

Two new *Mycale (Naviculina)* Gray (Mycalidae, Poecilosclerida, Demospongiae) from the Paulista Biogeographic Province (Southwestern Atlantic)

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ABSTRACT. Two new *Mycale (Naviculina)* Gray, 1867 are described, *M. (N.) arcuiris* sp. n. and *M. (N.) purpurata* sp. n., from the Paulista Biogeographic Province (Southwestern Atlantic). They both occur in the São Sebastião Channel area (São Paulo state coast), the former extending its known distribution to “Arvoredo Marine Biological Reserve” (Santa Catarina state coast). The new species are sibling and differ from each other by a series of very small traits, the most notorious being live-color: yellow, orange, green, white, grey and beige, always light, in *M. (N.) arcuiris* sp. n. and bordeaux in *M. (N.) purpurata* sp. n. Both species are compared with other known *M. (Naviculina)*. *Mycale (Aegogropila) hentscheli* Sim & Lee, 2001 is transferred to subgenus *Naviculina* and given a new name, viz. *M. (N.) chungae* nom. n., as the specific name was preoccupied by *M. (Carmia) hentscheli* Bergquist & Fromont, 1988. An identification key for all the species hitherto assigned to the subgenus is provided. **KEY WORDS.** Porifera, taxonomy, Southwestern Atlantic, *Mycale*, *Naviculina*

GRAY (1867) erected *Naviculina* for sponges with “boat-shaped defensive spicules”, the “naviculoid spiculum” *sensu* BOWERBANK (1864). The name has been overlooked ever since, until HOOPER & WIEDENMAYER (1994), while revising the list of Australian sponges, considered *Naviculina* a valid taxon within the Mycalidae, and transferred *Arenochalina* Lendenfeld, 1887 to its junior synonymy. This view has been contested by HAJDU (1999), who argued that both taxa are diagnosed by distinct characters, thus deserving the status of valid, natural species groups within *Mycale*. Two new species pertaining to *Mycale (Naviculina)*, the first records from the western Atlantic – Paulista Biogeographic Province (COELHO & SANTOS 1980; PALACIO 1982), are described here. An identification key for all the known *M. (Naviculina)* is provided.

MATERIAL AND METHODS

The collected samples were gathered through scuba diving along the coasts of the states of São Paulo and Santa Catarina, during an ongoing effort to survey the marine sponge biodiversity in these areas (Fig. 1). The São Sebastião Channel area (including the surroundings of São Sebastião Island) was sampled qualitatively

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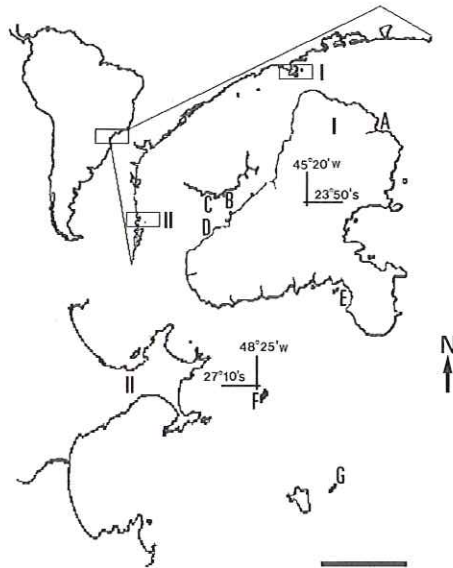


Fig. 1. Map of South America indicating the southeastern/southern Brazilian region (Southwestern Atlantic). In detail, the localities and collection stations where specimens came from: (I) Ilha de São Sebastião, São Paulo: (A) Saco do Poço, (B) Ponta do Jarobá, (C) Itaçuce Islet, (D) small embayment between Veloso and São Pedro, (E) Garoupa Rock; (II) Porto Belo, Santa Catarina: (F) Ilha da Galé, (G) Parcel da Ilha Deserta. Scale bar 10 km.

from 0 to 27 m depth. Specimens are deposited in the Porifera Collection of the Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ). Santa Catarina state specimens were collected at the “Arvoredo Marine Biological Reserve”, between 4 and 18.8 m depth, and are deposited in the Porifera Collection of Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul (MCNPOR). Specimens were photographed *in situ*, and microscopic preparations made according to MOTHES-DE-MORAES (1985) e HAJDU (1994). Scanning electron microscopy was done partly in a Jeol JSM-35 from the ZMA, University of Amsterdam (Amsterdam, The Netherlands); partly in a Zeiss DSM-940 from the IB-USP (São Paulo, Brazil); partly in a Jeol JSM-5310 from the Departamento de Microscopia Eletrônica, UFRJ (Rio de Janeiro, Rio de Janeiro); and partly in a Jeol JSM-5200 from the MCN-FZB (Rio Grande do Sul, Brazil). The methodology for the obtention of SEM preparations follows CARBALLO & HAJDU (1998). Spicule micrometries given in the text refer to minimum length – mean – maximum length/minimum width – mean – maximum width, unless stated otherwise.

Comparative material

Naviculina cliftoni Gray, 1867 (BMNH 1877.5.21.270, type slide – Freemantle, Australia).

Mycale diastrophochela Lévi, 1969 (MNHN-LBIM-D-CL 1447, holotype – Vema Seamount, SE Atlantic).

Mycale cleistochela Vacelet & Vasseur, 1971 (MNHN-LBIM-D-VV 36, holotype – Tulear, Madagascar); MNHN-LBIM-D-VV 35 (det. J. Vacelet & P. Vasseur, as ssp. *flagellifer* – Tulear, Madagascar).

Mycale aff. *peculiaris* Pulitzer-Finali, 1996 – ZMA 8512 (det. E. Hajdu & R.W.M. van Soest – Sumbawa, Indonesia); ZMA 8896, 8897, 8917 (det. E. Hajdu & R.W.M. van Soest – Tarupa Kecil, Indonesia).

Mycale obscura (CARTER 1882; BMNH 1881.10.21.318, holotype – Torres Str., Australia), BMNH 1881.10.21.318 (det. S. Ridley – Thursday Island, Torres Straits); BMNH 1925.11.1.732 (det. M.E. Shaw – Tasmania, Australia); SMF 1041 (det. E. Hentschel – Aru, Indonesia); ZMA 1602 (det. M. Burton – Indonesia); ZMH-S 1670 (det. E. Hentschel – Shark's Bay, Australia).

Abbreviations used are: BMNH (The Natural History Museum, London, United Kingdom), MCN (Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre, Brazil), MCNPOR (MCN – Porifera Collection), MNHN-LBIM-D-CL (Muséum d'Histoire naturelle, Paris, France – Laboratoire de Biologie des Invertébrés Marins et Malacologie – *leg.* – Claude Lévi), MNHN-LBIM-D-VV (Muséum d'Histoire naturelle, Paris, France – Laboratoire de Biologie des Invertébrés Marins et Malacologie – *leg.* – Jean Vacelet and Pierre Vasseur), MNRJ (Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil), SMF (Senckenberg Museum, Frankfurt am Main, Germany), ZMA (Zoölogisch Museum, Amsterdam, The Netherlands), ZMH-S (Zoologisch Museum Hamburg – Schwämme, Hamburg, Germany).

SYSTEMATICS

Poecilosclerida Topsent, 1928

Mycalina Hajdu, van Soest & Hooper, 1994

Mycalidae Lundbeck, 1905

Mycale Gray, 1867

Diagnosis. Mycalidae with anisochelas.

Mycale (*Naviculina*) Gray, 1867

Diagnosis. *Mycale* with naviculichelae (palmate anisochelae with a complete or nearly so fusion of both frontal alae, falx markedly expanded along the shaft, and lateral alae of the head projecting backward and upward).

Remarks. HAJDU (1999) recognized five species worldwide assignable to *M. (Naviculina)*, viz. *M. (N.) cliftoni* Gray, 1867 (type species), from Australia; *M. (N.) obscura* (Carter, 1882), from Indonesia and Australia; *M. (N.) diastrophochela* Lévi, 1969, from the Vema Seamount (SE Atlantic); *M. (N.) cleistochela* Vacelet & Vasseur, 1971, from Madagascar; and *M. (N.) peculiaris* Pulitzer-Finali, 1996, from Papua New Guinea. The latter species is here transferred to *Mycale* (*Aegogropila*), thus stressing the reticulated nature of its ectosomal architecture and reinterpreted

distinctive features of the morphology/ontogeny of its modified anisochelae, which do not conform to the pattern seen in proper naviculichelae *sensu* HAJDU (1999). A new term is here proposed for the anisochelae in *M. (A.) peculiaris*, viz. peculichelae. HAJDU's (1999) interpretation of a naviculichela is given in the diagnosis above, and found to be not entirely conforming to the chelae present in *M. peculiaris*, according both to illustrations presented by PULITZER-FINALI (1996) and on the study of additional material from the Zoologisch Museum Amsterdam (ZMA 8512, 8896, 8897, 8917), provisionally identified as *M. aff. peculiaris*. The modified chelae in *M. peculiaris* are tentatively defined below, pending a more thorough scrutiny of its morphology under SEM: palmate anisochelae with a complete or nearly so fusion of both frontal alae, falx markedly expanded along the shaft and frequently spined on its upper portion, lateral alae of the head projecting forward and upward.

Mycale (A.) hentscheli Sim & Lee, 2001, from Korea, is transferred to *M. (Naviculina)*. The name was preoccupied by *M. (Carmia) hentscheli* (Bergquist & Fromont, 1988, as *C. hentscheli*), which characterises a secondary homonymy. A new name is proposed here for the Korean material described by SIM & LEE (2001), viz. *M. (N.) chungae nomen novum*, in recognition of Prof. Chung Ja Sim's notorious contribution to our knowledge of Korean sponges. This taxonomic decision is taken in agreement with article 53.3 in ICZN (1999).

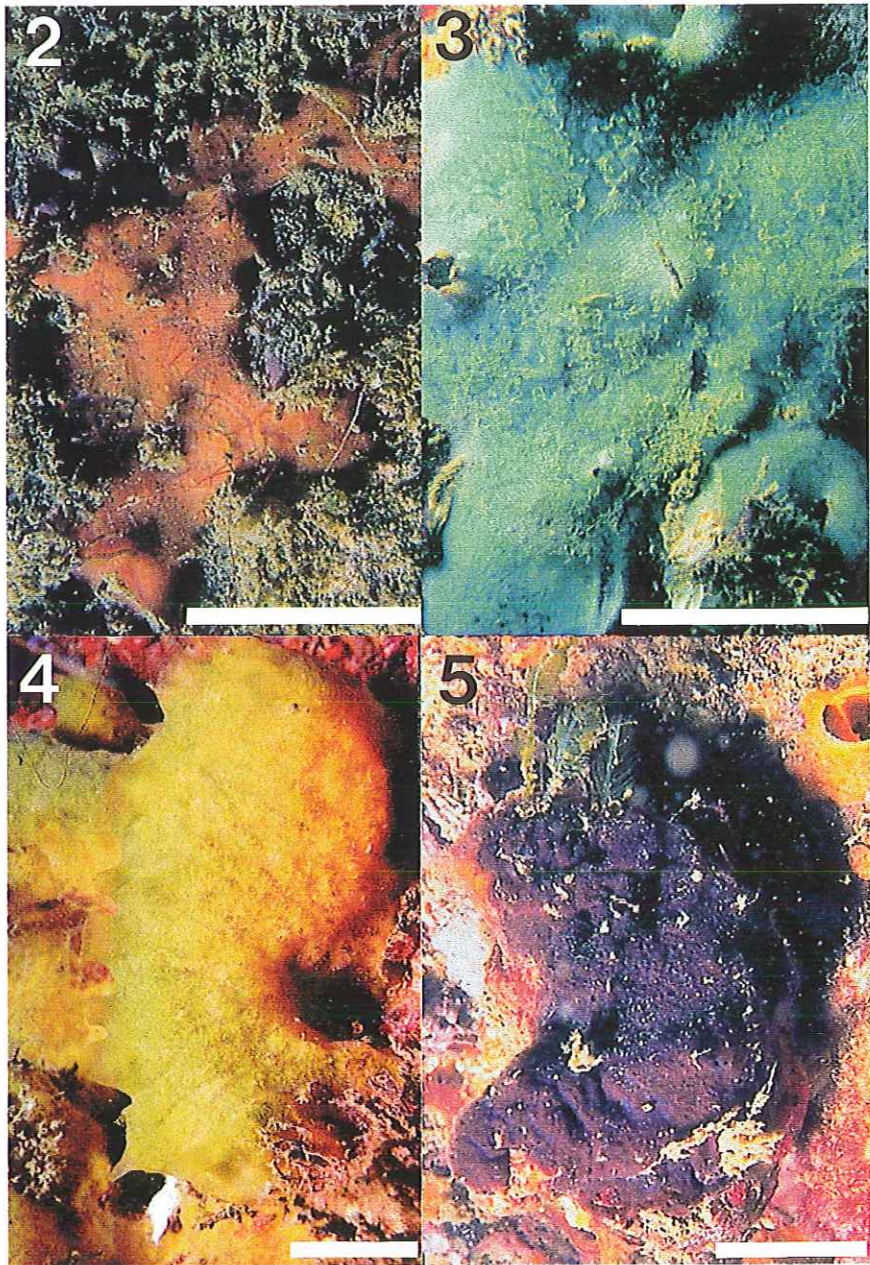
Mycale (Naviculina) arcuiris sp. n.

Figs 2-4, 6-15, Tab. I

Material studied. Holotype, BRAZIL, *São Paulo*: MNRJ-773, Saco do Poço (23°45.658'S-45°14.862'W, Ilha de São Sebastião, Ilhabela), 8m depth, E. Hajdu *leg.*, 09.I.1996. Paratypes: BRAZIL, *São Paulo*: MNRJ-263, Itaçuce Islet (23°49.890'S-45°26.558'W, off Praia de Barequeçaba, São Sebastião), 6m depth, E. Hajdu *leg.*, 19.I.1996; MNRJ-362, Ponta do Jarobá (23°49.676'S-45°25.278'W, São Sebastião Channel, São Sebastião), 0.5-2.5m depth, E. Hajdu & G. Muricy *leg.*, 26.I.1996; MNRJ-425, Ponta do Jarobá (23°49.676'S-45°25.278'W, São Sebastião Channel, São Sebastião), ca. 2m depth, E. Hajdu *leg.*, 23.VII.1996; MNRJ-1826, Garoupa Rock at Saco das Anchovas (23°55.450'S-45°18.100'W, Ilhabela), ca. 15m depth, E. Hajdu *leg.*, 09.IX.1998. Santa Catarina State: Ilha da Galé (27°10.800'S-48°24.300'W): MCNPOR 3757, 4m depth, C.B. Lerner *leg.*, 17.II.1998. Parcel da Ilha Deserta (submerged islet, 27°16.500'S-48°20.000'W): MCNPOR 3983, 3984, 3987, 3990, 18-18.8m depth, C.B. Lerner *leg.*, 23.II.1999.

Schyzotypes from holotype: ZMA 15832; MCN 4759.

Diagnosis. *Mycale arcuiris* sp. n. is the only *M. (Naviculina)* to combine megascleres which are always smaller than 450 µm long (means between 339 and 372 µm); anisochelae of normal palmate shape; naviculichelae which are often larger than 20 µm; and sigmas of the usual shape (non-flageliform), always separated into two distinct size categories, the larger ones between 35 and 69 µm long (means around 50 µm), and the smaller ones near 10 µm long. No toxas occur.



Figs 2-5. Underwater photographs. *Mycale* (*Naviculina*) *arcuiris* sp. n. (paratypes, alive, *in situ*): (2) specimen MNRJ 425; (3) specimen MNRJ 2999. Commonest live coloration at São Paulo State localities; (4) specimen MCN 3983; (5) *Mycale* (*Naviculina*) *purpurata* sp. n. (holotype, alive, *in situ*), specimen MNRJ 1671. Scale bar 2 cm.

Description (Figs 2-4). Thinly or massively encrusting; directly attached to rocky substrate. Thinner specimens soft and fragile, thicker ones firm but compressible. Surface smooth, translucent, membranaceous. Subectosomal canals moderately visible. Area coverage up to 9 x 5 cm. Oscula spread all over in low numbers; or on aligned, transparent, delicate chimney-like projections on the specimens' upper part (MCNPOR 3983, 3984, 3987, 3990). Live-color orange (MNRJ 425, 773), white (MNRJ 263), grey (MNRJ 362), light-green (MNRJ 263, 1826), beige (MCNPOR 3757) or greenish-yellow (MCNPOR 3983, 3984, 3987, 3990); preserved material white or whitish.

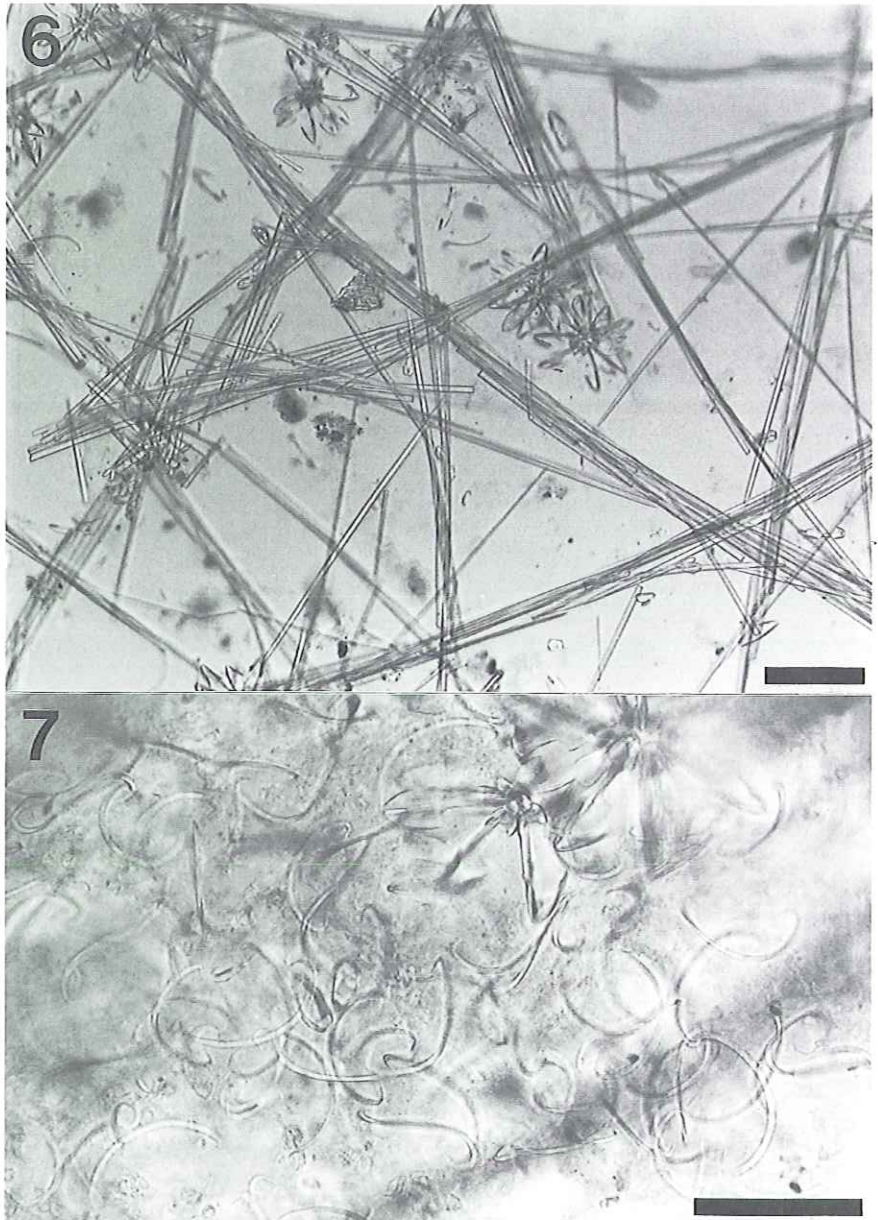
Skeleton (Figs 6-7). The ectosomal skeleton is composed of a neat, mostly triangular reticulation of paucispicular megasclere bundles (ca. 5 or less spicules across), to which some isolated megascleres are added strewn in confusion. It is situated on an easily detachable surface peel. Meshes are ca. 100 by 150 μm wide, and may include pores (ca. 60 μm in diameter). Spongin is not conspicuous, instead, anisochelae in rosettes (10-15 spicules, ca. 100 μm in diameter), as well as sigmas-I are often arranged around the bundles, presumably helping to hold them fast. Naviculichelae, and sigmas-II are frequently observed inside the meshes spread all over in low densities. Specimen MNRJ-263 has tightly packed batches of sigmas-I in the subectosomal region, in no apparent relation to the disposition of megasclere bundles, and/or interpore spaces. Choanosomal skeleton. Plumose, with sinuous, ascending tracts of mycalostyles (28.5 to 66.5 μm across) which diverge in tufts when approaching the sponge surface. Isolated mycalostyles strewn in confusion are seen among the main tracts, as well as rosettes of anisochelae, naviculichelae and sigmas spread randomly.

Spicules (Figs 8-15, Tab. I). Megascleres: straight, seldom mildly bent near the base, smooth mycalostyles; oval to roundish, slightly inflated base; apex abruptly sharpened, maybe telescoped. Microscleres: palmate anisochelae with straight shaft; naviculichelae with narrow, long frontal alae of the head, nearly fusing with feet, lateral alae of the head project backward and completely merge with shaft alongside; sigmas-I and -II delicate, smooth, sharp apices.

Ecology. This is a rare species and little can be said about its preferences. Its observed depth range goes from the shallowest infralittoral to some 19 m, and specimens tend to occur mainly on high diversity vertical surfaces. In Santa Catarina, specimens occurred on photophilous habitats, with considerable water flow, at moderate depths (18-19 m). The thinly encrusting specimen was collected in a sheltered bay, at 4 m depth.

Etymology. The species is named after the plethora of live colours exhibited by the specimens collected (*arcu*, Latin for arch; *iris*, Latin for rainbow).

Remarks. *Mycale* (*N.*) *arcuiris* **sp. n.** differs from *M. (N.) cleistochela* by the former's possession of considerably smaller megascleres, sigmas-I and -II, and absence of toxas. It is set apart from *M. (N.) cliftoni* by the former's possession of anisochelae-I and sigmas-I. The new species is distinguished from *Mycale (N.) diastrophochela* by the former's larger anisochelae-I and possession of sigmas; and from *Mycale (N.) cleistochela flagellifer* in result of the new species' much smaller megascleres, non flagelliform sigmas-I and absence of toxas. The new species is set apart from *Mycale (N.) chungae* **nom. n.** by the former's possession of a single



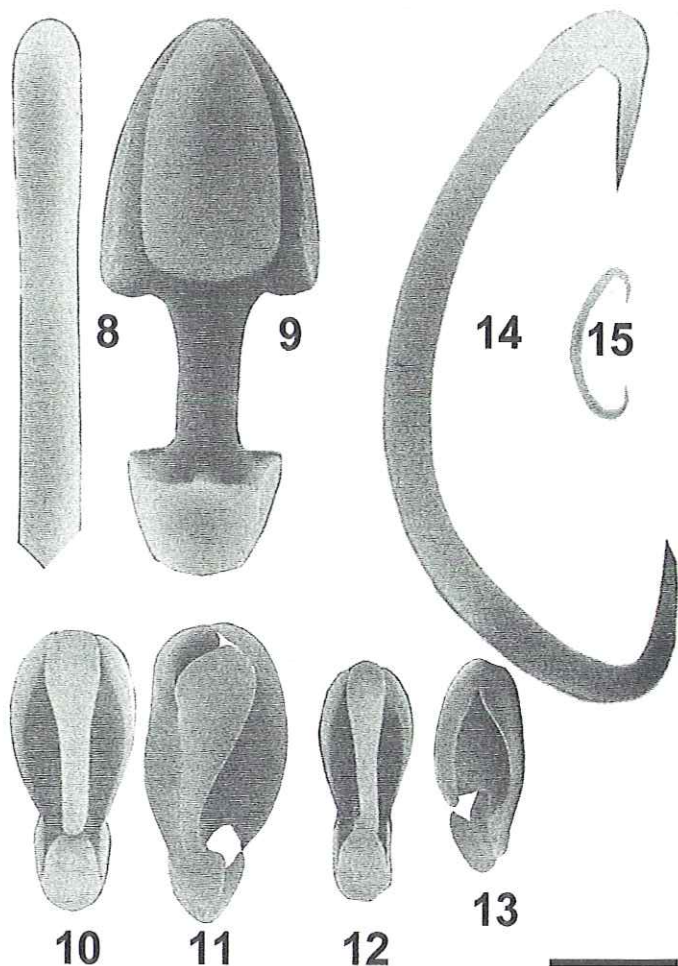
Figs 6-7. *Mycale* (*Naviculina*) *arcuiris* sp. n. (paratypes). (6) MNRJ 362, tangential section showing neat reticulation of paucispicular bundles of mycalostyles forming triangular or polygonal meshes. Anisochelae-I can be seen singly or in rosettes. Sigmas and naviculichelae can be seen too, but in smaller numbers. Scale bar 100 μ m. (7) MNRJ 263, detail of (sub)ectosomal area showing a dense aggregation of sigmas-I. A rosette of anisochelae and a naviculichela can also be seen. Scale bar 50 μ m.

Table I. Comparative data on spicule dimensions of *Mycale (N.) arcuiris* sp. n., *Mycale (N.) purpurata* sp. n. and other species of *Mycale (Naviculina)*. Measures are expressed as smallest length – mean – largest length, unless stated otherwise. Measures are given in μm . N = 20 for all the length measurements, and N = 10 for thickness measures, unless stated otherwise.

	Mycalostyles 1	Anisochelae 2	Naviculichelae	Sigma-I	Sigma-II	Toxas	Toxas
<i>M. arcuiris</i> sp. n.							
MNRJ 773	280- <u>346</u> -2-372	32- <u>39.9</u> -45	13.5- <u>18.5</u> -23.8	44- <u>50.8</u> -59	9- <u>10.4</u> -11.5		
Holotype	2.3- <u>4.6</u> -6.3 2.3- <u>5.9</u> -7.5	15- <u>19.8</u> -22		2- <u>2.5</u> -3			
MNRJ 263	296- <u>343</u> -2-380	44- <u>48.3</u> -55	15- <u>18.3</u> -25	45- <u>49.6</u> -58	8.8- <u>10.2</u> -12		
Paratype	1.8- <u>4.3</u> -6.5 1.8- <u>4.9</u> -7.5	22- <u>24.2</u> -28		1.8- <u>2.3</u> -3			
MNRJ 362	320- <u>353.6</u> -398	42- <u>46.7</u> -55	13- <u>17.7</u> -30	44- <u>48.9</u> -54	9.6- <u>9.8</u> -10.8		
Paratype	2.4- <u>5.8</u> -7.2 1.7- <u>6.0</u> -7.2	20- <u>22.2</u> -25		2- <u>2.3</u> -2.9			
MNRJ 425	330- <u>351.9</u> -369	37- <u>41.2</u> -45	15- <u>18.5</u> -24	41- <u>47.6</u> -54	9-12		
Paratype	4- <u>5.7</u> -7 3- <u>6.3</u> -7.4	19- <u>20.7</u> -22		2.2- <u>2.5</u> -2.9	(N=3)		
MNRJ 1826	305- <u>351.3</u> -380	40- <u>43.1</u> -48	18- <u>21.8</u> -28	40- <u>49.4</u> -55	12.5-15		
Paratype	5- <u>7.1</u> -8.8 8- <u>9.5</u> -11.3	15- <u>20.0</u> -23			(N=3)		
MNRJ 2999	305- <u>358.5</u> -395	27.5- <u>38</u> -47.5	15- <u>20.6</u> -25	43- <u>51.9</u> -58	10- <u>11.9</u> -13.8		
	5- <u>6.7</u> -5 3.8- <u>6.3</u> -8.8	10- <u>14.9</u> -25					
MCNPOR 3757	314- <u>339.3</u> -371	35- <u>37.6</u> -43	14- <u>19.4</u> -28	35- <u>44.9</u> -51	9- <u>10.8</u> -14		
Paratype	2.3- <u>5.3</u> -6.9 2.3- <u>5.1</u> -6.9	15- <u>16.8</u> -20		2.3	(N=8)		
MCNPOR 3983	333- <u>358.6</u> -409	28- <u>33.9</u> -43	16- <u>22.9</u> -30	44- <u>52.7</u> -58	9.2-10.4		
Paratype	4.6- <u>7.7</u> -12 2.3- <u>6.6</u> -9.2	12- <u>15.5</u> -20		2.3	(N=3)		
MCNPOR 3984	295- <u>357.2</u> -399	30- <u>34.3</u> -43	18- <u>21.9</u> -28	42- <u>47.6</u> -53	10-11.3		
Paratype	2.3- <u>6.4</u> -10 2.3- <u>6.2</u> -9.2	13- <u>16.0</u> -20		2.3	(N=3)		
MCNPOR 3987	304- <u>362.1</u> -399	30- <u>33.5</u> -40	16- <u>22.1</u> -30	48- <u>54.0</u> -62	10- <u>11</u> -12.5		
Paratype	4.6- <u>8.0</u> -11.5 2.3- <u>6.4</u> -9.2	14- <u>15.6</u> -19		2.3	(N=10)		
MCNPOR 3990	314- <u>372.4</u> -409	28- <u>32.8</u> -40	16- <u>22.6</u> -30	46- <u>56.4</u> -69	8.8- <u>10.3</u> -11.3		
Paratype	4.6- <u>6.6</u> -9.2 2.3- <u>6.5</u> -9.2	13- <u>15.8</u> -19		2.3	(N=10)		
<i>M. purpurata</i> sp. n.							
MNRJ 1671	240- <u>296.8</u> -330	28- <u>30.6</u> -35	17.5- <u>21.7</u> -25		9.5- <u>10.9</u> -11.8		
Holotype	2.5- <u>4.5</u> -6.3 3.8- <u>5.0</u> -6.3	10- <u>14.3</u> -15	(N = 100)				
MNRJ 1669	265- <u>296</u> -345	25- <u>29.8</u> -35	20- <u>22</u> -28		10.5		
Paratype	3.8- <u>4.8</u> -6.3 3.8- <u>5.6</u> -7.5	10- <u>13.6</u> -20			(N=1)		
<i>Mycale chungae</i> nom. n.							
	I. 300-460/6-10 II. 250-350/1-3	I. 35-40 II. 20-25 III. 15-20	15-25				
<i>Mycale cleistochela</i>							
	480-640/5-18	42-50	I; 20-30 II: 12-18	70-90	35-45	I. 30-60 II. 15-20	
<i>Mycale cliffoni</i> sensu HAJDU (1999)							
	330-388/5-8/ 6-10		I: 12-22 II: ?		? 15		
<i>Mycale diastrophochela</i>							
	325-360	30-32	23-25				
<i>Mycale flagellifer</i>							
	480-640/5-18	42-50	I: 20-30 II: 12-18	65-75	15-20	16-25	
<i>Mycale obscura</i> [HENTSCHEL's (1911) specimen remeasured]							
	255-298/2.5-5	32.5-36.3	I: 18.8-22.5 II: not found	37.5-50	10-12.5		

1) Measures expressed as smallest length – mean – largest length/smallest width of the head – mean – largest width of the head/ smallest width of the shaft – mean – largest width of the shaft (for literature data, width measures may have been taken at the stouter portion only, head or shaft). 2) Measures expressed as smallest total height – mean – largest total height/ smallest height of the the head – mean – largest height of the head.

category of megascleres and possession of sigmas-I. Besides, the new species' sigmas-II are nearly half the length of those in the Korean species. The new species is set apart from *M. (N.) obscura* by a set of slightly larger spicules, both megascleres and microscleres. Finally, it differs from the other new species described here, viz. *M. (N.) purpurata* sp. n., by the former's plethora of light-colours, opposed to the bordeaux live-colour in *M. (N.) purpurata* sp. n. Additionally, *M. (N.) arcuiris* sp. n. has slightly larger megascleres and anisochelae-I, and possesses sigmas-I, traits not exhibited by *M. (N.) purpurata* sp. n.



Figs 8-15. *Mycale* (*Naviculina*) *arcuiris* sp. n. (MNRJ 773, holotype), SEM micrographs of spicules, scale bar 10 μ m. (8) Detail of basal termination (head) of the mycalostyle; (9) anisochela, frontal view; (10-13) naviculichela: (10) face view, (11) side view; (12) face view, (13) side view; (14) Sigma-I; (15) Sigma-II.

Mycale (Naviculina) purpurata sp. n.

Figs 5, 16-23, Tab. I

Material studied. Holotype, BRAZIL, *São Paulo*: MNRJ-1671, small embayment between Veloso and São Pedro (23°52.863'S-45°26.930'W, São Sebastião Channel, Ilhabela), ca. 11.5 m maximum depth, E. Hajdu *leg.*, 21.IV.1998. Paratype, BRAZIL, *São Paulo*: MNRJ-1669, small embayment between Veloso and São Pedro (23°52.863'S-45°26.930'W, São Sebastião Channel, Ilhabela), ca. 11.5 m maximum depth, E. Hajdu *leg.*, 21.IV.1998. Schyzotypes from holotype: ZMA 16243; MCN 4759.

Diagnosis. *Mycale purpurata* sp. n. is the only *M. (Naviculina)* with megascleres smaller than 350 µm (means around 300 µm); palmate anisochelae; naviculichelae which are often larger than 20 µm; and a small category of sigmas only, sometimes very rare, around 10 µm long. No toxas occur.

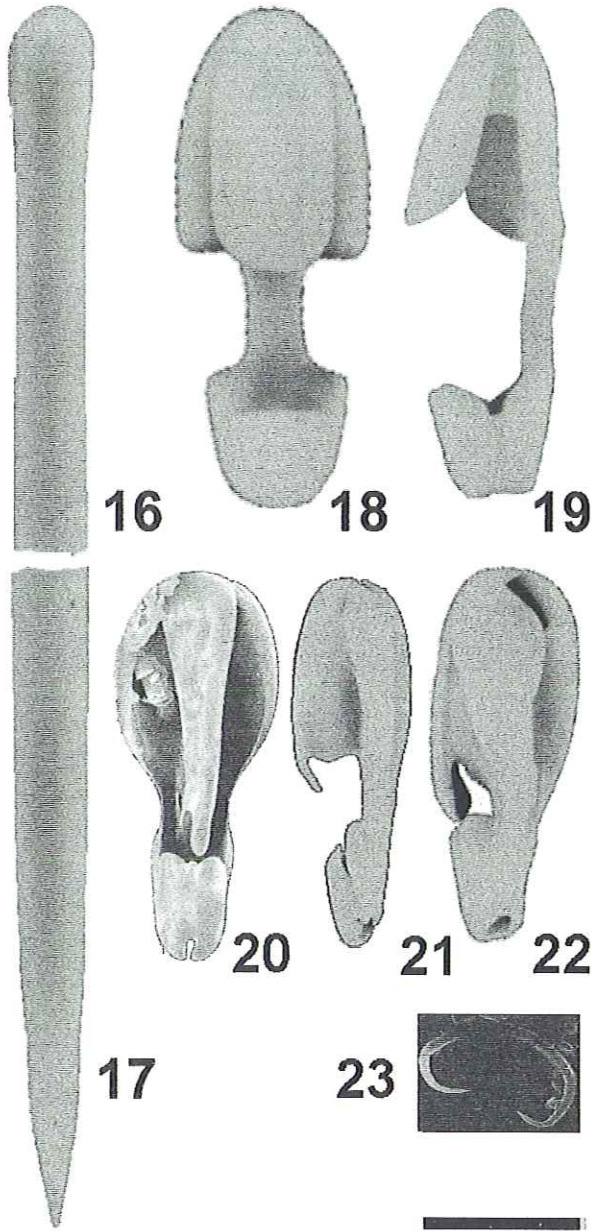
Description (Fig. 5). Thinly encrusting on a solitary ascidian (possibly *Microcosmus exasperatus* – holotype) and on barnacles (paratype). Surface smooth, membranaceous, but folded to contour contracted substrate (holotype). Area coverage is 5.4 x 3.6 cm in the holotype. Oscula are small (1-2 mm), inconspicuous, and scattered. Live-color purple (purpura).

Skeleton. The ectosomal skeleton is composed of a reticulation of paucispicular megasclere bundles, dense and confused at parts due to abundant criss-crossing spicules (holotype), or loose and sparse (paratype). It is situated on an easily detachable surface peel. Primary (5-7 spicules across) and secondary fibres (2-4 spicules across) can be recognized in the holotype. Meshes are frequently around 150 µm across, and may include pores (ca. 20-50 µm in diameter). Spongin is inconspicuous, but rosettes of anisochelae (10-15 spicules, ca. 80 µm in diameter) occur around the bundles and may help keep the architecture intact. Naviculichelae are often seen inside the meshes spread all over in low densities, as well as less common sigmas-II. Choanosomal skeleton. Plumose, with sinuous, ascending tracts of mycalostyles (30 to 100 µm across) which diverge in tufts when approaching the surface.

Spicules. (Figs 16-23, Tab. I) Megascleres. Straight, seldom mildly bent near the central part, smooth mycalostyles; oval, slightly inflated base; apex abruptly sharpened, maybe telescoped. Microscleres. Palmate anisochelae with straight shaft. Naviculichelae with narrow, long frontal alae of the head, sometimes nearly fusing with feet, frequent basal, thin digitiform process present; lateral alae of the head project backward and completely merge with shaft alongside, basal parts may project further down and slightly overlap the alae of the foot. Sigmas-II delicate, smooth, sharp apices.

Ecology. Both specimens were found in a small embayment near the southern end of the São Sebastião Channel. Depth is moderate (ca. 12 m), and water circulation very good. They were both collected on high diversity vertical walls of large rocks

Etymology. The name refers to the purple (*purpurata*, Latin for purple) live-colour of both specimens.



Figs 16-23. *Mycale (Naviculina) purpurata* sp. n. (MNRJ 1671, holotype), SEM micrographs of spicules, scale bar 10 μ m. (16) Detail of basal termination (head) of the mycalostyle; (17) detail of apical termination of the mycalostyle; (18) anisochela, frontal view; (19) anisochela, side view; (20) naviculichela, face view; (21) naviculichelae, side view; (22) naviculichela, side view; (23) sigma-II.

Remarks. *Mycale* (*N.*) *purpurata* **sp. n.** differs from *M.* (*N.*) *cleistochela* and *M.* (*N.*) *c. flagellifer* by the former's considerably smaller megascleres and anisochelae-I. In addition, it has no sigmas-I, a conspicuous trait in both madagascanian species. The new species differs from *M.* (*N.*) *cliftoni* by the former's possession of anisochelae-I and generally larger anisochelae-II. From *M.* (*N.*) *diastrophochela* it is distinguished by slightly larger megascleres and absence of sigmas in the brazilian species. *Mycale* (*N.*) *purpurata* **sp. n.** differs from *M.* (*N.*) *chungae nomen novum* by the former's possession of a single category of megascleres and much smaller sigmas-II. *Mycale* (*N.*) *purpurata* **sp. n.** is distinguished from *M.* (*N.*) *obscura* by the former's absence of sigmas-I. Both new species are distinguished from each other as argued in the remarks on *M.* (*N.*) *arcuiris* **sp. n.** above.

BIOGEOGRAPHICAL REMARKS

The recognition of a biogeographic province, transitional between a truly tropical Brazilian Province (North, Northeastern and part of Southeastern Brazil) and a truly subtropical Patagonian Province has been formally proposed by COELHO & SANTOS (1980) and PALACIO (1982). This is known as the Paulista Biogeographic Province. The use advocated here does not stress the significance of a transitional zone per se, but rather, the fact that apparent endemics seem to be common in the area stretching from Cabo Frio to Santa Catarina (e.g. *M. arcuiris* **sp. n.**; *Aplysina caissara* Pinheiro & Hajdu, 2001; *Petromica citrina* Muricy; Hadju; Minervino; Madeira & Peixinho, 2001), even if more restricted (but congruent) geographically (e.g. Provisional endemics to the Cabo Frio region – *Arenosclera brasiliensis* Muricy & Ribeiro, 1999; *Callyspongia pseudotoxa* Muricy & Ribeiro, 1999; *Dysidea robusta* Vilanova & Muricy, 2001. Provisional endemics to the São Sebastião channel region – *M. purpurata* **sp. n.**; *M. lilianae* Carballo & Hajdu, 1998; *Desmanthus meandroides* van Soest & Hajdu, 2000; *Halichondria cebimarensis* Carvalho & Hajdu, 2001; *H. migottea* Carvalho & Hajdu, 2001; *H. sulfurea* Carvalho & Hajdu, 2001; *H. tenebrica* Carvalho & Hajdu, 2001. Provisional endemics to the Santa Catarina region - *Haliclona mammillaris* Mothes & Lerner, 1994; *H. lilaceus* Mothes & Lerner, 1994; *H. catarinensis* Mothes & Lerner, 1994).

Identification key for the species of *Mycale* (*Naviculina*) known worldwide [*M. obscura* *sensu* HENTSCHEL (1911)]

1. Chelae are naviculichelae only *M. cliftoni*
- Chelae are naviculichelae plus normal palmate anisochelae 2
2. Megascleres larger than 500 µm common 3
- Megascleres mostly smaller than 400 µm 4
3. Larger sigmas flagelliform, smaller ones only 15-20 µm long, toxas in a single size category *M. cleistochela flagellifer*
- Larger sigmas of normal shape, 70-90 µm long; smaller ones 35-45 µm long, toxas in two size categories *M. cleistochela*

4. Sigmas present 5
 – No sigmas *M. diastrophochela*
5. Megascleres smaller than 350 μm 6
 – Megascleres frequently larger than 350 μm 7
6. Sigmas of a single size category around 10 μm long *M. purpurata* sp. n.
 – Sigmas in two size categories (I: 36, II: 8-9) *M. obscura*
7. Sigmas in two size categories, sigmas-I frequently over 50 μm
 *M. arcuiris* sp. n.
 – Sigmas in a single size category smaller than 30 μm . . . *M. (N.) chungae* nom. n.

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