

SCAPHOPODA (MOLLUSCA) OF FERNANDO DE NORONHA - PERNAMBUCO AND ATOL DAS ROCAS - RIO GRANDE DO NORTE, BRAZIL

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ABSTRACT

It was studied the Scaphopoda from the National Marine Park of Fernando de Noronha (PARNAMAR-FN - PE) and from the Biological Reserve of Atol das Rocas - RN – Brazil. The material was collected in beaches of Fernando de Noronha, from 1990 to 2002, and in random collections in Atol das Rocas at a depth of 0-45 meters, from 1999 to 2002. The Dentaliidae with eight species: *Dentalium laqueatum* Verrill, 1885; *Paradentalium americanum* (Chenu, 1843); *Paradentalium disparile* (d'Orbigny, 1853); *Paradentalium infractum* (Odhner, 1931); *Antalis antillaris* (d'Orbigny, 1853); *Graptacme calamus* (Dall, 1889); *Graptacme eborea* (Conrad, 1846); *Graptacme perlonga* (Dall, 1881). The family Fustiariidae with *Fustiaria liodon* (Pilsbry & Sharp, 1897) and Gadilidae: *Polyschides tetraschistus* (Watson, 1879). The species, *Dentalium laqueatum*, *Paradentalium americanum*, *Paradentalium disparile*, *Paradentalium infractum*, *Antalis antillaris*, *Graptacme calamus* and *Graptacme perlonga* are cited for the first time to the Fernando de Noronha area. In Atol das Rocas it is recorded for the first time the occurrence of *Graptacme perlonga*, *Fustiaria liodon* and *Polyschides tetraschistus*, thus expanding the geographic distribution of these species in oceanic islands in Brazil.

Keywords: Diversity, Marine molluscs, Brazilian Islands, Systematics.

RESUMO

Foram estudados os moluscos da classe Scaphopoda procedentes do Parque Nacional Marinho de Fernando de Noronha (PARNAMAR-FN - PE) e da Reserva Biológica do Atol das Rocas - RN – Brasil, tendo como objetivo dar conhecimento sobre as espécies que habitam estas regiões. O material foi coletado no médiolitoral e infralitoral em doze praias de Fernando de Noronha, nos períodos de maio a outubro de 1990 e de 1999 a 2002, e em coletas aleatórias no Atol das Rocas numa profundidade de 0 a 45 metros, de 1999 a 2002. Os espécimes foram identificados e examinados sob estereomicroscópio levando-se em consideração as características conquiliológicas. O material encontra-se depositado no Museu de Oceanografia Dr. Petrônio Alves Coelho da Universidade Federal de Pernambuco. Foram identificadas as espécies das Famílias Dentaliidae, Fustiariidae e Gadilidae. A Família Dentaliidae com oito espécies; sendo elas: *Dentalium laqueatum* Verrill, 1885; *Paradentalium*

americanum (Chenu, 1843); *Paradentalium disparile* (d'Orbigny, 1853); *Paradentalium infractum* (Odhner, 1931); *Antalis antillaris* (d'Orbigny, 1853); *Graptacme calamus* (Dall, 1889); *Graptacme eborea* (Conrad, 1846); *Graptacme perlonga* (Dall, 1881). A Família Fustiariidae com *Fustiaria liodon* (Pilsbry and Sharp, 1897) e os Gadilidae representados pela espécie *Polyschides tetraschistus* (Watson, 1879). Das nove espécies identificadas *Dentalium laqueatum*, *Paradentalium americanum*, *Paradentalium disparile*, *Paradentalium infractum*, *Antalis antillaris*, *Graptacme calamus* e *Graptacme perlonga* são citadas pela primeira vez para Fernando de Noronha assim como fica confirmada a presença das espécies *Graptacme eborea* e *Polyschides tetraschistus*. Para o Atol das Rocas foi confirmada a espécie *Graptacme eborea* e registra-se pela primeira vez a presença de *Graptacme perlonga*, *Fustiaria liodon* e *Polychides tetraschistus*, ampliando assim a distribuição geográfica dessas espécies em Ilhas Oceânicas no Brasil.

Palavras Chave: Diversidade, Moluscos marinhos, Ilhas brasileiras, Sistemática.

INTRODUCTION

In Brazil, the Scaphopoda class has been little studied, but some authors have included, in their work, lists, geographical distribution and descriptions of some species and some observations on ecological data, being highlighted the works of: Magalhães; Mezzalira (1953); Penna (1972); Penna-Neme (1974); Rios (1975, 1985, 1994, 2009); Mello (1982); Absalão (1989); Mello; Araújo (1989); Cabral & Mello (1994); Caetano et al. (2006). The scientific literature on the occurrence of Scaphopoda in the National Marine Park of Fernando de Noronha (PARNAMAR - FN) and in Atol das Rocas (RN) is virtually inexistent. This work represents the first scientific inventory of Scaphopoda in oceanic islands of Brazil.

MATERIAL AND METHODS

Description of Study Areas

The Fernando de Noronha Archipelago is located about 345 km from Cabo de São Roque in Rio Grande do Norte and about 545 km

from Recife, in Pernambuco, occupying the geographical position of 03°51'S - 32°25'W. It consists of over 20 islands, islets and isolated rocks of volcanic nature, which form a significant volcanic cone whose base, about 60 kilometers in diameter, is located 4,000 meters deep on the ocean floor. The main island has elongated shape in the Northeast-Southeast direction. Its area does not exceed 18.4 Km², takes the name of the archipelago and is the only inhabited. Other prominent islands are the Rata, Sela Gineta, Cabeluda, do Meio, Rasa, São José and the Morro do Leão and Viúva. The archipelago is an area where the fauna and flora are quite different from the mainland.

The Biological Reserve of Atol das Rocas is the only atoll in the South Atlantic Ocean and has fundamental ecological importance for its high biological productivity and for being an important area of shelter, feeding and reproduction of many species. According to Kikuchi (1999), the Atol das Rocas grows in the western portion of the flat top of

a seamount to Fernando de Noronha Fracture Zone. It is located about 260 km east of the city of Natal, in northeastern Brazil, and 145 Km west of Fernando de Noronha Archipelago. The region of Atol das Rocas is bathed by the Equatorial South Current, originated on the African coast, from the Benguela current.

Biological material

Specimens came from two lots, the first coming from collections manually held from May to October 1990 and from 1999 to 2002, in unconsolidated substrates in midlittoral and infralittoral in Fernando de Noronha Archipelago (Fig. 1); the second collected in Atol das Rocas (Fig. 2) along its entire length, at depths between 0-45 meters, from 1999 to 2002.

Animals were screened and identified at specific level through specialized literature under stereomicroscope, taking into account only the conchological characters, since the animals were presented devoid of soft tissue. The material is laid up in the

Oceanography Museum Dr. Petrônio Alves Coelho, Federal University of Pernambuco.

Morphometric measurements were performed according to Shimek (1989), Steiner (1999) and Absalão (1989); De Paula (2004), which included length (L), maximum diameter (Max), distance between the maximum diameter region and the anterior opening (Dmax), maximum curvature (Arc), distance between the maximum curvature region and the posterior opening (Larc), height of anterior opening (Ha), width of anterior opening (Wa), height of posterior opening (Hp) and width of posterior opening (Wp).

Copies are laid up in the collection of Museu Oceanográfico Dr. Petrônio Alves Coelho, Universidade Federal de Pernambuco – UFPE, Departamento de Oceanografia.

In this paper, the species are cited with their references, synonyms, diagnosis, geographical distribution and observations (where applicable), being illustrated with photography in digital camera.



Figure 1 - Map of Parque Nacional Marinho de Fernando de Noronha (PARNAMAR - FN) - (PE), marked with the collection areas.

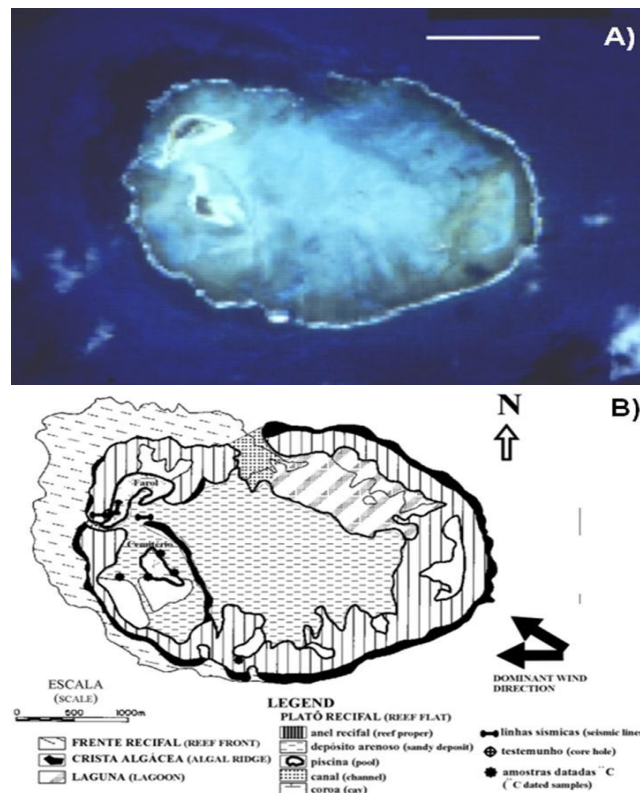


Figure 2 - Satellite Image (TM/LANDSAT) of Reserva Biológica de Atol das Rocas (RN). The scale (white bar) is equivalent to 1 km; B) Geomorphological map of Atol das Rocas.

RESULTS AND DISCUSSION

The species studied in the Fernando de Noronha National Marine Park and in the Biological Reserve of Atol das Rocas are part of the Caribbean Malacological Province stretching from North Carolina in the US to Uruguay, thus its malacofauna is in large part participant of the Caribbean fauna, due to the dispersion process (CABRAL & MELLO, 1994). Ten (10) species of Scaphopoda belonging to the families Dentaliidae, Fustiariidae and Gadilidae were identified. The family Dentaliidae was the one with the largest number of species, 8 (eight), being the other represented with a single species. The new occurrences for the Fernando de Noronha Archipelago are *Dentalium laqueatum* Verrill, 1885, *Paradentalium americanum* (Chenu, 1843), *Paradentalium disparile* (d'Orbigny, 1853), *Paradentalium infractum* (Odhner, 1931), *Antalis antilaris* (d'Orbigny, 1853), *Graptacme calamus* (Dall, 1889), *Graptacme perlonga* (Dall, 1881) and *Fustiaria liodon* (Pilsbry & Sharp, 1897). The species *Graptacme eborea* (Conrad, 1846) and *Polyschides tetraschistus* (Watson, 1879) are confirmed as occurring in Fernando de Noronha Archipelago. With regard to the Atol das Rocas, it was confirmed the presence of species *Graptacme eborea* (Conrad, 1846) registered by Penna-Neme (1974), *Graptacme perlonga* and *Polyschides tetraschistus*.

Systematics

Class SCAPHOPODA Keferstein in
Bronn, 1862

Order Dentaliida da Costa, 1776

Family Dentaliidae Gray, 1847

Genus *Dentalium* Linnaeus, 1758

Dentalium laqueatum Verrill, 1885
(Fig. 3)

Dentalium laqueatum Verrill 1885: 431, pl. 44, fig. 18; Dall 1889: 426, pl. 27, fig. 1; Maury 1922: 34; Abbott 1974: 383, fig. 4491; Scarabino 1994: 306, pl. 105, fig. 1496; Cabral e Mello 1994: 34, fig. 2; Rios, 1994: 306, pl. 105, fig. 1496; Steiner e Kabat 2001: 442; 2004: 608; Gracia et al. 2005: 330. fig. 3.

Dentalium (Dentalium) laqueatum Henderson 1920: 23; Penna-Neme 1974: 106; Scarabino 1985; 197, pl. 71, fig. 1008.

Dentalium (Dentalium) laqueatum laqueatum Henderson 1920: 24, pl. 1, figs. 6, 7.

Dentalium (Dentalium) laqueatum regulare Henderson 1920: 26, pl. 1, fig. 8.

Diagnosis: Slightly curved shell, colored cream to whitish. Ornamentation consists of nine to twelve primary longitudinal ribs, intercostal spaces with delicate secondary ribs. The shell is ornamented with fine transverse lines to form a crosslinked network. Posterior opening with six to nine angles and short notch on the ventral face, polygonal crenulate anterior opening.

Morphometric measurements: L (6 – 17,5mm); Max (1 – 2,5mm); Dmax (0 – 0); Arc (0,3 – 1,3mm); Larc (2,5 – 8,5mm); Ha (0,5 – 2,5mm); Wa (1,3 – 2,5mm); Hp (0,3 – 1,1mm); Wp (0,4 – 1mm).

Geographical Distribution: USA: North Carolina, Florida; Caribbean Sea: Gulf of Mexico, North of Cuba; Jamaica; Antigua, Barbados and

Grenada; North of Yucatan; Campeche Bank (HENDERSON, 1920; ABBOTT, 1974); Colombia (GRACIA et. al., 2005); Brazil: Amapá to Santa Catarina (PENNA-NEME, 1974; SCARABINO, 1985; RIOS, 1994).

Comments: Cabral & Mello (1994) mention the species in the state of Alagoas.

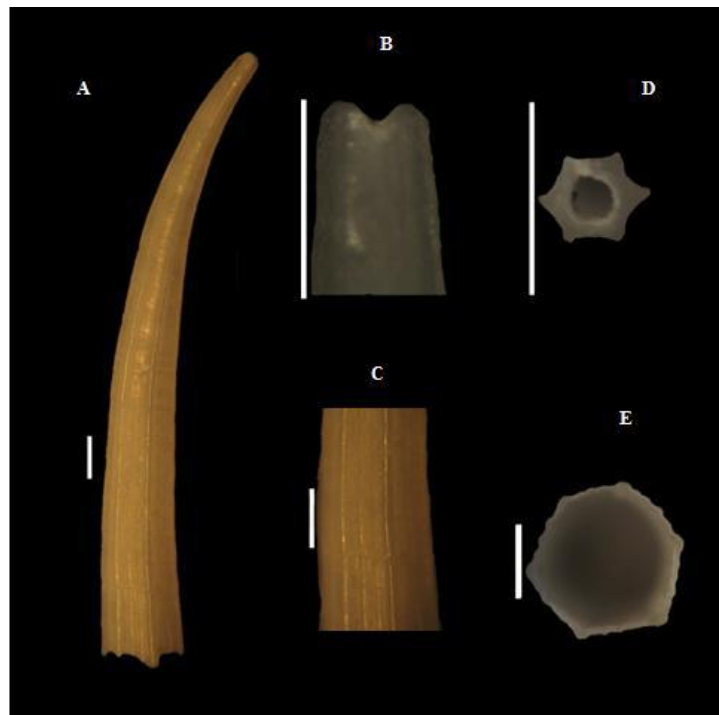


Figure 3 – *Dentalium laqueatum* Verril, 1885; A) Side view; B) Notch detail; C) Shell detail; D) Posterior opening; E) Anterior opening. The scale (white bar) equals 1 mm.

Genus *Paradentalium* Cotton & Godfrey, 1933

Paradentalium americanum (Chenu, 1843) Steiner & Kabat (2004) (Fig. 4)

Dentalium (Dentalium) gouldii gouldii: Henderson 1920: 30, pl. 2, figs. 6, 7.

Dentalium americanum Chenu 1843: pl. 4, figs. 9, 10; 1850: 1; Rios 1994: 305, pl. 105, fig. 1494; Steiner & Kabat 2004: 561.

Dentalium texasianum Philippi 1848: 144; Abbot 1974: p. 383, fig. 4492; Steiner & Kabat 2004: 656.

Dentalium (picteti) picteti: Pilsbry & Sharp 1897: 22, 23, pl. 11, fig. 87

[ex Deshayes MS]; Steiner & Kabat 2004: 630.

Dentalium (Dentalium) texasianum cestum: Henderson 1920: 29, pl. 2, figs. 1, 4, 8; Steiner & Kabat 2004: 575.

Dentalium (Dentalium) rebeccaense: Henderson 1920: 31, 32, pl. 3, fig. 2; Steiner & Kabat 2004: 637.

Dentalium gouldii: Dall 1889: 424, 425, pl. 26, fig. 4; Steiner & Kabat 2004: 595.

Diagnosis: Slightly curved shell, white colored, anterior and posterior opening on hexagonal section. Ornamentation constituted of six longitudinal ribs, sometimes with five or seven primary ribs. Smooth spaces between the ribs.

Observations: Some individuals may have five or seven primary longitudinal ribs, a fact also reported by Cabral & Mello (1994).

Morphometric measurements: L (5 – 17,7mm); Max (0,7 – 2,3mm); Dmax (0 – 0); Arc (0,3 – 1,8mm);

Larc (1,5 – 9,5mm); Ha (0,6 – 2,5mm); Wa (0,6 – 2,5mm); Hp (0,2 – 0,5mm); Wp (0,2 – 0,6mm).

Geographical Distribution:

Western Atlantic: North Carolina to Texas (ABBOTT, 1974); North Carolina to Florida, Antilles, Yucatan, Brazil (Amapá to São Paulo) (RIOS, 1994).

Comments: Lange de Morretes (1949) cited the occurrence of this species in the states of Rio de Janeiro and São Paulo. According to Cabral & Mello (1994), the species was found in the states of Amapá, Pará, Maranhão, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, São Paulo and Rio Grande do Sul. In Pernambuco, it is recorded by Mello (1982) on the beaches of Boa Viagem, Piedade, Candeias, Barra de Jangadas and Enseada dos Corais. Almeida & Oliveira (2000) points out the species to Santa Catarina.

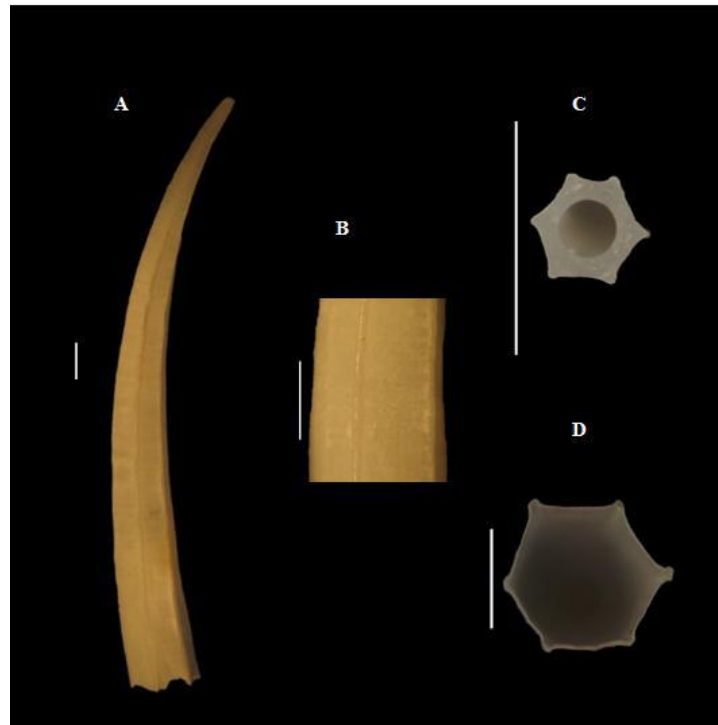


Figure 4 – *Paradentalium americanum* (Chenu, 1843); A) Side view; B) Shell detail; C) Posterior opening; D) Anterior opening. The scale (white bar) equals 1 mm.

Paradentalium disparile (d'Orbigny, 1853) (Fig. 5)

Dentalium disparile Orbigny 1853: 202, pl. 25, figs. 14-17; Dall 1889: 424; Scarabino 1973: pl. 1, fig. 8; Matthews & Rios 1974: 47.

Dentalium (Antalis) disparile Pilsbry and Sharp 1897: 56, pl. 14, figs. 16-21; Henderson 1920: 47, pl. 6, figs. 4-8; Maury 1922: 35; Haas 1953: 203; Lange de Morretes 1949: 53; Turner 1955: 311; Penne 1972: 230; Penna-Neme 1974: 111; Abbott 1974: 385, fig. 4505; Almeida & Oliveira 2000: 48, fig. 2.

Dentalium oerstedii: Jaeckel, 1927: 130 (non Mörch, 1860).

Dentalium (Dentale) disparile: Rios 1970: 144.

Dentalium (Heteroschismoides) callithrix (non Dall 1889): Penna 1972: 231

Antalis disparile Scarabino 1985: 198, pl. 72, fig. 1012; 1994: 306, pl. 106, fig. 1500; Díaz & Puyana 1994: 256, pl. 71, fig. 1040; Rios, 1994: 306, pl. 106, fig. 1500; Gracia-Valencia & Díaz 2000: 79; Steiner and Kabat 2001: 440; 2004: 584.

Paradentalium disparile: Caetano et al., 2006: 11, figs. 11-15.

Diagnosis: Slightly curved shell, with yellowish and opaque white coloration.

Ornamentation constitutes of 35 longitudinal ribs in the anterior region and 5 in the posterior region. Circular anterior opening. Little hexagonal posterior opening with small triangular notch on the convex side observed in few specimens.

Observations: The circular section of the anterior opening extends to

the middle of the shell, from this point forward, the section becomes hexagonal.

Morphometric measurements: L (1,5 – 27mm); Max (1,3 – 2,7mm); Dmax (0 – 0); Arc (0,3 – 1,2mm); Larc (4 – 10,5mm); Ha (1 – 2,8mm); Wa (1 – 2,8mm); Hp (0,3 – 0,8mm); Wp (0,3 – 0,8mm).

Geographical Distribution: USA: Florida; Antilles: Sabanilla; Cuba; Trinidad (HENDERSON, 1920; GRAY, 1854; TURNER, 1955); Colombia (GRACÍA-VALENCIA & DÍAZ, 2000); Brazil: Amapá to Santa Catarina (HENDERSON, 1920; JAECKEL, 1927; RIOS, 1970; PENNA, 1972; PENNA-NEME, 1974; SCARABINO, 1985, 1994).

Comments: Lange de Morretes (1949) mentions the species in the states of Rio de Janeiro and São Paulo. Oliveira (1950), making a survey of the biogeography of Guanabara Bay, finds the species in the place. Penna (1972) found this species in the bay of Ilha Grande, Rio de Janeiro. Penna-Neme (1974) pointed it to the state of Alagoas. Almeida & Oliveira (2000) refers this species in the coast of the Espírito Santo State. In this paper, it is first recorded for Fernando de Noronha/PE.

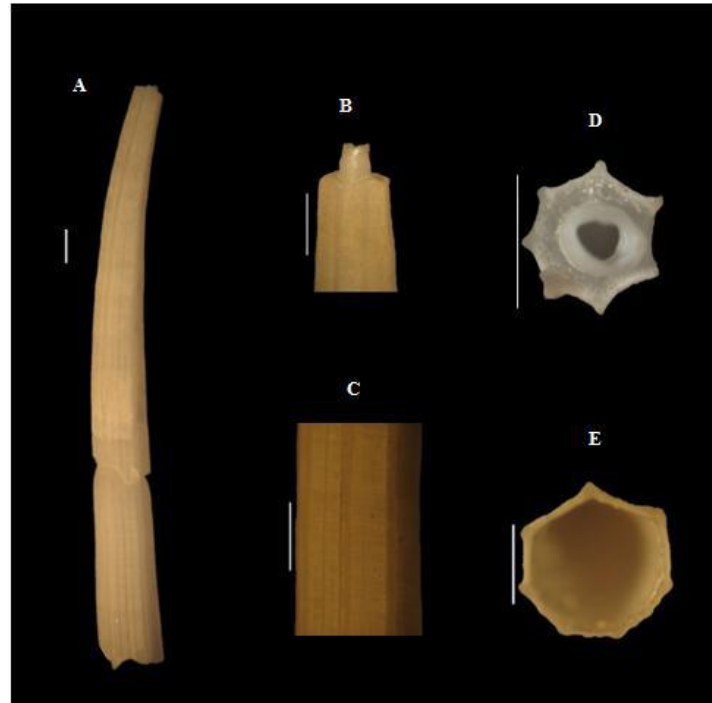


Figure 5 – *Paradentalium disparile* d'Orbigny, 1853; A) Side view; B) Tube detail, posterior region; C) Shell detail; D) Posterior opening; E) Anterior opening. The scale (white bar) equals 1 mm.

Paradentalium infractum (Ordhner, 1931) (Fig. 6)

Dentalium infractum Odhner 1931: 1, pl. 1, figs. 1-3, 8, 10, 12 pl. 2, figs. 15-17, 22, 23.

Dentalium (Dentalium) infractum: Scarabino 1973: 195, pl. 1, figs. 2, 2a.

Dentalium (Antalis) infractum: Penna-Neme 1974: 110, figs. 2,4,5,6.

Dentalium (Antalis) elegantulum: Penna-Neme 1974: 108, figs. 1, 3.

Antalis infractum: Scarabino 1985: 198, pl. 72, fig. 1013; Rios 1994: 306, pl. 106, fig. 1501.

Antalis infracta: Stiner & Kabat 2001: 440; 2004: 602.

Paradentalium infractum: Caetano et al., 2006: 12, figs. 16-19.

Diagnosis: Slightly curved, white colored shell, with hexagonal posterior opening and circular anterior opening. Ornamentation formed from nine to ten primary ribs. Secondary ribs in larger numbers in the posterior region. Posterior opening with small crack on the convex side, with possibility to present an occasional limestone tub.

Morphometric measurements: L (25,2 – 36,6mm); Max (2,5 – 3mm); Dmax (0 – 0); Arc (2,5 – 4mm); Larc

(12,4 – 16,5mm); Ha (2,5 – 3mm); Wa (2,5 – 3,5mm); Hp (0,6 – 0,8mm); Wp (0,6 – 0,8mm).

Geographical Distribution:

Venezuela (CAETANO et al., 2007); Brazil: Amapá, Maranhão (CAETANO et al., 2006), Alagoas, Bahia, Espírito Santo, Rio de Janeiro, São Paulo, Santa Catarina and Rio Grande do Sul (ODHNER, 1931; PENNA-NEME, 1974; SCARABINO, 1973, 1975, 1985, 1994); Uruguay (SCARABINO, 1973).

Comments: Cabral & Mello (1994) report that their studied copies have shown variations in some shell characters, such as the missing secondary ribs and the simple apex, without the notch, a fact not found in the studied material in this work. Scarabino (1973) reports that the diagnosis of the species studied by him features a polygonal apex in section, this variation is due to physical, chemical and biological factors that affected their conchological characteristics, a fact also reported by Emerson (1962).

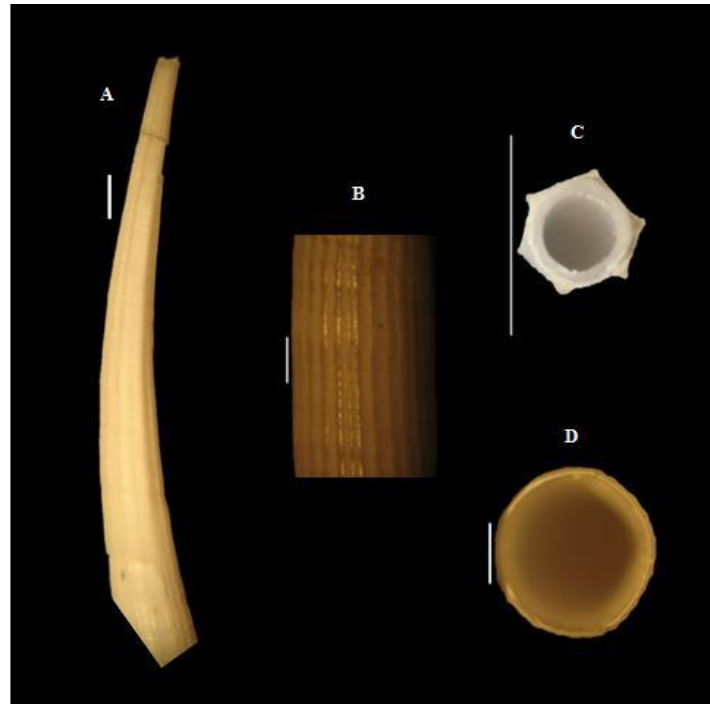


Figure 6 – *Paradentalium infractum* (Odhner, 1931); A) Side view; B) Tube detail, posterior region; C) Shell detail; D) Posterior opening; E) Anterior opening. The scale (white bar) equals 1 mm.

Genus *Antalis* H. & A. Adams, 1854

Antalis antillarum (d'Orbigny, 1853)
(Fig. 7)

Dentalium (Antalis) antillarum:
d'Orbigny 1846: 202, pl. 25, figs. 10-
13; Henderson 1920: 44, pl. 5, figs.
1-8.

Dentalium antillarum: d'Orbigny
1853: 202, pl. 25, figs. 10-13; Abbott
1974: 384, fig. 4502.

Diagnosis: White shell, some specimens with greenish reflections. Ornamentation consists of 30-35 longitudinal ribs in the anterior region and 20 in the middle-posterior region of the shell, with microscopic cross lines between the ribs. Circular anterior and posterior opening. Small oval posterior orifice, with a notch on the convex side.

Observations: Copies presenting mesh-shaped lattice spaces between the ribs.

Morphometric measurements: L (6 – 9,2mm); Max (0,7 – 1,3mm); Dmax (0 – 0); Arc (0,4 – 0,6mm); Larc (1,2 – 3,5mm); Ha (0,7 – 1,1mm); Wa (0,7 – 1,2mm); Hp (0,1 – 0,3mm); Wp (0,2 – 0,3mm).

Geographical Distribution: Western Atlantic: Antilles (ABBOTT, 1974); Florida, Caribbean to Brazil (Amapá to Rio de Janeiro) (RIOS, 1994).

Comments: Cabral & Mello (1994) mention the species in the states of Amapá, Maranhão, Ceará and Pernambuco.

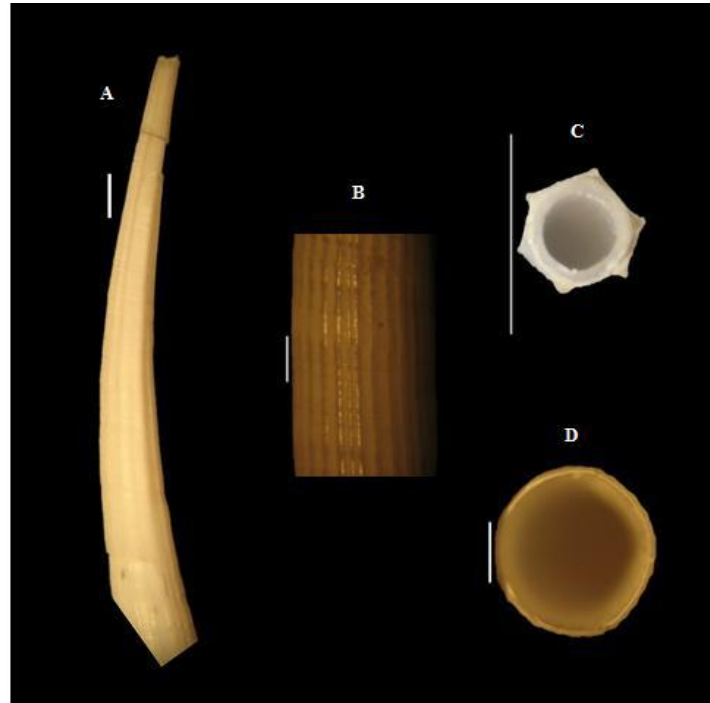


Figure 7 – *Antalis antillarum* (d'Orbigny, 1853); A) Side view; B) Shell detail; C) Posterior opening; D) Anterior opening. The scale (white bar) equals 1 mm.

Genus *Graptacme* Pilsbry & Sharp,
1897

Graptacme calamus (Dall, 1889)
(Fig. 8)

Dentalium calamus Dall, 1889: 421

Dentalium (Graptacme) calamus:
Hemerson, 1920: 72, pl. 12, figs.
7,8; Warmke & Abbott, 1961: 222,
fig. 34h; Penna, 1972: 230; Abbott,
1974: 386, fig. 4519; Penna-Neme,
1974: 112; Scarabino, 1975: 184, pl.
59, fig. 904.

Fustiaria (Laevidentalium) pelongum
(non Dall, 1881): Scarabino, 1973:
197 (in part).

Graptacme calamus: Scarabino,
1985: 198, pl. 72, fig. 1016; 1994:
307, pl. 106, fig. 1504; Cabral &
Mello, 1994: 36, figs. 6,7; Redfern,
2001: 190, pl. 76, fig. 780; Steiner &

Kabat, 2004: 572; Caetano *et al.*,
2006: 19, figs. 39-43.

Graptacme calama: Steiner &
Kabat, 2001: 446.

Diagnosis: Slightly curved, thin,
white colored shell. Ornamental
comprising numerous fine
longitudinal grooves. Oblique
posterior opening with a calcareous
projection and irregular crack.
Circular cross section at both
openings.

Morphometric measurements: L
(5,8 – 29,8mm); Max (0,6 – 2mm);
Dmax (0 – 0); Arc (0,3 – 1,5mm);
Larc (2,5 – 14mm); Ha (0,6 –
2,3mm); Wa (0,7 – 2,2mm); Hp (0,3
– 1,5mm); Wp (0,3 – 1,5mm).

Geographical Distribution: USA: North Carolina, Florida (HENDERSON, 1920; ABBOTT, 1974); Caribbean Sea: Cuba; Porto Rico; Brazil: Amapá to Rio Grande do Sul (PENNA-NEME, 1974; SCARABINO, 1975, 1985, 1994).

Comments: The shell features delicate longitudinal ribs in the

posterior region that disappear near the anterior region. All specimens examined were broken, yet the short and irregular longitudinal notch with irregular calluses, distinguishing characteristic of the species, was preserved. Cabral & Mello (1994) record it for the states of Maranhão, Pernambuco and Alagoas.

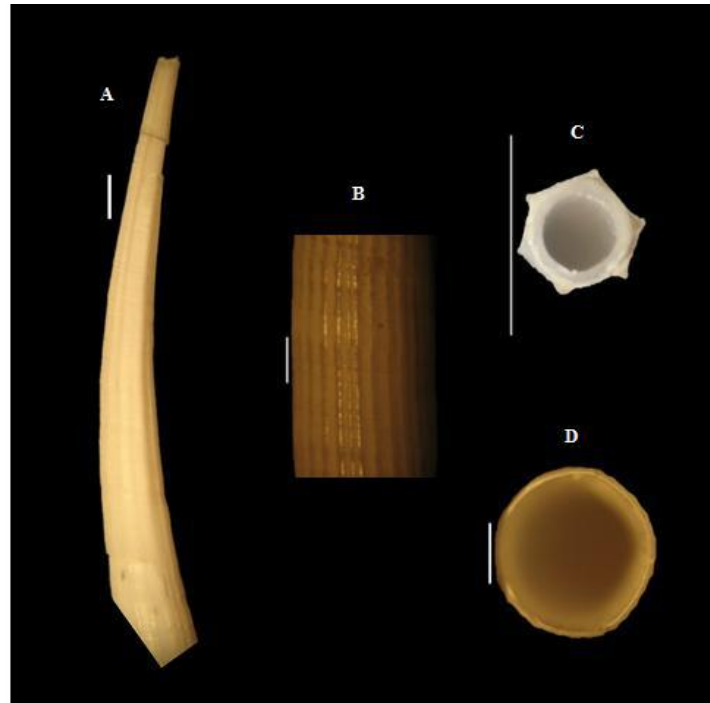


Figure 8 – *Graptacme calamus* (Dall, 1889); A) Side view; B) Tube detail, posterior region; C) Shell detail; D) Posterior opening; E) Anterior opening. The scale (white bar) equals 1 mm.

Graptacme eborea (Conrad, 1846)
(Fig.9)

Dentalium eboreum Conrad, 1846: 27; Pilsbry & Sharp, 1897: 89, pl. 16, figs. 47-49, 55-56; Matthews & Rios, 1974: 47.

Dentalium (Graptacme) eboreum: Henderson, 1920: 66, pl. 10, figs 3-

5, 8-9; pl. 11, fig. 6; Turner, 1955: 313; Warmke & Abbott, 1961: 224; Abbott, 1974: 386, fig. 4517; Scarabino, 1975: 185, pl. 59, fig. 905.

Dentalium (Graptacme) amaliense Henderson, 1920: 71, pl. 11, figs 4-

5; Rios, 1970: 145; Penna-Neme, 1974: 112.

Dentalium amaliense: Matthews & Kempf, 1970: 40; Matthews & Rios, 1974: 47.

Graptacme eboreum: Rios, 1985: 198, pl. 72, fig. 1017; 1994: 307, pl. 106, fig. 1905.

Graptacme eborea: Steiner & Kabat, 2001: 446; 2004: 586.

Diagnosis: Slightly curved, thin, white colored, glossy shell. Ornamentation consists of numerous fine longitudinal grooves to $\frac{1}{3}$ of the posterior region. Circular, slightly oblique anterior opening. Small and circular posterior opening, with deep notch on the convex side.

Morphometric measurements: L (23,7 – 30mm); Max (1,7 – 2,5mm); Dmax (0 – 0); Arc (1 – 2mm); Larc (12,3 – 19,5mm); Ha (1,8 – 2,7mm);

Wa (2 – 2,7mm); Hp (0,5 – 0,8mm); Wp (0,5 – 0,8mm).

Geographical Distribution: Western Atlantic: North Carolina, Florida; Santo Domingo; Antigua (HENDERSON, 1920); Yucatan; Brazil: Pará, Maranhão, Rio Grande do Norte, Espírito Santo, Rio de Janeiro (MATTHEWS; KEMPF, 1970; SCARABINO, 1975, 1994), Abrolhos (RIOS; BARCELLOS, 1980); Fernando de Noronha and Atol das Rocas (MATTHEWS; KEMPF, 1970).

Comments: Cabral & Mello (1994) record it for the states of Maranhão, Ceará and Pernambuco. Penna-Neme (1974), referring to the species, says that it was only known in the type locality, and that in the Brazilian coast it occurs in Atol das Rocas and Fernando de Noronha Archipelago.

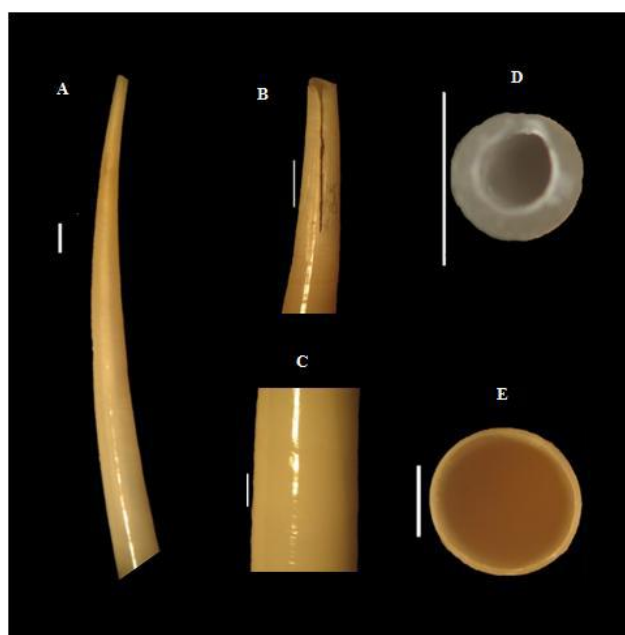


Figure 9 – *Graptacme eborea* (Conrad, 1846); A) Side view; B) Notch detail, convex face; C) Shell detail; D) Posterior opening; E) Anterior opening. The scale (white bar) equals 1 mm.

Graptacme perlonga (Dall, 1881)
(Fig. 10)

Dentalium perlongum Dall 1881: 36;
1889: 76, pl. 27, fig. 6.

Dentalium (*Laevidentalium*)
perlongum: Pilsbry and Sharp 1897:
104, pl. 18, figs. 10, 11; Henderson
1920: 75, pl. 9, fig. 1; Maury 1922:
38; Lange de Morretes 1949: 54;
Turner 1955: 313; Rios 1970: 144.

Graptacme perlongum: Scarabino
1985: 199, pl. 72, fig. 1018; 1994:
307, pl. 105, fig. 1506.

Graptacme perlonga: Steiner and
Kabat 2001: 446; 2004: 629;
Caetano et al., 2006: 20, figs. 44-45.

Diagnosis: Slightly curved, slender,
almost straight shell; with circular
section; long and tapered posterior
region. Regarding its coloration, it is
white, glossy, but not porcelain-like.
Smooth surface with longitudinal
grooves in the posterior region.

Posterior opening with a U-notch on
the ventral side.

Morphometric measurements: L
(18 – 25mm); Max (1,2 – 2,1mm);
Dmax (0 – 0); Arc (0,3 – 1,1mm);
Larc (7,7 – 10,7mm); Ha (1,2 –
2,2mm); Wa (1,2 – 2,2mm); Hp (0,3
– 0,5mm); Wp (0,3 – 0,5mm).

Geographical Distribution: USA:
North Carolina to Florida; Gulf of
Mexico; Granada (HENDERSON,
1920); Brazil: Ceará (HENDERSON,
1920), Bahia and Rio de Janeiro
(CAETANO et al., 2006).

Comments: Cabral & Mello (1994)
records it for the states of
Maranhão, Ceará and Alagoas.
Mello (1982) mentions it for
Pernambuco. Penna-Neme (1974)
talks about the occurrence in
Espírito Santo and São Paulo
States.

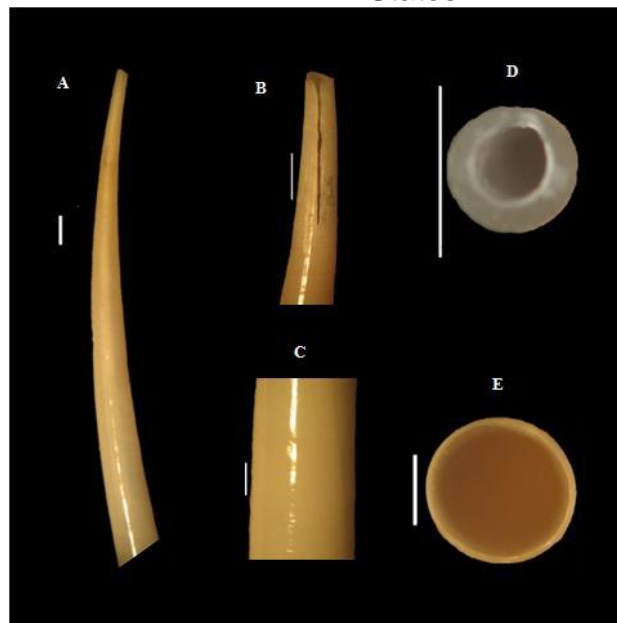


Figure 10 – *Graptacme perlonga* (Dall, 1881); A) Side view; B) Notch detail; C) Shell detail; D) Posterior opening; E) Anterior opening. The scale (white bar) equals 1 mm.

Family Fustiariidae Steiner, 1991

Genus *Fustiaria* Stoliczka, 1868

Fustiaria liodon (Pilsbry & Sharp, 1897) (Fig. 11)

Dentalium liodon: Pilsbry & Sharp, 1897: 107, pl. 21, figs. 37-39; Matthews & Rios 1974: 47.

Dentalium (Laevidentalium) liodon: Henderson 1920: 76, pl. 12, figs. 2-4; Warmke & Abbott 1961: 225, fig. 34b; Rios 1970: 144; Penna 1972: 231; Penna-Neme 1974: 112.

Dentalium (Laevidentalium) liodon liodon: Henderson 1920: 76.

Dentalium (Laevidentalium) liodon alloschismum Pilsbry & Sharp 1897: 108, pl. 21, figs. 40-42; Henderson 1920: 77, pl. 13, figs. 1-6.

Laevidentalium liodon: Scarabino 1985: 199, pl. 73, fig. 1023; 1994: 308, pl. 107, fig. 1511; Cabral & Mello 1994: 39, figs. 11, 12; Díaz & Puyana 1994: 256, pl. 71, fig. 1043.

Fustiaria liodon: Steiner and Kabat 2001: 445; 2004: 611; Caetano *et al.*, 2006: 24, figs. 48-51.

Diagnosis: Slightly curved, slender and dorsoventrally compressed shell. Cream coloration. Ornamentation comprising growth lines. Circular cross section. Posterior opening with a limestone projection and a V-shaped slot.

Morphometric measurements: L (10 – 36,7mm); Max (1,1 – 2,5mm); Dmax (0 – 0); Arc (0,3 – 1,5mm); Larc (4,5 – 18,6mm); Ha (1,3 – 2,5mm); Wa (1,3 – 2,5mm); Hp (0,4 – 0,9mm); Wp (0,4 – 0,9mm).

Geographical Distribution: USA: Florida; Caribbean Sea: St. Martin (PILSBRY; SHARP, 1897); Barbados; Antigua; Honduras (HENDERSON, 1920); Brazil: Amapá to Rio de Janeiro, including Fernando de Noronha (PENNA, 1972; PENNA-NEME, 1974; SCARABINO, 1975, 1985, 1994; CABRAL & MELLO, 1994).

Comments: Penna-Neme (1974) recorded this species in the bay of Ilha Grande (Rio de Janeiro). Mello (1982) and Mello; Araújo (1990) mention it to the coast of Pernambuco, on the Boa Viagem, Piedade, Candeias and Barra de Jangadas beaches. Rios (1975) cites it for the states of Amapá, Pará, Maranhão, Ceará, Rio Grande do Norte, Alagoas, Rio de Janeiro and the Fernando de Noronha Archipelago.

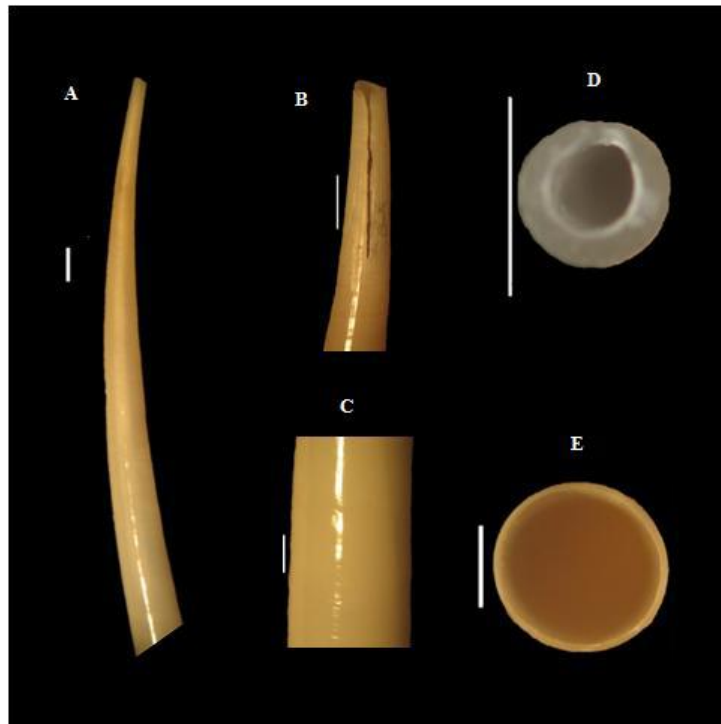


Figure 11 – *Fustiaria liodon* (Pilsbry & Sharp, 1897); A) Side view; B): Apical tube detail; C) Shell detail; D) Posterior opening; E) Anterior opening. The scale (white bar) equals 1 mm.

Family Gadilidae Stoliczka, 1868
Genus *Polyschides* Pilsbry & Sharp,
1897

Polyschides tetraschistus (Watson,
1879) (Fig. 12)

Siphonodentalium tetraschistus:
Watson 1879: 521; 1886: 15, pl. 2,
fig. 8a-d.

Siphonodentalium quadridentatum:
Dall, 1881: 36.

Cadulus incisus: Bush, 1885: 471,
pl. 45, fig. 20.

Cadulus quadridentatus: Dall, 1889:
428, pl. 27, fig. 5; Mathews & Rios
1969: 27; Rios 1969: 7; Scarabino
1980: 12, fig. 1b.

Cadulus tetradon (non Pilsbry &
Sharp, 1897): Castellanos 1970:
167, pl. 1, fig. 15.

Cadulus tetraschistus: Scarabino
1980: 12, fig. 1a.

Cadulus (Polyschides) tetraschistus:
Pilsbry & Sharp 1898: 148, pl. 23,
fig. 1; Henderson 1920: 97, pl. 17,
fig. 1; Lange de Morretes 1949: 52;
Turner 1955: 314; Penna-Neme
1974: 114; Scarabino 1975: 182, pl.
58, fig. 889; 1985: 202, pl. 73, fig.
1033; Cabral & Mello 1994: 42, figs.
15, 16.

Cadulus (Polyschides) tetraschistus
var. *quadridentatus*: Pilsbry & Sharp
1898: 149, pl. 25, fig. 1.

Cadulus (Polyschides) tetraschistus
var. *incisus*: Pilsbry & Sharp 1898:
149, pl. 25, fig. 1.

Cadulus (Polyschides)
quadridentatus: Henderson 1920:
97, pl. 17, figs. 2, 3; Maury 1922: 40;
Lange de Morretes 1949: 52; Turner
1955: 315; Warmke & Abbott 1961:
220, fig. 34c; Abbott 1974: 389, fig.
4545.

Cadulus (*Polyschides*)
quadridentatus *quadridentatus*:
Henderson, 1920: 99.

Cadulus (*Polyschides*)
quadridentatus *acompsus*:
Henderson 1920: 100, pl. 19, fig. 4.

Cadulus (*Polyschides*) *tetrodon* (non
Pilsbry & Sharp, 1897): Carcelles
1944: 468; Carcelles & Parodiz
1938: 262, pl. 1, fig. 1.

Polyschides tetraschistus; Díaz &
Puyana 1994: 257, pl. 71, fig. 1048;
Scarabino 1994: 310, pl. 107, fig.
1522; Redfern 2001: 191, pl. 76, fig.
785; Steiner & Kabat 2001: 448;
2004: 655; Absalão & de Paula
2004: fig. 1c; Absalão et al., 2005:
177, fig. 4; Caetano & Absalão
2005: figs. 5-8; Caetano et al., 2006:
32, figs. 64, 65.

Diagnosis: Slightly curved,
translucent shell. Maximum
diameter of the shell in the dorsal
region, near the anterior opening.
Subcircular cross section. Posterior
opening with four well-defined lobes.

Observations: Shell totally devoid
of ornamentation. With regard to the
size, Cabral and Mello (1994) refer
to copies with 7 mm length, which
was also confirmed by Almeida;
Oliveira (2000), whose studied
specimens ranged from 6.9 to 7.9
mm.

Morphometric measurements: L
(5,8 – 6,5mm); Max (0,8 – 1mm);
Dmax (1,1 – 1,5mm); Arc (0,3 –

0,3mm); Larc (2,9 – 3,2mm); Ha (0,6
– 0,8mm); Wa (0,7 – 1mm); Hp (0,4
– 0,5mm); Wp (0,5 – 0,6mm).

Geographical Distribution: USA:
North Carolina (HENDERSON,
1920; ABBOTT, 1974); Bermuda;
Cuba (TURNER, 1955); between
the Margaret Island and the
peninsula of Araya (PRINCZ, 1986);
Bahamas (REDFERN, 2001);
Colombia (DIAZ; PUYANA, 1994);
Brazil: Amapá to Rio Grande do Sul
(PENNA-NEME, 1974;
SCARABINO, 1975, 1985, 1994;
CAETANO; ABSALÃO, 2005),
Fernando de Noronha (WATSON,
1879) and Abrolhos (RIOS;
BARCELLOS, 1980); Uruguay:
River Plate (HENDERSON, 1920;
TURNER, 1955; SCARABINO,
1973); Argentina: Buenos Aires,
Quequen port (CARCELLES;
PARODIZ, 1938; TURNER, 1955),
San Matías Gulf (SCARABINO,
1973, 1975).

Comments: Lange de Morretes
(1949) points out the species to
Fernando de Noronha. Penna-Neme
(1974) collected the species in São
Paulo. Almeida & Oliveira (2000)
records it for Alagoas, coinciding
with the distribution of Cabral &
Mello (1994), where the authors
collected this species in
Pernambuco and Alagoas. Now
being confirmed for Fernando de
Noronha/PE and first recorded for
Atol das Rocas/RN.

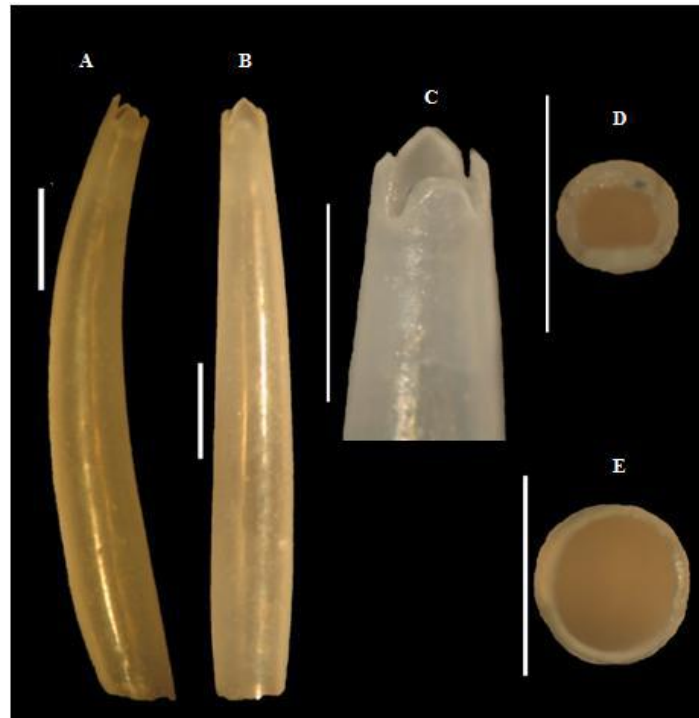


Figure 12 – *Polyschides tetraschistus* (Watson, 1879); A) Side view; B) Dorsal view; C) Detail of posterior region lobes; D) Posterior opening; E) Anterior opening. The scale (white bar) equals 1 mm.

CONCLUSIONS

- It was recorded for the first time in Fernando de Noronha the occurrence of species *Dentalium laqueatum*, *Paradentalium americanum*, *Antalis antillaris*, *Antalis disparile*, *Antalis infracta*, *Graptacme calamus* and *Graptacme perlonga*, and the presence of *Graptacme eborea* and *Polyschides tetraschistus* was confirmed;
- It was recorded for the first time in the Atol das Rocas Island the occurrence of *Graptacme perlonga*, *Fustiaria liodon* and *Polyschides tetraschistus*, and the presence of *Graptacme eborea* was confirmed.

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