

Finding of *Marginella caterinae* Bozzetti et G. Raybaudi, 1991 (Volutoidea Marginellidae) in Dhofar (Sultanate of Oman) and description of a sympatric sibling species

Franck Boyer^{1*} & José Rosado²

¹2 quater, route de la gare, 30840 Meynes, France; e-mail: franck.boyer7@orange.fr

²Avda. Friedrich Engels N. 373, 1°, 1101 Maputo, Mozambique; e-mail: joserosadoi50@gmail.com

*Corresponding author

ABSTRACT

Marginella caterinae Bozzetti et G. Raybaudi, 1991 (Volutoidea Marginellidae), described from Somalia, is revised on the ground of specimens collected along the central coast of the Dhofar, Oman. A sibling species collected in sympatry is described as *M. gabrielae* n. sp. The shell variability of both species is discussed, and their animal chromatism is illustrated. The generic placement of this species group is discussed, as well as its affinities with the species group of *M. cloveri* Rios et Matthews, 1972 distributed off equatorial and tropical Brazil.

KEY WORDS

Marginellidae; *Marginella*; *Glabella*; *Eratoidea*; Arabian Region; sibling species.

Received 12.04.2024; accepted 23.06.2024; published online 24.07.2024

INTRODUCTION

Like the other marginelliform groups from the waters of Oman, the Family Marginellidae J. Fleming, 1828 remains very poorly known, despite the high diversity revealed by Boyer (2017) through his revision of ten Marginellidae species collected off Masirah Island (eastern Oman). Until recent years, the micro-gastropods from the remote region of Dhofar (southern Oman) was about unexplored, due to the rough sea conditions linked to strong upwelling currents, winter tempests and frequent annual cyclones. The first Marginellidae species described from the Dhofar was proposed by Boyer (2015) as *Volvarina dhofarensis* on the basis of a specimen collected in Salalah (central Dhofar). In the follow, Cossignani & Lorenz (2018) proposed three new Marginellidae species from the same area, among seven marginelliform species recognized from Mirbat (central Dhofar), and besides three marginelliform species recognized from the eastwards Hallaniyat Islands (previously Khuria

Muriya Islands, southeastern Oman). Among the three Marginellidae species from the Dhofar proposed as new by Cossignani & Lorenz, one was attributed to the genus *Volvarina* Hinds, 1844 (as *V. delanoisi*), another one was attributed to the genus *Dentimargo* Cossmann, 1899 (as *D. aggressorum*), and the last one was attributed to the genus *Demissa* Boyer, 2016 (as *D. angelozzii*). The last two specific attributions seem to match species previously revised from Masirah by Boyer (2017).

The present article is dedicated to the recognition of a *Marginella* species collected off Mirbat (central Dhofar) in the recent years, and to the description of a cryptic sibling species collected in sympatry.

MATERIAL AND METHODS

The material under study is composed of dry specimens and empty shells obtained from dive samplings (rocks brushing) at 20-35 m depth off

Mirbat (central Dhofar) by Sandro Gori in the years 2014-2016, and by the second author in the years 2015-2016. The sampled material was dried immediately after the sampling parties, except for few live specimens photographed in-vitro by the second author before the drying operation.

Few worn empty shells and fragments were collected in shell grit on beaches located on the east side of Mirbat village, but their bad state did not allow to use them as reference material. Subsequent collects by snorkeling at 3-6 m depth by the two authors off Mirbat and other places from western and central Dhofar in November 2023 did not allow to find further specimens or shells of *Marginella* species. So, it is inferred that the two species examined in this study are not reaching the upper infralittoral levels and are probably ranging below the 10 m depth line.

ACRONYMS AND ABBREVIATIONS. MHN: Muséum d'Histoire Naturelle de Bordeaux, France; MHNG: Muséum d'Histoire Naturelle de Genève, Switzerland; MNRJ: Museu Nacional do Rio de Janeiro, Brazil; NHMUK: Natural History Museum of United Kingdom, London, Great-Britain; CFB: Franck Boyer collection (Meynes, France); JMC: José and Marcus Coltro collection (São Paulo, Brazil); CJR: José Rosado collection (Maputo, Mozambique); CSG: Sandro Gori collection (Livorno, Italy); spm: live collected specimen; sh: empty shell; ad: adult; juv: juvenile; L: shell length.

RESULTS

Systematics

Superfamilia VOLUTOIDEA Rafinesque, 1815
Familia MARGINELLIDAE J. Fleming, 1828
Genus *Marginella* Lamarck, 1799

TYPE SPECIES *Voluta glabella* Linnaeus, 1758, by monotypy.

Marginella caterinae Bozzetti et G. Raybaudi, 1991. Figs. 1-7

Marginella caterinae Bozzetti et G. Raybaudi, 1991: 22-23

TYPE MATERIAL. Holotype. SOMALIA • 1 sh; northeast Somalia, Off Cape Guardafui; L = 17.2

mm, (Figs 1-3); holotype NHMUK 199121. Paratype: SOMALIA • 1 sh; northeast Somalia, Off Cape Guardafui; L = 14.4 mm; paratype 1 coll. K. Nicolay • 1 sh; northeast Somalia, Off Cape Guardafui; L = 13.5 mm; paratype 2 coll. G. Raybaudi.

TYPE LOCALITY. Off Cape Guardafui, northeast Somalia.

OTHER MATERIAL EXAMINED. SOMALIA • 1 ad spm; Ras Hafun; deep water, trawlers; collection J. & M. Coltro, (Fig. 4). OMAN • 2 ad sh; Dhofar (southern Oman), Mirbat; 20-35 m depth; by diving; CFB • 1 ad sh + 1 ad spm; Dhofar (southern Oman), Mirbat; CJR (Figs. 5-7) • 4 ad sh + 1 ad spm + 1 juv sh + 1 fragment; Dhofar (southern Oman), Mirbat; CSG.

DESCRIPTION. See original description of the shell in Bozzetti & Raybaudi (1991). Animal (from specimen collected off Mirbat, Dhofar: Fig. 7): foot widely spread, quite long and massive siphon, quite strong by moderately long tentacles, small white eyes with black cornea on bulbous peduncles at the base of the tentacles. Fleishy-cream colour ground with thin white reticulations.

DISTRIBUTION. *Marginella caterinae* was known only from trawlers catches operated off Somalia. The present records allow to extend its distribution to the coasts of the Dhofar, where it was collected at mid-reef levels (20-35 m). The species is supposed to range in the whole Gulf of Aden, as well as along the coasts of the Mahrah Province (Eastern Yemen).

REMARKS. *Marginella caterinae* has no evident relatives in Indian Ocean out of his distribution range, but as far as shell features are concerned, it presents important affinities with *M. cloveri* Rios et Matthews, 1972 (Fig. 8), described from off equatorial Brazil, or more precisely with the sibling population documented from off French Guiana (Figs. 9, 10) and referred herein as *M. cf. cloveri*. The typical population of *M. cloveri* documented from the Brazilian states of Amapá, Pará and Maranhão presents a shell morphology very similar to that of *M. caterinae*, but its shell decoration is made of wide reddish bands fringed by short flames, whereas the population of *M. cf. cloveri* from French Guiana (Figs. 9, 10) shows series of square brownish marks at the centre of four narrow white spiral bands on

the middle and the lower part of the body whorl, a fifth narrow white band with brownish square marks being located under the suture. Cossignani (2006) illustrated the typical form of *M. cloveri* through homogenous specimens from equatorial Brazil, and he recognized two slightly diverging sibling populations from tropical latitudes, as *M. hybrida* Cossignani, 2006 from the State of Ceará, and *M. purpurea* Cossignani, 2006 from the State of Bahia. The status of these two populations remains to be verified more accurately, because they seem to differ from the typical form of *M. cloveri* only by their quite smaller length size and by slightly different colour shades (fawn-cream for *M. hybrida* and pinkish-red for *M. purpurea*), and they will possibly prove to be simple clinal variations of *M. cloveri*. Due its distinctive shell decoration (rows of square marks on narrow white spiral bands versus fringing flames), the population from French Guiana herein recognized as *M. cf. cloveri* may well prove to be a different species. Future comparison of the animal chromatism of the typical *M. cloveri* with the animal chromatism of *M. cf. cloveri* from French Guiana (Fig. 7) will possibly allow to resolve the point.

On the ground of the material at hand and of the records found in the literature, the shell features of *M. caterinae* seem to be very constant in Somalia as well as in Dhofar, and the species does not seem to present noticeable variations at the geographic or bathymetric scales.

***Marginella gabrielae* n. sp.** Figs. 11–20
<https://www.zoobank.org/88D719C7-6205-478C-BA32-0F1713BFBF6F>

TYPE MATERIAL. Holotype. OMAN • 1 sh; Dhofar, Mirbat; L = 12.9 mm, (Figs. 11, 12) ; MHNG-MOLL-159462 ex CJR.

TYPE LOCALITY. Mirbat, Dhofar, Oman, 20–35 m depth.

OTHER MATERIAL EXAMINED. OMAN • 2 ad spm; same data of holotype; (Figs. 17–18); CFB • 4 ad sh + 3 ad spm; same data of holotype; (Figs. 13–14, 19–20); CJR • 2 ad sh + 1 juv sh + 1 fragment; same data of holotype; (Figs. 15–16); CSG.

DESCRIPTION. Shell (from the holotype: Figs. 11, 12): roughly biconical outline, quite narrow and slender pointing spire, bulged protoconch of about

2 whorls, lenticular nucleus, teleoconch of 3.25 whorls, suture slightly incised and stepped, spire whorls moderately convex, bulged upper last whorl, wide aperture, arched labrum with moderately thickened lip and narrow stepped outer margin, smooth inner lip, short anal canal, rounded base, four spaced columellar plaits, lamella-shaped, quite thin and produced in the aperture. Reddish protoconch, tan colour ground, whitish subsutural zone with spiral rank of square brown marks, two whitish spiral bands at the upper third part and at the lower third part of the body whorl, each framed by two ranks of square brown marks, the middle band joining the parietal border at the level of the anal canal, the lower band joining the columellar border just over the fourth plait, double brown marks at the middle of the ventral side of the lip and before the rounded base.

Animal (Figs. 19, 20): foot widely spread, quite long and massive siphon, quite strong by moderately long tentacles, small white eyes with black cornea on bulbous peduncles at the base of the tentacles. Fleshy-cream colour ground with thin white reticulations.

DISTRIBUTION. *Marginella gabrielae* n. sp. is only known from the type locality, and it seems to be not occurring off Masirah Island, where semi-intensive dredgings were made at 10–20 m and dive samplings at 13–25 m, as well as off Somalia, from where the species was apparently never recorded.

ETYMOLOGY. From Gabriela Raybaudi, co-author of *M. caterinae* Bozzetti et Raybaudi, 1991.

REMARKS. *Marginella gabrielae* n. sp. differs from its sympatric sibling *M. caterinae* mostly by having double series of brown marks framing the middle and the lower spiral white bands on the body whorl of the shell, versus a single row of brown marks located at the centre of four well-separated white bands in *M. caterinae*. This difference is constant and no intergrade was observed. In the stations around Mirbat, our new species presents also a less oval outline than *M. caterinae*, showing a more inflated upper body whorl and a quite narrower and more pointing spire. For the other features, the two sibling species look to be similar, including for their size range and for their animal chromatism.

In the same way observed for *M. caterinae*, its sibling species *M. gabrielae* n. sp. does not show noticeable phenetic variability.



Figures 1–3. *Marginella caterinae*, holotype NHMUK 199121, off Cape Guardafui, Somalia, L = 13.5 mm. Fig. 4. *M. caterinae*, Ras Hafun, Somalia, deep water, L = 14 mm, JMC. Figures 5–7. *M. caterinae*, Mirbat, Dhofar, 20–35 m, shell and live specimen, L = 11.5 mm, CJR. Fig. 8. *M. cloveri*, paratype MNRJ 3642, off Estado de Maranhão, 45 m, L = 1.60 mm. Fig. 9. *M. cf. cloveri*, French Guiana, 30–60 m, L = 15.5 mm, CFB. Fig. 10. *M. cf. cloveri*, French Guiana, MNHN, live specimen.



Figures 11–12. *Marginella gabriellae* n. sp., holotype MHNG-MOLL-159462, Mirbat, Dhofar, 20–35 m, L = 12.9 mm. Figures 13–14. *M. gabriellae*, Mirbat, Dhofar, 20–35 m, L = 14.2 mm, CJR. Figures 15–16. *M. gabriellae* n. sp., Mirbat, Dhofar, 20–35 m, L = 13.5 mm, CSG. Figures 17–18. *M. gabriellae* n. sp., Mirbat, Dhofar, 20–35 m, L = 14.8 mm, CFB. Figures 19–20. *M. gabriellae* n. sp., Mirbat, Dhofar, 20–35 m, live specimens, CJR.

DISCUSSION

The generic placement of *M. caterinae* and of *M. gabriellae* n. sp. in the genus *Marginella* is following the conservative position adopted by Souza (1997) and by Boyer (2024) about the placement of *M. cloveri*. Preferably with a possible placement in the genus *Eratoidea* Swainson, 1840, Boyer (2024: 28) attributed the conservation of *M. cloveri* in the genus *Marginella* to its larger shell with smooth surface, simple plaits, subequal labial teeth and colourful decoration, matching more closely some species commonly accepted in the complex *Marginella/Glabella* distributed off West Africa and in the Western Indian Ocean. In fact, the only feature clearly shared between *Marginella cloveri* and the Caribbean *Eratoidea* species groups (sensu McCleery, 2011: cf. in Boyer, 2024) is the presence of subequal labial denticles, but this feature is also occurring in various species commonly attributed to the genera *Marginella* Lamarck, 1799 and *Glabella* Swainson, 1840.

The conservation of *M. caterinae* and of *M. gabriellae* in the genus *Marginella* sensu lato is considered as provisional, in the wait of a methodical revision of the natural and taxonomic identity of this genus, of its contents, of its natural limits, and of its phenetic/phyletic relations with the allied genera *Glabella* Swainson, 1840, *Eratoidea* Weinkauff, 1872, *Stazzania* Sacco, 1889 and *Dentimargo* Cossman, 1899, the two last ones being based on fossil type species. In such a revision, the strong unity of the species group *Marginella* sensu stricto (Boyer, 2009) will be necessarily taken in account, for its distinctive features compared to all the other species groups commonly attributed to the complex *Marginella/Glabella* sensu lato.

The important shell similarity observed between the *M. cloveri* species group and the *M. caterinae* species group suggests that they descend from lineages constituting a monophyletic group disbranched since the Lower Miocene, before the closure of the Tethys Sea about 17 Ma BP. The noticeable divergence in their respective animal chromatism (Figs. 7, 10, 19, 20) could be explained by asymmetric drifts in two lineages subjected to such an old disbranching, and it seems to illustrate a frequently observed evolutionary process: the conservation of some features or functions over time (here the shell features), while other features or functions

are noticeably modified (here the animal chromatism). The occurrence of various Recent marginellid and colombellid species from Oman showing close phenetic affinities with Recent species from Caribbean Sea, Brazil or northwest Africa was previously reported by Boyer (2017), Boyer & Renda (2021) and Boyer et al. (2022).

ACKNOWLEDGEMENTS

We are indebted to Sandro Gori (Livorno, Italy) for the loan of his marginellids collection from the Dhofar, and to Walter Renda (Amantea, Italy) for the mounting of the plates.

Photographic credits: Andrew Wakefield (Buckhurst Hill, Great Britain): Figs. 1–3; Jose and Marcus Coltro (São Paulo, Brazil): Fig. 4; Alexandre Pimenta (MNRJ, Brazil): Fig. 8; Laurent Charles (MHNB): Fig. 10; Walter Renda (Amantea, Italy): Figs. 5, 6, 9, 11, 12, 16–18. The other photos were made by the second author: Figs 7, 13, 14, 19, 20.

REFERENCES

- Boyer F., 2009. On the egg capsule of *Marginella glabella* (Linné, 1758). *Iberus*, 27: 99–102. <https://zenodo.org/doi/10.5281/zenodo.4543961>
- Boyer F., 2015. Sur quelques *Volvarina* (Marginellidae) de l'Océan Indien occidental. *Xenophora Taxonomy*, 6: 19–31.
- Boyer F., 2017. Révision des Marginellidae du récifal supérieur de l'île de Masirah (Oman). *Xenophora Taxonomy*, 17: 3–31.
- Boyer F., 2024. Description of a new *Eratoidea* species (Volutoidea: Marginellidae) from Honduras. *Novapex*, 25: 25–31.
- Boyer F., Pelorce J. & Gori S., 2022. Révision des Colymbellidae de l'île de Masirah, Oman. Part 1: genres *Smithena* gen. nov., *Anachis* H. Adams & A. Adams, 1853, *Zafra* A. Adams, 1860 et *Parvanachis* Radwin, 1968. *Novapex*, 23: 87–110.
- Boyer F. & Renda W., 2021. About *Volvarina eumorpha* (Melvill, 1906) and closely related species, with description of a new species from the Gulf of Oman. *Journal of Conchology*, 44: 189–198.
- Bozzetti L. & Raybaudi G., 1991. Una nuova *Marginella* dall'Oceano Indiano. *La Conchiglia*, 22 (261): 22–23.
- McCleery T., 2011. A revision of the genus *Eratoidea* Weinkauff, 1879 (Gastropoda: Marginellidae). *Novapex*, 12 (H.S. 8): 1–111.

- Cossignani T., 2006. Tre nuove marginelle dal Brasile (Gastropoda: Prosobranchia, Marginellidae). *Malacologia Mostra Mondiale*, 53: 12–15.
- Cossignani T. & Lorenz F., 2018. Dieci nuove marginelle da Oman. *Malacologia Mostra Mondiale*, 100: 30–39.
- Rios E. de C. & Matthews H.R., 1972. Uma nova espécie de *Marginella* Lamarck, 1799 do Brasil (Mollusca: Gastropoda). *Arquivos de Ciências do Mar, Fortaleza*, 12: 31–33.
- Souza P.J.S. de, 1997. A Tribo Marginellini Fleming, 1828 na Costa Brasileira (Mollusca, Gastropoda, Marginellidae). Dissertação apresentada à Coordenação de Pós - Graduação em Zoologia da Universidade Federal do Rio de Janeiro - grau de Mestre em Ciências Biológicas - Zoologia, I–XII, 1–75.

