

Cerithiidae, Litiopidae, Modulidae and Planaxidae (Gastropoda, Cerithioidea) collected by the Marion Dufresne MD55 expedition in southeastern Brazil

Daniel Caracanhas Cavallari¹; Sérgio Mendonça Almeida² & Luiz Ricardo L. Simone³

¹ Universidade de São Paulo (USP), Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto (FFCLRP), Departamento de Biologia (DB). Ribeirão Preto, SP, Brasil.

ORCID: <http://orcid.org/0000-0003-3104-6434>. E-mail: dccavallari@gmail.com (corresponding author)

² Universidade Católica de Pernambuco (UNICAP), Centro de Ciências da Saúde, Laboratório de Zoologia. Recife, PE, Brasil.

ORCID: <http://orcid.org/0000-0002-1336-6525>. E-mail: smalmeidasj@gmail.com

³ Universidade de São Paulo (USP), Museu de Zoologia (MZUSP). São Paulo, SP, Brasil.

ORCID: <http://orcid.org/0000-0002-1397-9823>. E-mail: lrsimone@usp.br

Abstract. Several deep-water mollusks collected during the Marion Dufresne MD55 expedition off SE Brazil have been studied in recent papers. The present work focuses on eight species belonging to the cerithioidean families Cerithiidae, Litiopidae, Modulidae and Planaxidae. Three species have their geographic distributions greatly expanded: *Bayericerithium bayeri* Petuch, 2001 from Pernambuco to Rio Grande do Norte and Ceará states (north) and to Bahia and Espírito Santo states (south), Brazilian coast; *Ittibittium oryza* (Mörch, 1876), from the Caribbean to the SW Atlantic; and *Angiola lineata* (Costa, 1778), from Trindade Island, Brazil to the Abrolhos Slope, nearly 870 km westward. Four species reported herein had their bathymetric ranges greatly expanded: *Alaba incerta* (d'Orbigny, 1841) from 0–40 m to 300 m; *B. bayeri* from 0–2 m to 120 m (live specimens); *Litiopa melanostoma* Rang, 1829 from 0–805 m to 1,550 m; *Fossarus orbigny* Fischer, 1864 from 0–40 to 830 m (shells only).

Key-Words. *Bayericerithium bayeri*; Deep-water mollusks; *Ittibittium oryza*; New records; Range extension.

INTRODUCTION

The MD55 cruise of R/V Marion Dufresne took place in May and June 1987 as a joint project of the Muséum national d'histoire naturelle (MNHN; Paris, France) and Universidade Santa Úrsula (USU; Rio de Janeiro, Brazil) (Tavares, 1999). The expedition recovered numerous deep-water mollusks from the southeastern Brazilian coast. Most of this material remained unstudied for years, but recent efforts have been steadily changing this scenario, e.g., comprehensive reports on Triphorinae (Fernandes *et al.*, 2013), Naticidae (Simone, 2014), Fissurellidae (Simone & Cunha, 2014), Seguenziidae (Salvador *et al.*, 2014), and Calliostomatidae (Cavallari *et al.*, 2019). The present work focuses on a small assembly of species belonging to the cerithioidean families Cerithiidae, Litiopidae, Modulidae and Planaxidae.

Cerithiidae is the largest family within Cerithioidea. It includes nearly two hundred spe-

cies of small to medium-sized (10–114 mm shell length) marine snails occurring in tropical and subtropical shallow waters around the globe, with a few deep-water representatives (e.g., species in the genera *Varicopeza* Gründel, 1976 and *Argyropeza* Melvill & Standen, 1901; Beesley, Ross & Wells, 1998; Strong *et al.*, 2011). Only three genera and five cerithiid species have been recorded in Brazilian waters: *Bayericerithium bayeri* Petuch, 2001, *Bittium varium* (Pfeiffer, 1840), *Cerithium attratum* (Born, 1778), *C. eburneum* Bruguière, 1792 and *C. litteratum* (Born, 1778) (Rios, 1994; Petuch, 2001; Rios, 2009; Rosenberg, 2009).

Litiopids are considerably less diverse if compared to cerithiids and planaxids, with a total number of species estimated at 16–18 (Strong *et al.*, 2011). Nevertheless, they are a widely distributed group of small-sized sea snails (less than 25 mm in length) that occur among algal and seagrass fronds in shallow, warm-temperate and tropical seas (Houbrick, 1987a; Beesley, Ross &

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Wells, 1998; Strong *et al.*, 2011). Two species have been recorded in the Western Atlantic to date, *Alaba incerta* (d'Orbigny, 1841) and *Litiopa melanostoma* Rang, 1829 (Rios, 2009; Rosenberg, 2009).

Modulids are an even less diverse group encompassing six extant (Houbrick, 1980; Strong *et al.*, 2011) small, shallow-water species. Their distribution is restricted to tropical and subtropical regions, and *Modulus modulus* (Linnaeus, 1758), *M. bayeri* Petuch, 2001, and *Trochomodulus carchedonius* (Lamarck, 1822) are the only species recorded in Brazilian waters (Rosenberg, 2009).

The Planaxidae are a family of largely marine, tropical to subtropical snails, usually inhabiting rocky shores. Remarkably, they brood eggs in a special head-foot concavity (Simone, 2001). With a total number of valid species estimated at 30–40 (Strong *et al.*, 2011), planaxids are represented in Brazil by two species: *Angiola lineata* (Costa, 1778) and *Fossarus orbigny* Fischer, 1864 (Rios, 2009).

Herein we provide updated taxonomic information on eight species belonging to the above-mentioned families. We report new records from the MD55 expedition, some of which are complementary to previous works (e.g., Leal, 1991) and represent relevant geographic and bathymetric range extensions.

MATERIAL AND METHODS

The MD55 specimens studied herein consist of shells from the collections of the Muséum national d'histoire naturelle (MNHN) and Museu de Zoologia da Universidade de São Paulo (MZSP), Brazil. Additional material from the Academy of Natural Sciences of Drexel University (ANSP), Philadelphia, USA, was also analyzed. The malacologists onboard of the R/V Marion DuFresne, namely Philippe Bouchet, José H. Leal and Bernard Métivier, recovered the above-mentioned MD55 specimens among the extensive material collected by the expedition. Sampling methods employed included Blake and Beam trawls, a Charcot dredge, and a Box corer at 67 stations along the continental platform of Rio de Janeiro and the Vitória-Trindade Seamount Chain (for detailed information, see Tavares, 1999). Examined material lists are given in each species entry. Photographs and measurements were obtained using a Zeiss AxioCam MRc 5 and Zeiss AxioVision SE64 Rel 4.8 imaging software. Unless otherwise stated, only MD55 specimens were measured. The following abbreviations are used throughout the text for shell measurements: H, shell height; W, shell width; h, aperture height; w, aperture width.

SYSTEMATICS

Family Cerithiidae

Genus *Ittibittium* Houbrick, 1993

Type species: *Ittibittium parcum* Gould, 1861, by original designation; Recent, Indo-Pacific.

Ittibittium oryza (Mörch, 1876)

(Figs. 1–6)

Synonymy see Faber (2005: 82). Complement: "*Bittium*" *turriculum*: Redfern, 2001: 21, figs. 88A, 88B (*non* Usticke, 1969).

Type locality: Saint Thomas.

Distribution: Caribbean, from the Bahamas and Greater Antilles to Santa Lucia (Faber, 2005).

New occurrence: Southwestern Atlantic, Brazil, off Espírito Santo.

Material examined: Brazil; off Espírito Santo: Abrolhos Continental Slope, 18°50'S, 37°57'W, 60 m, MNHN, 1 shell (MD55, sta. DC83, 28/v/1987); Jaseur Seamount, 20°27'S, 35°54'W, 54 m, MNHN, 2 shells (MD55, sta. DC34; 15/v/1987); Victoria Bank, 20°32'S, 38°10'W, 52 m, MZSP 122161, 5 shells (MD55, sta. DC22, 13/v/1987); Davis Bank, 20°39'S, 34°41'W, 60 m, MNHN, 2 shells, MZSP 147431, 1 shell (MD55, sta. DC40, 17/v/1987); Jaseur Seamount, eastern summit, 20°42'S, 35°22'W, 15–82 m, 1 shell (MD55, sta. DC35, 17/v/1987; among coral sand); Dogaressa Bank, 20°50'S, 34°44'W, 63 m, MNHN, 1 shell (MD55, sta. DC43, 17/v/1987); 20°54'S, 34°01'W, 60 m, MNHN, 2 shells (MD55, sta. DC42, 17/v/1987).

Additional (non-MD55) material: Caribbean; Bahamas: Grand Bahama Island, Sandy Beran's Cay, Dead Man's Reef, at the beach, 26°34'45"N, 78°51'45"W, ANSP 371127, 43 shells (J. Worsfold col.).

Measurements (\pm standard deviation, in mm; $n = 14$): $W = 1.59 \pm 0.18$; $H = 3.61 \pm 0.46$; $w = 0.62 \pm 0.14$; $h = 1.03 \pm 0.16$.

Remarks: Conchologically, the MD55 specimens are virtually identical to their Caribbean counterparts, even considering a wide variation in color, outline and sculpture. In specimens from both locations, the ground color is variable from homogeneously white (Figs. 5, 6) to white and orange (Figs. 1, 2), with a range of intermediary morphotypes. Shells are invariably turritiform, with convex whorls sculptured by thin, closely-spaced spiral cords. The most prominent spiral cord forms a distinct keel on each whorl. This peripheral keel may be somewhat smooth, with wide nodules more easily distinguished in apical view, or bear well-marked angular knobs (Figs. 3, 4). The new records presented herein are distant from the currently known distribution, expanding the range of the species from the Caribbean to the Southwestern Atlantic.

Genus *Cerithium* Bruguière, 1789

Type species: *Cerithium adansonii* Bruguière, 1792, by subsequent designation (Stewart, 1926) (= *C. nodulosum* Bruguière, 1789) (Sohl, 1960); Recent, Indo-Pacific.

***Cerithium atratum* (Born, 1778)**
(Figs. 7-9)

Synonymy see Houbrick (1974), Leal (1991) and Simone (2001). Complement:

Cerithium atratum: Matthews & Rios, 1967: 68; Furtado-Ogawa, 1970: 195; Oliveira, 1971: 84; Castro & Santos, 1989: 102; Migotto et al., 1993: 15; Diaz & Puyana, 1994: 144, pl. 45, fig. 502; Capelo & Buitrago, 1998: 123; Gordillo, 1998: 166; Salvador et al., 1998: 1015, fig. 4; Bitter & Martinez, 2001: 29; Arruda & Amaral, 2003: 297; Sevilla et al., 2003: 318; Denadai et al., 2004: 1696; Boehs et al., 2004: 539; Bandel, 2006: 114, pl. 1, fig. 2; Rosenberg et al., 2009: 627; Amaral et al., 2010: 235, fig. 18; Souza et al., 2010: 367; Gernet & Birckolz, 2011: 44; Gondim et al., 2011: 78; Matthews-Cascon et al., 2011: 25, pl. 3, figs. A-C; Ourives et al., 2011: 330; Strong et al., 2011: 50, fig. 1F; Barroso et al., 2013: 507, pl. 2, fig. 32; Petuch, 2013: 26, fig. 2.9A; Aguilar-Estrada et al., 2014: 508; Longo et al., 2014: 3, fig. 2A.

Cerithium (Thericium) atratum: Redfern, 2001: 20, pl. 11, fig. 82; Rios, 2009: 107, text fig.

Type locality: Guadeloupe (subsequent designation by Houbrick, 1974).

Distribution: Amphi-Atlantic; Eastern Atlantic: Mauritania to southern Angola; Western Atlantic: North Carolina, USA to Santa Catarina, Brazil (for details see Houbrick, 1974: 61, pl. 29; Simone, 2001).

Material examined: Brazil; off Espírito Santo: Jaseur Seamount, 20°27'S, 35°54'W, 54 m, MNHN, 1 shell + fragments (MD55, sta. DC34; 15/v/1987).

Additional (non-MD55) material: Brazil; Espírito Santo: Aracruz, Praia do Coqueiral, MZSP 91259, 2 shells (L.R.L. Simone col., ii/1998); Guarapari, MZSP 52940, 30 spms (Montouchet col., 06/xii/1968).

Measurements (in mm): W = 1.46; H = 3.08; w = 0.84; h = 1.26.

Remarks: Although the MD55 specimens are juvenile and fragmentary shells, they compare well with the earliest whorls of adult specimens from Espírito Santo (MZSP 91259). Redfern (2001: pl. 11, fig. 82) illustrated a very similar individual from Caribbean (compare with Fig. 7). Leal (1991) had previously reported the occurrence of this species in Jaseur Seamount, off Espírito Santo, Brazil.

Genus *Bayericerithium* Petuch, 2001

Type species: *Bayericerithium bayeri* Petuch, 2001, by original designation; Recent, Brazil.

***Bayericerithium bayeri* Petuch, 2001**
(Figs. 10-12)

Bayericerithium bayeri Petuch, 2001: 336, fig. 1A-C; 2013: 147, fig. 10.2C.

Type locality: Brazil, Pernambuco State, off Gaibu, on muddy sand bottom, 2 m depth near coralline algal reef.

Distribution: Brazil, state of Pernambuco, 2 m depth (Petuch, 2001).

New occurrences: Brazil: Ceará, Rio Grande do Norte, Bahia and Espírito Santo states, at 18-120 m depths.

Material examined: Brazil; off Espírito Santo: continental slope of Abrolhos, 18°50'S, 37°57'W, 60 m, 4 shells, MZSP 105301, 2 shells (MD55, sta. DC83, 28/v/1987); 18°59'S, 37°48'W, 607-620 m, MNHN, 1 shell, (MD55, sta. DC73, 27/v/1987); Jaseur Seamount, 20°27'S, 35°54'W, 54 m, MNHN, 2 shells (sta. DC34; 15/v/1987).

Additional (non-MD55) material: Brazil; Ceará: off Fortaleza, 18 m depth, MZSP 33517, 1 shell (H.R. Matthews col., VI/1967; former H.R. Matthews collection, Nº 491). Rio Grande do Norte: off Touros, Praia do Cajueiro, 18-21 m, MZSP 100667, 2 shells (col. by diving, 2011; under rocks); off Rio do Fogo, 20-25 m, MZSP 67938, 1 shell (A. Bodart col., III/1999; in coral sand), MZSP 70225, 3 shells (A. Bodart col., III/1999; in coral sand), 10-15 m, MZSP 74554, 38 shells (M. Coltro col., I/2007). Bahia: Minerva Seamount, 17°01'S, 37°37'W, 50 m, MZSP 107939, 5 spm (dredged, J. Coltro col., 12/VIII/2012), 17°06'S, 37°38'W, 120 m, MZSP 110859, 15 spm (dredged, local fishermen col., VIII/2012), MZSP 110910, 66 shells (dredged, local fishermen col., VIII/2012), MZSP 110959, 20 spm (dredged, local fishermen col., VIII/2012); off Alcobaça, 5-10 m, MZSP 33188, 8 spm (A. Bodart col., VII/2001), MZSP 34065, 21 spm (A. Bodart col., VII/2001), MZSP 65240, 10-12 m, 2 shells (A. Bodart col., VII/2001), MZSP 65241, 2 shells (A. Bodart col., I/2005; in coral sand), MZSP 69418, 15 spm (A. Bodart col., I/2005; in coral sand), 20-25 m, MZSP 69417, 1 spm (A. Bodart col., I/2005; in coral sand), MZSP 71941, 1 shell (A. Bodart col., IX/2001; in coral sand), MZSP 72318, 24 shells (A. Bodart col., VI/2001; in coral sand), Escalada Reef, 5-10 m, MZSP 34545, 2 spm (A. Bodart col., I/2002); unknown locality off southern Bahia, MZSP 35897, 4 shells (local fishermen col., 2002). Espírito Santo: off Guarapari, MZSP 91069, 6 spm (J. Coltro col., 2009).

Measurements (\pm standard deviation, in mm; n = 9): W = 2.32 \pm 0.91; H = 4.01 \pm 1.49.

Remarks: Although all the MD55 specimens are juvenile empty shells (Figs. 11-12), they compare exceedingly well with the earliest whorls of well-preserved adult specimens from relatively close locations. Adult *B. bayeri* have thick, stubby shells, but the initial spire whorls have a straight conical outline in some specimens (Petuch, 2001: fig. 1A-C). Ground color is cream-white, with widely spaced orange bands arranged in a zebra-like pattern, as reported by Petuch (2001) in the original description. In the present specimens, these colors are sometimes mixed with a diffuse violet-pinkish shade, especially in the initial 2-3 teleoconch whorls. The MD55 specimens

also have poorly developed sculpture except for very faint subsutural knobs and numerous densely packed spiral threads, which compares well with the original description. The distribution of *B. bayeri* was originally restricted to Pernambuco, but it is herein greatly expanded ca. 510 km northward to Rio Grande do Norte and Ceará states, and ca. 1,350 km southward to the states of Bahia and Espírito Santo. Petuch (2013) considered *B. bayeri* endemic to the Cearaian Biogeographic Subprovince (*sensu* Petuch, 2013), but the records reported herein are evidence of a wider range. In this sense, the species also occurs in the author's neighbor Bahian Province (from Alagoas to Rio de Janeiro states). The species' bathymetric range is also expanded as live specimens were collected at depths of up to 120 m (the only deeper record consists of empty shells, which were probably carried). *Bayericerithium* has been recently listed as a synonym of *Cerithium* in online taxonomic databases (*e.g.*, Rosenberg, 2009, 2014), which also list *Cerithium bayeri* (Petuch, 2001) as the valid combination. However, there is a *Cerithium bayeri* Beets, 1941, a fossil species from the Miocene of Indonesia (Beets, 1981). This would make *C. bayeri* (Petuch, 2001) a junior secondary homonym according to the ICZN (Art. 57.3). In the light of these facts, and since no formal revision including *Bayericerithium* has been published so far, we have chosen to keep the original combination.

Family Litiopidae
Genus *Alaba* H. & A. Adams, 1853

Type species: *Rissoa melanura* C.B. Adams, 1850, by subsequent designation [= *Alaba incerta* (d'Orbigny)]; Recent, Atlantic.

***Alaba incerta* (d'Orbigny, 1841)**
(Figs. 13-16)

Synonymy see Leal (1991) and Simone (2001).
Complement:

Alaba incerta: Absalão, 1989: 3; Redfern, 2001: 22, pl. 12, fig. 91A-B; Sevilla et al., 2003: 319; Rivera & Navarrete, 2007: 155, fig. F; Rios, 2009: 109 text fig.; Ourives et al., 2011: 330; Strong et al., 2011: 51; Longo et al., 2014: 4, fig. 3J.

Type locality: Jamaica.

Material examined: Brazil, Rio de Janeiro, off Salinas, 21°32'S, 40°09'W, 295-300 m, 2 shells (1 juvenile; MD55, sta. CB96; 31/v/1987).

Distribution: From Gulf of Mexico to Brazil (Rios, 2009; Miloslavich et al., 2010).

Measurements (in mm; illustrated specimen): W = 1.41; H = 3.8; w = 0.66; h = 1.08.

Remarks: Though none of the specimens studied herein were collected alive, the present records represent a bathy-

metric expansion from the previously reported range (of 0-40 m; Rosenberg, 2009), going as deep as 300 m.

Genus *Litiopa* Rang, 1829

Type species: *Litiopa melanostoma* Rang, 1829, by original designation; Recent, Atlantic.

***Litiopa melanostoma* Rang, 1829**
(Figs. 17-20)

Synonymy see Watson (1886), Tryon-Jr. (1887), Palmer (1942), Houbriek (1987a) and Bouchet (2002).
Complement:

Bombyxinus uva Bélanger in Lesson, 1831: sign. 14.

Litiopa melanostoma: Lebour, 1945: 462, fig. 8A-D; Morretes, 1949: 79, Abbott, 1954: 156, pl. 21, fig. k; Parker & Curray, 1956: 2434, tab.; Warmke & Abbott, 1962: 74, pl. 13, fig. G; Rios, 1970: 43, 1975: 50, pl. 13, 1985: 52, pl. 19, 1994: 63, pl. 21, 2009: 108, text fig.; Robertson, 1971: 4; Abbott, 1974: 108, fig. 1047; Stoner & Greening, 1984: 187, tab. 2; Houbriek, 1987a: 9; Jong & Coomans, 1988: 45, pl. 15; Scheltema et al., 1989: 139; Avila et al., 1998: 497; Redfern, 2001: 22, pl. 12, fig. 90A-B; Scarabino, 2004: 275; Reyes et al., 2007: 383, tab. 01; Williams et al., 2008: 67; Prozorova et al., 2012: 167; Huffard et al., 2014: 2741.

Type locality: Originally referred to as "mers de Terre-Neuve", which corresponds to the seas of Newfoundland, eastern Canada, according to Higo et al. (1999).

Distribution: Worldwide in open seas (Higo et al., 1999); Western Atlantic, from Gulf of Mexico to Venezuela (Miloslavich et al., 2010) and Brazil (Rios, 2009); Eastern Atlantic, from Azores to European waters (Avila et al., 1998); Pacific, tropical latitudes (Gofas et al., 2001).

Material examined: Brazil; off Espírito Santo: Abrolhos Continental Slope, 18°58'S, 37°48'W, 682 m, MNHN, 2 shells (MD55, sta. SY74, 27/v/1987); 18°59'S, 37°48'W, 1,540-1,550 m, MNHN, 3 shells, MZSP 147433, 2 shells (MD55, sta. DC70, 26/v/1987); 19°00'S, 37°49'W, 950-1,050 m, MNHN, 3 shells, MZSP 147434, 2 shells (MD55, sta. DC72, 27/v/1987).

Measurements (\pm standard deviation, in mm; n = 12): H = 3.33 \pm 0.73; W = 1.57 \pm 0.23; h = 1.39 \pm 0.22; w = 0.71 \pm 0.18.

Remarks: Though none of the specimens studied herein were collected alive (Fig. 19), the present records of well-preserved specimens represent a bathymetric expansion from the previously reported range of 0-805 m (Rosenberg, 2009), going as deep as 1,540-1,550 m. Nevertheless, this is a pelagic species that lives attached to floating debris (Higo et al., 1999). The present material was probably carried by debris floating at the surface level to the localities reported herein, and the shells sunk after death.

Family Modulidae
Genus *Modulus* Potiez & Michaud, 1838

Type species: *Trochus modulus* Linnaeus, 1758 by subsequent designation (Gray, 1847). Recent, Atlantic.

***Modulus modulus* (Linnaeus, 1758)**
(Figs. 21-23)

Synonymy see Abbott (1944), Leal (1991) and Simone (2001). Complement:

Modulus modulus: Matthews & Rios, 1967: 68; Macsotay & Campos, 2001: 45; Rios, 2009: 106, text fig.; Rosenberg et al., 2009: 627; Strong et al., 2011: 51, fig. 1H; Longo et al., 2014: 5, fig. 5G.

Modulus carchedonius: Absalão, 1989: 2; Rios, 2009: 106, text fig. (*non* Lamarck, 1822).

Distribution: Western Atlantic, from Florida to Santa Catarina, Brazil (Simone, 2001).

Material examined: Brazil; off Espírito Santo: Abrolhos Continental Slope, 18°56'S, 37°52'W, 85-105 m, MNHN, 2 shells, MZSP 147435, 1 shell (MD55, sta. DC82, 28/v/1987); 18°50'S, 37°57'W, 60 m, MNHN, 2 shells (MD55, sta. DC83, 28/v/1987).

Measurements (\pm standard deviation, in mm): W = 3.29 \pm 0.55; H = 3.4 \pm 0.43.

Remarks: Leal (1991) reported the occurrence of *M. modulus* in Vitória, Montague, Jaseur, Davis and Dogaressa Seamounts, but did not mention the Abrolhos Slope. This species lives at intertidal and upper infratidal levels (Abbott, 1944; Simone, 2001). The presence of samples in the given depths is possibly due to *post mortem* dislodging, even though there are records as deep as 105 m (Rosenberg et al., 2009).

Family Planaxidae
Subfamily Planaxinae Gray, 1850
Genus *Angiola* Dall, 1926

Type species: *Angiola periscelida* Dall, 1926 by original designation. Recent, Pacific.

***Angiola lineata* (Costa, 1778)**
(Figs. 24-27)

Synonymy see Houbrick (1987b) and Leal (1991). Complement:

Angiola lineata: Cruz & Gándara, 2006: 130; Rodríguez & Campos, 2013: 109; Capote et al., 2014: 20.

Distribution: Western Atlantic, from Bermuda and Florida to northern South America; Brazil, restricted to Trindade and Martin Vaz Islands; S/E Atlantic, Oceanic Islands of Ascension, Santa Helena, Canary Islands and Cape Verde (Leal, 1991).

Material examined: Brazil, Espírito Santo, off Conceição da Barra, Abrolhos Continental Slope, 18°59'S, 37°50'W, 637 m, 1 shell (MD55, sta. CB76; 27/v/1987).

Measurements (in mm): W = 2.15; H = 3.53; w = 0.9; h = 1.52.

Remarks: Leal (1991) reported the occurrence of *A. lineata* in the Islands of Trindade and Martin Vaz, but did not mention the Abrolhos Slope, which is located ca. 870 km to the west. The present record thus represents a considerable range expansion.

Subfamily Fossarinae Adams, 1860
Genus *Fossarus* Philippi, 1841

Type species: *Fossarus adansonii* Philippi, 1841, by monotypy [= *Fossarus ambiguus* (Linnaeus, 1758)]; Recent, Mediterranean.

***Fossarus orbigny* Fischer, 1864**
(Figs. 28-29)

Synonymy see Leal (1991). Complement:

Fossarus orbigny: Matthews & Rios, 1974: 49; Houbrick, 1990: 61; Rosenberg et al., 2009: 627.

Fossarus orbigny Fischer, 1854 [sic]: Absalão, 1989: 3; Rios, 1994: 54, pl. 21, fig. 245, 2009: 111, text fig.

Fossarus ambiguus: Longo et al., 2014: 5, fig. 5J (*non* Linnaeus, 1758).

Type locality: Cuba, Guadeloupe, Saint Lucia, Jamaica.

Distribution: from Bermuda to Santa Catarina, Brazil, including oceanic islands Atol das Rocas, Fernando de Noronha and Trindade (Leal, 1991).

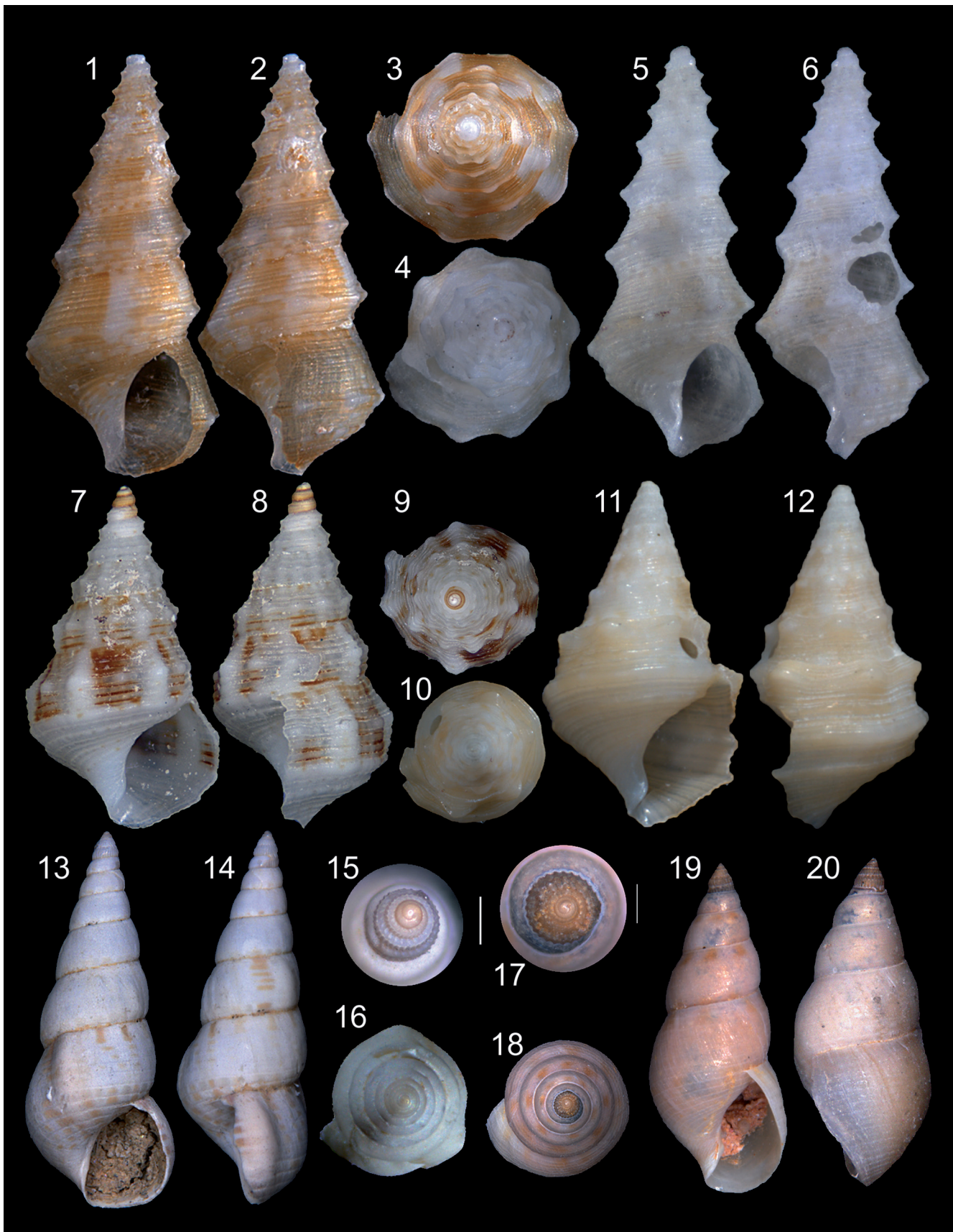
Material examined: Brazil; off Espírito Santo: continental slope of Abrolhos, 18°59'S, 37°50'W, 295 m, MNHN, 1 shell (MD55, sta. DC75, 27/v/1987); off Rio de Janeiro: S of Cabo Frio, 23°54'S, 42°10'W, 830 m, MNHN, 1 juvenile shell, MZSP 147436, same (MD55, sta. CB106, 02/vi/1987).

Measurements (in mm): W = 1.81; H = 2.08; w = 0.8; h = 1.2.

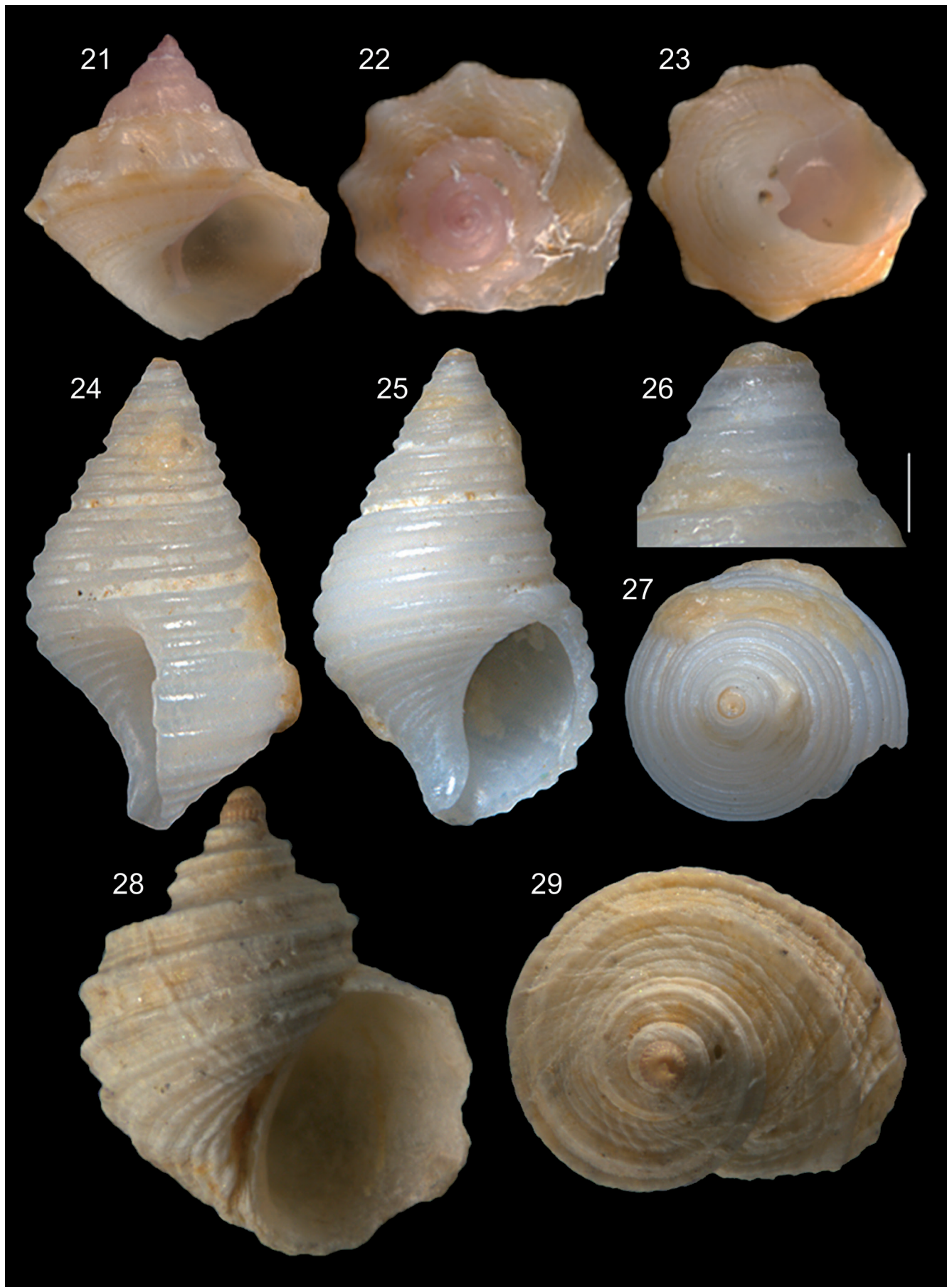
Remarks: The present records represent a bathymetric expansion from the previously reported range (of 0-40 m; Rosenberg, 2009), going as deep as 830 m. Despite being well-preserved, the present specimens are empty shells and could have been dislodged after death.

DISCUSSION

Despite the absence of new species in the present assembly, the numerous range and bathymetric range expansions reported herein are a relevant step towards a better understanding of the Brazilian seamount and deep-water environments. Some of the species reported



Figures 1-20. Cerithiidae and Litiopidae collected by the MD55 expedition off SE Brazil; (1-3) *Ittibittium oryza*; (1-3) MZSP 122161, sta. DC22 (L 4.5 mm), (1) apertural, (2) right lateral and (3) apical views; (4-6) MNHN, sta. DC35 (L 3.8 mm), (4) apical, (5) apertural and (6) right lateral views; (7-9) *Cerithium atratum*, MNHN, sta. DC34 (L 3.2 mm), (7) apertural, (8) right lateral and (9) apical views; (10-12) *Bayercerithium bayeri* juvenile specimen, MNHN, sta. DC34 (L 2.5 mm), (10) apical, (11) apertural, and (12) right lateral views; (13-15) *Alaba incerta* MNHN, sta. CB96 (L 3.8 mm), (13) apertural view, (14) right lateral, (15) protoconch detail, (16) apical view (scale = 0.2 mm). (17-20) *Litiopa melanostoma* MNHN, sta. DC72 (L 4.5 mm), (17) protoconch detail (scale = 0.2 mm), (18) apical, (19) apertural, (20) right lateral views.



Figures 21-29. Modulidae and Planaxidae collected by the MD55 expedition off SE Brazil; (21-23) *Modulus modulus* MNHN, sta. DC83 (W 4 mm), (21) apertural, (22) apical and (23) umbilical views; (24-27) *Angiola lineata*, MNHN, sta. CB76 (L 3.5 mm), (24) right lateral and (25) apertural views, (26) detail of apex (scale = 0.2 mm), (27) apical view; (28-29) *Fossarus orbigny*, MNHN, sta. DC75 (W 2.08 mm), (28) apertural and (29) apical views.

herein are known to live attached to floating debris and algae (e.g., *Alaba incerta*, *Litiopa melanostoma*; Higo et al., 1999) and were most likely carried to the collection localities along with their respective floating substrates, sinking after death. The deepest records for these species reported in the literature, including the ones presented herein, consist of empty shells. On the other hand, some of the remaining species found in the present samples can live in deeper waters, especially *Bayericerithium bay-eri* (1-120 m) and *Modulus modulus* (1-105 m) (Rosenberg et al., 2009). Unfortunately, the specimens had no soft parts, which prevents further analysis.

One of the species studied herein, *Ittibittium oryza*, is reported from the southwestern Atlantic for the first time. This is not unprecedented, since several papers based totally or partially on MD55 material reported the presence of genera and species of gastropods previously unrecorded in the Southwestern Atlantic (e.g., Fernandes et al., 2013; Simone & Cunha, 2014; Salvador et al., 2014; Cavallari et al., 2019; Fernandes & Pimenta, 2020). Significant range expansions of over 1,000 km have also been frequently reported in these studies (e.g., Cavallari et al., 2014; Salvador et al., 2014; Simone & Cunha, 2014; Cavallari et al., 2019). In many cases, the new records leave large occurrence gaps (e.g., some species recorded in the Caribbean and off southeastern Brazil, as in *I. oryza*). Actually, this may not reflect a real absence of occurrence, but rather an absence of samplings and studies (Fernandes & Pimenta, 2020), which reinforces the importance of the present and other similar efforts.

Bringing information about the Brazilian deep-water fauna into light has become an urgent task in face of the potential biodiversity loss due to oil extraction activities that are currently being or will be carried out in the country (Meira et al., 2016; Francini-Filho et al., 2018). Some of the extraction areas are or may be within the region sampled in MD55 expedition (Romero et al., 2011), which makes the matter even more critical. The MD55 material is a partial portrait of the deep-sea fauna of southeastern Brazil from over 30 years ago. The changes that this fauna could have undergone since then, and what could be the impacts caused by the oil extraction activities are important questions, which should be addressed in future studies.

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