

First record of the deep sea Paguridae *Catapaguroides microps* (Decapoda: Anomura) in the southwestern Atlantic Sea

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Abstract: The knowledge of Brazilian Paguridae (Decapoda, Anomura) is based mainly on shallow water samples (0-250 m), and only five species were recorded from deeper than 250 m. The genus *Catapaguroides* Milne-Edwards & Bouvier, 1892 is one of a few genera of Paguridae characterized by the absence of a pleurobranchia above the fourth pereopod. The genus is known mainly from the Indian and Pacific Oceans, and only three species are recognized in the Atlantic Ocean viz. *C. megalops* Milne-Edwards & Bouvier, 1892, *C. iris* Bouvier, 1922 and *C. microps* Milne-Edwards & Bouvier, 1892. *Catapaguroides microps* has been collected from 718 to 1900 m depth in the Indo-Pacific, northwestern and eastern Atlantic. Here, we describe specimens of *C. microps* collected from Campos Basin, SE Brazil. This is the first record of this species from the Southwestern Atlantic.

Résumé : Premier signalement du paguridé de grand fond *Catapaguroides microps* (Decapoda : Anomura) dans l'Atlantique sud-ouest. La connaissance sur les Paguridae du Brésil (Decapoda, Anomura) est basée sur des échantillons d'eaux peu profondes (0-250 m) et seulement cinq espèces sont connues des eaux profondes. Très peu de genres de Paguridae n'ont pas de pleurobranchies sur la patte 4, dont le genre *Catapaguroides* Milne-Edwards & Bouvier, 1892. Ce genre est plus fréquent dans l'Indo-pacifique et seulement trois espèces sont connues de l'Atlantique: *C. megalops* Milne-Edwards & Bouvier, 1892, *C. iris* Bouvier, 1922 et *C. microps* Milne-Edwards & Bouvier, 1892. *Catapaguroides microps* a été récoltée auparavant à 718-1900 m de profondeur dans l'Indo-pacifique et l'Atlantique nord. Ici, une population de *C. microps* est décrite du Bassin de Campos, Sud-est du Brésil. C'est la première fois que *C. microps* est signalée dans l'Atlantique sud-occidental.

Keywords: *Catapaguroides* • Paguroidea • Taxonomy • Campos Basin • Brazil

Introduction

The genus *Catapaguroides* was first described by Milne-Edwards & Bouvier (1892) based on *Catapaguroides*

microps, collected from Azores and Canaries, but this species was formally designated as type-species of the genus by Holthuis (1962). The genus *Catapaguroides* is recognized by the presence of ten pairs of gills (only two pairs of arthrobranchs above bases of the third maxilliped to fourth pereopods are present; without pleurobranchs); third maxilliped with *Crista dentata* reduced and lacking accessory tooth on ischium. In males the right

sexual tube is long and curved towards top while the left is short and covered with a fringe of setae (De Saint Laurent, 1968; McLaughlin, 2003). Currently, this genus comprises of 20 species (Komai, 2009; Türkay, 2009). So far, only three of these species have been recorded from Atlantic Ocean viz. *C. megalops* Milne-Edwards & Bouvier, 1892, *C. iris* Bouvier, 1922 and *C. microps* Milne-Edwards & Bouvier, 1892.

Catapaguroides microps differs from its sister species by the following characters: ocular peduncle with its reduced cornea and unarmed cheliped. The distribution is considered to be cosmopolitan, occurring in the Indo-Pacific, Eastern and Northwestern Atlantic Oceans, in deep waters ranging from 718 m to 1900 m (McLaughlin et al., 2007a). The original description of *C. microps*, was made by Milne Edwards & Bouvier (1892) and followed by two other publications by Milne Edwards & Bouvier (1899 & 1900). Holthuis (1962), subsequently designated *C. microps* as the type-species of the genus, and de Saint-Laurent (1968) redescribed the genus *Catapaguroides* with detailed descriptions of *C. microps*. Furthermore, Ingle (1993) gave an extensive description accompanied with figures and McLaughlin et al. (2007b) also gave a diagnosis accompanied by color photos and drawings of selected parts. The present study describes specimens of *C. microps* collected from the deep waters at Campos Basin, SE Brazil. This is the first record of *Catapaguroides* from the Southwestern Atlantic.

Materials and Methods

The specimens examined were collected by dredge as part of the Campos Basin Deep Sea Environmental Project. During this project two cruises were done on the continental slope of Campos Basin, Rio de Janeiro (21°48'S-22°48'S): Oceanprof I in February, 2003 and Oceanprof II August, 2003.

The specimens were preserved in alcohol 70%, removed from their shells for identification and deposited in the Museu Nacional Crustacea collection. The measurements given are for the shield length (sl). All the setae listed are simple unless otherwise stated.

Systematics

Catapaguroides microps Milne Edwards & Bouvier, 1892 (Figs 1 & 2)

Catapaguroides microps Milne Edwards & Bouvier, 1892: 221; 1899: 63; 1900: 207, pl. 204, figs 17-20; Holthuis, 1962: 243; de Saint Laurent, 1968: 935, figs 17, 21, 22 & 24; McLaughlin, 2002: 497.

Material examined

Cruise Oceanprof I: MNRJ 19002, 22°45.9'S-40°19.7'W, 1129 m, 1 male (sl. 1.9 mm); MNRJ 19003, 22°10.1'S-39°49.0'W, 1319 m, 1 male (sl. 2.2 mm), 1 ovigerous female (sl. 1.9 mm); MNRJ 19004, 22°11.7'S-39°47.2'W, 1626 m, 1 ovigerous female (sl. 1.9 mm); MNRJ 19005, 21°53.6'S-39°51.3'W, 1067 m, 2 males (sl. 2.2-2.5 mm), 1 ovigerous female (sl. 1.9 mm). **Cruise Oceanprof II:** MNRJ 21142, 22°30.7'S-40°00.9'W, 1124 m, 2 males (sl. 2.1-2.3 mm), 1 female (sl. 1.7 mm); MNRJ 21143, 22°32.6'S-39°56.0'W, 1605 m, 1 male (sl. 2.1 mm); MNRJ 21145, 22°24.4'S-39°55.5'W, 1116 m, 1 female (sl. 1.4 mm); MNRJ21141, 22°27.1'S-39°54.6'W, 1308 m, 6 males (sl. 1.5-2.4 mm), 7 ovigerous females (sl. 1.7-2.5 mm), 3 females (sl. 1.4-1.8 mm); MNRJ 21144, 22°46.1'S-40°20.6'W, 1111 m, 1 male (sl. 2.0 mm); MNRJ 21136, 22°11.7'S-39°51.7'W, 1143 m, 5 males (sl. 2.0-2.3 mm), 5 ovigerous females (sl. 1.4-1.9 mm), 5 females (sl. 1.6-2.1 mm); MNRJ 21137, 22°11.7'S-39°49.1'W, 1329 m, 2 males (sl. 1.9-2.4 mm), 3 ovigerous females (sl. 1.3-2.1 mm), 1 female (sl. 1.6 mm); MNRJ 21139, 22°12.1'S-39°47.2'W, 1623 m, 2 males (sl. 1.6-2.1 mm), 2 ovigerous females (sl. 1.6-1.7 mm); MNRJ 21133, 21°53.1'S-39°51.4'W, 1089 m, 36 males (sl. 1.2-2.6 mm), 24 ovigerous females (sl. 1.3-2.3 mm), 29 females (sl. 1.1-2.2 mm); MNRJ 21134, 21°53.5'S-39°51.2'W, 1080 m, 29 males (sl. 1.4-2.6 mm), 36 ovigerous females (sl. 1.4-2.1 mm), 14 females (sl. 1.4-2.3 mm); MNRJ 21146, 21°51'S-39°48.9'W, 1353 m, 4 males (sl. 1.7-2.1 mm), 1 ovigerous female (sl. 1.8 mm); MNRJ 21147, 21°50.2'S-39°47.9'W, 1621 m, 1 male (sl. 1.6 mm), 3 ovigerous females (sl. 1.8-2.2 mm), 2 females (sl. 1.9-2.0 mm); MNRJ 21135, 22°16.3'S-39°53.4'W, 1085 m, 45 males (sl. 1.5-2.5 mm), 28 ovigerous females (sl. 1.4-2.3 mm), 20 females (sl. 1.3-2.2 mm); MNRJ 21148, 22°15.5'S-39°51.3'W, 1316 m, 2 males (sl. 1.9-2.1 mm), 4 ovigerous females (sl. 1.8-2.1 mm); MNRJ 21140, 22°16.1'S-39°51.6'W, 1298 m, 2 males (sl. 2.4-2.1 mm), 3 ovigerous females (sl. 1.7-1.9 mm); MNRJ 21138, 22°15.5'S-39°47.5'W, 1623 m, 3 ovigerous females (sl. 1.7-1.9 mm).

Diagnosis

Fourth pereopod pleurobranchia absent. Corneas reduced. Ocular peduncles shorter than antennal and antennular peduncles. Basal antennular peduncle short, unarmed with statocyst, third segment with three or two long dorsal setae. Right cheliped longer and more robust than left cheliped; carpus unarmed. Male second pereopods with long distal articulated spine, a small tuft of setae close to it. Male with long right sexual tube (five times longer than coxae), left sexual tube short covered by a fringe of setae. Female left gonopore on third pereopod coxae (modified from de Saint Laurent, 1968 and McLaughlin, 2002).

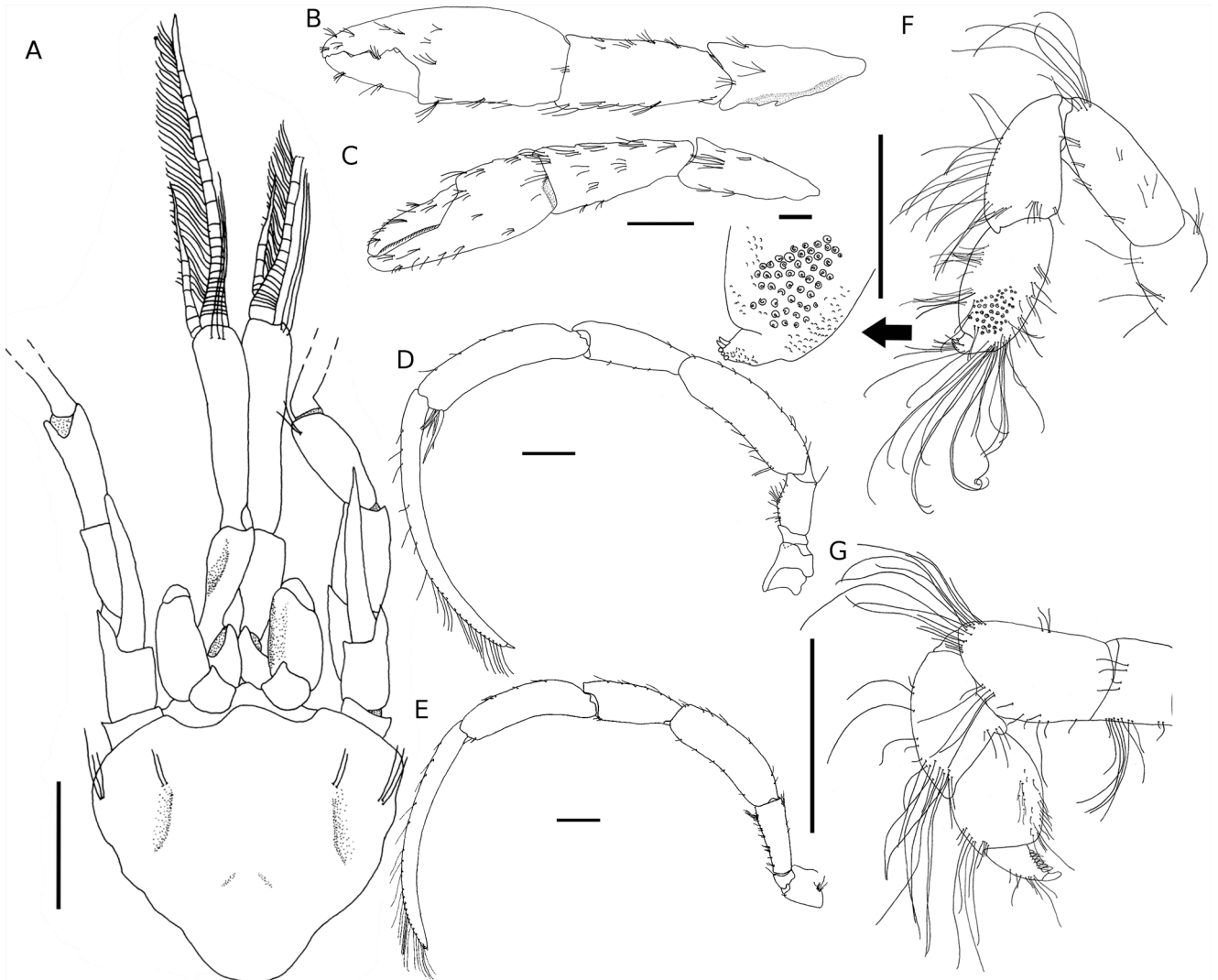


Figure 1. *Catapaguroides microps* Milne-Edwards & Bouvier, 1892. Male sl. 2.1 mm, MNRJ 21135. **A.** Cephalic shield. **B.** Right cheliped. **C.** Left cheliped. **D.** Second pereopod. **E.** Third pereopod. **F.** Fifth pereopod with hook setae detail. **G.** Fourth pereopod semi-chelated. Scale: 1.0 mm, fifth pereopod detail, scale: 0.01mm.

Figure 1. *Catapaguroides microps* Milne-Edwards & Bouvier, 1892. Mâle, bouclier céphalo-thoracique 2.1 mm, MNRJ 21135. **A.** Bouclier céphalo-thoracique. **B.** Chélipède droit. **C.** Chélipède gauche. **D.** Deuxième patte thoracique. **E.** Troisième patte thoracique. **F.** Cinquième patte thoracique (vue détaillée de soies en crochets). **G.** Quatrième patte thoracique semichélate. Échelle : 1,0 mm, cinquième patte vue détaillée, échelle : 0,01 mm.

Description

Shield slightly broader than long (Fig. 1A); anterior margin between rostral lobe and lateral projections concave; anterolateral margins sloping; posterior margin truncate, lateral angles rounded; dorsal surface iridescent, with moderately long setae close to anterolateral angle, with few sparse setae. Rostrum rounded. Lateral projections subtriangular reaching level of rostrum; small submarginal spine present.

Ocular peduncles short, basally robust (Fig. 1A), almost

0.4 shield length; dorsal margin with few short setae, corneal base with moderately long setae; corneas conical, reduced. Small ocular segments (Fig. 1A), subtriangular with spine on internal margin; basal width separated by less than one segment.

Antennular peduncles, when totally extended, overreaching distal margin of cornea. Basal segment unarmed, few setae on dorsolateral margin. Penultimate segment with three setae on dorsal margin. Ultimate segment with a row of setae on internal and dorsal margins, three plumose setae on distal margin.

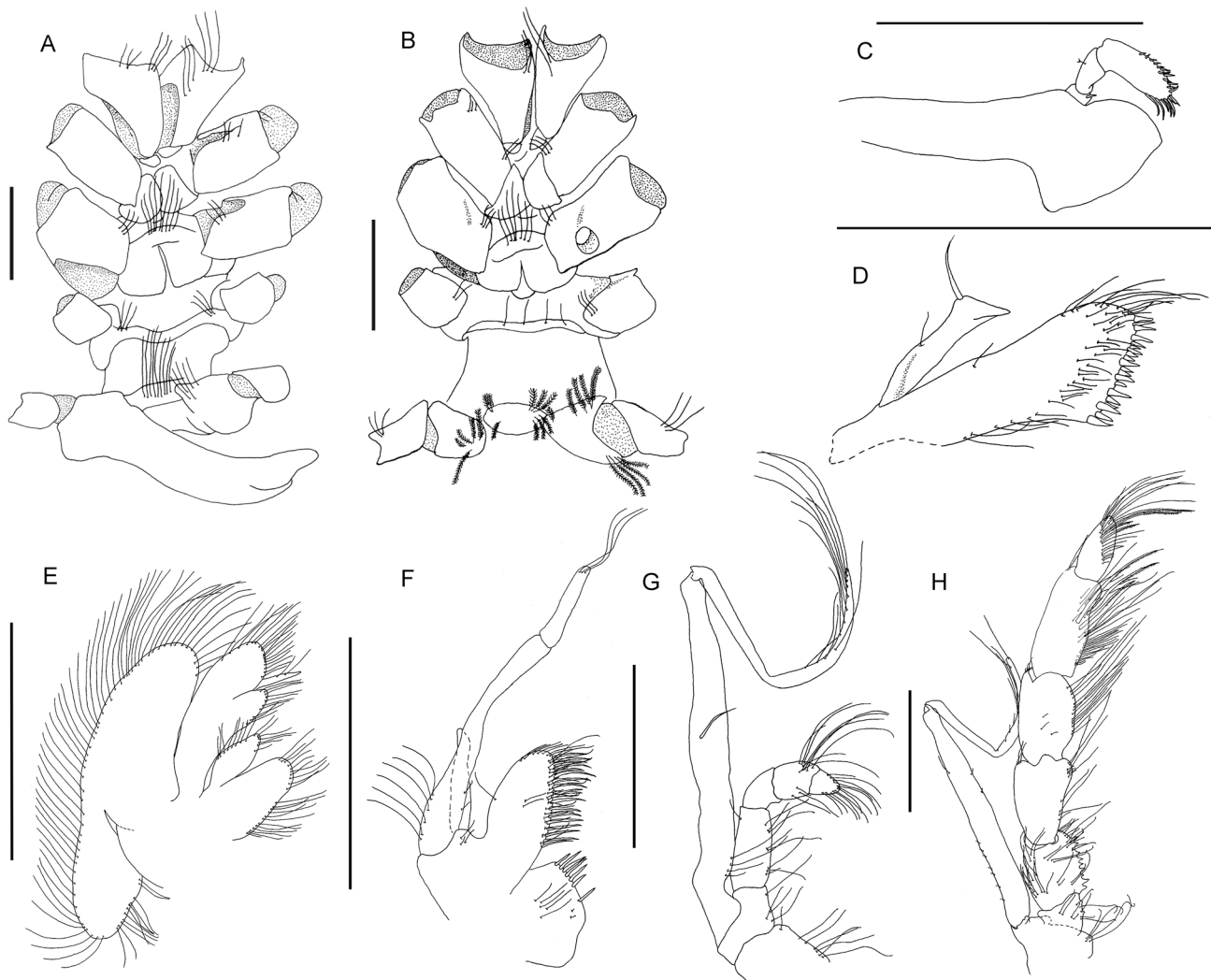


Figure 2. *Catapaguroides microps* Milne-Edwards & Bouvier, 1892. Male, sl. 2.2mm, MNRJ 21135. **A.** Ventral view, right sexual tube dislocated to down, left sexual tube with fringe of long setae. **C.** Mandible. **D.** Maxillula. **E.** Maxilla. **F.** First maxilliped. **G.** Second maxilliped. **H.** Third maxilliped with reduced *crista dentata*. Female, sl. 2.1 mm. **B.** Ventral view, left gonopore and plumose setae. Scale: 1.0 mm.

Figure 2. *Catapaguroides microps* Milne-Edwards & Bouvier, 1892. Mâle, bouclier céphalo-thoracique 2.2 mm, MNRJ 21135. **A.** Face ventrale du thorax, tube sexuel à droite décalé vers le bas dans la figure, tube sexuel à gauche dissimulé entre deux franges épaisses de soies du sternite. **C.** Mâchoire. **D.** Maxillule. **E.** Maxille. **F.** Premier maxillipède. **G.** Deuxième maxillipède. **H.** Troisième maxillipède, *crista dentata* réduite. Femelle, bouclier céphalo-thoracique 2.1 mm. **B.** Face ventrale du thorax, gonopore du côté gauche et soies plumeuses. Échelle : 1,0 mm.

Antennal peduncle overreaching distal margin of cornea (Fig. 1A). First segment unarmed. Second segment with distinct acute dorsolateral distal angle, with a terminal spine. Third segment with long setae on ventrolateral margin. Fourth segment within few small scattered setae. Fifth segment with three long plumose setae and small sparse simple setae. Antennal article narrow, curved, reaching proximal first third of the last peduncular segment; terminating in a thin spine and numerous scattered setae.

Antennal flagella moderately long; each article with one or two short setae.

Dactyl of right cheliped articulating obliquely with palm (Fig. 1B). Dactyl and propodus curved ventrally, dactyl 0.6-0.7 length of palm; cutting edge with three small teeth terminating in a small claw; simple setae scattered on surface; propodus slightly longer than dactyl; dorsal surface convex with fringe of setae distributed on lateral margin. Palm 0.9 length of carpus; surface convex, with few short

setae in small groups; fixed finger with fringe of setae concentrated close to cutting edge. Carpus 1.1 length of merus; dorsal surface with sparse setae; internal lateral margin with row of setae; ventral surface with tufts of moderately long setae. Merus subtriangular; dorsal and ventral surfaces and lateral margin with sparse setae. Ischium with sparse setae on dorsal and ventral surfaces.

Left cheliped (Fig. 1C) reaching proximal margin of right dactyl; dactyl and propodus ventrally curved, without distinct hiatus. Dactyl 1.3-1.6 length of palm; unarmed with tufts of sparse setae; cutting edge with row of corneous teeth. Palm 0.4-0.5 length of carpus; dorsal surface with tufts of sparse setae; internal lateral margin with tufts of setae; fixed finger unarmed, with tufts of setae. Carpus 1.0-1.1 length of merus, unarmed with sparse setae on dorsal surface and lateral external margins; internal lateral margin with tufts of setae; ventral surface with tufts of sparse setae. Merus subtriangular, unarmed; dorsal surface unarmed, with sparse setae; ventral surface with setae. Ischium unarmed, with setae on dorsal and ventral surfaces.

Ambulatory legs long, thin (Fig. 1D & E), right cheliped approximately length of dactyl, dactyl 1.2-1.7 length of propodus; with a thin, terminal claw; straight in dorsal view, curved ventrally in lateral view; dorsal margin proximal area with short row of setae, and proximally with long setae. Second pereopod anteroventral angle with short and long, stout setae, one longer, stouter (less evident in female). ventro-distal angle of propodus of third pereopod without spine (Fig. 1E), with 2 to 3 stout setae; dorsal surface with sparse setae on both medially and laterally; dorso-distal angle of carpus with small spine; dorsal surface with moderately long sparse setae; merus unarmed, with few tufts of moderately long setae on dorsal surface. Sternite of third pereopods with anterior lobe semicircular, anterior margin with abundant long setae (Fig. 2A & B). Fourth pereopod semichelate (Fig. 1G), ventral margin of propodus protruded under and reaching dactyl base, dactyl with 7 small teeth on ventral margin, ending in acute claw. Fifth pereopod with hooked setae (Fig. 1F).

Mandible without acute teeth; palp with three segments (Fig. 2C), setae on distal area. First maxilla with external lobe of endopod reduced (Fig. 2D); basal endite (broken off in the drawn specimen) with setae on apex; distal endite with stout setae on external margin. Second maxilla with elongated bilobed endites (Fig. 2E). First maxilliped endite with stout setae; exopod with flagella (Fig. 2F). Second maxilliped without epipod (Fig. 2G); endopod with four segments, exopod with two. Third maxilliped with reduced *crista dentata* (Fig. 2H).

Male sexual tube long on right coxae of fifth pereopod, directed from right to left and across ventral body surface, exceeding left coxae; right coxae with small sexual tube directed from left to right covered with long fringe of setae

(Fig. 2A). Female gonopore on third coxae of left pereopod (Fig. 2B).

Telson with posterior lobes asymmetrical, separated by deep medium groove; distal margins each with four spines; lateral margins delimited as chitin plates.

Distribution

Indo-Pacific Ocean: Indonesia; **Southwestern Atlantic: Brazil (Rio de Janeiro state)**; Eastern Atlantic: Azores, Cape Finisterre, Spain, and Morocco (new records in bold).

Remarks

All descriptive characters examined herein are similar to those mentioned in the original description of Milne-Edwards & Bouvier (1892) and in the diagnosis of de Saint Laurent (1968). Particularly, ocular peduncle length, absence of pleurobranchia on the fourth pereopod, unarmed chelipeds, shape and position of sexual tube and gonopore, and telson dentition were identical to previous descriptions. On the other hand, some individuals with lateral projections of shield more rounded than those described by these authors were observed. Besides, the diagnosis by de Saint Laurent (1968) states that the longest stout seta on anteroventral angle of pereopod 2 carpus is present only on males, but in Brazilian material it occurs also on the females, although smaller.

The identification was made based on literature (Milne-Edwards & Bouvier, 1892; de Saint Laurent, 1968). Some specimens were sent to Smithsonian Institution (USA) and examined by Dr. R. Lemaitre who confirmed the identification as *C. microps*.

Associations

Catapuroides microps was found in almost 12 different types of shells. However, most hermit crabs were found in shells of two gastropod genera: *Leucosyrinx* Dall, 1889 and *Pleurotomella* Verrill, 1872.

Discussion

The occurrence of *C. microps* in the Campos Basin is the first record of this species in Brazilian waters and in the Southwestern Atlantic making this distribution cosmopolitan. The world-wide distribution of a species can be the result of its long embryonic development, as well as the extended larval development, allowing it to have more time in its planktonic stage, and consequently, more time to be dispersed in the current flow. A simulation of larval dispersion has showed that the distance of larval dispersion tends to be directly proportional to duration of planktonic larval stage (Siegel et al., 2003). The *C. microps* population

of Campos Basin had no juveniles specimens collected (Lins, personal observations) suggesting that the larvae are not settling there, at least not during the periods when the sampling were carried out, and is very likely to be dispersed by the current flow to another site. Unfortunately, the knowledge in the biology of this species is poorly known, and more studies are necessary to correlate it with this distribution.

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