AULOSPONGUS PHAKELLOIDES SP. N. (DEMOSPONGIAE: POECILOSCLERIDA: RASPAILIIDAE) FROM DEEP WATER OFF JAMAICA, W.I.

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ABSTRACT

A new demosponge species of the genus *Aulospongus* is described from 550 m depth off Jamaica. Absence of a special ectosome and of spicules other than rhabdostyles places the new species among the reduced members of the genus. It differs from these in an unusual fan-shaped growth-form, shared only with *Aulospongus flabellum* Pulitzer-Finali, 1993 in 'vein-like' structures on one side of the fan, reminiscent of species of *Phakellia,* and in the shape and dimensions of the spicules. This is the second species of *Aulospongus* described from the Caribbean.

The genus *Aulospongus* was recently revised by Hooper et al. (1999) resulting in ten species with a "pan-equatorial, predominantly tropical-subtropical [distribution], with rare incursions into cooler temperate waters" (Hooper et al., 1999: 703). Until now the genus was represented in the Caribbean only by *Aulospongus samariensis* Hooper et al. 1999. Our purpose is to describe a new second Caribbean species of *Aulospongus* and identify how it differs from all previously known members of the genus. For synonymy, definitions, detailed description of all other congeneric species we refer to Hooper et al. (1999).

SYSTEMATICS

Aulospongus phakelloides new species
(Figs. 1–6)

Material.—Holotype: GSN 908A, 112/29, 13. 2. 68, Collector: R/V GOSNOLD (Woods Hole), with triangle dredge, 550 m depth, rocky environment at Morant Ridge, off the southeast tip of Jamaica. Coordinates: 17°55.2′N 76°04′W. The material was fixed in buffered formalin and later transferred to 70% ethanol. It has been deposited at the University of the West Indies, Department of Life Sciences, Kingston, Jamaica.

Description.—Fan-shaped sponge, 83 × 64 × 3 mm (Fig. 1), ochre colored in the dry state, brownish in ethanol, no oscules visible. The fan consists of thick fiber-bundles of amalgamated spicule tracts. The thickest bundles occur at the narrowest side of the fan, and it is possible that the sponge was stalked and torn when collected. As the sponge-fan widens the fiber-bundles branch and radiate to the margins of the fan. These fiber-bundles have a vein-like appearance on one side of the fan, reminiscent of species of *Phakellia*. Thinner fiber-bundles and spicule tracts connect the thick bundles and additionally branch off short, blind ending tracts, structuring the surface and concealing the thick bundles on one side. The texture of the fan leaves open spaces running through the entire blade, which are visible to the unaided eye. As a result of this, the sponge has no definable surface and water can pass through the blade in numerous places between the fiber bundles. Consistency is elastic, not easily torn but brittle when dry.

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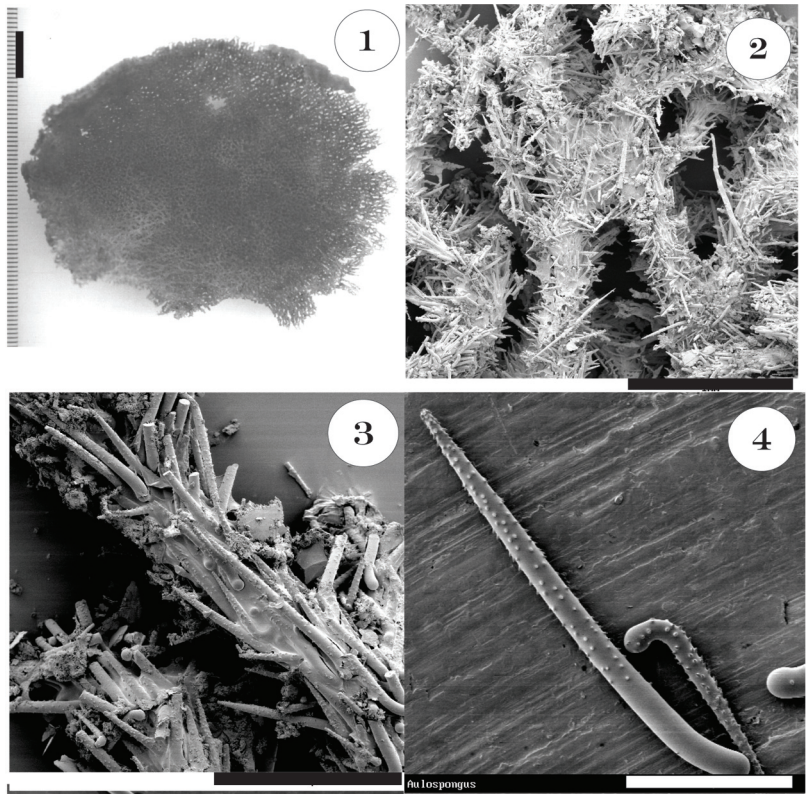

Figure 1. *Aulospongus phakelloides*, holotype. Scale bar = 1cm.
Figure 2. SEM photograph of the fan texture with polyspicular tracts of rhabdostyles. Scale bar = 1 mm.
Figure 3. SEM photograph of a single polyspicular tract of rhabdostyles. Large and small categories of rhabdostyles are not separated in special areas. Scale bar = 300 μm.
Figure 4. SEM photograph of both categories of rhabdostyles. Large category with slight bend, smooth base, smaller category with stronger bend and spined base. Scale bar = 100 μm.

Skeleton.—There is no special ectosome. The choanosome consists of a wicker-work of fiber-bundles and spicule tracts of varying diameters. Fiber-bundles up to a diameter of 1400 μm; thinnest (100–200 μm diameter) fiber bundles found as short, blind ending tracts forming the surface of the fan. Fiber-bundles and tracts cored and echinated by rhabdostyles with no recognizable distribution of the two categories (Figs. 2,3).

Spicules.—The spiculation consists of two categories of rhabdostyles (Fig. 4), the small category is acanthose all over with the spines getting more abundant and larger towards the tip. The blunt end is never completely smooth, and is conspicuously bent, up to an angle of 90° or more, and often tylote. The dimensions are: 120–180 × 13–18 μm (Figs. 4,6–8). The large category of rhadostyles differs not only in size, 240–360 × 20–25 μm, but also in having a smooth blunt end, sometimes half of the spicule lacks spines. The spines near the blunt end are smaller and less numerous than in the smaller rhabdostyles (Fig. 4,5). The large rhabdostyles are rarely straight, but bent to a lesser degree than in the small category. Rare oxeas, fragments of triaenes and some other spicules (mostly bro-

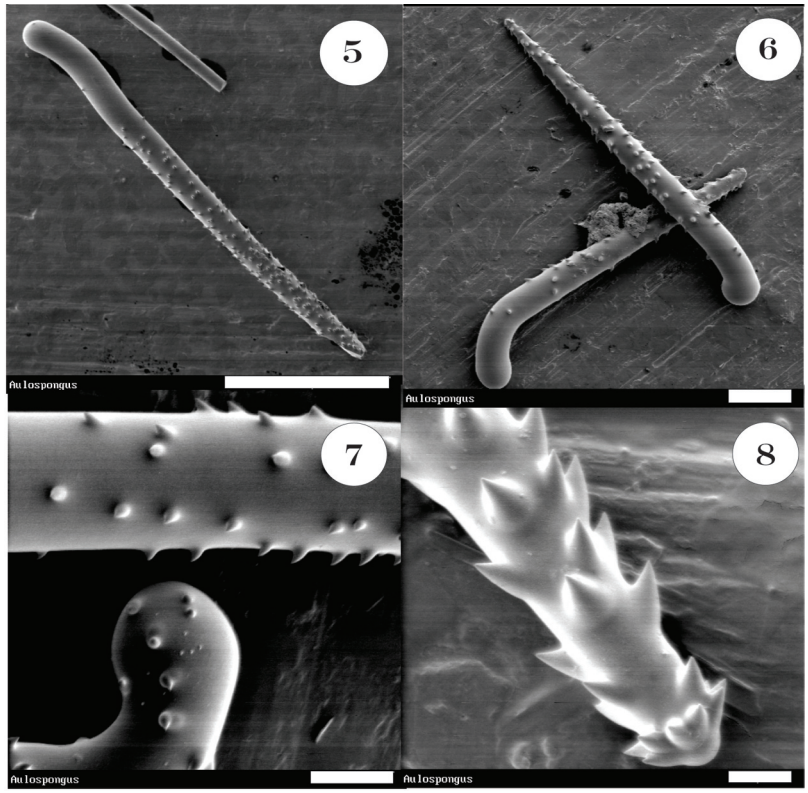

Figure 5. SEM photograph of large rhabdostyle category. Slight bend, smooth base, point sometimes blunt. Scale bar = 100 µm.
Figure 6. SEM photograph of small rhadostyle category. Heads are more heavily spined and often tylote. Scale bar = 30 µm.
Figure 7. SEM photograph. Detail of Figure 4, below: spined and tylote end of small rhabdostyle; above: spines on large rhabdostyle. Scale bar = 10 µm.
Figure 8. SEM photograph of point of small category of rhabdostyles. Note point, mostly structured by a conspicuous cap of spines. Scale bar = 3 µm.

ken) were present in small numbers. These were considered foreign to the sponge. Twenty-five spicules were measured in each category.

Remarks.—Assignment of the new species to *Raspailia* subgenus *Raspaxilla* was excluded because *Raspaxilla* has smooth principal styles and rhabdostyle categories are of different geometry, although *R. hymani* (Dickinson, 1945) is of very similar growth form and fan-like, flabellate growth-forms occur more often in this group. *Rhabderemia* is also a genus with rhabdostyles and microscleres, normally thraustoxeas, spirosigmata and rugose microstyles, which are lacking in some species. *Rhabderemia* is characterized by rhabdostyles bearing a basal spiral twist (Hooper, 2002). As this spiral twist has not been observed in the rhabdostyles of the species described here, assignment to *Rhabderemia* can also be excluded.

The assignment of the new species to the genus *Aulospongus* was made on the occurrence of fiber-bundles and of two categories of rhabdostyles of similar geometry, which were regarded as characteristic of the genus by Hooper et al. (1999). The genus contains ten species, but only one of them, *A. samariensis* Hooper et al. 1999, occurs in the Carib-

Table 1. Comparison of all described species of *Aulospongus* (Sources: Bowerbank, 1873; Thiele, 1898; Pulitzer-Finali, 1994; Hooper et al., 1999).

Species	Rhabdostyles I	Rhabdostyles II	Other spicules	Depth found	Region found
A. tubulatus (Bowerbank, 1973)	109–126 × 5–10	304–462 × 16–24	ectosomal styles	7–80 m	Indian Ocean
A. monticularis (Ridley & Dendy, 1886)	132–275 × 2–9	290–518 × 9–19		14–40 m	Atlantic
A. villosa (Thiele, 1898)	142–165 × 4–10	235–370 × 10–16		?	N-Pacific
A. involutum (Kirkpatrick, 1903)	122–195 × 5–11	224–370 × 12–22	styles & oxeas	37–68 m	Indian Ocean
A. gardineri (Dendy, 1922)	94–136 × 5–11 84–156 × 1–2	205–385 × 11–21	styles & anisoxeas	40–88 m	Indian Ocean
A. spinosum (Topsent, 1927)	75–145 × 7–10	770–1085 × 28–43		219 m	Atlantic, Mediterranean
A. cerebella (Dickinson, 1945)	400 × 30	600 × 35		90 m	Gulf of California
A. flabellum Pulitzer-Finali, 1994	120–370 × 11–19	340–570 × 16–34		110–170 m	W Indian Ocean
A. novaecaledoniensis Hooper, Lehnert & Zea, 1999	115–165 × 8–10	275–400 × 22–24	anisoxeas	300–315 m	New Caledonia
A. samariensis Hooper, Lehnert & Zea, 1999	112–232 × 6–13	218–412 × 9–18	anisoxeas	6–90 m	Caribbean
A. *phakelloides* sp. n.	120–180 × 13–20	240–350 × 20–25		550 m	Jamaica

spicule measurements in µm

bean. Fan-shaped *A. phakelloides* sp. n. differs from cylindrical to club-shaped *A. samariensis* not only in growth form, but also in having a spiculation of two categories of rhabdostyles, while *A. samariensis* has additionally anisoxeas and styles. Dimensions of the rhabdostyles (Table 1) are similar in both species, but differences are apparent regarding spination and form. *Aulospongus flabellum* Pulitzer-Finali, 1993 is most similar to our new species, regarding growth form, dimension of spicules, and lack of specialized ectosome. In contrast to *A. phakelloides*, *A. flabellum* has a completely smooth, large category of rhabdostyles. It has a conspicuous surface of longitudinal ridges and is known only from the Indian Ocean off Kenya, making conspecificity very unlikely. Of the remaining eight species, all are from other seas. Five (*Aulospongus tubulatus, Aulospongus gardineri, Aulospongus involutum, Aulospongus monticularis*, and *Aulospongus novaecaledoniensis*) have special ectosomal or subectosomal spicules, which are lacking in the new species, leaving three species still to discuss. *Aulospongus spinosum* (Topsent, 1927) has raphides in trichodragmata and thus differs from the present species. *Aulospongus cerebella* (Dickinson, 1945) has both categories of rhabdostyles considerably larger than *A. phakelloides* sp. n. and an entirely smooth, large category. Finally *A. villosa* (Thiele, 1898) has rhabdostyles of similar dimensions, only the thickness seems to be smaller. *Aulospongus villosa* is a massive, sub-spherical to bushy species and differs also in the habit of the rhabdostyles.

The characters separating this species from all other species of the genus are the vein-like surface pattern and the small category of rhabdostyles, which are mostly tylostylote and more heavily bent than in other species.

The most closely related species of *Aulospongus* are reduced species, lacking special ectosomal or subectosomal spicules like *A. villosa, A. cerebella, A. flabellum* and *A. spinosum*. All these occur in different seas and the differences are listed above.

The present species represents the deepest record for the genus *Aulospongus*. The temperate to pan-equatorial distribution of species in the genus, two deep-water records well below the thermocline, and the assumed close relatedness of species from distant waters questions if there might be unknown deep sea species of *Aulospongus* of wide distribution. This notion would allow the development of closely related species in distant parts of the world, thus explaining highly disjunct occurrence of genus members.

Etymology.—This species is named after the genus *Phakellia* which characteristically displays a fan-like growth form with 'vein-like' structures on the surface.

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