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Primitive decapods from the deep sea: first record of blind lobsters (Crustacea: Decapoda: Polychelidae) in northeastern Brazil

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ABSTRACT: We report herein the occurrence of the infraorder Polychelida in Potiguar Basin, northeastern Brazil. Specimens were collected by the project “Avaliação da Biota Bentônica e Planctônica na porção offshore das Bacias Potiguar e Ceará”, developed by the Brazilian Oil Company (PETROBRAS). Three species were recorded for the first time in this region: *Pentacheles validus* A. Milne-Edwards, 1880, *Polycheles typhlops* Heller, 1862, and *Stereomastis sculpta* (Smith, 1880) at 2000 m, 400 m and 2057 m depth, respectively. The Brazilian deep-sea floor remains poorly known, but progress has been made as a result of collections obtained by oceanographic expeditions and research projects developed by PETROBRAS in Campos Basin (Rio de Janeiro) and Potiguar Basin (Rio Grande do Norte), expanding the knowledge of the distribution area of Polychelidae in Brazilian deep sea waters.

Key words: deep sea biota, Potiguar Basin, polychelids, Atlantic Ocean, taxonomy.

INTRODUCTION

Deep-sea blind lobsters belong to the infraorder Polychelida Scholtz and Richter, 1995. These uncommon crustaceans are characterized by the presence of chelate pereopods 1–4 (sometimes also pereopod 5) and fixed and rudimentary eye-stalk in extant species (Galil, 2000). These decapods can be found from less than 100 m in the lower slope and in abyssal depths down to 5000 m (Galil, 2000; 2013).

Polychelids were most morphologically diverse during Mesozoic (Audo *et al.*, 2014), with five families recognized: Eryonidae De Haan, 1841, Coleiidae Van Straelen, 1924, Tetrachelidae Beurlen, 1930 and Polychelidae Wood-Mason, 1874. The latter family is the only extant and currently comprises about 38 species distributed in six genera (Ahyong, 2009; De Grave *et al.*, 2009; Chan, 2010). These crustaceans are considered as “living fossils” because of their rudimentary morphological characters which give them a

primitive appearance in relation to other decapod groups (Galil, 2000).

The polychelids are members of the deep sea biota and are considered very rare and little known. The knowledge about this group derives from a small number of specimens collected by deep sea cruises and scattered in distant museums (Galil, 2000). In Brazil, in a general way, deep sea fauna remains poorly known, but progress has been made as a result of collections obtained by oceanographic expeditions and research projects developed by PETROBRAS in Campos Basin (Rio de Janeiro) and Potiguar Basin (Rio Grande do Norte), raising the number of crustaceans species known from Brazilian waters.

As a result, to date five polychelid species have been recorded from Brazil: *Pentacheles laevis* Bate, 1878, *Pentacheles validus* A. Milne-Edwards, 1880, *Polycheles typhlops* Heller, 1862, *Stereomastis sculpta* (Smith, 1880), and *Stereomastis nana* (Smith, 1884) (Dall’Occo and Tavares, 2004; Alvarenga and

Cardoso, 2014). We report herein the occurrence of three Polychelidae species in Potiguar Basin, northeastern Brazil, expanding the knowledge of the distribution area of Polychelidae in Brazilian deep sea waters.

MATERIALS AND METHODS

The material was collected on board the RV Seward Johnson on the upper part of the continental slope (150 m depth) off the Potiguar Basin, in cruises carried out in May 2009 and April 2011. The samples were collected under the framework of the project “Avaliação da Biota Bentônica e Planctônica na porção offshore das Bacias Potiguar e Ceará”, developed by the Brazilian Oil Company (PETROBRAS). All samples were obtained using a box-corer (50 cm³) or van Veen grab (70 l).

The specimens were identified following Ahyong and Brown (2002), and Dall’Occo and Tavares (2004). The classification adopted in the present contribution followed De Grave *et al.* (2009) proposed scheme to genus level. Terminology used followed Galil (2000) and abbreviations used

include: (CL) carapace length (the distance from tip of rostrum to the middle of the posterior border of the carapace); (st.) station of collection. A restricted synonymy was provided for all species.

The material was deposited in Carcinological Collection of Museu de Oceanografia of Universidade Federal de Pernambuco, Recife, Pernambuco, Brazil (MOUFPE).

SYSTEMATICS

Infraorder Polychelida Scholtz and Richter, 1995

Family Polychelidae Wood-Mason, 1875

Genus *Pentacheles* Bate, 1878

Pentacheles validus A. Milne-Edwards, 1880 (Fig. 1)

Pentacheles validus A. Milne-Edwards, 1880: 65; Bouvier, 1925: 434; Galil, 2000: 308–311, fig. 10; Ahyong and Brown, 2002: 49; Ahyong,



Figure 1. *Pentacheles validus* A. Milne-Edwards, 1880, male from Potiguar Basin, northeastern Brazil. Dorsal view. CL 50.4 mm. MOUFPE 15071. Photo by Arthur Anker.

2009: 383; Chan, 2010: 162.

Polycheles debilis Smith, 1884: 360.

Polycheles validus Bouvier, 1905: 480; 1925: 434, fig. 10, pl. 5, figs. 1, 2; Firth and Pequegnat, 1971: 61.

Polycheles demani Stebbing, 1917: 28, pl. XCII; Firth and Pequegnat, 1971: 45.

Polycheles chilensis Sund, 1920: 226; Firth and Pequegnat, 1971: 42.

Type locality: Bequia, Windward Islands, Antilles.

Material examined: 1 male, CL 50.4 mm, Brazil, Rio Grande do Norte, Potiguar Basin, st. MT 85, 04°21.3'S / 36°44'W, 4.iv.2011, 2057 m (MOUFPE 15071).

Diagnosis: Epipod of third maxilliped longer than ischium; basal antennular segment proximally quadrate, lamellar. Lateral margins of carapace posterior to postcervical incision with more than 25 spines.

Distribution: Worldwide – Eastern Pacific: Chile; Indo-Pacific: East Indian Ridge, Vanuatu, Wallis and Futuna Islands, New Caledonia, Australian

Bight, New Zealand and Tasmania; Eastern Atlantic: Bay of Biscay, Azores, Canary Islands, West Africa and South Africa; Western Atlantic: United States, Bahamas Islands, Gulf of Mexico, Caribbean Sea (Galil, 2000), Brazil: Rio de Janeiro (Dall'Occo and Tavares, 2004) and Rio Grande do Norte (present contribution) and South Georgia Island (Galil, 2000); depth range: 914–3365 m (Firth and Pequegnat, 1971; Galil, 2000).

Genus *Polycheles* Heller, 1862

Polycheles typhlops Heller, 1862

(Fig. 2)

Polycheles typhlops Heller, 1862: 392, pl. 1, figs. 1–6; Bouvier, 1925: 237; Galil, 2000: 354, fig. 30; Silva *et al.*, 2003: 27–28; Ah Yong and Chan, 2004: 179–181, figs. 1D–F, 4H, 5A, B; Dall'Occo and Tavares, 2004: 146–148, figs. 1D, 2A; Ah Yong and Galil, 2006: 765–766; Coelho *et al.*, 2007: 7; Ah Yong and Chan, 2008: 64, fig. 1C; Chan, 2010: 162; Chang *et al.*, 2013: 9–10; Galil, 2013: 497–498, fig. 1B.

Pentacheles agassizi A. Milne-Edwards, 1880: 65.

Pentacheles hextii Alcock, 1894: 237–239.

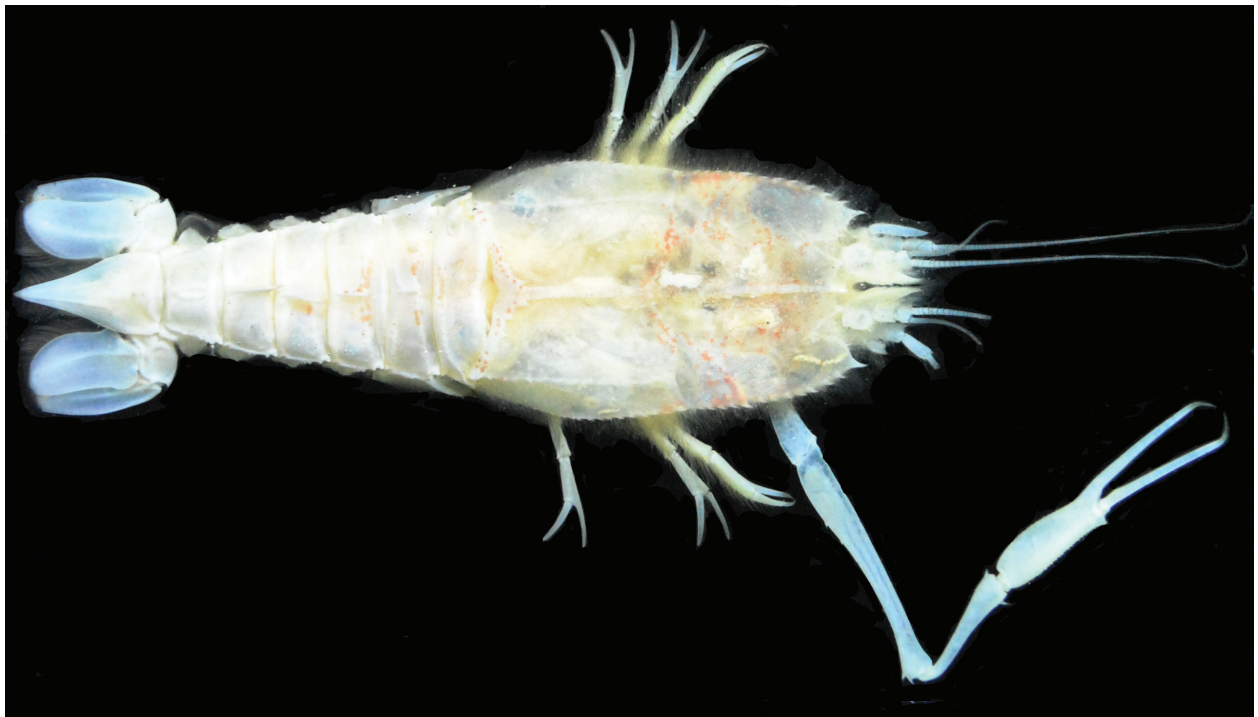


Figure 2. *Polycheles typhlops* Heller, 1862, female from Potiguar Basin, northeastern Brazil. Dorsal view. CL 30.52 mm. MOUFPE 15073. Photo by Arthur Anker.

Polycheles intermedius Balss, 1914: 599.

Type locality: Sicily, Italy.

Material examined: 1 female, CL 30.52 mm, Brazil, Rio Grande do Norte, Potiguar Basin, st. MT 65, 04°33'S / 36°53'W, 6.iv.2011, 400 m (MOUFPE 15073).

Diagnosis: Epipod of third maxilliped rudimentary; basal antennular segment proximally rounded. One rostral spine; posterior margin of carapace armed with three or more pairs of spines.

Distribution: Worldwide – Indo-Pacific: Japan, East China Sea, Taiwan, Philippines, New Caledonia, Fiji Island, Gulf of Aden, Kenya, Comoro Island, Mozambique, Madagascar, Indonesia and Australia (Galil, 2000); Eastern Atlantic: North Sea, North Africa, Cape Verde Islands, West Africa and South Africa; Mediterranean Sea – Israel, Spain and France; Western Atlantic: United States, West Indies, Bermuda, Gulf of Mexico, Caribbean Sea, Puerto Rico (Galil, 2000), Suriname, French Guyana and Brazil: Pará, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, Rio Grande do Sul

(Dall'Occo and Tavares, 2004) and Rio Grande do Norte (present contribution); depth range: 77 m – 2055 m (Adensamer, 1898; Galil, 2000).

Genus *Stereomastis* Bate, 1888

Stereomastis sculpta (Smith, 1880) (Fig. 3)

Polycheles sculptus Smith, 1880: 346; Bouvier, 1925: 438; Galil, 2000: 340, fig. 24; Ramos-Porto *et al.*, 2000: 250; Ah Yong and Brown, 2002: 75–78; Ah Yong and Chan, 2004: 179, fig. 3E, G; Dall'Occo and Tavares, 2004: 146, fig. 1C; Ah Yong and Galil, 2006: 765; Coelho *et al.*, 2007: 7.

Stereomastis sculpta Ah Yong 2009: 385; Chan 2010: 382.

Type locality: Nova Scotia, Canada.

Material examined: 1 female, CL 32.07 mm, Brazil, Rio Grande do Norte, Potiguar Basin, st. 85-2, 04°25'S / 36°28'W, 15.iv.2011, 2000 m (MOUFPE 15072).

Diagnosis: Epipod of third maxilliped



Figure 3. *Stereomastis sculpta* (Smith, 1880), female from Potiguar Basin, northeastern Brazil. Dorsal view. CL 32.07 mm. MOUFPE 15072. Photo by L.E.A. Bezerra.

rudimentary; basal antennular segment proximally rounded. Two rostral spines; posterior margin of carapace armed with one pair of submedian spines only.

Distribution: Worldwide – Eastern Pacific: Canada, United States and Chile; Indo-Pacific: Japan, China Sea, Philippines, Indonesia, Malay Archipelago, Australia, Tasmania, Vanuatu, New Zealand, Arabian Sea, East Africa, Gulf of Aden, Comoro Islands and Madagascar; Mediterranean Sea; Eastern Atlantic: Ibero-Moroccan Gulf, Mauritania, Canary Islands, Cape Verde islands, West Africa and South Africa; Western Atlantic: Labrador Sea, Canada, Iceland, United States, Gulf of Mexico, Caribbean Sea, Guyana (Galil, 2000) and Brazil: Pará, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, Santa Catarina (Dall’Occo and Tavares, 2004) and Rio Grande do Norte (present contribution); depth range: 200 m – 4000 m (Stephensen, 1923; Galil, 2000).

DISCUSSION

The present contribution reveals the occurrence of three polychelid species on the Brazilian northeastern coast, filling a gap of distribution of approximately 23°, between the north and south Brazil (Fig. 4). *Pentacheles validus* was first reported to Brazil by Dall’Occo and Tavares (2004), who examined material collected by the RV Marion Dufresne off the southeastern coast of Brazil. The present report is the second one from Brazil, as well as the northernmost occurrence of this species in Brazilian waters.

Polycheles typhlops is worldwide distributed and the most abundant species in Brazilian waters, once 33 specimens were reported by Dall’Occo and Tavares (2004) from the southeastern Brazil and one specimen recorded from Pará State, northern Brazil (Silva *et al.*, 2003). This study brought an additional record of this species for Brazil, being the first record for northeastern coast.

Finally, *Stereomastis sculpta* was previously identified as *Polycheles sculptus* (Galil, 2000; Ah Yong and Chan, 2004; Dall’Occo and Tavares, 2004; Ah Yong and Galil, 2006) because Galil (2000) synonymised the genus *Stereomastis* with

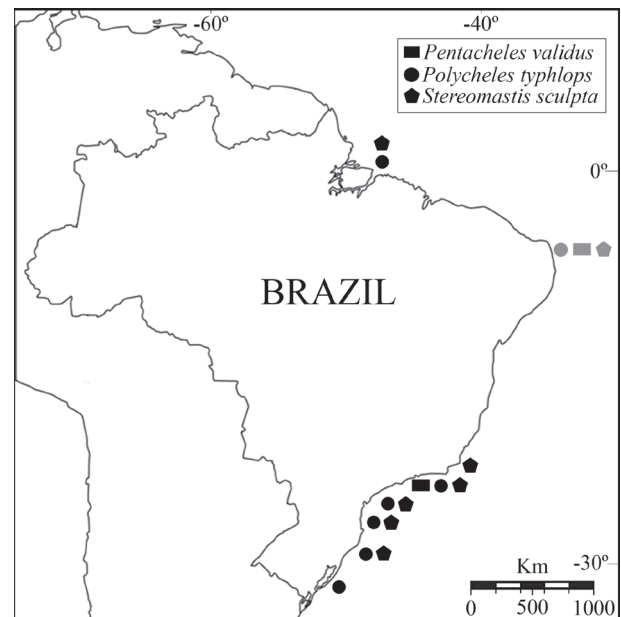


Figure 4. Distribution of *Pentacheles validus*, *Polycheles typhlops* and *Stereomastis sculpta* in Brazil. Previous distribution in Brazil (black symbols). Occurrence in Potiguar Basin, northeastern Brazil (grey symbols).

Polycheles. However, after a phylogenetic analysis, Ah Yong (2009) concluded that both genera were monophyletic and morphologically distinct, placing then *P. sculptus* in the genus *Stereomastis*. *Stereomastis sculpta* is also worldwide distributed and previously reported to Brazil from two specimens from Pará (Ramos-Porto *et al.*, 2000), and seven specimens recorded from southeastern and southern Brazil (Dall’Occo and Tavares, 2004). This present record extends the range of occurrence of *S. sculpta* in Brazil, consisting in the first record for northeastern coast.

In conclusion, this contribution extends the known Brazilian distribution of Polychelida species. We suggest that these species could be more frequent in deep sea Brazilian floor. Taking into account that this is an understudied group, more sampling is needed to describe the diversity of these deep sea crustaceans, and even biological aspects such as reproductive period and fecundity.

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