

TWO NEW SPECIES OF ACROCHAETIUM
FROM SOUTHERN BRAZIL

A. B. JOLY and M. CORDEIRO

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INTRODUCTION

In the course of preparation of the Northeastern marine flora of the State of São Paulo, Brazil, the senior author came across two interesting species of *Acrochaetium* which, we believe, are new to science.

One of them is an endophyte in *Agardhiella tenera* (J. Agardh) Schmitz and the other has been found growing associated with a silicious sponge. Though endophytic *Acrochaetia* are not uncommon, the association with sponges is of a rare occurrence. As far as we were able to find, there are only two other species of *Acrochaetium* known to be associated with sponge: *A. pongicolum* WEBER VAN BOSSE (WEBER VAN BOSSE 1921) and *A. spiculiphilum* DAWSON (DAWSON 1953), besides *Rhodochortonopsis spongicolum* YAMADA (YAMADA 1944).

Acrochaetium epispiculum sp. n.

Plate I (figs. 1-4)

Thallus endozoicus, in spiculis spongiae silicosae generis *Zygomycale* vivens, irregulariter dispersus in hospite, filamentis dicotomicis ramosis cum invenia sunt, atque unilateraliter deinde, prima forma, hac re, obscurata. Filamenta non modo in spiculis esqueleticis sed mesenchymaticis etiam crescunt, diametro variabili, ex $4,8\mu$ usque ad $7,2\mu$, prima mensura frequentiore. Cellulae longiores quam latiores $16,8-30,5\mu$ longae. Ramulorum cellulae secundariorum mi-

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nores sunt, eadem diametro sed minores, 12-18 μ . longae. Cellulae 2-3 chromatophoris parietalibus, sed non semper visilibus, filamentis tum roseis uniformibus. Monosporangia extremo ramulorum aliquorum producta, bifarium aut unilateraliter, circa 7,2 μ lata atque 15,2 μ longa.

Thalli endozoic forming irregularly dispersed patches in the host. The filaments are formed by somewhat elongated cells with a varying diameter. These filaments are, when young, seemingly dichotomous (Fig. 1). The cells at the base of each such dichotomy have a very characteristic shape. They have a triangular outline with the broader part towards the free ends of the filaments. This broadening of the terminal cells of the filaments is the indication of the beginning of the branching (Fig. 1). Afterwards, by additional lateral branching, chiefly from one side (Fig. 2), this initial pattern is obscured. This is especially true in old infested areas where the spicules are completely covered by algae. Apparently also occurs intercalary cell division. The filaments have a diameter varying from 4.8 to 7.2 μ being the smaller diameter more frequent. The cells are longer than broad, measuring 16.8 to 30.5 μ long. Cells of the secondary branches are somewhat smaller. They have the same diameter as above, but are considerably shorter, measuring from 12 to 18 μ long. The cells have two or three parietal chromatophores. These are in some places very difficult to see. The cells appear with a uniform somewhat granular rosy colour. Reproductive bodies, seemingly of the monospore type in the genus, were found. They are produced at the free end of certain branches. The ultimate cells of these branches bud off unilaterally or bilaterally the monosporangia, giving a peculiar appearance to this part of the plant. Fig. 4 shows one of such branches with several developing monosporangia and an emptied one. The monosporangia have a denser content and a somewhat darker colour. The mature monosporangia are longer than broad, with a diameter up to 7.2 μ and are 15.2 μ long. Several emptied monosporangia were also found and they had the same measures as above. The filaments of this plant grow directly apposed to the spicules of the sponge and they can bridge neighboring spicules forming a dense network. The filaments can be found upon large skeletal spicules (Figs. 2-3) as well as on the smaller spicules of the mesenchyma

(Fig. 1). This sponge can attain a height of more than half a meter and has a somewhat elongated shape, being very irregularly perforated in all possible directions. In some of these perforations, sometimes inside, sometimes at the surface, red patches caused by the algae attract the attention on the otherwise gray-purple colour of the sponge.

Type Holotype is deposited in the Herbarium of the Dept. of Botany, Univ. of São Paulo.

Type locality: Growing in the sponge *Zygomycale parishii* (Bowerbank) Topsent³ in the "Enseada do Flamengo", municipality of Ubatuba, State of São Paulo, Brazil.

Acrochaetium agardhiellae sp. n.

(Plate II, Figs. 1-4)

Thallus partim endophyticus, interiore thalli *Agardhiellae tenerae* atque exteriore crescens, fimbriis crebre ramosis hospitis thalli interiore, et parte libera duobus fimbriarum generibus formata: longis, non ramosis, sterilibus ac parvis, ramosis, fertilibusque.

Primum genus cellulis 14-87 μ longis, 4,8-10,8 μ latis, chromatophoris parietalibus. Ramuli fertiles monosporis 7,8 μ latis et 12,8 μ longis. Pars endophytica fimbriis irregulariter ramosis formata, cellulis quae inter alias corticalis regionis atque subcorticalis miscent, usque ad centrale hospitis thalli cavum et ibi spargunt.

Cellulae endophytici systematis breviores ac contortae, atque aliquibus regionibus quidem septa non visibilia.

Plants partly endophytic growing in- and outside the thallus of *Agardhiella tenera*, composed of a very ramified endophytic system of filaments and a free portion. This is originated from inside the *Agardhiella* and emerges perpendicularly to the surface. These filaments are of two kinds. Non branched, long, sterile ones and of especially branched, fertile ones. The former has long cells (Fig. 3) measuring from 14.4 to 87 μ long and with a diameter ranging from 4.8 to 10.8 μ , with parietal chromatophores. The fertile branches are much

3) Kindly identified by Dr. L. Fourneris of the "Instituto Oceanográfico" of the Univ. of São Paulo.

shorter, bearing few laterals, some of which produce monosporangia. These appear in small clusters, are ovoid, having a diameter of 7.8μ and are 12.8μ long. They are easily recognized by its denser red contents and its thicker membrane (Fig. 4).

The endophytic system has a quite different appearance (Figs. 1-2). It is composed of irregularly branched filaments which grow in between the cortical and sub-cortical layers of the host (Fig. 2), penetrating the hollow cavity at the center of the thallus (Fig. 1). In older infested plants of *Agardhiella*, the central cavity can be filled up with a dense network of *Acrochaetium* filaments. The cells of the endophytic filaments are much shorter, have an irregular and somewhat contorted outline (Fig. 2). In some parts, septa are not visible, thus giving to these portions a peculiar siphonaceous appearance (Fig. 1). The filaments that reach and bridge the hollow cavity of the host thallus, are more regular in outline, like the external ones, though the cells are shorter.

Type Holotype is deposited in the Herbarium of the Dept. of Botany, University of São Paulo.

Type locality: On *Agardhiella tenera* growing attached to rocks at the "Enseada do Flamengo", municipality of Ubatuba, State of São Paulo, Brazil.

DISCUSSION

Acrochaetium epispiculum finds its place near the two previously described species of *Acrochaetium* that inhabit sponges: *A. spongicolum* WEBER VAN BOSSE (1921, p. 192-196, Figs. 56, 57) and *A. spiculiphilum* DAWSON 1953, p. 22, Pl. 10, Figs. 2-4). Nevertheless we think it is sufficiently different to merit recognition as a new entity. It differs considerably in habit from *A. spiculiphilum*, having our plant larger cells. Nothing can be said about the reproductive structures of this species whose monospores were described by DAWSON as being "not positively identified". The other species, *A. spongicolum*, is also different, as can be judged by the drawing presented by Mme. WEBER VAN BOSSE. It differs also in size, being

our plant larger. Since reproductive structures were not found on the material described by her, nothing can be said in comparison with our material. *A. spongicolum*, on the other hand, has been found growing upon a corneous sponge.

Acrochaetium agardhiellae differs from the truly endophytic *Acrochaetia* and allied genera known to occur in the American Atlantic (see TAYLOR 1960) in the following way: 1. From *A. hypneae* (BÖRGESEN) BÖRGESEN (BÖRGESEN 1916, p. 51, Figs. 53-54) in its much more developed basal system, its longer cells and different position of the monosporangia. 2. From *A. repens* BÖRGESEN (BÖRGESEN 1916, p. 52, Figs. 55, 56) in its much more developed basal system and in its non branched, erect, sterile filaments. 3. From *A. phacelorhizum* BÖRGESEN (BÖRGESEN 1916, p. 54, Figs. 57-59) in its quite different habit. 4. From *A. homorrhizum* BÖRGESEN (BÖRGESEN 1916, p. 50, Figs. 50-52) in its more endophytic habitus, distinct non-moniliform basal filaments and non-branched, erect portion. 5. From *A. nemalionis* (DE NOTARIS) BORNET, in its more developed basal system and non-branched, erect, sterile, filaments. 6. From *Kylinia liagoriae* (BÖRGESEN) PAPENFUSS (BÖRGESEN 1916, p. 57, Figs. 60-62) in its very different habitus, besides the generic difference.

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ABSTRACT

Two new species of *Acrochaetia* are described: *Acrochaetium epispiculum* and *Acrochaetium agardhiellae*. The former was found growing associated with a silicious sponge and the other is an endo-

phyte on *Agardhiella tenera*. Besides the Latin diagnose, detailed descriptions as well as two plates are given.

SUMÁRIO

O presente trabalho descreve duas novas espécies de algas vermelhas: *Acrochaetium epispiculum* e *Acrochaetium agardhiellae*. A primeira vive associada a uma esponja silicosa e a segunda é uma endófito em *Agardhiella tenera*, outra alga vermelha. Além da diagnose latina, uma descrição detalhada, bem como duas pranchas com numerosos desenhos são apresentados.

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ESTAMPAS

PLATE I

Acrochaetium epispiculum sp. n.

- Fig. 1 Young dichotomic filaments growing upon mesenchyma spicules.
- Fig. 2 Young filaments; note beginning of terminal branching.
- Fig. 3 Older filaments attached upon a skeletal spicule; note secondary branching.
- Fig. 4 Older filaments. Pattern of original branching not discernible.
- Fig. 5 Fertile portion with monosporangia; note the tendency of unilateral disposition.

All figures from the type collection. Drawings made from formalin preserved material with exception of figs. 1 and 2, obtained from living material.

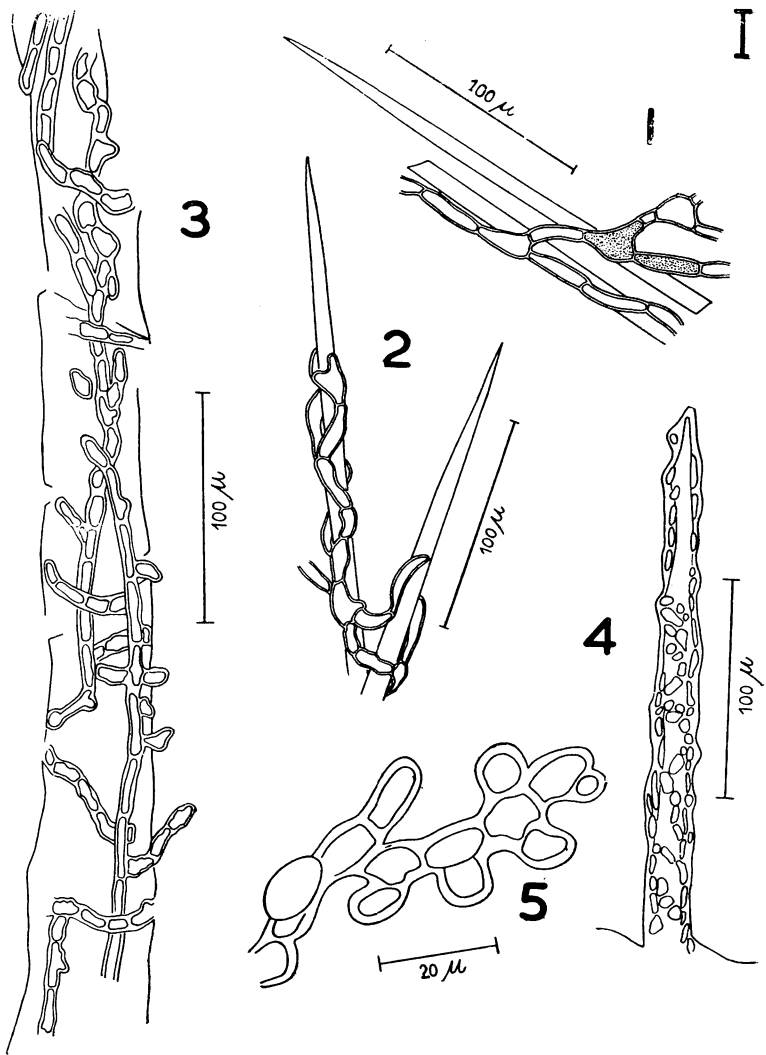


PLATE II

Acrochaetium agardhiellae sp. n.

- Fig. 1 Cross section of *Agardhiella*, showing endophytic and external portions of *Acrochaetium*. Note non branched sterile filaments and siphonaceous appearance of certain endophytic threads.
- Fig. 2 Cross section of *Agardhiella*, showing details of the endophytic *Acrochaetium*.
- Fig. 3 Erect non branched external filament.
- Fig. 4 Detail of monosporangia.

All figures from the type collection Drawings made from formalin preserved material with exception of fig. 2 obtained from living material.

II

