

**On *Metania spinata* (CARTER, 1881) and *Metania kiliani* n. sp.:  
Porifera, Metaniidae VOLKMER-RIBEIRO, 1986**

by

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### Abstract

Recent surveys on freshwater sponges at the very north and south of Brazil yielded specimens of the genus *Metania* which possessed the peculiar second kind of spiny megascleres described for *M. spinata* (CARTER, 1881) but did not show the anisochela series of microscleres described by VOLKMER-RIBEIRO (1984) for that species. A renewed comparative study with the syntypic series of *M. spinata* took to the selection of lectotype and paralectotypes, the redescription of the species and the description of a new species *M. kiliani*. Only *M. kiliani* n. sp. has a second class of microscleres made up of anisochelas. A new key is also proposed to sort out the five species of *Metania* now ascribed to the Neotropical Region.

Keywords: Freshwater sponges, Neotropical region, genus *Metania*.

### Introduction

The redescription of *Metania spinata* (CARTER, 1881) was based by VOLKMER-RIBEIRO (1984) upon the study of material collected by Dr. E. J. FITTKAU along 1962 from small tributaries to the Negro River or to the Amazon River around the Manaus area. Comparison was carried out at the time with two type slides of *M. spinata* loaned from the Natural History Museum (BMNH), London. The type material and the studied specimens had in common the possession of two classes of megascleres (one of smooth quite long oxea and the other of strongly spined also long oxea with conspicuously smooth extremities), large ovoid gemmules with a very thick pneumatic coat and two or more layers of gemmoscleres embedded in that coat. Anisochelas were present as a second class of microscleres in FITTKAU's material and run from rare to abundant

in the different specimens. The fact that the two type slides examined did not contain anisochelas was attributed to their probable scarceness in the type material. Quite recently the author when collaborating in the Maracá Rainforest Project collected from seasonal ponds at the headwaters of the Branco River, Roraima State, Brazil, material which had a second class of megascleres identical to the one associated to *M. spinata* as well as large ovoid gemmules. However the anisochela type of microscleres was not present whilst the spined oxecote microscleres were abundant. Also the shape and size of this category of microscleres was not similar to that seen in FITTKAU's material. More recently yet material identical to the one collected from Roraima waters was picked out of a man-made impoundment in São Paulo State, south of Brazil.

The author had the opportunity to study again the syntype series of *M. spinata* in the BMNH at the time she was participating in the Second Review Conference on the Maracá Rainforest Project in September 1989 in London. The renewed study rendered it evident that two species of sponges which imparted a similar second class of spined megascleres, long, almost smooth gemmoscleres and large ovoid gemmules with a large pneumatic coat had been involved in the VOLKMER-RIBEIRO (1984) redescription of *M. spinata*. However the presence of anisochelas as a second type of microscleres was characteristic only of the material collected by Dr. FITTKAU.

A series of other characteristics were particular, on the other hand, to the type material of *M. spinata* and the specimens collected from the head waters of the Branco River at Roraima State and from the man-made impoundment in São Paulo. The result of this large comparative study is now presented and includes the redescription and selection of lectotype and paralectotypes for *M. spinata* (CARTER, 1881) as well as the description of a new species, *M. kiliani* n. sp. for the specimens collected by Dr. FITTKAU.

## Systematics

### *Metania spinata* (CARTER, 1881) (Figs. 1E, 3, 4A-E)

*Tubella spinata* CARTER, 1881, p. 96; POTTS, 1887, p. 249; WELTNER, 1895, p. 129; TRAXLER, 1895, p. 64 (partim, only figs. 1, 2, 3, 8, 12, 14, 15, 16, 17); PENNEY, 1960, p. 59.

*Tubella thumi* TRAXLER, 1895, p. 64 (partim, only figs. 9, 20, 21).

*Metania spinata* GEE, 1931, p. 49; PENNEY & RACEK, 1968, p. 148; EZCURRA DE DRAGO, 1975, p. 175; VOLKMER-RIBEIRO, 1984 (partim, fig. 7); 1986 (partim); 1990 (partim).

Non *Metania spinata* VOLKMER-RIBEIRO, 1976.

Lectotype: The Natural History Museum (BMNH) n° 1890.1.9.101 (slide 45). DICKIE leg. June 1878. Locality: Amazon River.

Paralectotypes: The National History Museum (BMNH) n°s.: 1890.1.9.99 (slide 43); 1890.1.9.100 (slide 44); 1890.1.9.247 (slide 46), DICKIE leg. June 1878. Locality: Amazon River; 1890.1.9.241 (small box), DICKIE n° 14.79. Locality: Dr. J.W. trail, Obidos, Amazon; 1890.1.9.243 (small box), DICKIE n° 28.78, "on *Caladium arborescens*". Locality: Obidos, Amazon.

Remarks on type selection: No specimens were found in the BMNH labelled as *Tubella spinata*. However in the slide collection four (4) slides were found labelled as such in Carter's handwriting. Each slide has two large labels and yet a small round one bearing an extra numbering. Slide labelled as 45 was picked as lectotype because it is the only one to contain entire gemmules and at the same time spare alpha and beta megascleres, microscleres and gemmoscleres; the large label on this slide says "*Spongilla spinata*". Slide 46

contains dissociated alpha and beta megascleres and microscleres but has no gemmoscleres; its large second label says "*Spongilla spinata*, Amazon, 28.78 big leaf, DICKIE, 79". Slide 44 has only entire gemmules and a few spare alpha and beta megascleres but no microscleres. One gemmule in this slide was photographed in VOLKMER-RIBEIRO (1984), fig. 7; its second large label has CARTER's drawings for the gemmule, one gemmosclere, one microsclere and one incorrectly drawn beta megasclere. Slide 43 contains several disrupted gemmules and a whole set of dissociated spicules; its large second label has the correct drawings for all the spicules. Two small boxes were found in the specimens collection which bore no identification: they contain dried leaves with spongy crusts on them. Those crusts upon preparation revealed to be *M. spinata* specimens. Quite probably CARTER took material out of those leaves to prepare the four slides thus indicating that he worked on more than one specimen. At first the species was identified by him as a new *Spongilla* but he next decided to have it described in his genus *Tubella*.

Other material: "Grassy-pond" 2 km north of the Maracá Ecological Station housing, Maracá Island, River Uraricoera, Alto Alegre, Roraima State, Brazil: Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul (MCN) n°s.: 1366, 1367, 1369-1371, 1377, 1383-1385, 22.VII.87, C. VOLKMER-RIBEIRO leg.; 1430, 23.IX.87, Pedro S. MERA leg.; 1512, 1513, 1514, 1939, 2045, 2047-2063, 2069-2071, 4.-5.XII.-1987, C. VOLKMER-RIBEIRO leg.; 2045, "Igarapé" Serrinha (contributor to the Uraricoera River), Alto Alegre, Roraima State, Brazil, 9.XII.87, C. VOLKMER-RIBEIRO leg.; 1506, "Igarapé" of River Cauamé (contributor to the Uraricoera River), Alto Alegre, Roraima State, Brazil, 9.XII.87, C. VOLKMER-RIBEIRO leg.; 1948, 1949, 1950, "Lagoa Dourada", damming of Perdizes brook, Lobo Basin, São Carlos, São Paulo State, Brazil, 1989, M.C. GAMA MELÃO leg.

Redescription: Sponge forming thin, fragile, spreading crusts or small mound-like patchy crusts on leaves, stems or any other part of submerged living or decaying vegetation or sponge forming delicate stringy growths around filamentous algae. Living sponge emerald green when associated with zoochlorella or reddish brown when not associated.

Skeleton fragile and poorly developed consisting of short, slim, regularly spaced primary fibers and few secondary fibers extending among them thus forming a reticulum of very open meshes with a polygonal contour. The stringy growths exhibit short axial fibers plus the primary and secondary fibers, large amounts of spongin and conspicuous and regularly spaced small oscula. Gemmules abundant but sparsely distributed in a single basal layer and with the foraminal apertures turned laterally. Each gemmule protected by an irregular packing of megascleres where the beta megascleres predominate.

Megascleres of two distinct classes:

Alpha megascleres: long, slim, smooth, rarely spined, usually straight, abruptly pointed oxea. Alpha megascleres predominate in the building of the skeletal fibers.

Beta megascleres: Short to long, stout, straight to curved, densely spined oxea with abruptly pointed smooth extremities. Spines usually covering the middle third of the sclere, conical, short and acute to long stout and extremely acute or reduced to round bumps or surface of spicule only rugose. Beta megascleres exhibit large variations in length and spines shape and distribution. The largest ones are as long as the shortest alpha megascleres. There is a tendency towards reduction in the number of spines in the largest beta megascleres. Beta megascleres predominate in the making of an irregular packing around each gemmule.

Microscleres: Of only one kind, long, usually curved, profusely spined, slim oxea with extremities gradually sharpened and bearing a number of larger, regular spines with lanceolated extremities at the middle portion and small harpoonlike spines at the extremities.

Gemmoscleres: Boletiform amphidiscs of only one length group. Shafts long, slim, straight, sparsely spined, rarely smooth. Spines small, conical, acute, straight or turned to opposite directions. Collar of spines under the lower rotule rare. Lower rotule large, thick, umbonate, undulated, with polygonal contour and with thin borders. Borders entire, incurved towards the shaft and sometimes bearing a few small incurved hooks. Upper rotule small, well formed, umbonate or flat, bearing at its border six large, incurved hooks or spines, rarely knob-like.

Gemmules large, ovoid, flattened at the foraminal pole. Inner gemmular coat vase-like and prolonged into a short, straight foraminal tube provided with a long, pear shaped outer collar. Foraminal collar slightly projecting beyond the pneumatic coat. Pneumatic coat very thick particularly around the foraminal tube.

Gemmoscleres embedded in more than one layer in the gemmular coats: inner layer of gemmoscleres with the lower rotules side by side embedded in the inner gemmular coat; outer layer of gemmoscleres irregularly embedded in the pneumatic coat. (Gemmule illustrated in VOLKMER-RIBEIRO (1984) fig. 7).

Spicular measurements in Table 1.

Habitat: Sponges found in standing waters of seasonal ponds or of man-made impoundments. The specimens collected by the author from Igarapés Serrinha and Cauamé were picked out of shallow spreadings of the "igarapé" (small creek) waters wholly occupied by macrophytes. Most probably the syntype material was picked by DICKIE, a botanist, from such habitats around the town of Obidos, by the Amazon. The delicate skeleton of the sponge testifies to its adaptation to lentic environments.

*Metania kiliani* n. sp. (Figs. 1D, 2A-F)

*Metania spinata*, VOLKMER-RIBEIRO, 1976; 1984 (partim, figs. 5 and 6); 1986 (partim, figs. 3a and 6a, b, c); 1990 (partim, figs. 2a, 3a and 4a).

Holotype: Former MCN n° 71, Igarapé do Cachoeira (Cuieras River), Amazonas State, Brazil, XII, 1962, E.J. FITTKAU leg. Deposited at Museu Nacional da Quinta da Boa Vista, Rio de Janeiro, Brazil. Illustrated in VOLKMER-RIBEIRO (1984, fig. 6).

Paratypes: MCN n°s. 228, Igarapé Aduja (Itu River) Amazonas State, Brazil, 12.XI.1962, E.J. FITTKAU leg.; 81, Tarumazinho (Negro River), Amazonas State, Brazil, 16.XI.1962, E.J. FITTKAU leg. Deposited at Museu de Ciências Naturais (MCN), Fundação Zoobotânica do Rio Grande do Sul.

Type locality: Igarapé do Cachoeira, Cuieras River, Amazonas State, Brazil.

Distribution: Amazon Basin, Brazil.

Etyymology: The species name is dedicated in the memory of Prof. Ernst KILIAN, Zoologisches Institut der Justus-Liebig-Universität, Giessen, deceased on July 29, 1989. Prof. KILIAN's work largely contributed to the understanding of the structure and function of the choanocyte chamber of sponges.

Description: The sponge forms small, thin, fragile crusts on leaves or around twigs reached by flood waters. In the initial stage of growth the sponge builds long, acicular fibers which project from the basal membrane at regular intervals. The space among these fibers is completely occupied by an extraordinary number of large, yellowish, cocoon-like gemmules set loosely, side by side, on the basal membrane, with the foraminal apertures all turned upwards. In the following stage of growth the space between the gemmules is completely filled with a whitish mass made up of beta megascleres and some microscleres. This mass then grows out to completely cover the gemmular layer. At this point secondary fibers start to form, bidding together the acicular projections which then grow up as main longitudinal fibers. The most advanced stage of growth observed in the studied material was seen in sponges exhibiting a brownish hispid reticulum of wide meshes overlaying a whitish undulated mass where some small oscular apertures could be seen. Skeletal fibers thin and cylindrical. Dry sponge greyish brown.

Megascleres of two distinct types:

Alpha megascleres: Smooth, short, stout, straight to slightly curved oxea with abruptly pointed extremities. Alpha megascleres are the only scleres which integrate the long main fibers and the secondary transverse fibers.

Beta megascleres: Short, stout, spined, straight to curved oxea with abruptly pointed extremities. Spines stout, short, conical and usually covering the middle third of the sclere. These megascleres exhibit large variations in length. The largest are as long as the shortest alpha megascleres. There is a tendency towards reduction in the number of spines in the largest beta megascleres. The beta megascleres make up the vitreous mass which fills the space among the gemmules and conceals the gemmular layer under a whitish cover. The vitreous aspect of this cover is due to the fact that there is no trace of spongin bidding these scleres together. Beta megascleres are thus abundant in the studied specimens.

Microscleres of two distinct classes:

Minute anisochelas sometimes grouped in rosettes and not restricted to the pinacoderm. Rare in young specimens, abundant in adults.

Short, straight, spined, minute oxea with extremities gradually sharp pointed and bearing a few, long, irregular spines with lanceolate extremities aggregated in the middle portion. Extremities of the scleres covered with a microgranulation. This type of microsclere is not as abundant as the first one.

Gemmoscleres: Short, stout, boletiform amphidiscs with two slightly differing length groups. Shafts straight, more rarely curved, smooth except for the typical collar of spines under the lower rotule or for one or two spines close to the upper rotule. Lower rotule small, thick, slightly umbonate, conspicuously polygonal and with reduced margins. Modifications of the collar of spines can include one or more radial reinforcements which meet the margin of the rotule, marking off its polygonal profile at those points. Upper rotule usually well formed and bearing at its border six large, regular, incurved hooks. This rotule however may be reduced to knob with a few irregularly formed hooks or spines.

Gemmules: Abundant, set loosely, side by side at the basal membrane with the foraminal apertures all turned upwards. Free, large, cocoon shaped, forming a basal layer one gemmule thick. Porus tube long but always sunken in the very thick pneumatic coat. Pneumatic coat with finger-like projections. The first layer of gemmoscleres is radially arranged around the inner coat with the lower rotules setting in this coat and the upper ones embedded in the pneumatic coat. The pneumatic coat starts to thicken around the foraminal tube. As the finger-like thickening of the pneumatic coat goes on new gemmoscleres become sparsely embedded in this coat. Some upper rotules are seen protruding from the outer gemmular coat.

Spicular measurements in Table 1.

Habitat: Running waters of amazonian creeks ("igarapés").

## Discussion

The presence of anisochelas as a second series of microscleres sets *M. kiliani* n. sp. instantly apart from all other species of *Metania*. It is the only one of this genus to have retained that "poecilosclerid character", VOLKMER-RIBEIRO (1986). It must also be pointed out the fact that *M. spinata* and *M. kiliani* n. sp. besides the distinctions exhibited in their spicules and gemmules have marked habitat preferences with the first one inhabiting lentic environments and the second one lotic waters. The recent collection of *M. spinata* from waters at São Paulo State confirm VOLKMER-RIBEIRO's (1984, 1986) assumptions that this species would occur as far south as that in the Neotropical Region. The genus is thus represented in the Neotropical Region with five species and for that reason a new taxonomic key is presented to replace the one proposed by the author in 1986.

### Key to the Neotropical species of the genus *Metania* GRAY, 1867

- Sponges with boletiform gemmoscleres which have a spiny shaft and a collar of spines under the lower rotule (VOLKMER-RIBEIRO, 1986). . . . . genus *METANIA*.
1. Sponges with two classes of megascleres, one smooth and the other spiny and smaller than the former. . . . . 2
  - Sponges with only one class of smooth oxea as megascleres . . . . . *M. subtilis* (Fig. 1A).
  2. Spiny megascleres are strongyla about half the size of the smooth megascleres and with sparsely distributed spines along the whole sclere . . . . . 3
  - Spiny megascleres are oxea about two thirds the size of the smooth megascleres and with spines concentrated at the middle portion of the sclere, leaving the extremities smooth . . . . . 4
  3. Shaft of gemmoscleres slim, spiny, the lower rotule with poorly developed borders . . . . . *M. reticulata* (Fig. 1B).

- Shaft of gemmoscleres thick and extremely short, smooth or with rare spines, lower rotule with strongly developed borders which hide part of the shaft . . . . . *M. fittkawi* (Fig. 1C).
4. Two kinds of microscleres present: one of anisochelas and the other of small, spiny, straight oxeas bearing a few large and irregular spines at the middle portion . . . . . *M. kiliani* n. sp. (Fig. 1D).
- One class of microscleres present: those are large, usually straight, profusely spined oxea bearing a number of larger, regular spines at the middle portion . . . . . *M. spinata* (Fig. 1E).

## Resumo

*Metania spinata* (CARTER, 1881) foi redescrita por VOLKMER-RIBEIRO (1984) sobre espécimes de duas espécies muito próximas: *Metania spinata* e *Metania kiliani* n. sp. Somente esta última espécie tem anisochelas constituindo uma segunda série de microscleras. São eleitos lectótipo e paralectótipos para *Metania spinata*, que é novamente redescrita. A nova espécie é descrita e uma nova chave de identificação é proposta para o gênero *Metania* na região Neotropical.

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## References

- CARTER H.J. (1881): History and classification of the known species of *Spongilla*. - Ann. Mag. nat. hist. 5(7): 7-107.
- EZCURRA DE DRAGO, I. (1975): Freshwater sponges of Suriname. - Stud. Fauna Suriname 15: 175-183.
- GEE, N.G. (1931): A contribution towards an alphabetical list of the known freshwater sponges. - Peking Nat. Hist. Bull. 5(1): 31-52.
- PENNEY, J.T. (1960): Distribution and bibliography (1892-1957) of the freshwater sponges. - Univ. South Carolina Publ. 3(3,1): 1-97.
- PENNEY, J.T. & A.A. RACEK (1968): Comprehensive revision of a worldwide collection of freshwater sponges (Porifera - Spongillidae). - Bull. U. S. natn. Mus. 272: 1-184.
- POTTS, E. (1887): Contribution towards a synopsis of the American forms of freshwater sponges with description of those named by other authors and from all parts of the world. - Proc. Acad. nat. Sci. Philadelphia 1887: 158-279.
- TRAXLER, L. (1895): Spikule von Süßwasserschwämmen aus Brasilien. - Földt. Közl. 25: 238-240.

- VOLKMER-RIBEIRO, C. (1976): Revisão do gênero *Metania* GRAY, 1867 (Porifera - Spongillidae) para a região Neotropical. - Tese (Livr. Doc. Zoologia) Instituto de Biociências, PUCRGS, Porto Alegre: 51 p.
- VOLKMER-RIBEIRO, C. (1984): Evolutionary study of the genus *Metania* GRAY, 1867 (Porifera: Spongillidae). II. Redescription of two Neotropical species. - *Amazoniana* 8(4): 541-553.
- VOLKMER-RIBEIRO, C. (1986): Evolutionary study of the genus *Metania* GRAY, 1867. III. Metaniidae, new family. - *Amazoniana* 9(4): 493-509.
- VOLKMER-RIBEIRO, C. (1990): A new insight into the systematics, evolution and taxonomy of freshwater sponges. - In: RÜTZLER, K. (ed.): *New perspectives in sponge biology* (3rd Int. Sponge Conf. 1985). - Smithsonian Institution Press, Washington: 323-331.
- WELTNER, W. (1895): Spongillidenstudien III. Katalog und Verbreitung der bekannten Süßwasserschwämme. - *Arch. Naturgesch.* 61(1): 114-144.

Tab. 1: Sizes, in micrometers (minimum and maximum), of spicules and gemmules of the Neotropical species of *Metania* GRAY, 1867.

	Gemmuleae	Alfa megascleres		Beta megascleres	
		Length range	Width range	Length range	Width range
<i>M. reticulata</i>	391-588	106-245	11-36	75-111	15-19
<i>M. fittkawi</i>	229-690	113-219	8-28	60-126	8-16
<i>M. subtilis</i>	413-776	216-381	8-43		
<i>M. spinata</i>	900-1316	210-600	9-32	148-491	12-30
<i>M. kiliani</i> n. sp.	475-779	189-275	9-16	126-113	11-19
<b>Microscleres</b>					
		Oxea		Chaelae	
	Length range	Width range	Length range		
<i>M. reticulata</i>	43-103	3-10			
<i>M. fittkawi</i>	43-90	3-5			
<i>M. subtilis</i>	79-143	9-10			
<i>M. spinata</i>	46-173	2-6			
<i>M. kiliani</i> n. sp.	55-120	4-12	16		
<b>Gemmoscleres</b>					
	Length range	Width range	Diameter of lower rotule		
<i>M. reticulata</i>	22-38	2-6	16-20		
<i>M. fittkawi</i>	15-25	3-5	15-21		
<i>M. subtilis</i>	33-56	3-7	17-27		
<i>M. spinata</i>	43-86	2-5	21-34		
<i>M. kiliani</i> n. sp.	27-44	2-6	15-23		

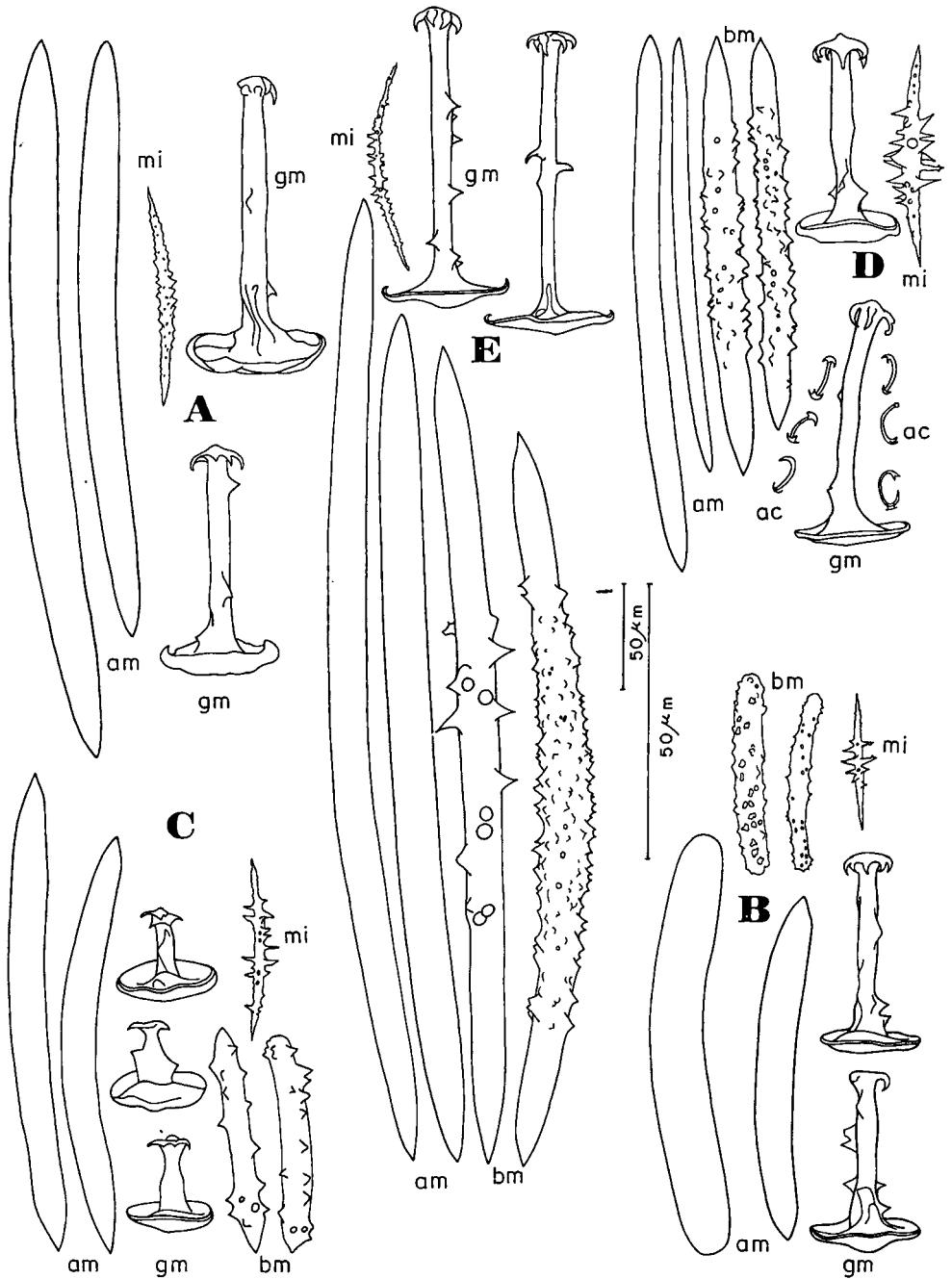


Fig. 1:

Camera lucida drawings for the spicular set of each of the five species of the genus *Metania* occurring in the Neotropical Region: am = alpha megascleres, bm = beta megascleres, mi = anioxeia microscleres, ac = anisochela microscleres, gm = gemmosclere. A = *Metania subtilis* VOLKMER-RIBEIRO, 1979; B = *Metania reticulata* (BOWERBANK, 1863); C = *Metania fittkaui* VOLKMER-RIBEIRO, 1979; D = *Metania kiliani* n. sp.; E = *Metania spinata* (CARTER, 1881). (The larger scale applies only to the gemmoscleres).



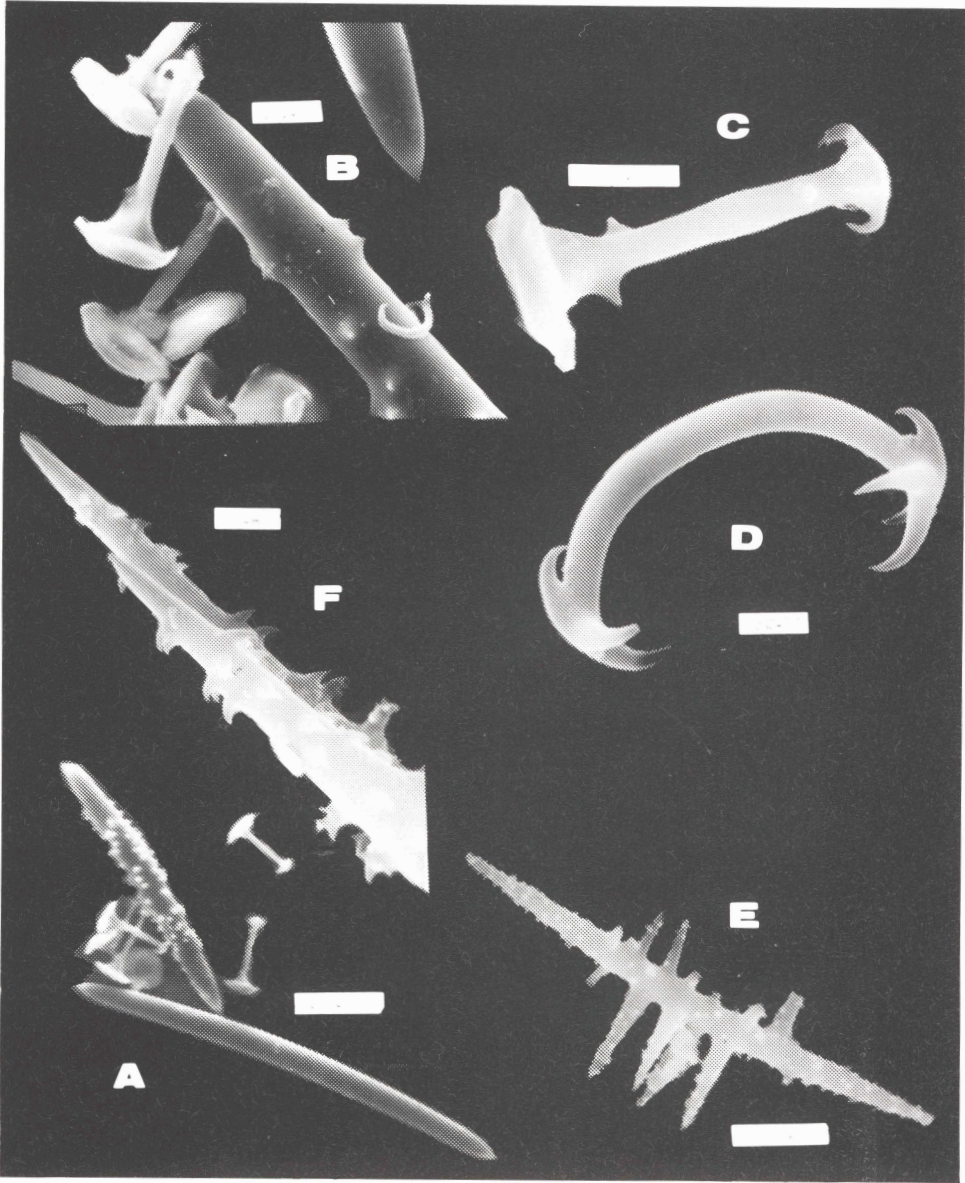


Fig. 2:

*Metania kiliani* n. sp. Spicules photographed at the SEM. A = Several gemmoscleres and one each of an alpha megasclere and a beta megasclere; B = Several gemmoscleres, one anisochela and the extremity of one beta megasclere; C = One gemmosclere; D = One anisochela; E = One anifioxa microsclere (the extremities of the sclere are broken); F = Detail of the extremities of two anifioxa microscleres.



Fig. 3:  
 Living specimen of *Metania spinata* (MCN n° 1377) encrusting part of a palm tree fallen in the water. Sponge emerald green. Natural size.

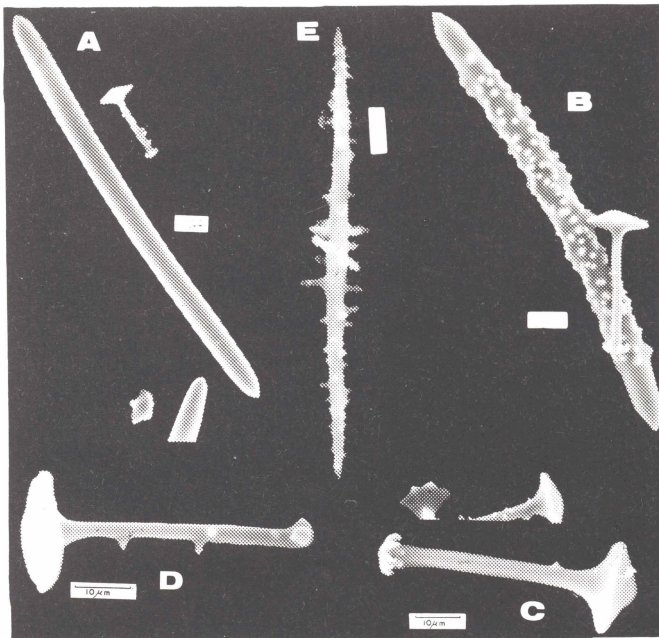


Fig. 4:  
*Metania spinata* (CARTER, 1881). Spicules photographed at the SEM. A = Alpha megascleres and gemmoscleres; B = Beta megascleres, one entire gemmosclere and lower rotules of two other gemmoscleres; C and D = Gemmoscleres; E = Microsclere.