



New information on the marginellids of São Tomé and Príncipe, with new records and the description of four new species

Nueva información sobre los marginelidos de São Tomé y Príncipe, con nuevas citas y descripción de cuatro especies nuevas

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ABSTRACT

Some marginellids collected in the islands of the Guinean Gulf, São Tomé and Príncipe, are studied, presenting new records, descriptions and figures of uncommon forms and complementary information. Four new species are described.

RESUMEN

Se estudian algunos marginelidos recolectados en las Islas del Golfo de Guinea, São Tomé y Príncipe, y se presentan nuevas citas, descripciones y figuras de formas no habituales, e información suplementaria. Se describen cuatro especies nuevas.

INTRODUCTION

The marginellids from the islands of the Guinean Gulf have been studied for many years. TOMLIN & SHACKLEFORD (1912, 1913a & 1913b) mentioned from São Tomé 13 species names from this group, but many of them, such as *Marginella miliaria* (Linnaeus, 1758), *M. bifasciata* Lamarck, 1822 and *M. olivaeformis* Kiener, 1834, belong to other geographical areas and were not correctly identified. These authors described four new species: *Marginella eveleighi*, *M. liparozona*, *M. melvilli* and *M. chalmersi*. NOBRE (1886, 1887) also recorded some species from these islands.

In more recent papers, GOFAS & FERNANDES (1988) presented a revision of the family in the island of São Tomé, describing 11 species, of which 7 were new. Later, FERNANDES & ROLÁN (1992) provided new records for both São Tomé and Príncipe

islands and described a new species. Since these two papers and for many years, no new publications were issued on the Marginellidae of these islands.

During recent years, the second author (SG) visited several times these islands, with many dives resulting in the collection of a large amount of samples (see collecting points in Figure 1 and Table I); the Marginellids were set aside in order to make a complete revision of the group but unfortunately some material was made available elsewhere so that COSSIGNANI (2012) described three new species on the basis of only nine shells and with scarce information, and furthermore made some mistakes that will be discussed in the present work.

The study of several hundred specimens and shells of Marginellidae is the

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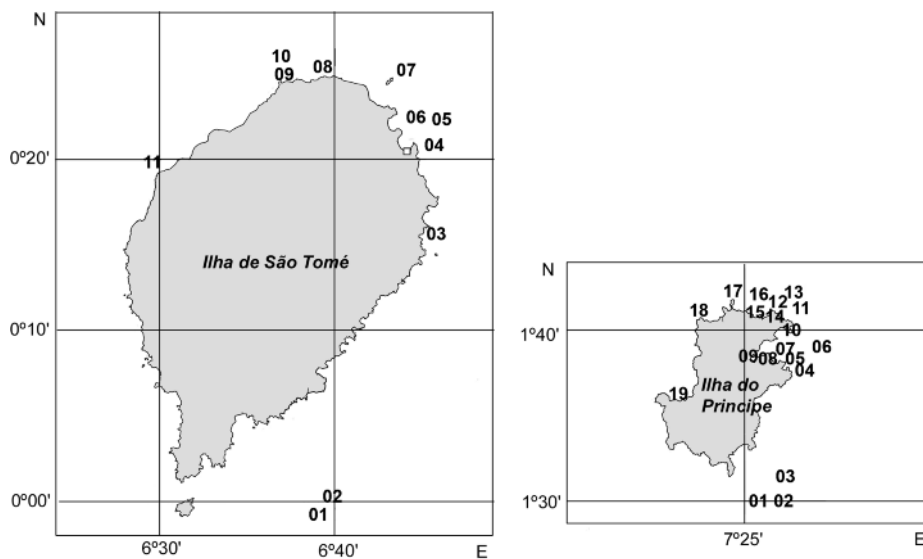


Figure 1. Map of São Tomé and Príncipe islands, showing the location of collecting places.
 Figura 1. Mapa de las islas de São Tomé y Príncipe, indicando la situación de los puntos de muestreo.

basis for the present work in which some new records are made and 4 new species are described.

MATERIAL AND METHODS

Most of the shells were collected by scuba diving, in some cases at night. Some places were visited and sampled many times in nearly identical locations. In some cases positions were recorded with a portable GPS.

Abbreviations

MMM Malacologia Mostra Mondiale, Cupra Maritima, Italy
 MHNG Museum d’Histoire Naturelle, Geneva, Switzerland

MHNS Museo de Historia Natural, Santiago de Compostela, Spain
 MNCN Museo Nacional de Ciencias Naturales, Madrid, Spain
 MNHN Muséum National d’Histoire Naturelle, Paris, France
 NMW National Museum of Wales, Cardiff, Wales
 CCS collection of Cedric Simbille, Paris, France
 CFB collection of Franck Boyer, Paris, France
 CFD collection of Francisco Déniz Guerra, Canary Is., Spain
 CJR collection of José Rosado, Maputo, Moçambique
 CPR collection of Peter Ryall, Maria Rain, Austria
 CSG collection of Sandro Gori, Livorno, Italy

RESULTS

Genus *Plesiocystiscus* Coovert & Coovert, 1995 *Plesiocystiscus violaceus* spec. nov. (Figure 2A-H)

Type material: Holotype in MNHN (26621H, sp, Fig. 2A) and 2 paratypes in MNHN (26621P, sp in alcohol). Other paratypes: MNCN 15.05/60085, 1 sp), CSG (2 sp); CPR (1 sp) and CJR (1 sp).

Table I. Coordinates of sampling places. Only the place name is given where a GPS was not used.
 Tabla I. Coordenadas de los lugares de muestreo. Solamente se da el topónimo cuando no se usó un GPS.

Numbers in map	São Tomé		
01	Sete Pedras	00°01.600' N	06°37.600' E
02	Pedra Branca	00° 02.091' N	06° 37.588' E
03	Ilheu Santana	00° 14.660' N	06° 45.039' E
04	São Tomé city	00°20' 10"	N 06°40' 53" E
05	Minerio	00° 23.016' N	006° 46.228' E
06	Baia Ana Chaves		
07	Kia Reef		
08	Pedra Conchas		
09	Lagoa Azul-Morro Carregado		
10	Lagoa Azul Fundao	00° 24.492' N	06° 36.431' E
11	Ponta de Diogo Vaz	00° 19.159' N	06° 29.633' E
12	Esprinha		
Príncipe			
01	Tinhosa Pequena	01° 22.521-900' N	07° 16.535-984' E
02	Tinhosa Grande	01° 20.334-627' N	07° 17.354-698' E
03	Ilheu Boné de Joquei	01° 30' 640-921' N	07° 25' 45-962' E
04	Ponta da Graça	01° 38' 20" N	07° 28' 28" E
		01° 37.497' N	01° 27.404' E
		01° 36.959' N	07° 27.269' E
05	Ponta Viro Viro	01° 38.406' N	07° 27.329' E
06	Sete Brazas	01° 37.751' N	07° 28.984' E
		01° 37.798' N	07° 29.019' E
		01° 39.126' N	07° 28.127' E
07	Ponta Cabra	01° 38.442-460' N	07° 27.208-283' E
08	Ponta da Mina	01° 38.438-974' N	07° 26.218-607' E
09	Chimado-Hospital Velho	01° 38.802' N	07° 25.737' E
10	Ilheu Santana	01° 39.684' N	07° 22.820' E
11	Ilheu dos Mosteiros	01° 41.129-231' N	07° 27.337-360' E
12	Pedra do Kaki	01° 40.489' N	07° 27.564' E
13	Pedra Galé	01° 43.419-533' N	07° 22.765-849' E
	Praia Evora	01° 38.24-727' N	07° 26.34-540' E
14	Praia Campana		
15	Ponta das Burras		
16	Praia das Burras		
17	Ilheu Bom Bom		
18	Ponta Marmita	01° 40.951' N	07° 22.140' E
19	Baia das Agulhas	01° 36.484' N	7° 20.222' E

Type locality: Sete Pedras, SE of São Tomé Island.

Etymology: The specific name alludes to the violet colour of the soft parts.

Description: Shell small, shiny and translucent, oblong, swollen posteriorly, with a low and very globose spire. Outer lip thickened and curved, internally smooth. Columella with four weak

plaits, aperture narrow and elongate, wider on the anterior part.

Soft parts: Described from the examined material after being fixed, but it was recorded that this colour pattern was

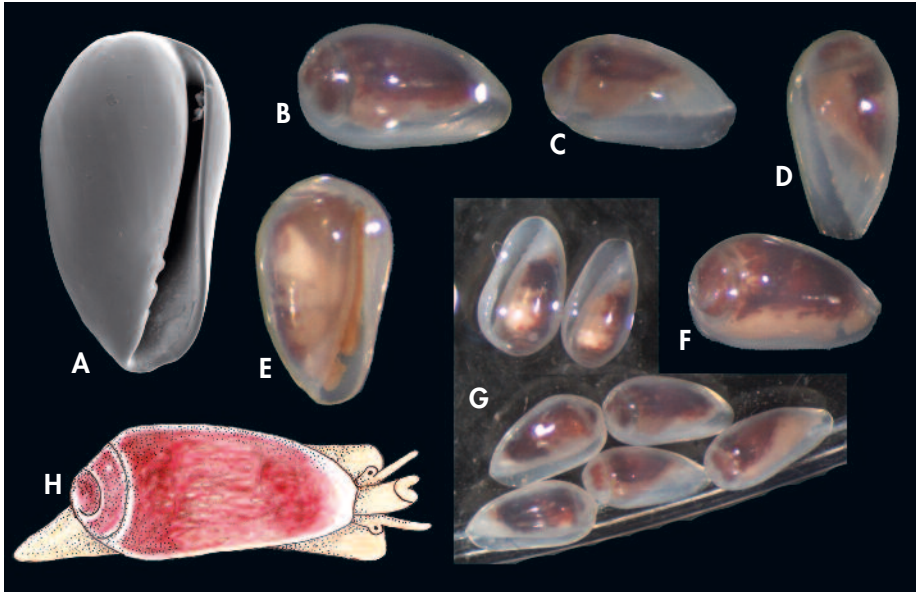


Figure 2. *Plesiocystiscus violaceus* spec. nov. A: holotype, 2.6 mm (MNHN); B-F: paratypes, with soft parts; G: group of paratypes in alcohol; H: colour pattern.

Figura 2. *Plesiocystiscus violaceus* spec. nov. A: holotipo, 2,6 mm (MNHN); B-F: paratipos, con partes blandas; G: grupo de paratipos en alcohol; H: patrón de color.

similar when alive: Animal with a red-violet colour, on all the body parts visible by transparency. It is a little darker in the anterior and posterior parts comprised within the shell; there are some small oval lighter spots, not very numerous; the visible parts of head, siphon and foot are whitish with purple dots.

Dimensions: Holotype 2.6 mm. Paratypes of similar size.

Habitat: Collected brushing spheroid concretions of a coralline alga in 27-30 m depth. These concretions are frequent on the bottom surrounding the islands of the Guinean gulf.

Distribution: Only known from type locality.

Remarks: The differences with other described species from that area are

seen in the soft parts, the shell being very similar:

- *Plesiocystiscus gutta* (Gofas & Fernandes, 1988) is very dark in colour, visible by transparency, with numerous yellowish microspots and a few red ones; the foot is whitish with some brown spots on the anterior part, including the head, and yellow on the caudal part.

- *Plesiocystiscus josephinae* (Fernandes & Rolán, 1992) was collected in Principe Island and it has, visible by transparency within the shell, very dark parts anteriorly and posteriorly, with a wider space between them which is pink with small orange spots. The foot is whitish-translucent and only the propodium is orange.

Genus *Volvarina* Hinds, 1844

Volvarina insulana Gofas & Fernandes, 1988 (Figure 3A-E)

Volvarina insulana Gofas & Fernandes, 1988: 13, figs. 14-15, pl. 1D. [Type locality: Esprainha].



Figure 3. *Volvarina insulana* Gofas & Fernandes, 1988; A-D: shells, 8.9, 8.1, 8.4, 8.2 mm, Tinhosa Grande, 15 m, Príncipe Island (CSG); E: living animal on a dark background.

Figura 3. Volvarina insulana Gofas & Fernandes, 1988; A-D: conchas, 8,9; 8,1; 8,4; 8,2 mm, Tinhosa Grande, 15 m, isla del Príncipe (CSG); E: animal vivo sobre fondo oscuro.

Type material: Holotype in MNHN (represented in GOFAS & FERNANDES, 1988, fig. 14a, 14b).

Other material examined: Príncipe Island: 7 s, Pedra Galé, 10-35 m (CSG); 1 s, Tinhosa Pequena, 41 m (CSG); 5 s, Sete Brazas, 21 m (CSG); 5 s, Sete Brazas, 20 m (CSG); 5 s, Tinhosa Grande, 15 m (CSG); 2 sp, Ponta Cabra, Baía de Santo Antonio, 10 m (CSG); 2 s, Tinhosa Pequena West, 42 m (CSG); 1 s, Ponta da Mina, 10 m (CSG); 1 s, Ilheu Santana, Baía de Santo Antonio, 10 m (CSG); 1 sp, Baía das Agulhas, 10 m (CSG). São Tomé Island: 2 s, Ilheu Santana, 21 m (CSG); 35 s, Esprinha, 2-10 m (MHNS).

Description: See GOFAS & FERNANDES (1988). The soft parts from specimens of Príncipe have a transparent foot with milk-white blotches (Fig. 3E).

Distribution: São Tomé and Príncipe Is.

Remarks: The radula of this species was presented in FERNANDES &

ROLÁN (1992: fig. 1A). This species was described as having a shell with three fading darker bands. In the material from Príncipe, these bands are more marked (Figs. 3A-D). Some shells were totally cream without bands.

Genus *Marginella* Lamarck, 1799
Marginella helmatina Rang, 1832 (Figure 4A-I)

Marginella helmatina Rang, 1832: [Type locality: see Remarks: Principe Island?].

Type material: In MNHN (0530) a lot of 4 syntypes, one of which is represented on the institutional website <<http://coldb.mnhn.fr>>

Other material examined: Principe Island: 1 sp (Fig. 4), 1 s, 1 j, Ponta da Mina, (CSG); 3 sp, Ponta da Mina, 6 m, Santo Antonio (CCS, CJR); 1 s, Ponta Cabra (CSG); 2 s, Ponta Marmita, 13 m (CCS, CJR); 12 sp, Baía das Agulhas, 3-7 m (CSG). Gabon: 1 sp, Port Gentil, 20-25 m (CSG).

Description: See RANG (1832). The soft parts (dorsum of the foot, siphon and tentacles) are translucent with numerous milk-white and some orange spots.

Dimensions: Up to 26 mm.

Habitat: This species prefers calm water and sandy bottoms, between 3 and 13 m.

Distribution: This species is known from Principe Island and there are records from Gabon (Bernard, 1984) and from Senegal.

Remarks: RANG (1832) wrote after the description of this species: “*Nous avons trouvé la Marginelle helmatine sur la côte d’Afrique, depuis l’embouchure de la Gambie jusqu’aux Bisagots*”. However the

label of the MNHN specimen reads “Ile de Prince”. In this situation we consider that the syntype represented would be more similar to the population here studied, whereas the material seen from Senegal: (<http://www.femorale.com.br/shellphotos/detail.asp?species=Marginella+helmatina+Rang%2C+1832>) is evidently rather different morphologically and it could be a different species, or a population with different characters (wider and thicker shell than the population from Principe). The shells of the population mentioned from Gabon (Bernard, 1984 and Fig. 4I) are also quite different and their relationship with the insular population is still to be studied.

Marginella gemma Adams, 1850 (Figures 5A-O, 6A-H)

Marginella gemma Adams, 1850. [Type locality: “East Africa”].

Marginella gorii Cossignani, 2012. *Malacologia Mostra Mondiale*, 75: 29. [Type locality: Principe Island].

Type material: Holotype of *Marginella gemma* Adams, 1850 in (NHMUK 1961135)(GOFAS & FERNANDES, 1988: fig. 31a, 31b); holotype of *Marginella gorii* in MMM (COSSIGNANI, 2012, figs. without number).

Other material examined: Principe I.: 5 sp, Tinhosa Grande, 15 m (CSG); 1 s, Ponta da Graça, 22 m, under rocks (CSG); 3 sp, 1 s, Ponta da Graça, 22 m (CSG); 1 sp, 1 s, Pedra Galé, 10 m (CSG); 13 sp, Pedra Galé, 35 m (CSG); 2 sp, Pedra Galé, 10 m (CSG); 3 sp, Ilheu dos Mosteiros, 20 m (CSG); 1 sp, Tinhosa Grande, 15 m (CSG); 1 sp, 1 j, Tinhosa Grande, 12 m (CSG); 4 sp, 1 s, Tinhosa Grande, 15 m (CSG); 3 sp, Tinhosa Pequena, 42 m (CSG); 1 sp, Sete Brazas, 10 m (CSG); 12 sp, Sete Brazas, 26 m (CSG); 4 sp, 17 m (CSG); 2 sp, Pedra do Kaki, 16 m (CSG); 2 sp, Tinhosa Pequena, 25 m (CSG); 11 sp, 1 s, 2 j, Bonné de Joquei, 15 m (CSG); 2 sp, Ilheu Santana, Santo Antonio, 10 m (CSG).

Description: This is a very variable species in size and mainly in pattern colouration: In Figures 5A-O, we represent 15 specimens that are very different, and between these specimens there are intergradations so that they constitute forms of one single species.

Soft parts: the animal is almost transparent with very fine milk-white small spots everywhere (foot, siphon and tentacles) (Figs. 6G-H).

Dimensions: The holotype of *M. gemma* is 11.6 mm. The holotype of *M. gorii* is 11.25 mm. The larger shells col-



Figure 4. *Marginella helmatina* Rang, 1832. A-G: Living specimens on dark background, Ponta da Mina, Santo Antonio, Príncipe Is; H: shell, 19.2 mm, Ponta Cabra, Baía de San Antonio, 10 m (CSG); I: shell, 24.0 mm, Port Gentil, Gabon, 20-25 m (CSG).

Figura 4. Marginella helmatina Rang, 1832. A-G: animales vivos sobre fondo oscuro, Ponta da Mina, Santo Antonio, Isla del Príncipe; H: concha, 19,2 mm, Ponta Cabra, Baía de San Antonio, 10 m (CSG); I: concha, 24,0 mm, Port Gentil, Gabon, 20-25 m (CSG)

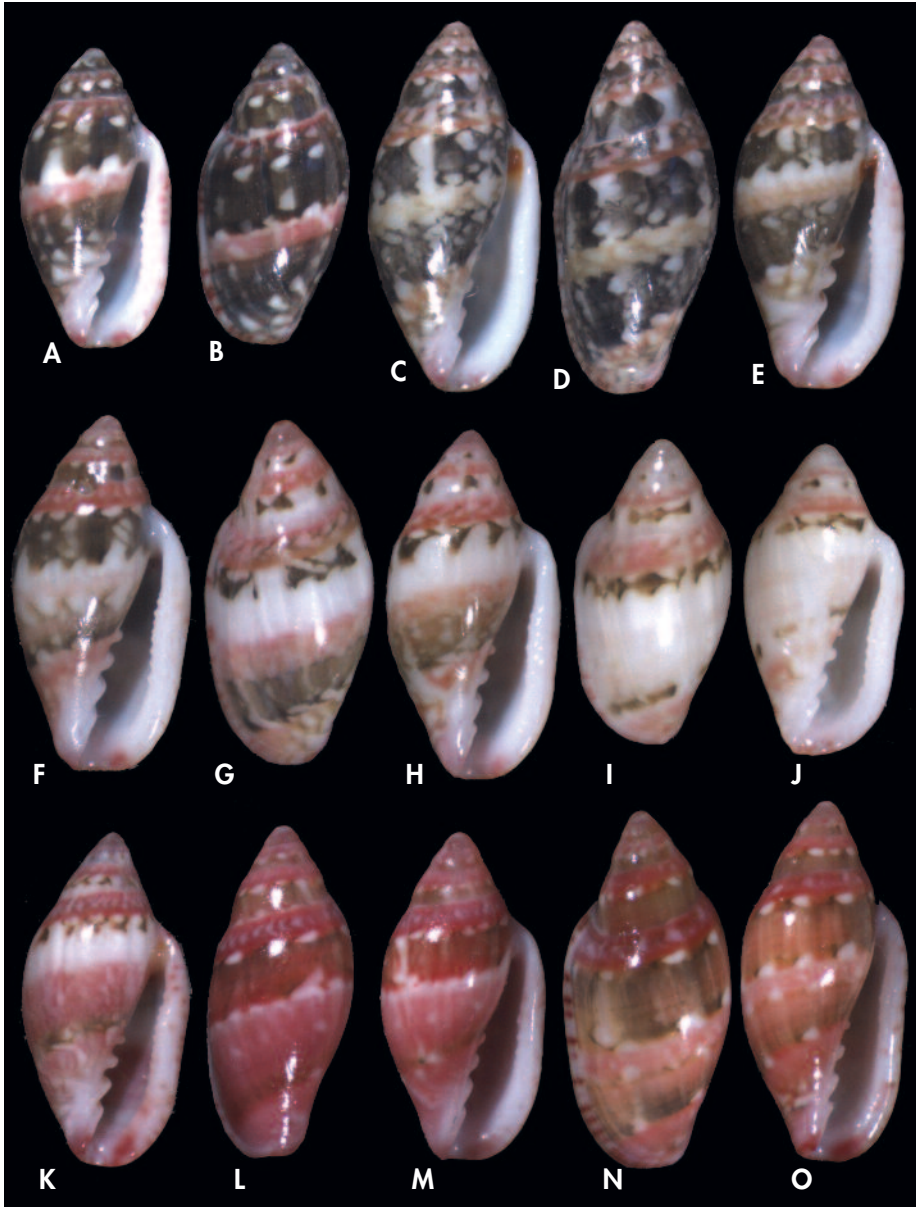


Figure 5 A-O. *Marginella gemma* Adams, 1850. A, B: shell, 11.3 mm, Pedra Galé, 10; C-E: shells, 14.3, 14.3, 13.4 mm, Tinhosa Grande, 15 m; F: shell, 12.5 mm, Pedra Galé, 35 m; G, H: shells, 12.2 and 13.3 mm, Mosteiros Fora, 20 m; I, J: shell, 11.6 mm, Tinhosa Grande, 15 m; K: 12.6 mm, Sete Brazas, 20 m; L-O: shells, 12.6, 12.6, 13.7, 13.7 mm, Pedra Galé; all from Principe island (CSG).

Figura 5 A-O. *Marginella gemma* Adams, 1850. A, B: concha, 11,3 mm, Pedra Galé, 10; C-E: conchas, 14,3; 14,3; 13,4 mm, Tinhosa Grande, 15 m; F: concha, 12,5 mm, Pedra Galé, 35 m; G, H: conchas, 12,2 y 13,3 mm, Mosteiros Fora, 20 m; I, J: concha, 11,6 mm, Tinhosa Grande, 15 m; K: 12,6 mm, Sete Brazas, 20 m; L-O: conchas, 12,6; 12,6; 13,7; 13,7 mm, Pedra Galé; todas de isla del Principe (CSG).

lected reach up to 14.5 mm, but some populations can have smaller shells.

Habitat and distribution: The species was collected only in Príncipe Island in many localities, under rocks, on rocky bottoms. We noted that the shells inside Baía de Santo Antonio (with calm water) are smaller and less colourful. The largest and more colourful specimens were found in the small islet outside the bay, where the water is rougher.

Remarks: GOFAS & FERNANDES (1988: fig. 31a, 31b) represented the holotype of *Marginella gemma* Adams, 1850 (in BMNH 1961135). These figures are rather

similar to our Figure 5I-J, which represent a form with light colour but only a variation. The shell shown by FERNANDES & ROLÁN (1992, fig. 2) has a different pattern more similar to our Figure 5E.

COSSIGNANI (2012) described the species here studied as *Marginella gorii*, the holotype and paratypes being rather similar to our Figures 5L-O. This shows that an overview of the variability of a species is needed before describing a new one based on only a few specimens.

This species is larger than *M. spinacia* Gofas & Fernandes, 1988, and has a wider shell.

Marginella cf. melvilli Tomlin & Shackleford, 1913 (Figure 6I-M)

Marginella melvilli Tomlin & Shackleford, 1913: 11, pl. 1, figs 1-2. [Type locality: São Tomé island].
?Marginella liparozona Tomlin & Shackleford, 1913: 43. [Type locality: São Tomé island].

Type material: *M. melvilli*, holotype in NMW (1955-158-1094), represented in GOFAS & FERNANDES (1988: figs. 4a, 4b, 5a, 5b); *M. liparozona*, lectotype in NWM (1955-158-1093) (Fig. 6I), also represented in GOFAS & FERNANDES (1988: figs. 6a, 6b).

Other material examined: Príncipe: 10 sp, Ponta das Burras, 2-5 m (CSG); 1 s, Ponta Viro Viro, inside of the Baía de Santo Antonio, 01°38'406"N, 07°27'329"E, 16 m (CSG); 4 sp, Ilheu Bom Bom, 10 m (CSG).

Description: See TOMLIN & SHACKLEFORD (1913) and GOFAS & FERNANDES (1988).

Remarks: These taxa (*M. melvilli* and *M. liparozona*) are admitted by GOFAS & FERNANDES (1988) as possible synonyms because the difference of the pink bands is not important in this group.

The material collected and presented in this work has more colour and a more marked pattern than the holotype, but the latter could be from a light form (like *M. liparozona*). At present the status of these taxa awaits more information and provisionally we keep them as different from *M. gemma*.

Marginella chalmersi Tomlin & Shackleford, 1912 (Figure 7 A-K)

Marginella chalmersi Tomlin & Shackleford, 1912: 320, pl.4, figs 3-4. [Type locality: São Tomé].

Type material: Holotype (Figs. 7B-C) in NHMUK (7124).

Other material examined: São Tome: 12 sp, Sete Pedras, 10 m (CSG); 2 sp, Lagoa Azul-Morro Carregado, 12 m (CSG); 55 sp, Lagoa Azul "Fundão" at 15-36 m, collected during the night (CSG).

Description: See TOMLIN & SHACKLEFORD (1912) and GOFAS & FERNANDES (1988). The new population found is as follows: Shell ovoid elongate, robust, smooth and shiny, with a high spire and rounded apex. Suture indistinct. Aperture narrow and elongate, larger than 1/2 of

the height size. Outer lip thickened, with about 10-14 denticles inside. The colouration is cream-white and dark brown: two bands of this last colour are visible on the last whorl: the upper one is larger, separated from the suture by a light band, and it is formed by two parts, the upper one



Figure 6. A-F: *Marginella gemma* Adams, 1850. A, B: shell with a similar shape to the holotype, 10.9 mm, Ponta das Burras, São Tomé (CSG). C, D: shells with a dubious pattern from Pedra Galé, 13.1 and 11.5 mm (CSG); E, F: shell with typical light pattern, 14.8 and 12.4 mm, Bonné de Joquei, Príncipe (CSG). G, H: live collected specimens, showing their soft parts. I-M: *Marginella* cf. *melvilli* Tomlin & Shackleford, 1913; I: lectotype of *M. liparozona*, 7.4 mm (NMW); J-M: shells considered as forms of *M. melvilli*, 11.0, 11.0, 11.1, 10.1 mm, Ilheu Bombom, Príncipe (CSG).

Figura 6 A-F: *Marginella gemma* Adams, 1850. A, B: concha con forma similar al holotipo, 10,9 mm, Ponta das Burras, São Tomé (CSG). C, D: conchas con un patrón de color dudoso, de Pedra Galé, 13,1 y 11,5 mm (CSG); E, F: concha con patrón claro típico, 14,8 y 12,4 mm, Bonné de Joquei, Príncipe (CSG). G, H: ejemplares recolectados vivos, mostrando sus partes blandas. I-M: *Marginella* cf. *melvilli* Tomlin & Shackleford, 1913; I: lectotipo de *M. liparozona*, 7,4 mm (NMW); J-M: conchas consideradas como formas de *M. melvilli*, 11,0; 11,0; 11,1; 10,1 mm, Ilheu Bombom, Príncipe (CSG).

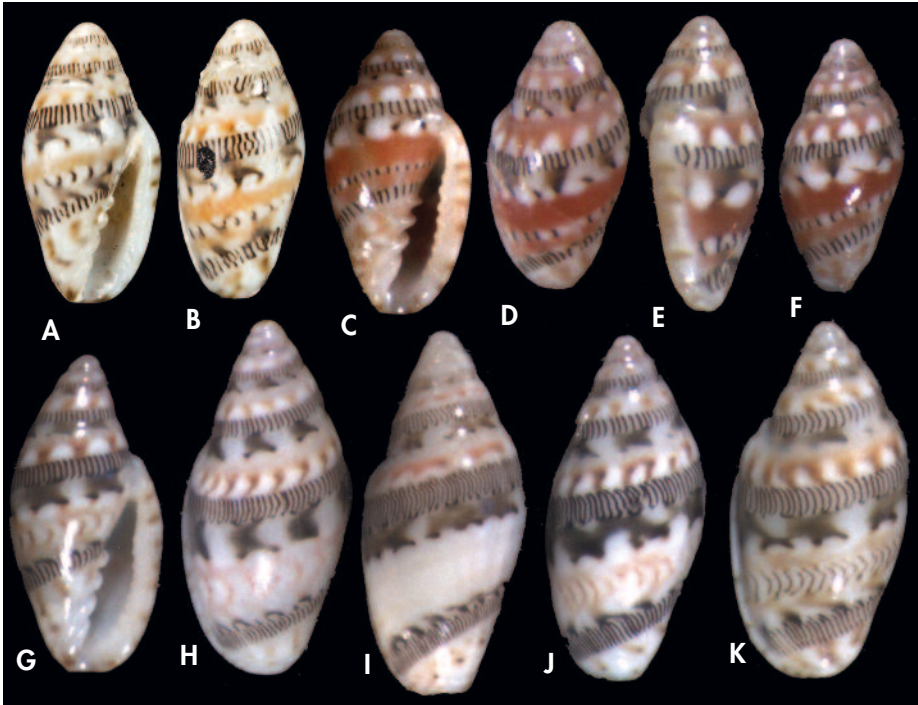


Figure 7. *Marginella chalmersi* Tomlin & Shackelford, 1912. A, B: holotype (NHMUK 7124); C-F: shells, 5.9, 5.5, 6.1, 5.1 mm, from Sete Pedras, São Tome, 10 m (CSG); G-K: shells 6.9, 7.8, 7.8, 7.5, 7.9 mm, Lagoa Azul “Fundão”, São Tomé (CSG).

Figura 7. *Marginella chalmersi* Tomlin & Shackelford, 1912. A, B: holotipo (NHMUK 7124); C-F: conchas, 5,9; 5,5; 6,1; 5,1 mm, de Sete Pedras, São Tome, 10 m (CSG); G-K: conchas 6,9; 7,8; 7,8; 7,5; 7,9 mm, Lagoa Azul “Fundão”, São Tomé (CSG).

with numerous axial irregular lines; the lower one formed by large isolated blotches, usually with oblique extensions and sometimes with two of them fused; the lower dark band is present around the middle of the last whorls and is almost formed by axial irregular lines. The spaces between them are white with cream-orange lines or small, very variable blotches.

The soft parts, described by GOFAS & FERNANDES (1988: pl. 1a) are whitish.

Dimensions: the holotype is 6 mm, and the population has a similar size; larger specimens of the new found population reach 8.0 mm.

Remarks: The species is represented and described in GOFAS & FERNANDES (1988). This description is coincident with the original description and the holotype. The population from Lagoa Azul has shells which are a little larger and lighter in colour but probably within the variability of the species.

Marginella spinacia Gofas & Fernandes, 1988 (Figure 8 A-M)

Marginella spinacia Gofas & Fernandes, 1988: [Type locality: Esprahinha].

Type material: Holotype in MNHN (represented in GOFAS & FERNANDES, 1988: figs. 2a, 2b); paratypes in many collections.

Other material examined: São Tomé: 120 sp, 10-15 m, Lagoa Azul-Morro Carregado (CSG); 107 sp, Espirinha, 2-10 m (MHNS); 87 sp, Ponta de Diogo Vaz, 12 m (CSG); 56 sp, Lagoa Azul-Morro Carregado, 11 m (CSG); 12 sp, Lagoa Azul, South side, 12 m (CSG); 30 sp, 8 s, Kia Reef, 15 m (CSG); 14 sp, Baía Ana Chaves, 22 m (CSG); 2 sp, Pedra Conchas, 20 m (CSG); 10 sp, São Tomé Capital, 10 m (CSG); 10 sp, 20 s, Lagoa Azul "Fundao", 30 m (SC); 10 sp, 25 s, Lagoa Azul "Fundao", 36 m (CSG); 1 sp, Ilheu Santana, 20 m (CSG); 7 sp, 8 s, Minerio 43 m (CSG); 250 sp, Lagoa Azul-Morro Carregado, 8-12 m (MHNS). Príncipe: 75 sp, Baía das Agulhas, 10 m (CSG).

Description: See GOFAS & FERNANDES (1988).

Dimensions: Usually between 7.0-8.0 mm, only exceptionally the largest shells reach up to: 11.2 mm

Remarks: This species was described from São Tomé (GOFAS & FERNANDES, 1988) and it was presented as a dark shell, with typical pattern and scarce variability, and collected between 2-5 m in depth. In recent collections by the second author (SG) the species was found down to 30 m, the deep popula-

tions being lighter in colour (Figures 7G-K). It was collected also from Príncipe Island recently in larger quantity (Figures 8M). This species was recorded in this island for the first time by ROLÁN & FERNANDES (1992).

We show here the high variability of this species, so that those who are prone to describe new species with such great ease understand that it is preferable to know better the variability of populations before creating new and needless taxa erroneously.

Marginella michelae Cossignani, 2012 (Figure 9 A-J)

Marginella michelae Cossignani, 2012. *Malacologia*, 75: 30. [Type locality: "Isola de Príncipe, São Tomé, Tennesa Pequena"].

Type material: Holotype in MMM, Cupra Marittima.

Other material examined: São Tomé: 3 sp, 1 s, East Sete Pedras, on spheroid concretions of the coralline alga *Lithothamnion corallioides*, 30 m (CSG).

Description: See COSSIGNANI (2012).

The soft parts are milk white; under magnification it can be seen that the background is a little transparent and there are many very small milk-white dots.

Distribution and remarks: COSSIGNANI (2012) described this species based on scarce material. Furthermore, the description of *Marginella michelae* has an important error, because the author indicated as type locality "Isola di

Príncipe, São Tomé, Tennesa (sic) Pequena". The second author of the present work (SG) has dived extensively in Príncipe, in São Tomé and in Tinhosa Pequena (this is the exact name). The present species has been found only in a small area around Sete Pedras, Southeast of São Tomé Island, at 27-30 m, collected on spheroid concretions of the coralline alga *Lithothamnion corallioides*. This must be considered the real type locality.

Marginella colombi Cossignani, 2012 (Figures 10 A-L, 11 A-K)

Marginella colombi Cossignani, 2012: 31, figs. without number. [Type locality: stated as "Isola de Príncipe, São Tomé, Tennesa Pequena", see remarks].

Type material: Holotype in MMM.

Other material examined: Príncipe Island: 10 sp, Ponta Cabra, Baía de Santo Antonio, 12 m (CSG); 2 sp, Sete Brazas, 21 m (CSG); 10 sp, 1 j, Tinhosa Grande, 15 m (CSG); 6 sp, Tinhosa Grande, 16 m (CSG); 6 sp, 2 s, Tinhosa Grande, 20 m (CSG); 5 sp, 2 s, Tinhosa Grande, 12 m (CSG); 1 sp, Tinhosa

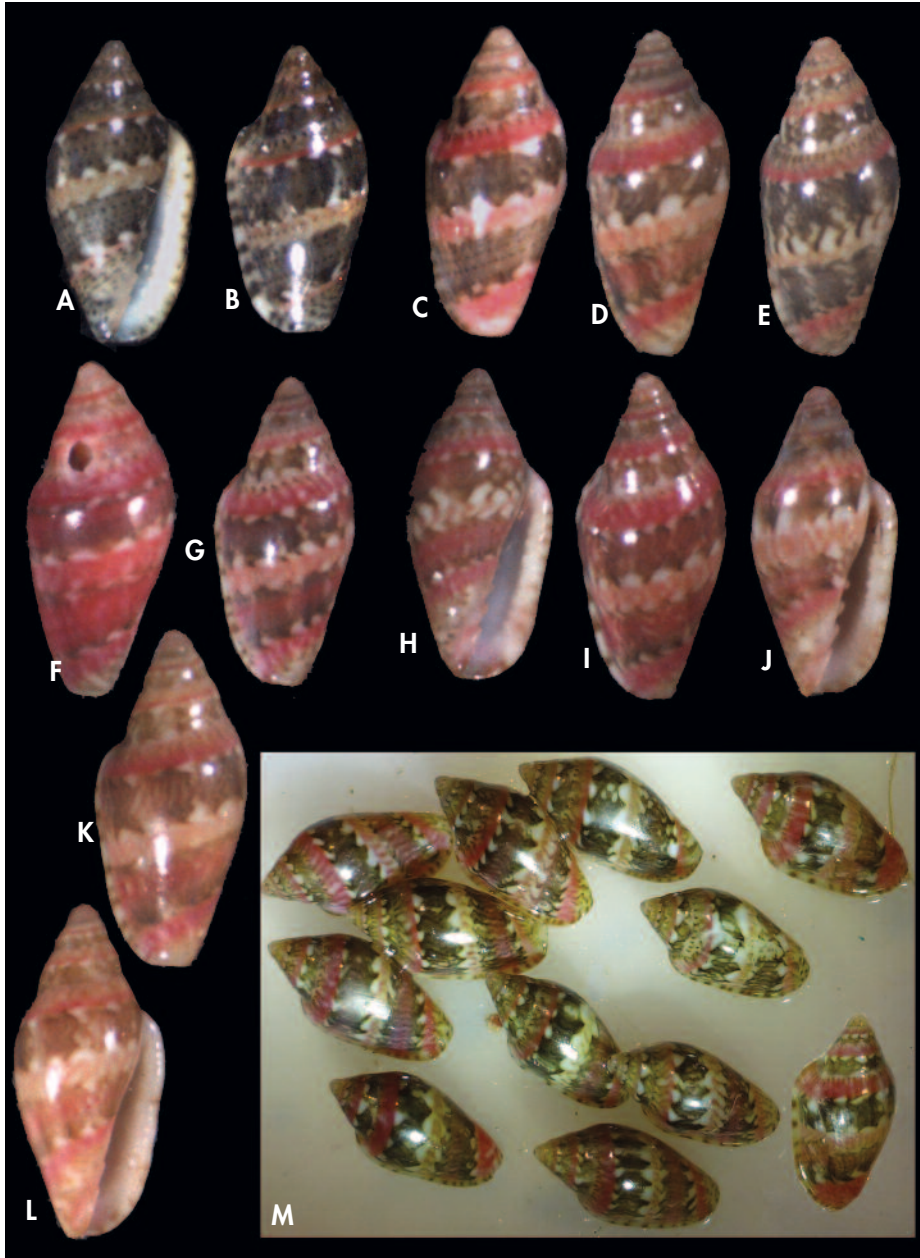


Figure 8. *Marginella spinacia* Gofas & Fernandes, 1988. A, B: 7.0 and 7.1 mm, typical pattern, Lagoa Azul, 15 m (CSG); C, D: 7.2, 8.1 mm, light pattern, Lagoa Azul, 15 m (CSG); E-L: 9.0, 10.2, 8.5, 8.6, 8.8, 8.3, 9.0 mm, variable patterns, Lagoa Azul, 28 m (CSG); M: lot of shells from Príncipe, Baía das Agulhas (CSG).

Figura 8. *Marginella spinacia* Gofas & Fernandes, 1988. A, B: 7,0 y 7,1 mm, patrón de color típico, Lagoa Azul, 15 m (CSG); C, D: 7,2 y 8,1 mm, patrón claro, Lagoa Azul, 15 m (CSG); E-L: 9,0; 10,2; 8,5; 8,6; 8,8; 8,8; 8,3; 9,0 mm, patrones variables, Lagoa Azul, 28 m (CSG); M: lote de conchas de Príncipe, Baía das Agulhas (CSG).

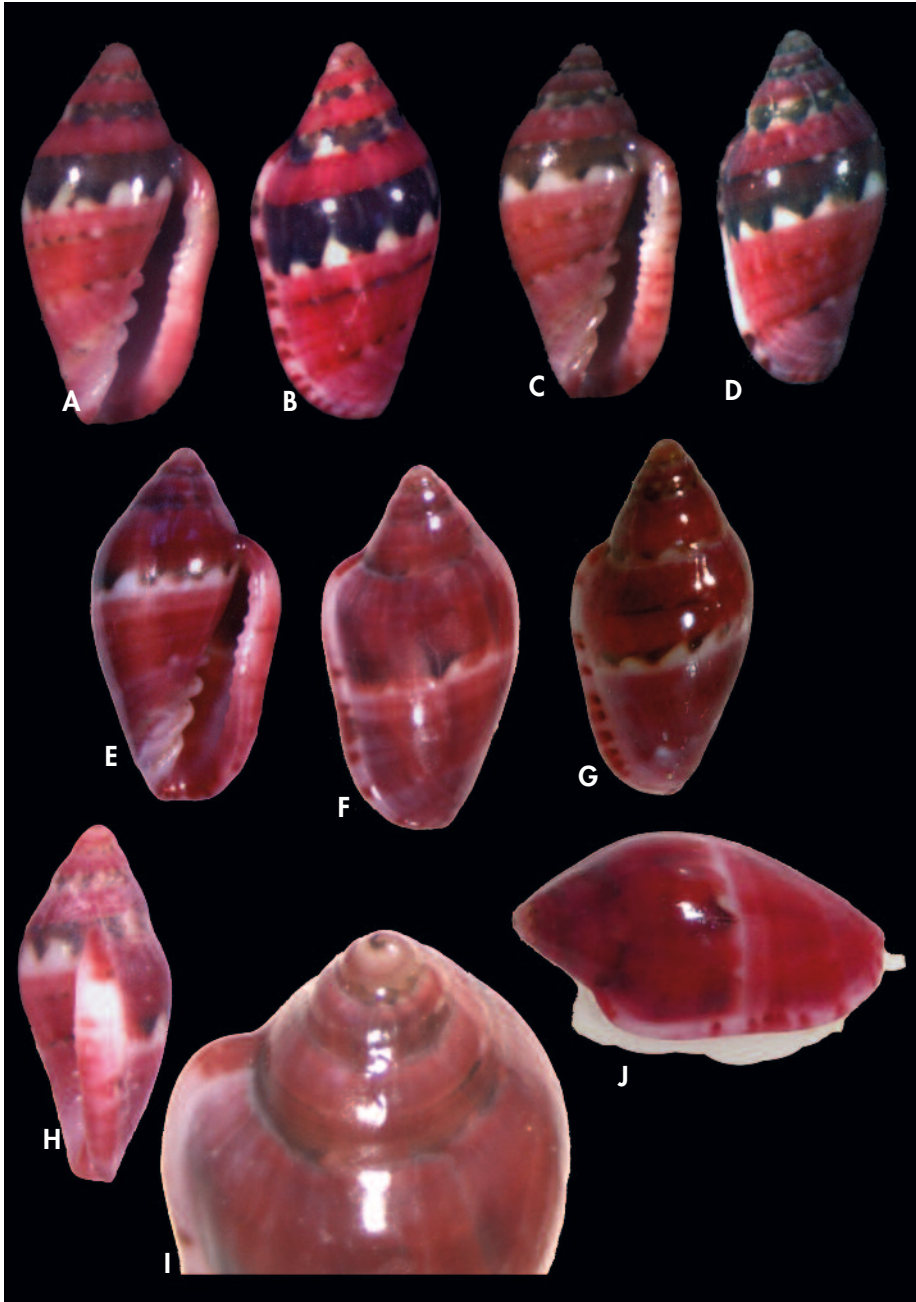


Figure 9. *Marginella michelae* Cossignani, 2012. A-H: shells. A, B: 10.3 mm; C, D: 9.6 mm; E, F: 9.6 mm; G: 9.6 mm; H: 9.7 mm; all from CSG. I: view of the apex; J: specimen of the Figures E and F, with soft parts.

Figura 9. *Marginella michelae* Cossignani, 2012. A-H: conchas. A, B: 10,3 mm; C, D: 9,6 mm; E, F: 9,6 mm; G: 9,6 mm; H: 9,7 mm; todas de CSG. I: vista apical; J: ejemplar de las Figuras E y F, con partes blandas.



Figure 10. *Marginella colombi* Cossignani, 2012, shells with variable pattern. A: 6.3 mm (CSG); B-C: 6.5 mm; D-E: 6.5 mm; F-G: 6.6 mm; H: 6.5 mm: all from Sete Pedras, Príncipe (CSG); I-J: shell, 6.5 mm, Sete Brazas, Príncipe (CSG); K-L: shells, 6.3 mm and 6.6 mm, Ponta da Graça, Príncipe Island (CSG).

Figura 10. *Marginella colombi* Cossignani, 2012, conchas con patrón de color variable. A: 6,3 mm (CSG); B-C: 6,5 mm; D-E: 6,5 mm; F-G: 6,6 mm; H: 6,5 mm: todas de Sete Pedras, Príncipe (CSG); I-J: concha, 6,5 mm, Sete Brazas, Príncipe (CSG); K-L: conchas, 6,3 mm y 6,6 mm, Ponta da Graça, ilha de Príncipe (CSG).

Grande, 25 m (CSG); 1 sp, Tinhosa Grande, 25 m (CSG); 10 sp, Sete Brazas, 20 m (CSG); 6 sp, Sete Brazas, 21 m (CSG); 7 sp, Sete Brazas, 20 m (CSG); 9 sp, west Sete Pedras, 18 m (CSG); 8 sp, Pedra Galé, 35 m (CSG); 36 sp, Pedra do Kaki, 16 m (CSG); 3 sp, off Ilheu dos Mosteiros, 20 m (CSG); 1 sp, Ponta da Graça, 16 m (CSG); 2 sp, Ponta da Graça, 17 m (CSG); 1 sp, Praia Evora, Santo Antonio, 7 m (CSG); 2 sp, Praia Evora, Santo Antonio, 9 m (CSG); 1 sp, west Tinhosa Pequena, 42 m (CSG); 2 sp, Tinhosa Pequena, 25 m (CSG); 6 sp, Tinhosa Pequena, 20 m (CSG); 4 sp, Bonné de Joquei, 12 m (CSG); 3 sp, 10 m (CSG); 1 sp, Pedra Galé, 10 m (CSG); 3 sp, Pedra Galé, 35 m (CSG); 1 sp, 1 s, Ilheu Santana, Santo Antonio, 10 m (CSG); 32 sp, 3 j, Baia das Agulhas, 10 m (CSG).

Remarks: This is one of the species we had under description and was pre-empted by the paper of COSSIGNANI (2012) based on only three shells. The type locality must be corrected to the exact name Tinhosa Pequena.

COSSIGNANI (2012) indicated as type locality "Isola di Principe, São Tomé, Ténossa (sic) Pequena", making the

same mistake as for *M. michelae*. *Marginella colombi* has never been found in São Tomé, but only in Principe and the small islets around.

We have found two specimens that are completely white.

The variability of the shell can be shown in the following Figures 10 and 11.

Marginella britoi spec. nov. (Figure 12 A-K)

Marginella festiva Kiener: Sowerby, 1847: 382, pl.75, figs.72-73.

Type material: Holotype (Figs. 12A-B) MNHN (26624, sp); paratypes: MNCN (15.05/60086, 1 sp, Figs. 12C-D); MHNS (100603, 1 sp, Fig. 12E); CSG (4 sp); all from the type locality. Other paratypes: CSG (1 sp, Lagoa Azul "Fundao", 26 m, Figs. 12G-H) (1 sp, Pedra Branca, 30 m); CFD (1 sp, type locality; CPR (1 sp, Lagoa Azul "Fundao", 21 m); CFB (1 sp, Lagoa Azul "Fundao", 36 m); CSG (1 sp, Lagoa Azul "Fundao", São Tomé, 33 m, Fig. 12I); CJR (1 sp, Lagoa Azul "Fundao", 30 m.

Other material studied: São Tomé: 2 s, eroded, from Type locality (CSG); 2 s, 1 s eroded, Lagoa Azul "Fundao", 30-34 m (CSG). Principe: 1 j, Tinhosa Pequena, 20 m (CSG).

Type locality: Ponta de Diogo Vaz, 12-21 m, 00°19'159"N, 06°29'633"E, São Tomé Island.

Etymology: The specific name is after the native diver Elder "Dede" Brito, who helped during diving collections.

Description: Shell elongate with maximum dimensions varying in different populations, solid, shiny with a prominent spire. The colour is dark except for one band in the middle of the last whorl which has irregular borders and may be variable in width; the dark part of the shell has brown and red alternating, this last colour in subsutural position. Darker lines reach the thickening of the external lip which is whitish or pink-cream and form there red-brown spots, which are more numerous on the anterior part.

Aperture narrow, a little wider in its lower part; columella with four plaits; external lip thickened and minutely denticulate interiorly (15-18 teeth).

Soft parts: animal totally white, with small milk white spots and some very

small grey ones, and some elongate yellowish stripes on the caudal part.

Dimensions: The holotype is 12.2 mm. One shell reaches 20.2 mm. Other shells from Lagoa Azul and from Principe, are smaller than 10 mm.

Distribution: Known from São Tomé Island; few shells with similar pattern were collected in Principe I., in Tinhosa Pequena.

Habitat: The specimens from the type locality were collected under large stones, in 12-24 m. However those from Lagoa Azul were collected washing the dead coral *Tubastrea aurea* (Quoy & Gaimard, 1830) from deeper water.

Remarks: We consider populations from the type locality (Ponta de Diogo Vaz, São Tomé) and those from Lagoa Azul (São Tomé) and Tinhosa Pequena

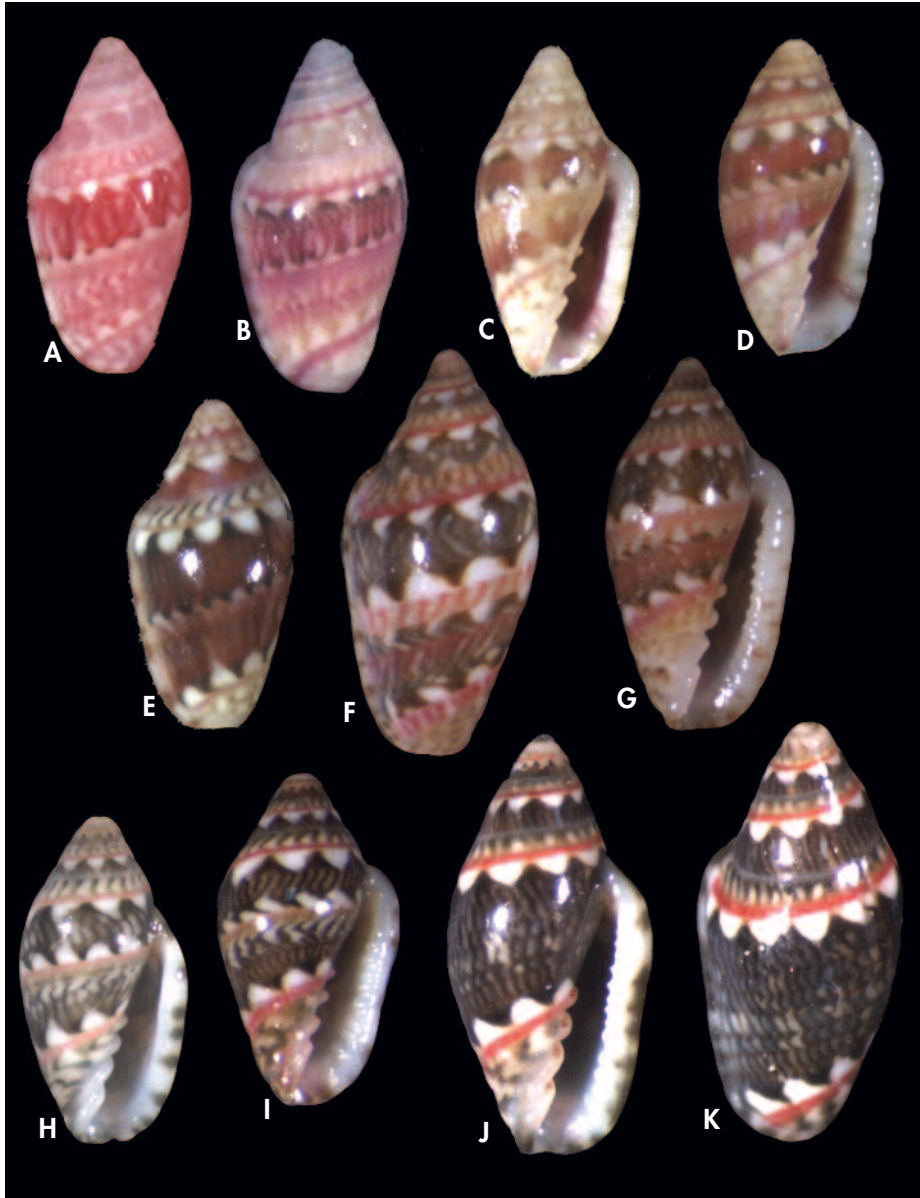


Figure 11. *Marginella colombi* Cossignani, 2012, shells with variable pattern. A, B: 6.2 and 6.7 mm, Sete Brazas, Príncipe (CSG); C-E: shells, 5.7, 5.5, 5.6 mm, Sete Brazas (CSG); F, G: shells, 8.1 and 7.4 mm, Tinhosa Grande, Príncipe (CSG); H: shell, 6.1 mm, Ponta da Graça, Príncipe (CSG); I: shell, 5.8 mm, Tinhosa Grande, Príncipe (CSG); J, K: shell, 8.8 mm, Bonné de Joquei, Príncipe (CSG).

Figura 11. *Marginella colombi* Cossignani, 2012, conchas con patrón de color variable. A, B: 6,2 y 6,7 mm, Sete Brazas, Príncipe (CSG); C-E: conchas, 5,7; 5,5; 5,6 mm, Sete Brazas (CSG); F, G: conchas, 8,1 y 7,4 mm, Tinhosa Grande, Príncipe (CSG); H: concha, 6,1 mm, Ponta da Graça, Príncipe (CSG); I: concha, 5,8 mm, Tinhosa Grande, Príncipe (CSG); J, K: concha, 8,8 mm, Bonné de Joquei, Príncipe (CSG).

(Principe), to be conspecific, notwithstanding the fact that the latter are evidently smaller. They are equal in other characters.

The differences of *M. britoi* with other known species from São Tome and Principe Islands are found in the shell characters and the colour of the soft parts:

- *Marginella gemma* Adams, 1850 is very variable in pattern and colouration: most of their shells have 2 dark spiral bands bordered by narrower lighter bands which occasionally can be wider. *M. britoi* has a red line between the bands and two more on the last whorl. A white band is almost usual between the dark ones. *M. gemma* can also have

wider cream or white areas but it lacks red spiral bands. *Marginella britoi* is relatively narrower in shape.

-*Marginella chalmersi* Tomlin & Shackleford, 1912 has a shell with very typical axial irregular lines in 2-3 bands. The animal is whitish with yellow spots in the tentacles.

-*Marginella spinacia* Gofas & Fernandes, 1988, is also dark, but smaller in size, reaching up to 8 mm, the pattern presents numerous spiral lines of minute spots, and the soft parts show numerous yellow and wine coloured oval spots.

- *Marginella michelae* Cossignani, 2012 has a shell with a deep red colour and is more biconical.

Marginella tyermani Marrat, 1876 (Figure 13 A-H)

Marginella tyermani Marrat, 1876: [Type locality: Corisco, Gabon].

Marginella eveleighi Tomlin & Shackleford, 1913: 11, pl. 1, figs 5-6. [Type locality: São Tomé Island].

Type material: Holotype of *Marginella tyermani* probably in Liverpool Museum: not examined. Holotype of *Marginella eveleighi* represented in GOFAS & FERNANDES (1988, figs. 12a, 12b)

Other material examined: Principe: 1 sp, Ponta Viro Viro, (CSG); 11 sp, Ponta da Mina, Santo Antonio, 10 m (CSG); 6 sp, Ponta da Mina, Santo Antonio, 6 m (CSG); 5 sp, 1 j, Ilheu dos Mosteiros, 16 m (CSG); 1 s, Chimalo and Hospital Velho (CSG). Gabon: 12 sp, 1 j, Pointe Denis, near mouth 1° river, south Bookomo Estuary, 0.5 m (CCS).

Description: See MARRAT (1876). The animal (Figs. 6E-G) has a transparent foot with numerous spots and rounded blotches of milky-yellowish colour. In the tentacles there is a line of spots. The siphon is yellowish and not transparent.

Distribution: Corisco, Gabon.

Habitat: On fine mud and muddy sand, 5-8 m.

Remarks: The most similar species are *M. mirandai* and *M. hernandezi* (see below).

Marginella mirandai spec. nov. (Figure 14 A-I)

Type material: Holotype (Figs. 14A-C) in MNHN (26625). Paratypes in the following collections: CSG (3 sp, Figs. 14D, 14F-G); CCS (1 sp, 1 j), from type locality; CSG (2 sp, 1 j), MHNS (100604, 1 sp, Fig. 14E), NMW (1 sp), CPR (1 s, 1 j), CJR (2 j) all from Praia Campana, NE of Principe, 15 m.

Other material examined: Principe: 2 juv, Ponta da Graça, Baía de Santo Antonio, 14 m (CSG); 1 juv, Praia Campanha, NE of the island, 15 m (CSG);

Type locality: Ponta da Graça, 01°37'856"N, 07°27'697"E, Baía de Santo Antonio, on sand, 14 m.

Etymology: The specific name is after Alberto Miranda, director of the Center Club Maxell of São Tomé for his help with the diving and collecting.

Description: Shell elongate with pointed spire, solid, shiny with a white

background colour and black lines. The protoconch is rounded, whitish, not

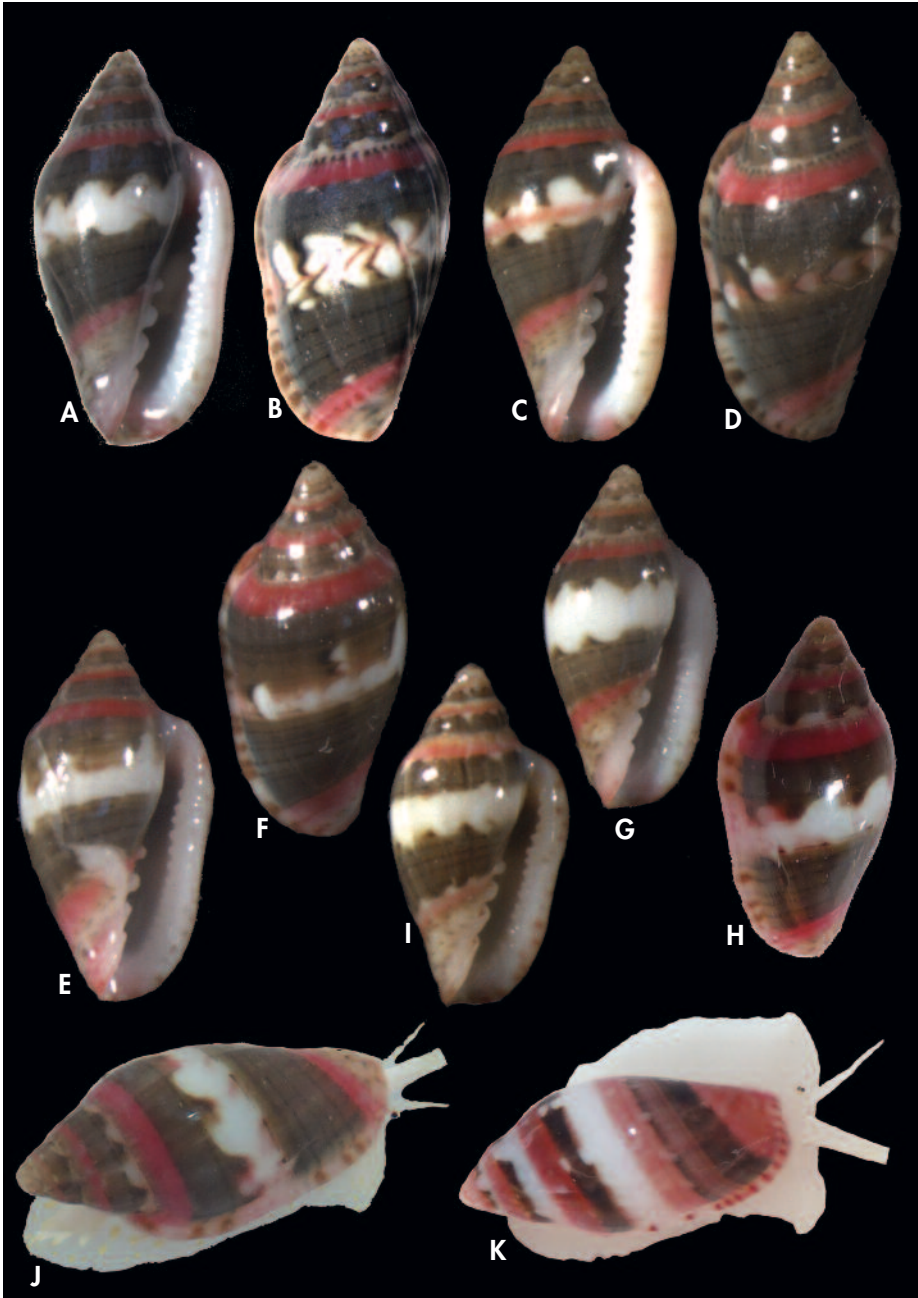


Figure 12. *Marginella britoi* spec. nov. A, B: holotype, 12.2 mm (MNHN); C, D: paratype, 12.8 mm (MNCN); E, F: paratype, 11.9 mm (MHNS); G, H: paratype, 10.8 mm (CSG), all from type locality; I: paratype, 9.4 mm, Lagoa Azul, São Tomé (CSG); J, K: specimens with soft parts.

Figura 12. *Marginella britoi* spec. nov. A, B: holotipo, 12,2 mm (MNHN); C, D: paratipo, 12,8 mm (MNCN); E, F: paratipo, 11,9 mm (MHNS); G, H: paratipo, 10,8 mm (CSG), todos de la localidad tipo; I: paratipo, 9,4 mm, Lagoa Azul, São Tomé (CSG); J, K: ejemplares con partes blandas.

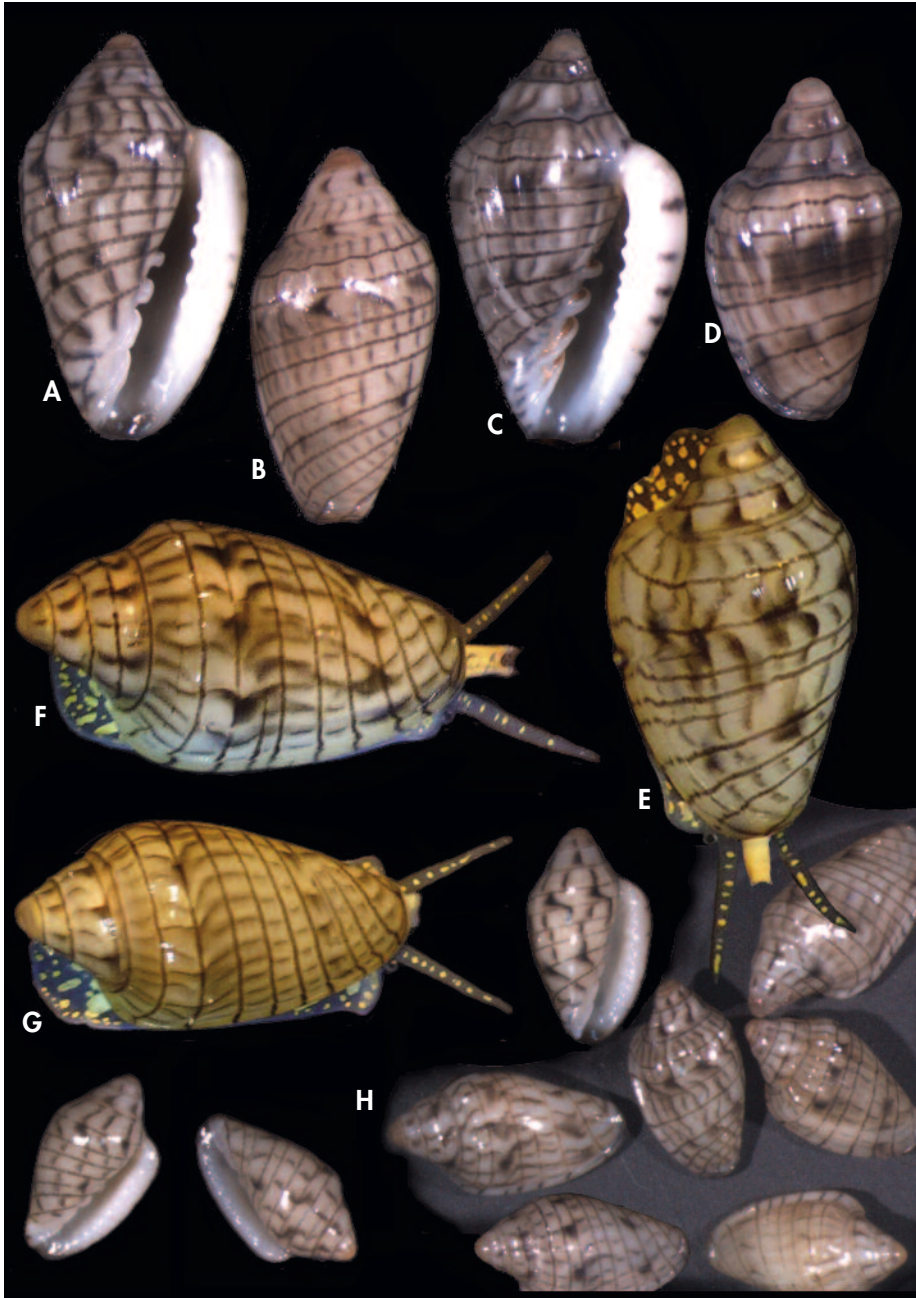


Figure 13. *Marginella tyermani* Marrat, 1876. A, B: shells, 8.3 and 7.8 mm, from Ponta da Mina, São Tomé (CSG); C, D: Shells, 8.3, 7.3 mm, Gabon (CSG); E-G: living specimens from Ponta da Mina, São Tomé; H: lot of specimens from the same locality (CSG).

Figura 13. *Marginella tyermani* Marrat, 1876. A, B: shells, 8,3 y 7,8 mm, de Ponta da Mina, São Tomé (CSG); Conchas, C, D: 8,3 y 7,3 mm, Gabon (CSG); E-G: Ejemplares vivos de Ponta da Mina, São Tomé; H: lote de ejemplares de la misma localidad (CSG).

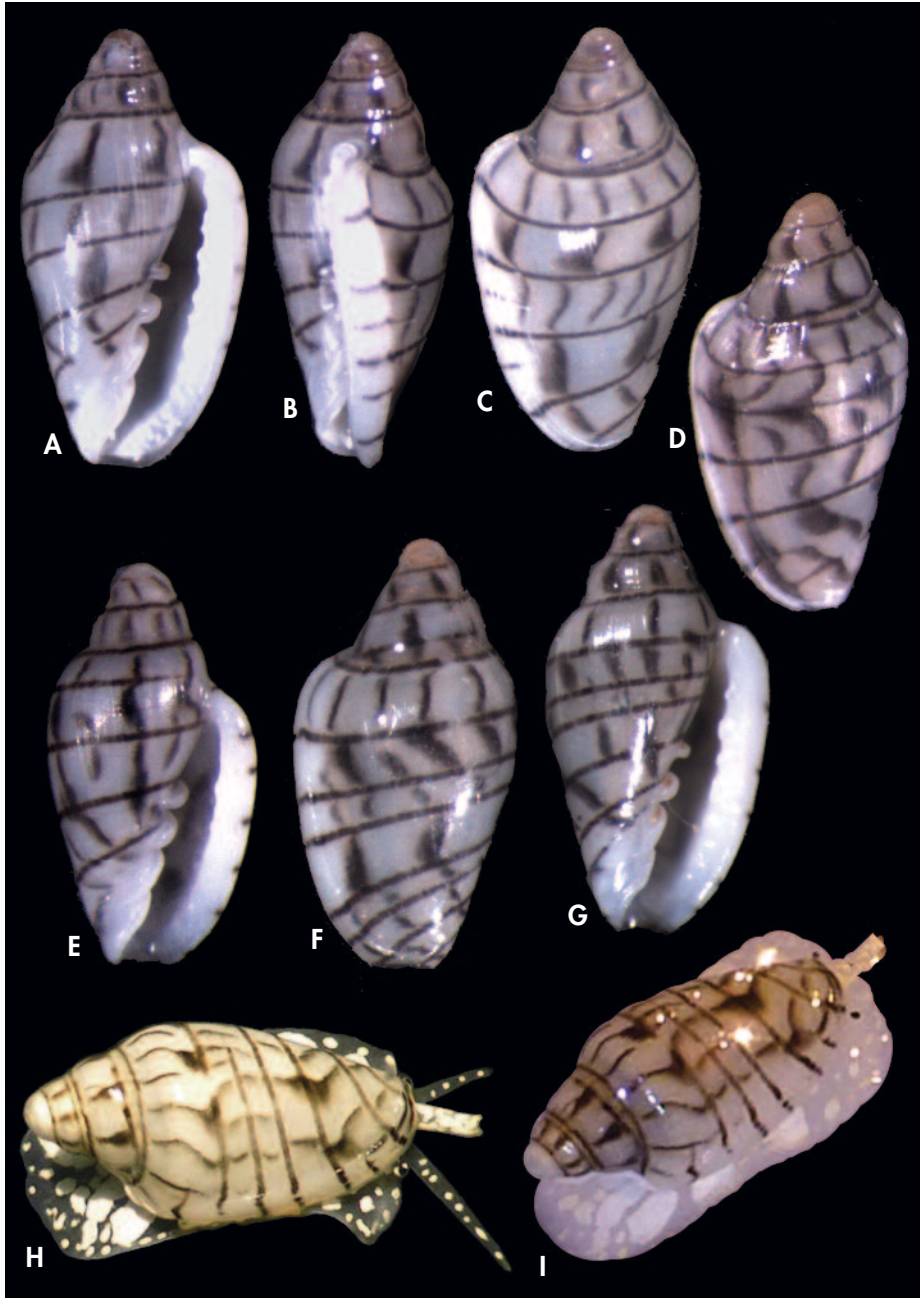


Figure 14: *Marginella mirandai* spec. nov. A-C: holotipo, 6,7 mm (MNHN); D: paratipo, 6,1 mm, from Baía da Graça (CSG); E: paratipo, 5,5 mm (MHNS); F, G: paratipo, 6,1 mm (CSG); H, I: the same specimen with soft parts on dark and light background.

Figure 14: *Marginella mirandai* spec. nov. A-C: holotipo, 6,7 mm (MNHN); D: paratipo, 6,1 mm, de Baía da Graça (CSG); E: paratipo, 5,5 mm (MHNS); F, G: paratipo, 6,1 mm (CSG); H, I: El mismo ejemplar con partes blandas, fotografiado sobre fondo oscuro y claro.

clearly separated from the teleoconch. This has about $3\frac{3}{4}$ whorls, which increase quickly. The last whorl is very prominent and represents more than about $\frac{3}{4}$ of the height. Aperture elongate, a little wider in its lower part; external lip white, very widened; columella opisthocline, with 4 separated and very prominent folds, of which the three lower ones are very oblique; the portion without folds represents about 30-40% of its total length. The external pattern appears grey in general, with 6-7 fine spiral black lines on the last whorl, and only one on each of the first whorls. These lines are irregularly separated (the wider space is usually the subsutural) and between them appear short axial and very variable lines or blotches, frequently inclined in different directions.

Dimensions: the holotype is 6.7 mm. The paratypes are slightly smaller.

Soft parts whitish, transparent with numerous milk white spots and blotches, those situated anteriorly being smaller and the lateral and caudal ones larger. These milk white spots appear also on the tentacles and are more numerous on the siphon.

Distribution: NE of Principe Island.

Remarks: This species at first glance may show some similarity to *M. tyermani*, but the latter species is larger, with a spire that is more pointed, and more numerous spiral dark lines. The axial lines and blotches in *M. mirandai* are usually limited to one interspace between spiral lines and the colour of the blotches on the soft parts is white instead of yellowish.

For the differences with *M. hernandezii* spec. nov. see below.

Marginella hernandezii spec. nov. (Figure 15A-K)

Type material: Holotype (Figs. 15A-B) in MNHN (26626). Paratypes: CSG (1 s, Praia das Burras, 18-20 m, Fig. 15D); CSG (3 s, 4 j, Baía das Agulhas, Fig. 15C); CCS (2 s) from the same locality; CSG (1 s, Fig. 15G); CSG (1 s, Fig. 15I), from Ponta da Graça; MHNS (100605, 1 s, Fig. 15F), CPR (1 sp, Fig. 15H), and CJR (1 s, Fig. 15E), from Praia das Burras: all from Principe island.

Type locality: Principe I.: Baía das Agulhas, 01°36'06"N, 07°20'55"E, 15 m, on rocky bottom.

Etymology: The specific name is after José María Hernández, a Spanish malacologist, who passed away some time ago, visited São Tomé Islands several times and collected there with the authors.

Description: Shell elongate with pointed spire, solid, shiny with a grey colour. The protoconch is rounded, whitish, not clearly separated from the teleoconch. This has $3\frac{3}{4}$ whorls, which increase quickly. The last whorl is very prominent and represents $\frac{3}{4}$ of the height. On the dorsum, some shells can have very short and scarcely prominent axial ribs, not present in other shells. Aperture elongate, slightly wider in its lower part; external lip white, very widened; columella opisthocline, with 4 separated and very prominent folds which are very oblique, specially the lower ones and which take up about 60% of the length. The external pattern appears grey in general, with fine, spiral lines of dark grey, one on each of the first whorls and 10 on the last one, not regularly separated and crossed by

irregular zigzag axial lines, which form two light bands with axial blotches.

The animal is transparent with small white to scarcely yellowish blotches on the foot, the siphon is light yellow and the tentacles transparent with small light yellow dots.

Dimensions: The holotype is 9.4 mm. The larger paratype is 9.8 mm.

Distribution: This species was found in Baía das Agulhas, diving, dredged at Praia das Burras and night diving at Ponta da Graça, Baía de Santo Antonio.

Habitat: Live material was found under sand, 3-15 m and under a thin layer of sand on flat rocks; also dredged at 20 m in dark sand mixed with spheroidal concretions of *Lithothamnion coralloides*.

Remarks: This new species is different from any other of the islands species



Figure 15. *Marginella hernandezi* spec. nov. A, B: holotipo, 9,4 mm (MNHN); C: paratipo, 9,3 mm, type locality (CSG); D: paratipo, 8,5 mm, off Praia das Burras (CSG); E: paratipo, 8,4 mm, same locality (CJR); F: paratipo, 7,4 mm (MHNS); G: paratipo, 8,6 mm, Baía das Agulhas (CSG); H: paratipo, 7,4 mm off Praia das Burras (CPR); I: paratipo, 9,8 mm, Baía de Santo Antonio (CSG); J, K: living specimens on dark bottom.

Figure 15. *Marginella hernandezi* spec. nov. A, B: holotipo, 9,4 mm (MNHN); C: paratipo, 9,3 mm, de la localidad tipo (CSG); D: paratipo, 8,5 mm, frente a Praia das Burras (CSG); E: paratipo, 8,4 mm, misma localidad (CJR); F: paratipo, 7,4 mm (MHNS); G: paratipo, 8,6 mm, Baía das Agulhas (CSG); H: paratipo, 7,4 mm frente a Praia das Burras (CPR); I: paratipo, 9,8 mm, Baía de Santo Antonio (CSG); J, K: ejemplares vivos sobre fondo oscuro.

by its gray colour pattern, its wider aperture, wider thickened outer lip and prominent columellar folds. Some shells lack spiral lines, but we consider that they are the same species, being equal in other characters.

Marginella tyermani Marrat, 1876 from Congo, Gabon and São Tomé has some remote similarity but this latter species has a shell which is strongly ribbed, with a greenish-yellowish colour, is more solid, relatively wider, the apex is wider, the columellar folds larger, the spiral lines are more marked, and the fine axial zigzag lines are almost always wanting. The animal is similar but the blotches on the foot are larger and more yellowish in *M. tyermani*.

CONCLUSIONS

For the present work approximately 1500 specimens and shells of marginellids from São Tomé and Príncipe were examined, and several trips to both islands were necessary for collecting material, photographs and information. In the present work 4 new species are described, giving information on others previously known.

It seems evident that the West African coast is a paradise for the genera *Marginella*, *Volvarina*, *Granulina*, etc. with numerous endemic species living within short distances. Of these

ACKNOWLEDGEMENTS

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The second author thanks all the staff of Club Maxel diving center of São Tomé: Jean Louis Testori and Nicolas Cartrom (the old and the new owner),

M. mirandai spec. nov. is smaller, it has about 6 more marked spiral lines on the last whorl instead of those 10 fine lines in *M. hernandezi*; furthermore the pattern is different: *M. hernandezi* has irregular zigzag with axial lines more marked than the spiral ones, that are prolonged over the middle of the whorls, sometimes covering the complete shell; on the contrary, the pattern of *M. mirandai* has more predominant spiral lines, while the axial lines are not in zigzag but frequently shorter, rarely crossing the spiral ones. Both species live sympatrically.

Marginella fumigata Gofas & Fernandes, 1994, from Angola, is larger (13-16 mm), the two first whorls are smooth and the subsequent ones show axial ribs.

areas, some have a marked personality, such as those from Cape Verde Archipelago, Senegal, Ghana, São Tomé and Príncipe Islands, and Angola, which are the best recognized. In these areas, many species have been described during the last years of the last century and the beginning of this one and new papers are informing us continuously about new records and new species described. However many coastal areas are unexplored even now and so it is probable that further new species shall be described in a near future.

Edmilson Augusto and Alberto Miranda (the old and the new director), and the divers: Helder "Dede" Brito, Eslander "Danger" Campos, Apolo Pires, Armando Pires; Lucas Narciso Tabares; Rodhesio dos Anjos, the motorist Joao Lopes Antonio. Thanks to José Rosado and Cedric Simbile for their cooperation in the research and observations in Príncipe and for the photos of the live animals. To Peter Ryall for his notes and to Jennifer Callighan, assistant curator of Mollusca, National Museum of Wales for her help and information.

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