

## New genera and species of Urothoidae (Amphipoda) from the Brazilian deep sea, with the re-assignment of *Pseudurothoe* and *Urothopsis* to Phoxocephalopsidae

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Box-corer samples taken between 700 and 2000 m depth on the slope of the Campos Basin, southeastern Brazilian deep sea, provided the material for the description of two new genera in the family Urothoidae, *Carangolioides* gen. nov. and *Coronaurothoe* gen. nov., and three new species: *Carangolioides castellatus* sp. nov., *Carangolioides hamatus* sp. nov. and *Coronaurothoe rotunda* sp. nov. *Carangolioides* gen. nov. differs from other urothoid genera by the presence of a distolateral projection on the outer lobes of the lower lip and the distally truncated margin of the upper lip, while *Coronaurothoe* gen. nov. differs by the mandibular molar being triturate with a distal crown of stout setae. In this study, we provide detailed descriptions and illustrations of the new taxa. An identification key to genera of Urothoidae is also provided. The genera *Pseudurothoe* Ledoyer, 1986 and *Urothopsis* Ledoyer, 1967 are removed in this paper from Urothoidae to Phoxocephalopsidae.

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**Keywords:** Urothoidae; Phoxocephalopsidae; *Carangolioides* gen. nov.; *Coronaurothoe* gen. nov.; Brazil

### Introduction

The family Urothoidae Bousfield, 1978 comprises small, ranging from 2 mm to 10 mm in length, exclusively marine amphipods, highly adapted to a fossorial lifestyle (Bousfield 1982). Urothoid species are densely setose and spinose, displaying broad bodies and appendages modified for burrowing. They are commonly recognized by the following: antenna 1 geniculate between articles 2 and 3 of the peduncle, gnathopods 1 and 2 subchelate, pereopod 7 phoxocephalid-like, shorter than pereopod 6, with basis posteriorly expanded, and a deeply cleft telson (Barnard and Drummond 1979).

Urothoidae currently comprises 61 species grouped into six genera: *Carangolia* Barnard, 1961; *Cunicus* Griffiths, 1974; *Pseudurothoe* Ledoyer, 1986; *Urothoe* Dana,

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1852; *Urothoides* Stebbing, 1891; and *Urothopsis* Ledoyer, 1967. The family has a cosmopolitan distribution, and can be found from shallow waters to abyssal regions, down to 5000 m depth. A single species has been recorded from Brazilian waters, *Urothoe falcata* Schellenberg, 1931 (Wakabara et al. 1991; Wakabara and Serejo 1998; Valério-Berardo et al. 2000).

This is the first taxonomic survey dedicated to Urothoidae collected in deep waters of Brazil, and includes the description of two new genera, *Carangolioides* gen. nov. and *Coronaurothoe* gen. nov., and three new species: *Carangolioides castellatus* sp. nov., *Carangolioides hamatus* sp. nov. and *Coronaurothoe rotunda* sp. nov. Finally, the genera *Pseudurothoe* Ledoyer, 1986 and *Urothopsis* Ledoyer, 1967 are removed in this paper from Urothoidae to Phoxocephalopsidae Barnard and Drummond, 1982.

### Material and methods

Material examined was collected from soft bottoms at the Campos Basin continental slope, southeastern Brazilian deep sea, off the Rio de Janeiro State coast, between 700 m and 2000 m. The sampling sites were assessed by box-corer (model USNEL SPADE CORER MK I), aboard N/R Astro Garoupa, during *Projeto de Caracterização Ambiental das Águas Profundas da Bacia de Campos* coordinated by the Brazilian Oil Company (CENPES/Petrobras), in two campaigns, November 2002 and June 2003. The main objectives of the project were to characterize and inventory the marine biodiversity of the continental slope of Campos Basin; the project involved partnerships with several Brazilian universities. It is one of the most comprehensive studies of deep-sea fauna ever made on the Brazilian continental margin (Lavrado et al. 2010).

Specimens were dissected under a stereoscopic microscope and mounted on glycerine gel slides. Illustrations were drawn under an optical microscope with camera lucida and digitally prepared as described by Coleman (2003). The material is housed in the Crustacea collection of the Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ) in vials of 70% ethanol or as glycerine gel slides. Descriptions and the identification key were prepared using the software DELTA (Dallwitz et al. 1997).

The following abbreviations were used on the figures: Hd, head; A1, antenna 1; A2, antenna 2; LL, lower lip; UL, upper lip; Md, mandible; Mx1-2, maxillae 1–2; Mxp, maxilliped; Gnt1-2, gnathopods 1–2; P3-7, pereopods 3–7; Ep1-3, epimeral plates 1–3; U1-3, uropods 1–3; T, telson; r, right; l, left.

### Taxonomy

Order AMPHIPODA Latreille, 1816

Superfamily HAUSTORIOIDEA Stebbing, 1906

Family PHOXOCEPHALOPSIDAE Barnard and Drummond, 1982

Phoxocephalopsidae – Barnard and Drummond 1982: 15; Barnard and Clark 1982: 261, 1984: 85; Thurston 1989: 300; Barnard and Karaman, 1991: 636.

*Diagnosis*

See Thurston (1989).

*Composition*

*Puelche* Barnard and Clark, 1982; *Phoxocephalopsis* Schellenberg, 1931; *Eophoxocephalopsis* Thurston, 1989; *Pseudurothoe* Ledoyer, 1986 and *Urothopsis* Ledoyer, 1967.

*Remarks*

The family Phoxocephalopsidae was erected based on the genus *Phoxocephalopsis*. Previously, this genus was included in the family Haustoriidae Stebbing, 1906, after the classification had been discussed for a long time (Bousfield 1978; Barnard and Drummond 1979; Thurston 1982). Before being placed in its own family, *Phoxocephalopsis* was included in Urothoidae, when it was introduced by Bousfield (1978); Barnard and Drummond (1982) redefined Urothoidae, restricting its generic composition to *Carangolia*, *Cunicus*, *Urothoe* and *Urothoides*. These genera share: geniculate antenna 1, peduncle article 4 of antenna 2 of *Urothoe* shape, scarcely expanded, and uropods 1–2 rami styliform and spinose or naked or rami absent. However, Barnard and Drummond (1982) did not refer *Urothopsis* to that family, although it had been included there by Bousfield (1978); Ledoyer (1986) described the new genus *Pseudurothoe* within Urothoidae from Madagascar. Later, Barnard and Karaman (1991) followed his family diagnosis and included *Urothopsis* within Urothoidae.

Recently, we studied the type species of *Pseudurothoe* and *Urothopsis* deposited at the Muséum National d'Histoire Naturelle, Paris. An examination of *Pseudurothoe benthedii* Ledoyer, 1986 and *Urothopsis brevicaudata* Ledoyer, 1967, and a comparison with the detailed figures and descriptions of other Urothoidae led to a discussion of the relationship between these genera and Phoxocephalopsidae. Antenna 1 is not geniculate between articles 2 and 3, antenna 2 has the peduncular article 4 much expanded (Phoxocephalopsidae form) and the rami of uropod 1 are styliform (curved) and naked. Taking this into account, we moved *Pseudurothoe* and *Urothopsis* to Phoxocephalopsidae.

**Key to genera of Phoxocephalopsidae**

1. Uropod 2 uniramous ..... *Urothopsis* Ledoyer, 1967  
Uropod 2 biramous ..... 2
2. Antenna 2 peduncle article 4 strongly nasiform ..... *Pseudurothoe* Ledoyer, 1986  
Antenna 2 peduncle article 4 not nasiform ..... 3
3. Rami of uropod 1 with apical nail ..... *Eophoxocephalopsis* Thurston, 1989  
Rami of uropod 1 without apical nail ..... 4
4. Epimeral plate 2 strongly or weakly dominating epimeral plate 3 .....  
..... *Phoxocephalopsis* Schellenberg, 1931  
Epimeral plate 3 equal to or larger than epimeral plate 2 .....  
..... *Puelche* Barnard and Clark, 1982

Family **UROTHOIDAE** Bousfield, 1978

Haustoriidae (in part) – Chevreux and Fage 1925: 91, figs 90–95; Gurjanova 1951: 328, figs 210–212; Lincoln 1979: 312, figs 154–156; Bellan-Santini 1989: 365, figs 257–264.

Urothoidae (in part) Bousfield 1978: 356.

Urothoidae Barnard and Karaman 1991: 726.

*Diagnosis* (modified from Barnard and Karaman 1991).

Head short, rostrum weak, anteroventral angle well developed and projected ventrally. Antenna 1, peduncle with articles elongated, geniculate between articles 2 and 3, flagellum short. Antenna 2 strongly sexually dimorphic in most taxa; article 4 weakly expanded, stout setae absent or in setal rows; article 5 slightly shorter and more slender than article 4; flagellum variable in length, commonly short in females and elongated in males. Upper lip dominant in size, epistome slightly distinct. Mandible short and stout, incisors smooth or weakly spinose; accessory setal row weakly developed or absent; palp 3-articulate, article 3 apically rounded. Lower lip, outer lobes well developed. Maxilla 1, inner plate with fewer than six setae; palp 2-articulate. Maxilla 2 inner and outer plates subequal in length. Maxilliped palp 4-articulate, article 2 expanded or nasiform, article 4 unguiform to clavate, commonly setose, apical nail weakly developed. Gills at pereonite 2 to 6, oostegites slender. Gnathopods 1 and 2 slender, similar to each other, ischium short, carpus elongate. Pereopods 3–5 carpus well developed. Pereopods 6–7 similar or developed in phoxocephalid form, with pereopod 7 shorter than pereopod 6, with basis posteriorly expanded. Epimeral plate 3 dominant in size. Uropod 3 peduncle short, flat and expanded; outer ramus 2-articulate, dominant in size. Telson cleft.

*Type genus*

*Urothoe* Dana, 1852

*Composition*

*Carangolia* Barnard, 1961; *Carangolioides* gen. nov.; *Coronaurothoe* gen. nov.; *Cunicus* Griffiths, 1974; *Urothoe* Dana, 1852; and *Urothoides* Stebbing, 1891.

*Removed genera*

*Pseudurothoe* Ledoyer, 1986 and *Urothopsis* Ledoyer, 1967 are transferred here to Phoxocephalopsidae Barnard and Clark, 1982.

*Remarks*

Until now, the family Urothoidae included three monotypic genera: *Cunicus*, *Pseudurothoe* and *Urothopsis*; the last two genera are now removed to Phoxocephalopsidae. *Carangolia* comprises four described species, *Urothoides* 10

species and *Urothoe*, which is the most speciose, 44 species. Most taxonomic studies dedicated to this group in the past commonly have neither illustrations nor descriptions of mouthparts. In this study, we detail these structures, which have become essential for the separation of the species, and which have been used to establish the two new genera described herein. Another important aspect of urothoid taxonomy is that only a small number of structures have been illustrated and often the descriptions are short or poorly detailed, as in Chevreux and Fage (1925), Gurjanova (1951), Lincoln (1979) and Bellan-Santini (1989), making it difficult to recognize the species. The biggest taxonomic problem in the family Urothoidae involves the genus *Urothoe*, because it has a large number of species and some variation in the character states. In the original description of Dana (1852) only a few features were used, including: gnathopods 1 and 2 slender, subchelate, and similar; antenna 1 shorter than antenna 2; maxillipeds long and slender, with inner plate small; uropod 3 rami foliaceous; and telson deeply cleft. Only the uropod 3 with foliaceous rami is an exclusive feature of the genus, which makes it a weakly defined group. Many species displaying features described above were grouped into *Urothoe*, resulting in a taxon with wide morphological variation. These facts suggest that *Urothoe* might be, actually, a non-monophyletic group. Currently, *Urothoe* is in great need of an extensive revision, and a more restricted diagnosis for it must be established. Still, in this work it has been possible to establish two new genera supported by clear and well-defined characters. The diagnostic characters of the genera included in Urothoidae are presented in Table 1.

### *Carangolioides* gen. nov.

#### *Diagnosis*

Body globular. Eyes absent. Antenna 1 accessory flagellum 3-articulate. Mandible molar present; lacinia mobilis present; incisor smooth. Upper lip distal margin truncated. Lower lip outer lobe with distolateral projection. Maxilla 1 palp article 1 longer than article 2. Gnathopods 1–2 subchelate. Pereopod 5 coxa posterior lobe present. Epimeral plate 3 without ornamentations. Uropods 1–2 styliform. Uropod 3 short, inner ramus shorter than outer ramus article 1, which is two to four times the article 2 length.

#### *Type species*

*Carangolioides castellatus* gen. nov. et sp. nov.

#### *Composition*

The genus *Carangolioides* gen. nov. groups two species: *Carangolioides castellatus* gen. nov. et sp. nov. and *Carangolioides hamatus* gen. nov. et sp. nov.

#### *Etymology*

The name *Carangolioides* refers to the morphological similarity of this genus to *Carangolia*. Gender masculine.

Table 1. Diagnostic features for genera in the family Urothoidea.

	<i>Carangolia</i>	<i>Carangolioides</i> gen. nov.	<i>Coronaurathoe</i> gen. nov.	<i>Cunicus</i>	<i>Urothoe</i>	<i>Urothoides</i>
Md – molar	<b>Absent</b>	Present, well developed and smooth	<b>Present, with crown of robust setae</b>	Vestigial, reduced to one robust bristle	Present, well developed	Present, well developed
Md -Lacinia mobilis	<b>Absent</b>	Present	Present	Present	Present	Present or Absent
Mx1 – Palp	Art.2 < Art.1	Art.2 < Art.1	<b>Art.2 &gt; Art.1</b>	Art.2 subequal to Art.1	1-articulate or Art.2 < Art. 1/ Art.2 > Art. 1	Art.2 < Art.1
Upper lip – distal margin	Tapering	<b>Truncate</b>	Rounded	?	?	Rounded
Lower lip – outer lobe	Without distolateral projection	<b>With distolateral projection</b>	Without distolateral projection	?	Without distolateral projection	Without distolateral projection
Mxp – Art. 2 of palp	Distally expanded	Distally expanded	<b>With projection on distal corner of inner margin</b>	Distally expanded	Distally expanded	Distally expanded
U1 – Rami	Present	Present	Present	<b>Absent</b>	Present	Present
U2 – Rami	Biramous	Biramous	Biramous	<b>Absent</b>	Biramous	Biramous
U3 – Rami	Stubby	Stubby	Styliform	Rounded*	<b>Foliaceous (leaf-shaped)</b>	Styliform
P7	As long as P6	As long as P6	As long as P6	As long as P6	As long as P6	<b>Much shorter than P6; phoxocephalid-like</b>

‘?’, data not found in the literature; \*, data obtained from the illustrations in the literature. Characters in bold indicate features exclusive to each genus.

*Remarks*

*Carangolioides* gen. nov. differs from the other genera previously described in the family by the upper lip with distal margin truncated and lower lip with distolateral projection on the outer lobe.

The new genus is similar to *Carangolia* by the globular shape of the body, pereopods 3 and 4 similar to each other, with marginal and facial stout setae on carpus and propodus, and the extremely enlarged mandible with incisor strongly developed. However, in *Carangolioides* gen. nov. the accessory flagellum on antenna 1 is short, but well developed, molar and lacinia mobilis are present, and the telson is longer than wide.

The studies of Barnard (1961) and Bellan-Santini and Ledoyer (1986) do not present complete descriptions and illustrations of the type materials, besides the lack of details of their mouthparts, which makes it difficult to determine the character variations of the mouthparts of Urothoidae. To establish the states of those characters, the studies of Barnard (1962) and Jaume and Sorbe (2001) were used, with complete descriptions of the type species *Carangolia mandibularis* Barnard, 1961 and the holotype of *Carangolia barnardi* Jaume and Sorbe, 2001 respectively.

***Carangolioides castellatus* gen. nov. et sp. nov.**  
(Figures 1–3)

*Material examined*

Holotype: sex unknown, 4.0 mm, Oceanprof I #74, 22°27'31" S, 40°09'23" W, 750 m, N/R Astro Garoupa col., MNRJ 21439.

Paratypes: 1 female, 5.4 mm, Oceanprof II #79, 22°20'22" S, 40°01'24"W, 750 m, N/R Astro Garoupa col., MNRJ 21440; 2 specimens, sex unknown, 3.5 to 3.8 mm, Campos Basin, depth and collector unknown, MNRJ 18320; 1 female, 5.6 mm, Oceanprof I #59, 21°25'59" S, 39°55'30" W, 750 m, N/R Astro Garoupa col., MNRJ 21441; 1 female, 6.0 mm, Oceanprof I #79, 22°19'50" S, 40°00'35" W, 750 m, N/R Astro Garoupa col., MNRJ 21442.

*Etymology*

The species name is an adjective, derived from the Latin word *castellum*, and refers to the posterior margin of the pereopod 5 basis, which is castellated.

*Diagnosis*

Rostrum present; head anteroventral angle rounded. Mandible lacinia mobilis reduced to a robust seta. Gnathopod 1 palm subequal in length to posterior margin of propodus. Gnathopod 2 palm shorter than posterior margin of propodus. Coxa 4 posterior margin straight. Pereopod 5 basis with posterior margin castelloserrate. Coxa 6 and 7 posteroventral margin lobate. Epimeral plate 3 posteroventral corner produced, apically rounded. Uropods 1 and 2 rami naked. Uropod 3 short and robust, outer ramus article 1 about twice as long as article 2.

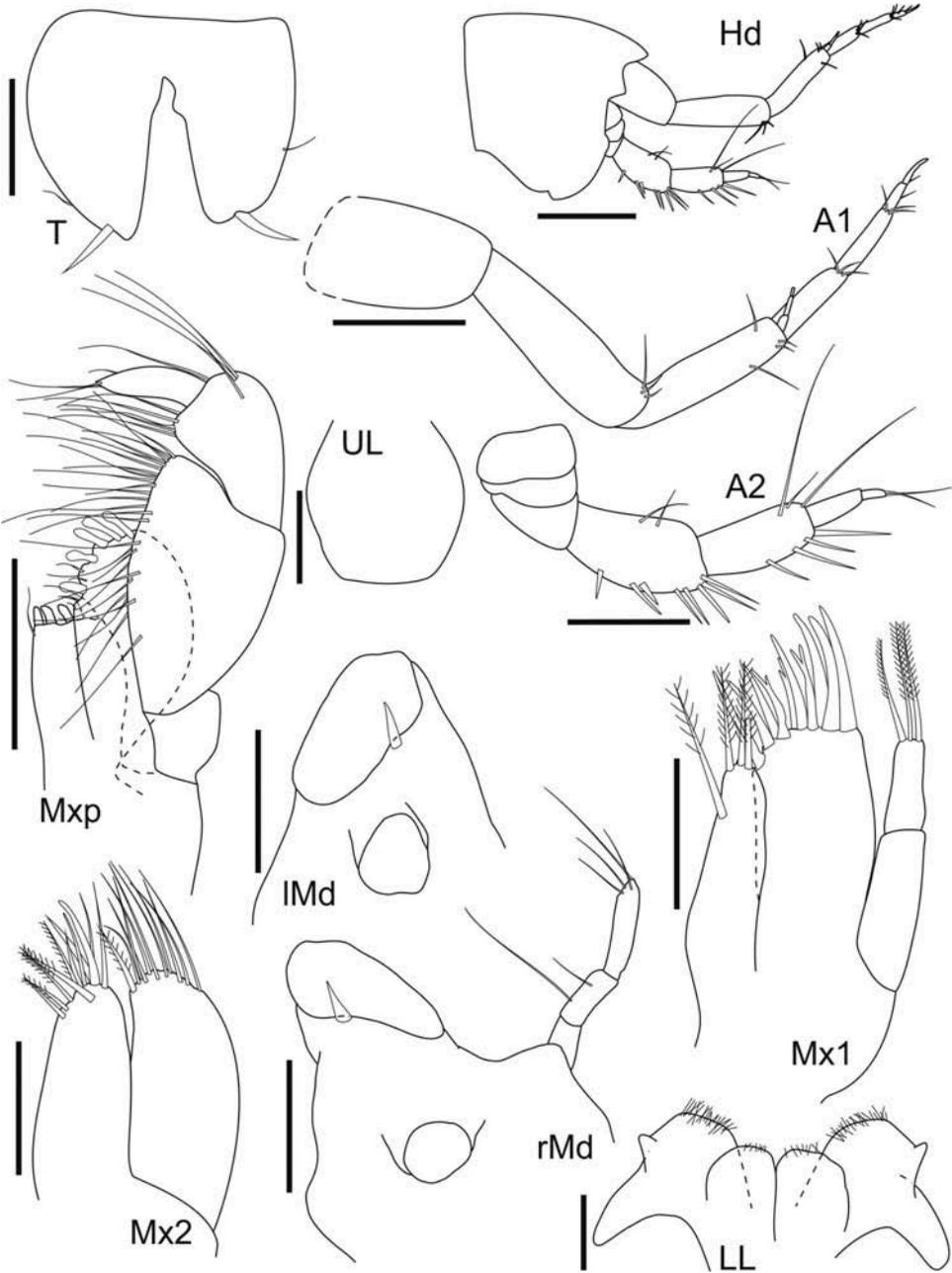


Figure 1. *Carangolioides castellatus* gen. et sp. nov., holotype, sex unknown, 4.0 mm, 22°27'31" S, 40°09'23" W, 750 m depth, MNRJ 21439. Scale bars: 0.5 mm for Hd; 0.2 mm for A1–2, Md, Mp, UL; 0.1 mm for all others.

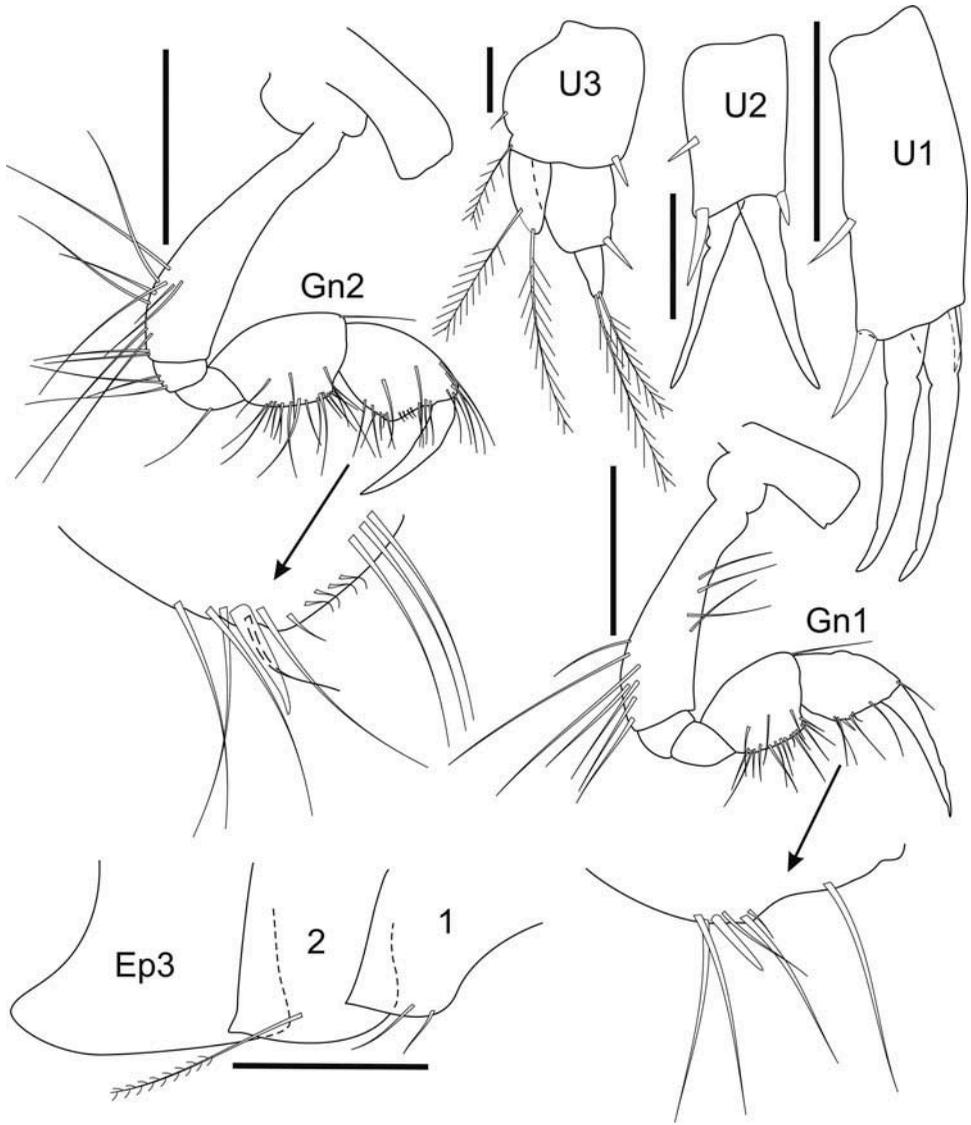


Figure 2. *Carangolioides castellatus* gen. et sp. nov., holotype, sex unknown, 4.0 mm, 22°27'31" S, 40°09'23" W, 750 m depth, MNRJ 21439. Scale bars: 0.1 mm for U3; 0.2 mm for U1–2; 0.5 mm for all others.

### Description

Head: eyes absent; rostrum absent; anteroventral corner rounded. Antenna 1 peduncular article 1 naked; primary flagellum 4-articulate, 1.25 times longer than peduncular article 3; accessory flagellum present, 3-articulate. Antenna 2 reaching end of peduncular article 2 of antenna 1; peduncular article 4 longer and stouter than article 5, both with two and three slender setae, respectively, on anterior margin, and with a row of eight and four robust setae, respectively, on posterior margin. Upper lip

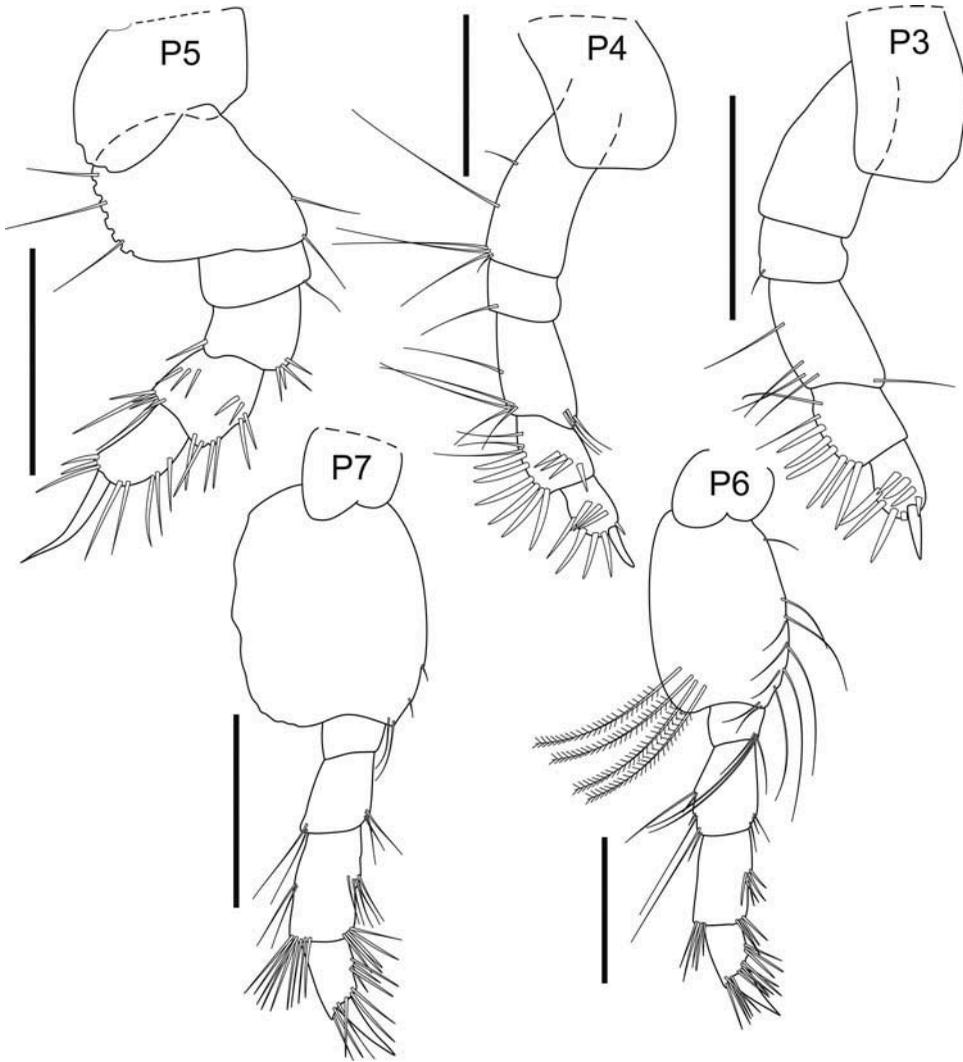


Figure 3. *Carangolioides castellatus* gen. et sp. nov., holotype, sex unknown, 4.0 mm, 22°27'31" S, 40°09'23" W, 750 m depth, MNRJ 21439. Scale bars: 0.5 mm.

truncate distally. Mandible molar present, non-tritulative; lacinia mobilis of both left and right simple and spiniform; accessory setal row absent; incisor process well developed of medium length and smooth; palp article 2 shorter than article 3 (0.6 times), with two marginal setae; article 3 with four distal long setae. Lower lip outer lobes with distolateral projection. Maxilla 1 inner plate with one subdistal seta and three distal pappose setae; outer plate with nine robust setae; article 1 of palp 1.8 times longer than article 2; article 2 with three distal pappose setae. Maxilla 2 outer plate wider than inner plate, both with long setae on distal margin. Maxilliped inner plate with three apical robust setae, outer plate reaching two-thirds of palp article 2, with seven marginal robust setae; palp article 2 expanded, 1.65 times longer than

wide, inner distal margin produced, inner margin densely setose; article 3 expanded distally; article 4 0.65 times the length of article 3, with two slender distal setae.

Gnathopod 1 coxa rectangular, twice as long as wide, anteroventral angle rounded and posteroventral angle notched; basis long and slender, widened distally, anterior margin with four long setae, posterior margin with seven long setae; carpus subequal to propodus, posterior margin slightly lobate and densely setose; propodus with a seta on anterodistal angle; palm acute, sinuous, longer than posterior margin, with five long setae and one robust seta near palmar corner; dactylus moderately stout, longer than propodus. Gnathopod 2 coxa rectangular, about twice as long as wide, anteroventral and posteroventral angles rounded; basis long and slender, widened distally, posterior margin with 11 long setae; carpus slightly longer than propodus, posterior margin slightly lobate and densely setose; propodus outer surface not densely setose; palm almost transverse, shorter than outer margin, with one robust seta on palmar corner; dactylus moderately stout, subequal to propodus. Pereopod 3 coxa 1.6 times longer than wide; basis 1.8 times longer than wide; merus with a seta at anterodistal angle, shorter than propodus and carpus together; carpus robust 1.2 times longer than wide, with nine robust setae on posterior margin; propodus slightly more slender than carpus, with two rows of four robust setae on both inner and outer margins of posterior margin; dactylus short, 0.8 times propodus length. Pereopod 4 coxa 1.25 times longer than wide, posterior margin not excavate with posteroventral angle not produced; basis twice as long as wide, with six long setae posterior margin; merus shorter than propodus and carpus together; carpus robust, 1.3 times longer than wide, with six robust and three slender setae on posterior margin and a row of four facial robust setae; propodus slightly more slender than carpus, with two rows of four and three robust setae on both inner and outer margin of posterior margin, respectively; dactylus short, 0.8 times propodus length. Pereopod 5 coxa 1.2 times wider than long, with posteroventral lobe produced; basis ovate, as long as wide, posterior margin castelloserrate with three long setae; merus as long as wide, posterodistal angle with one seta; carpus 1.2 times longer than wide, anterior margin with two combs of robust setae (4-4), posterior margin with two combs of robust setae (4-6); propodus about as long as carpus, 1.7 times longer than wide, anterior margin with five long setae, posterodistal angle with one comb of three robust setae; dactylus styliform, 1.2 times longer than propodus. Pereopod 6 coxa slightly wider than long, with produced posteroventral lobe; basis ovate, 1.2 times longer than wide, posterior margin smooth with a row of four very long plumose facial setae; merus 1.3 times longer than wide, anterior margin with four slender setae, posterior margin with six slender setae; carpus 1.8 times longer than wide, anterior margin with two combs of slender setae (4-4); propodus shorter than carpus, 0.6 times longer than wide, anterior margin with two combs of slender setae (3-5); dactylus as long as propodus. Pereopod 7 coxa as long as wide, with posteroventral lobe produced; basis ovate, 1.25 times longer than wide, posterior margin sinuous lacking setae; merus slightly longer than wide, anterior margin with three slender setae, posterodistal angle with two slender setae; carpus 1.75 times longer than wide, anterior margin with one comb of four slender setae, posterior margin with two medial slender setae, posterodistal angle with five slender setae; propodus 1.4 times shorter than carpus, 1.6 times longer than wide, anterior margin with one medial comb of four slender setae, distal margin with six slender setae; dactylus subequal to propodus.

Epimeral plate 1: ventral margin with two long setae; posteroventral angle acute and slightly produced. Epimeral plate 2: ventral margin with one pappose seta; posteroventral angle acute and slightly produced. Epimeral plate 3: ventral margin lacking setae, posteroventral angle strongly produced into blunt process. Uropod 1: peduncle 1.2 times longer than rami, inner margin with one robust seta, anterodistal angle with one stout seta, posterodistal angle with robust setae; inner ramus subequal to outer ramus, both rami naked. Uropod 2: peduncle 0.7 times as long as rami, inner margin with one robust seta, inner distal angle with one stout seta, outer distal angle with robust setae; inner ramus subequal in length to outer ramus, both rami naked. Uropod 3 about 0.7 times the uropod 2 length and 0.6 times as long as uropod 1, peduncle as long as wide, and subequal in length to outer ramus, distomedial angle with one plumose seta, distolateral angle with one robust seta; rami foliaceous and stubby; inner ramus shorter than article 1 of outer ramus, with one long seta on inner margin, and one distal pappose seta; outer ramus 2-articulate, article 1 twice as long as article 2, distolateral angle with one robust seta; article 2 with two distal pappose setae. Telson deeply cleft (up to 70% length), lateral margins each with one short, slender seta; distal margin of each lobe weakly incised and with one robust seta.

#### *Variation*

The antenna 1 flagellum varies from 4- to 5-articulate. The distolateral corner of pereopod 6 basis has four to nine pappose setae. The epimeral plates 1 and 2 also present variation in number of setae on their ventral margins.

#### *Remarks*

*Carangolioides castellatus* gen. et sp. nov. is easily distinguished from *C. hamatus* gen. et sp. nov. by the following: the anteroventral unproduced angle of the head, in contrast to the acute projected angle observed in *C. hamatus* (which slightly overlaps the anteroventral margin of the head in the illustration); the unproduced posterior margin of coxa 4, in contrast to the sinuous coxa 4, with a posterodistal subacute projection in *C. hamatus*; the posteroventral corner of epimeral plate 3 produced in an apically rounded process, versus the posteroventral corner produced in an acute upward hook, in *C. hamatus*; and the lacinia mobilis reduced to a stout seta, in contrast to the well-developed and multicuspidate lacinia mobilis present in *C. hamatus*. In addition, the naked rami and sparsely armed peduncle of uropod 1 of *C. castellatus* differ markedly from the heavily armed uropod 1 of *C. hamatus*.

#### *Geographic distribution*

Known only from the type locality, Campos Basin, off Rio de Janeiro State coast.

#### *Bathymetric range*

Collected at 750 m depth.

*Carangolioides hamatus* gen. nov. et sp. nov.  
(Figures 4–6)

*Material examined*

Holotype: female, 5.4 mm, Oceanprof II #49, 22°04'32" S, 39°54'11" W, 750 m, N/R Astro Garoupa col., MNRJ21434.

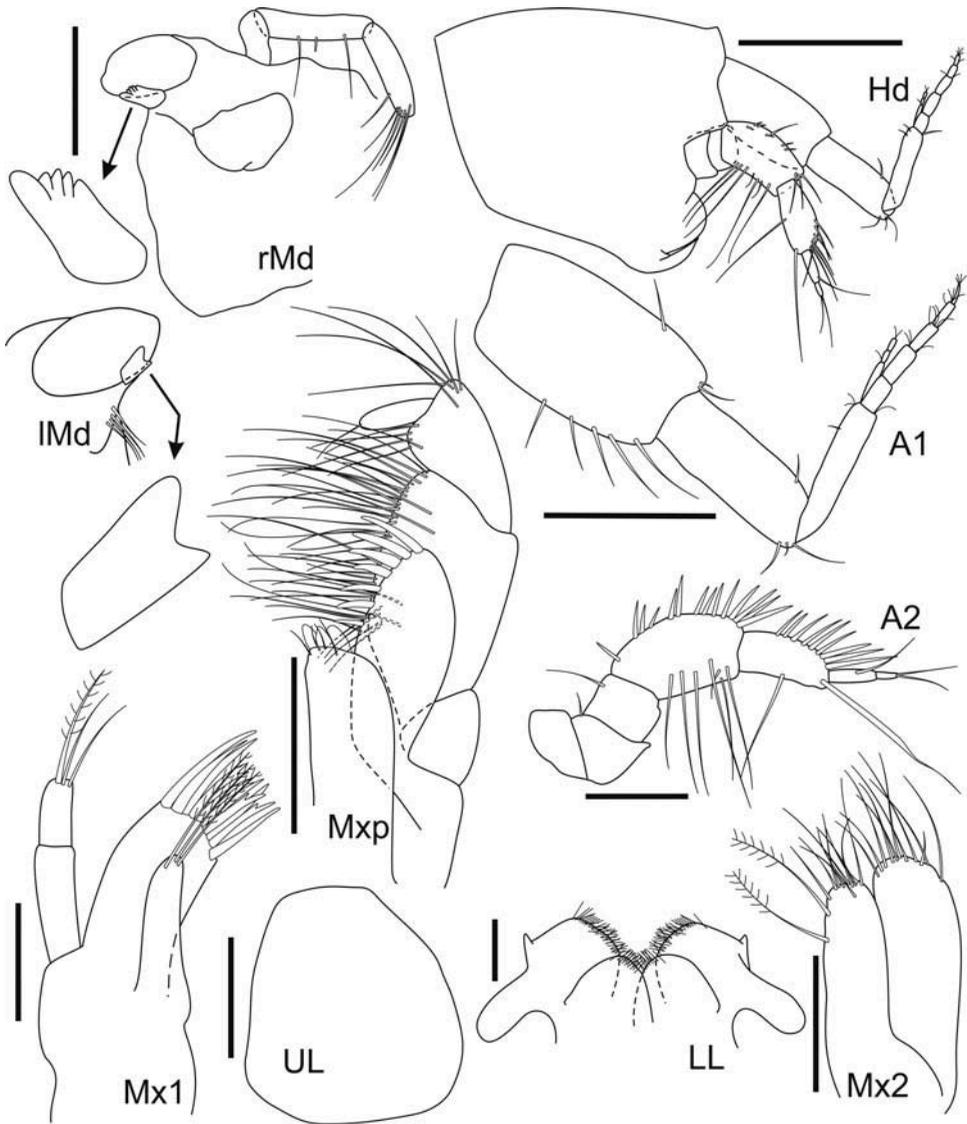


Figure 4. *Carangolioides hamatus* gen. et sp. nov., holotype, female, 5.4 mm, 22°04'32" S, 39°54'11" W, 750 m depth, MNRJ21434. Scale bars: 0.5 mm for Hd; 0.2 mm for A1–2, Md, Mp, UL; 0.1 mm for all others.

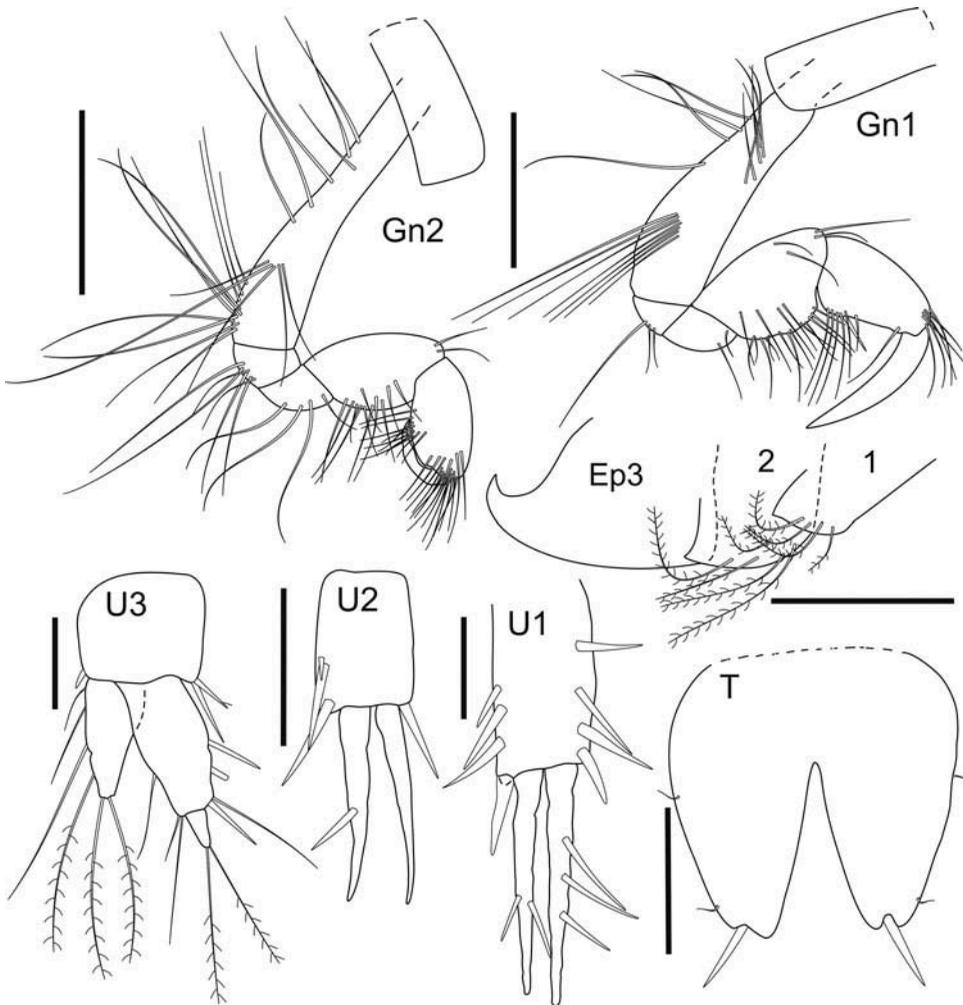


Figure 5. *Carangolioides hamatus* gen. et sp. nov., holotype, female, 5.4 mm, 22°04'32" S, 39°54'11" W, 750 m depth, MNRJ21434. Scale bars: 0.1 mm for T; 0.2 mm for U1–3; 0.5 mm for all others.

Paratypes: 1 specimen, sex unknown, 4.3 mm, 1 male, 4.3 mm, 1 female, 4.3 mm, Oceanprof II #49, 22°04'32" S, 39°54'11" W, 750 m, N/R Astro Garoupa col., MNRJ 21435; 1 specimen, sex unknown, 4.7 mm, Oceanprof I #64, 22°36'03" S, 40°21'45" W, 750 m, N/R Astro Garoupa col., MNRJ 21436; 2 specimens, sex unknown, 2.0 to 3.8 mm, Oceanprof I #54; 21°57'17" S, 39°56'01" W, 750 m, N/R Astro Garoupa col., MNRJ 21437; 1 female, 4.7 mm, Oceanprof II #79, 22°20'22" S, 40°01'24" W, 750 m, N/R Astro Garoupa col., MNRJ 21438.

*Etymology*

The species name is a Latin adjective *hamatus* (hooked), and refers to the hook-shaped posteroventral corner on the epimeral plate 3.

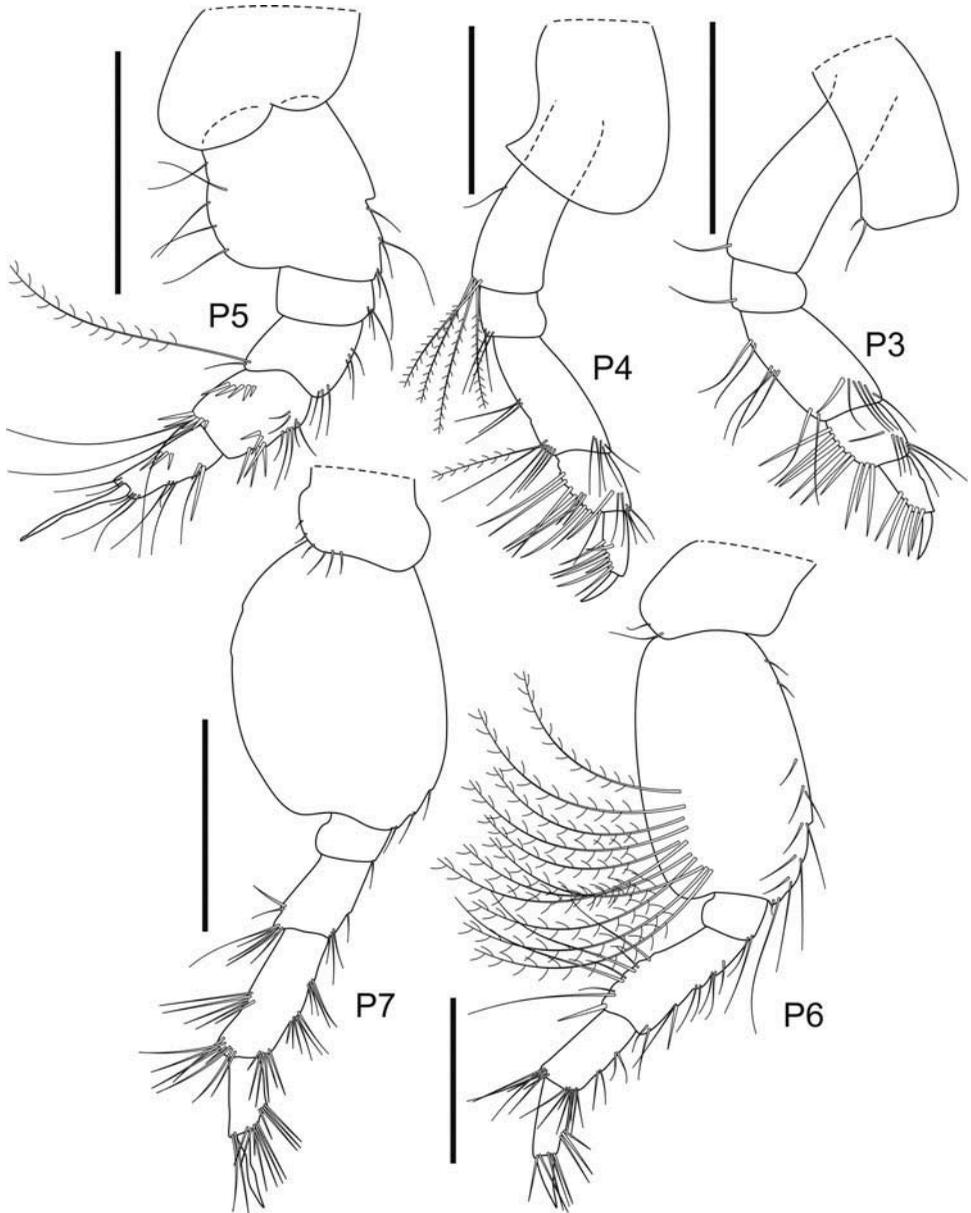


Figure 6. *Carangolioides hamatus* gen. et sp. nov., holotype, female, 5.4 mm, 22°04'32" S, 39°54'11" W, 750 m depth, MNRJ21434. Scale bars: 0.5 mm.

#### Diagnosis

Head without rostrum; anteroventral angle with a sharp projection. *Lacinia mobilis* dentate. Gnathopod 1 and 2 palm longer than posterior margin of corresponding propodus. Coxa 4 with excavated posterior margin, posteroventral angle acute and produced. Pereopod 5 basis with smooth posterior margin. Epimeral plate 3

posteroventral angle produced into a large hook. Uropod 1 and 2 rami with robust setae.

### *Description*

Head without eyes; rostrum absent; anteroventral corner produced into a curved acute and long spine. In the illustration this projection slightly overlaps the anteroventral margin of the head. Antenna 1 peduncular article 1 with five slender setae on posterior margin; primary flagellum 5-articulate and subequal in length to peduncular article 3; accessory flagellum present, 3-articulate. Antenna 2 reaching end of peduncular article 2 of antenna 1; peduncular article 4 longer and stouter than article 5, with row of 14 robust setae on anterior margin, and row of seven long setae on lateral surface; article 5 with row of nine robust setae on anterior margin, and two long setae on posterior margin. Mandible molar present, non-triturative; right mandible lacinia mobilis 5-dentate; left *lacinia mobilis* bifid, accessory setal row present, with four simple setae; incisor process well developed, of moderate length and smooth; palp article 2 longer than article 3, with three marginal setae; article 3 with one subdistal and six distal long setae. Maxilla 1 inner plate with three distal pappose setae; outer plate with nine robust setae; palp article 1 1.6 times longer than article 2; article 2 with three distal pappose setae. Maxilla 2 outer plate wider than inner plate, both with long setae on distal margin. Maxilliped inner plate with three apical robust setae, outer plate reaching two-thirds of palp article 2, with seven marginal robust setae; palp article 2 expanded, 1.8 times longer than wide, distomedial margin produced, medial margin densely setose; article 3 widened distally; article 4 half length of article 3, with a slender distolateral seta.

Gnathopod 1 coxa rectangular, longer than wide (2.5 times), anteroventral angle rounded and posteroventral angle about 90°; basis long and slender, widened distally, posterior margin with four long setae, facial margin with two combs of long setae (5–7); carpus slightly longer than propodus, posterior margin slightly lobate and densely setose; propodus with a tuft of setae on anterodistal angle; palm acute, longer than outer margin, with six long setae and one robust seta near palmar corner; dactylus stout, longer than propodus. Gnathopod 2 coxa rectangular, longer than wide (2.4 times), anteroventral angle rounded and posteroventral angle about 90°; basis long and slender, widened distally, posterior margin with 16 long setae, facial margin with five long setae; carpus slightly longer than propodus, posterior margin not lobate and densely setose; propodus facial margin densely setose; palm acute, longer than outer margin, with eight long setae defining palmar corner; dactylus moderately stout, as long as palm. Pereopod 3 coxa longer than wide (1.8 times), with two setae on posteroventral angle; basis 2.3 times longer than wide, with one seta on posterodistal angle; merus with a row of oblique and facial setae, longer than propodus and carpus together; carpus robust 1.1 times longer than wide, with nine robust and long setae on posterior margin; propodus more slender than carpus, with five robust setae on posterior margin; dactylus short, 0.7 times propodus length. Pereopod 4 coxa longer than wide (1.2 times), posterior margin excavate with posteroventral angle produced into an acute process; basis 2.6 times longer than wide, with three plumose setae on posterodistal angle; merus with a row of oblique and facial setae, longer than propodus and carpus together; carpus

robust 1.25 times longer than wide, with nine robust and long setae on posterior margin; propodus more slender than carpus, with seven robust setae on posterior margin; dactylus short, 0.9 times propodus length. Pereopod 5 coxa wider than long (1.2 times), with posteroventral lobe produced; basis ovate, longer than wide (1.4 times), posterior margin smooth with five long setae; merus as long as wide, posterodistal angle with a very long plumose seta and one short seta; carpus 1.3 times longer than wide, anterior margin with two combs of robust setae (7–6), posterior margin with two combs of setae (5–5), posterodistal angle with three very long setae; propodus as long as carpus, 2.3 times longer than wide, anterior margin with one proximal comb of two robust setae and one middle and distal combs of slender setae (3–3), posterior margin with one comb of robust setae (3), posterodistal angle with two slender setae; dactylus styloform, 1.1 times longer than propodus. Pereopod 6 coxa wider than long (1.4 times), with posteroventral lobe slightly produced; basis ovate, longer than wide (1.3 times), posterior margin smooth with a row of 11 facial very long plumose setae; merus longer than wide (2.3 times), anterior margin with nine slender setae, posterior margin with seven slender setae and one robust seta on posterodistal angle; carpus 2.1 times longer than wide, anterior margin with three combs of slender setae (2-2-7), posterodistal angle with six slender setae; propodus as long as carpus, 2.2 times longer than wide, anterior margin with one middle comb of three slender setae, distal margin with five slender setae; dactylus short, 0.8 times longer than propodus. Pereopod 7 coxa wider than long (1.3 times), with posteroventral lobe not produced; basis ovate, longer than wide (1.25 times), posterior margin smooth, lacking setae; merus longer than wide (1.2 times), anterior margin with four slender setae, posterior margin with two combs of slender setae (2–5); carpus 2.4 times longer than wide, anterior margin with three combs of slender setae (2-2-7), posterodistal angle with six slender setae; propodus as long as carpus, 2.2 times longer than wide, anterior margin with one middle comb of three slender setae, distal margin with five slender setae; dactylus short, 0.8 times of propodus length.

Epimeral plate 1 ventral margin with four pappose setae; posteroventral angle acute. Epimeral plate 2 ventral margin with four pappose setae; posteroventral angle acute and slightly produced. Epimeral plate 3 ventral margin lacking setae, posteroventral angle strongly produced into an upturned acute spine. Uropod 1 peduncle shorter than rami (0.7 times), both inner and outer margins with four robust setae; inner ramus slightly shorter than outer ramus, with two medial robust setae; outer ramus with three robust setae. Uropod 2 peduncle shorter than rami (0.8 times), inner margin with three robust setae, outer margin with one robust seta on distal angle; inner ramus glabrous and subequal outer ramus; outer ramus with one medial robust seta. Uropod 3 slightly longer than uropod 2 and 0.6 times the uropod 1 length, peduncle wider than long (1.2 times), shorter than outer ramus (0.6 times), distal inner angle with one robust seta, distal outer angle with two robust setae; rami foliaceous; inner ramus shorter than article 1 of outer ramus, inner margin with four long setae and two distal pappose setae; outer ramus 2-articulate, article 1 3.3 times longer than article 2, inner margin with three slender setae, outer margin with three robust setae and one long seta; article 2 with two distal pappose setae. Telson deeply cleft (up to 70% length), lateral margins each with two short setae; distal margin of each lobe weakly incised distally with one robust seta.

### *Variation*

Paratypes showed variation in the number of setae on the ventral margin of both epimeral plates 1 and 2, and in the number of long setae in the facial row on the basis of pereopod 6, which varied from 9 to 12.

### *Remarks*

Apart from the generic differences, *Carangolioides hamatus* gen. et sp. nov. shows some similarities with *Urothoe falcata*. At a glance, both species can be differentiated by epimeral plate 3, which has the posteroventral angle strongly produced into an upturned acute spine in the new species. However, *C. hamatus* sp. nov. differs from the latter in having the palm of gnathopod 2 longer than the posterior margin of the propodus; the posterior margin of pereopod 7 smooth versus dentate; basis of pereopod 6 not widened distally; coxa 7 lacking a posteroventral lobe; and the inner ramus of uropod 3 shorter than article 1 of the outer ramus, versus subequal.

### *Geographic distribution*

Known only from the type locality, Campos Basin, off Rio de Janeiro State coast.

### *Bathymetric range*

Collected at 750 m depth.

## ***Coronaurothoe* gen. nov.**

### *Diagnosis*

Body globular, eyes absent; antenna 1 accessory flagellum absent; mandibular molar with crown of short, stout setae, lacinia mobilis denticulate; incisor massive and smooth; maxilla 1 palp article 1 shorter than article 2; lower lip outer lobes without distolateral projection; maxilliped palp article 2 distomedial corner produced into a lobe; gnathopods 1 and 2 subchelate; pereopod 5 basis longer than wide; pereopod 6 dactylus longer than propodus; epimeral plate 3 smooth; uropods 1 to 3 styliform; uropod 3 outer ramus article 1 longer than article 2.

### *Type species*

*Coronaurothoe rotunda* gen. et sp. nov.

### *Composition*

Monotypic.

### *Etymology*

From Latin *corona* (crown), referring to the crown of short, stout setae present on mandible molar combined with the pre-existing genus *Urothoe*. Gender feminine.

*Remarks*

*Coronurothoe* gen. nov. differs from other urothoid genera by its mandibular molar surrounded by a crown of robust setae, article 1 of the maxillary palp shorter than article 2, article 2 of maxillipedal palp having the distal corner of the inner margin produced and the telson cleft to about 50% length.

*Coronurothoe rotunda* gen. nov. et sp. nov.  
(Figures 7–9)

*Material examined*

Holotype: sex unknown, 3.0 mm, Oceanprof II #59, 21°52'59" S, 39°55'32" W, 750 m, N/R Astro Garoupa col., MNRJ 21443.

Paratypes: 1 specimen, sex unknown, 3.5 mm, Oceanprof II #59, 21°52'59" S, 39°55'32" W, 750 m, N/R Astro Garoupa col., MNRJ 21444; 1 female, 4.3 mm, Oceanprof I #69, 22°31'12" S, 40°15'11" W, 750 m, N/R Astro Garoupa col., MNRJ 21445; 1 specimen, sex unknown, 3.0 mm, Oceanprof I #74, 22°27'31" S, 40°09'23" W, 750 m, N/R Astro Garoupa col., MNRJ 21446; 1 specimen, sex unknown, 3.5 mm, Campos Basin, depth data and collector unknown, MNRJ 18320.

*Etymology*

From Latin *rotundus* (rounded), referring to the rounded projection present at the anteroventral corner of the head.

*Diagnosis*

As for genus.

*Description*

Head without eyes; rostrum absent; anteroventral corner produced into rounded process. Antenna 1 peduncular article 1 with two slender setae on anterior margin; primary flagellum 4-articulate and 2.6 times as long as peduncular article 3; accessory flagellum absent. Antenna 2 reaching end of peduncular article 2 of antenna 1; peduncular article 4 as long as article 5, anterior margin with five slender setae, facial margin with two long setae; peduncular article 5 anterior margin with five slender setae. Upper lip rounded distally. Mandible molar present, large and triturative; right mandible lacinia mobilis 5-dentate; left mandible lacinia mobilis 4-dentate, accessory setal row absent; incisor process well developed, large and smooth; palp article 2 longer than article 3, with one marginal seta; article 3 with four distal setae. Maxilla 1 inner plate with one distal pappose seta and three short setae; outer plate with nine robust setae; palp article 1 shorter than article 2 (0.12 times); article 2 with six distal pappose setae. Maxilla 2 outer plate wider than inner plate, both with long setae on distal margin. Maxilliped inner plate with three apical robust setae, outer plate about one-half length of palp article 2, with seven marginal robust setae; palp article 2

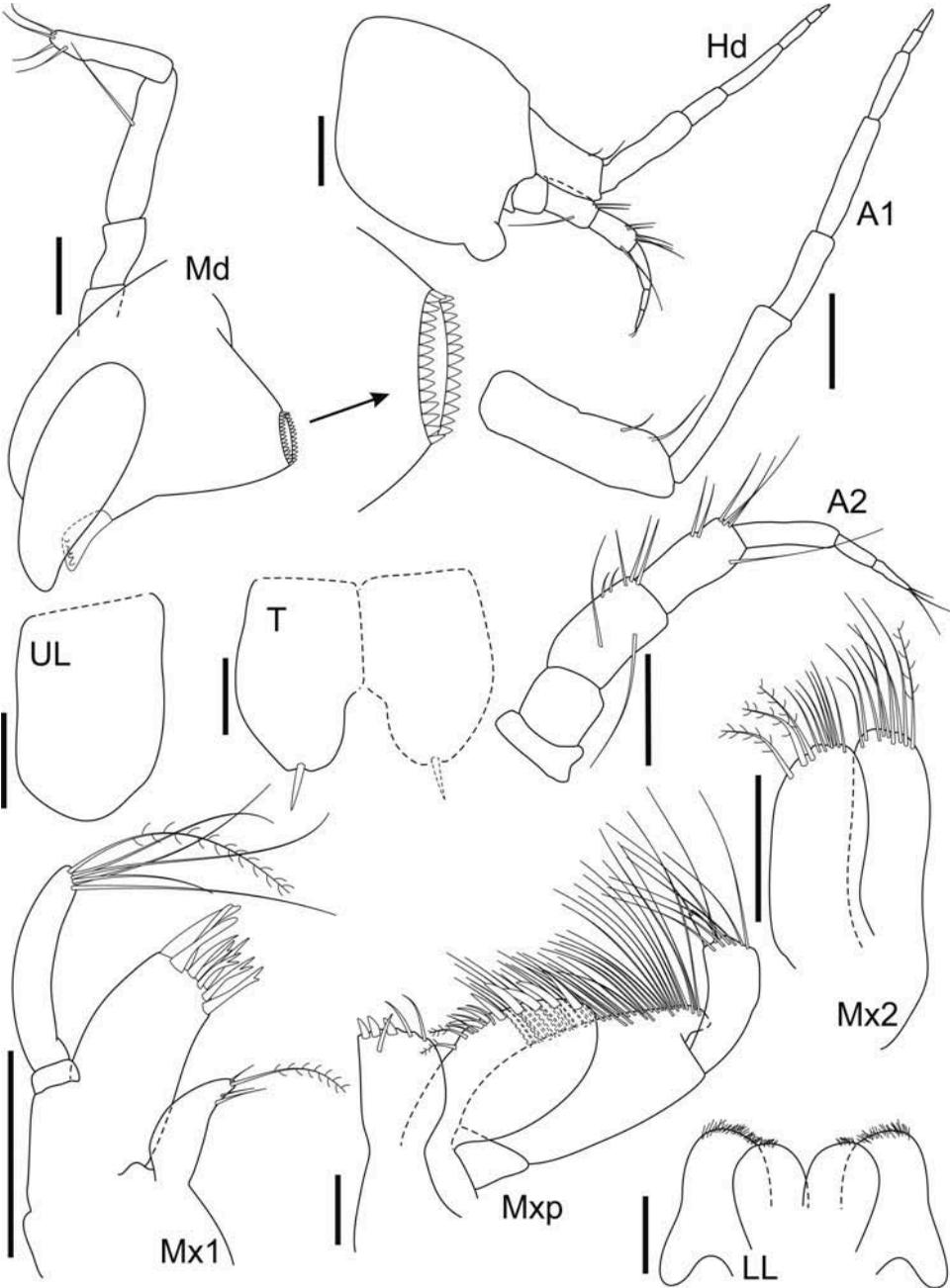


Figure 7. *Coronaurathoe rotunda* gen. et sp. nov., sex unknown, 3.0 mm, 21°52'59" S, 39°55'32" W, 750 m depth, MNRJ 21443. Scale bars: 0.2 mm for Hd; 0.1 mm for all others.

expanded, twice as long as wide, inner distal margin produced, inner margin densely setose; article 3 widened distally; article 4 0.3 times of article 3, with a slender distal setae.

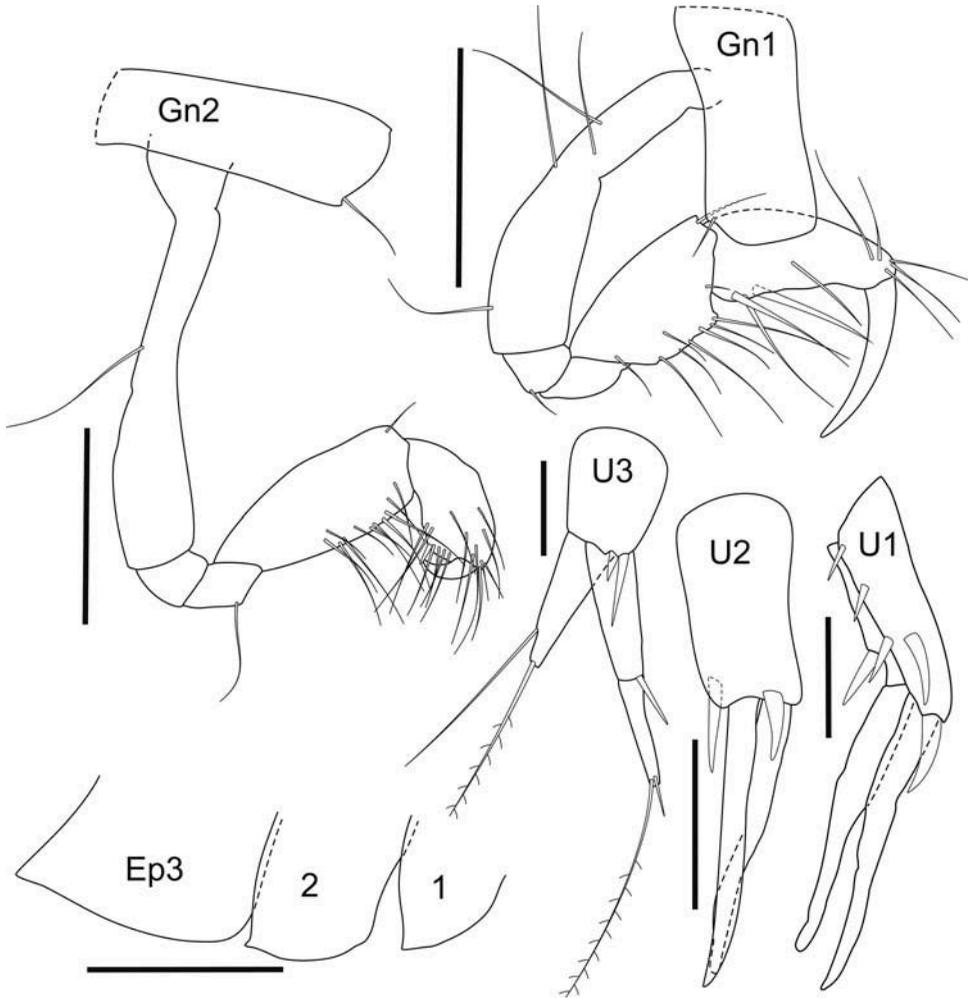


Figure 8. *Coronaurathoe rotunda* gen. et sp. nov., sex unknown, 3.0 mm, 21°52'59" S, 39°55'32" W, 750 m depth, MNRJ 21443. Scale bars: 0.1 mm for U1; 0.2 mm for U2<sup>3</sup>; 0.5 mm for all others.

Gnathopod 1 coxa rectangular, twice as long as wide, anteroventral corner subquadrate, posteroventral angle with a notch bearing a seta; basis long and slender, widened distally, posterior margin with four long setae; carpus slightly shorter than propodus, posterior margin slightly lobate and poorly setose; propodus with a tuft of setae on anterodistal angle; palm extremely acute, excavated and longer than posterior margin, with two long and robust setae near palmar corner; dactylus stout, as long as propodus. Gnathopod 2 coxa rectangular, 2.9 times longer than wide, posteroventral angle with a notch; basis long and slender, widened distally, posterior margin with one long seta; carpus 1.2 times longer than propodus, posterior margin not lobate and poorly setose; propodus facial margin setose; palm acute, shorter than outer margin, with one robust seta on palmar

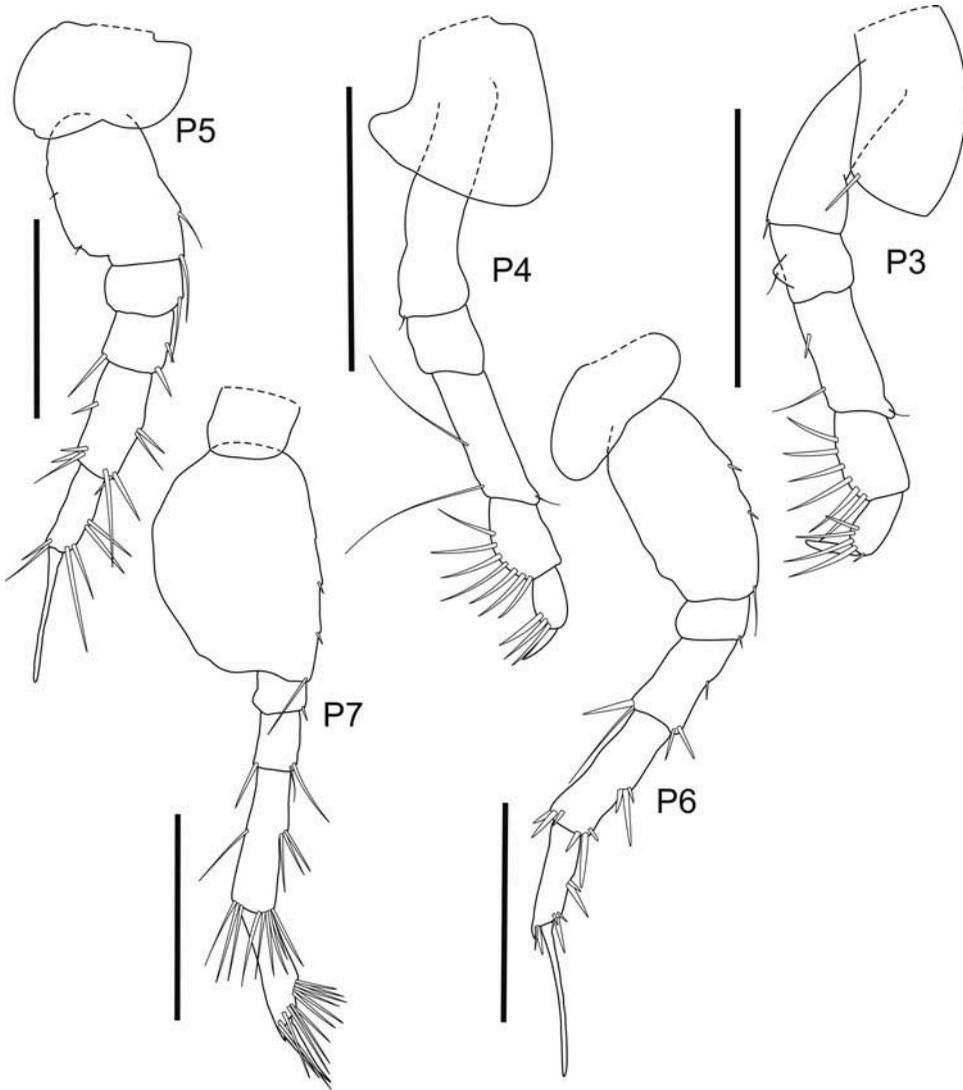


Figure 9. *Coronaurothoe rotunda* gen. et sp. nov., sex unknown, 3.0 mm, 21°52'59" S, 39°55'32" W, 750 m depth, MNRJ 21443. Scale bars: 0.5 mm.

corner; dactylus stout, as long as palm. Pereopod 3 coxa twice as long as wide, with one seta on posteroventral angle; basis 2.5 times longer than wide, with one seta on posterodistal angle; merus with two setae on posterior margin, shorter than carpus and propodus combined; carpus moderately robust, 1.5 times longer than wide, with six long robust setae on posterior margin; propodus more slender than carpus, with four robust setae on posterior margin; dactylus short, 0.8 times propodus length. Pereopod 4 coxa almost as long as wide, posterior margin excavate with posteroventral angle produced into rounded process; basis 3.3 times longer than wide, with one short seta on posterodistal angle; merus with

two long setae on posterior margin, longer than carpus and propodus combined; carpus moderately robust, 1.7 times longer than wide, with seven long robust setae on posterior margin; propodus more slender than carpus, with three robust setae on posterior margin; dactylus short, 0.75 times propodus length. Pereopod 5 coxa slightly wider than long, with posteroventral lobe produced; basis ovate, 1.3 times longer than wide, posterior margin slightly sinuous, distally notched, with two short setae; merus as long as wide, anterodistal angle with a robust seta; posterodistal angle with a robust seta; carpus 2.3 times longer than wide, anterior margin with two combs of robust setae (2–2), posterior margin with two combs of setae (2–2); propodus shorter than carpus, 2.75 times longer than wide, anterior margin with two combs of setae (2–2), posterodistal angle with two slender setae; dactylus styliform, 1.6 times longer than propodus. Pereopod 6 coxa 1.7 times wider than long, with produced posteroventral lobe; basis ovate, 1.8 times longer than wide, posterior margin smooth, lacking setae; merus 1.9 times longer than wide, anterior margin with two combs of setae (1–2), posterior margin with two setae on posterodistal angle; carpus 2.9 times longer than wide, anterior margin with two combs of slender setae (3–3), posterodistal angle with three slender setae; propodus about 0.7 times carpus length, 3.6 times longer than wide, anterior margin with two setae midway, distal margin with five slender setae; dactylus long, 1.4 times longer than propodus. Pereopod 7 coxa 1.2 times wider than long, with posteroventral lobe not produced; basis ovate, 1.4 times longer than wide, posterior margin smooth lacking setae; merus 1.3 times longer than wide, anterodistal angle with two seta, posterodistal angle with one long seta; carpus 2.5 times longer than wide, anterior margin with two combs of slender setae (3–5), posterior margin with a slender seta midway, posterodistal angle with three slender setae; propodus shorter than carpus, 3.8 times longer than wide, anterior margin with one middle comb of six slender setae, distal margin with six slender setae; dactylus short, 0.5 times of propodus length.

Epimeral plates 1–3 each with ventral margin lacking setae and with posteroventral angle acute. Uropod 1 peduncle 0.7 times shorter than rami, with one robust seta on both inner and outer distal angle; rami subequal in length and naked. Uropod 2 peduncle shorter than rami (0.85 times), with one facial robust seta, inner margin with four robust setae, outer margin with one robust seta; rami subequal in length and naked. Uropod 3 about 0.7 times the uropod 2 length and 0.5 times the uropod 1 length, peduncle 1.2 times longer than wide, 0.47 times shorter than outer ramus, distal outer angle with two robust setae; rami lanceolate; inner ramus subequal to article 1 of outer ramus, with one long seta on inner margin, with one apical long pappose seta; outer ramus 2-articulate, article 1 1.3 times longer than article 2, outer margin distal angle with one robust seta; article 2 with one apical long and pappose seta and one short seta. Telson cleft (about 40%), lateral margins with two short setae; distal margin of each lobe weakly incised distally with one robust seta.

### *Variation*

Paratypes showed variation in number of pappose setae on the ventral margin of both epimeral plates 1 and 2, and the flagellum of antenna 1, that varied from 4- to 5-articulate.

*Remarks*

*Coronaurothoe rotunda* gen. et sp. nov. is easily distinguished from other species in the family Urothoidae by its mandible molar, palp of maxilla 1 and palp of maxilliped. However, this species shares some features with species of other urothoid genera. Thus, the lacinia mobilis in *Coronaurothoe rotunda* gen. et sp. nov. is present, as in almost all species of the family. Only *Carangolia* and some species of *Urothoides* lack the lacinia mobilis. The new species has a rounded apical margin of the upper lip, as in *Urothoides*. The lower lip of *Coronaurothoe rotunda* gen. et sp. nov. does not have a distolateral process, as in *Carangolia* and *Urothoides* species. Finally, the new species has pereopod 7 subequal in length to pereopod 6, as in the other four genera of Urothoidae. Only *Urothoides* shares the phoxocephalid-like pereopod 7 with the new taxon, which is much shorter than pereopod 6.

*Geographic distribution*

Known only from the type locality, Campos Basin, off Rio de Janeiro State coast.

*Bathymetric range*

Collected at 750 m depth.

**Key to genera of the family Urothoidae**

1. Uropod 2 lacking rami ..... *Cunicus* Griffiths, 1974  
    Uropod 2 biramous ..... 2
2. Pereopod 7 shorter than pereopod 6, phoxocephalid-type .....  
    ..... *Urothoides* Stebbing, 1891  
    Pereopod 7 subequal in length to pereopod 6, not phoxocephalid-type ..... 3
3. Uropod 3 rami foliaceous ..... *Urothoe* Dana, 1852  
    Uropod 3 rami not foliaceous ..... 4
4. Lower lip outer lobe with distolateral projection; upper lip, distal margin truncated  
    ..... *Carangolioides* gen. nov.  
    Lower lip outer lobe without distolateral projection; upper lip, distal margin not  
    truncated ..... 5
5. Mandible molar with crown of stout setae; article 2 of maxilliped palp, distomedial  
    corner produced into a blunt process ..... *Coronaurothoe* gen. nov.  
    Mandible molar and lacinia mobilis absent; incisor strongly developed .....  
    ..... *Carangolia* Barnard, 1961

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