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Monanchora brasiliensis sp. nov. (Poecilosclerida: Demospongiae), new crambeid from the Brazilian coast, south-western Atlantic, with monodentate anchorate chelae

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A new Brazilian endemic Monanchora *is described,* M. brasiliensis *sp. nov. It is clearly distinct from any other species in the genus by the monodentate shape of its anchorate isochelae, and its smooth, centrotylote and strongyloid microrhabds. Monodentate anchorate isochelae are relatively common, normally abundant, and represent the main diagnostic character for recognizing the new species, but microrhabds are usually rare and may be even absent.* Monanchora brasiliensis *sp. nov. can be further differentiated from other Atlantic species of the genus in eventually showing tetralobate branches and a skeleton formed by well-defined honey-coloured spongin fibres. The affinities of the new species with other crambeids and the nature of anchorate isochelae, microrhabds as well as the megascleres in defining* Monanchora *are discussed. An amended diagnosis for the genus is proposed.*

Keywords: taxonomy, Myxillina, Porifera, South America, Brazil

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INTRODUCTION

Monanchora Carter, 1883 is a genus of shallow water marine sponges belonging to the Crambeidae (Myxillina: Poecilosclerida: Demospongiae), defined by the presence of two categories of subtylostyles in combination with unguiferous anchorate isochelae, and by the absence of asterose desmas, which are present in *Crambe* Vosmaer, 1880 (van Soest, 2002). Additional microscleres may be present in *Monanchora*, such as sigmoid anchorate isochelae and characteristic acanthomicrorhabds, unique to Crambeidae (van Soest, 2002). The genus is represented by thirteen species occurring in the Caribbean Sea (e.g. van Soest, 1984, 1990; Zea, 1987), south-western Atlantic (Lerner *et al*., 2005; Muricy & Hajdu, 2006; Muricy *et al*., 2008), eastern Atlantic, western Indian Ocean, Indo-Pacific region, Western Australia (van Soest, 1990, 2002) and in the deep North Pacific (Lehnert *et al*., 2006; van Soest *et al*., 2011).

Crambe and *Monanchora* are rich sources of secondary metabolites named crambescidins, polycyclic guanidine alkaloids with antimicrobial (e.g. Muricy *et al*., 1993; Tavares *et al*., 1995; Hua *et al*., 2007; Seleghim *et al*., 2007), cytotoxic (Gallimore *et al*., 2005; Seleghim *et al*., 2007), antitumoural (Aron *et al*., 2004; Hua *et al*., 2007) and strong antiviral activities, particularly against HIV (e.g. Patil *et al*., 1995). Crambescidin alkaloids were also shown to be active in preventing degenerative diseases in the brain of mice (Suna *et al*., 2007). The strong chemical similarity between *C. crambe* (Schmidt, 1862) (type of *Crambe*), from the Mediterranean Sea and Eastern Atlantic, and *M. arbuscula* (Duchassaing & Michelloti, 1864), from the Tropical Western Atlantic (e.g. Tavares *et al*., 1994, 1995; van Soest *et al*., 1996), and the remarkable variability in the presence/absence of desmas observed in the first species (e.g. Maldonado *et al*., 1999) have been proposed as arguments for merging *Crambe* and *Monanchora* in a single genus *Crambe*, the senior synonym (van Soest, 1990, 2002; Hajdu *et al*., 1994; Tavares *et al*., 1995; Braekman *et al*., 2000). Nevertheless, due to the presence of asterose desmas in many species, both genera are currently maintained as separate (van Soest, 2002).

Monanchora arbuscula was up to now the only species in the genus recognized in the entire Western Atlantic region (van Soest, 1990, 2002) with a distribution stretching from the Gulf of Florida to Santa Catarina State, Southern Brazil (Lerner *et al*., 2005; Muricy *et al*., 2008). This is one of the

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most variable demosponges in regard to its morphology, with a complete spicular complement composed of two categories of subtylostyles, tridentate anchorate isochelae, sigmoid microscleres and acanthomicrorhabds (van Soest, 2002). Nevertheless, microscleres can be completely absent from this species or present only in the form of unique sigmoid anchorate isochelae (e.g. van Soest, 1984 as *M. barbadensis*; Zea, 1987 as *M. unguifera*; van Soest, 2002). A comprehensive revision of *M. arbuscula* is under preparation.

In this work we describe an atypical *Monanchora* endemic from the Brazilian coast with clear-cut diagnostic morphological characters associated with a variable habit as observed for other genera and species of Crambeidae (van Soest, 2002). Additionally, we discuss the nature of anchorate isochelae and microrhabds, as well as megasclere morphology in defining *Monanchora*.

MATERIALS AND METHODS

Specimens were collected by snorkelling, SCUBA diving or trawling on the coasts of, or off Rio Grande do Norte, Bahia, Espírito Santo, Rio de Janeiro, São Paulo and Santa Catarina States, between 1974 and 2011. The material examined is deposited in the Porifera collections of the following Brazilian institutions: Universidade Federal de Pernambuco (Recife, PE); Museu Nacional, Universidade Federal do Rio de Janeiro (Rio de Janeiro, RJ); and Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul (Porto Alegre, RS). Specimens, especially older materials, were fixed first in formalin and then transferred to 70% ethanol. Newer samples were put straight in ethanol 70–80%. Specimens were identified by examining the external morphology, internal anatomy and the shape and size of spicules following current procedures as described in Rützler (1978). Twenty to thirty spicules were measured for each category per specimen examined. Values are shown as: minimum–$\underline{\text{mean}}$–maximum (± standard deviation), length/width, unless stated otherwise.

Abbreviations used are: BMNH, The Natural History Museum, London, United Kingdom; MNRJ, Porifera Collection of Museu Nacional, Universidade Federal do Rio de Janeiro; MCNPOR, Porifera Collection of Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul; USNM, National Museum of Natural History, Smithsonian Institution, Washington, DC; UFPEPOR, Porifera Collection of Universidade Federal de Pernambuco; ZMA POR, Porifera Collection of Zoölogisch Museum, Universiteit van Amsterdam, Amsterdam, The Netherlands.

SYSTEMATICS

Phylum PORIFERA Grant, 1836
Class DEMOSPONGIAE Sollas, 1885
Order POECILOSCLERIDA Topsent, 1928
Suborder MYXILLINA Hajdu, van Soest & Hooper, 1994
Family CRAMBEIDAE Lévi, 1963
Genus *Monanchora* Carter, 1883

DIAGNOSIS

Crambeidae with a skeleton composed of one or two categories of subtylostyles in combination with spatuliferous or unguiferate anchorate isochelae, reduced sigmoid isochelae and microrhabds in a hymedesmioid to plumose arrangement. Frequently one or more categories of microscleres are completely absent. Pseudoastrose tylostyles or desmas absent. Anchorate isochelae may be mono- or tridentate, usually with a pair of well developed lateral fimbriae along the shaft. Microrhabds are usually pointed and spined, or smooth, strongyloid and centrotylote. Subdermal channels are characteristically white or yellow-lined, or indistinguishable from the rest of the body. Spongin scarce or forming well defined and robust fibres (slightly emended from van Soest, 2002: 553).

Type species: *Monanchora clathrata* Carter, 1883. Type locality: Fremantle, Western Australia (van Soest, 2002).

Monanchora brasiliensis sp. nov.
(Figures 1, 2A–F, 3A–C, 4A–G; Table 1)

DIAGNOSIS

Monanchora encrusting or arborescent. Arborescent specimens eventually exhibit tetralobate branches with lobes almost symmetrically disposed in opposition to each other (in a cross-like pattern). Colour carmine red or orange in life and pale beige or dark brown after fixation in ethanol. Ascending spongin fibres with a well defined contour and a honey colour are always evident, cored and echinated by choanosomal subtylostyles ending in tufts of ectosomal subtylostyles at the surface. Ectosomal subtylostyles frequently ending in a cluster of spines at the apex (spines visible only under scanning electron microscopy), anchorate isochelae have a single developed tooth in each extremity, and microrhabds, when present, are smooth, centrotylote and strongyloid. Sigmoid isochelae are absent.

TYPE MATERIAL

Holotype: São Paulo State, Taubaté (Ilhabela) (23°54′39.7″S 45°27′35.4″W): MNRJ 173, 19 m depth, E. Hajdu coll., 16 January 1996.

Paratypes: Rio Grande do Norte State (04°47′17.1″S 36°44′47.8″W): UFPEPOR 223, 15–16 m depth, 'Martins Filho' trawler coll., 24 November 2003; (05°01′57.2″S 36°18′18.7″W): UFPEPOR 401, 6–9 m depth, 'Martins Filho' trawler coll., 5 June 2004. Bahia State, Nova Viçosa (18°09′S 39°15′W): MNRJ 673, 19 m depth, RV 'Riobaldo' coll., 3 April 1974. Espírito Santo State (18°50′S 39°35′W): MNRJ 693, unknown collector, 5 April 1974. Rio de Janeiro State, Cabo Frio, Comprida island (22°52′23.6″S 41°57′17.2″W): MNRJ 14205, 7.5 m depth, E. Hajdu coll., 29 March 2011. São Paulo State, Praia do Perequê (Ilhabela): MNRJ 31, A.L. Castro coll., 12 April 1963; Saco do Frade (Ilhabela) (23°54′58.3″S 45°27′32.8″W): MNRJ 150, 24 m depth, E. Hajdu coll., 16 January 1996; Taubaté (Ilhabela) (23°54′39.7″S 45°27′35.4″W): MNRJ 174, 19 m depth, E. Hajdu coll., 16 January 1996; Saco do Eustáquio (Ilhabela) (23°50′13.7″S 45°14′17.2″W): MNRJ 248, 12 m depth, E. Hajdu coll., 18 January 1996. Santa Catarina State, Deserta Island (27°16′30″S 48°20′00″W): MCNPOR 3424, 14 m depth, C.B. Lerner coll., 14 February 1997.

COMPARATIVE MATERIALS EXAMINED

Monanchora arbuscula (Duchassaing & Michelotti, 1864): microscopic slide of dissociated spicules and thick sections of the lectotype of *Pandaros arbusculum* Duchassaing &

Michelotti, 1864 (ZMA POR 1728), US Virgin Islands, St Thomas, unknown collector and date of collection.

Monanchora clathrata Carter, 1883: microscopic slide of a thick section of the holotype BMNH 1973.12.5.1, western coast of Australia, Fremantle, G. Clifton coll., unknown date of collection.

Monanchora dianchora (Bergquist, 1965): *Neofolitispa dianchora sensu* Bergquist, 1965 (USNM 24009), Micronesia, Republic of Palau, Iwayama Bay, western coast of Kogai Hanto, 2.5–7.6 m depth, unknown coll., 16 August 1955. Holotype of *Folitispa pingens* de Laubenfels, 1954 (USNM 22924), Iwayama Bay, near Koror, 2 m depth, collected by divers, 1 September 1949.

Monanchora laevissima (Dendy, 1922): microscopic slides of dissociated spicules and thick sections of the holotype of *Hymedesmia laevissima* Dendy, 1922 (BMNH 1931.1.7.69a, slides labelled as R.N. CXXV. 6), Republic of Mauricio, Mauricio's Islands, western Indian Ocean, 180 m depth, unknown coll., 23 August 1905. Paratype of *Hymedesmia laevissima* (BMNH 25.11.1.277, labelled as R.N. CXXVII. 5) from the same locality, >180 m depth, Gardiner coll., 23 August 1905.

Monanchora unguiculata (Dendy, 1922): microscopic slides of dissociated spicules and thick section of the holotype (BMNH 1921.11.7.47a, slides labelled as *Amphilectus* (?) *unguiculatus* Dendy, 1922 – Sealark sponges, R.N. CXIII. 10), British Territory of the Indian Ocean, Egmont Island, collector and date of collection unknown.

DESCRIPTION

Thinly encrusting or arborescent sponge with various branches emitted from a short peduncle less than 1 cm in width, or projected directly from a thinly encrusting base (Figures 1, 2A–F). Branches are normally irregular or eventually tetralobate, with lobes projected as longitudinally disposed ridges in opposition to each other, with numerous small blunt projections at the margins (Figure 2A–C). Encrusting specimens less than 1 cm thick and up to 5 cm wide. The holotype is thinly encrusting on a fragmented shell, measuring 1.9 × 1.3 cm in area and approximately 1 mm thick. Arborescent specimens up to 8 cm tall and 6 cm wide, each branch measuring 1–1.8 cm in diameter. Lobes are 3 mm wide. Oscules circular 0.9–1.8 mm wide in encrusting specimens. Subdermal channels are not evident. Colour carmine red (Figure 1) or orange in life and pale beige or dark brown after fixation in ethanol (Figure 2A–F). Surface even and smooth between branches, to irregular and rugose at the extremities of arborescent specimens (Figure 2D); and smooth, even and microhispid in encrusting specimens (Figure 2E, F). Arborescent specimens are soft and elastic at the distal portion of the branches; tough, less compressible near the base of the branches; and almost hard at the peduncle, when present. Encrusting specimens are soft and elastic.

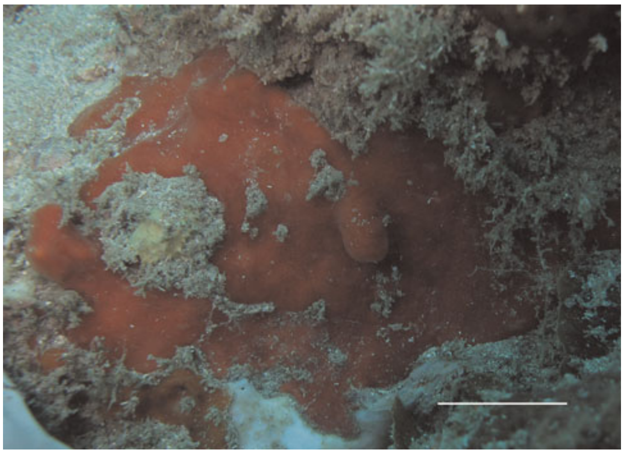

Fig. 1. *Monanchora brasiliensis* sp. nov. *in situ* (Paratype MNRJ 14205), Comprida Island, Cabo Frio, Rio de Janeiro State. Scale bar = 2 cm.

Skeleton

Plumose skeleton in arborescent specimens (Figure 3A, B), or hymedesmioid in thinly encrusting specimens (Figure 3C, D). Plumose skeleton formed by ascending spongin fibres, 40–125 µm thick, cored by unispicular or paucispicular tracts of choanosomal subtylostyles ending in tufts of ectosomal subtylostyles near the sponge surface (Figure 3A, B). Hymedesmioid skeleton formed by ascending spongin fibres cored by a single choanosomal subtylostyle, ending in tufts of ectosomal subtylostyles near the sponge surface (Figure 3C, D). Ectosomal and choanosomal subtylostyles are also echinating the fibres (Figure 3B), and ectosomal subtylostyles are tangentially disposed at the base and at the surface of the sponge (Figure 3C, D). Spongin is always evident in the form of a thin sheet at the sponge base arising as clearly delineated and robust fibers of a honey color (Figure 3B, D). Anchorate isochelae scattered or concentrated in the ectosome, and scattered in the choanosome (Figure 3B). Microrhabds, when present, scattered in the ectosome and in the choanosome.

Spicules

Megascleres in two categories (Table 1): choanosomal subtylostyles, almost styles, thick, fusiform, straight or slightly curved, with an elongate tyle defined by a slight constriction near the base and a pointed apex (Figure 4A, C). Ectosomal subtylostyles thin, straight or slightly curved (Figure 4B, D) sharply pointed or ending in a cluster of spines at the apex (Figure 4E). Microscleres (Table 1): anchorate isochelae spatuliferous, monodentate, with a single well developed tooth in each extremity, without lateral teeth, and with a pair of lateral fimbriae along the entire length of its shaft (Figure 4F). Microrhabds smooth, straight, strongylote and centrotylote, normally bearing one or two tyles along the axis (Figure 4G). Anchorate isochelae are always present and are normally abundant, but may also be rare and the microrhabds are relatively rare and may be absent.

ECOLOGY

Monanchora brasiliensis sp. nov. is a rare species on the north-east and southern Brazilian coast, but is relatively common on the south-eastern coast of Brazil, particularly in Rio de Janeiro and São Paulo States. It is distributed in tropical and subtropical waters, attached to calcareous algae in coral reef regions, encrusting rocky overhangs, or bivalve shells in muddy bottom sediments. Bathymetric distribution: 6 m (Rio Grande do Norte) to 24 m depth (Saco do Frade, Ilhabela, São Paulo).

ETYMOLOGY

The specific epithet *brasiliensis* is derived from the new species' distribution along a vast sector of the Brazilian coast.

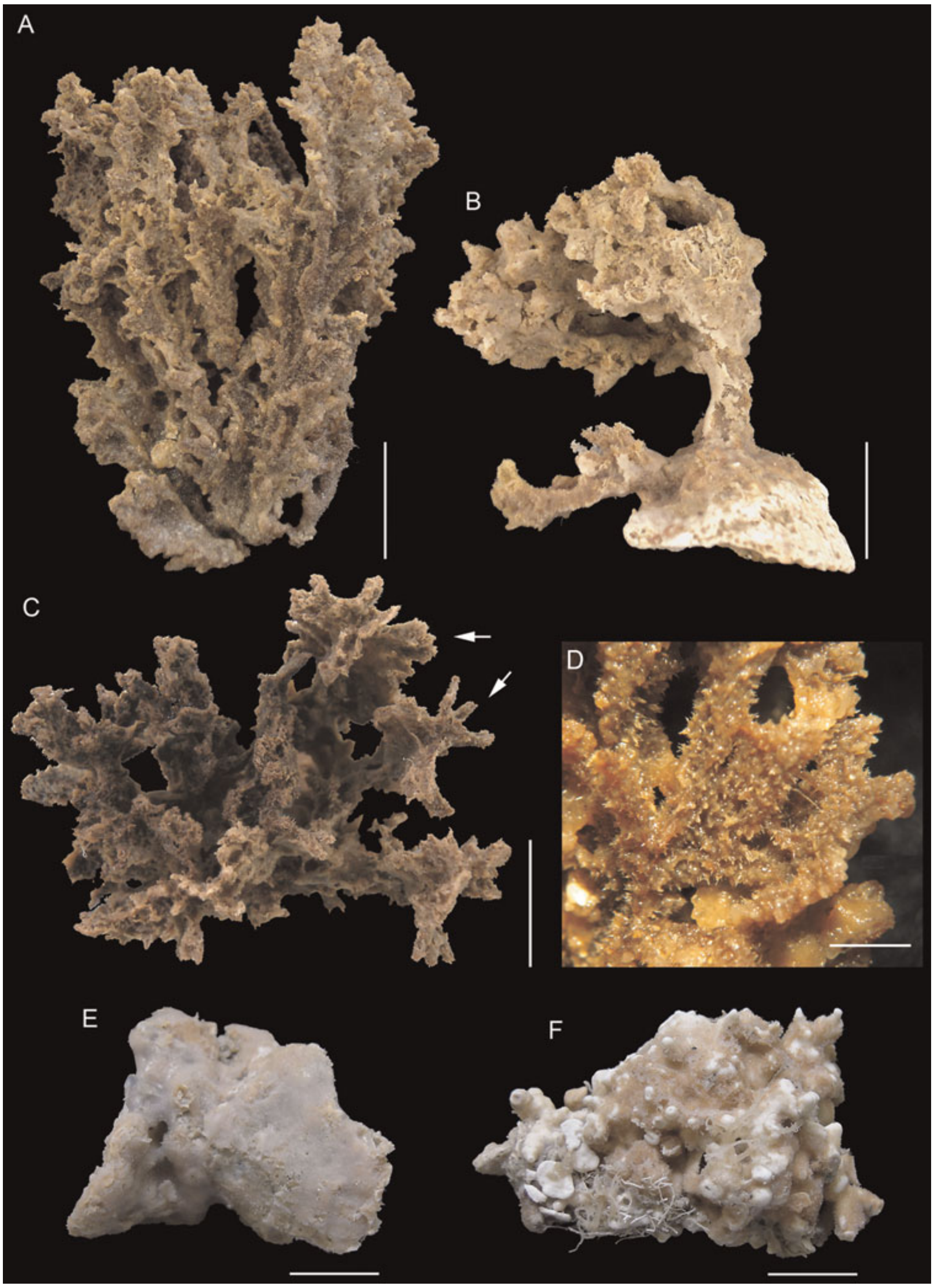

Fig. 2. *Monanchora brasiliensis* sp. nov., preserved specimens: (A, B) arborescent specimens; (C) upper view of the Paratype MNRJ 693 (arrows point to tetralobate branches); (D) hispid surface in detail; (E, F) encrusting specimens; (A, C, D) Paratype MNRJ 693; (B) Paratype MNRJ 673; (E) Paratype UFPEPOR 401; (F) Paratype UFPEPOR 223. Scale bars: A–C = 2 cm; D = 5 mm; E, F = 1 cm.

GEOGRAPHICAL DISTRIBUTION

Brazil, off Mossoró (Rio Grande do Norte), Nova Viçosa (Bahia), Barra Nova (Espírito Santo), Ilhabela (São Paulo) and Deserta island (Santa Catarina).

DISCUSSION

Monanchora brasiliensis sp. nov. is the only species in Crambeidae with monodentate anchorate isochelae and smooth microrhabds. Technically speaking these chelae might be described as palmate due to their single frontal tooth in each termination, sided by two lateral alae completely fused to the shaft, albeit rudimentary in shape (Hajdu *et al.*, 1994). Nevertheless, the observed co-occurrence in the new species of two categories of subtylostyles and microrhabds with the atypical chelae in a plumose arrangement suggests its appropriate placement in *Monanchora* (van Soest, 1990, 2002). As a consequence, the monodentate anchorate chelae are more likely a regression from the tridentate transformation series proposed by Hajdu *et al.* (1994), which postulates arcuate and anchorate chelae to have at least three clearly formed alae on each side of the chela. The lateral fused alae observed in the atypical chelae described here are henceforth

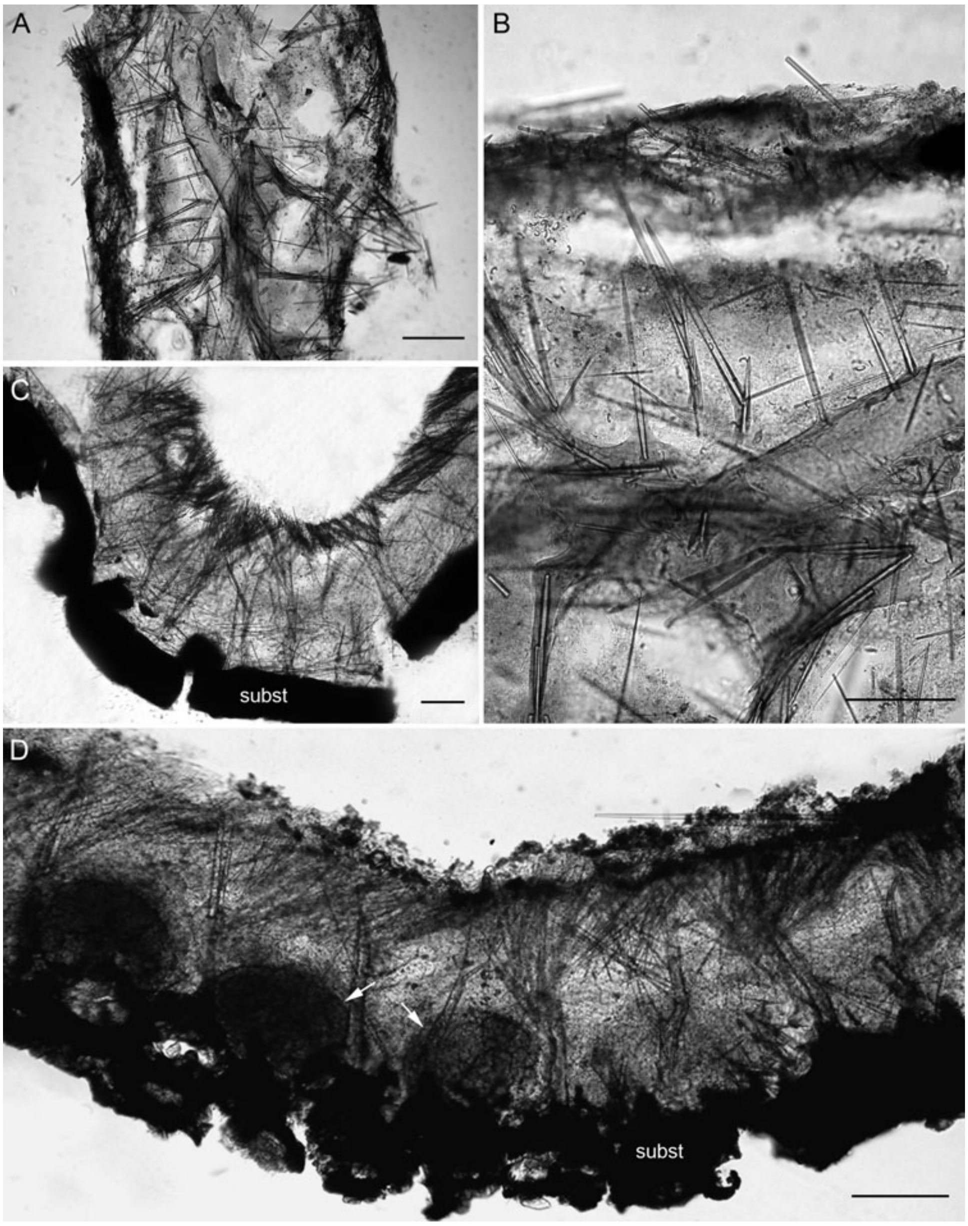

Fig. 3. Internal anatomy of *Monanchora brasiliensis* sp. nov.: (A) plumose skeleton in cross-section of a branch; (B) fibre echinated by choanosomal subtylostyles and anchorate isochelae scattered in the choanosome in detail; (C, D) hymedesmioid skeleton, arrows point to eggs or embryos. Note the well marked fibres, even in the hymedesmioid skeleton; (A, B) Paratype MNRJ 693; (C) Paratype UFPEPOR 223; (D) Paratype UFPEPOR 401; subst, substrate. Scale bars: A, C = 300 μm; B, D = 200 μm.

interpreted as well developed fimbriae of a typical anchorate isochelae as observed for other Myxillina species.

The microrhabs observed in the new species show some affinities with the ones observed in *Discorhabdella* spp. (Crambeidae) also; i.e. a possible homology between the two concentrations of spines observed near the extremities or in the middle part of the shaft of microrhabds in some *Discorhabdella* spp. (i.e. *D. incrustans*; Maldonado & Uriz, 1996, figure 6D; and *D. urizae*; Maldonado *et al.*, 2001, figure 2n–p) and the tyles in the microrhabds of *M. brasiliensis* sp. nov. Furthermore, the presence of ectosomal subtylostyles spined at the apex in the new species strenghtens the argument by van Soest (2002) of a possible homology of these crambeid ectosomal subtylostyles and the terminally spined tornotes of some myxillid species (Uriz & Maldonado, 1995; Maldonado & Uriz, 1996; van Soest, 2002; Esteves *et al.*, 2007). Other species of *Crambe* and *Monanchora* possessing the same character are *C. tuberosa* Maldonado & Benito, 1991 and *M. laevissima* Dendy, 1922 (van Soest, 2002), and to a lesser degree, *Crambe chilensis* Esteves *et al.*, 2007, *C. panamensis* Maldonado *et al.*, 2001 (Esteves *et al.*, 2007) and the four known recent *Discorhabdella* spp. (e.g. Maldonado & Uriz, 1996; Maldonado *et al.*, 2001; Esteves *et al.*, 2007).

Van Soest (2002) defined *Monanchora* as 'Crambeidae without pseudoastrose spicules or desmas; microscleres spatulate or unguiferate anchorate isochelae (may be absent), reduced sigmoid chelae (may be absent), and spined microxeas (may be absent). In life, the surface has characteristic white- or yellow-lined veinal channel pattern.' Comparison

Table 1. Spicule dimensions of *Monanchora brasiliensis* sp. nov. Values: minimum–mean–maximum (± SD) in micrometres. Ectosomal and choanosomal subtylostyles: length/width; anchorate isochelae: total length/claw length. N = 30, except for the width of subtylostyles: N = 20.

Specimen	Ectosomal subtylostyle	Choanosomal subtylostyle	Anchorate isochelae	Microrhabds
Holotype MNRJ 173	132.3–302.5–485.1 (±113.9)/ 2.6–5.0–7.8 (±1.4)	176.4–336.3–578.2 (±116.7)/ 7.8–11.9–15.7 (±2.0)	14.4–18.3–23.5 (±2.0)/ 3.9–4.8–5.2 (±0.6)	15.7–22.8–28.7 (±2.8)
Paratype MCNPOR 3424	152.0–264.4–408.5 (±78.6)/ 2.3–4.0–4.6 (±1.0)	171.0–323.0–465.5 (±98.5)/ 6.9–7.8–11.5 (±1.4)	13.8–18.6–23.0 (±2.2)/ 5.0–5.2–6.0 (±0.6)	—
Paratype MNRJ 31	98.0–230.4–347.9 (±64.5)/ 3.9–4.8–6.5 (±0.8)	—	14.4–16.2–18.3 (±1.0)/ 3.9–4.8–5.2 (±0.6)	—
Paratype MNRJ 150	147.0–269.3–426.3 (±84.7)/ 3.9–5.5–7.8 (±1.2)	196.0–343.5–573.3 (±115.3)/ 13.1–15.7–19.6 (±1.9)	18.3–20.0–23.5 (±1.6)/ 5.2–6.2–7.8 (±0.7)	13.1–24.1–28.7 (±3.3)
Paratype MNRJ 174	205.8–325.5–450.8 (±80.2)/ 3.9–5.9–9.1 (±1.2)	176.4–358.8–646.8 (±125.6)/ 9.1–13.6–18.3 (±2.6)	17.0–19.2–23.5 (±1.5)/ 3.9–5.3–6.5 (±0.7)	—
Paratype MNRJ 248	125.0–199.3–230.0 (±20.0)/ 2.5–3.3–5.0 (±0.7)	181.3–224.1–284.2 (±26.0)/ 6.5–9.3–13.1 (±2.0)	~20.0/ ~5.0	—
Paratype MNRJ 673	232.8–315.7–402.6 (±49.1)/ 2.4–3.6–4.8 (±0.9)	135.8–201.4–291.0 (±48.7)/ 4.8–8.7–12.0 (±1.9)	14.4–16.4–19.2 (±1.3)/ 4.0–5.0–4.5 (±0.7)	—
Paratype MNRJ 693	261.9–372.0–455.9 (±50.6)/ 2.4–4.3–7.2 (±1.1)	174.6–254.5–349.2 (±48.4)/ 9.6–11.2–12.0 (±1.1)	14.4–17.0–19.2 (±1.6)/ 3.6–4.8–6.0 (±0.5)	—
Paratype UFPEPOR 223	184.3–264.6–358.9 (±41.9)/ 2.4–4.0–6.0 (±0.9)	111.6–227.6–334.7 (±53.5)/ 6.0–9.2–12.0 (±1.8)	13.2–14.8–18.0 (±1.4)/ 3.6–4.7–4.8 (±0.4)	—
Paratype UFPEPOR 401	164.9–321.3–451.1 (±77.6)/ 2.4–4.2–6.0 (±1.1)	179.5–290.4–494.7 (±74.3)/ 7.2–10.7–15.6 (±2.5)	12.5–14.5–17.0 (±1.2)/ 3.5–4.6–6.0 (±0.5)	—

of the new species with the types or additional material of *M. clathrata* (type species of *Monanchora*), *M. arbuscula*, *M. dianchora*, *M. laevissima* and *M. unguiculata* has confirmed the morphological variability observed in the genus and revised by van Soest (2002). Their skeletal elements include two categories of subtylostyles with distinct shape and dimensions, one or two categories of tridentate anchorate isochelae, sigmoid anchorate isochelae (like sigmas) and

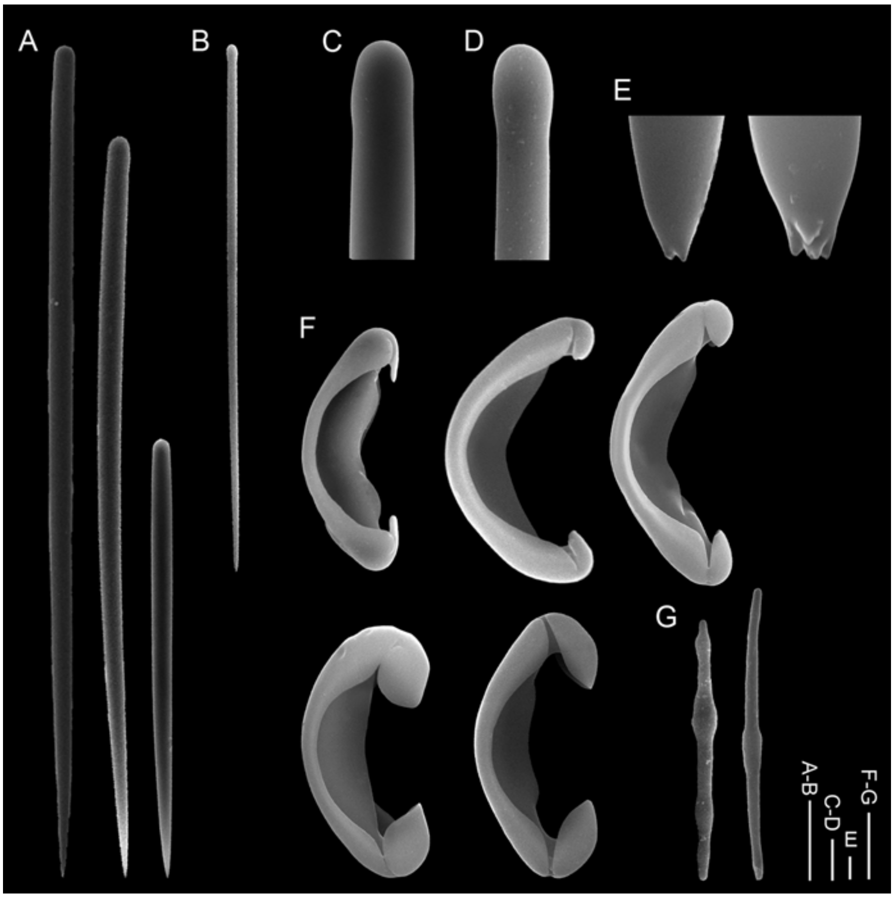

Fig. 4. Spicules of *Monanchora brasiliensis* sp. nov. (holotype): (A) choanosomal subtylostyles; (B) ectosomal subtylostyle; (C) detail of the base of a choanosomal subtylostyle; (D) detail of the base of an ectosomal subtylostyle; (E) detail of the apex of ectosomal subtylostyles; (F) monodentate anchorate isochelae; (G) strongyloid smooth centrotylote microrhabds. Scale bars: A, B = 50 μm; C, D, F & G = 5 μm; E = 1 μm.

spined microrhabds (acanthomicrorhabds) (cf. van Soest, 1990, 2002), but no monodentate anchorate isochelae and smooth microrhabds.

We propose here a slightly modified definition for the genus, to include the new species with monodentate chelae, smooth microrhabds and no whitish or yellowish coloured subdermal channels. The latter character is not mandatory for the identification of a *Monanchora*, as it was only precisely described for *M. arbuscula* (e.g. Zea, 1987 as *M. unguifera*; van Soest, 1984 as *M. barbadensis*; van Soest, 2002) and *M. dianchora* (Bensemhoun *et al.*, 2007), and this character is known to be quite variable (e.g. Muricy *et al.*, 2008) and of subjective interpretation in the former species. The variation in the shape of anchorate isochelae and microrhabds are herein admitted in *Monanchora*, justified by the combination of these microscleres with the two categories of subtylostyles present in *M. brasiliensis* sp. nov., unique to *Monanchora* (van Soest, 1990, 2002).

The new species can be compared to *M. arbuscula* (Zea, 1987 as *M. unguifera*; van Soest, 1984 as *M. barbadensis*; van Soest, 2002) and *M. dianchora* (de Laubenfels, 1935; de Laubenfels, 1954 as *Folitispa pingens*; Bergquist, 1965 as *Neofolitispa dianchora*; van Soest, 2002) in the variability of its growth form, from encrusting to arborescent, and in the frequently marked similarity of ectosomal and choanosomal subtylostyles' overall morphology. The variability in the presence/absence of microrhabds shown by the new species (Table 1) is also observed in other species of *Monanchora* (*M. arbuscula*; van Soest, 1990), *Crambe* and *Discorhabdella* (e.g. Uriz & Maldonado, 1995; Maldonado & Uriz, 1996; van Soest, 2002; Esteves *et al.*, 2007). Nevertheless, the characteristic monodentate anchorate isochelae are usually common in the new species, and the variability in the number of categories of subtylostyles and presence/absence of microrhabds are not related to its different growth forms, which might suggest we were dealing with a species complex instead.

Monanchora brasiliensis sp. nov. in its arborescent growth form can eventually be differentiated from other erect crambeid species (e.g. *Crambe erecta* Pulitzer-Finali, 1993, *M. arbuscula* and *M. dianchora*) in showing tetralobate branches, each branch composed of four lobes almost symmetrically disposed in a cross-like pattern in transverse section. The overall shape of the new species in its branching growth form resembles a *Ptilocaulis* species with its scopiform branches and hispid texture, as described by Alvarez *et al.* (1998). The new species can be distinguished also from other Atlantic species in the genus, i.e. *M. arbuscula* and *M. stocki* van Soest, 1990, in presenting a robust skeleton made up of well defined honey coloured spongin fibres (even in encrusting specimens with a hymedesmioid skeleton) and associated tough consistency and fibrous texture. In life *M. brasiliensis* sp. nov. can be differentiated by its constant lack of white or yellow-lined subdermal channels, a common feature in *M. arbuscula* (e.g. van Soest *et al.*, 2002; Hajdu *et al.*, 2011). Regarding its spicule assemblage, in addition to the presence of monodentate anchorate isochelae and smooth microrhabds, *M. brasiliensis* sp. nov. can be differentiated from *M. arbuscula* and *M. stocki* by showing ectosomal subtylostyles spined at the apex and by the absence of sigmoid anchorate isochelae (usually present in *M. arbuscula*; e.g. van Soest, 1984, 1990, 2002).

Monanchora brasiliensis sp. nov. is the third species of the genus recognized in the Atlantic Ocean, but as exemplified in this work, the biodiversity of *Monanchora* on the Brazilian coast is probably underestimated and likely to be enhanced with accurate morphological studies of encrusting as well as larger specimens deposited in museum collections housed in Brazil and other countries.

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