ADDITIONS TO THE MARINE FLORA OF BRAZIL. VI.

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1 — *Introduction*

This paper deals with some marine algae collected in the shores of the States of Espirito Santo, Bahia and Paraíba, that are reported for the first time as occuring along the American South Atlantic. As in the previous papers of this series (see Joly 1956, Joly e col. 1962, 1963, 1965a, 1965b). Each new record is documented with structural as well as reproductive features, of the Brazilian plants allowing comparison with material from other regions.

The coasts where these plants were collected are among the richest in marine algae along the Brazilian shores.

A new variety of *Pterosiphonia parasitica* is proposed herein, the species is for the first time found along the American shores.

2 — *Descriptions*

Valonia macrophysa Kützing

References: Kützing 1856, T. 87, figs. 3 a, b, c; Börgesen 1913, p. 29; Taylor 1928, p. 75, pl. 13, fig. 17; 1960, p. 110, pl. 2, fig. 6, pl. 7, fig. 4.

Plate I, fig. 1.

Plants gregarious, growing in clumps, firmly attached to the substratum, of a dark green colour when alive. The clumps are formed by numerous individuals, maintained together by special hapteral cells develloped from the basal portions of the largest vesicula. Ve-

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getative cells of our material have a diameter varying from 0.4 up to 0.9 cm and up to 3.0 cm high.

These plants were collected at the following places: "Cabo Santo Agostinho", State of Pernambuco and at "Praia dos Fornos", Cabo Frio, Rio de Janeiro State.

This is the first reference of the occurence of this species in South America. It was previously known to occur at the Caribbean islands on the American Atlantic.

Cladophoropsis macromeres Taylor

References: Taylor 1928, p. 64, pl. 4, figs. 15-16; 1960, p. 118, pl. 2, fig. 2.

Plate V, figs. 1-2.

The Brazilian material of this species was found growing associated with *Valonia aegagropila* C. Agardh, forming curled tufts. The filaments are in certain portions irregularly and sparsely branched; in other portions the branching is more frequent and generally unilaterally placed. The basal parts of the filaments have a diameter varying from 300 to 330μ. The upper young branches have a diameter varying from 195 to 225μ. The largest cell measured 1.800μ long. Multilobed hapteral projections are very frequent. They are produced at the distal end of many vegetative cells. These contribute to the fixation of the plants.

The Brazilian material differs in some respects from the Caribbean plants but are, nevertheless, best placed in this species than in *C. membranacea* (C. Agardh) Börgesen, a much delicate plant. The main differences are:
The diameter of the filaments (both basal and terminal ones), is a little below the given range.

Our plants also differ in habit of the Caribbean material, being not loose. Apparently this is a consequence of the abundance of hapteral projections found in our material.

The plant was found at the following places: "Cabo Branco", Paraíba State. This is the first reference of the occurrence of this species on continental South America.

Galaxaura comans Kjellman

References: Börgesen 1916, p. 90, figs. 95, 96; Taylor 1960, p. 336.

Plate II, figs. 1-4.

Plants growing isolated, measuring up to 6 cm high, abundant and irregularly branched, very little or no calcified, extremely vilose in appearance, almost of a spongy texture and of a wine red colour when alive. Branches from 2 to 3 mm wide, densely covered by assimilatory filaments, all of the same type. Medullary filaments very uniform having a diameter of about 15μ. Assimilatory filaments born on somewhat ovoid cells, one or sometimes two, for each such cells. Assimilatory filaments with a very uniform diameter of about 19μ, each starting from one ovoid cell having 50μ of diameter and about 80μ long. Tetrasporangia borne on the assimilators terminal on short lateral branches, cruciately divided, having a diameter varying from 37 to 41μ.

The plants were found in the following localities: "Praia de Meaípe", Espirito Santo State, and "Recife da Lixa", Bahia State. They were found with tetrasporangia in the month of June. This is the first reference of the occurrence os this species on continental South America.

Galaxaura lapidescens (Ellis et Solander) Lamouroux

References: Börgesen 1916, p. 95, figs. 102-104; Taylor 1928, p. 138, pl. 21, fig. 13, pl. 30, fig. 8; 1960, p. 337.

Plate I, fig. 2; Plate II, fig. 5.

Plants growing isolated, measuring up to 8,5 cm high, abundantly ramified, branches arising from different intervals, all of the same diameter. Plants of a rather vilose appearance, almost of a spongy texture, of a red-brown colour when alive. Branches with a diameter of 2 mm completely covered with assimilatory filaments, which are of two types, long and short ones. Both types are suported by an ovoid cell. Medullary filaments of an uniform diameter of about 15μ. Long assimilatory filaments with a diameter, ranging between

15 and 19μ. Short assimilatory filaments rarely with more than 2 or 3 cells. Both types of filaments with one, sometimes 2 or 3, small ovoid cells at their base, these having a diameter of 37 up to 48μ. Tetrasporangia with a diameter varying from 30 up to 34μ, cruciately divided. This is the first reference of the occurrence of this species on the Brazilian shores.

The plants were found at "Praia de Meaipe", Espirito Santo State, "Recife da Lixa", Bahia State and they were found with tetrasporangia in the month of July.

Halymenia pseudofloresia Collins et Howe

References: Collins and Hervey 1917, p. 149; Taylor 1960, p. 418.

Plate I, fig. 3; Plate II, fig. 6.

Plants large, measuring up to 50 cm high isolated, of a very slipery gelatinose texture and of a beautiful rosy-red colour when alive.

From a small roundish holdfalt starts a short and almost cylindrical estipe which gives rise to the flat, branched, laminar portion of the frond. At the base the frond is distinctly cuneate expanding rapidly into the basal wider portion of the thallus. The frond can be entire or sometimes divided up to 3 times in strap-shaped long portions. If entire can have several marginal branches of varied width, and also be proliferous. The frond is undulated and have a width up to 5 cm, being sometimes divided again at the upper portions. Margins usually somewhat eroded and in places, abundantly proliferous.

The frond has a thickness of about 150μ (in cross sections). The large stellate cells have a diameter of about 38μ and the surface cells have a diameter varying from 5 up to 8μ. The cortical region has only 5 or 6 rows of cells. Tetrasporangia, measuring 10 to 15μ of diameter, imersed in the cortical region scattered over the frond.

The plant was found very abundant and it was collected washed ashore at a place known as "Ponta Grossa", municipality of Aracati, Ceará State. This is the first reference of the occurrence of this species in South America.

Wrangelia penicillata C. Agardh

References: Harvey 1853, p. 143, pl. 34 b, figs. 1-9, Börgesen 1916, p. 120, figs. 131-132; Taylor 1928, p. 145, pl. 20, figs. 11, 12, 19, pl. 32, figs. 1, 7; 1960, p. 503, pl. 66, figs. 5-6, pl. 74, fig. 5.

Plate III, figs. 1-2.

The Brazilian material of this species was found growing as isolated plants or in small clumps. The largest plants measured up to 12.5 cm high. They have a brown-red colour and are well branched.

The main axis has regular and alternately placed two ranks of short branches. Main axis and secondary ones completely corticated by downward growing rhizoids, forming a pseudo parenchymatous cortex. Last orders branchlets, monosiphonus, abundant and furcately branched. Gonimoblasts protected by somewhat incurved well branched, involucral filaments. Carposporangia having a diameter of about 27μ. Tetrasporangia large, almost spherical, having a diameter up to 75μ.

The plants were collected at "Ilha do Francês", near Piuma, and at Guarapari, both localities on the Espirito Santo State. They were found with carposporangia and with tetrasporangia in the month of May. This is the first reference of the occurrence of this species on continental South America.

Dasya pedicellata (C. Ag.) C. Agardh

References: Börgesen 1919, p. 316; Taylor 1928, p. 173, pl. 35, fig. 7; 1960, p. 562.

Plate III, figs. 3, 4.

Of this beautiful delicate plant, abundant material was found. The plants had a rosy-brown colour when alive, being flacid and mucose to the touch. The largest plant collected measured up to 23 cm high with a proeminent main axis dissected by numerous irregularly placed laterals. These were not, or very seldomly, branched again.

The main axis as well as the laterals are densely covered by very numerous and delicate monosiphonous branchlets. The base of the main axis as well as the bases of the older laterals showed no branchlets. The axis and the main branches are completely corticated by downward growing rhizoids. Last order branchlets (ramelli) with a diameter varying from 13 to 15μ, with cells 63 up to 81μ long. Spermatangial cluster develloped at the last branching of a ramelli, with the central axis clearly visible through the spermatangia, always ending by numerous sterile cells, remaining as a filamentous tip. Spermatangial clusters measuring up to 325μ long and with a diameter of about 3.5μ.

The plant was found at the "Ilha do Francês", near Piuma, Espirito Santo State. It was found with spermatangia during the month of May. This is the first reference of the occurrence of this species along the Brazilian shores.

Lophocladia trichoclados (Martens, "in" C. Ag.) Schmitz

References: Börgesen 1918, p. 302, figs. 304-307; 1919, p. 305, figs. 308-312; Taylor 1928, p. 181; 1960, p. 590.

Plate IV, figs. 1-6.

Plants filamentous, flacid, of a beautiful red colour when alive, measuring up to 7 cm high. Main axis showing 2 or 3 dichotomies and these are abundantly ramified. Axis with 4 pericentrals, corticated more densely below, sparsely above. Last order branches very delicate, bearing monosiphonous branchlets, radially placed. Branchlets furcatelly ramified. Cystocarps measuring up to 954μ high and with a maximum diameter of about 682μ. Carposporangia distinctly elongated, measuring up to 91μ long, with a diameter of about 32μ. Spermatangial bodies cylindrical, developed from a branch of a monosiphonous ramelli were the 3 basal cells remain sterile, as a peduncle. The central axis is clearly visible through the spermatangia. The spermantangial body measures up to 353μ long and with a diameter of about 58μ. Spermatangia having a diameter of 7μ. Tetrasporangia produced in distinctive stichidia borne at the base of a monosiphonous branchlet. It is somewhat spirally twisted, each node bearing one tetrasporangium. The stichidium is 423μ high and has

a diameter of 94μ. The tetrasporangium has a diameter ranging from 47 up to 54μ.

The plants were found with cyctocarps, spermatangia and tetrasporangia in the month of June.

It was collected at the "Recife da Coroa Vermelha", off Caravelas, Bahia State. This is the first reference of the occurrence of this genus and species along the Brazilian shores.

Pterosiphonia parasitica (Hudson) Falkenberg var. *australis* Joly et Cordeiro-Marino n. var.

References: (for the species) Falkenberg 1901, p. 265, T. 2, figs. 3-9; Kylin 1956, figs. 416, 523, 524; Harvey 1849, pl. 147 (as *Polysiphonia parasitica* Greville).

Plate I, fig. 4; Plate III, fig. 5; Plate V, figs. 3-10.

Plants growing in colonies, forming low, dense tufts of a brown dark-red colour when alive, measuring up to 4 cm high.

The erect main branches arise from a decumbent portion fixed to the substratum by numerous strong unicelular rhizoids ending in a multicelular disc. The erect main flatened axis is dissected by regular, alternate and distichously placed flat laterals. Each lateral branch of first order is in turn dissected by regular, alternate and distichously placed short flat branches. These second order laterals can in certain places, have in the same way, third degree flatened laterals. This pattern of branching produces a frond where there is considerable overlaping of branches, giving the apearance of a piece of delicate lace. The last order branches are always ascendent and slightly curved. The plant has no cortication except at the extreme base and on the older rhizomes and has from 6 up to 10 pericentrals.

The prostrate portion is also distinctly flatened having the larger diameter varying from 166 up to 246μ and the minor diameter varying from 127 up to 168μ. The rhizome has from 8 to 9 pericentrals and is also slightly corticated.

The erect main portion has a diameter of about 367μ at its second segment from the base. Higher up the larger diameter varies from 342 up to 369μ and the minor diameter from 209 up to 304μ.

Each second segment bears one lateral branch, alternately placed. The first order branches are from 2400 up to 2775μ long with a diameter varying from 150 up to 195μ. The second order branches are from 630 up to 675μ long with a diameter varying from 90 up to 105μ. The tetrasporangia are produced on the upper non modified last order branches. Each segment carries one sporangium. They are placed in a slight spiral line and are tetrahedrically divided.

Our plant differs from the other known related species as for instance *P. dendroidea* (Mont.) Falkenberg, in the number of last order branches on each first order lateral. This species has from 6 to 10 pinnules on each pinna, ours have at least 20 for each pinna. Only the first three segments of the lateral branch coalesce with the main axis in our species, against four in *P. dendroidea*.

The presence of the cortication at the base of the main erect branches, as well as on the prostrate old axis is the distinctive feature that characterize the present variety.

Pterosiphonia parasitica (Hudson) Falkenberg. var. *australis*. Joly et Cordeiro-Marino n. var.

A typus difert pars basalis ramis erectis ac ramis prostatis corticatis.

Habitat: Guarapari: Espirito Santo State, growing on rocks at low tide level. Found with tetrasporangia in the month of May.

This is the second species of this genus to be found along the American Atlantic coast. The other common species being *P. pennata* (Roth) Falkenberg.

3 — *Acknowledgements*

The senior author wishes to acknowledge the "Fundação de Amparo à Pesquisa do Estado de São Paulo" (FAPESP) for the grant given him to support travel expenses involved.

4 — *Summary*

This paper gives information concerning the findings for the first time of the following marine algae along the Brazilian shores: *Valonia macrophysa, Cladophoropsis macromeres, Galaxaura lapidescens, Halymenia pseudofloresia, Wrangelia penicillata, Dasya pedi-*

cellata, Lophocladia trichoclados and *Pterosiphonia parasitica* var. *australis*.

Some of these plants were found for the first time on continental South America. The last named species is reported for the first time as ocurring on the American Atlantic shores. A new variety of this species is proposed. Five plates with numerous drawings are presented.

5 — *Sumário*

O presente trabalho refere o encontro pela primeira vez no litoral brasileiro das seguintes espécies de algas marinhas: *Valonia macrophysa, Cladophoropsis macromeres, Galaxaura comans, Galaxaura lapidescens, Halymenia pseudofloresia, Wrangelia penicillata, Dasya pedicellata, Lophocladia trichoclados* and *Pterosiphonia parasitica* var. *australis*.

Algumas destas plantas são pela primeira vez encontradas na costa da América do Sul. A última espécie da lista é referida pela primeira vez como ocorrendo na costa Atlântica Americana. Uma nova variedade desta espécie é descrita. Cinco pranchas com numerosas ilustrações completam o trabalho.

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PRANCHAS

Plate I:

Fig. 1 — *Valonia macrophysa*. Habitus of a single plant, isolated from a clump, showing the buding off of a new vesicula.

Fig. 2 — *Galaxaura lapidescens*. Habitus of a part of a plant.

Fig. 3 — *Halymenia pseudofloresia*. Habitus of a very large plant.

Fig. 4 — *Pterosiphonia parasitica* var. *australis*. Upper portion of an erect vegetative branch, note the characteristic overlaping of second order branches.

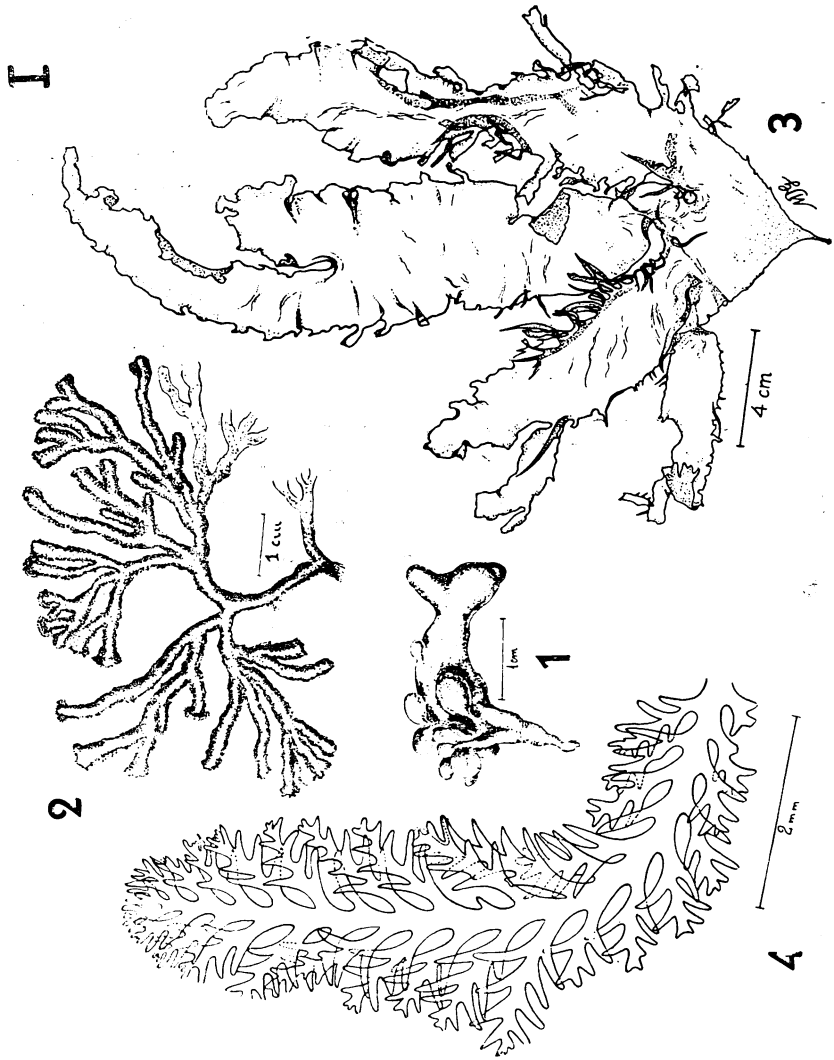
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Plate II:

Figs. 1-4 — *Galaxaura comans*. Group of assimilatory filaments seen from the surface. Base of the assimilators showing no moniliform cells. Two assimilators with tetrasporangia.

Fig. 5 — *Galaxaura lapidescens*. Upper portion of medullary filaments with the base of two assimilators, note the uniform cylindrical shape of the assimilators and the somewhat moniliform basal cells.

Fig. 6 — *Halymenia pseudofloresia*. Part of a cross section of the laminar portion of the frond.

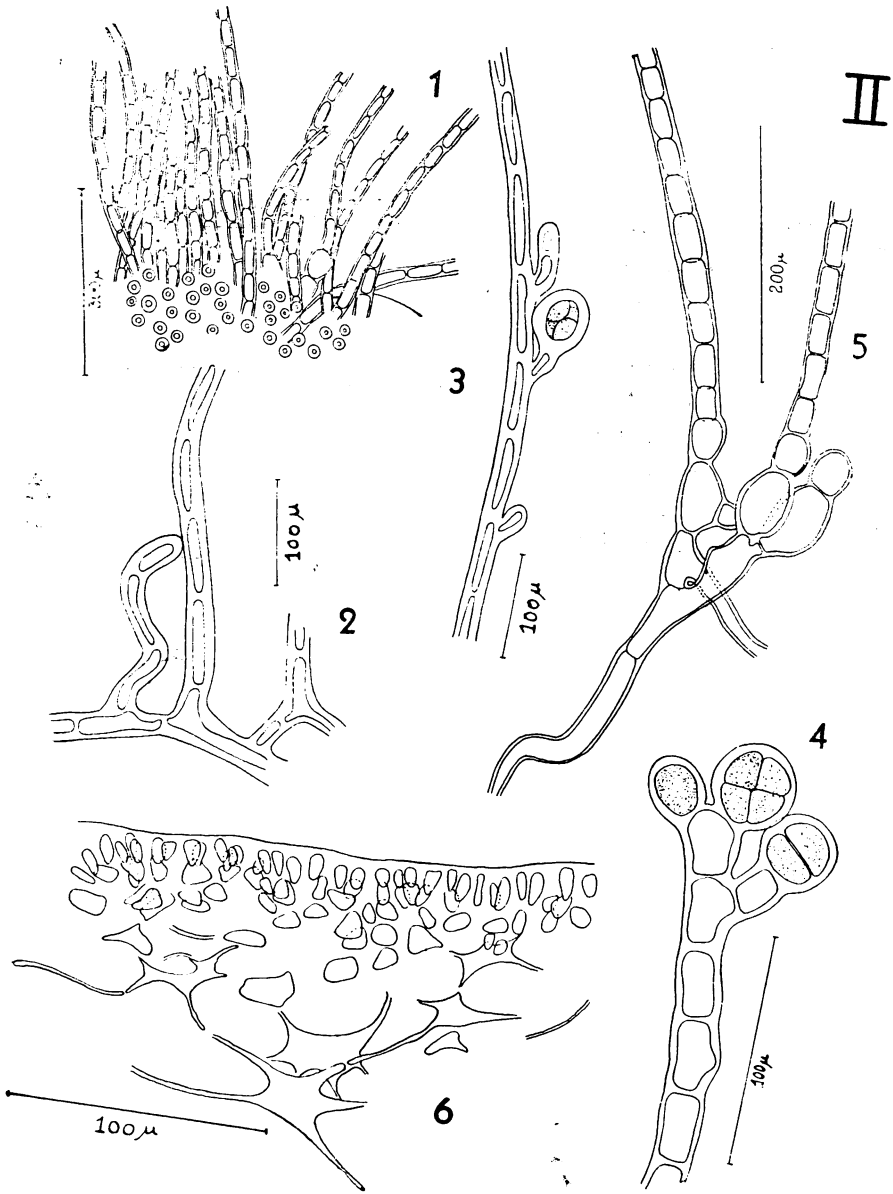
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Plate III:

Figs. 1-2 — *Wrangelia penicillata*. Gonimoblasts with carposporangia and part of the involucral filaments. Detail of a tetrasporangium.

Figs. 3-4 — *Dasya pedicellata*. Young and mature spermatangial bodies.

Fig. 5 — *Pterosiphonia parasitica* var. *australis*. Upper portion of a tetrasporic plant.

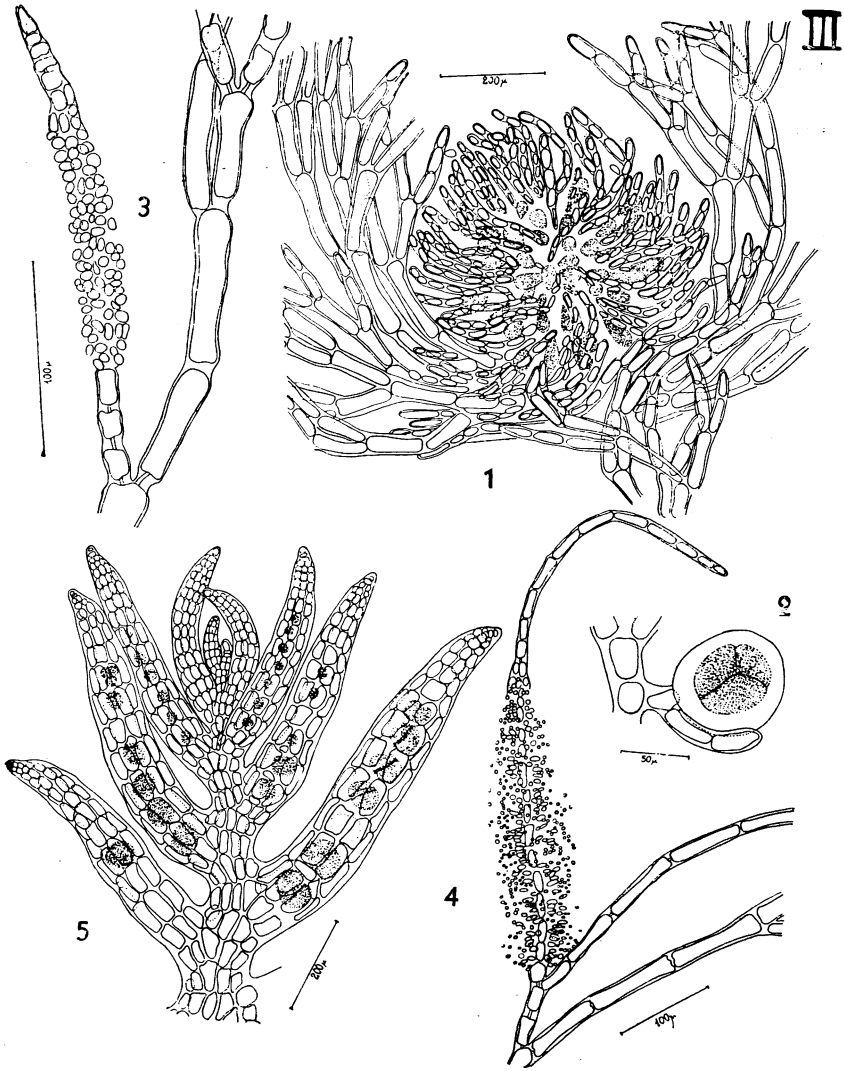
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Plate IV:

Figs. 1-6 — *Lophocladia trichoclados*. Detail of the branch types. Detail of the cortication. Young and mature stichidia. Spermatangial body. Cystocarp.

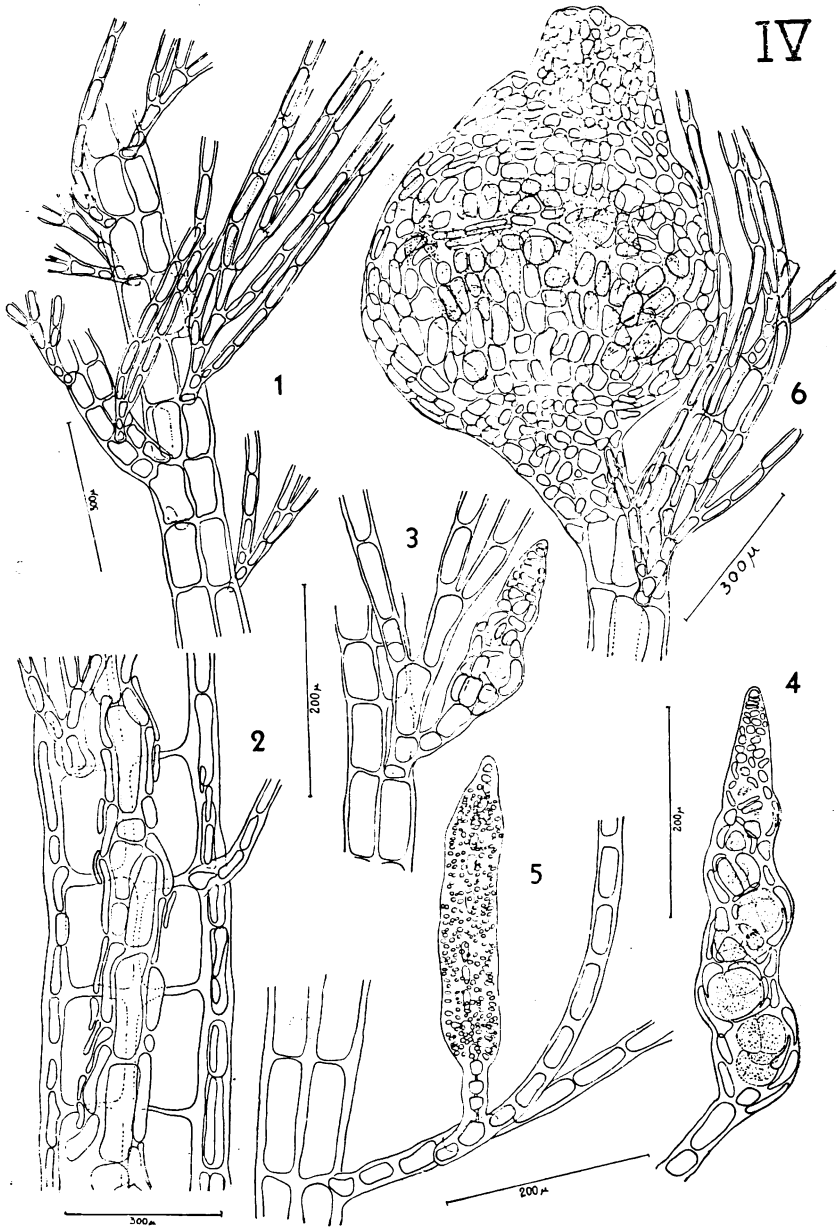
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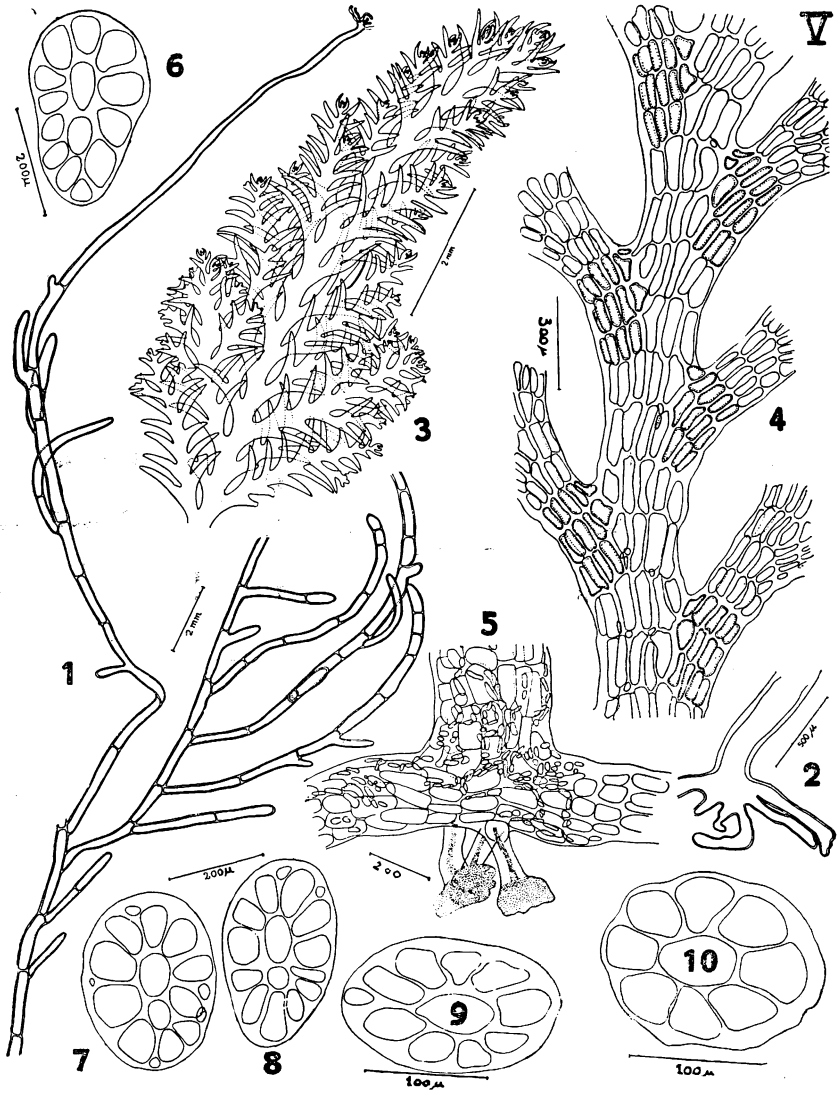
Plate V:

Figs. 1-2 — *Cladophoropsis macromeres*. Habitus of a part of a plant; note the tenaculum developed at the upper portion. Detail of the tenaculum.

Figs. 3-10 — *Pterosiphonia parasitica* var. *australis*. Upper portion of a sterile branch. Detail of the way of branching; note that the first 3 segments of the determinate branch are fused with the main axis (stappled cells) and the very beginning of the cortication. Decumbent axis and basal portion of an erect shoot, note that in all sections the central cell of the fused lateral appears; note beginning of cortication and the flatened frond. Two cross sections of the young prostrate axis; note beginning of cortication in the first drawing.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