

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/226253729>

Asterocherids (Copepoda; Siphonostomatoida) associated with invertebrates from California Reefs: Abrolhos (Brazil)

Article in *Hydrobiologia* · February 2002

DOI: 10.1023/A:1015641516360

CITATIONS

19

READS

220

1 author:



R. Johnsson

Universidade Federal da Bahia

95 PUBLICATIONS 695 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Avaliação e pesquisa do Coral Sol na Baía de Todos os Santos [View project](#)



Phylogeny of the family Artotrogidae (Copepoda: Siphonostomatoida) [View project](#)



Asterocherids (Copepoda; Siphonostomatoida) associated with invertebrates from California Reefs: Abrolhos (Brazil)

R. Johnsson

Universidade de São Paulo, Dpto. Zoologia, Inst. Biociências, Caixa Postal 1146, CEP 05422-970, São Paulo, SP, Brazil (E-mail: johnsson@ib.usp.br)

Received 18 July 2000; in revised form 22 October 2001; accepted 14 November 2001

Key words: Copepoda, Siphonostomatoida, Asterocheridae, association, Brazil

Abstract

Four new asterocherid siphonostomatoid copepods are described, and several new geographical and host records are provided from California Reefs off the coast of Brazil. *Acontiophorus monanchorae* sp. nov. and *Scottocheres youngi* sp. nov. were both found associated with the sponge *Monanchora* sp. *Asterocheres aplysinus* sp. nov. and *Asterocheres spongius* sp. nov. were each associated with three genera of sponges. *Asterocheres crenulatus* previously recorded from the region, was associated with the sponge *Xestospongia* sp. *Asterocheres paraboecki* was recorded for the first time in the region. *Asterocheres spinopaulus*, previously reported from sponges, was found associated with bryozoans and cnidarians. *Cletofontius titanus* and *Orecturus bahiensis* were again recorded from the region and from sponges. *Scottocheres laubieri*, previously known from the Mediterranean Sea, was recorded for the first time in Brazilian waters, associated with the sponge *Aplysina* sp.

Introduction

The family Asterocheridae is the largest family of siphonostomatoid copepods that is associated with invertebrates. Johnsson (1997, 1998a–c, 1999a, b) and Johnsson & Bustamante (1997) recorded members of this family from different areas along the Brazilian coast. The present report presents new records of asterocherids from California Reefs. California Reefs are located in the Abrolhos region off the state of Bahia (18° 15' 00" S × 38° 30' 00" W). In this area these are the most distant reefs from the coast. Hosts included five genera of sponges, as well as ascidians, bryozoans, and crinoids.

Order Siphonostomatoida Thorell, 1859

Family Asterocheridae Giesbrecht, 1899

Genus *Acontiophorus* Brady, 1880

Acontiophorus monanchorae sp. nov.

(Figs 1a–g, 2a–e, 3a–d)

Material examined: Holotype: female MNRJ 12370; allotype: male MNRJ 12339 both associated with *Monanchora* sp., from California Reefs, Abrol-

hos, Bahia State, Brazil, collected on 25 November 1997. This material has been deposited in the Museu Nacional/Universidade Federal do Rio de Janeiro, Rio de Janeiro.

Description: Female – Body length 521 μm (excluding caudal setae), greatest body width 250 μm . Body shape cyclopiform (Fig. 1a), prosome slightly enlarged and dorso-ventrally rounded, cephalotorax and pedigerous somites 2 and 3 with pointed epimera. Pedigerous somite 4 partially covered by preceding somite, with rounded epimera and posterior margin strongly serrulated. Ratio of length to width of prosome 1.5:1, ratio of length of prosome to urosome 2.6:1.

Urosome (Fig. 1b) four-segmented. Genital double somite 114 × 93 μm , ratio of length to width 1.2:1, rounded anterolaterally, with indentation on lateral margins near genital aperture. Postgenital somite, 43 × 59 μm , ratio of length to width 0.7:1, posterior margin serrulated with tooth-like projection. Anal somite, 27 × 52 μm , ratio of length to width 0.7:1, with notch on posterior margin. Caudal rami 23 × 25 μm armed with six setae. Seta I absent. Length of setae II–VII,

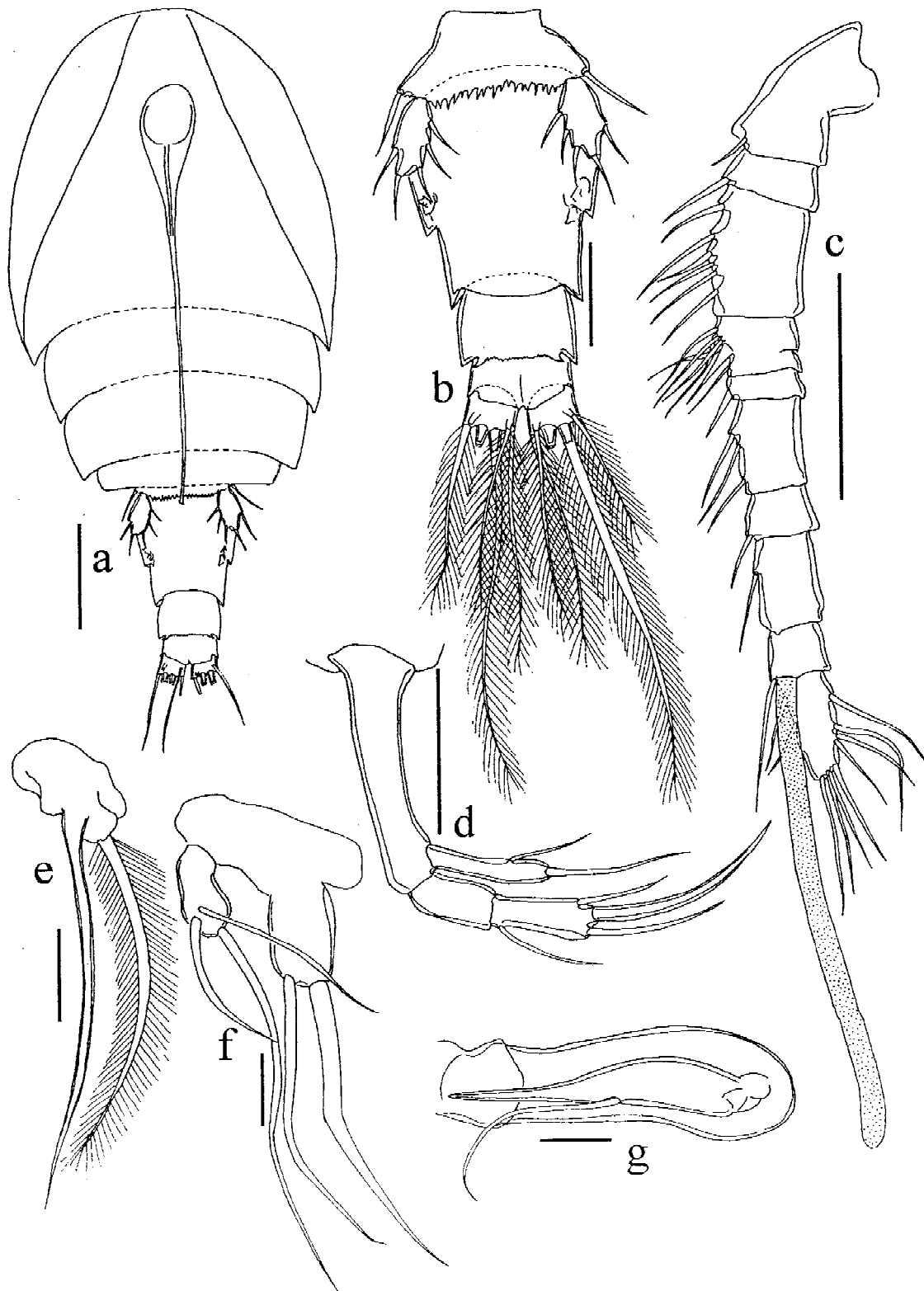


Figure 1. *Acontiophorus monanchorae* n. sp. Female Holotype, MNRJ 12370. *a*, ventral view; *b*, urosome; *c*, antennule; *d*, antenna; *e*, mandible; *f*, maxillule; *g*, maxilla. Scale bars: *a*, 100 μm ; *b*–*d*, 50 μm ; *e*–*g*, 20 μm .

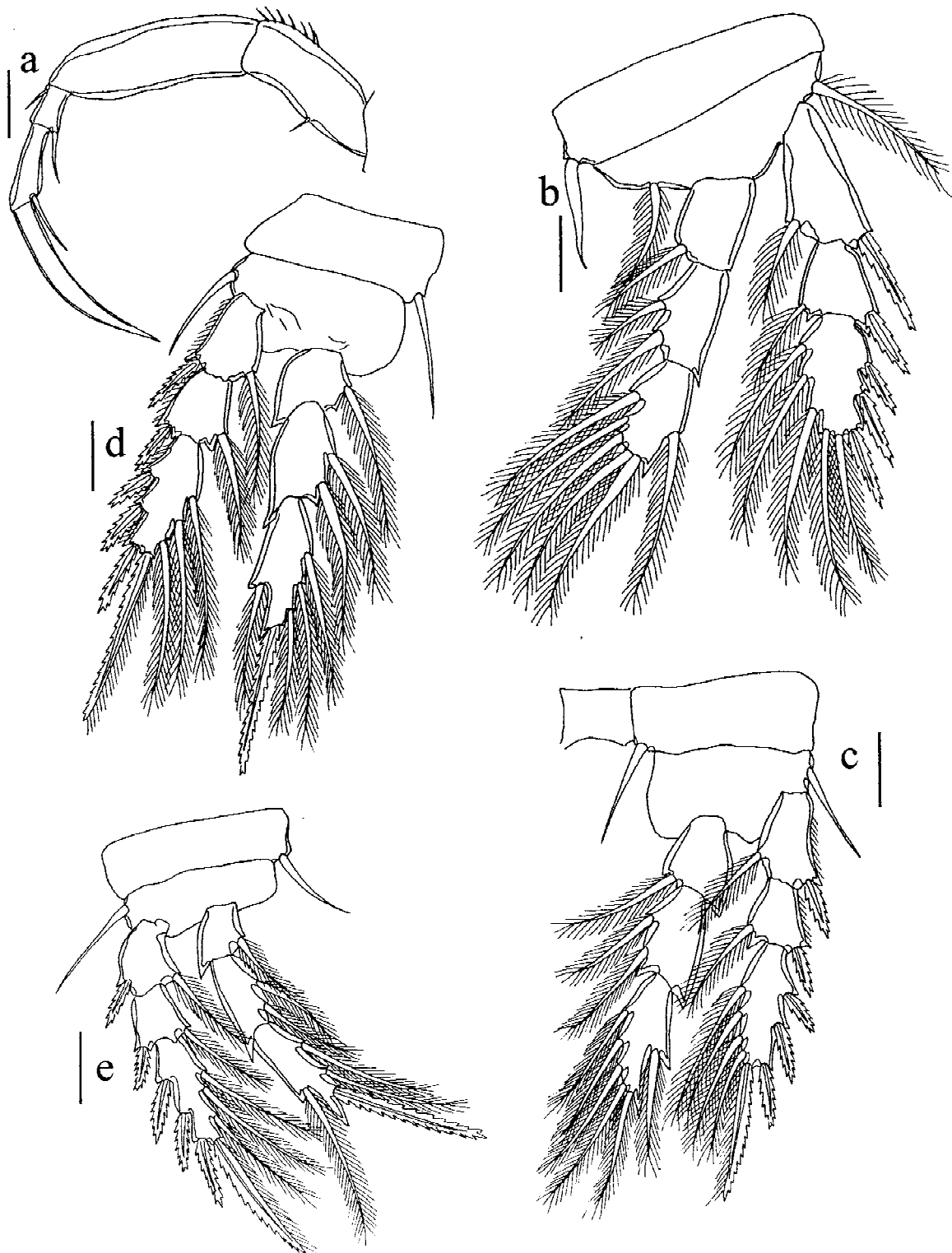


Figure 2. *Acontiophorus monanchorae* n. sp. Female Holotype, MNRJ 12370. a, maxilliped; b, P1; c, P2; d, P3; e, P4. Scale bars: a–e, 20 μ m.

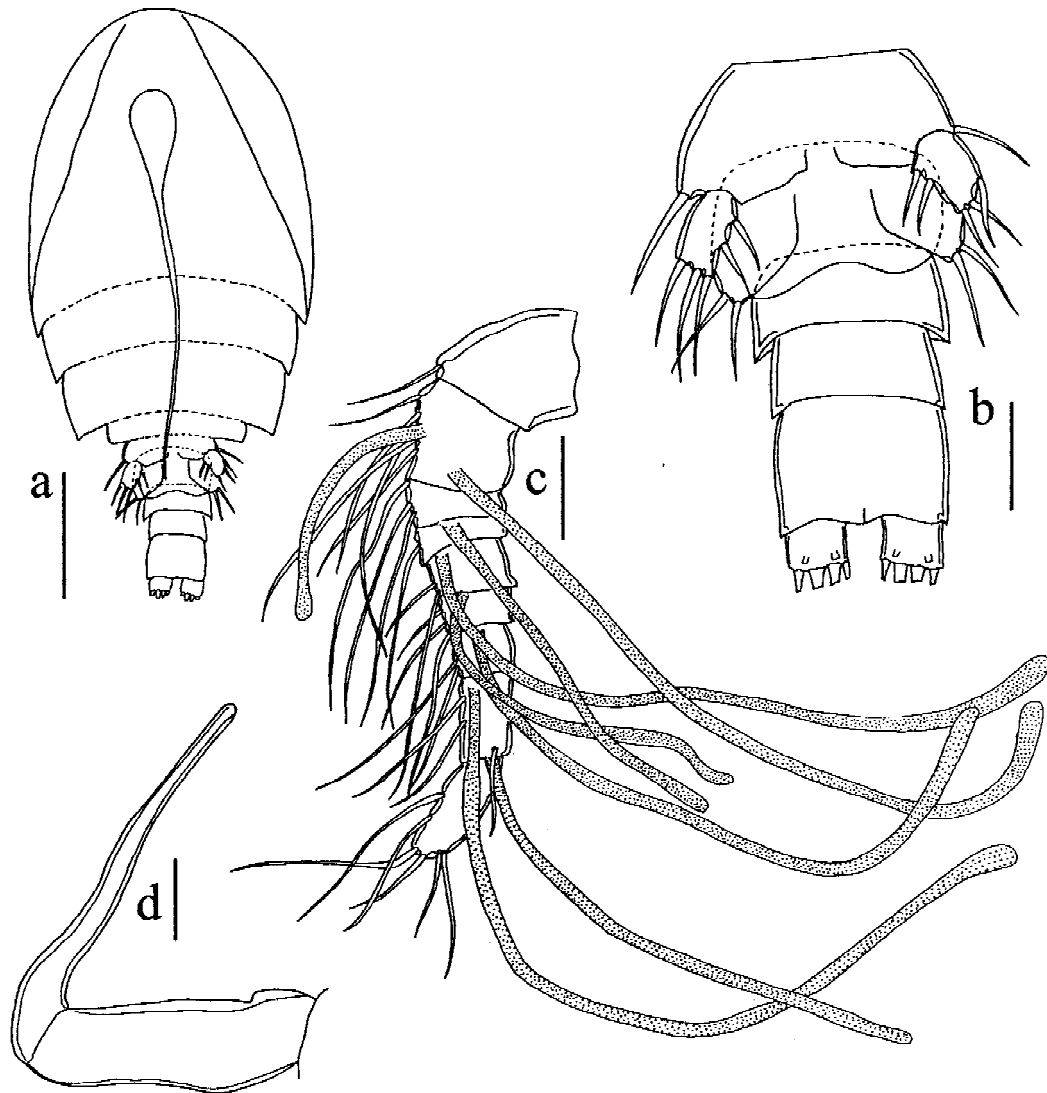


Figure 3. *Acontiophorus monanchorae* n. sp. Male Allotype, MNRJ 12339. a, ventral view; b, urosome; c, antennule; d, maxilla. Scale bars: a, 100 μm ; b, 30 μm ; c, d, 20 μm .

64, 89, 184, 180, 111, and 86 μm respectively. All setae plumose.

Antennule (Fig. 1c) 185 μm long, 10-segmented. Basal part four-segmented, rather broad. Length of segments 1–10 measured along posterior margin 41 (24 μm along anterior margin), 9, 29, 14, 5, 21, 10, 21, 11, and 23 μm , respectively. Antennule with the following setation: 1; 1; 6; 7; 1; 3; 1; 1 + ae and 10. The fourth and fifth segments with spine. Aesthetasc 129 μm long.

Antenna (Fig. 1d) 175 μm long (including claw), with basis 69 μm long. Exopod one-segmented,

34 μm , with long robust distal seta and thin lateral one. Endopod two-segmented, first segment 20 μm long, unarmed; second segment 28 μm long with one proximal seta, one subdistal seta and one distal seta; terminal claw 57 μm long, curved distally. Oral siphon (Fig. 1a) produced into long, siphon-like distal portion, 325 μm long, reaching genital double-somite. Mandible (Fig. 1e) comprised of stylet, 88 μm long, and mandibular palp reduced to plumose seta 68 μm long. Maxillule (Fig. 1f) bilobed, both lobes large and short, with similar length. Inner lobe 29 μm , armed

with two apical setae. Outer lobe 23 μm long and armed with three setae.

Maxilla (Fig. 1g) with syncoxa 98 μm long and long straight claw, 89 μm long, with narrow seta in its mid-lateral margin. Maxilliped (Fig. 2a) four-segmented, comprising syncoxa 44 μm long, armed with small seta on inner margin and row of setules on outer margin, basis 62 μm long. Endopod two-segmented, segments measuring 12 and 24 μm long. First endopodal segment with two setae, second segment bearing distal seta and slightly curved claw-like element, 60 μm long.

Swimming legs 1–4 (Fig. 2b–e) biramous, with three-segmented rami throughout.

	Coxa	Basis	Exopod	Endopod
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,4	0-1;0-2;1,2,3
P3	0-1	1-0	I-1;I-1;III,I,3	0-1;0-2;1,I,3
P4	0-1	1-0	I-1;I-1;III,I,3	0-1;0-2;1,I,2

Fifth leg (Fig. 1b) with free segment armed with five smooth setae. Three of them on inner margin, one on outer margin and one distally. Somite 5 bearing smooth seta near insertion of free segment.

Male: Body similar to female (Fig. 3a). Length (excluding caudal setae) 504 μm , greatest body width 245 μm . Somite of leg 5 partially covered by fourth somite. Ratio of length to width of prosome 1.6:1, ratio of length of prosome to urosome 3.1:1.

Urosome (Fig. 3b) five-segmented. Genital somite 34 \times 70 μm , ratio of length to width 0.5:1, rounded anteriorly and projected posteriorly, armed with two setae. All postgenital somites wider than long (21 \times 55 μm , 22 \times 48 μm , 36 \times 49 μm) ratio of length to width 0.4, 0.5 and 0.7:1 respectively. Caudal rami, 13 \times 16 μm armed with six setae.

Antennule (Fig. 3c) 135 μm long, (not including setae), and nine-segmented. Length of segments measured along posterior margin: 36 (13 μm along anterior margin), 21, 10, 7, 7, 8, 10, 16, and 20 μm respectively. Setation as follows: 1; 5+2ae; 3; 1+ae; 2+ae; 3+ae; 2+ae; 3+2ae and 6 respectively. Aesthetascs on segments 2, 4, 5, 6, 7 and 8 with 47; 153; 77; 139; 74; 135; 167 and 104 μm respectively.

Maxilla (Fig. 3d) with straight claw and without seta on mid-lateral margin as observed in the female. All other appendages as in the female.

Etymology: The specific name refers to the host, *Monanchora* sp.

Remarks: *Acontiphorus monanchorae* n. sp. has many differences from *A. brevifurcatus* Stock, 1966. The free segment of P5 is armed with five setae in the new species, instead of four. The siphon reaches the genital double-somite while in *A. brevifurcatus* it reaches the insertion of P2 (Stock, 1966).

In *A. tynani* Eiselt, 1965 the maxilliped is five-segmented and the syncoxa has a long seta (Eiselt, 1965) exactly as observed by Stock (1966) in *A. brevifurcatus* but in *A. monanchorae* n. sp. it is four-segmented and the syncoxa shows a short seta. The maxilla in *A. tynani* has a three-segmented claw (Eiselt, 1965), *A. monanchorae* n. sp. has the maxilla similar to claw in *A. brevifurcatus*, *A. maldivensis* Sewell, 1949 and *A. ornatus* (Brady & Robertson, 1875) with one-segmented claw and seta on its mid-lateral margin (Giesbrecht, 1899; Sewell, 1949 and Stock, 1966).

Acontiphorus maldivensis has four setae on P5 (Sewell, 1949) as in *A. brevifurcatus* thus differing from *A. monanchorae* n.sp.. In *A. maldivensis* the exopod of the antenna is shorter than the first endopodal segment, while in *A. monanchorae* n. sp. the exopod is longer.

Acontiphorus antennatus Hansen, 1923 was described based on two specimens which probably belong to different species, although Hansen (1923) has attributed these differences to the age. Between these two specimens there is a 50% difference on the total length of the body, the siphon in one specimen reaches the insertion of P5 and on the other the middle of the genital double somite, and the caudal rami shows differences in length and slenderness. However there are common characteristics that make *A. antennatus* different from *A. monanchorae* n. sp.; the exopod of the antenna is almost as long as the two endopodal segments together and P5 is armed with four setae (Hansen, 1923) and while the exopod of the new species is just longer than any endopodal segment and P5 has five setae, as previously stated.

Acontiphorus monanchorae n. sp. also shows two characteristics that make it different from all the other species of the genus. The antennule is 10-segmented with an aesthetasc located one segment before the apical segment. In *A. brevifurcatus*, *A. maldivensis* and *A. ornatus* the antennule is 16-segmented (Giesbrecht, 1899; Sewell, 1949; Stock, 1966). In *A. tynani* it is 13-segmented (Eiselt, 1965) and in *A. antennatus*, *A. scutatus* and *A. zealandicus* it is 11-segmented (Gies-

brecht, 1899; Hansen, 1923; Nicholls, 1944). In all these species the aesthetasc is located three segments proximally to the apical segment.

The other important characteristic of *A. monanchorae* n. sp. is the maxillule that shows two and three setae on inner and outer lobes respectively. *Acontiphorus brevifurcatus*, *A. tynani*, *A. maldivensis*, *A. zealandicus* and *A. scutatus* have four and three setae, respectively, on inner and outer lobes (Giesbrecht, 1899; Nicholls, 1944; Sewell, 1949; Eisele, 1965; Stock, 1966). In *A. ornatus* there are three setae on inner lobe and two on outer lobe (Brady, 1880). Hansen (1923) does not describe the maxillule of *A. antennatus*.

Genus *Asterocheres* Boeck, 1860

Asterocheres abrolhensis Johnsson, 1998

Material examined: 23 females MNRJ 12340 associated with *Callyspongia* sp.; one female and one male MNRJ 12343 associated with *Monanchora* sp.; two females and four males MNRJ 12341 associated with other sponges and two females and one male associated with ascidians.

Remarks: This species has been previously observed by Johnsson (1998c) in Viçosa Reefs. Both Viçosa and California Reefs are located in Abrolhos region. The previous record indicated an association with sponges from the order Haplosclerida in which the genus *Callyspongia* is included. For the first time this species is observed associated with ascidians.

Asterocheres crenulatus Johnsson, 1998

Material examined: four females MNRJ 12169 associated with *Xestospongia* sp. from California Reefs, Abrolhos, Bahia State, Brazil, collected on 25/XI/1997.

Remarks: This species has also been previously recorded by Johnsson (1998c) from Viçosa Reefs and from Porto de Galinhas, Pernambuco State. For the first time the host genus has been identified.

Asterocheres paraboecki Johnsson, 1998

Material examined: three females MNRJ 12286 associated with *Callyspongia vaginalis*; one female MNRJ 12234 associated with *Callyspongia* sp.; one female MNRJ 12285 associated with *Aplysina lacunosa* and two females and one male MNRJ 12342 asso-

ciated with ascidians. All from California Reefs, Abrolhos, Bahia State, Brazil; collected on 25/XI/1997.

Remarks: *Asterocheres paraboecki* has been previously recorded to Rio de Janeiro State associated with sponges (Johnsson, 1998c), with this new record it has its distribution extended towards the northeast, up to Bahia State. At least two species of sponges (*Callyspongia vaginalis* and *Aplysina lacunosa*) were confirmed as hosts. Besides that *A. paraboecki* was also found associated with ascidians.

Asterocheres spinopaulus Johnsson, 1998

Material examined: two males MNRJ 12352 associated with bryozoan and crinoids in California Reefs, Abrolhos, Bahia State, Brazil; collected on 25/XI/1997.

Remarks: This species was previously known from Abrolhos region (Johnsson, 1998c) and was found associated with sponges. However, for the first time it is recorded associated with bryozoans and crinoids.

Asterocheres aplysinus sp. nov.

(Figs 4a–e, 5a–f, 6a–d)

Material examined: Holotype: female MNRJ 12353 associated with *Aplysina lacunosa*. Allotype: male MNRJ 12356 associated with *Callyspongia vaginalis*. Paratypes: five females MNRJ 12354 associated with *A. lacunosa*; six females MNRJ 12355 and three males MNRJ 12357 associated with *Dysidea jeaniae*; one female MNRJ 12375 associated with sponges. All from California Reefs, Abrolhos, Bahia State, Brazil; collected on 25/XI/1997.

Description: Female: Body length (excluding caudal setae) 619 μm , greatest body width 391 μm . Body shape cyclopiform (Fig. 4a) with prosome slightly enlarged and dorso-ventrally flattened; urosome cylindrical. Cephalotorax and pedigerous somite 2 with slightly pointed epimera. Pedigerous somite 3 and 4 with rounded epimera. Somite of leg 5 partially covered by fourth somite. Ratio of length to width of prosome 1.3:1, ratio of length of prosome to urosome 2.2:1.

Urosome four-segmented (Fig. 4b). Genital double somite 116 \times 127 μm , ratio of length to width 0.9:1, rounded anterolaterally, with setules near genital

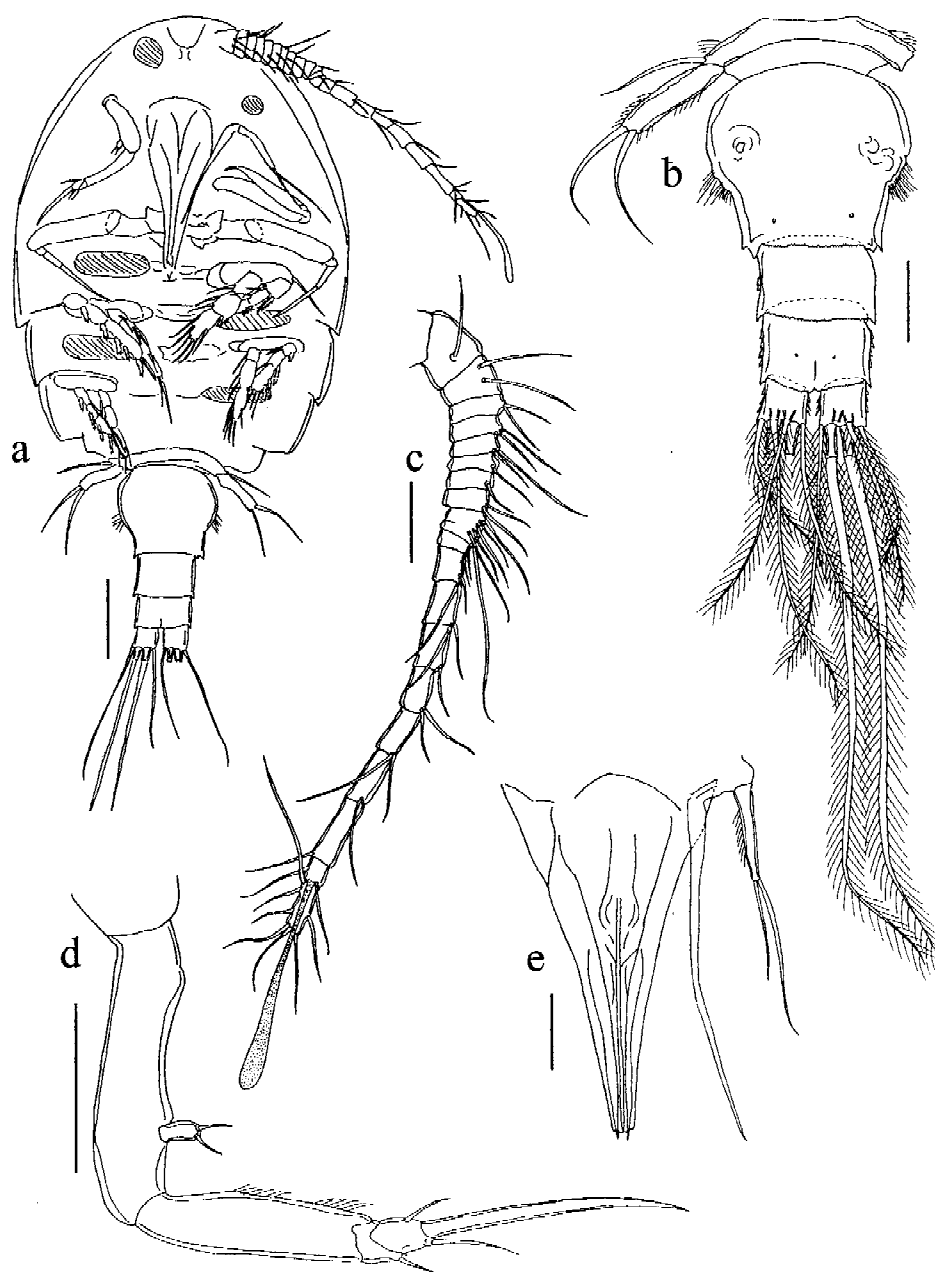


Figure 4. *Asterocheres aplysinus* n. sp. Female Holotype, MNRJ 12353. a, ventral view; b, urosome; c, antennule; d, antenna; e, mandible and oral cone. Scale bars: a, 100 μm ; b–e, 50 μm .

aperture and posterior margin serrated. Postgenital somites, all wider than long ($54 \times 71 \mu\text{m}$, $57 \times 66 \mu\text{m}$) ratio of length to width 0.8:1 and 0.9:1, respectively. Caudal rami $29 \times 27 \mu\text{m}$, armed with six setae. Inner and outer margins with setules. Seta I absent, setae II–VII, 123, 156, 380, 349, 153 and $100 \mu\text{m}$, respectively. All setae plumose.

Antennule (Fig. 4c) $379 \mu\text{m}$ long (not including setae) and 19-segmented. Length of segments measured along their posterior margin: 45 (21 μm along anterior margin): 12; 11; 11; 9; 7; 11; 11; 14; 9; 23; 27; 29; 27; 30; 36; 43; 16 and $32 \mu\text{m}$, respectively. Segmental homologies and setation as follows: I-1; II-2; III-2; IV-2; V-2; VI-1; VII-1; VIII-2; IX–XII-6;

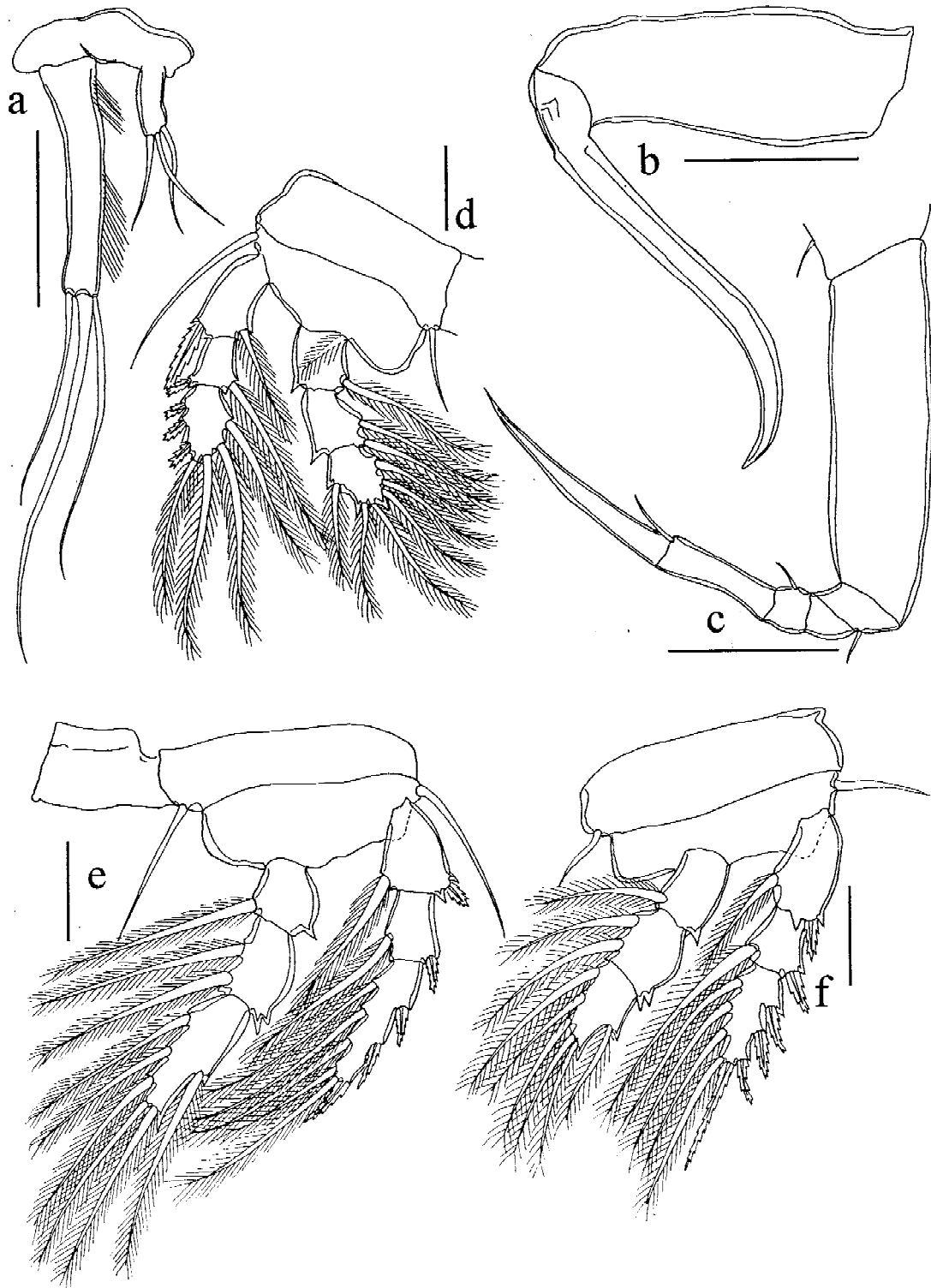


Figure 5. *Asterocheres aplysinus* n. sp. Female Holotype, MNRJ 12353. a, maxillule; b, maxilla; c, maxilliped; d, P1; e, P2; f, P3. Scale bars: a-f, 50 μ m.

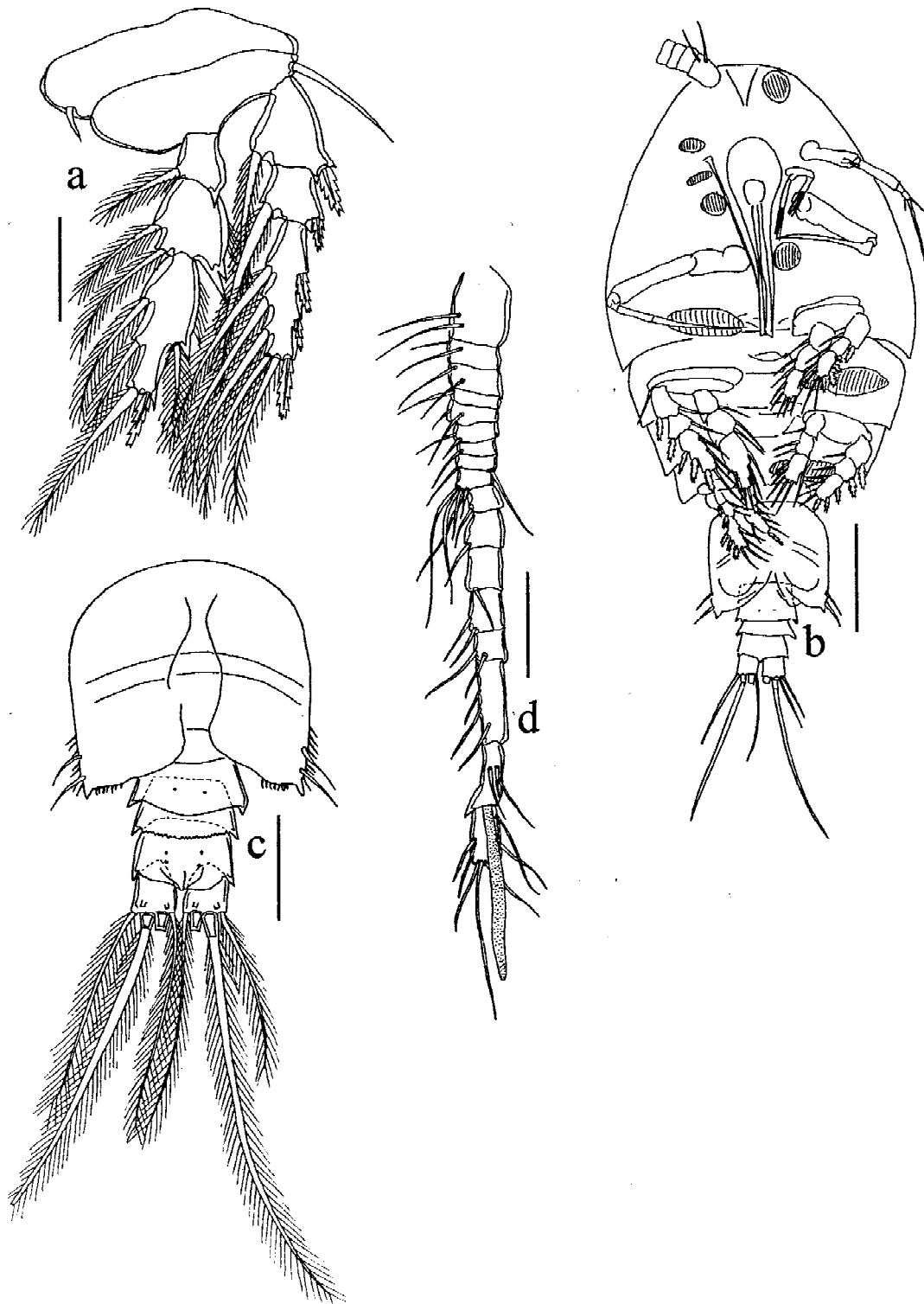


Figure 6. *Asterocheres aplysinus* n. sp. Female Holotype, MNRJ 12353. a, P4. Male Allotype, MNRJ 12356 b, ventral view; c, urosome; d, antennule. Scale bars: a, c, d, 50 μm ; b, 100 μm .

XIII-1; XIV-2; XV-2; XVI-2; XVII-2; XVIII-2; XIX-1; XX-1; XXI-2+ae; XXII-XXVIII-7. Aesthetasc on segment XXI 137 μm long.

Antenna (Fig. 4d) 259 μm (including claw) with basis 83 μm long. Exopod one-segmented, 11 μm long with 2 setae. Endopod three-segmented; first segment 66 μm long, unarmed and outer margin with setules, second segment 14 μm long, with distal seta. Third segment 18 μm long, with two setae; one subdistal and the other distal close to terminal curved claw with 78 μm long. Oral cone (Fig. 4e) 221 μm long, reaching insertion of leg 1. Mandible (Figure 4e) comprised of 216 μm long stylet and one-segmented palp, 56 μm long, with two subequal apical setae. Maxillule (Fig. 5a) bilobed; both lobes armed with three setae, inner lobe 67 μm long, and outer lobe 20 μm long. Maxilla (Fig. 5b) with syncoxa 104 μm long and curved claw 137 μm long. Maxilliped (Fig. 5c) six-segmented, comprising syncoxa 25 μm long, with seta on inner margin, basis 99 μm long, endopodal segments measuring 13, 14, 11 and 34 μm , respectively. First endopodal segment with distal seta on outer margin, second segment unarmed, third segment with seta on inner margin. Fourth endopodal segment with distal seta near narrow and straight claw-like element.

Swimming legs 1–4 (Figs 5d–f and 6a) biramous, with three-segmented rami throughout.

	Coxa	Basis	Exopod	Endopod
P1	0-1	1-1	I-1;I-1;III,2,2	0-1;0-2;1,2,3
P2	0-1	1-0	I-1;I-1;III,2,3	0-1;0-2;1,2,3
P3	0-1	1-0	I-1;I-1;III,I+1,3	0-1;0-2;1,2,3
P4	0-1	1-0	I-1;I-1;III,2,3	0-1;0-2;1,I+1,2

First and second endopodal segments of P4 showing sharp tooth on outer margin.

Fifth leg (Fig. 4b) with free segment with row of setules on inner and outer margins and two distal smooth setae. Somite 5 bearing plumose seta and few setules near insertion of free segment.

Male: Body similar to female (Fig. 6b). Length (excluding caudal setae) 567 μm long, greatest width 315 μm . Cephalotorax and pedigerous somites 2 and 3 with pointed epimera. Pedigerous somite 4 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 1.4:1. Ratio of length of prosome to urosome 2.5:1.

Urosome (Fig. 6c) five-segmented. Genital somite 98 \times 116 μm , ratio of length to width 0.8:1, with two setae close to fringe of setules. Postgenital somites all wider than long, 29 \times 54, 15 \times 50, 32 \times 48 μm , ratio of length to width 0.5, 0.3 and 0.7:1, respectively. Caudal rami 25 \times 21 μm , armed with six setae.

Antennule (Fig. 6d) 304 μm long (not including setae), and 17-segmented. Length of segments measured along posterior margin 36 (29 μm along anterior margin): 12; 12; 7; 11; 9; 5; 9; 16; 11; 18; 21; 21; 16; 39; 30 and 29 μm respectively. Segmental homologies and setation as follows: I-2; II-2; III-2; IV-1; V-2; VI-2; VII-1; VIII-1; IX-XII-6; XIII-1; XIV-1; XV-1; XVI-2; XVII-2; XVIII-XIX-3; XX-XXI-3+ae; XXII-XXVIII-7. All setae smooth. Aesthetasc on segment XXI 84 μm long. Segment XXI with tooth-like projection. All other appendages as in the female.

Etymology: The specific name refers to the host, *Aplysina* sp.

Remarks: *Asterocheres aplysinus* n. sp. has the siphon reaching the insertion of P1 and the free segment of P5 with two setae. Among the species of the genus *Asterocheres* only *A. latus* (Brady, 1872), *A. boeckii* (Brady, 1880), *A. intermedius* (Hansen, 1923) and *A. paraboecki* Johnsson, 1998 share these characters.

A. aplysinus n. sp. shows a set of characteristics that are not shared with the species mentioned above. The maxillule has three setae on each lobe while *A. latus* and *A. paraboecki* have four setae (Gotto, 1993; Johnsson, 1998c; Stock, 1960) and *A. boeckii* and *A. intermedius* have four and three setae on inner and outer lobes, respectively (Sars, 1918; Hansen, 1923). The mandibular palp in *A. aplysinus* n. sp. is one-segmented while *A. boeckii*, *A. latus* and *A. paraboecki* are two-segmented (Sars, 1918; Gotto, 1993; Johnsson, 1998c) and in *A. intermedius* this character is not described (Hansen, 1923).

A. aplysinus n. sp. also has a four-segmented maxilliped endopod and a 19-segmented antennule. These characters are not present in any of these species.

Asterocheres spongus sp. nov.
(Figs 7a–g, 8a–d, 9a–c)

Material examined: Holotype: female MNRJ 12363, allotype: male MNRJ 12364, both associated with *Aplysina lacunosa*. Paratypes: 12 females MNRJ

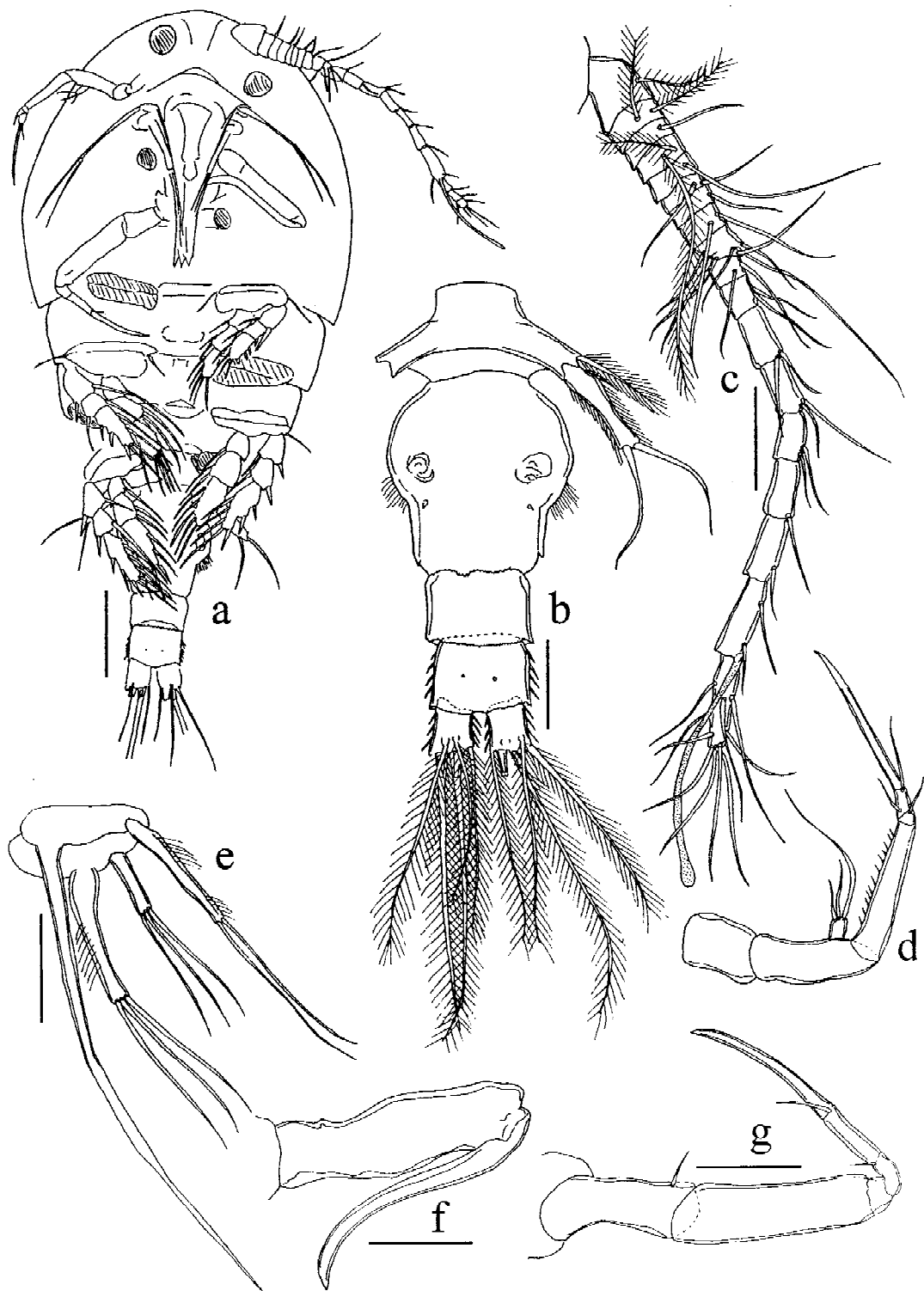


Figure 7. *Asterocheres spongus* n. sp. Female Holotype, MNRJ 12363. *a*, ventral view; *b*, urosome; *c*, antennule; *d*, antenna; *e*, mandible and maxillule; *f*, maxilla; *g*, maxilliped. Scale bars: *a*, 100 μ m; *b*–*g*, 50 μ m.

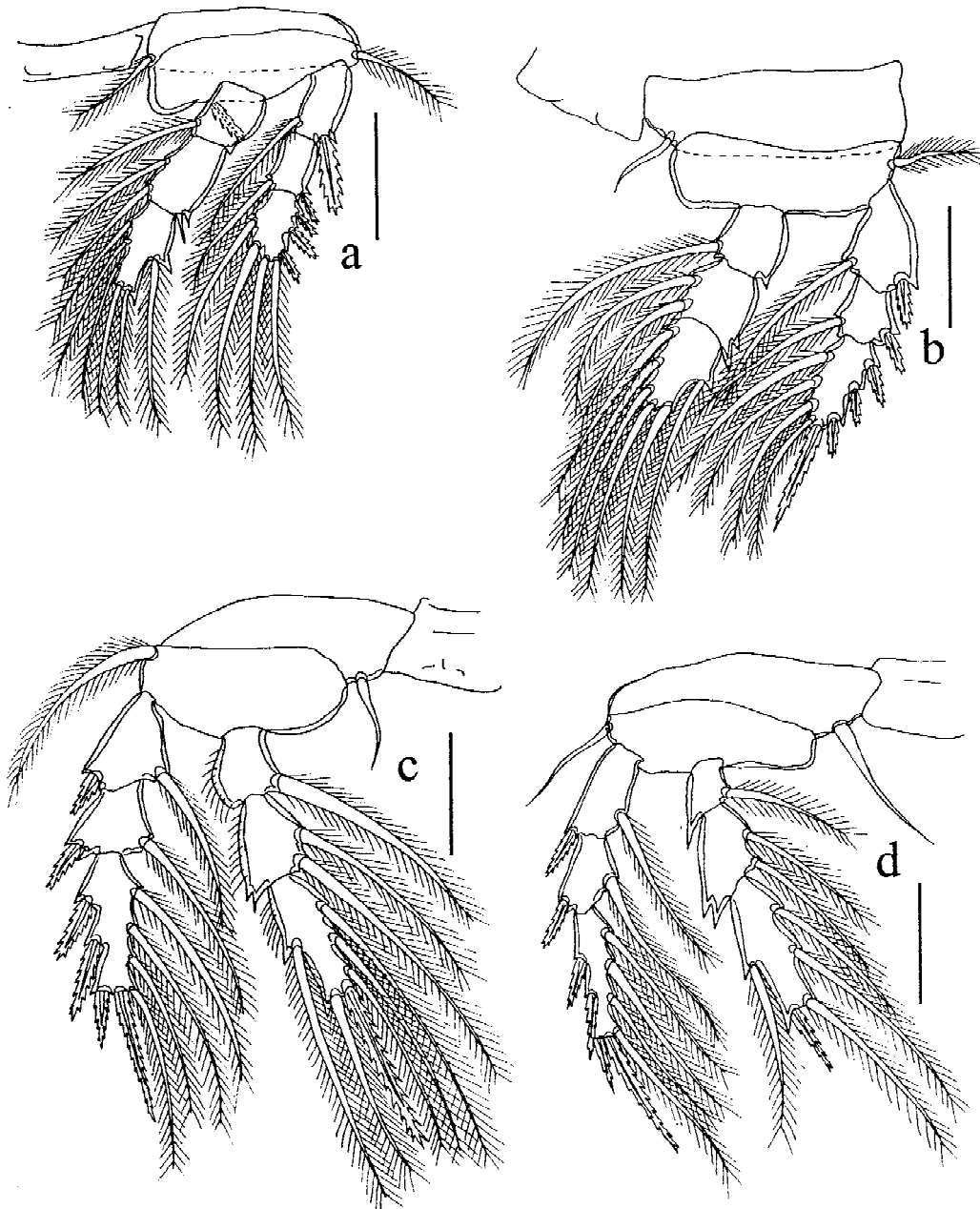


Figure 8. *Asterocheres spongius* n. sp. Female Holotype, MNRJ 12363. a, P1; b, P2; c, P3; d, P4. Scale bars: a–d, 50 μm .

12365 and 23 males MNRJ 12366 also associated with *Aplysina lacunosa*; one female MNRJ 12382 and two males MNRJ 12383 associated with *Callyspongia vaginalis*; two females MNRJ 12367 associated with *Callyspongia* sp.; one female MNRJ 12368 associated with ascidians; one female MNRJ 12369 associated with bryozoans and crinoids; three females MNRJ

12374 associated with *Dysidea jeaniae*. All from California Reefs, Abrolhos, Bahia State, Brazil; collected on 25/XI/1997.

Description: Female: Body length (excluding caudal setae) 813 μm , greatest body width 417 μm . Body shape cyclopiform (Fig. 7a) with prosome

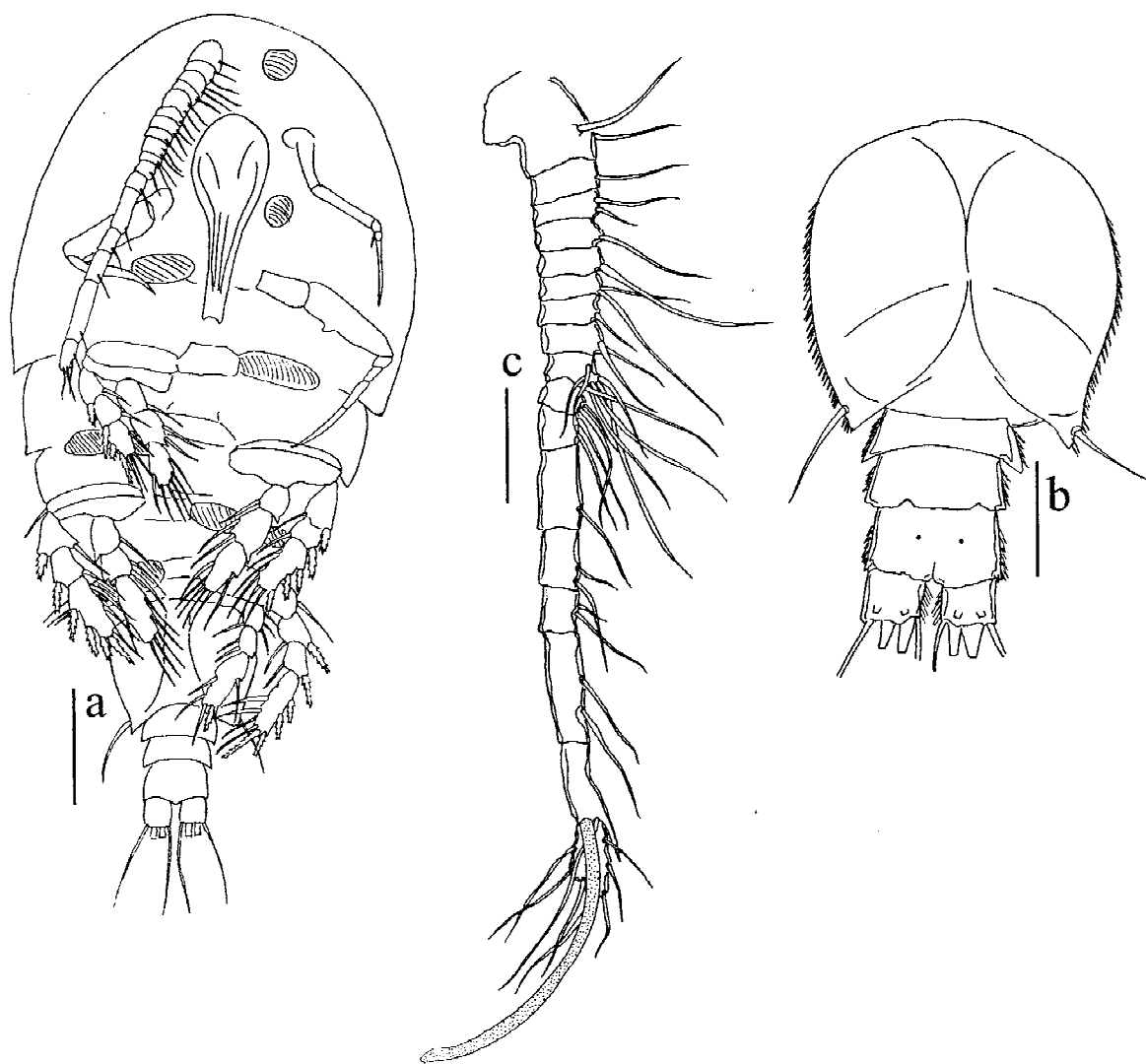


Figure 9. *Asterocheres spongius* n. sp. Male Allotype, MNRJ 12364. a, ventral view; b, urosome; c, antennule. Scale bars: a, 100 μm ; b, c, 50 μm .

slightly enlarged and dorso-ventrally flattened; urosome cylindrical. Cephalotorax with slightly pointed epimera. Pedigerous somites 2 to 4 with rounded epimera. Somite of leg 5 partially covered by fourth somite. Ratio of length to width of prosome 1.3:1. Ratio of length of prosome to urosome 1.8:1.

Urosome (Fig. 7b) four-segmented. Genital double-somite $121 \times 114 \mu\text{m}$, ratio of length to width 1.1:1, rounded anterolaterally, with group of setules and two small teeth near genital aperture. Small denticles on lateral margins close to posterior margin serrulated. Postgenital somites, wider than long ($46 \times 62 \mu\text{m}$, $46 \times 59 \mu\text{m}$) ratio of length to width 0.7,

0.8:1, respectively. Anal somite with lateral margins covered with setules. Caudal rami $29 \times 25 \mu\text{m}$, armed with six setae. Inner and outer margins covered with setules. Seta I absent, setae II–VII, 125, 116, 175, 157, 116 and $102 \mu\text{m}$ respectively. All setae plumose.

Antennule (Fig. 7c) $360 \mu\text{m}$ long (not including setae), 18-segmented. Length of segments measured along posterior margin: 43 (23 μm along anterior margin) 10; 9; 11; 11; 7; 10; 13; 16; 11; 16; 29; 27; 26; 29; 33; 33 and $46 \mu\text{m}$, respectively. Segmental homologies and setation as follows: I-1; II-2; III-1; IV-2; V-1; VI-2; VII-1; VIII-2; IX–XIII-7; XIV-2; XV-2; XVI-2; XVII-2; XVIII-2; XIX-1; XX-2; XXI-

2+ae; XXII-XXVIII-10. Aesthetasc on segment XXI 123 μm long.

Antenna (Fig. 7d) 221 μm long (including claw) with basis 58 μm long. Exopod one-segmented, 10 μm long with two short and one long distal setae. Endopod three-segmented, first segment 67 μm long, unarmed and with row of setules on outer margin, second segment 7 μm long and with small distal seta. Third segment 11 μm long, with two setae, one subdistal and the other distal near slightly curved claw, 78 μm long. Oral cone (Fig. 7a) 214 μm long, reaching beyond insertion of maxilliped. Mandible (Fig. 7e) comprised of stylet 240 μm long and slender one-segmented palp, 64 μm long, with two distal setae and row of setules on lateral margin.

Maxillule (Fig. 7e) bilobed; both lobes armed with three setae. Inner lobe, 64 μm long and row of setules on inner margin. Outer lobe 32 μm long. Maxilla (Fig. 7f) with syncoxa 119 μm long and long, curved claw, 136 μm long. Maxilliped (Fig. 7g) five-segmented, comprising syncoxa 75 μm long, armed with inner seta, basis, 93 μm long. Endopod three-segmented, segments measuring 10, 12 and 32 μm long, respectively. Second segment with short distal seta, third segment bearing distal seta near straight claw-like element, 75 μm long. Swimming legs 1-4 (Fig. 8a-d) biramous, with three-segmented rami throughout.

	Coxa	Basis	Exopod	Endopod
P1	0-1	1-I	I-1;I-1;III,2,2	0-1;0-2;1,2,3
P2	0-1	1-0	I-1;I-1;III,I,4	0-1;0-2;1,2,3
P3	0-1	1-0	I-1;I-1;III,I,4	0-1;0-2;1,1+I,3
P4	0-1	1-0	I-1;I-1;III,I,4	0-1;0-2;1,1+I,2

Second endopodal segment of all legs with lateral margins producing a bifid tooth. Endopod of P3 with outer margin covered with setules.

Fifth leg (Fig. 7b) with free segment armed with two smooth distal setae and row of setules on inner and outer margins. Somite 5 bearing plumose seta near insertion of free segment.

Male: Body similar to female (Fig. 9a). Length 690 μm long (excluding caudal setae) and greatest width 328 μm . Ratio of length to width of prosome 1.3:1. Ratio of length of prosome to urosome 2.0:1.

Urosome (Fig. 9b) five-segmented. Genital somite 129 \times 132 μm , rounded, posterior corners bearing a

seta. Postgenital somites 14 \times 67, 26 \times 58, 30 \times 55 μm , ratio of length to width 0.2, 0.4, and 0.6:1, respectively. Postgenital somites covered with spinules. Caudal rami 17 \times 25 μm , armed with six setae.

Antennule (Fig. 9c) 362 μm long (not including setae), and 17-segmented. Length of segments measured along posterior margin 42 (32 μm along anterior margin) 11; 12; 14; 11; 8; 12; 14; 15; 12; 14; 36; 26; 18; 47; 33 and 35 μm , respectively. Segmental homologies and setation as follows: I-2; II-1; III-2; IV-1; V-1; VI-2; VII-1; VIII-2; IX-XIII-7; XIV-2; XV-2; XVI-1; XVII-2; XVIII-2; XIX-XX-2; XXI-1+ae; XXII-XXVIII-7. All setae smooth. Aesthetasc on segment XXI 125 μm long. Segment XXI showing digitiform outgrowth. All other appendages as in the female.

Etymology: The specific name refers to the many sponges that are hosts to this species.

Remarks: *Asterocheres spongius* n. sp. has a siphon extending up to the maxilliped insertion and the free segment of P5 with two setae. The following species share these characters: *A. abyssi* (Hansen, 1923); *A. canui* Giesbrecht, 1897; *A. indicus* Sewell, 1949; *A. jeanyeatmanae* Yeatman, 1970; *A. longisetosus* Nair & Pillai, 1984; *A. ovalis* Sewell, 1949; *A. renaudi* Canu, 1892; *A. simplex* Schirl, 1973; *A. spinopaulus* Johnsson, 1998; *A. tenerus* (Hansen, 1923); *A. uncinatus* (Kricagin, 1928) (Marcus & Por, 1960 as *Asterocheres carausi*) and *A. ventricosus* (Brian, 1928).

The claw-like element of the maxilliped in *A. spongius* is more than twice longer than the preceding segment, such characteristic does not occur in *A. tenerus*, *A. renaudi*, *A. ventricosus*, *A. indicus* and *A. simplex* where the maxilliped claw is smaller than twice the total length of the preceding segment (Canu, 1892; Hansen, 1923; Brian, 1928; Sewell, 1949; Schirl, 1973).

The new species has the outer lobe of the maxillule with half the total length of the inner lobe and each lobe is armed with three apical setae. Among all the species mentioned above only *A. longisetosus* and *A. canui* show each maxillulary lobe armed with three apical setae (Canu, 1892; Nair & Pillai, 1984). However *A. canui* shows a subdistal seta on the outer lobe (Canu, 1892) while in *A. spongius* this seta is absent.

The mandibular palp in *A. spongius* n. sp. is one-segmented and armed with two-setae. The other species have the mandibular palp two-segmented, ex-

cept *A. longisetosus*, *A. ovalis* and *A. renaudi* (Canu, 1892; Sewell, 1949; Nair & Pillai, 1984). The exopod of the antenna in *A. spongus* n. sp. is armed with three setae, only *A. jeanyeatmanae* (Yeatman, 1970) shows the same armature. Finally, among all these species, *A. spongus* is the only one with the antennule 18-segmented.

The combination of the characteristics from P5, siphon, antennule, antenna, maxillule and mandible make *A. spongus* n. sp. different from all other species of the genus.

Genus *CletoPontius* Thompson & Scott, 1903
CletoPontius titanus Johnsson, 1999

Material examined: one female MNRJ 12170 associated with *Xestospongia* sp. and one female MNRJ 12171 associated with sponges. All from California Reefs, Abrolhos, Bahia State, Brazil; collected on 25/XI/1997.

Remarks: The genus *CletoPontius*, initially erected by Thompson & Scott (1903) was monospecific until Johnsson (1999a) described *C. titanus* associated with sponges in Viçosa Reefs (Abrolhos region). *C. titanus* is now recorded in California Reefs, associated with *Xestospongia* sp.

Genus *Orecturus* Humes, 1992

Orecturus bahiensis Johnsson, 1998

Material examined: one female MNRJ 12345 associated with sponges from California Reefs, Abrolhos, Bahia State, Brazil; collected on 25/XI/1997.

Remarks: Johnsson (1998a) observed this species in Coroa Vermelha Reefs and Paredes Reefs, two different areas located in Abrolhos region. The species is now collected in another area of the region and associated with sponges.

Genus *Scottocheres* Giesbrecht, 1897

Scottocheres laubieri Stock, 1967 (Fig. 10a–b)

Material examined: two females and one male MNRJ 12346 associated with *Aplysina lacunosa* from California Reefs, Abrolhos, Bahia State, Brazil; collected on 25/XI/1997.

Remarks: The species (Fig. 10a, b) found in Brazil shows the same characteristics of *S. laubieri* Stock

(Stock, 1967) from the Mediterranean Sea that make it different from the remaining species of the genus. The exopods of P2 to P4 present just two spines on outer margin.

	Coxa	Basis	Exopod	Endopod
P1	0-1	1-I	I-1; I-1; III,2,2	0-1; 0-1; 1,2,3
P2	0-1	1-0	I-1; I-1; II,I,4	0-1; 0-2; 1,2,3
P3	0-1	1-0	I-1; I-1; II,I,4	0-1; 0-2; 1,1+I,3
P4	0-1	1-0	I-1; I-1; II,I,3	0-1; 0-2; 1,I,2

The basal segment of P5 is armed with a spinule on its inner margin.

Scottocheres youngi sp. nov.

(Figs 11a–g, 12a–d, 13a,b)

Material examined: one female MNRJ 12338 associated with *Monanchora* sp. from California Reefs, Abrolhos, Bahia State, Brazil; collected on 25/XI/1997.

Description: Female: Body length (excluding caudal setae) 593 μm , greatest body width 273 μm . Body shape cycloform (Fig. 11a), with prosome slightly enlarged and dorso-ventrally rounded, urosome cylindrical. Cephalotorax and pedigerous somites 2 to 4 with rounded epimera. Ratio of length to width of prosome 1.2:1. Ratio of length of prosome to urosome 1.3:1.

Urosome (Fig. 11b) four-segmented. Genital double somite 136 \times 105 μm , ratio of length to width 1.3:1, rounded antero-laterally, showing large indentation on lateral margins, close to genital aperture. Posterior margin serrulated. Postgenital somite 86 \times 48 μm , ratio of length to width 1.8:1, with posterior margin serrulated. Anal somite 32 \times 32 μm . Caudal rami (Fig. 11c) 29 \times 14 μm armed with six setae. Seta I absent, setae II-VII, 37; 38; 101; 121; 30 and 27 μm , respectively. All setae plumose.

Antennule (Fig. 11d) 184 μm long (not including setae), and 18-segmented. Length of segments measured along their posterior margin: 25 (16 μm along anterior margin); 14; 9; 7; 9; 8; 5; 7; 7; 8; 10; 9; 10; 9; 11; 10; 10 and 18 μm , respectively. Segmental homologies and setation as follows: I-1; II-2; III-1; IV-2; V-1; VI-2; VII-1; VIII-2; IX-XIII-6; XIV-1; XV-1; XVI-1; XVII-1; XVIII-1; XIX-1; XX-1; XXI-1+ae;

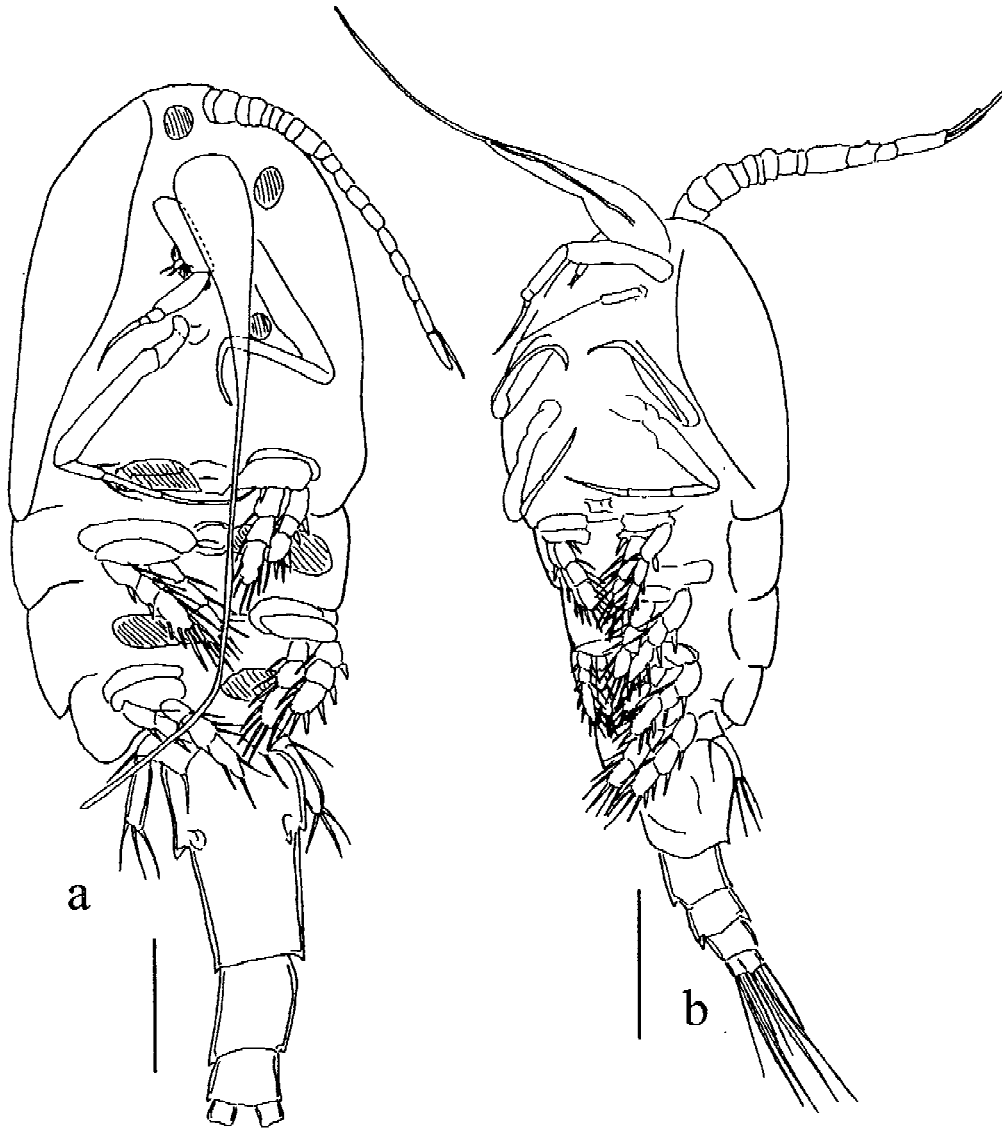


Figure 10. *Scottocheres laubieri* Stock, 1967, MNRJ 12346. a, female – ventral view; b, male – ventral view. Scale bars: a, b, 100 μm .

XXII-XXVIII-6. Aesthetasc on segment XXI 184 μm long.

Antenna (Fig. 11e) 150 μm long (including claw) with basis 51 μm long. Exopod one-segmented, 6 μm long with two distal setae. Endopod three-segmented, first segment 49 μm long, unarmed; second segment 6 μm long with small distal seta. Third endopodal segment 8 μm long, armed with two distal setae and terminal slightly curved claw, 36 μm long. Oral cone (Fig. 11a) 307 μm long, reaching insertion of P5. Mandible (Fig. 11f) comprised of sharp stylet 141 μm long. Mandibular palp absent.

Maxillule (Fig. 11g) bilobed, both lobes with three setae. Inner lobe 45 μm long and outer lobe 27 μm long. Maxilla (Fig. 12a) with syncoxa 69 μm long and claw 104 μm long, showing partial articulation at 1/3 from its distal extremity. Maxilliped (Fig. 12b) five-segmented, comprising syncoxa 24 μm long, armed with inner seta, basis 62 μm long. Endopod three-segmented, segments measuring 12, 24, 25 μm long, respectively. First endopodal segment with seta; second segment with two setae and third segment bearing curved, 33 μm long claw-like element and distal seta.

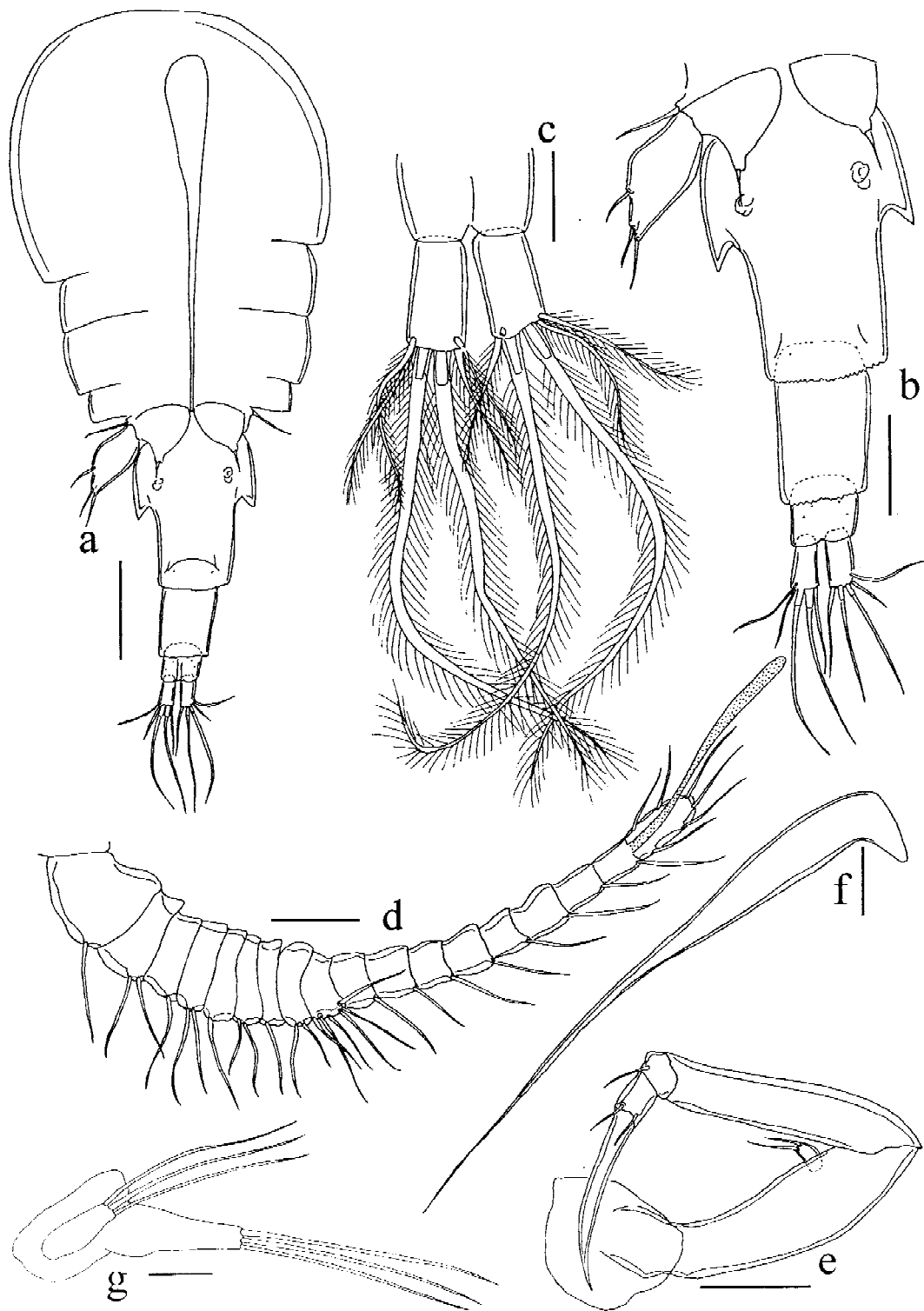


Figure 11. *Scottocheres youngi* n. sp. Female Holotype, MNRJ 12338. *a*, ventral view; *b*, urosome; *c*, caudal rami; *d*, antennule; *e*, antenna; *f*, mandible; *g*, maxillule. Scale bars: *a*, 100 μm ; *b*, 50 μm ; *c*–*g*, 20 μm .

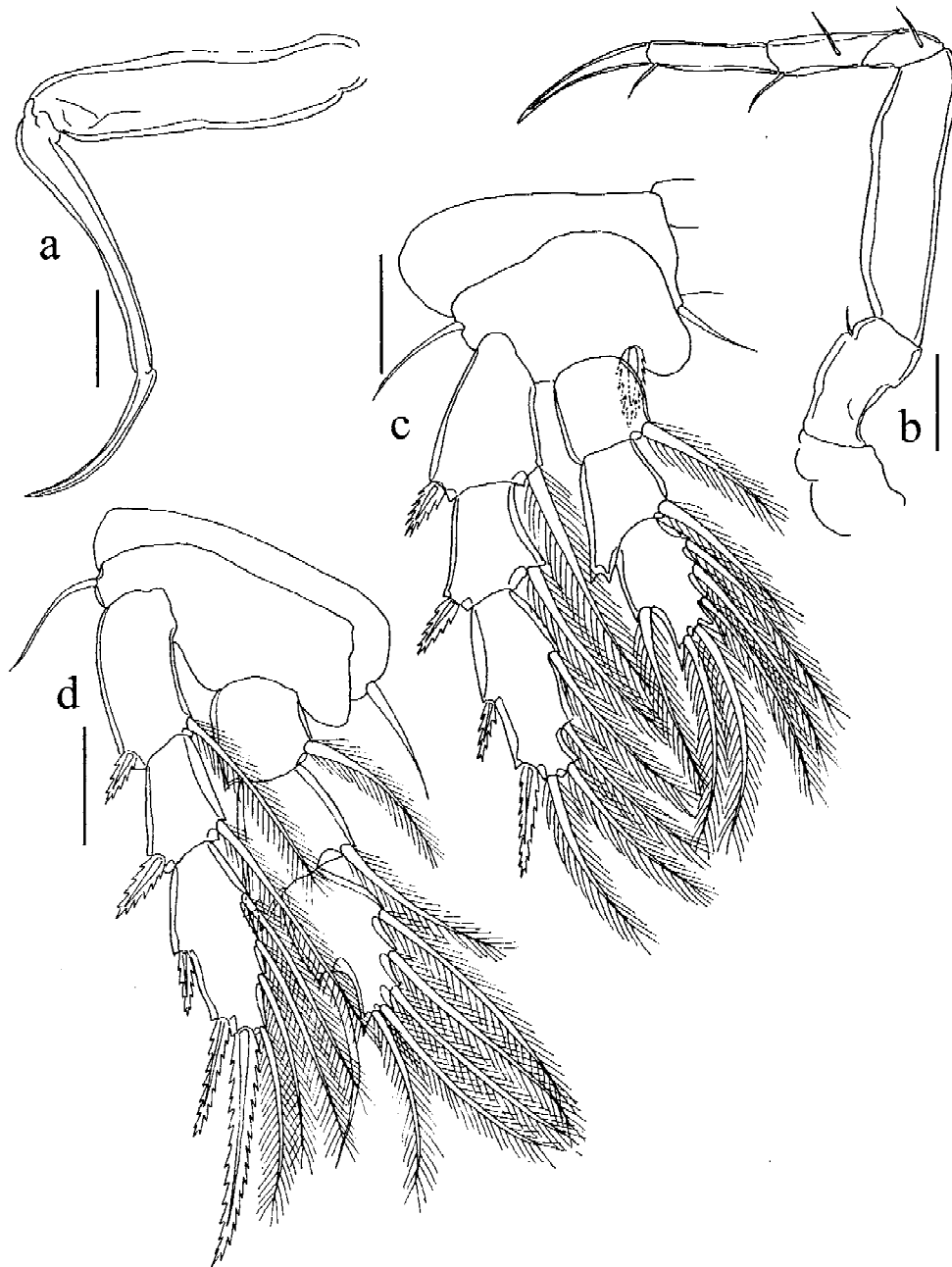


Figure 12. *Scottocheres youngi* n. sp. Female Holotype, MNRJ 12338. a, maxilla; b, maxilliped; c, P1; d, P2. Scale bars: a–d, 20 μ m.

Swimming legs 1–4 (Figs 12c,d; 13a,b) biramous, with three-segmented rami throughout.

	Coxa	Basis	Exopod	Endopod
P1	0-1	1-1	I-1; I-1; II,2,2	0-1; 0-1; 1,2,3
P2	0-1	1-0	I-1; I-1; II,I,4	0-1; 0-1; 1,2,3
P3	0-1	1-0	I-1; I-1; II,I,4	0-1; 0-1; 1,1+I,3
P4	0-1	1-0	I-1; I-1; II,I,3	0-1; 0-2; 1,I,2

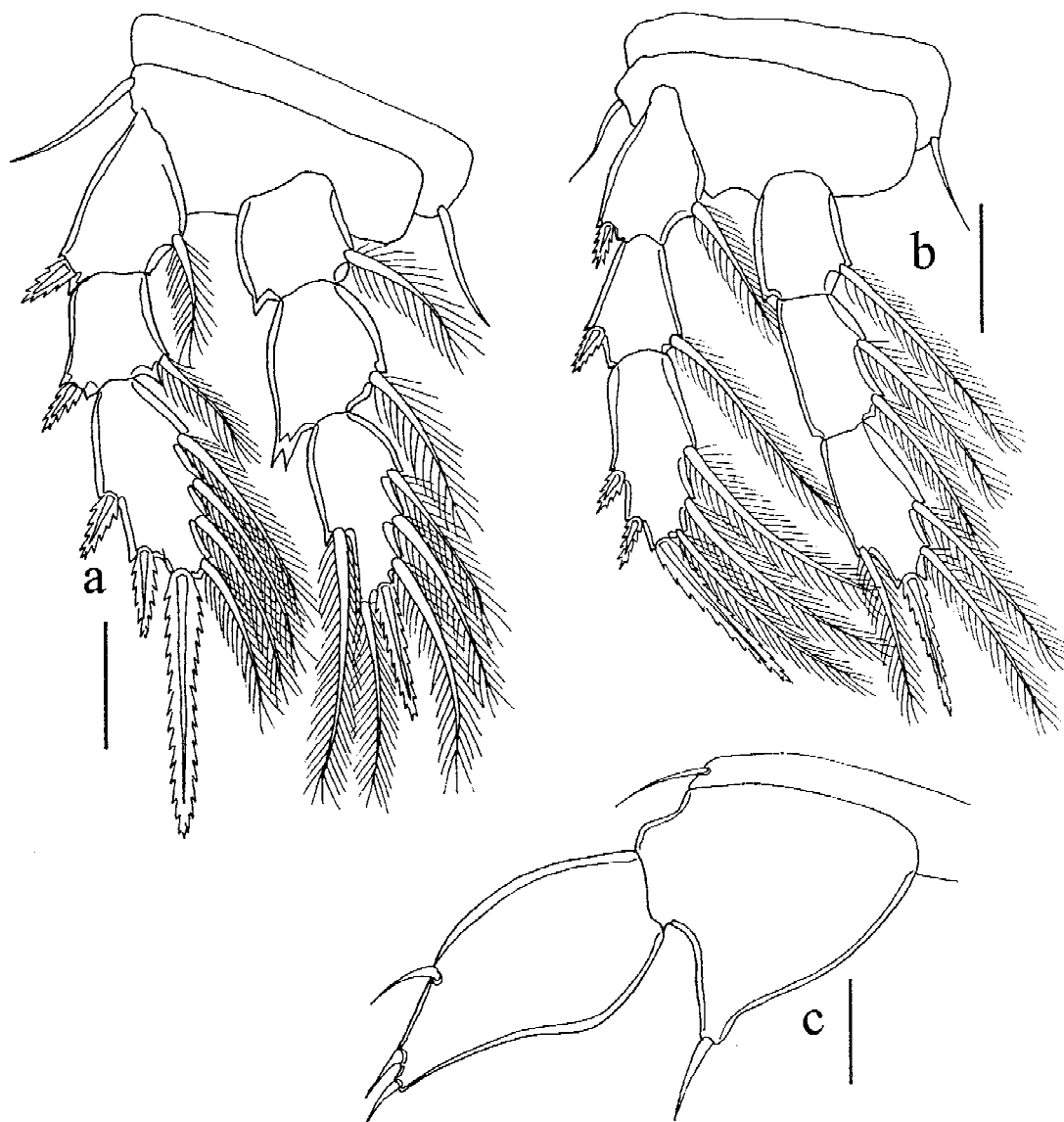


Figure 13. *Scottocheres youngi* n. sp. Female Holotype, MNRJ 12338. a, P3; b, P4; c, P5. Scale bars: a–c, 20 μ m.

Second endopodal segment of P1 to P3 with a single seta on its inner margin. Fifth leg (Fig. 13c) with basal triangular segment $53 \times 50 \mu\text{m}$ armed with a seta on inner margin. Free segment of P5 $59 \times 32 \mu\text{m}$ with three setae. Somite 5 bearing smooth seta near insertion of basal segment.

Male: unknown.

Etymology: The specific name 'youngi' honors Dr. Paulo Secchin Young from Museu Nacional / UFRJ (Rio de Janeiro, Brazil), whose efforts improved the

Crustacea knowledge of Brazil.

Remarks: Among the seven species of the genus *Scottocheres* only *S. longifurca* Giesbrecht, 1897 and *S. gracilis* Hansen, 1923 have the caudal rami longer than wide as observed in *S. youngi* n. sp.. However in *S. gracilis* it is more than 5 times longer than wide (Hansen, 1923) while in *S. longifurca* and in the new species it is not more than three times longer than wide (Giesbrecht, 1897).

In *Scottocheres youngi* n. sp. the endopod of the maxilliped is three-segmented with a short claw while in *S. longifurca* the maxilliped is two-segmented with a long claw. *Scottocheres youngi* n. sp. has the exopodal setation of P1 and P2 with II,2,2 and the endopod of P3 1,1+I,3, while in *S. longifurca* the exopod is II,I,4; III,I,4 and the endopod 1,I,3.

Acknowledgements

I am thankful to Dr. P. S. Young (Museu Nacional / UFRJ, Rio de Janeiro) for his several useful comments, Dr Janet Reid (National Museum of Natural History/Smithsonian Institution) for the English revision of the Abstract and Introduction. I also would like to thank the Fundação de Amparo a Pesquisa no Estado de São Paulo (FAPESP); Fundação de Amparo a Pesquisa no Estado do Rio de Janeiro (FAPERJ) and the Fundação Universitária José Bonifácio (FUJB) for the financial support.

References

- Brady, G. O., 1880. A monograph of the free and semi-parasitic Copepoda of the British Islands, 3. Ray Society, London, 182 pp.
- Brian, A., 1928. Descrizione di specie nuove o poco conosciute di copepodi bentonici del mare Egeo. Boll. Mus. Zool. Anat. comp. R. univ. Genova 7: 1–37.
- Canu, E., 1892. Les Copepodes du Boulonnais, morphologie, embryologie, taxonomie. Trav. Lab. Zool. Wimereux 6: 1–292.
- Eiselt, J., 1965. Revision und Neubeschreibungen weiterer siphonostomer Cyclopoiden (Copepoda, Crustacea) aus der Antarktis. Sitz. Oster. Akad. Wiss. Math.-Natur. 174: 151–169.
- Giesbrecht, W., 1897. System der Ascomizontiden, einer semiparasitischen Copepoden-Familie. Zool. Anz. 20: 9–14, 17–24.
- Giesbrecht, W., 1899. Die Asterocheriden des Golfes von Neapel und angrenzenden Meeresabschnitte. Fauna und Flora des Golfes von Neapel 25: 1–217.
- Gotto, V., 1993. Commensal and Parasitic Copepods associated with marine invertebrates (and whales). University Book Services/Dr W. Backhuys, Oegstgeest, 264 pp.
- Hansen, H. J., 1923. Crustacea Copepoda. II. Copepoda Parasita and Hemiparasita. The Danish Ingolf-Expedition 3: 1–92.
- Johnsson, R., 1997. *Asteropontius elephantinus* n. sp., a new siphonostomatoid (Crustacea – Copepoda) associated with a sponge from the Brazilian coast. Nauplius 5: 1–8.
- Johnsson, R., 1998a. A new species of *Orecturus* Humes, 1992, Siphonostomatoida (Crustacea, Copepoda) associated with *Echinaster* sp. and sponges in Bahia (Brazil). Bol. Mus. Nac. 395: 1–7.
- Johnsson, R., 1998b. *Kolocheres angustus* a new species and genus of Asterocheridae (Copepoda: Siphonostomatoida) associated with sponges in Brazil. Nauplius 6: 1–7.
- Johnsson, R., 1998c. Six new species of the genus *Asterocheres* (Copepoda; Siphonostomatoida) associated with sponges in Brazil. Nauplius 6: 61–99.
- Johnsson, R., 1999a. *Cletopontius titanus* new species, a new siphonostomatoid (Crustacea: Copepoda) associated with sponges from Brazil. Bull. Mar. Sci. 64: 195–200.
- Johnsson, R., 1999b. A revision of *Asteropontius* Thompson & Scott (Copepoda: Siphonostomatoida: Asterocheridae) with description of a new species and the erection of a new genus. Bol. Mus. Nac. 401: 1–11.
- Johnsson, R. & A. O. Bustamante, 1997. *Monocheres cagarrensis* sp. nov. (Copepoda, Siphonostomatoida) from Brazil. Crustaceana 70: 894–900.
- Marcus, A. & F. Por, 1960. Die Copepoden einer probe aus dem felsbiotop von Yalta (Krimhalbinsel). Trav. Mus. Hist. Nat. 'Greco Antipa' 2: 145–163.
- Nair, B. U. & N. K. Pillai, 1984. On three new species of Asterocherid copepods, with a redescription of *Indomyzon quasimi* Ummerkuty. Rec. zool. Sur. India 81: 357–372.
- Nicholls, A. G., 1944. Littoral Copepoda from South Australia, 2. Calanoida, Cyclopoida, Notodelphyoida, Monstrilloida and Caligoida. Rec. S. Aust. Mus. 8: 1–62.
- Sars, G. O., 1918. An account of the Crustacea of Norway, 6 Copepoda Cyclopoida. Bergen Museum, Bergen, 225 pp.
- Schirl, K., 1973. Cyclopoida siphonostoma (Crustacea) Von Banyuls (Frankreich, Pyrenées Orientales) mit besonderer berucksichtigung des gast-wirtverhältnisses. Bijdr. Dierk. 43: 64–92.
- Sewell, R. B. S., 1949. The littoral and semi-parasitic Cyclopoida, the Monstrilloida and Notodelphyoida. Sci. Rep. John Murray Exp. 1933-34 9: 17–199.
- Stock, J. H., 1960. Sur quelques copepodes associes aux invertébrés des côtes du Roussillon. Crustaceana 1: 218–257.
- Stock, J. H., 1966. Cyclopoida siphonostoma from Mauritius (Crustacea: Copepoda). Beaufortia 13: 145–194.
- Stock, J. H., 1967. Copépodes associés aux invertébrés des côtes du Roussillon. VII. Sur deux espèces jumelles de Cyclopoïdes Siphonostomes: *Scottocheres elongatus* (T. & A. Scott) et *S. laubieri* spec. nov. Viet Millieu Ser. A 18: 203–214.
- Thompson I. C. & A. Scott, 1903. Report on the Copepoda collected by Professor Herdman, at Ceylon, in 1902. Ceylon Pearl Oyster Fisheries I, suppl. rep. 7: 227–307.
- Yeatman, H. C., 1970. Copepods from Chesapeake Bay sponges including *Asterocheres jeanyeatmanae* n. sp. Trans. am. Micr. Soc. 89: 27–38.