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Taxonomical study on the mollusks collected in Marion-Dufresne (MD55) and other expeditions to SE Brazil: the Fissurellidae (Mollusca, Vetigastropoda)

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Abstract

The Fissurellidae collected by the Marion-Dufresne Expedition, as well as other regional expeditions to SE Brazil are examined taxonomically, treating 21 species, of which 20 are new. The following new species are described (order according to depth range; species marked with * are from expeditions other than MD55): *Cornisepta uirapa* (790–940 m), *Cornisepta arrepiata* (295–1,050 m), *Cornisepta aninga* (295–1,050 m), *Cranopsis hycavis* (637 m), *Cranopsis nymphalis* (295 m), *Cranopsis enigmatica* (790–940 m), *Cranopsis cearensis** (250 m), *Cranopsis apostrema* (110–940 m), *Cranopsis alaris* (250–450 m), *Cranopsis canopa** (250 m), *Cranopsis columbaris** (250 m), *Emarginula suspira* (54–940 m), *Emarginula icosisculpta* (10–12 m), *Manganeosepta atiaia* (950–1,570 m), *Profundisepta denudata** (3,000 m), *Puncturella volcano* (607–620 m), *Rimula leptarcis* (85–105 m), *Zeidora pussa* (607–940 m), *Zeidora crepidula* (790–940 m), *Hemimarginula hemitoma* (1–105 m). *Diodora mirifica* Métivier, 1972 (10–12 m), common in Brazilian oceanic islands, is the only fissurellid species previously known from that area. The genera *Cornisepta*, *Cranopsis*, *Manganeosepta*, *Profundisepta*, *Zeidora*, and *Hemimarginula* are reported for the first time from Brazil. *Emarginula suspira* is named for material that has been misidentified as *E. tuberculosa*, a Miocene Mediterranean fossil

Key words: Brazil, MD55 Expedition, Fissurellidae, new species, deepwater

Introduction

The Brazilian deep sea has been an extraordinary focus of attention, since the Brazilian government has started the extraction of “Pré-Sal” (pre-salt) level of petroleum (a petroleum layer covering a thick salt layer in deep-sea soil), engaging in intense oceanic activities at depths of up to 2,000 m off the SE Brazilian coast. However, the local malacofauna is poorly known and thus it is difficult to evaluate the environmental impact of human activities in this fragile deep water ecosystem. The study of the important biological samples collected along the southeastern coast of Brazil, in May 1987, during the cruise MD55 of the R/V *Marion-Dufresne* operated by Terres Australes et Antarctiques Françaises improve our understanding of this ecosystem. To date, only a small fraction of the taxa collected during this expedition has been studied: Volutidae: Leal & Bouchet (1989), Muricidae: Houart (1991), Cancellariidae: Verhecken (1991), Terebridae: Simone (1999, 2000), Olividae: Absalão & Pimenta (2003), Nystiellidae: García (2011), Pyramidellidae: Pimenta et al. (2011), Triphoridae: Fernandes et al. (2013), Fernandes & Pimenta (2013), Pulmonata: Salvador et al. (2013). Fissurellids from some samples collected by other local expeditions are treated here as well.

The curator of the mollusk collection of the MD55 cruise, Philippe Bouchet, has kindly offered us the opportunity to study those samples. A first paper (Simone & Cunha 2012) dealt with xenophorids, cypraeoideans, mitriforms and terebrids. The present paper refers to Fissurellidae.

Fissurellidae are marine limpets mostly occurring intertidal or in shallow waters worldwide, although their presence in deep water is not uncommon (e.g., McLean & Geiger 1998; Geiger & Thacker 2005, 2006). Their limpet-like shell mostly uses an excurrent water current passing through an opening in the shell to remove fecal matter. This opening varies from a simple groove or slit to a completely separated hole, which is placed variably from the anterior shell border to the shell apex in different genera. The presence of paired pallial and reno-

The largely unknown richness of the local fauna, exemplified by the here studied fissurellids, suggests that this fauna could form an important source of data for environmental control and monitoring. Brasil-Petrobras started petroleum exploration in depths around 2,000 m. It is unknown how those exploratory activities affect the local fauna and the environment. Previous reports on the impact of commercial activities, mandatory under Brazilian laws, rarely deal with mollusks, and if they are included, mostly wide-ranged species are treated (e.g., Amaral et al. 2003; Larrazábal & Oliveira 2003; Simone & Cunha 2003; Absalão et al. 2005; Cunha 2011). As demonstrated here, the alleged presence of a wide-ranging fauna is challenged. This emphasizes the significance of studying the coastal Brazilian deep waters, which is not commensurate with its importance.

Species of the subfamily Emarginulinae dominate the deepwater fissurellid fauna of SE Brazil. Exceptions are *Hemimarginula*, belonging to Hemitominiae, and *Diodora*, belonging to Diodorinae. However, these taxa are not restricted to deep waters, as two of the species are found as shallow as 10 m, and *H. hemitoma* reaches 105 m depth. However, it is important to emphasize that the examined samples are only empty shells, and possible post mortem transport must be considered. Another interesting issue is the dominant occurrence of the minute, septum-bearing taxa. *Cornisepta*, *Manganeosepta*, *Puncturella*, *Cranopsis*, *Zeidora*, *Profundisepta* have a septum in their shells, while *Hemimarginula*, *Emarginula*, *Rimula*, and *Diodora* lack a septum. Two of the latter, *Hemimarginula* and *Diodora*, are normally considered to represent shallow water taxa. It is not known whether the septum is an adaptation for deep water habitat.

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Literature Cited

- Absalão, R.S. & Pimenta, A.D. (2003) A new subgenus and three new species of Brazilian deep water *Olivella* Swainson, 1831 (Mollusca, Gastropoda, Olivellidae) collected by the RV Marion Dufresne in 1987. *Zoosystema*, 25, 177–185.
- Absalão, R.S., Pimenta, A.D. & Caetano, C.H.S. (2005) Turridae (Mollusca, Neogastropoda, Conoidea) coletados no litoral sudeste do Brasil, programa Revizee “score” central. *Biociências*, 13, 19–47.
- Adams, A. (1851) A catalogue of the species of *Emarginula*, a genus of gasterepodous Mollusca, belonging to the family Fissurellidae; in the collection of H. Cuming, Esq. *Proceedings of the Zoological Society of London*, 19, 82–92. <http://dx.doi.org/10.1111/j.1096-3642.1851.tb01134.x>
- Adams A. (1860) On some new genera and species of Mollusca from Japan. *Annals and Magazine of Natural History*, 3(5), 299–307.
- Aldea, C., Zelaya, D.G. & Troncoso, J.S. (2011) A new gigantic species of *Zeidora* Adams, 1860 from Antarctic waters (Gastropoda: Fissurellidae). *The Nautilus*, 125, 79–82.
- Amaral, A.C.Z., Lana, P.C., Fernandes, F.C. & Coimbra, J.C. (2003) *Biodiversidade bêmica da região sul-sudeste da costa brasileira*. REVEZEE Score Sul. Ministério do Meio Ambiente. São Paulo, 156 pp.
- Betts, V. (1981) *Dicionário Parintintin-Português*. Sociedade Internacional de Lingüística. Cuiabá, 231 pp.
- Clarke, A.H. (1961) Abyssal mollusks from the South Atlantic Ocean. *Bulletin of the Museum of Comparative Zoology*, 125, 343–387, pls. 1–4.
- Cowan, I.M. (1969) A new species of gastropod (Fissurellidae, *Fissurisepta*) from the eastern North Pacific. *The Veliger*, 12, 24–26.
- Cunha, C.M. (2011) A new species of *Acteon* (Opisthobranchia: Acteonidae) from Northeast Brazil. *Zoologia*, 28, 229–232.

<http://dx.doi.org/10.1590/s1984-46702011000200012>

- Dall, W.H. (1889) Reports on the results of dredgings, under the supervision of Alexander Agassiz, in the Gulf of Mexico (1877–78) and in the Caribbean Sea (1879–80), by the U. S. Coast Survey Steamer 'Blake'. *Bulletin of the Museum of Comparative Zoology*, 18, 1–492, pls. 10–40.
- Dall, W.H. (1927) Small shells from dredgings off the southeast coast of the United States by the United States Fisheries Steamer 'Albatross' in 1885 and 1886. *Proceedings of the United States National Museum*, 70, 1–134.
<http://dx.doi.org/10.5479/si.00963801.70-2667.1>
- Dautzenberg, P. & Fischer, H. (1896) Dragages effectués par l'Hirondelle et par la Princesse-Alice, 1888-1895. *Mémoires de la Société Zoologique de France*, 9, 395–498, pls. 15–22.
- Defrance, M. (1827) *Dictionnaire des Sciences Naturelles*, 45, 471–472.
- Egorova, E.N. (1972) Biological results of the Soviet Antarctic expeditions. 7. Mollusca of the Davis Sea. *Explorations of the Faunas of the Seas*, 26, 1–142.
- Espinosa, J., Ortea, J. & Fernández-Garcés, R. (2004) Descripción de dos nuevas especies del género *Zeidora* A. Adams, 1860 (Mollusca: Gastropoda) de las costas de Cuba. *Avicennia*, 17, 67–70.
- Farfante, I.P. (1943a) The genera *Fissurella*, *Lucapina* and *Lucapinella* in the Western Atlantic. *Johnsonia*, 1 (10), 1–20.
- Farfante, I.P. (1943b) The genus *Diodora* in the Western Atlantic. *Johnsonia*, 1 (11), 1–20.
- Farfante, I.P. (1947) The genera *Zeidora*, *Nesta*, *Emarginula*, *Rimula* and *Puncturella* in the Western Atlantic. *Johnsonia*, 2, 93–148.
- Fernandes, M.R. & Pimenta, A.D. (2013) Taxonomic review of *Metaxia* (Gastropoda: Triphoridae) from Brazil, with description of a new species. *Zoologia*, 28, 819–830.
<http://dx.doi.org/10.1590/s1984-46702011000600016>
- Fernandes, M.R., Pimenta, A.D. & Leal, J.H. (2013) Taxonomic review of Triphorinae (Gastropoda: Triphoridae) from the Vitória-Trindade Seamount Chain, southeastern Brazil. *The Nautilus*, 127, 1–18.
- García, E.F. (2011) A new species of *Eccliseogyra* (Gastropoda: Nystiellidae) from southeastern Brazil. *The Nautilus*, 125, 167–170.
- Geiger, D.L. & Thacker, C.E. (2005) Molecular phylogeny of Vetigastropoda reveals non-monophyletic Scissurellidae, Trochoidea, and Fissurelloidea. *Molluscan Research*, 25, 47–55.
- Geiger, D.L. & Thacker, C.E. (2006) Molecular phylogeny of basal gastropods (Vetigastropoda) shows stochastic colonization of chemosynthetic habitats at least from the mid Triassic. *Cahiers de Biologie Marine*, 46, 343–346.
- Gray, J.E. (1825) A list and description of some species of shells not taken notice of by Lamarck. *Annals of Philosophy*, 25 (n.s. 9), 134–140.
- Gray, J.E. (1847) A list of the genera of Recent Mollusca, their synonyma and types. *Proceedings of the Zoological Society of London*, 12, 129–219.
- Heilprin, A. (1889) On some new species of Mollusca from the Bermuda Islands. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 41, 141–142, pl. 8.
- Houart, R. (1991) The southeastern Brazilian Muricidae collected by RV Marion-Dufresne in 1987, with the description of three new species. *The Nautilus*, 105, 26–37.
- Jeffreys, J.G. (1877) New and peculiar species of Mollusca procured in the Valourous expedition. *Annals and Magazine of Natural History*, Series 4, 19, 231–243.
- Jeffreys, J.G. (1882) On the Mollusca procured during the Lightning and Porcupine expeditions. IV. *Proceedings of the Zoological Society of London* (1881), 922–952.
- Lamarck, J.B.P.M. (1798–1816) *Tableau Encyclopédique et Méthodique des Trois Règnes de la Nature*. Vol. 3. Paris, 16 pp., pls. 391–488.
- Lamarck, J.B.P.M. (1801) *Système des Animaux sans Vertèbres*. Paris, viii, 432 pp.
- Lamarck, J.B.P.M. (1822) *Histoire Naturelle des Animaux sans Vertèbres*. Paris, 7, 711 pp.
- Larrazábal, M.E. & Oliveira, V.S. (2003) Thecosomata e Gymnosomata (Mollusca, Gastropoda) da cadeia Fernando de Noronha, Brasil. *Revista Brasileira de Zoologia*, 20 (2), 351–360.
<http://dx.doi.org/10.1590/s0101-81752003000200028>
- Leal, J.H. (1991) *Marine Prosobranch Gastropods from Oceanic Islands off Brazil*. Universal Book Services. Dr. W. Backhuys. Oegstgeest, 419 pp.
- Leal, J.H. & Bouchet, P. (1989) New deep-water Volutidae from off southeastern Brazil (Mollusca: Gastropoda). *The Nautilus*, 103, 1–12.
- Libassi, I. (1859) Sopra alcune conchiglie fossile dei dintorni de Palermo. *Reale Accademia di Scienze, Lettere e Belle Arti di Palermo, Atti (n.s.)*, 3, 1–47.
- Linné, C. (1771) *Mantissa Plantarum*. Laurentii Salvii. Holmiae [Stockholm, Sweden], pp. 43–588.
- Lowe, R.T. (1827) On *Balamus punctatus*, *Puncturella Flemingii*, &c.; together with some corrections relative to *Turbo carneus*, and some of the Chitones before described. *Zoological Journal*, 3, 76–80.
- Matthews, H.R. & Kempf, M. (1970) Moluscos marinhos do norte e nordeste do Brasil. II. Moluscos do Arquipélago de Fernando de Noronha (com algumas referências ao Atol das Rocas). *Arquivos de Ciências do Mar*, 19, 1–53.
- McLean, J.H. (1970) Descriptions of a new genus and eight new species of Eastern Pacific Fissurellidae, with notes on other species. *The Veliger*, 12, 362–367.

- McLean, J.H. (2011) Reinstatement of the fissurellid subfamily Hemitominae, with the description of new genera, and proposed evolutionary lineage, based on morphological characters of shell and radula (Gastropoda: Vetigastropoda). *Malacologia*, 54, 407–427.
<http://dx.doi.org/10.4002/040.054.0111>
- McLean, J.H. & Geiger, D.J. (1998) New genera and species having *Fissurisepta* shell form, with a generic-level phylogenetic analysis (Gastropoda: Fissurellidae). *Los Angeles County Museum of Natural History Contributions in Science*, 475, 1–32.
- Métivier, B. (1972) Sur quelques Fissurellidae (Mollusques, Gastéropodes) du nord, nord-est du Brésil. *Bulletin du Muséum National d'Histoire Naturelle*, Series 3 (Zoologie), 32, 405–416.
- Pilsbry, H.A. (1943) Floridian species of *Rimula*. *The Nautilus*, 57, 37–40.
- Pimenta, A.D., Santos, F.N. & Absalão, R.S. (2011) Taxonomic revision of the genus *Eulimella* (Gastropoda, Pyramidellidae) from Brazil, with description of three new species. *Zootaxa*, 3063, 22–38.
- Rios, E.C. (1985) *Seashells of Brazil*. Fundação Universidade do Rio Grande. Rio Grande, 329 pp., 102 pls.
- Rios, E.C. (1994) *Seashells of Brazil*, second edition. Editora da FURG. Rio Grande, 368 pp., 113 pls.
- Rios, E.C. (2009) *Compendium of Brazilian Sea Shells*. Universidade Federal do Rio Grande. Rio Grande, 668 pp.
- Rios, E.C., Calvo, I.S. & Barcellos, L.J. (1987) Moluscos marinos de Isla Trinidad. *Comunicaciones de la Sociedad Malacologica del Uruguay*, 7, 57–62.
- Salvador, R.B., Cunha, C.M. & Simone, L.R.L. (2013) Taxonomic revision of the orthalicid land snails (Pulmonata: Stylommatophora) from Trindade Island, Brazil. *Journal of Natural History*, 47, 949–961.
<http://dx.doi.org/10.1080/00222933.2012.759290>
- Salvini-Plawén, L. & Haszprunar, G. (1987) Vetigastropoda and the systematics of streptoneurous Gastropoda (Mollusca). *Journal of Zoology*, A 211, 747–770.
<http://dx.doi.org/10.1111/j.1469-7998.1987.tb04485.x>
- Seguenza, G. (1862) Paleontologia malacologica delle roccie terziarie del discreto di Messina studiata nei suoi rapporti zoologici e geognostici. *Annali dell'Accademia degli Aspiranti Naturalisti*, Serie 3, 2, 77–95.
- Simone, L.R.L. (1999) Comparative morphology and systematics of Brazilian Terebridae (Mollusca, Gastropoda, Conoidea), with descriptions of three new species. *Zoosystema*, 21, 199–248.
- Simone, L.R.L. (2000) [1998] A phylogenetic study of the Terebrinae (Mollusca, Caenogastropoda, Terebridae) based on species from the Western Atlantic. *Journal of Comparative Biology*, 3, 137–150.
- Simone, L.R.L. (2008) A new species of *Fissurella* from São Pedro e São Paulo Archipelago, Brazil (Vetigastropoda, Fissurellidae). *The Veliger*, 50, 292–304.
- Simone, L.R.L. & Cunha, C.M. (2003) *Pseudococculina rimula*, a new species (Cocculiniformia: Pseudococculinidae) from off southeastern Brazil. *Nautilus*, 117, 69–77.
- Simone, L.R.L. & Cunha, C.M. (2012) Taxonomic study on the mollusks collected in Marion-Dufresne expedition (MD55) to SE Brazil: Xenophoridae, Cypraeoidea, mitriforms and Terebridae (Caenogastropoda). *Zoosystema*, 34, 745–781.
<http://dx.doi.org/10.5252/z2012n4a6>
- Sowerby, G.B.I. (1812–1846) *The mineral conchology of Great Britain; or coloured figures and descriptions of those remains of testaceous animals or shells, which have been preserved at various times and depth in the earth. Vols. 1.–7.* London, 234 pp., 251 pp., 194 pp., 160 pp., 168 pp., 250. & 123 pp. + pls 610–648.
- Sowerby, G.B. III (1901) Descriptions of five new species of shells. *Journal of Malacology*, 8, 101–103, pl. 9.
- Swainson, W. (1840) *A treatise on Malacology*. Longman, Orme, Brown, Green, & Longmans and John Taylor. London, 419 pp.
- Verhecken, A. (1991) Description of two new species of bathyal Cancellariidae (Mollusca, Gastropoda) from off Brazil. *Bulletin du Muséum National d'Histoire Naturelle (Zoologie)*, 12, 547–553.
- Watson, R.B. (1883) Mollusca of H.M.S. 'Challenger' Expedition. Part XIX. *Zoological Journal of the Linnean Society*, 17, 320–340.
<http://dx.doi.org/10.1111/j.1096-3642.1884.tb02028.x>