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Two new species of *Cryptopontius* Giesbrecht, 1899 (Copepoda, Siphonostomatoida, Artotrogidae) associated with invertebrates from Northeastern Brazil

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Abstract

Cryptopontius is the most species-rich genus in the family Artotrogidae with 25 species, being recorded in almost all oceans, except in the Arctic. However only three species of this genus have been recorded from the Brazilian coast, all of them along the coast of Pernambuco state. This study describes two new species of the genus. *Cryptopontius phyllogorgius* **sp. nov**. differs from other species by having 9-segmented antennule, and nine elements on the third exopodal segment of leg 4. *Cryptopontius pentadikos* **sp. nov.** differs from its congeners by having five expressed antennulary segments proximal to fused ancestral IX-XII, two setae on second endopodal segment of leg 1, eight elements on third exopodal segment of leg 1 and the free segment of leg 5 with two setae. A key to species of the genus *Cryptopontius* is provided.

Key words: symbiotic copepods, Porifera, Octocorallia, biodiversity

Introduction

The genus *Cryptopontius* Giesbrecht, 1899 comprises 25 species, and it is the largest genus in the family Artotrogidae Brady, 1880. Together with *Bradypontius* Giesbrecht, 1895 and *Artotrogus* Boeck, 1859, that have respectively 22 and 12 species, these three genera represent more than 50% of the diversity of the family that is comprised of 21 genera (Boxshall & Halsey 2004; Conradi 2014).

There are several records of the genus and its occurrence from the Mediterranean Sea, Western Pacific, Atlantic and Indian Oceans is well-documented. Recent records have been published from the Easter Island, Brazilian and Antarctic coast suggesting a likely worldwide distribution (Johnsson *et al*. 2002; Neves & Johnsson 2008; Conradi 2014).

The species *Bradypontius ancistronus* Neves & Johnsson, 2008, *Cryptopontius aesthetascus* Neves & Johnsson, 2008 and *Cryptopontius expletus* Neves & Johnsson, 2008 were the first and only three species of artotrogid copepods recorded from the Brazilian coast. The first two of them were found associated with sponges and the latter with algae (Neves & Johnsson 2008). With the description of these two new species of *Cryptopontius* in the present study, the actual number of Brazilian species increases to five. A key to all described species in the genus is provided.

Material and methods

The hosts were collected in Periperi beach, located in the Todos-os-Santos Bay (Fig. 1). The gorgonian *Phyllogorgia dilatata* (Esper, 1806) and a sponge species of the genus *Clathria* Schmidt, 1862 were found attached to sparse rocks in a predominantly sandy beach, at a depth of 1 m, during low tide. The samples were hand-collected, placed

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in plastic bags and washed in a solution of ethanol 70% in the laboratory. The washings were filtered through a 100 µm mesh net and preserved in ethanol. The copepods were sorted out under a dissecting microscope.

The copepods were cleared in lactic acid, measured and stained in Black Chlorazol E. After dissection, they were mounted on a slide with CMC-9 (Huys & Boxshall 1991). The drawings were made with the aid of a drawing tube fitted on an Olympus CH30 microscope. All structures were examined with the aid of a Nikon Eclipse Ci microscope equipped with digital camera. Length measurements were made along the midline. For the armature formula of legs 1–4, spines are represented by Roman numerals and setae are indicated by Arabic numerals (Huys & Boxshall 1991). For the antennule, Roman numerals indicate ancestral segments (Huys & Boxshall 1991). The type specimens are deposited in the Museu de História Natural of the Universidade Federal da Bahia (UFBA), Brazil.

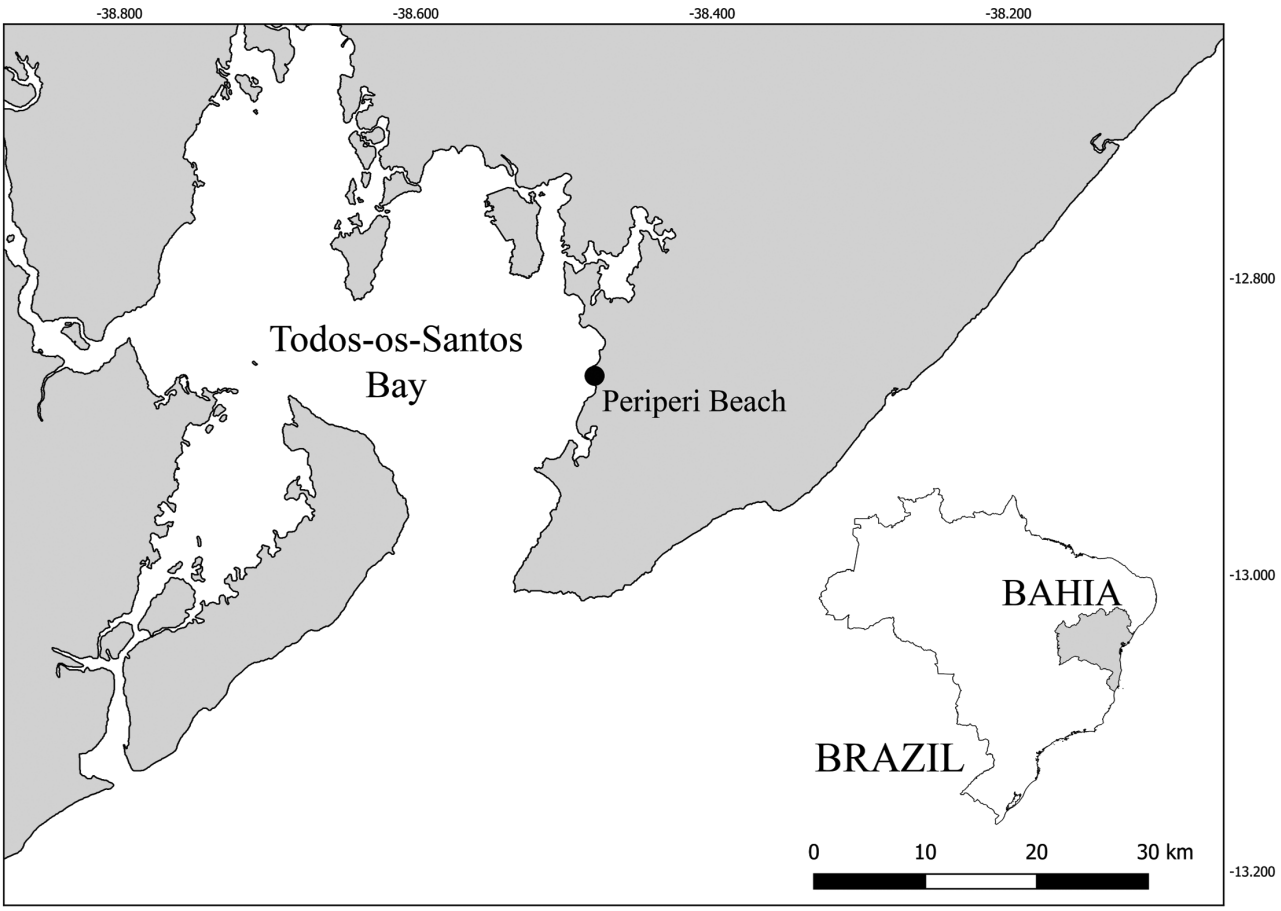

FIGURE 1. Sampling site in Periperi Beach, Todos-os-Santos Bay, Salvador, Bahia, Brazil.

Taxonomy

Order Siphonostomatoida Thorell, 1859

Family Artotrogidae Brady, 1880

Genus *Cryptopontius* Giesbrecht, 1899

***Cryptopontius phyllogorgius* sp. nov.**
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(Figures 2–4)

Material examined. Holotype female (UFBA 3331), Periperi Beach (12°51’59”S, 38°28’47”W), Salvador city, Bahia State, Brazil, collected by I. Bonfim and A. Farias on August 30, 2015. Specimens found associated with the gorgonian *Phyllogorgia dilatata* (Esper 1806). Holotype dissected and mounted on slide.

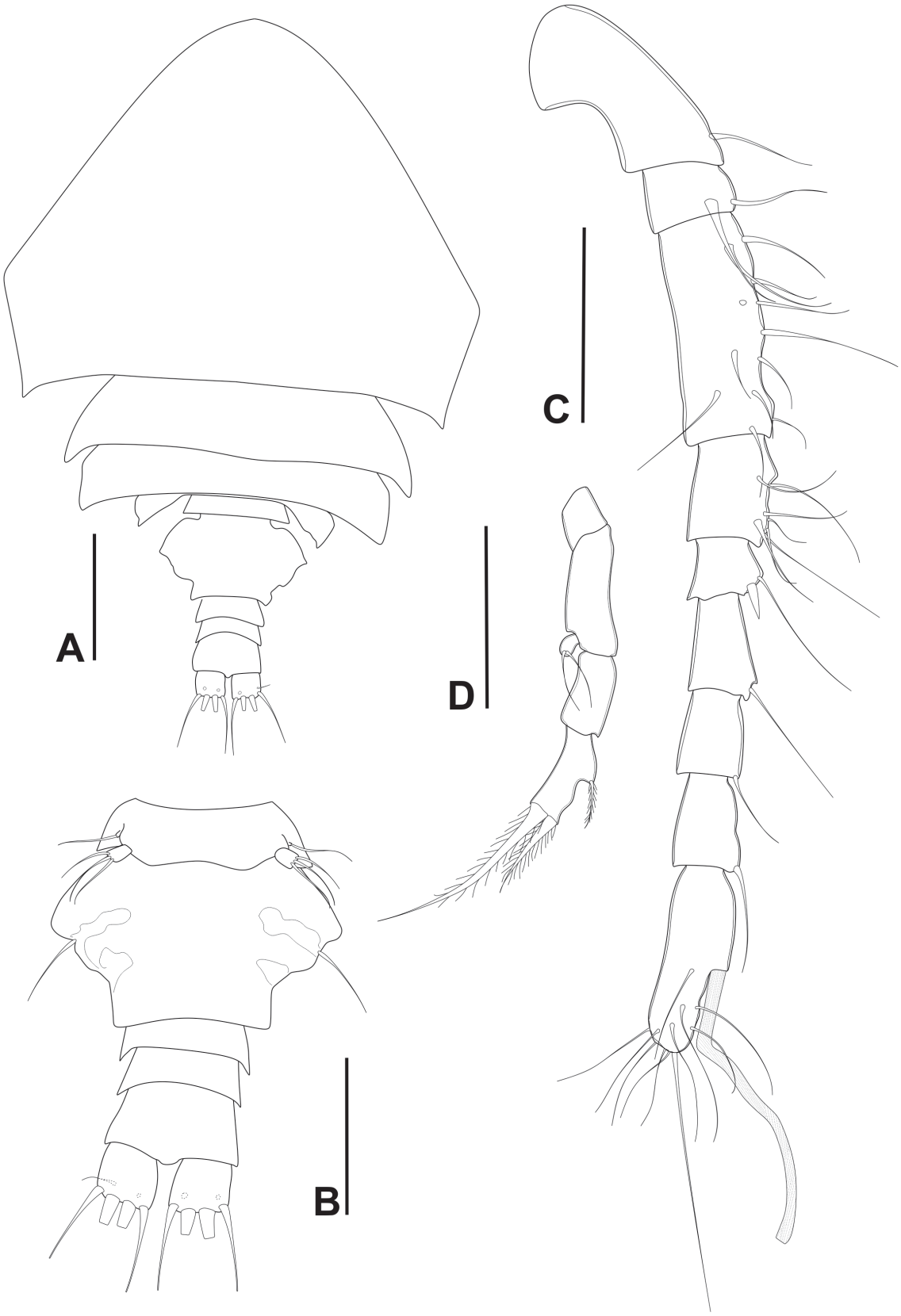

FIGURE 2. *Cryptopontius phyllogorgius* **sp. nov.** female (holotype: UFBA 3331). A, body, dorsal view; B, urosome; C, antennule; D, antenna. Scale bars: A = 200 μm; B = 100 μm; C–D = 50 μm.

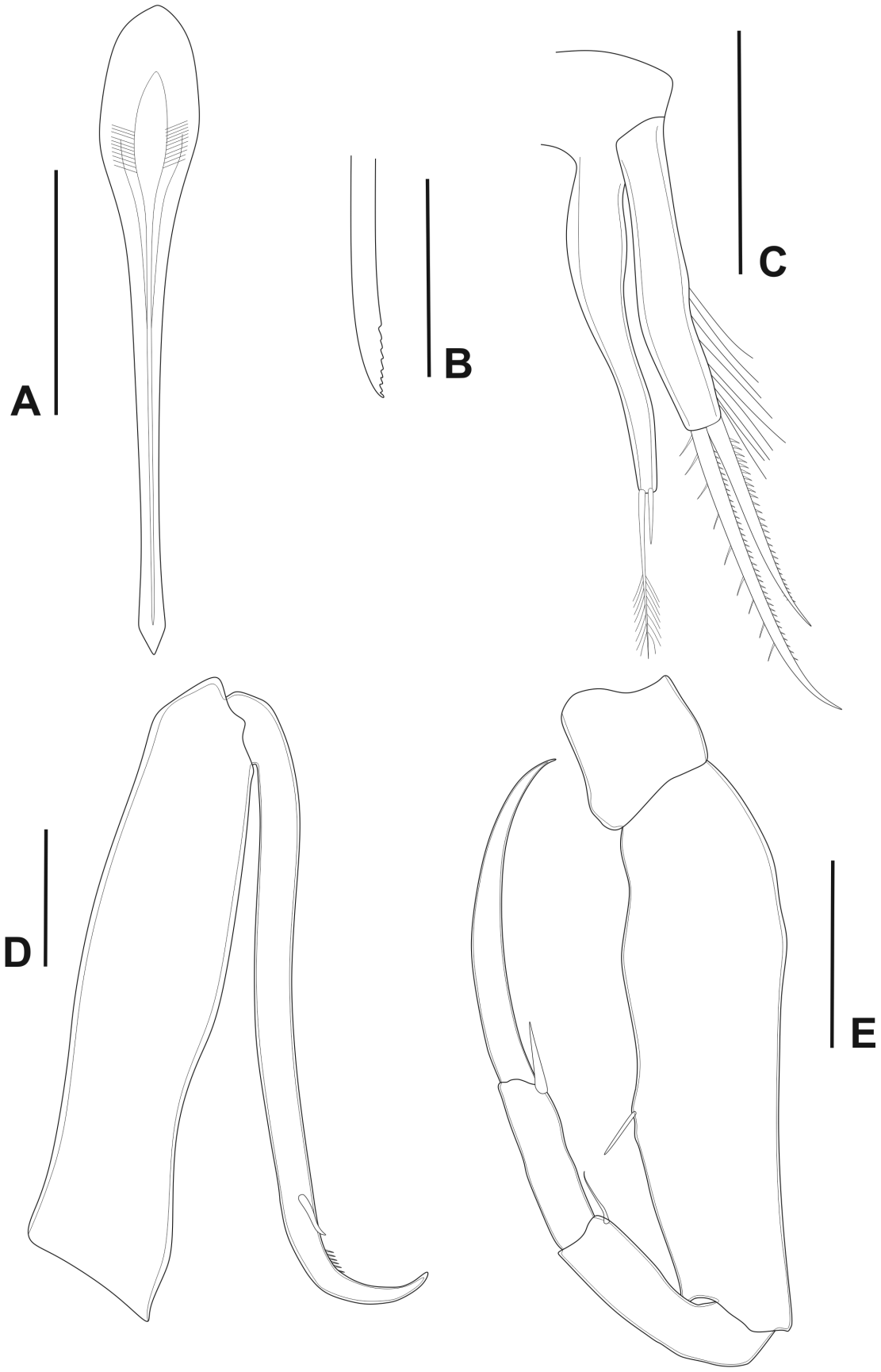

FIGURE 3. *Cryptopontius phyllogorgius* **sp. nov.** female (holotype: UFBA 3331). A, oral cone; B, mandible; C, maxillule; D, maxilla; E, maxilliped. Scale bars: A = 200 μm; B = 25 μm; C–E = 50 μm.

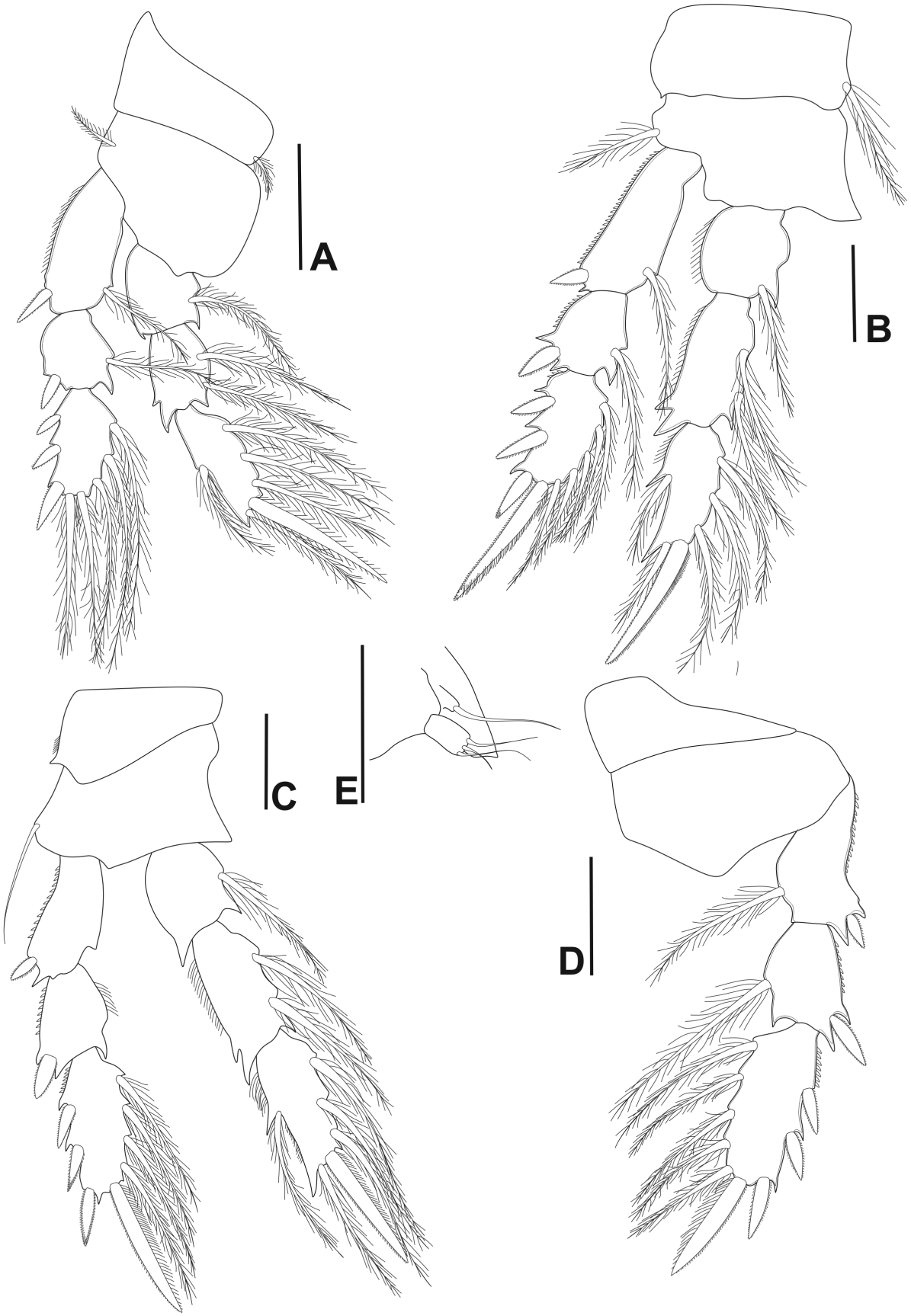

FIGURE 4. *Cryptopontius phyllogorgius* **sp. nov.** female (holotype: UFBA 3331). A, leg 1; B, leg 2; C, leg 3; D, leg 4; E, leg 5. Scale bars: A–E = 50 μm.

Description of female. Body (Fig. 2A) cyclopiform, dorsoventrally flattened, 1.107 µm long, 584 µm wide. Cephalothorax 584 long and 769 µm wide (length:width ratio = 0.7:1); with greatest width at posterior quarter; epimera of cephalothorax and first pedigerous somite with slightly projected posterior corners. Prosome 784 µm long and 769 µm wide, nearly as wide as long, (length: width ratio = 1:0.9). Epimera of fourth pedigerous somite not visible in dorsal view and extended to anterior a quarter of genital double-somite. Urosome (Fig. 2B) 251 µm long and 184 µm wide (length: width ratio = 1:0.7), composed of five somites. Genital double-somite 109 µm long and maximum width 184 µm, length: width ratio = 0.6:1. Two postgenital somites, both wider than long (82 × 21 and 76 × 24 µm, respectively), anal somite nearly as long as two postgenital somites (84,4 × 51,5 um). Caudal rami nearly as long as wide (37 × 34), length: width ratio = 1:0.9, armed with six setae.

Antennule (Fig. 2C) 271 µm long (not including setae), 9-segmented. Lengths of segments in proximal to distal order: 49, 14, 57, 24, 15, 23, 20, 21 and 48 µm respectively. Segmental homologies and setation as follows: 1(I)-1; 2(II)-2; 3(III–VIII)11; 4(IX–XII)-7; 5(XIII–XIV)-1+I; 6(XV–XVI)-1; 7(XVII–XVIII)-1; 8(XIX–XX)-1; 9(XXI–XXVIII)-11+Aesthetasc. Segment 2 with long seta showing robust basis; a spine on segment 5 and very slender and long seta on terminal segment. Aesthetasc 79 µm long.

Antenna (Fig. 2D) with coxa 11 µm long; basis 34 µm long. Exopod 1-segmented, 6 µm long, with two distal naked setae. Endopod 2-segmented, first segment 21 µm long, unarmed; second segment 27 µm long, armed with short subproximal, 19 µm long, located at about half of the segment and two distal setae, a short one and a robust long spine-like seta, both 27 and 61 µm long respectively. All endopodal setae plumose.

Oral cone (Fig. 3A) 503 µm long, reaching insertion of leg 1. Mandible (Fig. 3B) comprising stylet inserted into oral cone, distal margin armed with few denticles.

Mandibular palp absent.

Maxillule (Fig. 3C) bilobed; inner and outer lobes measuring 73 and 63 µm long, respectively. Each lobe armed with two distal setae. Inner lobe tapering, armed with long plumose seta and short naked seta, 36 and 14 µm long, respectively. Outer lobe armed with two strong setae, 63 and 46 µm long, respectively; longer seta armed with large sparse spinules on inner margin; outer lobe armed with row of long setules on outer margin. Maxilla (Fig. 3D) 506 µm long; unarmed syncoxa, 238 µm long and thin claw strongly curved distally towards outer margin and armed distally with naked seta.

Maxilliped (Fig. 3E) 4-segmented, 376 µm long; syncoxa unarmed, 34 µm long; basis longest, 144 µm long, with seta on medial inner margin. Endopod 2-segmented, measuring 62 and 46 µm long, respectively. First segment with naked seta distally; second segment with naked spine-like seta close to curved claw-like element, 90 µm long.

Legs 1−3 (Figs. 4A−C), biramous, with 3-segmented rami. Leg 4 (Fig. 4D) with 3-segmented exopod, and endopod absent. Armature formula as follows:

Legs	coxa	basis	exopod	endopod
Leg 1	0–1	1–0	I–1; I–1; III,2,3	0–1; 0–2; 1,1+I,3
Leg 2	0–1	1–0	I–1; I–1; III,I,5	0–1; 0–2; 1,1+I,3
Leg 3	0–0	1–0	I–1; I–1; III,I,5	0–1; 0–2; 1,1+I,3
Leg 4	0–0	0–0	I–1; I–1; III,I,5	absent

Coxa and basis of first leg (Fig. 4A) with short plumose setae. Legs 2 and 3 (Figs. 4B and 4C) with outer margin of exopod with spinules and outer margin of endopod showing setules, except the first endopod of leg 3. Leg 3 (Fig. 4C) with row of short setules on outer margin of coxa and slender naked seta on outer margin of basis. Legs 2–3 showing long, robust spine distally on third exopodal and endopodal segments. Legs 1–3 with two tooth-like processes on distal outer margin of second endopodal segment. Fifth leg (Fig. 2B) has a protopodal segment fused to somite, and a free reduced exopodal segment, nearly as wide as long, with 3 distal naked setae. Leg 6 located midlaterally with single seta.

Male: Unknown

Etymology. The specific name refers to the host species, *Phyllogorgia dilatata* (Esper, 1806).

Remarks. Among other features, *Cryptopontius* can be distinguished from the others genera of Artotrogidae by having both rami of first leg 3-segmented, with 3 spines and 4 or 5 setae (III, 4/5) on third exopodal segment; leg 4 uniramous, lacking endopod, or represented by a single seta on a minute segment (Boxshall & Halsey 2004).

The new species shares a 9-segmented antennule with another 12 species of the genus. However, this pattern can be achieved in two different ways in the genus. The first pattern occurs with the ancestral segment II free and the segments III-VIII fused, as can be observed in six species: *C. tenuis* (Giesbrecht, 1895), *C. gracilis* Wilson, 1932, *C. orientalis* Ummerkutty, 1961*, C. graciloides* Ummerkutty, 1961, *C. paracapitalis* Nicholls in Eiselt, 1961 and *C. tanacredii* Johnsson, Rocha & Boyko, 2002 (Giesbrecht 1895; Wilson 1932; Ummerkutty 1961; Eiselt 1961; Johnsson et al. 2002). The second pattern shows the fusion of ancestral segments II-VII and the segment VIII free, as seen in the remaining six species: *C. brevifurcatus* (Giesbrecht, 1895), *C. brevicaudatus* (Brady, 1899), *C. longipes* Nicholls, 1944, *C. proximus* Nicholls, 1944, *C. madeirensis* Johnsson, 2001 and *C. acutus* Kim, 2007 (Giesbrecht 1895; Brady 1899; Nicholls 1944; Johnsson 2001 and Kim 2007). *Cryptopontius phyllogorgius* **sp. nov.** shows the identical fusion pattern of the second group of species.

Cryptopontius phyllogorgius **sp. nov.** differs from *C. longipes* and *C. acutus* in having nine elements on the third exopodal segment of leg 4 (Nicholls 1944; Kim 2007) instead of eight. The new species can be distinguished from *C. proximus*, *C. gracilis, C. tenuis* and *C. orientalis* by having two setae on the second endopodal segment of P1 instead of one (Giesbrecht 1895; Wilson 1932; Nicholls 1944; Ummerkutty 1961).

The maxillule outer lobe of *C. brevifurcatus* has three setae (Brady 1899), whereas the new species has only two. In addition, *Cryptopontius phyllogorgius* **sp. nov.** has two setae on the inner lobe of the maxillule, distinct from *C. brevicaudatus* and *C. madeirensis* which have three setae (Brady 1899; Johnsson 2001) and *C. paracapitalis* with only one seta (Eiselt 1961). *C. tanacredii* and *C. graciloides* also have two setae on the inner lobe, but, in *C. tanacredii* the inner lobe is remarkable longer than the outer one and *C. graciloides* has a single seta on the antennal exopod (Ummerkutty 1961; Johnsson *et al.* 2002).

Cryptopontius pentadikos sp. nov.

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(Figures 5–8)

Material examined. Holotype male (UFBA 3332), allotype juvenile female (UFBA 3333) and one paratype male (UFBA 3334); Periperi Beach (12°51’59”S, 38°28’47”W), Salvador city, Bahia State, Brazil, collected by I. Bonfim and A. Farias on August 30, 2015. Specimens found associated with the sponge *Clathria* sp. Holotype and allotype dissected and mounted on permanent slides, paratype preserved in ethanol 70%.

Description of male. Body (Fig. 5A) cyclopiform, dorsoventrally flattened, 922 µm long, 465 µm wide. Cephalotorax nearly as long as wide, 459 µm long and 465 µm wide (length:width ratio = 1:0.9); epimera of cephalothorax, first and second pedigerous somites with slightly projected posterior corners. Prosome 611 µm long, longer than wide (length:width ratio = 1:0.7). Fourth pedigerous somite narrow and bow-shaped due to posterior corners highly projected and fifth pedigerous somite reduced. Urosome (Fig. 5B) 365 µm long and 192 µm wide (length: width ratio = 1:0.5), composed of six somites. Genital somite 102 µm long and maximum width 192 µm, (length: width ratio = 0.5:1). Four postgenital somites all wider than long (124×44, 123×38, 102×37 and, 99×52 µm, respectively). Prosome: urosome ratio = 1:0.6. Caudal rami (Fig. 5B) nearly longer than wide, 50×41 µm. Length: width ratio = 1:0.8, armed with six setae.

Antennule (Fig. 5C) 266 µm long (not including setae), 11-segmented. Length of segments in proximal to distal order: 49, 13, 35, 11, 9, 10, 14, 9, 43, 21 and 52 µm respectively. Segmental homologies as follows: 1(I)-10; 2(II)-1+ae; 3(III–VI)-4+4ae; 4(VII)-1+ae; 5(VIII)-1; 6(IX–XII)-2+ae; 7(XIII)-1+1ae; 8(XIV)-1+ae; 9(XV–XVIII)-3+4ae; 10(XIX–XX)-1+ae; 11(XXI–XXVIII)-11+ae. Terminal aesthetasc 134 µm long. Rounded spots on segments representing scars of missing setae in first segment, and aesthetascs on second, third and, fourth ones.

Antenna (Fig. 5D) with basis 27 µm long. Exopod 1-segmented, 8 µm long, with two long naked apical setae. Endopod 2-segmented, first segment 19 µm long, unarmed; second segment 29 µm long, armed with naked seta on proximal inner margin and two long robust setae distally located, 37 and 30 µm long, longer one with denticles on inner margin.

Mandible (Fig. 6A) comprising stylet 323 µm long, inserted into oral cone; oral cone reaching maxilliped basis. Mandibular stylet distally showing serrated region with small setules. Mandibular palp absent.

Maxillule (Fig. 6B) bilobed, inner and outer lobes with 66 and 40 µm long, respectively. Inner lobe laterally naked, armed with two slender setae, both broken. Outer lobe ornamented with long setules on outer margin, two

robust setae distally, 34 and 46 µm long respectively, both setae armed with small setules on outer margin, longer seta armed with strong and sparse denticles. Maxilla (Fig. 6C) with unarmed syncoxa, 166 µm long, and claw, 205 µm long; claw with subdistal naked seta, protrusions on outer margin and tip bent forming 90-degree angle.

Maxilliped (Fig. 6D) 3-segmented, 368 µm long; basis 192 µm long, unarmed. Endopod 2-segmented, measuring 17 and 39 µm long respectively and curved claw-like element, 89 µm long. First and second endopodal segments with naked seta distally on each segment.

Legs 1−3 (Figs. 7A−D) biramous, with 3-segmented rami, leg 4 with exopod 3-segmented and endopod absent. Armature formula as follows:

Legs	coxa	basis	exopod	endopod
Leg 1	0 – 0	0 – 0	I–1; I–1; III,2,3	0–1; 0–2; 1,2,3
Leg 2	0 – 0	0 – 0	I–1; I–1; III,I,5	0–1; 0–2; 1,1+I,3
Leg 3	0 – 1	0 – 0	I–1; I–1; III,I,5	0–1; 0–2; 1,1+I,3
Leg 4	0 – 1	1 – 0	I–1; I–1; III,I,5	Absent

Leg 3 (Fig. 7C) showing coxa with row of long setules on outer margin and long plumose seta on inner margin. Additionally, leg 3 showing seta much smaller than distal spine on third endopodal segment. Leg 4 (Fig. 7D) showing minute plumose setae on inner margin of coxa, small naked seta on outer margin of basis and long distal spine on the third exopodal segment. Leg 5 (Fig. 4E) with basal seta located in the protopodal segment fused to somite, exopodal segment longer than wide, 4×2 µm, with lateral seta and two distally located setae. Leg 6 located midventrally, with three naked setae.

Juvenile Female. Body (Fig. 8A) cyclopiform, dorsoventrally flattened, length (excluding caudal setae) 658 µm and body width 293 µm. Prosome longer than wide 486×297 µm. Length:width ratio = 1:0.6. Epimera of cephalothorax, first and second pedigerous somite with slightly projected posterior corners as in male. Fourth pedigerous somite slightly less projected and bow-shaped as in male, fifth pedigerous somite reduced. Urosome (Fig. 8B), 172 µm long, composed of five somites. Genital double-somite 41 µm long and maximum width 101 µm, length:width ratio = 0.4:1. Three postgenital somites wider than long (18×79, 27×71 and, 32×72 µm respectively). Caudal rami (Fig. 8B) longer than wide, 33×28 µm. Length:width ratio 1:0.8, armed with six setae. Antennule, antenna and oral appendages broken. Leg 5 (Fig. 8B) with protopodal segment fused to somite, basal seta broken, rudimentary free exopodal segment, as wide as long with 2 distal naked setae. Other legs as in male.

Etymology. The specific name "*pentadikos*", from the Greek meaning "five", alludes to the proximal region of the antennule, in which there are five segments, resulting from the fusion of ancestral segments III to VI.

Remarks. Although most of the *Cryptopontius* species have been described based on female individuals, there are some artotrogid species descriptions based in male specimens such as *Bradypontius ovatus* Nicholls, 1944, *Artotrogus latifurcatus* Nicholls, 1944, *Tardotrogus challengeri* Eiselt, 1961, *Antarctopontius spinipes* Eiselt, 1965, *Bradypontius ancistronus* Neves & Johnsson, 2008, and *C. aesthetascus* Neves & Johnsson, 2008 (Nicholls 1944; Eiselt 1961; 1965; Neves & Johnsson 2008). Moreover, as pointed out by Neves & Johnsson (2008), non-sexually dimorphic features can distinguish male from female specimens, which means all characteristics except general aspects of body, urosome and distal antennule segmentation (XIII to XXVIII).

Cryptopontius pentadikos **sp. nov.** shows a uniramous fourth leg with nine elements on the third exopodal segment, 2 and 6 setae on the second and third endopodal segment of leg 1, respectively. The new species shares these features with *C. paracapitalis* Nicholls, 1944, *C. madeirensis* Johnsson, 2001, *C. tanacredii* Johnsson, Rocha & Boyko, 2002, *C. graciloides* Ummerkutty, 1961, *C. ascidius* Kim, 1996, *C. aesthetascus*, *C. brevifurcatus* (Giesbrecht, 1895), *C. brevicaudatus* (Brady, 1910), *C. expletus* Neves & Johnsson, 2008 and *C. phyllogorgius* **sp. nov.** However, *C. pentadikos* **sp. nov.** can be distinguished from all these species by having ancestral segments III-VI fused and five expressed antennulary segments, rather than three as in [fc] *Cryptopontius phyllogorgius*. **sp. nov.,** *C. graciloides*, *C. madeirensis, C. expletus* and *C. tanacredii*, four as in *C. paracapitalis, C. brevicaudatus*, *C. brevifurcatus* and *C. ascidius* and seven in *C. aesthetascus* proximal to fused ancestral segments IX-XII (Nicholls 1944; Ummerkutty 1961; Kim 1996; Johnsson 2001; Johnsson *et al.* 2002; Neves & Johnsson 2008).

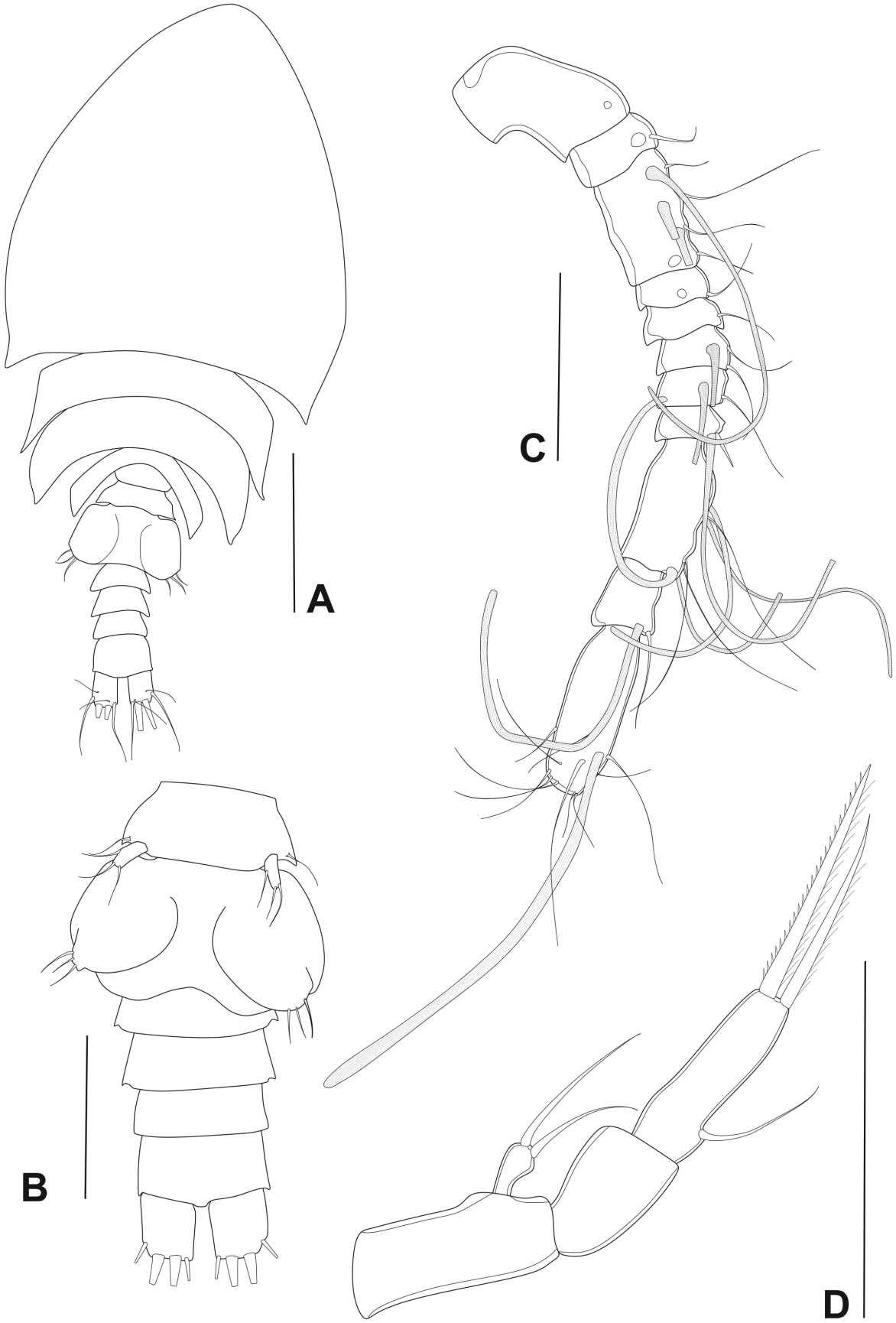

FIGURE 5. *Cryptopontius pentadikos* **sp. nov.** male (holotype: UFBA 3332). A, body, dorsal view; B, urosome; C, antennule; D, antenna. Scale bars: A = 250 μm; B–D = 50 μm.

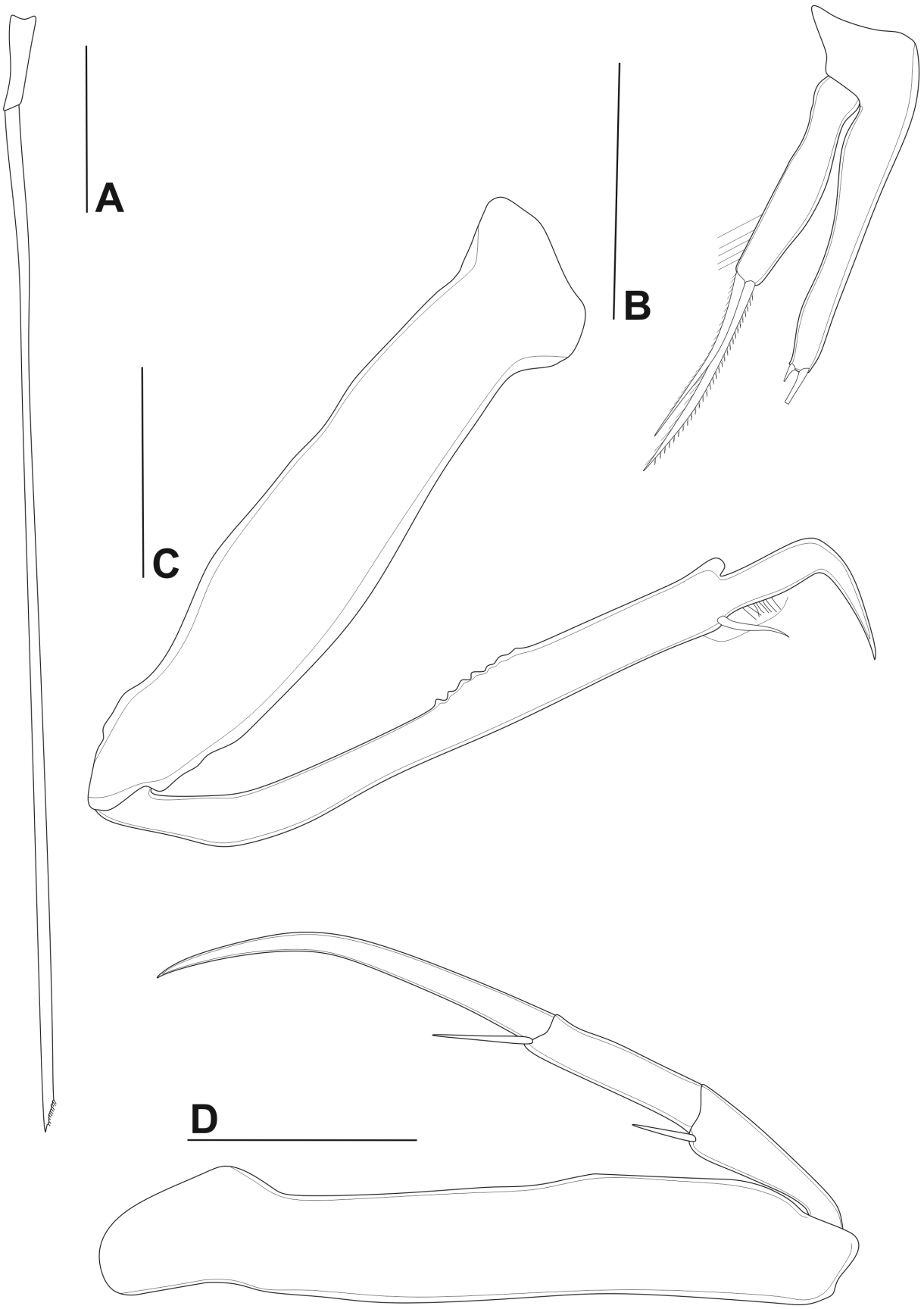

FIGURE 6. *Cryptopontius pentadikos* **sp. nov.** male (holotype: UFBA 3332). A, mandible; B, maxillule; C, maxilla; D, maxilliped. Scale bars: A–D = 50 μm.

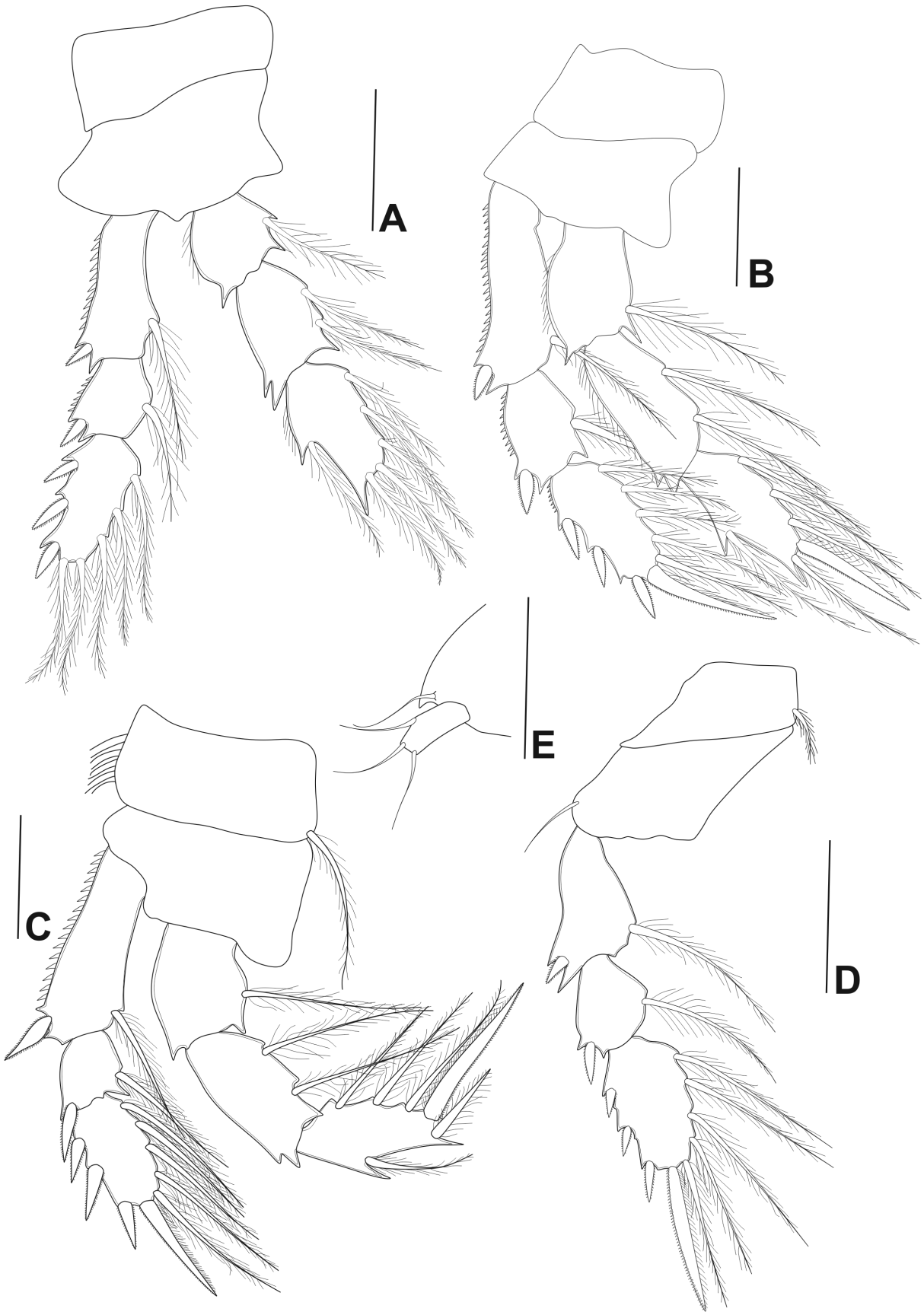

FIGURE 7. *Cryptopontius pentadikos* **sp. nov.** male (holotype: UFBA 3332). A, leg 1; B, leg 2; C, leg 3; D, leg 4; E, leg 5. Scale bars: A–D = 50 μm; E = 25 μm.

Moreover, *C. pentadikos* **sp. nov.** differs from *C. brevifurcatus* and *C. ascidius* by having maxillule outer lobe with 2 setae instead of 3 (Giesbrecht 1895; Kim 1996); from *C. paracapitalis* by having maxillule inner lobe with two setae instead of 1 (Nicholls 1944), or from *C. brevicaudatus* and *C. madeirensis* that have 3 setae on inner lobe (Giesbrecht 1895; Johnsson 2001); from *C. tanacredii* by having maxillule inner lobe with similar length to outer lobe (Johnsson et al. 2002) and from *C gracilioides* that has a single terminal seta on the antennal exopod (Ummerkutty 1961), instead of two as in the new species.

Cryptopontius pentadikos **sp nov.** and *C. phyllogorgius* **sp nov.** differ from the others Brazilians species by having 11 and 9 antennulary segments, respectively, instead of 12 *on C. aesthetascus* and 8 in *C. expletus*. Also, *C. aesthetascus* and *C. expletus* show 3 apical setae, instead of 2 apical and a single basal seta on the second segment of antennal endopod. *C. aesthetascus* has a 3-segmented maxilliped endopod, character absent in all Brazilian species, that have 2 segments.

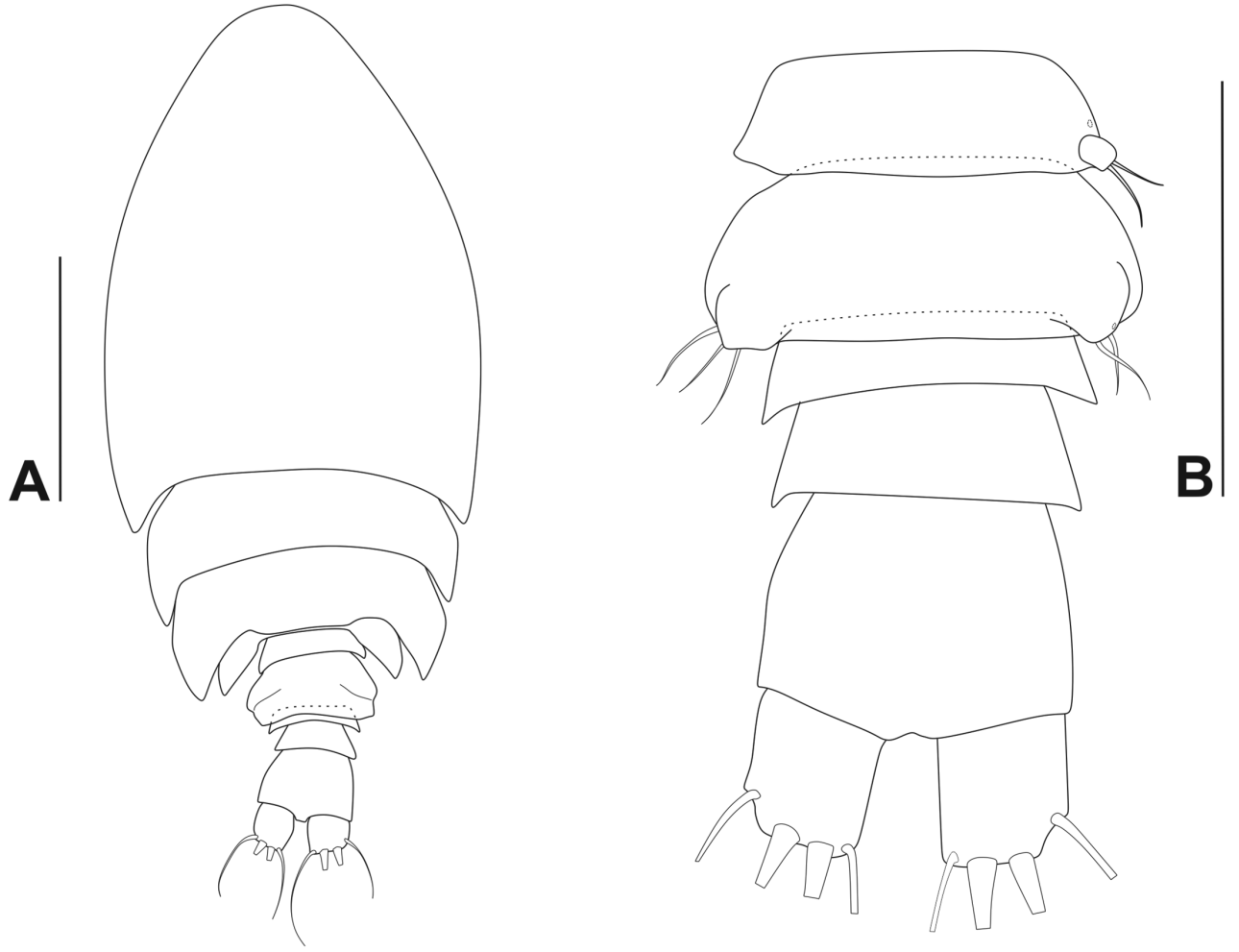

FIGURE 8. *Cryptopontius pentadikos* **sp. nov.** juvenile female (allotype: UFBA 3333). A, body, dorsal view; B, urosome; Scale bars: A = 100 µm; B = 50 µm

Key to the species of the genus *Cryptopontius*

1. Endopod of leg 4 reduced to a single segment … . . . . . *C. digitatus* Kim, 1996
- Endopod of leg 4 absent … 2
2(1). Antennule with 7 segments proximal to fused ancestral segments IX–XII, with ancestral segments III–IV fused … . . . . . *C. aesthetascus* Neves & Johnsson, 2008
- Antennule with less than 7 segments proximal to fused ancestral segments IX–XII … 3
3(2). Antennule with 5 segments proximal to fused ancestral segments IX–XII, with ancestral segments III–VI fused … . . . . . ***C. pentadikos* sp. nov.**
- Antennule with less than 5 segments proximal to fused ancestral segments IX–XII 4

4(3). Female antennule 8-segmented ... 5
- Female antennule with more than 8-segmented ... 11
5(4). Caudal rami longer than anal somite ... 6
- Caudal rami shorter than anal somite ... *C. ricinius* Malt, 1991
6(5). Second endopodal segment of leg 1 armed with one or two setae ... 7
- Second endopodal segment of leg 1 unarmed ... *C. ignotus* (Brady, 1910)
7(6). Second endopodal segment of leg 1 with single seta ... 8
- Second endopodal segment of leg 1 with two setae ... 9
8(7). Antennal exopod with single seta ... *C. latus* (Brady, 1910)
- Antennal exopod with two setae ... *C. minor* Stock, 1965
9(7). Third exopodal segment of leg 1 with eight elements ... 10
- Third exopodal segment of leg 1 with seven elements ... *C. quinquesetus* Kim, 1996
10(9). Third endopodal segment of leg 1 with six setae and three setae on the free segment of leg 5 ... *C. expletus* Neves & Johnsson, 2008
- Third endopodal segment of leg 1 with five setae and two setae on the free segment of leg 5 ... *C. donghaensis* Kim, 1996
11(4) Female antennule 9-segmented ... 12
- Female antennule 10-segmented ... 24
12 (5). Third exopodal segment of leg 4 with eight elements ... 13
- Third exopodal segment of leg 4 with nine elements ... 14
13 (12) Free segment of female leg 5 longer than wide, male antennule 9-segmented ... *C. longipes* Nicholls, 1944
- Free segment of female leg 5 wider than long, male antennule 10-segmented ... *C. acutus* Kim 2007
14(12). Second endopodal segment of leg 1 with two setae ... 15
- Second endopodal segment of leg 1 with one seta ... 21
15(14). Maxillule outer lobe with three setae ... *C. brevifurcatus* (Giesbrecht, 1895)
- Maxillule outer lobe with two setae ... 16
16(15). Maxillule inner lobe with one seta ... *C. paracapitalis* Nicholls, 1944
- Maxillule inner lobe with more than one seta ... 17
17(16). Maxillule inner lobe with two setae ... 18
- Maxillule inner lobe with three setae ... 20
18(17). Maxillule inner lobe with two setae and similar in length to outer lobe ... 19
- Maxillule inner lobe with two setae and longer than outer lobe ... *C. tanacredii* Johnsson, Rocha & Boyko, 2002
19(18). Antennal exopod bearing a single terminal seta ... *C. gracilioides* Ummerkutty, 1961
- Antennal exopod bearing two terminal setae ... ***C. phyllogorgius* sp. nov.**
20(17). Maxillule inner lobe with three setae and much longer than outer lobe ... *C. brevicaudatus* (Brady, 1910)
- Maxillule inner lobe with three setae and similar in length to outer lobe ... *C. madeirensis* Johnsson, 2001
21(14). Third exopodal segment of leg 1 with eight elements (III+5) ... *C. proximus* Nicholls, 1944
- Third exopodal segment of leg 1 with seven elements (III+4) ... 22
22(21). Third endopodal segment of leg 1 with five setae ... *C. gracilis* Wilson, 1932
- Third endopodal segment of leg 1 with six setae ... 23
23(22). Third exopodal segment of leg 2 with III-6; third endopodal segment of leg 2 with 1-5 ... *C. tenuis* (Giesbrecht, 1895)
- Third exopodal segment of leg 2 with IV-5; third endopodal segment of leg 2 with 1-1+I-3 ... *C. orientalis* Ummerkutty, 1961
24(11). Third exopodal segment of leg 1 with eight elements (III-5) ... 25
- Third exopodal segment of leg 1 with seven elements (III-4) ... 26
25(24). Maxillule outer lobe with three setae; antennal exopod with two setae ... *C. ascidius* Kim, 1996
- Maxillule outer lobe with two setae; antennal exopod with one seta ... *C. similis* Nicholls, 1944
26(24). Siphon reaching between insertion of maxilla and maxilliped ... *C. capitalis* (Giesbrecht, 1895)
- Siphon reaching insertion of leg 1 ... *C. thorelli* (Giesbrecht, 1895)

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References

Boxshall, G.A. & Halsey, S.H. (2004) *An introduction to copepod diversity*. The Ray Society, London, 966 pp.

Brady, G.S. (1899) On the marine Copepoda of New Zealand. *Transactions of the Zoological Society of London*, 15 (2), 31–54, pls.
https://doi.org/10.1111/j.1096-3642.1899.tb00018.x

Conradi, M. (2014) Three artotrogids (Crustacea: Copepoda: Siphonostomatoida) from the Ross Sea, Antarctica. *Polar Research*, 33, 1–10
https://doi.org/10.3402/polar.v33.24135

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

Eiselt, J. (1965) Revision und Neubeschreibungen weiterer siphonostomer Cyclopoiden (Copepoda, Crust.) aus der Antarktis. *Sitzungsberichte Oesterreichusche Akademie der Wissenchaften Mathematisch-Naturwissenchaftliche klasse*, Abteilung I, Biologische Wissenchaften und Erdwissenschaften, 74, 151–169.

Giesbrecht, W. (1895) The subfamilies, genera, and species of the copepod family Ascomyzontidae, Thorell: diagnosis, synonymy and distribution. *Annals and Magazine of Natural History*, Series 6, 16,173–186.
https://doi.org/10.1080/00222939508680251

Huys, R. & Boxshall, G.A. (1991) *Copepod evolution*. The Ray Society, London, 468 pp.

Johnsson, R. (2001) Two new artotrogids (Copepoda:Siphonostomatoida) from Madeira Island, Portugal. *Hydrobiologia*, 453/454, 431–440.
https://doi.org/10.1023/A:1013110621739

Johnsson, R., Rocha, C.E.F. & Boyko, C.B. (2002) A new species of *Cryptopontius* (Crustacea: Copepoda: Siphonostomatoida) from Easter Island. *American Museum Novitates*, 3370, 1–8.
https://doi.org/10.1206/0003-0082(2002)370<0001:ANSOCC>2.0.CO;2

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

Kim, I.H. (2007) Copepods (Crustacea) associated with marine invertebrates from the Moluccas. *Korean Journal of Systematic Zoology*, Special Issue, No. 6, 1–126.

Neves, E. & Johnsson, R. (2008) Three new species of Artotrogidae (Copepoda, Siphonostomatoida) from the southeastern coast of Pernambuco State, Brazil. *Zootaxa,* 1932, 47–60.
https://doi.org/10.11646/zootaxa.1932.1.5

Nicholls, A.G. (1944) Littoral copepods from South Australia.(II) Calanoida, Cyclopoida, Notodelphyoida, Monstrilloida and Caligoida. *Records of the Australian Museum*, 8, 1–62.

Ummerkutty, A.N.P. (1961) Studies on Indian copepods 5. On eleven new species of marine cyclopoid copepods from the southeast coast of India. *Journal of the Marine Biological Association of India*, 3 (1 & 2), 19–69.

Wilson, C.B. (1932) The copepods of the Woods Hole region, Massachusetts. *Bulletin of the United States National Museum*, 1932, i–xix + 1–635.
https://doi.org/10.5479/si.03629236.158.i