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Reports on the results of the N.Oc. "Prof. W. Besnard" expeditions to the southern coast of Brazil under the Revizee Program: Chirostylidae and Galatheidae (Crustacea: Decapoda: Anomura)

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Abstract

The distribution patterns of the species of the family Chirostylidae and Galatheidae collected under the Revizee Program (Living Resources in the Exclusive Economic Zone) off the Brazilian southern coast are analyzed. The study area extended from the Cape São Tomé (Rio de Janeiro; 22°00'S) south to Chui (Rio Grande do Sul; 34°30'S). The collections were made during several cruises of N.Oc. "Prof. W. Besnard" between December 1997 and April 1998 over the shelf and slope (60–808 m). One species of the genus *Agononida***,** seven species of the genus *Munida*, one species of *Munidopsis* and one of *Uroptychus* were collected.

Key words: Chirostylidae, Galatheidae, *Agononida*, *Munida*, *Munidopsis*, *Uroptychus*, Brazilian southern coast

Introduction

The Exclusive Economic Zone (ZEE) is a recent concept of maritime territory introduced by the United Nations Convention of the Law of the Sea (UNCLOS). The ZEE granted to each coastal country the right of exclusive sustainable use of the marine resources within the 200 nautical mile economic zone.

Following the recommendation of UNCLOS, in 1994 the Brazilian government established the national Revizee Program (Living Resources in the Exclusive Economic Zone). This program had several specific objectives to be accomplished within 10 years. These included the estimation of the distribution, seasonal variation, abundance and potential sustainable yield of fishery stocks; obtaining general information on the structure and dynamics of the marine ecosystem that the living resources inhabit; the evaluation and monitoring of the potential sustainable yield and prospects for future exploitation of

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marine resources; and the definition of new research fields for conservation and monitoring objectives.

The Revizee Program covered the entire Brazilian coast, but, for operational purposes, the area was divided into four regions, termed "scores", each region with specific oceanographic characteristics: Northern, Northeastern, Central and Southern (Amaral & Rossi-Wongtschowski 2004).

The Southern Score extended from the Cape São Tomé (Rio de Janeiro; 22°00'S, 41°00'W) south to Chui (Rio Grande do Sul; 34°30'S, 53°00'W).

One species of the genus *Agononida* Baba & de Saint Laurent, fifteen species of the genus *Munida* Leach, four species of the genus *Munidopsis* Whiteaves and three species of the genus *Uroptychus* Henderson were previously known from the Brazilian coast (Melo-Filho 1998; Tavares & Campinho 1998; Melo 1999; Melo-Filho & Melo 2001b). Munida, *Munidopsis* and *Uroptychus* have a wide geographical and bathymetric distribution. Members of the genus *Munida* are generally confined to the continental shelf and upper part of the continental slope, occurring in the tropical and temperate zones of all the oceans (Pequegnat & Pequegnat 1970). The genus *Munidopsis* is distributed worldwide in all deep-sea habitats, commonly found living on the continental slope, usually deeper than 500 m, and on the abyssal plain below 2000 meters (Baba 1988). The genus *Uroptychus* has a similar distribution, with most species living on the continental slope. The genus *Agononida*, described recently (Baba & de Saint Laurent 1996), include *Agononida longipes* (A. Milne-Edwards, 1880), previously reported for the Brazilian coast (Melo 1999) like *Munida longipes* A. Milne-Edwards.

According to Macpherson & Segonzac (2005), the deep-sea galatheid fauna in the Atlantic is very rich, emphasizing the necessity of further studies. The same can be said for the family Chirostylidae.

Material and methods

The collections were made on the shelf and slope (60–808 m) off the southern Brazilian coast (22°00'S–34°30'S) by N.Oc. (Navio Oceanográfico, R.V.) "Prof W. Besnard", between December 1997 and April 1998. Material of the genera *Munida*, *Munidopsis* and *Uroptychus* were obtained at several oceanographic stations (Table 1, Figure 1) and deposited in the carcinological collection of the Museu de Zoologia da Universidade de São Paulo (MZUSP). The specimens were examined in the Faculdade de Ciências Biológicas da Universidade Presbiteriana Mackenzie (FCBEE-UPM).

Type-material was used to confirm the determinations of most of the species. Descriptions and figures of all the species were provided by Melo-Filho (1992, 1997), Melo (1999), Tavares & Campinho (1998), and Melo-Filho & Melo (2001b).

TABLE 1. List of oceanographic stations of the N.Oc. "Prof W. Besnard" (Revizee Program — "Score Sul") where species of the families Chirostylidae and Galatheidae were collected: A. station number; B. date; C. position; D. location; E. depth (m); F. species.

A	B	C	D	E	F
6651	15/12/97	25°53'S, 45°42'W	SP	256	*Munida flinti*, *Agononida longipes*
6652	15/12/97	25°51'S, 45°47'W	SP	206	*Munida flinti*
6659	09/01/98	24°20'S, 43°46'W	SP	505	*Munida constricta*
6660	09/01/98	24°17'S, 43°48'W	SP	314	*Munida flinti*, *Agononida longipes*
6661	09/01/98	24°07'S, 45°51'W	SP	147	*Munida irrasa*
6665	10/01/98	24°20'S, 44°09'W	SP	258	*Munida irrasa*, *Agononida longipes*
6666	10/01/98	24°17'S, 44°12'W	SP	163	*Munida flinti*, *Munida pusilla*
6671	11/01/98	24°32'S, 44°27'W	SP	260	*Agononida longipes*
6673	11/01/98	24°17'S, 44°35'W	SP	133	*Munida irrasa*, *Munida pusilla*, *Munida spinifrons*
6676	12/01/98	24°49'S, 44°44'W	SP	153	*Munida irrasa*, *Agononida longipes*
6678	12/01/98	24°46'S, 45°11'W	SP	99	*Munida irrasa*
6679	12/01/98	25°18'S, 44°52'W	SP	808	*Munida constricta*, *Uroptychus nitidus* var. B
6681	12/01/98	25°11'S, 44°56'W	SP	168	*Munida irrasa*, *Munida pusilla*
6684	13/01/98	25°43'S, 45°09'W	SP	511	*Munida iris*
6686	13/01/98	25°36'S, 45°13'W	SP	380	*Munida irrasa*, *Munida pusilla*
6693	19/01/98	26°41'S, 46°27'W	SP	430	*Munida forceps*, *Munidopsis polita*
6782	14/03/98	27°10'S, 46°46'W	PR	480	*Uroptychus nitidus* var. B
6811	22/03/98	29°14'S, 47°50'W	SC	506	*Uroptychus nitidus* var. B

Taxonomic Account

Family Chirostylidae Ortmann

Genus *Uroptychus* Henderson

Uroptychus nitidus (A. Milne-Edwards, 1880)

Diptychus nitidus A. Milne-Edwards, 1880: 62; A. Milne-Edwards & Bouvier, 1894: 306; 1897: 134, pl. 11, figs. 21–22; pl. 12, figs. 10–16.

Uroptychus nitidus Henderson, 1888: 174, pl. 21, fig. 6; Benedict, 1902: 292; van Dam, 1933: 37, 41; Chace, 1942: 11, figs., 3–6; Pequegnat & Pequegnat, 1970: 159, figs. 5–15; Melo, 1999: 168, figs. 101–102; Melo-Filho, 1999: 383, fig. 1.

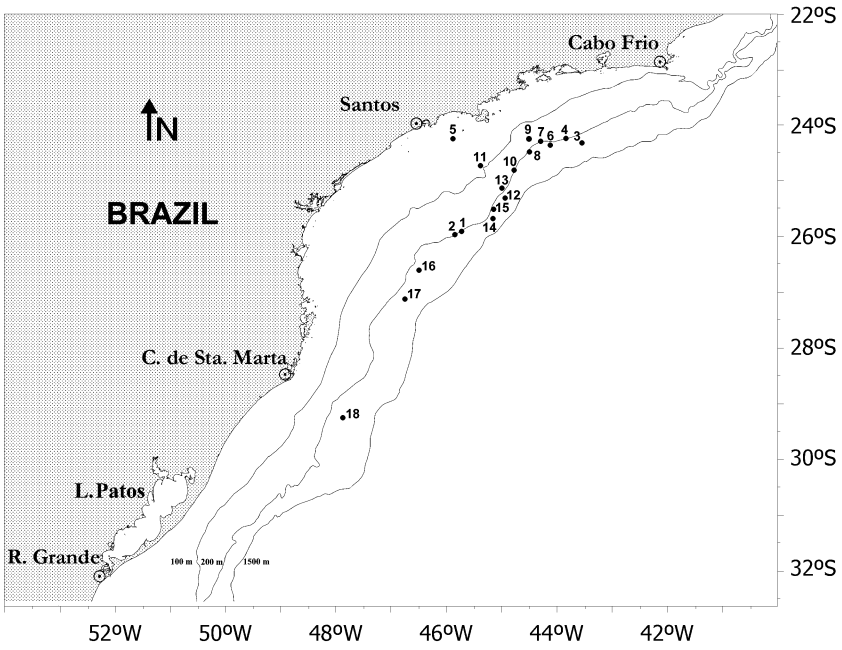

FIGURE 1. Oceanographic stations of the N.Oc. "Prof W. Besnard" (Revizee Program-"Score Sul") where species of the families Chirostylidae and Galatheidae were collected: 1, st. 6651; 2, st. 6652; 3, st. 6659; 4, st.6660; 5, st.6661; 6, st.6665; 7, st. 6666; 8, st. 6671; 9, st. 6673; 10, st. 6676; 11, st. 6678; 12, st. 6679; 13, st. 6681; 14, st. 6684; 15, st. 6686; 16, st. 6693; 17, st. 6782; 18, st. 6811.

Material examined

Brazil: São Paulo — N.Oc. “Prof. W. Besnard”, st. 6679, 808 m, 2 ex. (MZUSP 13194), 1 ex. (MZUSP 13195). Paraná — N.Oc. “Prof. W. Besnard”, st. 6782, 480 m, 1 ex. (MZUSP 13214). Santa Catarina — N.Oc. “Prof. W. Besnard”, st. 6811, 506 m, 1 ex. (MZUSP 13201).

Recognition characters (Variety B, of Chace, 1942: 15)

Medium-sized form, carapace 6.6 mm to base of rostrum, 4.8 to 6.7 in ovigerous females. Carapace not very convex dorsally**,** a fairly deep transverse groove in lateral view; lateral margins more or less denticulate. Rostrum narrow, twice as long as eyes. Cornea slightly wider than eyestalk, medium brown in color. Chelipeds five or slightly more than five times as long as carapace without rostrum; chelipeds more slender in females than in males; merus smooth, devoid of denticles; carpus subcylindrical, with few denticles on lower surface and with a very obscure furrow on inner portion of upper surface; chela broad and flattened dorso-ventrally; fingers shorter than palm, but never more than one-fourth shorter; hiatus usually present in both sexes.

Distribution (Variety B)

Western Atlantic: Gulf of Mexico (southeast), Cuba (north coast of eastern side) Brazil (Pernambuco, Espírito Santo, São Paulo, Paraná, Santa Catarina); between 450 and 808 meters depth.

Remarks

The specimens examined agree almost entirely with the description of *U. nitidus* variety B by Chace (1942). However, in the material examined, there is a darker stain, close to the posterior margin of the carapace.

Family Galatheidae Samouelle

Genus Agononida Baba & de Saint Laurent

Agononida longipes (A. Milne-Edwards, 1880)

Munida longipes A. Milne-Edwards, 1880: 50; A. Milne-Edwards & Bouvier, 1894: 257; 1897: 44, pl. 3, figs. 9–13; Benedict, 1901: 147; 1902: 310; Hay & Shore, 1918: 402, pl. 28, fig. 9; Schmitt, 1935: 178; Chace, 1942: 47; Pequegnat & Pequegat, 1970: 132, fig. 5–3; Wenner & Boesch, 1979: 110; Wenner, 1982: 363; Takeda, 1983: 88; Williams, 1984: 235, fig. 170; Lemaitre, 1984: 428, tab. 1; Abele & Kim, 1986: 35, figs. c, p. 405; Melo-Filho & Melo, 1992a: 514; Poupin, 1994: 36; Escobar-Briones & Soto, 1993: 111, tab. 2; Rambla, 1995: 98, fig. 2; Melo-Filho, 1998: 395; Melo, 1999: 192, fig. 121, 122 a–e; Melo-Filho, 1999: 388, fig. 13; Melo-Filho & Melo 2001a: 1190, fig. 9; 2001b: 1155, fig. 20, 21; 2001c: 47.
Munida paynei Boone, 1927: 53, fig. 11.
Agononida longipes. — Baba & de Saint Laurent, 1996: 442.

Material examined

Antilles: Barbados USS “Blake”, st. 274, 376m (MNHN Ga 543, lectotype). Brazil: São Paulo — N.Oc. “Prof. W. Besnard”, st. 6651, 256 m, 1 ex. (MZUSP13208); st. 6660, 314 m, 4 ex. (MZUSP 13199), 3 ex. (MZUSP 13213), 11 ex. (MZUSP 13233), 1 ex. (MZUSP 13250); st. 6665, 258 m, 4 ex. (MZUSP 13239), 1 ex. (MZUSP 13241), 12 ex. (MZUSP 13248); st. 6671, 260 m, 1 ex. (MZUSP 13212); st. 6676, 153 m, 11 ex. (MZUSP 13233).

Recognition characters

Carapace with margins arched, almost as wide as long. Outer orbital spine followed by 5 lateral spines. Gastric area with 1 pair of epigastric spines. One parahepatic spine on each side of carapace. Branchial and hepatic areas unarmed. One cervical spine on each side of carapace. Cardiac area with 1 central spine above mesocardiac groove. Several spines in posterior branchial area. Posterior margin of carapace with 1 pair of spines. Remainder of carapace unarmed. Rostrum short, length similar to supraocular spines. Abdominal tergites 2 and 3 with anterior margin armed with 4 spines each; abdominal tergite 4 with 2 or 4 spines on anterior margin. Peduncle of antennule with outer terminal

spine much longer than inner one. Peduncle of antenna with only segment 2 armed, with 1 inner and 1 outer spine. Third maxilliped with 1 strong spine on ventral (flexor) margin of merus. Ambulatory legs characteristically long, their lengths similar to that of cheliped.

Distribution

Western Atlantic: Virginia, Carolinas, Gulf of Mexico (south and north coast), Bahamas, Cuba (north and south coast), Cay Sal Banks, Puerto Rico, Lesser Antilles (St. Kitts, Dominica, St. Lucia, Barbados), Mexico, Venezuela, Guiana and Brazil (São Paulo, Santa Catarina, Rio Grande do Sul); 129–729 meters depth. According to Wenner (1982), this species is most abundant between 200 and 400 meters.

Remarks

Agononida longipes is an easily recognizable species, possessing a wide carapace, short rostrum and legs as long as the chelipeds. The ovigerous female from station 274 of USS "Blake" (Barbados), was selected as the lectotype by Melo-Filho & Melo (1992a). According to Chace (1942), *M. paynei* Boone is synonymous with this species.

Genus *Munida* Leach

Munida constricta A. Milne-Edwards, 1880

Munida constricta A. Milne-Edwards, 1880: 52; A. Milne-Edwards & Bouvier, 1897: 40, pl. 3, fig. 5; Benedict: 1902: 307; Chace, 1942: 34, fig. 14; Pequegnat & Pequegnat, 1970: 127; Melo-Filho & Melo, 1992a: 516; 1992b: 766, fig. 17; Melo-Filho, 1998: 394; Melo, 1999: 180, figs. 109, 110 a–d; Melo-Filho 1999: 389, fig. 8; Melo-Filho & Melo, 2001b: 1144, figs. 8, 9; 2001c: 42.

Munida miles. — Henderson, 1888: 126 [*part.*].

Material examined

Caribbean Sea: USS “Blake”, st. 221, 760 m, Saint Lucie, 1 ex. (MNHN Ga 534, lectotype). Brazil: São Paulo — N. Oc. “Prof. W. Besnard”, st. 6659, 505 m, 1 ex. (MZUSP 13210); st. 6679, 808 m, 2 ex. (MZUSP 13197).

Recognition characters

Lateral borders of carapace parallel. Outer orbital spine followed by 6 lateral spines. With transverse row of 8 epigastric spines, including 1 pair of small spines between the pair of large medial spines. One or two parahepatic spines on each side of carapace. One small postcervical spine on each side. Remainder of carapace unarmed. Abdominal tergites 2 and 3 with anterior margin armed. Tergite 4 with anterior margin armed or, more rarely, unarmed. Peduncle of antennule with outer terminal spine longer than inner spine and with outer dorso-lateral spine followed by 1 smaller proximal outer lateral spine. Peduncle of antenna armed with 1 long distomesial spine on segment 1 (basis) and 1

distolateral denticle on segment 2. Third maxilliped with 1 long proximal spine and 1 shorter distal spine on ventral (flexor) margin of merus.

Distribution

Western Atlantic: Cuba (north coast), Lesser Antilles (Neves, Dominica, St. Lucia, St. Vincent, Grenadines, Grenada) and Brazil (Alagoas, Espírito Santo, São Paulo, Santa Catarina and Rio Grande do Sul); 277–835 meters depth.

Remarks

Munida constricta is very similar to *M. miles*, differing from it in possessing a carapace with parallel borders. According to Chace (1942), the syntypes from USS "Blake" stations 146 and 147 are actually *M. miles*. Melo-Filho & Melo (1992a) selected the specimen from USS "Blake" station 221 as the lectotype of the *M. constricta*.

***Munida flinti* Benedict, 1902**

Munida Stimpsoni A. Milne-Edwards, 1880: 47 [*part.*]; A. Milne-Edwards & Bouvier, 1897: 48 [*part.*], pl. 4, fig. 1.

Munida stimpsoni.—Henderson, 1888: 126, pl. 14, fig. 1; Moreira, 1901: 83; Coelho & Ramos, 1972: 172; Coelho, Ramos & Melo, 1990: 25.

Munida flinti Benedict, 1902: 258, fig. 9; Chace, 1942: 57; Springer & Bullis, 1956: 15; Pequegnat & Pequegnat, 1970: 130; Takeda, 1983: 87; Melo-Filho & Melo, 1992b: 765, figs. 15–16; 1997: 193, fig. 2, a–f; Melo-Filho, 1998: 394; Melo, 1999: 182, fig. 111; Melo-Filho, 1999: 390, fig. 9; Melo-Filho & Melo, 2001a: 1180, figs. 3, 4; 2001b: 1146, figs. 10, 11; 2001c: 43.

Material examined

Gulf of Mexico: USS "Albatross", st. 2404, 108 m, off the Mississippi Delta, 1885, 1 ex. (USNM 9778, lectotype). Caribbean Sea: USS "Blake", st. 262, 166 m, Grenada, 1 ex. (MCZ 2821, syntype of the *M. stimpsoni*). Brazil: São Paulo — N.Oc. "Prof. W. Besnard", st. 6651, 256 m, 3 ex. (MZUSP 13205); st. 6652, 206 m, 1 ex. (MZUSP 13251); st. 6660, 314 m, 4 ex. (MZUSP 13211), st. 6666, 163 m, 4 ex. (MZUSP 13211).

Recognition characters

Carapace with arched margins. Outer orbital spine followed by 4 small lateral spines. Gastric area with 2 pairs of spines behind supraocular spines: 1 well-developed epigastric pair, and another, smaller protogastric pair. One parahepatic spine on each side of carapace, forming hexagon with preceding spines. Anterior hepatic and branchial areas unarmed. One small postcervical spine on each side. One spine on mesocardiac sulcus. Posterior margin of carapace with 1 pair of spines. Remainder of carapace unarmed. Transverse lines continuous, indistinct, with regularly spaced cilia. Abdominal tergites 2, 3 and 4 with anterior margin armed. Tergite 4 with posterior margin unarmed or, more rarely, armed with 1 spine. Peduncle of antennule with 1 inner terminal spine little longer than

outer spine. Lateral margin with 2 spines of average development. Peduncle of antenna with small outer distal spine on segment 2. Remaining segments unarmed. Third maxilliped with strong spine at middle of ventral (flexor) margin of merus.

Distribution

Western Atlantic: Gulf of Mexico (north and south coasts), Lesser Antilles (Grenada), Guiana, Brazil (Alagoas, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, Rio Grande do Sul) and Uruguay (to the north of the Rio de la Plata); usually 11–315 meters depth; a single specimen was collected at 630 meters depth by the HMS "Challenger" (st. 122, Alagoas).

Remarks

Munida flinti differs from the similar species (*M. benedicti* Chace, *M. stimpsoni* A. Milne-Edwards and *M. striata* Chace), in having only the second segment of the antennal peduncle armed. Besides, it possesses a carapace with continuous transverse lines, little marked, and the peduncle of the antenna with the distal segment relatively short. The spinulation of the carapace and abdominal tergites is extremely variable in *M. flinti* (Melo-Filho, 1992). According to Chace (1942), the specimens of *M. flinti* from stations 16 and 262 of USS "Blake" are syntypes of *M. stimpsoni*. All of the records of this last species for the Brazilian coast actually refer to *M. flinti*. Melo-Filho & Melo (1997) selected the male from USS "Albatross" station 2404 (Gulf of Mexico, off the Mississippi Delta; USNM 9778) as the lectotype.

Munida forceps A. Milne-Edwards, 1880

Munida forceps A. Milne-Edwards, 1880: 49; A. Milne-Edwards & Bouvier, 1897: 28, pl. 2, fig. 8; Benedict, 1902: 307; Chace, 1942: 39, fig. 15; Springer & Bullis, 1956: 15; Bullis & Thompson, 1965: 9; Pequegnat & Pequegnat, 1970: 131, fig. 5–2; Wenner, 1982: 361; Takeda, 1983: 88; Abele & Kim, 1986: 35, fig. a, p. 403; Melo-Filho & Melo, 1992b: 768, figs. 18–24; Poupin, 1994: 35, pl. 3d; Rambla, 1995: 98, fig. 2; Melo-Filho, 1998: 394; Melo, 1999: 184, fig. 113, 114 a–d; Melo-Filho, 1999: 390, fig. 10; Melo-Filho & Melo, 2001a: 1183, fig. 5; 2001b: 1148, fig, 12, 13; 2001c: 44.

Material examined

Brazil: São Paulo — N.Oc. "Prof. W. Besnard", st. 6693, 430 m, 1 ex. (MZUSP 13217).

Recognition characters

Carapace with margins slightly arched. Outer orbital spine on antero-lateral

angle, followed by 5 smaller lateral spines. Gastric area with epigastric row of strong spines. One parahepatic spine on each side of carapace. Anterior branchial areas each with 1 spine. One strong postcervical spine on each side. Remainder of carapace unarmed. Transverse lines well spaced, distinct. Abdominal tergites 2 with anterior margin armed. Remaining tergites unarmed. Peduncle of antennule with outer terminal spine much longer than inner spine. Outer lateral margin with 1 medium-sized proximal spine and 1 very long distal one. Peduncle of antenna with strong inner terminal spine on first segment (basis); second segment with 2 strong spines. Remaining segments unarmed. Third maxilliped with 2 spines, in addition to several intercalate tubercles on ventral (flexor) margin of merus. Chela characteristically long and very stout. Coxae of the third and fourth ambulatory legs characteristically granulated.

Distribution

Western Atlantic: Virginia, Florida (tropical east coast), Gulf of Mexico (north and south coast), Cuba (north coast), Mexico, Venezuela, Guiana, Brazil (Alagoas, Espírito Santo, Rio de Janeiro, Santa Catarina, Rio Grande do Sul) and Uruguay (north of the Rio de la Plata): most records at 73–426 meters depth, but the specimen from HMS "Challenger" st. 122 was dredged at 630 m and a specimen from off the Rio Grande do Sul coast (MZUSP 5177) was dredged at 950 m,.

Remarks

A. Milne-Edwards (1880) reported a single specimen of *M. forceps*, collected by USS "Blake" at station 36 (holotype). According to Chace (1942), however, there is also an ovigerous female of this species, collected together with the holotype (USS "Blake", st. 36) but not mentioned by A. Milne-Edwards (1880) and A. Milne-Edwards & Bouvier (1897). *Munida forceps* is easily identifiable by its long and very stout chelipeds. According to Melo-Filho & Melo (2001c), a single specimen was collected off the Uruguay coast (north of the Rio de la Plata) by N.Oc. "Prof W. Besnard" st. 6693 (MZUSP 13217).

***Munida iris* A. Milne-Edwards, 1880**

?Munida caribaea Stimpson, 1860: 244.

Munida iris A. Milne-Edwards, 1880: 49; A. Milne-Edwards & Bouvier, 1894: 256; 1897: 21, pl. 2, figs. 2–7; 1900: 285; Benedict, 1902: 310; Chace, 1942: 33; 1956: 15; Springer & Bullis, 1956: 15; Bullis & Thompson, 1965: 9; Pequegnat & Pequegnat, 1970: 131; Coelho & Ramos, 1972: 171; Williams & Wigley, 1977: 9, figs. 1, 2, tab. 1; Coelho; Ramos-Porto & Calado, 1986: 137, 140, 149; Takeda, 1983: 89; Lemaitre, 1984: 427, tab. 1; Poupin, 1994: 35; Escobar-Briones & Soto, 1993: 111, tabs. 1, 2; Melo-Filho, 1998: 394; Melo, 1999: 188, figs. 117, 118 a–e; Melo-

Filho, 1999: 395, fig. 11; Melo-Filho & Melo 2001a: 1184, fig. 6; 2001b: 1150, figs. 16, 17; 2001c: 45.

?Munida caribaea. — Smith, 1881: 428; 1883: 40, pl. 3, fig. 11; 1884: 355; 1886: 643. [*non Munida caribaea* A. Milne-Edwards & Bouvier, 1894: 256; 1897: 25 (= *Munida irrasa* A. Milne-Edwards, 1880)].

Munida sp. Indet. — Smith, 1882: 22, pl. 10, fig. 1.

Munida iris rutllanti Zariquiey-Alvarez, 1952: 217, fig. 8

Munida iris iris. — Wenner & Boech, 1979: 110, tab. 1; Wenner, 1982: 322; Williams, 1984: 233, fig. 168; Abele & Kim, 1986: 35, figs. d, e, 403.

Munida rutllanti. — García-Razo, 1996: 738.

Material examined

EUA: New England — USS "Fish Hawk", est. 871, 207m, 5 ex. (MNHN-969). Brazil: São Paulo — N.Oc. "Prof. W. Besnard", st. 6684, 511 m, 1 ex. (MZUSP 13206).

Recognition characters

Carapace with margins arched. Outer orbital spine followed by 6 lateral spines. Gastric area with epigastric row of spines. One parahepatic spine on each side of carapace. Branchial areas armed with 1 or 2 spines on each side. One to 3 postcervical spines on each side, with or without inserted spinules. Remainder of carapace unarmed. Supraocular spines long. Abdominal tergite 2 with anterior margin armed with 1 pair of spines. Remaining abdominal tergites unarmed. Peduncle of antennule with inner terminal spine little longer than outer spine. Peduncle of antenna with segment 1 (basis) armed with 1 inner terminal spine, segment 2 with 1 inner terminal spine and 1 outer terminal spine and segment 3 armed with 1 inner terminal spine. Third maxilliped with long spine on ventral (flexor) margin of merus. Sternum with armed margins.

Distribution

Western Atlantic: Virginia, Carolinas, Gulf of Mexico (southeast coast), Cuba (north coast), Cay Sal Banks, Lesser Antilles (Barbados), Mexico (off Cozumel), Guiana, Brazil (Alagoas, São Paulo, Rio Grande do Sul) and Uruguay (north of the Rio de la Plata). E astern Atlantic: Gulf of Cadiz, Canaries, African Coast (Western Sahara, Mauritania), Cape Verde Islands. Western Mediterranean (Spain, Morocco); 45–1303 meters depth, though usually between 200 and 400 meters.

Remarks

Munida iris is similar to *M. irrasa*, differing from it in the larger adult, armed second abdominal tergite, and the presence of one spine on the ventral (flexor) margin of the merus of the third maxilliped. Following Zariquiey-Alvarez (1952), most authors treated the eastern Atlantic and Mediterranean populations of *M. iris* as a subspecies (*M. iris rutllanti*). García-Raso (1996), without presenting justifications, treated *M. iris rutllanti* as *M. rutllanti*. The populations of the Mediterranean and eastern Atlantic are not isolated,

since the Strait of Gibraltar does not seem to be an effective boundary for most decapods (Almaça 1985; Melo-Filho 1997). *Munida iris* is a species with an amphi-Atlantic pattern of distribution. That pattern is possible, according to the model of Scheltema (1966, 1968 & 1971), by means of larval transport through the North Atlantic. This also occurs in other species of the genus (*M. microphthalma* A. Milne-Edwards and *M. sanctipauli* Henderson). The material examined establishes the first record of *M. iris* off the São Paulo coast.

Munida irrasa A. Milne-Edwards, 1880

?*Munida caribaea* Stimpson, 1860: 244.

Munida cariboea. — A. Milne-Edwards, 1880: 49.

Munida irrasa A. Milne-Edwards, 1880: 49; Faxon, 1895: 73; Benedict, 1902: 310; Hay & Shore, 1918: 402, pl. 28, fig. 8; Chace, 1942: 46; Haig, 1956: 3; Springer & Bullis, 1956: 15; Bullis & Thompson, 1965: 9; Williams, 1965: 105; 1984: 234; Pequegnat & Pequegat, 1970: 132; Coelho & Ramos, 1972: 171; Scelzo, 1973: 163; Coelho, Ramos-Porto & Koening, 1980: 56, tab. 7; Wenner, 1982: 362; Lemaitre, 1984: 428, tab. 1; Abele & Kim, 1986: 35, figs. b–c, p. 402; Melo-Filho & Melo, 1992a: 513; Melo-Filho, 1998: 395; Melo, 1999: 190, fig. 119, 120 a–d; Melo-Filho, 1999: 395, fig. 12; Melo-Filho & Melo 2001a: 1187, fig. 7, 8; 2001b: 1153, fig. 18, 19; 2001c: 45.

Munida caribaea. — A. Milne-Edwards & Bouvier, 1894: 256; 1897: 25, pl 1, figs. 16–20, pl. 2, fig. 1; Doflein & Balss, 1913: 172 [*non Munida caribaea* Smith, 1881: 428; 1883: 40, pl. 3, fig. 11; 1884: 35; 1886: 643 (= *Munida iris* A. Milne-Edwards, 1880)].

Munida caribea. — Young, 1900: 403; Türkay, 1968: 249.

Munida sculpta Benedict, 1902: 270, fig. 18; Chace, 1942: 44, figs. 19a–b; Pequegnat & Pequegat, 1970: 136.

Munida simplex. — Coelho & Ramos-Porto, 1980: 136; Coelho, Ramos-Porto & Koening, 1980: 56, tab. VII.

Material examined

Caribbean Sea: USS “Albatross”, 1 ex. (USNM 7798, unknown station, 1884, ovigerous female, holotype of *M. sculpta* Benedict); USS “Blake”, st. 192 (Dominica), 248 m, 4 ex. (MNHNGa 947, paralectotypes of *M. irrasa*); est. 232 (St. Vincent), 158 m, 2 ex.(MCZ 4713, paralectotypes of *M. irrasa*); est. 241 (Grenadines), 293 m, 1 ex. (MNHNGa 948, paralectotypes of *M. irrasa*); est. 253 (Grenada), 166 m, 2 ex. (MCZ 4714,non ovigerous female lectotype of *M. irrasa* and ovigerous female paralectotype); est. 272 (Barbados), 137 m, 6 ex. (MCZ 3063, paralectotypes of *M. irrasa*); est. 276 (Barbados), 169 m, 3 ex. (MCZ 2839, paralectotypes of *M. irrasa*). Brazil: São Paulo — N.Oc. “Prof. W. Besnard”, st. 6671, 147 m, 49 ex (MZUSP 13218), 1 ex. (MZUSP 13228), 5 ex. (MZUSP 13230), 2 ex. (MZUSP 13235); st. 6665, 258 m, 5 ex. (MZUSP 13215), 3 ex. (MZUSP 13220), 2 ex. (MZUSP 13238), 1 ex. (MZUSP 13245), 6 ex. (MZUSP 13247); st. 6673, 133 m, 1 ex. (MZUSP 13200); st. 6676, 153 m, 3 ex. (MZUSP 13209), 2

ex. (MZUSP 13224); st. 6678, 99 m, 1 ex. (MZUSP 13203); st. 6681, 168 m, 8 ex. (MZUSP 13242), 40 ex. (MZUSP 13243); st. 6686, 380 m, 7 ex. (MZUSP 13207), 1 ex. (MZUSP 13249).

Recognition characters

Carapace with arched margins. Outer orbital spine followed by 6 or more lateral spines. With transverse row of epigastric spines. One parahepatic spine on each side of carapace. Branchial areas armed with 1 pair of spines on each side. Usually with 1 pair of postcervical spines on each side of carapace; but these spines may be lacking or be present in a larger number. Remainder of carapace unarmed. Supraocular spines short, reaching proximal margin of cornea. Abdominal tergites unarmed. Peduncle of antennule with inner terminal spine much longer than outer spine. Peduncle of antenna with segment 1 (basis) armed with 1 strong inner terminal spine, segment 2 armed with 1 inner terminal and 1 outer terminal spine and segment 3 armed with 1 inner terminal and 1 outer terminal spine; fourth segment with 1 outer terminal spinule. Third maxilliped with at least 3 spines on ventral (flexor) margin of merus. Sternum with armed margins.

Distribution

Western Atlantic: Carolinas, Gulf of Mexico (southeast and northeast coast), Bahamas, Cuba (north and south coast), Cay Sal Banks, Lesser Antilles (St. Croix, Dominica, St. Lucia, St. Vincent, Barbados, Grenadines, Grenada), Colombia, Venezuela, Brazil (Amapá, Pará, Maranhão, Espírito Santo, Rio de Janeiro, São Paulo, Rio Grande do Sul) and Uruguay (north of the Rio de la Plata); 38–468 meters depth.

Remarks

Stimpson (1860) briefly described *M. caribaea* based on material collected at Sombrero Island and Sandkey. The short description of Stimpson (1860), without illustrations, is insufficient to characterize the species. It is possible that *M. irrasa* is a junior synonym of *M. caribaea*, as considered by A. Milne-Edwards & Bouvier (1897). However, the description of Stimpson (1860) could refer equally to *M. irrasa* or to *M. iris*. Considering that the type-material was destroyed, Faxon (1895) suggested the suppression of the name *M. caribaea*. Subsequent authors (Benedict 1902; Chace 1942; Williams 1984) supported that suggestion. The status of *M. caribaea* is left unresolved at present until either a neotype is established or an application is made to the ICZN to suppress the name. Melo-Filho & Melo (1992a) designated as the lectotype of *M. irrasa*, the ovigerous female from station 253 of USS "Blake" (MCZ 4714). Examination of the type material of *M. sculpta* Benedict proved that it is a junior synonym of *M. irrasa*.

Munida pusilla Benedict, 1902

Munida pusilla Benedict, 1902: 268, fig. 16; Haig, 1956: 2; Springer & Bullis, 1956: 15; Williams, 1984: 256, fig. 171; Abele & Kim, 1986: 35, figs. f–g,; Melo-Filho, 1998: 395; Melo, 1999: 198, figs. 127–128; Melo-Filho & Melo, 2001b: 1159, figs. 26–27; 2001c: 48; Melo-Filho & Coelho-Filho, 2004: 61.
Munida spinifrons. — Coelho & Ramos, 1972: 171 [*part.*].
Munida brasiliae Coelho, 1973: 344 [*part.*].

Material examined

Brazil: São Paulo — N.Oc. "Prof. W. Besnard", st. 6666, 163 m, 1 ex. (MZUSP 13222), 1 ex. (MZUSP 13223), 1 ex. (MZUSP 13226); st. 6673, 133 m, 1 ex. (MZUSP 13202); st. 6681, 168 m, 18 ex. (MZUSP 13483); st. 6686, 380 m, 5 ex. (MZUSP 13216).

Recognition characters

Carapace convex, with anterior margin oblique. Outer orbital spine followed by 6 lateral spines. Gastric area with transverse row of 4 spines. One parahepatic spine on each side of carapace. Branchial areas armed with 1 spine on each side. One postcervical spine on each side of carapace. Remainder of carapace unarmed. Rostrum short and obscurely spinulated on margin. Abdominal tergites 2 unarmed, or armed with 1 pair of spines on anterior margin. Remaining abdominal tergites unarmed. Peduncle of antennule with inner terminal spine longer than outer one; outer lateral margin with 2 spines. Peduncle of antenna with only first segment armed, with 1 outer terminal spine. Third maxilliped with at most 2 spines on ventral (flexor) margin of merus. Chelipeds short, palm longer than fingers. Sternum unarmed.

Distribution

Western Atlantic: the Carolinas, Florida (temperate east coast), Gulf of Mexico (northeast and southeast coast), Mexico, Colombia, Venezuela and Brazil (Amapá, Ceará, São Paulo). Between 38 and 168 meters depth. Collected at 380 meters at N.Oc. "Prof. W. Besnard" st. 6686.

Remarks

Record off São Paulo extended the species' known distribution further south and the bathymetric range to 380 m.

Munida spinifrons Henderson, 1885

Munida spinifrons Henderson, 1885: 412; 1888: 144, pl. 15, figs. 1, 1a, 1b; Milne-Edwards & Bouvier, 1894: 256; Moreira, 1901: 83; Coelho, 1967–69: 232 [*part.*]; Pequegnat & Pequegnat, 1970: 127; Coelho & Ramos, 1972: 171 [*part.*]; Fausto-Filho, 1978: 67; Abele & Kim, 1986: 36, fig. a, p. 401; Coelho, Ramos-Porto & Calado, 1986: 88; Baba & Camp, 1988: 414, fig. 1;

Melo-Filho & Melo, 1992b: 763, figs. 8–14; Melo-Filho, 1998: 395; Melo, 1999: 202, figs. 131–132; Melo-Filho & Melo, 2001b: 1163, figs. 30–31; 2001c: 49; Melo-Filho & Coelho-Filho, 2004: 61.

Material examined

Brazil: Fernando de Noronha — HMS "Challenger", 1885, st. 113A, 13–45 m (BMNH 1888: 33, holotype). São Paulo — N.Oc. "Prof. W. Besnard", st.6673, 133 m, 5 ex. (MZUSP 13227).

Recognition characters

Carapace strongly convex, anterior margin oblique. Outer orbital spine followed by 6 lateral spines. Gastric area with transverse row of 6 spines. One parahepatic spine on each side of carapace. Branchial areas armed with 1 or 2 spines on each side. Remainder of carapace unarmed. Rostrum long, with distinct spines or spinules on margin. Abdominal tergite 2 armed with 1 pair of spines on anterior margin. Remaining abdominal tergites unarmed. Peduncle of antennule with inner terminal spine longer than outer one; outer lateral margin with 2 spines. Peduncle of antenna with first (basis) segment armed with 1 inner terminal spine and second segment armed with 1 outer terminal spine. Third maxilliped with 4 spines on ventral (flexor) margin of merus. Chelae with palm of same length or slightly shorter than fingers.

Distribution

Western Atlantic: Florida (east coast, north of Cape Canaveral) and Brazil (Amapá, Ceará, Rio Grande do Norte, Fernando de Noronha, Rocas Atoll, Espírito Santo, Rio de Janeiro, São Paulo): 13–150 meters depth.

Remarks

Munida spinifrons is similar to *M. angulata* Benedict and *M. petronioi* Melo-Filho & Melo. An interesting fact is that in specimens occurring at the southern and northern ends of the species distribution (Florida and the southeast coast of Brazil), the rostrum is little or very little spinulated, and most individuals feature 2 (two) spines on the anterior branchial area. These can be easily confused with *M. pusilla*. Specimens occurring near the center of the distribution area, off the Brazilian northeast coast, have well-developed rostral spinulation and, usually, 1 spine in the anterior branchial area (Melo-Filho & Melo 1994, 2001b; Melo-Filho & Coelho-Filho 2004).

Genus *Munidopsis* Whiteaves

Munidopsis polita (Smith, 1883)

Anoplonotus politus Smith, 1883: 50, pl. 2-fig. 1, pl. 3-fig. 1–5a.
Munidopsis polita; Benedict, 1902: 324; Chace, 1942: 75; Pequegnat & Pequegnat, 1970: 155;

1971: 6, 21; Pequegnat, 1975: 44; Wenner, 1982: 369, 373, tab. 3; Wenner & Read, 1982: 188, tab. 2; Poupin, 1994: 39; Melo-Filho, 1998: 396.

Material examined

Brazil: São Paulo — N.Oc. "Prof. W. Besnard", st.6693, 430 m, 1 ex. (MZUSP 13252).

Recognition characters

Carapace dorsally smooth and unarmed. Rostrum triangular, minutely serrate or with small scattered spines. Cornea and eyestalk unarmed. Abdominal tergites smooth and unarmed. No epipods on chelipeds or ambulatory legs. Third maxilliped with 1 strong tooth on ventral (flexor) surface of merus.

Distribution

Western Atlantic: Massachusetts (Martha's Vineyard); Virginia; Florida (Straits), Gulf of Mexico (northwest), Nicaragua, Lesser Antilles (Guadeloupe), Colombia and Brazil (São Paulo); 129–860 meters depth.

Remarks

The specimen from N.Oc. "Prof. W. Besnard" st. 6693 extends the area of occurrence of *Munidopsis polita* significantly.

Discussion

Several authors have noted the existence of a distinct zoogeographic region off the southeast coast of South America (Ekman 1953; Briggs 1974; Melo 1985; Absalão 1989; Dall 1991). Study of the distribution of the genus *Munida* (Melo-Filho 1997; Melo-Filho & Melo 2001c) corroborated the existence of a distinct faunistic region, from Cabo Frio (23° S) to Rio de la Plata (35° S). No known endemic species of Chirostylidae or Galatheidae occur in this area, being also present in the Northern Hemisphere (Virginia, the Carolinas, Florida, the Gulf of Mexico and the Caribbean Sea).

The hydrology south of Cabo Frio is complex. The influence of continental waters is insignificant off the coast of São Paulo, Paraná and Santa Catarina. Evidence of superficial tropical water cease at around 30°S. The characteristics of the water become remarkably subtropical off the Rio Grande do Sul coast, with salinities and temperatures between 35–36‰ (ppm) and 10–20°C (Emilsson 1961). In this area, because of the influence of the Patos Lagoon and the Rio de la Plata, the Brazil Current suffers a drastic reduction of salinity. Under the influence of prevailing winds and the Earth's rotation the Brazil Current turns towards the east. This turn, already noticeable at the level of Cabo Frio, becomes more and more marked. Around 35–38°S, the eastward component is predominant

(Tchernia 1980). Southeast winds and the influence of the cold Falkland/Malvinas Current generate upwelling areas along the coast of Santa Catarina and Rio Grande do Sul (Palacio 1982).

The contact zone between Malvinas/Falkland Current and Brazil Current, around 35–38°S, represents the Subtropical Convergence (STC) in the western part of the South Atlantic. The Convergence area is marked on the surface by a tightening of the 12–14°C isotherms and is characterized by a strong temperature gradient of 10–14°C in winter and 14–18°C in summer. The Subtropical Convergence is recognized as an important hydrological boundary by several authors (Balech 1954; Boltovskoy 1961; Schlenz 1965; Tommasi,1965; Tchernia 1980; Melo 1985; Absalão 1989; Dall 1991).

TABLE 2. Northern and southern geographic distribution limits, in the Western Atlantic, of the species of Chirostylidae and Galatheidae collected under the Revizee Program (Score-Sul).

Species	North	South
Uroptychus nitidus (var. B)	Gulf of Mexico (southeast)	Brazil (Santa Catarina)
Agononida longipes	Virginia	Brazil (Rio Grande do Sul)
Munida constricta	Cuba (north coast)	Brazil (Rio Grande do Su)l
Munida flinti	Gulf of Mexico (north and south)	Uruguay (north of Plata River)
Munida forceps	Virginia	Uruguay (north of Plata River)
Munida iris	Virginia	Uruguay (north of Plata River)
Munida irrasa	Caroline	Uruguay (north of Plata River)
Munida pusilla	Caroline	Brazil (São Paulo)
Munida spinifrons	Florida (east, to the north of Canaveral Cape)	Brazil (São Paulo)
Munidopsis polita	Massachusetts	Brazil (São Paulo)

All the species of the genus *Munida*, *Munidopsis* and *Uroptychus* collected in the Revizee Program along the southern coast of Brazil, follow the distributional pattern previously reported by Melo-Filho & Melo (2001b), and occur in the Northern Hemisphere. Information on the geographic and bathymetric distributions is still limited and incomplete (Table 2 and Figure 2), but most of those species seem to have an affinity for temperate waters, extending their distribution to the south along the edge of the continental shelf and the upper slope, finding their southern limit off Rio Grande do Sul and the Uruguay coast. None of the Galatheidae or Chirostylidae species known from Brazil occurs south of the Rio de la Plata (Melo 1999; Melo-Filho 2001b), thus indicating the presence of a definitive boundary in this area, on the shelf and slope (Melo-Filho & Melo 2001c).

On the continental shelf, the extreme variation of the abiotic factors along the coast of Rio Grande do Sul and the low-salinity water mass produced by the Rio de la Plata (temperatures between 15–20°C and salinities around 33‰) constitute an efficient

boundary. On the upper slope there seems to be a thermal barrier, since the Brazil Current gradually turns eastward and flows over the upper slope, generating abnormally high bottom temperatures (Palacio 1982).

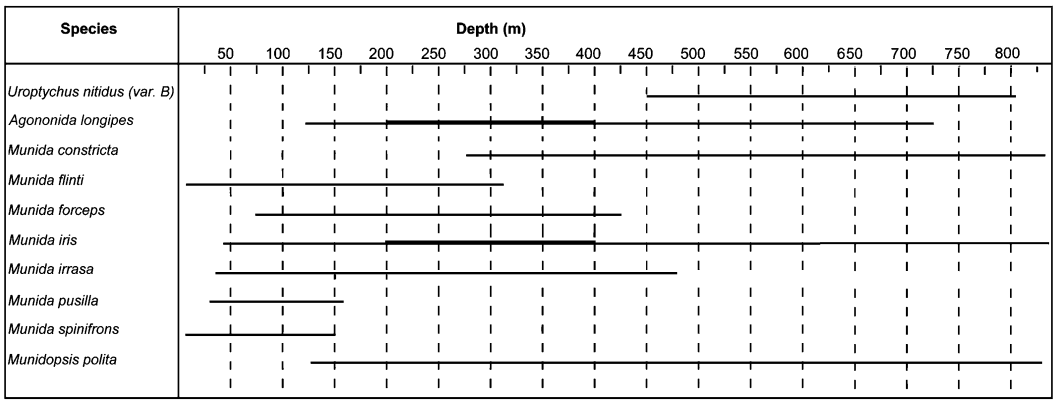

FIGURE 2. Depth distributions for the species considered in the study. The heavy lines for M. iris and A. longipes indicate their preferential bathymetric distribution.

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References

Abele, L.G. & Kim, W. (1986) *An illustrated guide to the marine decapod crustaceans of Florida.* Florida, Department of Environmental Regulation. Technical Series, v. 8, n. 1. 760 pp.

Amaral, A.C.Z. & Rossi-Wongtschowski, C.L.B. (2004) *Biodiversidade Bentônica da Região Sudeste-Sul do Brasil–Plataforma Externa e Talude Superior.* São Paulo, Instituto Oceanográfico–USP. Serie documentos Revizee: Score Sul. 216 pp.

Absalão, R.S. (1989) Padrões distributivos e zoogeografia dos moluscos da plataforma continental brasileira. Parte III. Comissão Oceanográfica Espírito Santo I. *Memórias do Instituto Oswaldo Cruz*, 84 (supl. 4), 1–6.

Baba, K. (1988) *Chirostylid and Galatheid Crustaceans (Decapoda: Anomura) of the “Albatross” Philippine Expedition, 1907–1910.* Tokyo, The Carcinological Society of Japan. *Research on Crustacea*, Special number 2. 203 pp.

Baba, K. & Camp, D.K. (1988) Two species of galatheid crustaceans (Decapoda: Anomura) new to Florida, *Munida spinifrons* Henderson, and *Munidopsis kucki*, new species. *Proceedings of the Biological Society of Washington*, 10 (2), 414–422.

Baba, K. & de Saint Laurent, M. (1996) Crustacea Decapoda: revision of the genus *Bathymunida*

Balss, 1914, and description of six new related genera (Galatheidae). In: Crosnier, A. (Ed.) Résultats des Campagnes MUSORSTOM, Vol. 15. *Mémoires du Muséum national d'Histoire naturelle, Paris*, 168: 433–502.

Balech, E. (1954) Division zoogeografica del litoral sudamericano. *Revista de Biologia Marina*, 4, 184–195.

Benedict, J.E. (1902) Description of a new genus and forty-six new species of crustaceans of the Family Galatheidae with a list of the known marine species. *Proceedings of the United States National Museum*, 26 (1311), 243–334.

Boltovskoy, E. (1961) Línea de la convergencia subantártica en el Atlántico sur y su determinación usando las indicaciones biológicas foraminíferas. *Servicio de Hidrologia Naval*, H, 1018.

Boone, L. (1927) Crustacea from tropical east American Seas. Scientific results of the first oceanographic expedition of the "Pawnee", 1925. *Bulletin of the Bingham Oceanographic Collection*, 1 (2), 1–147.

Briggs, J.C. (1974) *Marine Zoogeography.* McGraw Hill Ed., New York, 475 pp.

Bullis, H.R. Jr. & Thompson, J.R. (1965) Collections by the exploratory fishing vessels "Oregon", "Silver Bay", "Combat", and "Pelican" made during 1956–1960 in the southwestern North Atlantic. *Special Scientific Report of the United States Fisheries Fish and Wildlife Service*, 510, 1–130.

Chace, F.A.Jr. (1942) Reports on the scientific results of the "Atlantis" expeditions to the West Indies, under the joint auspices of the University of Havana and Harvard University. *Torreia*, 11, 1–106.

Coelho, P.A. (1967–69) A distribuição dos crustáceos decápodos reptantes do norte do Brasil. *Trabalhos Oceanográficos da Universidade Federal de Pernambuco*, 9–11, 223–238.

Coelho, P.A. (1973) Descrição preliminar de *Munida brasiliae*, n.sp., do Norte e Nordeste do Brasil (Crustacea: Decapoda: Galatheidae). *Ciência e Cultura*, 25 (6), 344.

Coelho, P.A. & Ramos, M.A. (1972) A constituição e a distribuição da fauna de decápodos do litoral leste da América do Sul entre as latitudes de 5°N e 39°S. *Trabalhos do Instituto Oceanográfico da Universidade Federal de Pernambuco*, 13, 133–236.

Coelho, P.A. & Ramos-Porto, M.A. (1980) Crustáceos decápodos da costa do Maranhão, Brasil. *Boletim do Instituto Oceanográfico*, 29 (2), 135–138.

Coelho, P.A., Ramos, M. & Melo, G.A.S. (1990) Crustáceos decápodos do Estado de Alagoas. *Anais da Sociedade Nordestina de Zoologia*, 3 (3), 21–34.

Coelho, P.A., Ramos-Porto, M. and Calado, T.C.S. (1986) Litoral do Rio Grande do Norte: Decapoda. *Caderno Ômega da Universidade Federal Rural de Pernambuco, Série Ciências Aquáticas*, 2, 79–105.

Coelho, P.A.; Ramos-Porto, M. & Koening, M.L. (1980) Biogeografia e Bionomia dos crustáceos do litoral equatorial brasileiro. *Trabalhos Oceanográficos da Universidade Federal de Pernambuco*, 15, 7–138.

Dall, W. (1991) Zoogeography of the Penaeidae. *Memoirs of the Queensland Museum*, 31, 39–50.

Doflein, F. & Balss, H. (1913) Die Galatheiden der Deutschen Tiefsee-Expedition. *Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia" 1898–1899*, 20, 125–184.

Ekman, S. (1953) *Zoogeography of the sea*. Sidgwick and Jackson Limited, London, 417 pp.

Emilsson, I. (1961) The shelf and coastal waters off southern Brazil. *Boletim do Instituto Oceanográfico*, 11 (2), 101–112.

Escobar-Briones, E. & Soto, L. (1993) Bentos del mar profundo en México. *In*: Salazar-Vallejo, S.I. & Gonzáles, N.E. (Eds.) *Biodiversidad marina y costera de México*. CONABIO/CIQRO, México. 865 pp.

Fausto-Filho, J. (1978) Crustáceos estomatópodos e decápodos dos substratos de lama do Nordeste brasileiro. *Arquivos de Ciências do Mar*, 18 (1–2), 63–71.

Faxon, W. (1895) Reports on an exploration off the West coasts of Mexico, Central and South America, and off Galapagos Islands, in charge of Alexander Agassiz, by the U.S. Fish Commission Steamer "Albatross", during 1891, Lieut. Commander Z. L. Tanner, U.S.N., Commanding. XV. The Stalk-eyed Crustacea. *Memoirs of the Museum of Comparative Zoology, at Harvard College*, 18, 1–292.

García-Razo, J.E. (1996) Crustacea Decapoda (excl. Sergestidae) from Ibero-Moroccan waters. Results of Balgim-84 Expedition. *Bulletin of Marine Science*, 58 (3), 730–752.

Haig, J. (1956) The Galatheidae (Crustacea: Anomura) of the Allan Hancock Expedition with a review of the Porcellanidae of the Western Atlantic. *Report of Allan Hancock Atlantic Expedition*, 8, 1–44.

Hay, W.P. & Shore, C.A. (1918) The decapod crustaceans of Beaufort, N.C., and the surrounding region. *Bulletin of the United States Bureau of Fisheries*, 35, 369–475.

Henderson, J.R. (1885) Diagnoses of the new species of Galatheidea collected during the "Challenger" Expedition. *Annals and Magazine of Natural History*, 5 (16), 407–421.

Henderson, J.R. (1888) Report on the Anomura collected by H.M.S. "Challenger" during the years 1873–76. *Report on the scientific results of the voyage of H.M.S. "Challenger" during the years 1873-76, Zoology*, 27, 1–221.

Lemaitre, R. (1984) Decapod crustaceans from Cay Sal Bank, Bahamas, with notes on their zoogeographic affinities. *Journal of Crustacean biology*, 4 (3), 425–447.

Macpherson, E. & Segonzac, M. (2005) Species of the genus *Munidopsis* (Crustacea, Decapoda, Galatheidae) from the deep Atlantic Ocean, including cold-seep and hydrothermal vent areas. *Zootaxa*, 1095, 1–60.

Melo, G.A.S. (1985). *Taxonomia e padrões distribucionais e ecológicos dos Brachyura (Crustacea: Decapoda) do litoral sudeste do Brasil*. Instituto de Biociências, Universidade de São Paulo, São Paulo, 216 pp.

Melo, G.A.S. (1999) *Manual de identificação dos Crustacea Decapoda do litoral brasileiro: Anomura, Thalassinidea, Palinuridea, Astacidea*. Plêiade Ed. and FAPESP, São Paulo, 551 pp.

Melo-Filho, G.A.S. (1992) *Taxonomia e distribuição do gênero Munida Leach (Crustacea: Decapoda: Galatheidae) na costa brasileira.* Instituto de Biociências, Universidade Estadual Paulista, Rio Claro, 187 pp.

Melo-Filho, G.A.S. (1997) *O gênero Munida Leach (Crustacea: Decapoda: Galatheidae) no Atlântico e Mediterrâneo: Composição e Biogeografia*. Instituto de Biociências, Universidade de São Paulo, São Paulo, 248 pp.

Melo-Filho, G.A.S. (1998) Malacostraca–Eucarida. Chirostylidae and Galatheidae. *In:* Young, P. S. (Ed.), *Catalogue of Crustacea of Brazil*. Museu Nacional, Rio de Janeiro, pp. 393–397.

Melo-Filho, G.A.S. (1999) Famílias Chirostylidae e Galatheidae. *In*: Buckup, L. & Bond-Buckup, G. (Eds.), *Os crustáceos do Rio Grande do Sul*. Editora da Universidade UFRGS, Porto Alegre, pp. 383–397.

Melo-Filho, G.A.S. & Coelho-Filho, P.A. (2004) Material of *Munida* Leach (Decapoda: Galatheidae) collected off northeast coast of Brazil under Revizee Program. *Nauplius* 12 (2), 59–64.

Melo-Filho, G.A.S. & Melo, G.A.S. (1992a) Designation of lectotypes for the species of *Munida* (Crustacea: Anomura: Galatheidae) collected by the U.S. Coast Survey Steamer "Blake" (1877–79) and description of a new species. *Proceedings of the Biological Society of Washington*, 105 (3), 512–520.

Melo-Filho, G.A.S. & Melo, G.A.S. (1992b) Reexamination of the material of *Munida* Leach (Crustacea: Anomura: Galatheidae) collected by the H.M.S. "Challenger" (1872–76) along the Brazilian coast. *Proceedings of the Biological Society of Washington*, 105 (4), 760–774.

Melo-Filho, G.A.S. & Melo, G.A.S. (l994) Three new species of *Munida* (Crustacea: Anomura: Galatheidae) from the Brazilian coast. *Papéis Avulsos de Zoologia*, 39 (5), 49–60.

Melo-Filho, G.A.S. & Melo, G.A.S. (l997) Redescrição e designação de lectótipos para duas espé-

cies do gênero *Munida* Leach 1820 (Crustacea: Decapoda: Galatheidae) coletadas pelo U.S.F.C. "Albatross" (1885) no Golfo do México. *Papéis Avulsos de Zoologia,* 40 (12), 189–202.

Melo-Filho, G.A.S. & Melo, G.A.S. (2001a) Espécies do gênero *Munida* Leach (Crustacea, Decapoda, Galatheidae) coletadas entre Torres (Rio Grande do Sul, Brasil) e Maldonado (Uruguai) pelo Programa Rio Grande do Sul (PRS I–II, GEDIP). *Revista Brasileira de Zoologia*, 18 (4), 1177–1196.

Melo-Filho, G.A.S. & Melo, G.A.S. (2001b) Espécies do gênero *Munida* Leach (Crustacea, Decapoda, Galatheidae), distribuídas na costa do Brasil. *Revista Brasileira de Zoologia*, 18 (4), 1135–1176.

Melo-Filho, G.A.S. & Melo, G.A.S. (2001c) Taxonomia e Zoogeografia das espécies do Gênero *Munida* Leach, 1820 (Crustacea: Decapoda: Galatheidae) distribuídas ao longo da costa Temperada-Quente do Atlântico-Sul Ocidental. *Tropical Oceanography*, 29 (1), 37–57.

Milne-Edwards, A. (1880) Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico and in the Caribbean sea, 1977, 78, 79, by the United States Coast Survey Steamer "Blake"... VIII. Études préliminaires sur les Crustacés. *Bulletin of the Museum of Comparative Zoology at Harvard College*, 8 (1), 1–68.

Milne-Edwards, A & Bouvier, E.L. (1894) Considérations générales sur la famille des Galathéidés. *Annales des Sciences Naturelles, Zoologie*, 7 (16), 191–327.

Milne-Edwards, A & Bouvier, E.L. (1897) Reports on the results of dredging under the supervision of Alexander Agassiz in the Gulf of Mexico (1877–78), in the Caribbean Sea (1878–79), and along the Atlantic Coast of the United States (1880) by the U.S. Coast Survey Steamer "Blake", Lieut. Commander C.D. Sigsbee, U.S.N., and Commander J.R. Bartlett, U.S.N., commanding. XXXV. Description des Crustacés de la famille des Galathéidés recueillis pendant l'expédition. *Memoirs of the Museum of Comparative Zoology at Harvard College*, 19 (2), 1–141.

Milne-Edwards, A & bouvier, E.L. (1900) Crustacés Décapodes. Première partie. Brachyures et Anomoures. *Expéditions Scientifiques du "Travailleur" et du "Talisman" pendant les années 1880, 1881, 1882, 1883*, Paris, 396pp.

Moreira, C. (1901) Contribuições para o conhecimento da fauna brasileira. Crustáceos do Brasil. *Archivos do Museu Nacional do Rio de Janeiro*, 11, 1–51.

Palacio, F.J. (1982) Revisión zoogeográfica marina del sur del Brasil. *Boletím do Instituto Oceanográfico*, 31 (1), 69–92.

Pequegnat, L.H. (1975) List of catalogued invertebrate species in the Texas A & M University systematic collection of marine organisms. *Report of the Department of Oceanography, Texas A & M University*, TAMU–SG–76–601, l–109.

Pequegnat, L.H. & Pequegnat, W.E. (1970) Deep-sea anomurans of superfamily Galatheoidea with descriptions of two new species. *Contributions on the Biology of the Gulf of Mexico*, 1 (5), 125–170.

Pequegnat, W.E. & Pequegnat, L.H. (1971) New species and new records of *Munidopsis* (Decapoda: Galatheidae) from the Gulf of Mexico and Caribbean Sea. *Texas A&M University Oceanographic Studies*. Gulf Publishing CO., 1 (supplement), l–24.

Poupin, J. (1994) *Faune Marine Profonde des Antilles Françaises: Récoltes du navire Polka faites en 1993*. Orstom Éditions, Paris, 88 pp.

Rambla, J.P.B. (1995) Crustaceos de la plataforma y talud continental de la región nororiental de Venezuela colectados por el B/O "Dr. Fridtjof Nansen" en 1988. II.—Decapoda: Anomura: Galatheoidea. *Boletin del Instituto Oceanográfico de Venezuela,* 34 (1/2), 95–107.

Scelzo, M.A. (1973) Lista de los crustáceos decápodos Anomura obtenidos en 1966 por la expedición "Walter Herwig" en el Atlántico sur y depositados en las colecciones del Instituto de Biología Marina. *Physis*, Section A, 32 (84), 161–174.

Scheltema, R.S. (1966) Evidence for trans-Atlantic transport of gastropod larvae belonging to the genus *Cymatium*. *Deep Sea Research*, 13, 83–95.

Scheltema, R.S. (1968) Dispersal of larvae by equatorial ocean currents and its importance to the zoogeography of shoal-water tropical species. *Nature*, 217 (5134), 1159–1162.

Scheltema, R.S. (1971) Larval dispersal as a means of genetic exchange between geographically separated populations of shallow-water benthic marine gastropods. *Biological Bulletin*, 140 (2), 284–322.

Schlenz, E. (1965) Outline of the ecological distribution of the Foraminifera of the Brazilian continental shelf. *Anais da Academia Brasileira de Ciências*, 37, 325.

Schmitt, W.L. (1935) Crustacea Macrura and Anomura of Porto Rico and the Virgin Islands. *Scientific Survey of Porto Rico and Virgin Islands*, 15 (2), 125–227.

Smith, S.I. (1881) Preliminary notice of the Crustacea dredged, in 64 to 325 fathoms, off the south coast of New England, by the United States Fish Commission in 1880. *Proceedings of the United States National Museum*, 3, 413–452.

Smith, S.I. (1882) Report on the Crustacea. XVII. Part I. Decapoda. Reports on the results of dredging, under the supervision of Alexander Agassiz, on the east coast of the United States, during the summer of 1880, by the U.S. Coast Survey Steamer "Blake", commander J.R. Bartlett U.S.N. commanding. *Bulletin of the Museum of Comparative Zoology at Harvard College*, 10 (1), 1–108.

Smith, S.I. (1883) Preliminary report on the Brachyura and Anomura dredged in deep water off the south coast of New England by the United States Fish Commission in 1880, 1881, and 1882. *Proceedings of the United States National Museum*, 6 (1), 1–57.

Smith, S.I. (1884) Report on the Decapod Crustacea of the "Albatross" dredging off the east coast of the United States in 1883. *Report of the Commission of Fish and Fisheries*, 10, 1–1101.

Smith, S.I. (1886) Report on the Decapod Crustacea of the "Albatross" dredging off the east coast of the United States the summer and autumn of 1884. *Report of the Commission of Fish and Fisheries*, 13, 1–1108.

Springer, S. & Bullis, H.R. Jr. (1956) Collections by the "Oregon" in the Gulf of Mexico. List of crustaceans, mollusks, and fishes identified from collections made by exploratory fishing vessel "Oregon" in the Gulf of Mexico and adjacent seas, 1950 through 1955. *Special Scientific Report United States Fisheries Fish and Wildlife Service*, 196, 1–134.

Stimpson, W. (1860) Notes on North American Crustacea, in the Museum of the Smithsonian Institution n° II. *Annals of the Lyceum of Natural History of New York*, 7, 176–246.

Takeda, M. (1983) Crustaceans. *In*: Takeda, M. & Okutani, T. (Eds.) *Crustaceans and Mollusks Trawled off Suriname and French Guiana*. Japan Marine Fishery Resource Research Center, Tokyo, pp. 19–180.

Tchernia, P. (1980) *Descriptive Regional Oceanography.* Pergamon Press, New York, 253 pp.

Tavares, M. & Campinho, P. (1998) Three new records of deep-sea squat lobsters of the genus *Munidopsis* Whiteaves from the southwestern Atlantic Ocean (Decapoda: Galatheidae). *Crustacean Research*, 27, 88–100.

Tommasi, L. R. (1965) Faunistic provinces of the western South Atlantic littoral region. *Anais da Academia Brasileira de Ciências*, 37, 261–262.

Türkay, M. (1968) Decapoden von den Margarita-Inseln (Venezuela) (Crustacea). *Senckenbergiana Biologica*, 49 (3/4), 249–257.

van Dam, A.J. (1933) Die Decapoden der Siboga Expedition. 8. Galatheidea: Chirostylidae. *Siboga-Expeditio*, 119 (39A), 1–46.

Wenner, E.L. (1982) Notes on the distribution and biology of Galatheidae and Chirostylidae (Decapoda: Anomura) from the Middle Atlantic Bight. *Journal of Crustacean Biology*, 2 (3), 360–377.

Wenner, E.L. & Boech, D.F. (1979) Distribution patterns of epibenthic decapod Crustacea along the

shelf-slope coenocline, Middle Atlantic Bight, U.S.A. *Bulletin of the Biological Society of Washington*, 3, 106–133.

Wenner, E.L. & Read, T. (1982) Seasonal composition and abundance of decapod crustacean assemblages from the South Atlantic Bight, U.S.A. *Bulletin of Marine Science*, 32 (1), 181–206.

Williams, A.B. (1965) Marine decapod crustaceans of the Carolinas. *Fishery Bulletin*, 65 (1), 1–298.

Williams, A.B. (1984) *Shrimps, lobsters and crabs of the Atlantic coast of the eastern United States, Maine to Florida*. Smithsonian Institution Press, Washington, D.C., 550 pp.

Williams, A.B. & Brown, W.S. (1972) Notes on structure and parasitism of *Munida iris* A. Milne Edwards (Decapoda: Galatheidae) from North Carolina, U.S.A. *Crustaceana*, 22 (3), 303–308.

Young, C.G. (1900) *The stalk-eyed Crustacea of British Guiana, West Indies, and Bermuda*. John M. Watkins (Ed.), London, 514 pp.

Zariquiey-Alvarez, R. (1952) Estudio de las espécies europeas del género *Munida* Leach, 1818. *EOS*, 28 (2/3), 143–231.

