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Nauplius, v.20, n.2, p.107-116, 2012

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A new species of *Cheiriphotis* (Amphipoda, Corophiidae) from the southwestern Atlantic Ocean

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Abstract

A new species, *Cheiriphotis petronioi* sp. nov., is described from the Brazilian coast. This species is recognizable amongst its congeners by the carpus of adult male gnathopod 2 not fused with propodus and the palm acute and uropod 1 of adult males without a group of apical setae between rami. Specimens studied herein were collected between 23° and 34°S (Brazil – São Paulo and Rio Grande do Sul) from 16 to 38 m depth. An updated key to all species of the genus is provided.

Key words: Benthic amphipod, Brazil, Corophioidea, Protomeiinae, Taxonomy.

Introduction

The genus *Cheiriphotis* Walker, 1904 is widely distributed around the world, being recorded from circumtropical to warm-temperate ocean (Barnard and Karaman, 1991). The species of this genus are readily recognized by the large male gnathopod 2, strongly setose pereopods 5–7 and uropod 3 with inner ramus much reduced or absent. To date, there are 15 described species within this genus, but only two of them have been recorded from Brazilian waters, *C. megacheles* (Giles, 1885) and *C. neotropicalis* Valério-Berardo, Souza and Rodrigues, 2007, both from the southern Brazilian coast (Valério-Berardo and Myagi, 2000; Valério-Berardo *et al.*, 2007).

In this paper, we describe a new species of *Cheiriphotis* collected aboard of the R.V. Prof. W. Besnard in 1970 and N.Oc. Atlântico Sul in 1992 on the southwestern Brazilian continental shelf. This study represents the

southernmost record for the genus in the southwestern Atlantic Ocean. An updated key to all species of the genus is provided.

Material and Methods

Type material is deposited in the Museu de Oceanografia Petrônio Alves Coelho, Universidade Federal de Pernambuco (MOUFPE) and Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ). Appendages and mouthparts were mounted on glass slides and sealed with glycerol gel after staining with Chlorazol Black. The illustrations were drawn under optic microscope with *camera lucida* and digitally prepared according to methods described by Coleman (2003). The crustacean spines and setae classification follows Watling (1989). The nomenclature of the gnathopod palm is based on Poore and Lowry (1997). The following abbreviations are used in the figures:

A, antenna; E, epistome; Ep, epimeron; Gn, gnathopod; Ha, habitus; LL, lower lip; Md, mandible; Mx, maxilla; Mxp, maxilliped; P, pereopod; T, telson; UL, upper lip; Ur, uropod; m, male; f, female.

Results and Discussion

Systematics

Order Amphipoda Latreille, 1816

Suborder Corophiidea Leach, 1814

Family Corophiidae Leach, 1814

Subfamily Protomeiinae Myers and Lowry, 2003

Genus *Cheiriphotis* Walker, 1904

Diagnosis: See Barnard and Karaman (1991) and Wongkamhaeng *et al.* (2012).

Species composition: *Cheiriphotis* contains 15 species: *Cheiriphotis australiae* Stebbing, 1910; *C. delloyei* Pirlot, 1934; *C. durbanensis* K.H. Barnard, 1916; *C. erythraeus* Ruffo, 1969; *C. madagascarensis* Ledoyer, 1979; *C. mediterranea* Myers, 1983; *C. megacheles* (Giles, 1885); *C. minima* Ledoyer, 1982; *C. neotropicalis* Valério-Berardo, Souza and Rodrigues, 2007; *C. pediformis* Myers, 1995; *C. petronioi* sp. nov.; *C. rotui* Myers, 1989; *C. trifurcata* Wongkamhaeng, Azman and Puttapreecha, 2012; *C. walkeri* Stebbing, 1918; *C. williamsoni* Salman and Jabbar, 1990.

Removed species: *Cheiriphotis quadrichelatus* Ortiz and Lalana, 1997 (transferred to the genus *Kamaka* DersHAVIN, 1923).

Remarks: In the literature, the number of valid species in this genus has been controversial over time. Some morphologically similar species were synonymized and revalidated in different times (e.g. *C. delloyei*, *C. durbanensis* and *C. megacheles*). In fact, most species of *Cheiriphotis* show great ontogenetic variation in the morphology of gnathopod 2, therefore it may be hard to distinguish some species

from each other.

Barnard and Karaman (1991) listed 10 species and since then six new species were added to the genus (including *C. petronioi* sp. nov.). However, the species *C. quadrichelatus*, included in the Valério-Berardo *et al.* (2007) and Wongkamhaeng *et al.* (2012) keys, clearly belongs in the genus *Kamaka*, being a possible synonym of *K. taditadi* Thomas and Barnard, 1991 (Lowry, 2010). Thus, it should be transferred from *Cheiriphotis* to *Kamaka* and its validity should be better investigated. Barnard and Karaman (1991) cited also *C. geniculata* by K.H. Barnard, 1916, but this seems to be mistake as K.H. Barnard (1916) only described *C. durbanensis* sp. nov. (pag. 247) (Krapp-Schickel and Myers, 2006). Unfortunately, this error was disseminated in some subsequent publications. Recently, Wongkamhaeng *et al.* (2012) cited 16 species within this genus, including *C. quadrichelatus* and *C. durbanensis*, the latter species although listed in the generic composition was not included in their key to all *Cheiriphotis* species. Finally, we considered herein the genus *Cheiriphotis* comprising 15 species, as listed above.

Cheiriphotis petronioi sp. nov.
(Figs. 1–3)

Material examined: Holotype, female, 3.7 mm (dissected and drawn), Brazil, São Paulo State, *Mini Biological Trawl Project* (MBT E) – 23°51'S / 45°40'W, 06 May 1970, 22 m, on fine sand with silt, *R.V. Prof. W. Besnard* col., MOUFPE 15056.

Paratypes: 1 male, 3.5 mm (dissected and drawn), Brazil, São Paulo State, MBT E – 23°51'S / 45°40'W, 06 May 1970, 22 m, on fine sand with silt, *R.V. Prof. W. Besnard* col., MOUFPE 15057. 2 males and 5 females, Brazil, São Paulo State, MBT E – 23°51'S / 45°40'W, 06 May 1970, 22 m, on fine sand with silt, *R.V. Prof. W. Besnard* col., MOUFPE 15058. 1 male, Brazil, Rio Grande do Sul State, St. 23, 34°06'19"S / 52°20'44"W, 31 November 1992, 38 m, *N.Oc. Atlântico Sul* col., MNRJ 13880. 2 males, Brazil, Rio Grande do Sul State, St. 52, 32°44'46"S / 52°16'02"W,

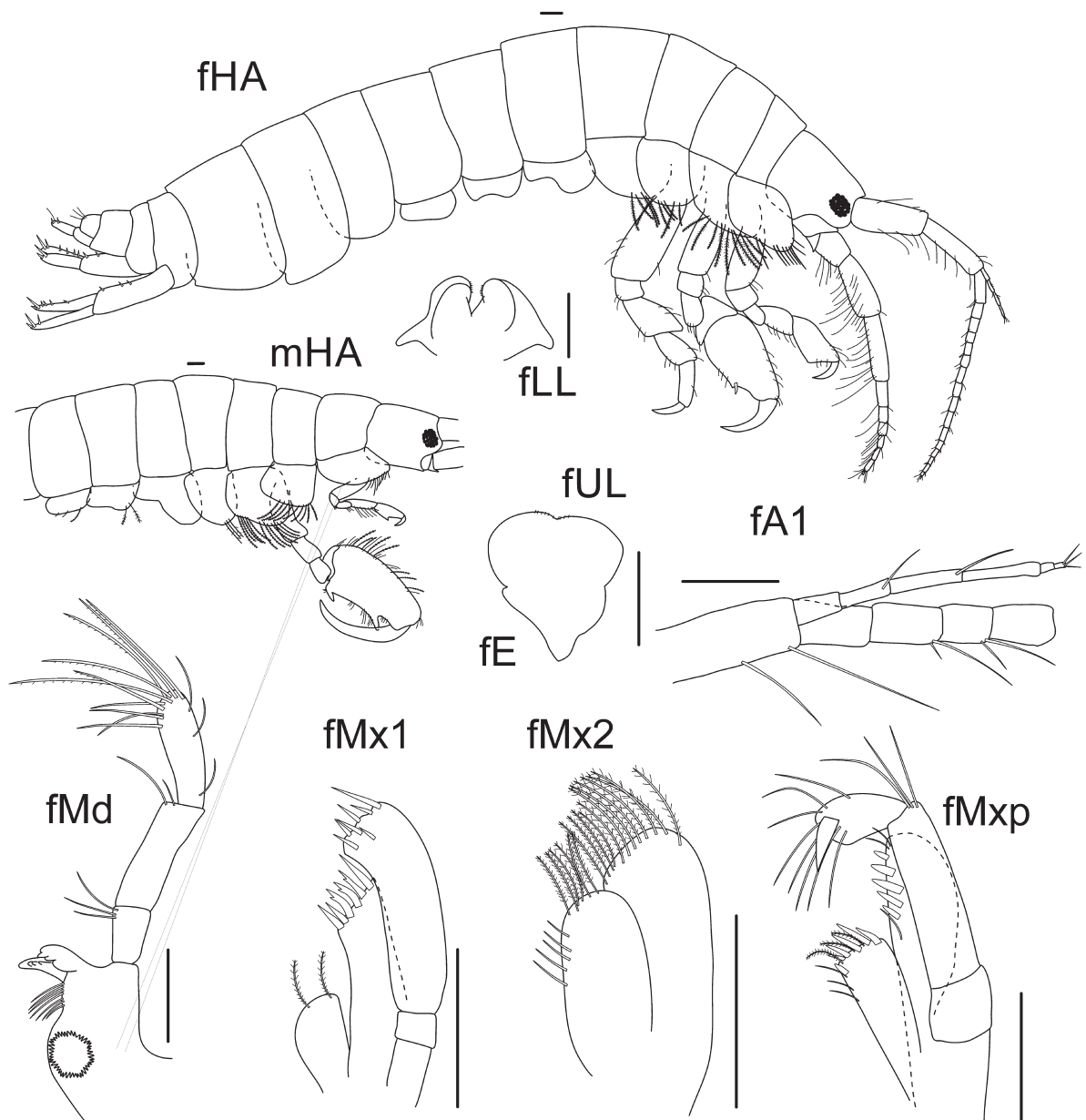


Figure 1. *Cheiriphotis petronioi* sp. nov., holotype, female, 3.7 mm, São Paulo State, Brazil (23°51'S / 45°40'W), 06 May 1970, 22 m, MOUFPE 15057. Paraatype, male, 3.5 mm, São Paulo State, Brazil (23°51'S / 45°40'W), 06 May 1970, 22 m, MOUFPE 15056. Scale bars = 0.1 mm.

01 December 1992, 16 m, *N.Oc. Atlântico Sul* col., MNRJ 13874. 2 males, Brazil, Rio Grande do Sul State, St. 528, 32°25'00"S / 51°35'00"W, 04 December 1992, 33 m, *N.Oc. Atlântico Sul* col., MNRJ 14038. 17 males, 50 females, Brazil, Rio Grande do Sul State, St. 531, 32°17'50"S / 51°50'00"W, 04 November 1992, 23 m, *N.Oc. Atlântico Sul* col., MNRJ 14043.

Etymology: Named in honor to Dr. Petrônio Alves Coelho (4 November 1937

– 28 November 2011), who made a great contribution to crustacean studies on Brazilian coast.

Diagnosis: Head rostrum short. *Coxa 1* subtriangular, with a row of simple setae on ventral margin. *Gnathopod 1* propodus, palm oblique, surface of palm with 11 robust setae, dactylus elongate, inner margin serrate. *Gnathopod 2* propodus, palm with a great excavation and margin defined by a robust seta; dactylus robust, curved, serrate,

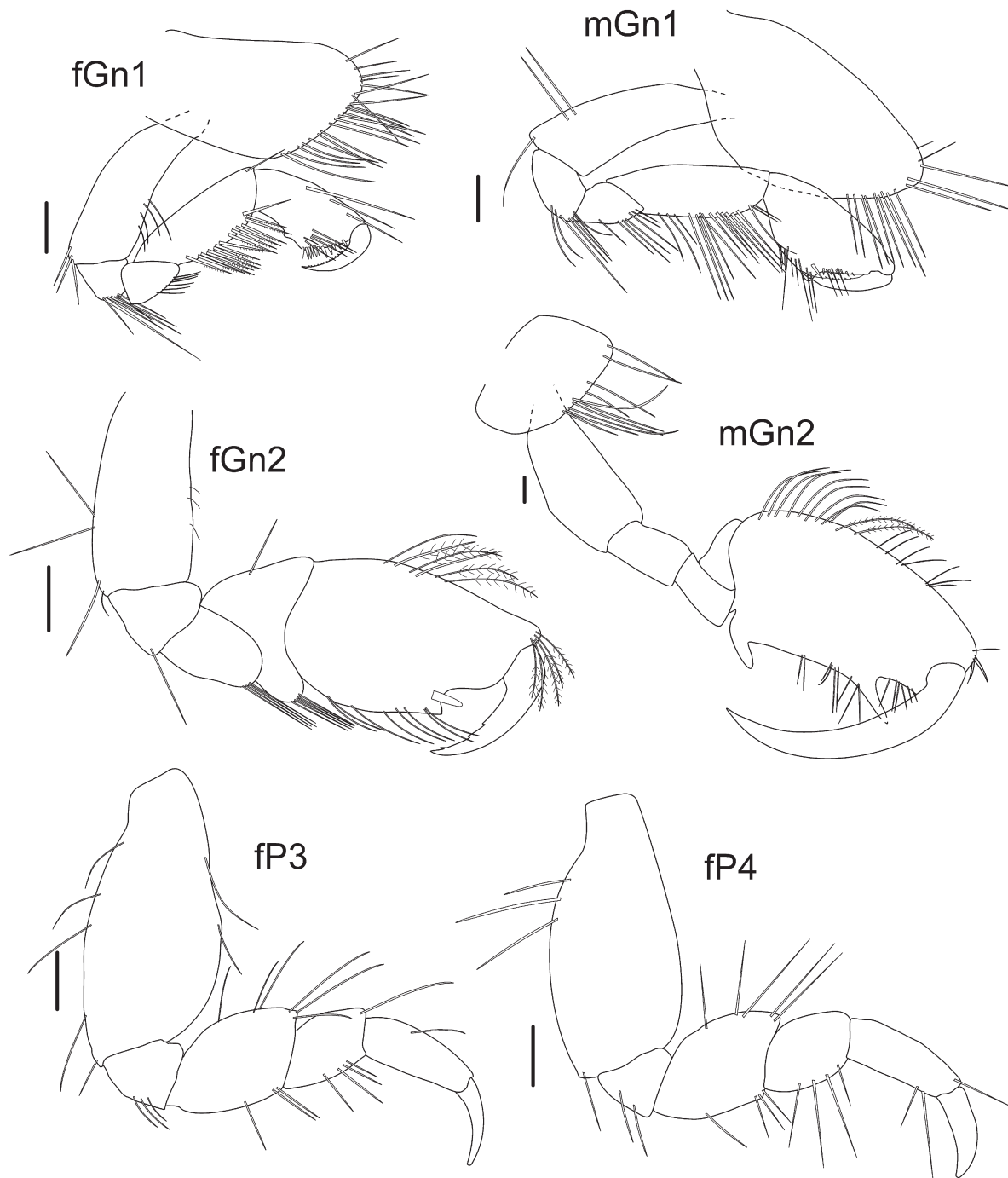


Figure 2. *Cheiriphotis petronioi* sp. nov., holotype, female, 3.7 mm, São Paulo State, Brazil (23°51'S / 45°40'W), 06 May 1970, 22 m, MOUFPE 15057. Paratype, male, 3.5 mm, São Paulo State, Brazil (23°51'S / 45°40'W), 06 May 1970, 22 m, MOUFPE 15056. Scale bars = 0.1 mm.

extending well the palm. *Epimeron* 1 lacking setae on ventral margin. *Epimeron* 2–3 with a notch and 1 simple seta. *Uropod* 3 biramous; peduncle with 3 robust setae on dorsodistal margin; inner ramus vestigial, with 1 robust seta on apical margin; outer ramus 3 times inner ramus length, with 2 robust setae and 1 simple seta on apical margin and 2 robust setae

on dorsal margin. *Telson* broader than long, with 2 simple setae on posterodistal margin, laterally naked.

Description: based on holotype female, 3.7 mm (MOUFPE 15056). *Head* rostrum short; *Antenna* 1 subequal in length to antenna 2; accessory flagellum 6-articulate, with 3 short

setae. *Antenna 2* peduncle article 4 shorter than article 5; flagellum 6-articulate, shorter than peduncle. *Epistome* acute. *Mandible* palp article 1 with 3 setae on inner margin, article 2 longer than article 3, with 2 inner distal setae, article 3 spatulate, with long distal setae and 3 simple setae on outer margin. *Maxilla 1* inner plate shorter, with 2 apical pinnate setae; outer plate reaching about 2/3 length of palp, with 6 distal robust setae; palp 2-articulate, article 2 with 7 distal robust setae. *Maxilla 2* inner plate shorter than outer plate, with 5 simple and long setae on inner margin, both plates with distal plumose setae. *Maxilliped* inner lobe reaching well beyond apex of article 1 of palp, with 6 robust setae and 3 plumose setae on distal margin and 3 simple setae on inner margin; outer plate reaching about 2/3 length of palp article 2, with 5 strong robust setae on inner margin; palp 4-articulate, article 2 longer than articles 3 and 4 combined, article 4 with 1 robust seta and a few of simple setae on distal margin.

Coxa 1 longer than wide, widened distally, with a row of plumose setae on ventral margin, anteroventral corner rounded produced. *Coxae 2–4* subquadrate, with a row of plumose setae on ventral margin. *Coxa 5* bilobate, produced anterodistally, naked. *Gnathopod 1* basis long, not much broader distally, with 4 simple setae on anterior margin and 3 simple setae on posterodistal margin corner; ischium and merus short, with a row of simple and long setae on posterior margin; carpus longer than propodus, with a row of pinnate setae along posterior margin and 1 long seta on anterodistal corner; propodus anterior margin with 3 long simple setae, palm oblique, with 11 robust setae; dactylus robust and slightly overlapping palmar corner, inner margin serrate. *Gnathopod 2* basis moderately robust, with 3 long setae on posterior margin; ischium shorter than merus, with one long seta on posterodistal corner; merus with a tuft of long setae on posterodistal corner; carpus triangular, lobate, with one single seta on anterior margin, posterior margin with a tuft of long setae; propodus ovate, 2.4X longer than

carpus, anterior margin with a row of plumose setae, posterior margin with a row of long simple setae, palm acute, with a excavation, palmar corner defined by a subacute process and one robust seta. *Pereopods 3 and 4* similar in shape, both with basis equal in length to articles 2–4 and moderately inflated; merus with anterior margin produced; carpus subrectangular, with a few long simple setae on posterior margin; propodus longer and slender than carpus; dactylus curved and falcate. *Pereopod 5* basis ovate, as broad as long, with a 4 short setae on posterior margin, posterodistal corner produced; ischium short and naked; merus subequal to carpus, with a row of plumose and simple setae along anterior margin; carpus with 3 simple setae on anterior margin and 2 on posterior margin; propodus longer than carpus, with 4 simple setae on anterior margin and posterior margin armed with 4 robust setae; dactylus short and falcate. *Pereopod 6* missing. *Pereopod 7* basis ovate, posterior margin with a row of plumose setae; ischium short, with 2 simple setae on anterodistal margin; merus and carpus subequal in length; propodus slender, with a tuft of simple long setae on posterodistal corner; dactylus curved, with 1 plumose seta on posterior margin.

Epimeron 1 lacking setae on ventral margin. *Epimera 2–3* with a notch and 1 simple seta. *Uropod 1* biramous, longer than uropods 2 and 3; peduncle elongate, with 1 robust seta on posterodistal margin; rami subequal in length; inner ramus lacking marginal setae, with 3 distal robust setae; outer ramus with 2 marginal robust setae, 2 subapical robust setae and 2 apical robust setae. *Uropod 2* biramous; peduncle with 2 robust setae on dorsal margin; rami subequal in length; inner ramus with 2 marginal robust setae and 2 apical robust setae; outer ramus with 2 apical robust setae. *Uropod 3* biramous; peduncle with 3 robust setae on dorsodistal margin; inner ramus short, with 1 distal robust seta; outer ramus with 2 dorsomarginal robust setae and two groups of lateromarginal robust setae (3–1), and 2 apical robust setae and one slender seta. *Telson* wider than long, with 2 simple setae on posterodistal margin, lateral naked.

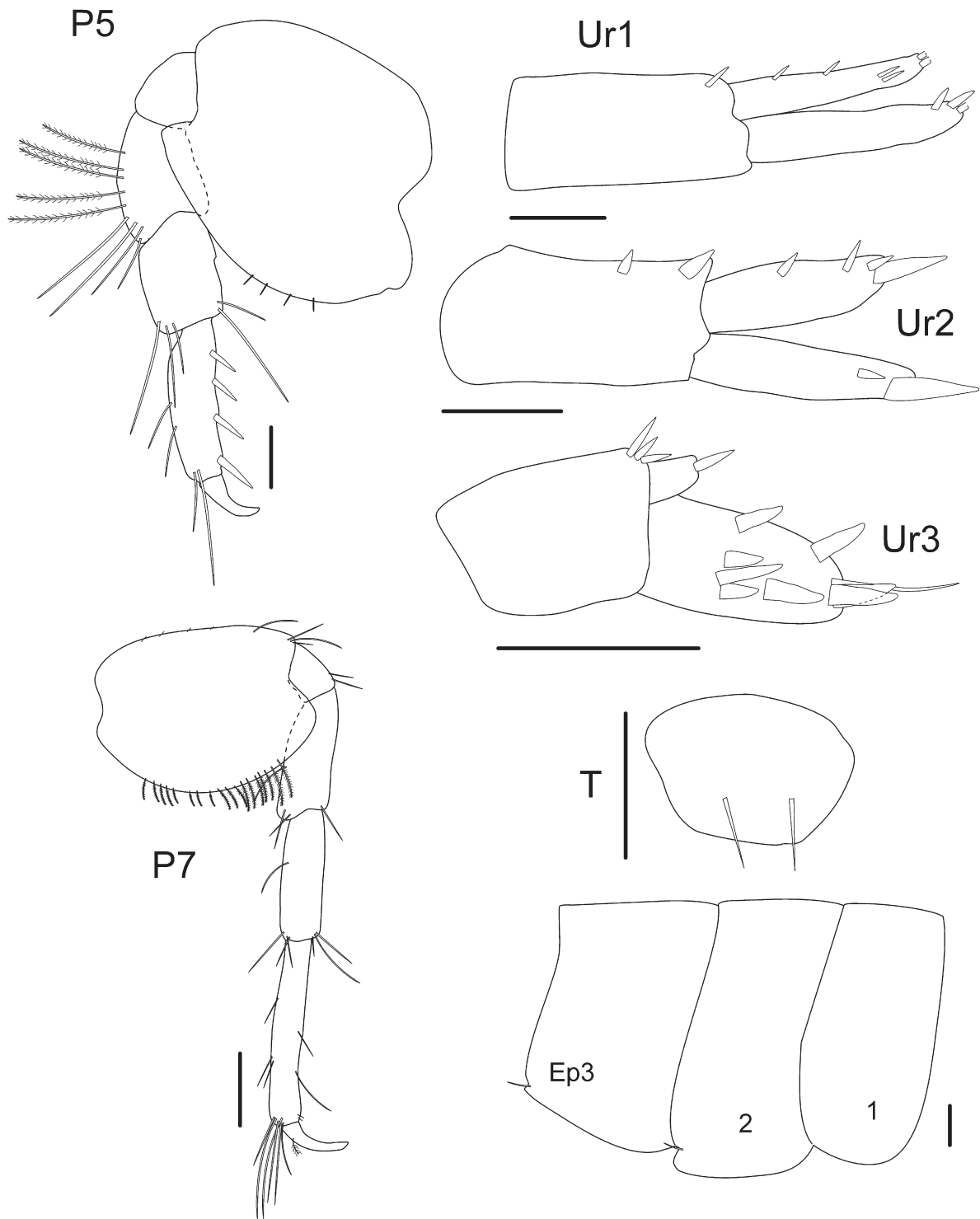


Figure 3. *Cheiriphotis petronioi* sp. nov., paratype, female, 3.7 mm, São Paulo State, Brazil (23°51'S / 45°40'W), 06 May 1970, 22 m, MOUFPE 15057. Scale bars = 0.1 mm.

Sexually dimorphic characters based on paratype male (3.5 mm, MOUFPE 15057). *Gnathopod 1* basis long, with 2 long simple setae on posterior margin and 1 simple seta on posterodistal margin corner; ischium slightly longer than merus, with long and simple setae

on posterodistal margin; merus subtriangular with long and simple setae on posterodistal margin; carpus longer than propodus, anterior margin lacking setae, posterior margin with a row of pinnate setae; propodus anterior margin lacking setae, posterior margin with a row

of pinnate setae, palm acute, excavated with short setae, palmar corner defined by a blunt spine and one robust setae; dactylus robust and slightly overlapping palmar corner, inner margin serrate. *Gnathopod 2* broader than gnathopod 1; basis moderately robust; ischium and merus subrectangular; carpus not fused with propodus; propodus ovate, enormous, 2X longer than wider, anterior margin with a row of plumose and simple setae, palm extremely acute, occupying most of posterior margin, with 3 strong acute processes, two near dactylus insertion separated by a U-excavation, the other one defining palmar corner; dactylus robust and curved, fitting palm.

Remarks: *Cheiriphotis petronioi* sp. nov. shares the biramous uropod 3 with *C. australiae*, *C. delloyei*, *C. durbanensis*, *C. erythraeus*, *C. megacheles* and *C. rotui*. However, *C. petronioi* sp. nov. differs from *C. australiae*, *C. erythraeus* and *C. rotui* in having 6 marginal robust setae on outer ramus of uropod 3. Also, *C. petronioi* sp. nov. is readily distinguished from *C. megacheles* by the shape of gnathopod 2. In the former, adult male has the carpus and propodus not fused and propodus with palm extremely acute occupying most of posterior margin (*vs.* transverse).

Cheiriphotis petronioi sp. nov. additionally resembles *C. erythraeus*. In adult male, both species have gnathopod 2 with carpus not fused with propodus and uropod 1 peduncle without a group of apical setae between rami. However, *C. petronioi* sp. nov. can be distinguished from *C. erythraeus* by gnathopod 2 with propodus ovate (*vs.* rectangular) and palm less sculptured and acute (*vs.* transverse), and epimeron 2 without plumose setae on ventral margin.

Geographical distribution: Specimens were collected between 23° and 34°S (Brazil – São Paulo and Rio Grande do Sul) (Fig. 4).

Depth range: 16 to 38 m depth.

1a. Uropod 3 uniramous..... 2

1b. Uropod 3 with short inner ramus..... 9

2a. Antenna 1 accessory flagellum 2-articulate..... *C. minima* Ledoyer, 1982¹

2b. Antenna 1 accessory flagellum 2–4 articulate, if 2-articulate uropod 3 peduncle broadened..... 3

3a. Gnathopod 2 carpus fused with the propodus..... 4

3b. Gnathopod 2 carpus short but not fused with the propodus 8

4a. Gnathopod 2 basis dilated on anterodistal corner, propodus palm transverse with 2 depressions; epimeron 2 without plumose setae on ventral margin *C. walkeri* Stebbing, 1918

4b. Gnathopod 2 basis not dilated on anterodistal corner, propodus palm transverse with 2–4 processes (excluding palmar corner); epimeron 2 with plumose setae on ventral margin.....5

5a. Gnathopod 1 carpus slightly shorter than propodus; gnathopod 2 propodus as broad as long.... *C. williamsoni* Salman and Jabbar, 1990

5b. Gnathopod 1 carpus as long as or longer than propodus; gnathopod 2 propodus broader than long..... 6

6a. Gnathopod 2 propodus palmar corner defined by a short spine..... *C. trifurcata* Wongkamhaeng, Azman and Puttapreecha, 2012

6b. Gnathopod 2 propodus palmar corner defined by a strong spine..... 7

7a. Gnathopod 2 propodus broader than long; epimeron 3 lacking a notch on posteroventral margin..... *C. neotropicalis* Valério-Berardo, Souza and Rodrigues, 2007

7b. Gnathopod 2 propodus as broad as long;

epimeron 3 with a notch on posteroventral margin..... *C. mediterranea* Myers, 1983

8a. Gnathopod 2 palm acute; uropod 3 peduncle broadened distally
..... *C. madagascarensis* Ledoyer, 1979²

8b. Gnathopod 2 palm transverse; uropod 3 peduncle not broadened distally.....
..... *C. pediformis* Myers, 1995

9a. Head ventral margin strongly excavated to insert the large peduncular articles of antenna 2..... *C. rotui* Myers, 1989

9b. Head not as above9

10a. Gnathopod 2 carpus completely fused with propodus..... *C. megacheles* (Giles, 1885)

10b. Gnathopod 2 carpus short but not fused with propodus..... 11

11a. Gnathopod 2 palm transverse, dactylus overlapping the palm, epimeron 2 with plumose setae on ventral margin.....
..... *C. erythraeus* Ruffo, 1969

11b. Gnathopod 2 palm acute, dactylus not overlapping the palm, epimeron 2 without setae on ventral margin 12

12a. Gnathopod 2 palm with a great excavation and with a strong projection defining posteroventral corner; female gnathopod 2 palm without robust seta along posterior margin *C. australiae* Stebbing, 1910

12b. Gnathopod 2 palm without a great excavation, 1–2 teeth defining posteroventral corner; female gnathopod 2 palm with a robust seta along posterior margin 13

13a. Antenna 1 accessory flagellum +5-articulate, gnathopod 2 palm occupying most of posterior margin of propodus..... *C. petronioi* sp. nov.

13b. Antenna 1 accessory flagellum no more than 4-articulate in adult, gnathopod 2 palm not occupying most of posterior margin of propodus..... 14

14a. Antenna 1 accessory flagellum 3-articulate; gnathopod 2 palm longer than posterior margin of propodus; uropod 1 with a strong ventromedial robust seta.....
..... *C. delloyei* Pirlot, 1934

14b. Antenna 1 flagellum accessory 4-articulate; gnathopod 2 palm subequal in length than posterior margin of propodus; uropod 1 without ventromedial robust seta ..
..... *C. durbanensis* K.H. Barnard, 1916

¹ Male is undescribed

² Antennae were missing on type material

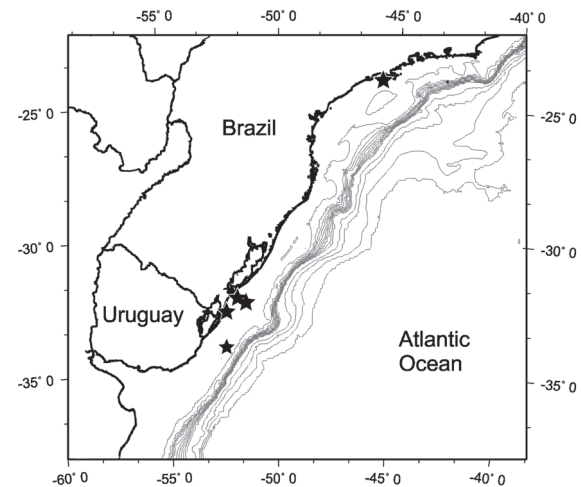


Figure 4. Geographic distribution of *Cheiriphotis petronioi* sp. nov.

Acknowledgments

Thanks are due to Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and Fundação de Amparo à Ciência e Tecnologia do Estado de Pernambuco (FACEPE) for the first author's fellowship (Edital 2010/1). We would like to thank Dr Cristiana S. Serejo for making available the specimens from crustacean collection of Museu Nacional/UFRJ.

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