Cah. Biol. Mar. (2008) 49 : 277-282

The occurrence of the brachyuran crab *Sotoplax robertsi* Guinot, 1984 (Crustacea: Decapoda: Euryplacidae) in the South Atlantic Ocean

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Abstract: We report herein the euryplacid crab *Sotoplax robertsi*, previously known only from the type locality (Gulf of Mexico, 28º30'N, 84º58'W), off the east coast of Brazil (states of Bahia and Espírito Santo, 13°54'14"S, 39°00'34"W and 20º44'S, 40º25'W, respectively). This is the first record from the South Atlantic Ocean, and considerably extends the known geographical range of this species. We provide information on the morphology of the male, and the first description of the female.

Résumé : *Sur l'occurrence du crabe* Sotoplax robertsi *Guinot, 1984 (Crustacea : Decapoda : Euryplacidae) dans l'Océan Atlantique Sud.* Nous signalons ici la récolte de spécimens du crabe *Sotoplax robertsi* Guinot, 1984 de la famille Euryplacidae, connu antérieurement seulement de la localité-type (Golfe du Mexique, 28°30'N, 84°58'W), sur la côte orientale du Brésil (états de Bahia et du Espírito Santo, 13°54'14"S, 39°00'34"W et 20°44'S, 40º25'W, respectivement). C'est le premier signalement de cette espèce dans la partie sud de l'Océan Atlantique, ce qui étend considérablement la connaissance sur sa distribution géographique.

Keywords: Brachyura • Goneplacoidea • New record • Geographical distribution • Western Atlantic • Brazil.

Introduction

The monotypic genus *Sotoplax* was established by Guinot (1984) to contain a small species of crab collected by Dr. L. A. Soto during the exploration of the northeastern continental shelf of the Gulf of Mexico, from 1970-1971. This brachyuran, originally identified as *Euryplax* sp. by Soto (1980), was subsequently described as a new genus and new species, *Sotoplax robertsi*, by Guinot (1984).

The species description was based on a single male specimen, deposited at the U. S. National Museum of Natural History, Smithsonian Institution, Washington, D.C. Pereiopods 2-5 of the holotype were missing, except for one detached ambulatory leg. *Sotoplax* can easily be differentiated from any other euryplacid genus by the

Reçu le 20 mai 2008 ; accepté après révision le 14 août 2008.
Received 20 May 2008; accepted in revised form 14 August 2008.

conspicuously slender sterno-abdominal cavity at the level of male sternite 4. The male abdomen that fits into this cavity is also very slender, terminating in an extremely long and narrow tongue-like telson which has a rounded tip. The male gonopod 1 has an enlarged basis and sinuous middle region, and tapers to a slender truncated tip armed with large spines. The carapace is smooth and glabrous, armed with two spines on the anterolateral margin; the anterior, i.e., the exorbital spine, is larger and curved forwards, whereas the second spine is smaller and horizontally directed (Guinot, 1984).

While conducting a survey study of macroinvertebrates on soft bottoms of Camamu Bay, Bahia, Brazil, we collected three specimens that were not assignable to any of the euryplacid genera known from the Brazilian coast. The morphological characteristics of the specimens match those in the original description of *S. robertsi* by Guinot (1984). At about the same time, one of the authors (LEAB), while examining specimens deposited in the crustacean collection of the Museu de Zoologia of the Universidade de São Paulo (MZUSP), also discovered a male specimen of *S. robertsi* from Espírito Santo in eastern Brazil, which had been misidentified as *Frevillea hirsuta* (Borradaile, 1916).

For the present report, the gonopods 1 and 2 of this species were examined using scanning electron microscopy, and the morphology of the appendages was compared with the drawings provided by Guinot (1984). Additional morphological remarks, especially on the female characters, are also provided. This is the first report of *S. robertsi* in the South Atlantic Ocean, which considerably extends the geographical distribution of this crab.

Material and Methods

The specimens from Bahia were collected in April 2004, during the activities of the project "Inventário da Macrofauna Bentônica e da Ictiofauna na Baía de Camamu - BA", sponsored by the Universidade Estadual do Sudoeste da Bahia (UESB), Jequié Campus, Bahia. Sampling was carried out from a fishing boat (trawler) using a trawl net with mesh of 3 cm (measured between knots) and aperture of 4 m. Voucher specimens were fixed in 70% ethanol and deposited in the crustacean collections of the Museu de Zoologia, Universidade Estadual de Santa Cruz (MZUESC), Ilhéus, Bahia, Brazil, and the Departamento de Oceanografia, Universidade Federal de Pernambuco, Recife, Brazil (DOUFPE). The specimen from Espírito Santo was collected by the late Dr. Sérgio de Almeida Rodrigues in 1967. This material is deposited in the crustacean collection of the Museu de Zoologia, Universidade de São Paulo, Brazil (MZUSP). For comparison, we examined specimens of *Frevillea hirsuta* also deposited in the MZUSP.

The material for scanning electron microscopy analysis was prepared according to the method proposed by Felgenhauer (1987). The appendages were washed in three 5-minute changes of distilled water, and then placed in a weak solution of the anionic surfactant TWEEN-80 for 15 minutes, and sonicated for 10 seconds to remove debris. Finally, after dehydration and critical-point drying, the gonopods were mounted on stubs and gold-palladium coated in a vacuum chamber before being photographed.

Abbreviations used: (m) males, (f) females, (ovf) ovigerous females, (CL) carapace length, (CW) carapace width, (St.) station of collection, (SEM) Scanning Electron Microscopy. CW was measured between the two exorbital spines. Measurements provided are in millimeters.

Results

Sotoplax robertsi Guinot, 1984
(Figs 1-4)

Euryplax sp. – Soto, 1980: 93.
Sotoplax robertsi Guinot, 1984: 92, figs 1-3, Pl. A-D; Abele & Kim, 1986: 55, 592, 600, 601, figs a, b; Ng et al., 2008: 78.

Material examined

1♀ (3.1 x 4.9, CL x CW), 1m (3.3 x 5.1, CL x CW, without pereiopods, gonopods dissected for SEM analysis) Brazil, Bahia, Camamu Bay (St. 5: 13°54'14"S, 39°00'34"W), coll. M.C. Guerrazzi, 24.IV.2004 (MZUESC 1196); 1♂ (4.8 x 7.3, CL x CW, without pereiopods), same station, date and collector (DOUFPE 14005); 1♂ (not measured), Brazil, Espírito Santo (20º44'S, 40º25'W), 33 m, coll. S.A. Rodrigues, 20.V.1967 (MZUSP 6132).

Comparative material

Frevillea hirsuta – 1♂, 1ovf, Brazil, Rio de Janeiro, Ilha Grande, 75 m, 16.II.1968 (MZUSP 2925); 1♂, Brazil, São Paulo, Ubatuba, coll. R/V Prof. W. Besnard, VII.1988 (MZUSP 11876); 1♀, Brazil, São Paulo, Santos, 20.II.1984 (MZUSP 6649); 1♂, Brazil, Rio Grande do Sul, coll. GEDIP, 27.IV.1968 (MZUSP 6122).

Ecology

Collected at Camamu Bay in mud-sand bottoms, down to 10 m depth. Material from Espírito Santo was collected at 33 m.

Distribution

Type locality, Gulf of Mexico, "middle shelf region off the Apalachicola Bay", 28°30'N, 84°58'W (Soto, 1980, as *Euryplax* sp.; Guinot, 1984); eastern Brazilian coast,

Figure 1. *Sotoplax robertsi*. Female (MZUESC 1196), in dorsal view, from Camamu Bay, Bahia, Brazil. CL = 3.1 mm; CW = 4.9 mm.

Figure 1. *Sotoplax robertsi*. Femelle (MZUESC 1196), vue dorsale, de la Baie de Camamu, Bahia, Brésil. Longueur de la carapace = 3,1 mm ; largeur de la carapace = 4,9 mm.

Camamu Bay (state of Bahia) and state of Espírito Santo (present study).

Remarks

The holotype of *S. robertsi* was supposedly deposited in the U. S. National Museum of Natural History (USNM 298146). However, this number corresponds to an amphipod specimen (*Stenopleustes* sp.), and there is no material deposited as *Sotoplax* in that collection (T. Chad Walter, USNM crustacean collection database manager, pers. comm.). The holotype male is actually in the Paris Museum under the catalogue number B8740, and we were able to examine photographs of the specimen courtesy of Peter K. L. Ng and Peter Castro. Our specimens from eastern Brazil agree very well with these photographs as well as the description and figures provided by Guinot (1984). Although the holotype carapace has no well-defined regions as noted by Guinot, the groove between the

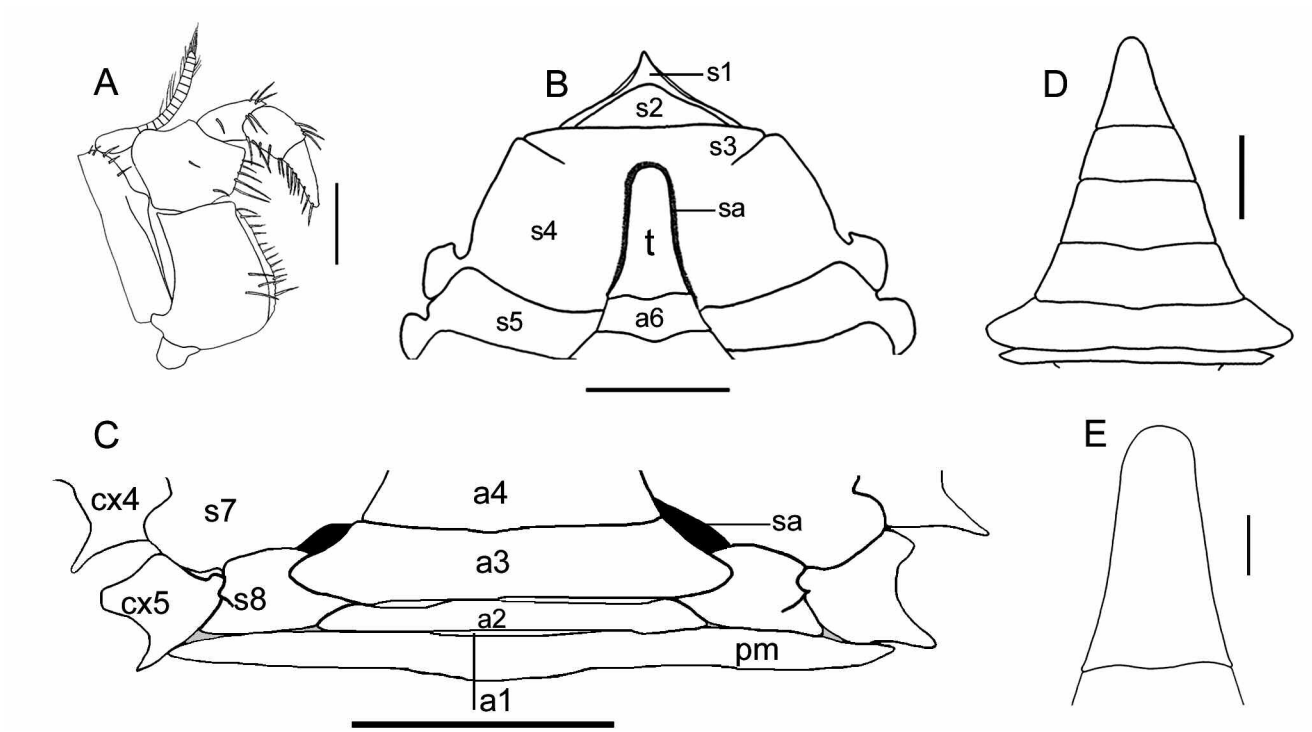


Figure 2. *Sotoplax robertsi*. Male from Camamu Bay, Bahia, Brazil, (MZUESC 1196). **A.** Right maxilliped 3. **B.** Anterior region of thoracic sternum, posterior abdomen and telson. **C.** Posterior region of thoracic sternum and anterior region of abdominal segments. **D.** Abdomen (first abdominal segment not represented), ventral view. **E.** Detail of telson, ventral view. Abbreviations: (a) abdominal segment, (cx) coxae, (pm) posterior margin of carapace, (s) sternites, (sa) sterno-abdominal cavity, (t) telson. Scale bars: A, D-E = 0.5 mm; B-C = 1 mm.

Figure 2. *Sotoplax robertsi*. Mâle de la Baie de Camamu, Bahia, Brésil, (MZUESC 1196). **A.** Troisième maxillipède droit. **B.** Région antérieure du sternum thoracique, région postérieure de l'abdomen et du telson. **C.** Région postérieure du sternum thoracique et segments abdominaux antérieurs. **D.** Abdomen (premier segment abdominal non représenté), vue ventrale. **E.** Détail du telson, vue ventrale. Abréviations: (a) segments abdominaux, (cx) coxopodites, (pm) bord postérieur de la carapace, (s) sternites, (sa) cavité sterno-abdominale, (t) telson. Échelles : A, D-E = 0,5 mm ; B-C = 1 mm.

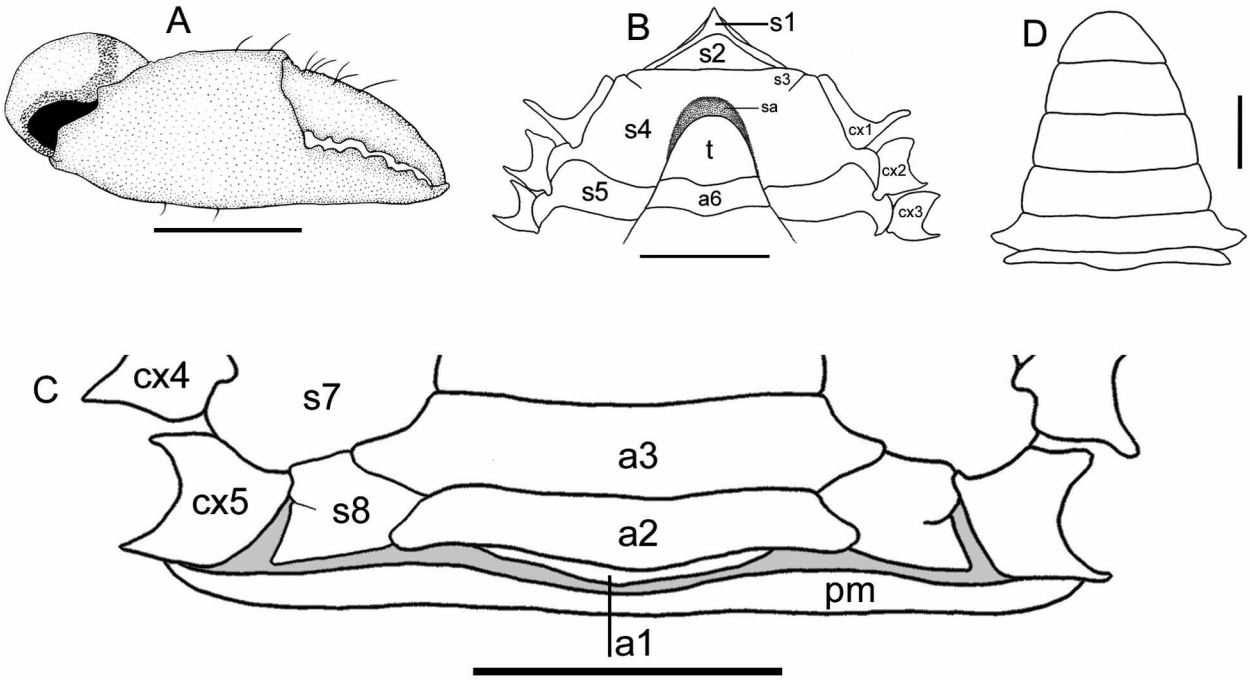
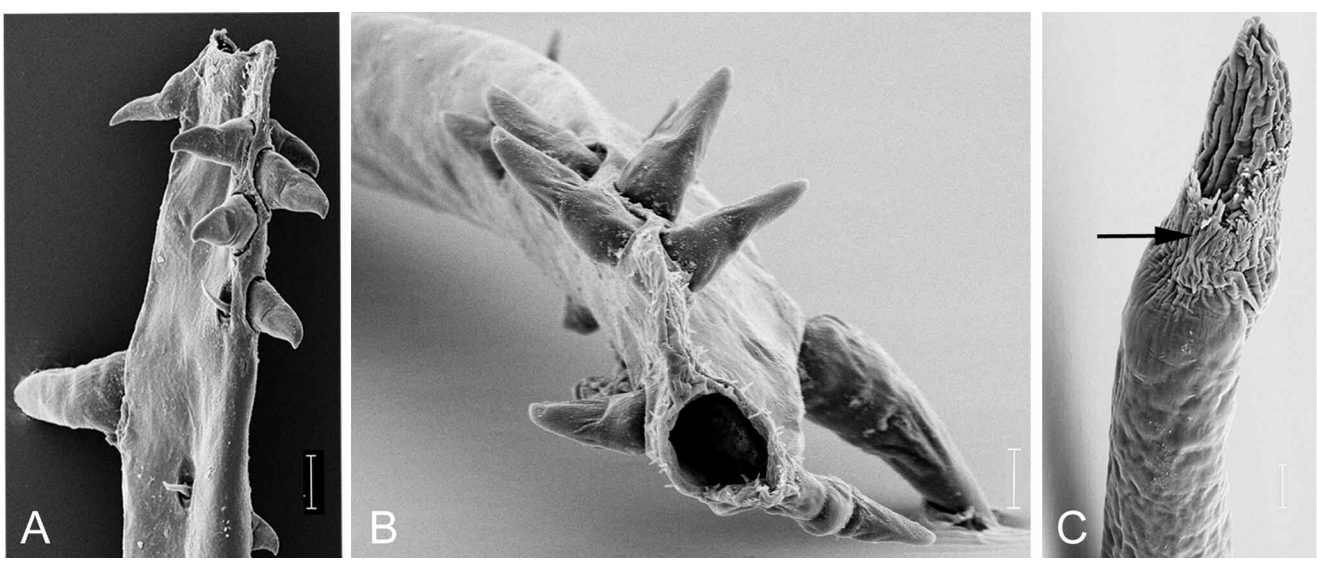


Figure 3. *Sotoplax robertsi*. Female from Camamu Bay, Bahia, Brazil, (MZUESC 1196). **A.** Right cheliped, lateral view. **B.** Anterior region of thoracic sternum, posterior abdomen and telson. **C.** Posterior region of thoracic sternum and anterior region of abdominal segments. **D.** abdomen (first abdominal segment not represented), ventral view. Abbreviations: (a) abdominal segment, (cx) coxae, (pm) posterior margin of carapace, (s) sternites, (sa) sterno-abdominal cavity, (t) telson. Scale bars: A-C = 1 mm; D = 0.5 mm.

Figure 3. *Sotoplax robertsi*. Femelle de la Baie de Camamu, Bahia, Brésil, (MZUESC 1196). **A.** Chélipède droit, vue latérale. **B.** Région antérieure du sternum thoracique, région postérieure abdominale et telson. **C.** Région postérieure du sternum thoracique et segments abdominaux antérieurs. **D.** Abdomen (premier segment abdominal non représenté), vue ventrale. Abréviations: (a) segments abdominaux, (cx) coxopodites, (pm) bord postérieur de la carapace, (s) sternites, (sa) cavité sterno-abdominale, (t) telson. Échelles : A-C = 1 mm ; D = 0,5 mm.



cardiac and intestinal regions observed in the holotype photographs is not conspicuous in our material. Comparison of the images obtained by SEM analysis of the male gonopod 1 with those provided by Guinot (1984: 93, fig. 2B-D) revealed an identical morphology. The tip of this appendage is truncated, and the distal region is armed with prominent corneous spines with acute tips and very few setae (Fig. 4A). The distal aperture of this gonopod is rounded (Fig. 4B). Gonopod 2 is very short, a typical feature of euryplacid crabs (Guinot, 1969; Ng & Castro, 2007). The apical lobe, rudimentary in the holotype (see Guinot, 1984: 93, Fig. 2G), was not clearly seen in our SEM images, possibly because of over-drying during the preparation of the material for SEM (Fig. 4C).

The carapace of the female specimen (MZUESC 1196) is almost entirely glabrous, except for the presence of a few setae in the anterior part near the orbital region. The female thoracic sternum is similar to that of the males. The lateral margins of the third abdominal segment are acute, whereas in the males these margins are more rounded (Figs 2D & 3D). In both sexes, a large area of sternite 8 is visible (Figs 2C & 3C) when the abdomen is closed (see comparison with species of *Frevillea* A. Milne Edwards, 1880 in Discussion). The lateral margin of the female somite 4 is slightly convex, whereas somites 5 and 6 have straight margins (Fig. 3D). In males, the lateral margins of somites 5 and 6 are slightly concave, and somite 6 has straight margins (Fig. 2D). The female telson is shorter than that of males, and the posterior margin is broadly rounded (Fig. 3B, D). The male holotype has more robust chelipeds and a proportionally longer palm than those of the female analysed. The tooth on the inner angle of the carpus in the female is more acute. The submedian tooth present on the outer surface of the merus of the male holotype is absent in the female. Unfortunately, chelipeds or other ambulatory appendices are missing in the two males analysed by us (MZUESC 1196; DOUFPE 14005), preventing a comparison with the characters of the holotype.

Discussion

In dorsal view, the carapace of *S. robertsi* superficially resembles species of *Frevillea* in the trapezoidal shape and the presence of two antero-lateral spines. However, in *Frevillea*, the sterno-abdominal cavity is broad; the second and third somites of the male abdomen almost entirely cover the eighth abdominal sternite (see Guinot, 1969, p. 509, fig. 33); and the telson is short; whereas in *Sotoplax*, the abdominal cavity is slender; a large portion of the eighth abdominal sternite is uncovered, because the lateral margins of the second and third somites do not reach the coxae of the fifth ambulatory legs; and, finally, the telson is long and narrow (Guinot, 1984). The pattern of spinulation of the male gonopod 1 is also quite different in these two genera (see Guinot, 1969, p. 516, fig. 58a, b; Guinot, 1984, p. 93, fig. 2B-D). *Frevillea hirsuta*, the only species of this genus reported from Brazil (Melo, 1996), is easily distinguished from *S. robertsi* by the presence of a dense tuft of long setae on the outside of the distal half of the carpus and proximal palm, which also extends to the inner side of the cheliped (Borradaile, 1916). Moreover, the second antero-lateral spine of the carapace is smaller than the exorbital spine, whereas in *S. robertsi* these two spines are more similar in length.

Guinot (1984) referred *Sotoplax* provisionally to the subfamily Euryplacinae, family Goneplacidae (see also Ng & Castro, 2007). Karasawa & Schweitzer (2006) did not include this genus in their phylogenetic study of recent and fossil genera of the Xanthoidea *sensu lato* (superfamilies Pilumnoidoidea, Xanthoidea, Eriphioidea, Goneplacoidea, and Portunoidea). In the *Systema Brachyurorum*, Ng et al. (2008) maintained the genus among the euryplacids, but they commented that the family placement of *Sotoplax* is problematic because it has features common to both Goneplacidae *sensu stricto* and Euryplacidae. They also pointed out that gonopod 1 is quite unusual among the known euryplacids, with regard to the rounded tip armed with large spines. According to these authors, the family Euryplacidae is in urgent need of revision to clarify the placement of several genera.

The occurrence of *S. robertsi* on the eastern Brazilian coast significantly increases our knowledge of the species' range, although there is a huge gap between the Gulf of Mexico and the state of Bahia. The presently known range of this crab suggests a discontinuous tropical distribution, like other western Atlantic decapod species (see Coelho & Ramos, 1972; Coelho et al., 1978). However, it is also

Figure 4. *Sotoplax robertsi*. Scanning Electron Microscopy of the gonopods, male from Camamu Bay, Bahia, Brazil, (MZUESC 1196). **A.** Tip of the left gonopod 1. **B.** Left gonopod 1, view of the distal opening. **C.** Tip of the left gonopod 2, arrow indicates possible position of the apical lobe. Scale bars: A = 20 µm; B-C = 10 µm.

Figure 4. *Sotoplax robertsi*. Microscopie electronique à balayage des gonopodes, mâle de la Baie de Camamu, Bahia, Brésil, (MZUESC 1196). **A.** Apex du premier gonopode gauche. **B.** Premier gonopode gauche, vue de l'ouverture distale. **C.** Apex du deuxième gonopode gauche, la flèche signale la position possible du lobe apical. Échelles : A = 20 µm ; B-C = 10 µm.

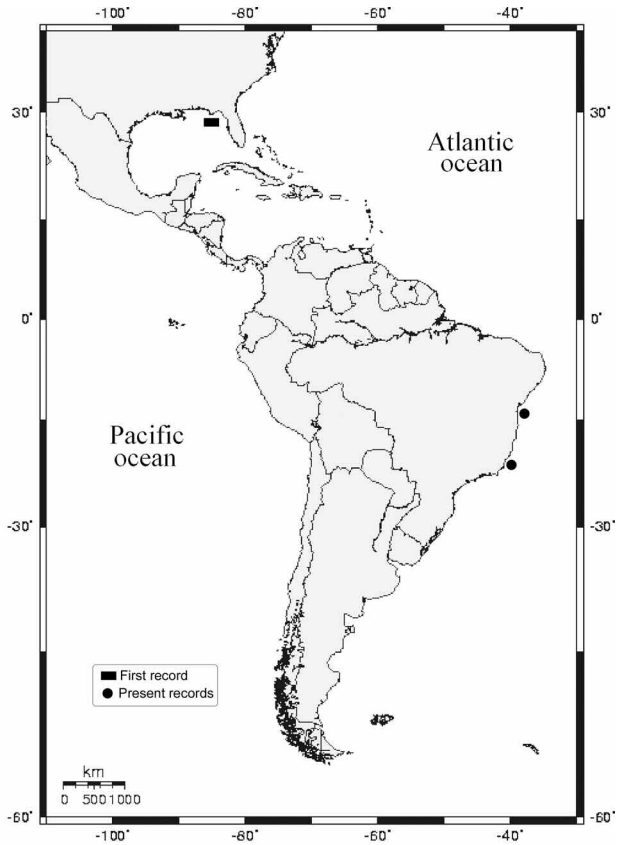


Figure 5. *Sotoplax robertsi*. Presently known range of the species.

Figure 5. *Sotoplax robertsi*. Distribution géographique actuellement connue de l'espèce.

possible that *S. robertsi* is more common than presently appears, either because it has not been well collected or because it might be confused with species of *Frevillea*.

Acknowledgements

To UESB for financing the project "Distribuição da Macrofauna Bentônica e da Ictiofauna da Baía de Camamu, região sul do Estado da Bahia" (Process 2001-68). To Drs. Marcos Tavares and Gustavo Melo for permitting examination of material deposited in the MZUSP. To Dr. Rafael Lemaitre for the facilities provided to LEAB at the Smithsonian Institution, Washington, DC. To Scott Whittaker (USNM Image Laboratory) for invaluable help with the SEM analysis at the NMNH´s SEM laboratory. To Dr. Janet W. Reid for assistance with the English text. To Fabiana Holanda and Rosa Lopes for assistance with the French language. L.E.A. Bezerra thanks PROPESQ/UFPE for the provision of a PhD scholarship, and CAPES for the provision of a travel grant to visit collections abroad. We are also indebted to Dr. D. Guinot (Muséum National d'Histoire Naturelle, Paris) and T. Chad Walter (National Museum of Natural History, Smithsonian Institution, Washington, DC) for the information on the whereabouts of the holotype of *S. robertsi*, and to Drs. Peter K. L. Ng and Peter Castro, who kindly shared with us photographs of the holotype of the species.

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