrecht (Canu, 1892 as *Asterocheres lilljeborgi*); *A. indicus* Sewell (Sewell, 1949); *A. jeanyeatmanae* Yeatman (Yeatman, 1970); *A. longisetosus* Nair & Pillai (Nair & Pillai, 1984); *A. ovalis* Sewell (Sewell, 1949); *A. renaudi* Canu (Canu, 1892); *A. simplex* Schirl (Schirl, 1973); *A. tenerus* (Hansen) (Hansen, 1923 as *Ascomyzon tenerus*); *A. uncinatus* (Kricagin) (Marcus & Por, 1960 as *Asterocheres carausi*) and *A. ventricosus* (Brian) (Brian, 1928 as *Ascomyzon ventricosum*).

A. spinopaulus n. sp. has the maxilliped claw twice as long as the preceding segment, while in *A. tenerus*, *A. renaudi* and *A. ventricosus* the maxilliped claw is less than 1.5 times the preceding segment Canu, 1892; Hansen, 1923 and Brian, 1928). In addition, in *A. renaudi* the body is long and narrow with a ratio of length to width of prosome 2.4 : 1 (Canu, 1892) while in *A. spinopaulus* n. sp. the ratio is 1.6 : 1. In *A. tenerus* the mandibular palp has only 1 seta (Hansen, 1923) instead of 2 as in the new species and the maxillule outer lobe is armed with 3 setae instead of 4 (Hansen, 1923). In *A. ventricosus* the third pedigerous somite does not cover the fourth (Brian, 1928) as in *A. spinopaulus* n. sp. *A. ventricosus* also presents an uncommon setal formula (Brian, 1928), completely different from that of *A. spinopaulus* n. sp.

In *A. indicus* and *A. simplex* the maxilliped claw is between 1.5 times and twice the length of the preceding segment. *A. indicus* and *A. simplex* also have the antennal exopod armed with 2 setae and the third pedigerous somite not covering the fourth (Sewell, 1949 and Schirl, 1973), while in *A. spinopaulus* n. sp. the maxilliped claw is twice as long as the preceding segment, the antennal exopod is armed with a single seta and pedigerous somite 3 covers totally the fourth and partially, the fifth pedigerous somite.

A. canui, *A. uncinatus*, *A. abyssi* and *A. ovalis* all have the inner lobe of the maxillule at least twice as long as the outer lobe (Canu, 1892; Hansen, 1923; Sewell, 1949 and Marcus & Por, 1960); while in *A. spinopaulus* n. sp., *A. longisetosus* and *A. jeanyeatmanae* the inner lobe is only slightly longer than the outer (Yeatman, 1970 and Nair & Pillai, 1984).

A. canui has 3 setae on the inner lobe of the maxillule and 4 on the outer lobe (Canu, 1892); in *A. abyssi* and *A. uncinatus* there are 4 on the inner lobe and 3 on the outer (Hansen, 1923 and Marcus & Por, 1960). In *A. ovalis* there are 4 setae on the each maxillary lobe (Sewell, 1949), exactly as in *A. spinopaulus* n. sp. but the antennal

exopod of *A. ovalis* is armed with 2 apical setae (Sewell, 1949) and not one, as in *A. spinopaulus* n. sp.

A. longisetosus has 3 setae on each maxillulary lobe (Nair & Pillai, 1984) while *A. jeanyeatmanae* and *A. spinopaulus* n. sp. have 4 setae on each maxillulary lobe.

Finally *A. spinopaulus* n. sp. differs from *A. jeanyeatmanae* because the antennal exopod is armed with single seta instead of 2, the antennule is 19-segmented, not 21-segmented and the genital double-somite has its greatest width posteriorly, instead of being barrel-like shape as in *A. jeanyeatmanae* (Yeatman, 1970).

Asterocheres tetrasetosus n. sp. (Figs. 14 - 15)

MATERIAL EXAMINED: Holotype, 1 female MNRJ 8573 from Viçosa Reefs, Abrolhos Bahia, Brazil, collected by P. S. Young et al. on 28/II/1994, associated with sponges.

DESCRIPTION: Female - Body (fig. 14a) with broad prosome and cylindrical urosome. Mean body length 592 μm (excluding caudal setae) and greatest width 385 μm , based on a single specimen. Leg 1 somite fused with cephalosome and with slightly pointed epimera. Pedigerous somite 2 with denticle on anterior corner and pointed epimera. Third pedigerous somite also with denticle on anterior corner but with rounded posterior corner and partially covering following somite. Fourth pedigerous somite with denticles at anterior corners and partially covering pedigerous somite 5. Ratio of length to width of prosome 1.5 : 1. Ratio of length of prosome to that of urosome 2.7 : 1.

Genital double-somite (fig. 14b) 93 x 111 μm , wider than long, ratio of length to width 0.8 : 1. Rounded anteriorly and ornamented with row of setules on mid lateral margin. Postgenital somite 38 x 59 μm , wider than long, ratio of length to width 0.6 : 1, posterior corner pointed. Anal somite 34 x 57 μm , wider than long, ratio of length to width 0.6 : 1 also with posterior corner pointed. Caudal rami 18 x 25 μm , wider than long, armed with 6 setae. Seta I absent, setae II to VII with 166, 132, 213, 234, 113 and 145 μm respectively. All setae plumose.

Antennule slender (fig. 14c) 325 μm long, not including setae, 20-segmented. Basal part 9-segmented, rather broad, distal part slender. Length of segments measured along posterior margin 27 μm (43 μm along anterior margin); 14; 11; 9; 13; 9; 10; 12; 18; 4; 9; 13; 21; 21; 16; 21; 23; 29; 9 and 21 μm respectively. Segmental homologies and setation as follows: I-2; II-2; III-2; IV-1; V-1; VI-1; VII-1; VIII-2; IX-XII-5; XIII-1; XIV-1; XV-2; XVI-1; XVII-1; XVIII-2; XIX-2; XX-2; XXI-1+ae; XXII-XXIII-4; XXIV-XXVIII-6. Setae from segments I to VI plumose, remaining setae smooth. Aesthetasc on segment XXI 136 μm long.

Antenna (fig. 14d) 204 μm long (including claw) with basis 79 μm long. Exopod 1-segmented, 8 μm long, armed with single seta apically, longer than first endopodal segment. Endopod 3-segmented. First segment 42 μm long and unarmed. Second segment 13 μm armed with short seta distally. Third segment 16 μm long and armed with single seta plus slightly curved claw, 46 μm , longer than first endopodal segment.

Oral cone (fig. 14a) produced into short siphon-like distal portion, 136 μm . Mandible (fig. 14e) comprising pointed stylet 72 μm long and 1-segmented palp, 36 μm long, armed with 2 plumose setae, patch of setules medio-distally. Maxillule (fig. 14f) bilobed, inner lobe 40 μm , more than twice as long as outer lobe and armed with 4 smooth setae. Outer lobe, 17 μm long and armed with 3 smooth

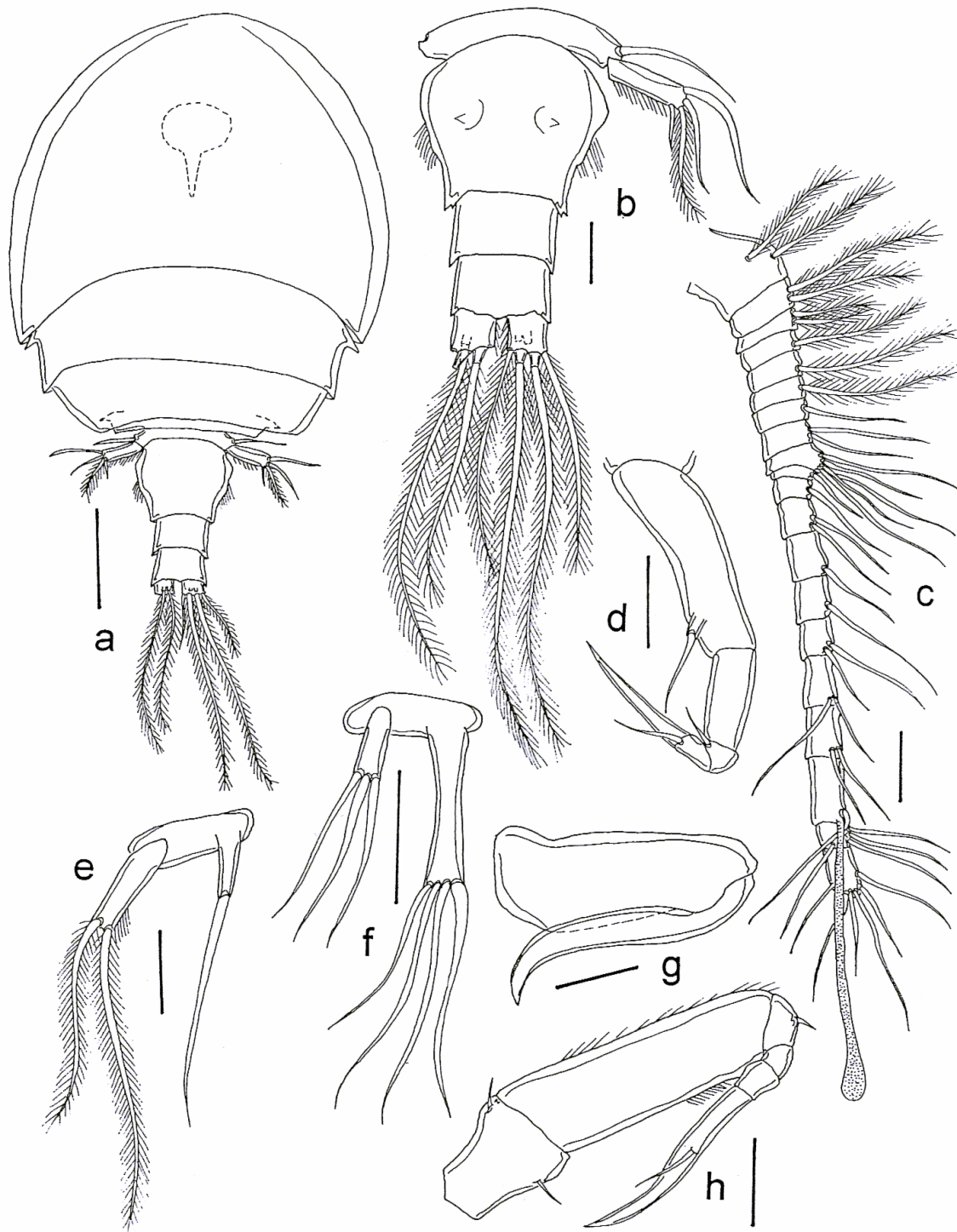


Figure 14. *Asterocheres tetrasetosus* n. sp. Female Holotype, MNRJ 8573 a) dorsal view; b) urosome; c) antennule; d) antenna; e) mandible; f) maxillule; g) maxilla; h) maxilliped. Scale bars: a) 0.1 mm; b - h) 0.03 mm.

setae of equal length. Maxilla (fig. 14g) with syncoxa, 91 μm long and narrow curved claw 99 μm long, slightly longer than syncoxa.

Maxilliped (fig. 14h) 5-segmented, comprising short syncoxa, 39 μm , armed distally with inner seta and outer setule; basis 102 μm long with outer margin bearing row of setules, inner margin with patch of setules latero-distally. First endopodal segment 18 μm armed with very short seta. Second and third endopodal segments 10 and 12 μm respectively, unarmed. Curved claw-like element, 76 μm long, with seta at midlength.

Swimming legs 1-4 (figs. 15a - 15d) biramous with 3-segmented rami throughout. Setal formula as follows:

| | coxa | basis | exo. | end. |
|----|------|-------|---------------|-----------------|
| P1 | 0-1 | 1-1 | I-1;I-1;III-4 | 0-1;0-2;1-5 |
| P2 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-2;1-5 |
| P3 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-2;1-5 |
| P4 | 0-1 | 1-0 | I-1;I-1;III-5 | 0-1;0-1;1-1+1-2 |

P1 with second and third exopodal segments armed with small spines, additional seta located on basis, close to inner margin of endopod. P2 and P3 also with exopodal spines reduced.

P5 (fig. 15e) with free segment, 50 x 13 μm , bearing 4 setae, 2 long and smooth, one long and plumose, one short and smooth.

Male: unknown.

ETHYMOLOGY: The specific name refers to “*tetra + setosus*” referring to the existence of 4 setae on the free segment of P5.

REMARKS: *Asterocheres tetrasetosus* n. sp. presents a characteristic that makes it different from all the other known species of the genus *Asterocheres*: the existence of 4 setae on the free segment of P5.

In addition, *A. tetrasetosus* n. sp. has a single inner seta on the second endopodal segment of leg 4. This characteristic only occurs in *A. ventricosus* and *A. boeckii* (Sars, 1918 and Brian, 1928). However in *A. ventricosus* the setation of the swimming legs is completely different; P1 does not have a seta on the first exopodal segment or on the first and second endopodal segments, P2 does not have a seta on the inner margin of the first and second exopodal segments, P3 has an additional seta on the outer margin of the first endopodal segment and P4 lacks a seta on the first and second endopodal segments and on the first exopodal segment (Brian, 1928). While *A. tetrasetosus* n. sp. has setation similar to *A. reginae*, which was considered to be the setation of a typical *Asterocheridae* (Boxshall & Huys, 1994).

A. tetrasetosus n. sp. differs from *A. boeckii* because the genital-double somite is wider than long while in *A. boeckii* this is longer than wide (Sars, 1918). Also, the siphon in the new species does not reach the maxilliped insertion and in *A. boeckii* it reaches the insertion of P1 (Sars, 1918).

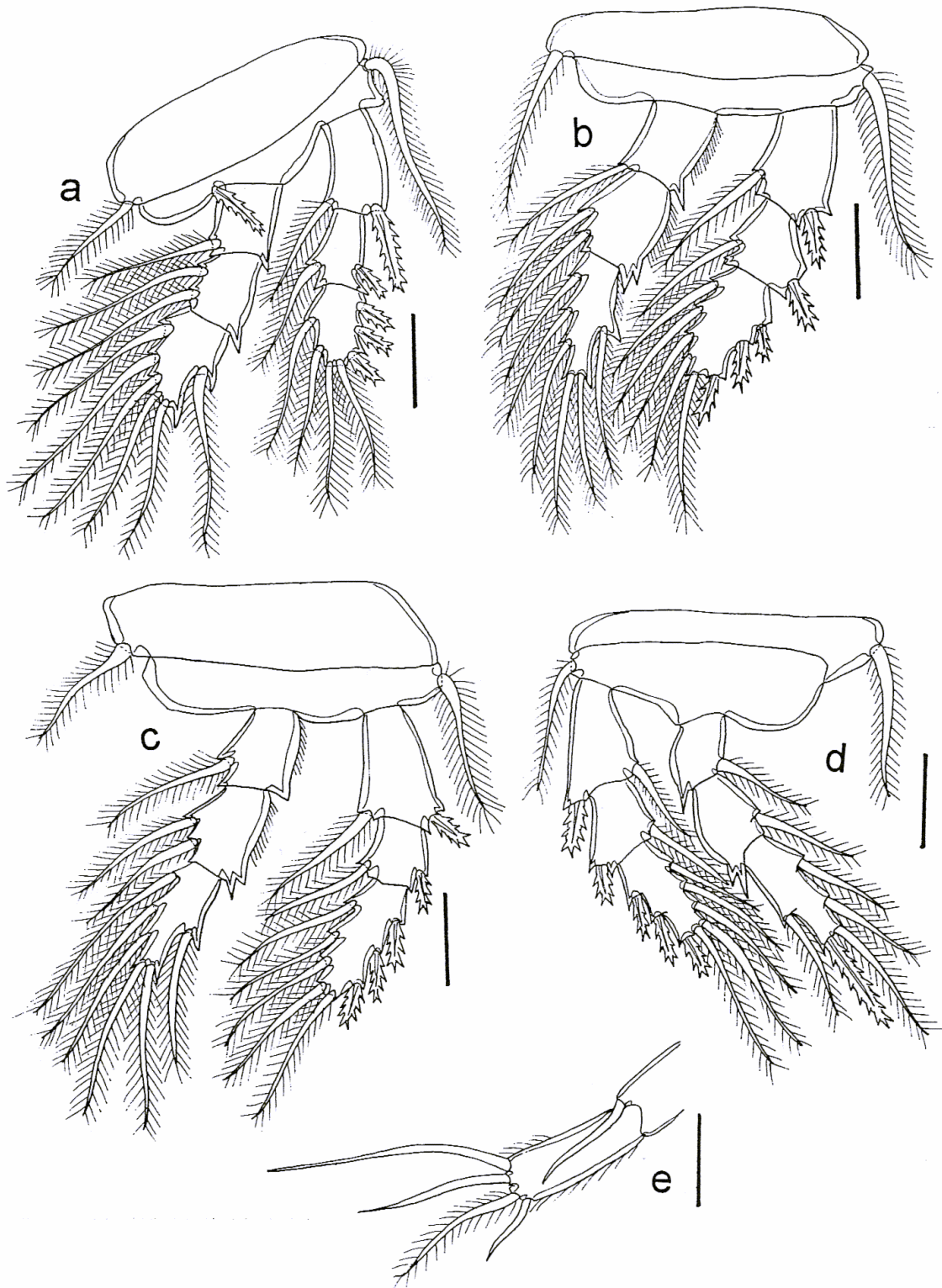


Figure 15. *Asterocheres tetrasetosus* n. sp. Female Holotype, MNRJ 8573 a) P1; b) P2; c) P3; d) P4. Scale bars: a - d: 0.03 mm.

Key to the females of the genus *Asterocheres*¹:

- 1a) Siphon reaching beyond insertion of leg 2 2
 1b) Siphon reaching from insertion of leg 1 up to insertion of leg 2 5
 1c) Siphon not reaching insertion of leg 1 13
- 2a) Maxillule outer lobe shorter than $\frac{1}{2}$ of inner lobe; siphon not reaching insertion of P4 *A. stimulans* Giesbrecht, 1897
 2b) Maxillule outer lobe longer than $\frac{1}{2}$ of inner lobe; siphon reaching beyond insertion of P4 3
- 3a) Maxillule inner lobe armed with 3 setae; siphon reaching beyond caudal rami *A. proboscideus* Stock, 1960
 3b) Maxillule inner lobe armed with 4 setae; siphon not reaching beyond genital double-somite 4
- 4a) Maxillule outer lobe more than $\frac{3}{4}$ length of inner lobe; both lobes armed with 4 setae; free segment of P5 with 2 setae *A. siphonatus* Giesbrecht, 1897
 4b) Maxillule outer lobe $\frac{1}{2}$ length of inner lobe; outer and inner lobes armed with 4 and 3 setae respectively; free segment of P5 armed with 3 setae *A. stocki* Nair & Pillai, 1984
- 5a) Width of genital double-somite $\frac{1}{4}$ of its length *A. intermedius* (Hansen, 1923)
 5b) Width of genital double-somite more than $\frac{1}{4}$ of its length 6
- 6a) Free segment of P5 armed with 2 setae 7
 6b) Free segment of P5 armed with 3 setae 9
- 7a) Caudal rami at least 1.5 times longer than wide; maxillule outer lobe $\frac{1}{3}$ length of inner lobe *A. latus* (Brady, 1872)
 7b) Caudal rami as long as wide or slightly longer than wide; maxillule outer lobe less than $\frac{1}{3}$ length of inner lobe 8
- 8a) Second endopodal segment of P4 armed with 1 seta; anal somite shorter than postgenital somite *A. boeckii* (Brady, 1880)
 8b) Second endopodal segment of P4 armed with 2 setae; anal somite longer than postgenital somite *A. paraboeckii* n. sp.
- 9a) Caudal rami longer than wide 10
 9b) Caudal rami as long as wide or wider than long 12
- 10a) Caudal rami longer than anal somite *A. parvus* Giesbrecht, 1897
 10b) Caudal rami shorter than anal somite 11
- 11a) Antenna exopod armed with 1 seta *A. ellisi* Hamond, 1968
 11b) Antenna exopod armed with 2 setae *A. complexus* Stock, 1960
- 12a) Antenna exopod without lateral seta; genital double-somite without indentation; maxillule outer lobe $\frac{1}{2}$ length of inner lobe *A. corneliae* (Schirl, 1973)

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| 12b) Antenna exopod armed with 1 lateral seta; genital double-somite with indentation; maxillule outer lobe less than $\frac{1}{2}$ length of inner lobe | <i>A. genodon</i> Stock, 1966 |
| 13a) Free segment of P5 armed with 2 setae | 14 |
| 13b) Free segment of P5 armed with 3 setae | 22 |
| 13c) Free segment of P5 armed with 4 setae | <i>A. tetrasetosus</i> n. sp. |
| 14a) Maxilliped claw less than 1.5 length of preceding segment | 15 |
| 14b) Maxilliped claw equal or more than 1.5 length of preceding segment | 17 |
| 15a) Genital double-somite longer than wide | <i>A. tenerus</i> (Hansen, 1923) |
| 15b) Genital double-somite wider than long | 16 |
| 16a) Maxilliped claw longer than preceding segment; cephalothorax longer than wide; genital double-somite without indentation; second pedigerous somite at least twice length of third pedigerous somite; postgenital somite shorter than anal somite | <i>A. renaudi</i> Canu, 1891 |
| 16b) Maxilliped claw as long as preceding segment; cephalothorax as wide as long or wider than long; genital double-somite with indentation; second pedigerous somite slightly longer than third pedigerous somite, postgenital somite longer than anal somite..... | <i>A. ventricosus</i> (Brian, 1927) |
| 17a) Maxilliped claw less than twice length of preceding segment | 18 |
| 17b) Maxilliped claw at least twice length of preceding segment | 19 |
| 18a) Genital double-somite as long as wide, and as long as postgenital and anal somites together | <i>A. indicus</i> Sewell, 1949 |
| 18b) Genital double-somite wider than long, and longer than postgenital and anal somites together | <i>A. simplex</i> Schirl, 1973 |
| 19a) Maxillule inner lobe slightly longer than outer lobe; caudal rami as long as wide or slightly longer than wide..... | 20 |
| 19b) Maxillule inner lobe at least twice length of outer lobe; caudal rami twice as long as wide | <i>A. uncinatus</i> (Krigacin, 1873) |
| 20a) Maxillule armed with 3 setae on each lobe; mandibular palp armed with 3 setae | <i>A. longisetosus</i> Nair & Pillai, 1984 |
| 20b) Maxillule armed with 4 setae on each lobe; mandibular palp armed with 2 setae | 21 |
| 21a) Antennal exopod armed with 3 setae; antennule 21-segmented;genital double-somite barrel-like | <i>A. jeanyeatmanae</i> Yeatman, 1970 |
| 21b) Antennal exopod armed with 1 seta; antennule 20-segmented; genital double-somite with its greatest width posteriorly | <i>A. spinopaulus</i> n. sp. |
| 22a) Caudal rami as long as wide or longer than wide | 23 |
| 22b) Caudal rami wider than long | 36 |
| 23a) Postgenital somite at least 1.5 times length of anal somite | 24 |
| 23b) Postgenital somite shorter or only slightly longer than anal somite | 27 |

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| 24a) Antenna exopod armed with 1 seta | <i>A. hongkongensis</i> Malt, 1991 |
| 24b) Antenna exopod armed with 2 setae | 25 |
| 25a) Mandibular palp armed with 2 setae | <i>A. mucronipes</i> Stock, 1960 |
| 25b) Mandibular palp armed with 3 setae | 26 |
| 26a) Caudal rami $\frac{1}{4}$ longer than anal somite; genital double-somite longer than postgenital and anal somites together | <i>A. major</i> Thompson & Scott, 1903 |
| 26b) Caudal rami $\frac{1}{2}$ longer than anal somite; genital double-somite shorter than postgenital and anal somites together | <i>A. minor</i> Thompson & Scott, 1903 |
| 27a) Maxilliped claw slightly longer than preceding segment | 28 |
| 27b) Maxilliped claw at least twice as long as than preceding segment | 31 |
| 28a) Antennule 18-segmented; antenna exopod armed with 3 setae | <i>A. lilljeborgi</i> Boeck, 1859 |
| 28b) Antennule more than 18-segmented; antenna exopod armed with 2 setae .. | 29 |
| 29a) Antennule 19-segmented | <i>A. abrolhensis</i> n. sp. |
| 29b) Antennule 21-segmented | 30 |
| 30a) Genital double-somite wider than long; anal somite longer than postgenital somite; maxillule inner lobe at least 1.5 times longer than outer lobe; caudal rami 6 times longer than wide | <i>A. tenuicornis</i> Brady, 1910 |
| 30b) Genital double-somite longer than wide; anal somite shorter than postgenital somite; maxillule inner lobe slightly longer than outer lobe; caudal rami slightly longer than wide | <i>A. violaceus</i> (Claus, 1889) |
| 31a) Antenna exopod armed with 1 seta | 32 |
| 31b) Antenna exopod armed with 2 setae | 33 |
| 32a) Cephalothorax with epimeral areas forming an angle of about 32° ; caudal rami slightly longer than wide; genital double-somite with an indentation..... | <i>A. lunatus</i> n. sp. |
| 32b) Cephalothorax with epimeral areas forming an angle of more than 50° ; caudal rami 1.5 times longer than wide; genital double-somite without indentation..... | <i>A. bacescui</i> Marcus, 1965 |
| 33a) Pedigerous somite 3 covering totally pedigerous somites 4 and 5 and partially the genital double-somite | <i>A. maxillatus</i> Stock, 1987 |
| 33b) Pedigerous somite 3 partially covering pedigerous somite 4 | 34 |
| 34a) Maxillule outer lobe almost as long as inner lobe; postgenital somite longer than anal somite | <i>A. minutus</i> (Claus, 1889) |
| 34b) Maxillule outer lobe at least twice as long as inner lobe; postgenital somite as long as anal somite | 35 |
| 35a) Genital double-somite wider than long; siphon reaching insertion of maxilliped | <i>A. suberitis</i> Giesbrecht, 1897 |

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| 35b) Genital double-somite longer than wide; siphon reaching beyond insertion of maxilliped | <i>A. echinicola</i> (Norman, 1868) | |
| 36a) Anal somite equal or longer than postgenital somite | | 37 |
| 36b) Anal somite shorter than postgenital somite | | 42 |
| 37a) Maxilliped claw almost 1.5 times longer than preceding segment | <i>A. orientalis</i> Sewell, 1949 | |
| 37b) Maxilliped claw almost twice longer than preceding segment | | 38 |
| 38a) Antennule 19-segmented | | 39 |
| 38b) Antennule 20-segmented | | 41 |
| 39a) Genital double-somite at least 1.5 times wider than long in its midregion; prosome almost as wide as long | | 40 |
| 39b) Genital double-somite slightly wider than long in its anterior region; prosome longer than wide | <i>A. rotundus</i> Malt, 1991 | |
| 40a) Antennal exopod armed with 1 proximal seta; maxillule outer lobe armed with 4 setae and half as long as inner lobe | <i>A. scutatus</i> Stock, 1966 | |
| 40b) Antennal exopod without proximal seta; maxillule outer lobe armed with 2 setae and 1/5 of the total length of inner lobe | <i>A. crenulatus</i> n. sp. | |
| 41a) Maxilla with aesthetasc on basis | <i>A. aesthetes</i> Ho, 1984 | |
| 41b) Maxilla without aesthetasc on basis | <i>A. simulans</i> (Scott, 1898) | |
| 42a) Maxillule inner lobe at least 3 times longer than outer lobe; antennule 19-segmented | | 43 |
| 42b) Maxillule inner lobe twice as long as outer lobe; antennule at least 20-segmented | | 44 |
| 43a) Antenna exopod armed with lateral seta; genital double-somite with an indentation laterally | <i>A. manaarensis</i> Thompson & Scott, 1903 | |
| 43b) Antenna exopod without lateral seta; genital double-somite without indentation | <i>A. halichondriae</i> Stock, 1966 | |
| 44a) Antennule 20-segmented | <i>A. dentatus</i> Giesbrecht, 1897 | |
| 44b) Antennule 21-segmented | | 45 |
| 45a) Antenna exopod without lateral seta; cephalothorax with epimeral area rounded | <i>A. bulbosus</i> Malt, 1991 | |
| 45b) Antenna exopod with lateral seta; cephalothorax with epimeral areas pointed | <i>A. reginae</i> Boxshall & Huys, 1994 | |

¹ - *A. ruber* and *A. simulans* (Stock, 1966 pg. 209 - note) are *nomina nuda*, because they have no description. *A. simulans* could be a *lapsus calami* of either *A. simulans* (Scott, 1898) or *A. stimulans* Giesbrecht, 1897.

Key to the males of the genus *Asterocheres*:

- 1a) Siphon reaching beyond insertion of leg 2 2
 1b) Siphon reaching from insertion of leg 1 up to insertion of leg 2 4
 1c) Siphon not reaching insertion of leg 1 8
- 2a) Maxillule outer lobe less than $\frac{1}{2}$ length of inner lobe; siphon not reaching insertion of P4 *A. stimulans* Giesbrecht, 1897
 2b) Maxillule outer lobe more than $\frac{1}{2}$ length of inner lobe; siphon reaching beyond insertion of P4 3
- 3a) Maxillule outer lobe more than $\frac{3}{4}$ length of inner lobe; each lobe armed with 4 setae; free segment of P5 with 2 setae *A. siphonatus* Giesbrecht, 1897
 3b) Maxillule outer lobe $\frac{1}{2}$ as long as inner lobe; outer and inner lobes armed with 4 and 3 setae respectively; free segment of P5 armed with 3 setae *A. stocki* Nair & Pillai, 1984
- 4a) Free segment of P5 armed with 2 setae 5
 4b) Free segment of P5 armed with 3 setae 6
- 5a) Second endopodal segment of P4 armed with 1 seta; anal somite shorter than postgenital somite *A. boeckii* (Brady, 1880)
 5b) Second endopodal segment of P4 armed with 2 setae; anal somite longer than postgenital somite *A. paraboeckii* n. sp.
- 6a) Caudal rami longer than wide; maxillule inner lobe armed with 4 setae 7
 6b) Caudal rami as long as wide or wider than long; maxillule inner lobe armed with 3 setae *A. corneliae* Schirl, 1973
- 7a) Antenna exopod armed with 1 seta *A. ellisi* Hamond, 1968
 7b) Antenna exopod armed with 2 setae *A. complexus* Stock, 1960
- 8a) Free segment of P5 armed with 2 setae 9
 8b) Free segment of P5 armed with 3 setae 16
- 9a) Genital somite longer than wide 10
 9b) Genital somite wider than long 11
- 10a) Mandibular palp armed with 1 seta; maxilliped claw longer than basis; antennal exopod armed with 2 setae *A. tenerus* (Hansen, 1923)
 10b) Mandibular palp armed with 2 setae; maxilliped claw shorter than basis; antennal exopod armed with 1 seta *A. alter* Eiselt, 1965
- 11a) Maxilliped claw less than twice as long as preceding segment *A. simplex* Schirl, 1973
 11b) Maxilliped claw at least twice length of preceding segment 12
- 12a) Maxillule inner lobe slightly longer than outer lobe 13
 12b) Maxillule inner lobe at least twice length of outer lobe 14

- 13a) Antennal exopod armed with 3 setae; genital somite barrel-like *A. jeanyeatmanae* Yeatman, 1970
 13b) Antennal exopod armed with 1 seta; genital somite with its greatest width posteriorly *A. spinopaulus* n. sp.
- 14a) Maxillule inner lobe armed with 3 setae *A. canui* Giesbrecht, 1897
 14b) Maxillule inner lobe armed with 4 setae 15
- 15a) Maxillule inner lobe 3 times longer than outer lobe; maxilliped claw twice length of preceding segment; mandibular palp with 2 segments *A. abyssi* (Hansen, 1923)
 15b) Maxillule inner lobe 2.5 times longer than outer lobe; maxilliped claw more than twice length of preceding segment; mandibular palp with 1 segment *A. ovalis* Sewell, 1949
- 16a) Caudal rami wider than long 17
 16b) Caudal rami as long as wide or longer than wide 22
- 17a) Mandibular palp with 1 segment 18
 17b) Mandibular palp with 2 segments 19
- 18a) Maxillule outer lobe armed with 3 setae; antennal exopod armed with lateral seta; maxilla without aesthetasc on basis *A. bulbosus* Malt, 1991
 18b) Maxillule outer lobe armed with 4 setae; antennal exopod without lateral seta; maxilla with aesthetasc on basis *A. aesthetes* Ho, 1984
- 19a) Antennal exopod with lateral seta *A. reginae* Boxshall & Huys, 1994
 19b) Antennal exopod without lateral seta 20
- 20a) Maxilliped claw twice length of preceding segment; maxillule inner lobe 3 times longer than outer lobe 21
 20b) Maxilliped claw slightly shorter than preceding segment; maxillule inner lobe less than 3 times longer than outer lobe *A. simulans* (Scott, 1898)
- 21a) Genital somite armed with 1 seta on posterior corner *A. rotundus* Malt, 1991
 21b) Genital somite armed with 2 setae on posterior corner *A. halichondriae* Stock, 1966
- 22a) Maxillule outer lobe armed with 3 setae *A. violaceus* (Claus, 1889)
 22b) Maxillule inner lobe armed with 4 setae 23
- 23a) Mandibular palp with 1 segment 24
 23b) Mandibular palp with 2 segments 27
- 24a) Antennal exopod armed with 2 setae 25
 24b) Antennal exopod armed with 1 or 3 setae 26
- 25a) Maxillule outer lobe armed with 2 setae and less than $\frac{1}{2}$ length of inner lobe *A. mucronipes* Stock, 1960
 25b) Maxillule outer lobe armed with 4 setae and more than $\frac{1}{2}$ length of inner lobe *A. minutus* (Claus, 1889)

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| 26a) Mandibular palp armed with 2 apical setae; antennal exopod armed with 1 seta | <i>A. bacescui</i> Marcus, 1965 |
| 26b) Mandibular palp armed with 1 apical seta; antennal exopod armed with 3 setae | <i>A. suberitis</i> Giesbrecht, 1897 |
| 27a) Mandibular palp armed with 3 setae | 28 |
| 27b) Mandibular palp armed with 2 setae | 29 |
| 28a) Caudal rami $\frac{1}{4}$ longer than anal somite | <i>A. major</i> Thompson & Scott, 1903 |
| 28b) Caudal rami $\frac{1}{2}$ longer than anal somite | <i>A. minor</i> Thompson & Scott, 1903 |
| 29a) Maxillule outer lobe armed with 2 setae | 30 |
| 29b) Maxillule outer lobe armed with 4 setae | 31 |
| 30a) Cephalothorax with epimeral area sharpened; antennal exopod armed with 1 seta | <i>A. lunatus</i> n. sp. |
| 30b) Cephalothorax with epimeral area rounded; antennal exopod armed with 2 setae | <i>A. micheli</i> Gurney, 1927 |
| 31a) Caudal rami as long as wide | <i>A. abrolhensis</i> n. sp. |
| 31b) Caudal rami longer than wide | 32 |
| 32a) Prosoma with epimeral areas pointed; antennal exopod armed with 2 setae | <i>A. tenuicornis</i> Brady, 1910 |
| 32b) Prosoma with epimeral areas rounded; antennal exopod armed with 3 setae | <i>A. liljeborgi</i> Boeck, 1859 |

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