Arq. Est. Biol. Mar. Univ. Ceará, 5 (1):65-78
Junho, 1965 — Fortaleza, Ceará, Brasil

ADDITIONS TO THE MARINE FLORA OF BRAZIL V.

A. B. Joly [1] — M. Cordeiro-Marino [2]
N. Yamaguishi-Tomita [2] — Y. Ugadim [1]
E. de Oliveira Filho [1] — M. M. Ferreira [3]

1 — INTRODUCTION

New and extensive collections of marine algae made in Salvador, Bahia (Lat. S 12° 57', Long. W 38° 29') in Fortaleza, Ceará (Lat. S 3° 46', Long. W 38° 33') and in a few other places in the neighbourhood of the last named city showed that a number of common algae in these regions were up to now unreported on the Brazilian shores (Taylor 1960). Certain findings are very puzzling from a phytogeographical point of view (see under *Caulerpa scalpelliformis*). The four previous papers of this series (see Joly 1956, Joly and col. 1962, 1963, 1965) dealt with algae found south of Rio de Janeiro, approximately to the latitude of 23° S. The present report is the first of a series dealing with Brazilian algae found north of Rio de Janeiro.

2 — SYSTEMATIC ACCOUNT

Struvea anastomosans (Harvey) Piccone

References: Borgesen 1913, p. 54, fig. 39; Taylor 1928, p. 73, pl. 3, fig. 10; 1960, p. 122, pl. 5, fig. 1, pl. 9, fig. 2

Plate II, figs. 1-4

Plants gregarious, several erect or spreading blades arising together from a common stoloniferous portion. The blade is a net and when young has a fairly triangular outline. Older ones are not so regular by differences on development of the lateral branches. The blade has a distinct erect monosiphonous peduncle without any lateral branches. On the middle and upper portions the axis is multicellular and one where each cell bears two oppositely placed lateral branches. These are also uniseriately multicellular and ones where each cell bears again two oppositely placed lateral branches of second order. This pattern is repeated again. Here and there the regularity is not so even. The cells of the branches, usually of 2nd. or 3rd. order, when touching a cell from another branch, produce a special cell, a kind of hapteron, that anchors firmly one branch to another. The process is repeated again and again and in this way a net is established.

Our largest plants measured up to 2,5 cm high and the peduncle alone (stipe) from 0,7 to 1,3 cm. The blade has a maximum diameter of 1.005 micra. The largest blades had from 7 to 16 pairs of lateral branches of first order. The main axis in the region where it is ramified has a diameter varying from 225 up to 495 micra. The blade filaments have a diameter around 105 micra.

Our plants were collected on a reef in the beach of Amaralina, Salvador, Bahia, where they were growing associated with several other algae exposed at low tide.

This is the first reference of the occurrence of this genus and species on the Brazilian shores.

Caulerpa scalpelliformis (R. Br.) Weber van Bosse f. *denticulata* (Decaisne) Weber van Bosse

References: Weber van Bosse 1893, p. 286, pl. XXII, figs. 11 a, b, c, d, pl.

1 — Dept. of Botany, University of São Paulo.
2 — Cryptogamic Section, "Instituto de Botânica do Estado de São Paulo.
3 — Research Fellow "National Research Council of Brazil" (CNPq).

XXIII, figs. 8, 9, 10; Borgesen, 1940, p. 49, Durairatnam 1961, p. 28.

Plate I, fig. 1

Plants stoloniferous fixed to the substratum by rhizoid bearing branches. The rhizome has a diameter of about 1,5 mm and at varying intervals bears erect flat branches (blades). These measure up to 8 cm long and 11 mm in its broadest part. The erect branches have a short flattened stalk portion from which the marginally toothed flattened blade arises. The blade has a distinct cuneate lower portion gradually passing to the stalk. From there on the blade has a near uniform diameter. The blade shows along both margins a series of about seven to nine large broad teeth. These are distinctly curved apically and are in turn minutely denticulated in the upper free portion. The large teeth have shallow obliquely disposed incisions which do not disturb the entireness of the blade.

Our material agrees very well with the description and the figures presented by Weber van Bosse and quoted above. Even we had a plant that was a strict replica of her figure n.º 10 in plate XXIII. Our material was collected in a shallow lagoon behind a coral reef at the northern side of the island of Itaparica (Salvador, Bahia) at a place named Mar Grande. Our plant was growing associated with several forms of *Caulerpa cupressoides, Neomeris annulata* and *Acetabularia crenulata*.

This species was previously known to occur at the Red Sea, Ceylon and the Mauritius Island, as far as we were able to ascertain. This is the first finding of the species outside the Indo-Pacific region.

One more thing about this species: In Borgesen's paper quoted above, at the end of the reference to the present species (Borgesen, 1. et p. c.) he gives the known geographical distribution of the species as follows: "Indian Ocean, Red Sea, Brazil etc.". It is at the present impossible to trace Borgesen's statement that the species occurred at the Brazilian shores. We are inclined to believe that possibly it was a mistake.

Acetabularia crenulata Lamouroux

References: Harvey 1858, p. 40, pl. 42, figs. 1-7; Mazé and Schramm 1870-1877, p. 83; Solms-Laubach 1895, p. 24, pl. I, figs. 1-3; Collins 1901, p. 247; Borgesen 1913, p. 81, fig. 66; Collins and Hervey 1917, p. 53; Taylor 1960, p. 105, pl. 4, fig. 5, pl. 6, fig. 12; Taylor 1928, p. 67, pl. 5, figs. 11, 22-24 (as *Acetabulum crenulatum* (Lam.) Kuntze); Taylor and Arndt 1929, p. 656 (as *Acetabulum crenulatum* (Lam.) Kuntze).

Plate II, figs. 5-7

Plants measuring from 4 to 5 cm high of a white-green colour when alive, usualy several growing together over dead mollusc shells lying on the bottom of shallow lagoons behind a coral reef.

The plant has ramified rhizoidal portions deeply sunken in the shell and from which the erect axis arises. This is fairly well calcified and shows the verticills of scars left by the deciduous assimilatory filaments. They measured up to 6 mm long, with a diameter varying from 90 to 150 micra.

At the summit one finds the cup formed by the fertile branches (rays). This portion has a diameter of about 1,3 cm and each ray measures 5 mm long. The number of rays in each cup varies from 49 to 54. The corona inferior is deeply incised, measures up to 247.9 micra long and bears no scars. The corona superior measures up to 296 micra long and bears two large, centrally placed scars. Each ray produces from 125 to 153 gametangia (cysts). The free portion of each ray is distinctly apiculated, a characteristic of this species.

Our plants were collected in a shallow lagoon behind a coral reef in the island of Itaparica, Salvador, Bahia, in a place locally known as Mar Grande, during low tide. The plants were fixed to dead mollusc shells lying in the bottom, associated with *Neomeris annulata, Caulerpa scalpelliformis* and *Caulerpa cupressoides* mainly. This is the first reference of the occurrence of this species in the American South Atlantic and the second species of the genus to be found along the Brazilian shores.

Dictyota jamaicensis Taylor

Reference: Taylor 1960, p. 223, pl. 32, figs. 4-5

Plates, I, II, figs. 2, 8-9

Plants growing isolated, measuring up to 16 cm high, of a light brown colour when alive. The frond measures about 3 mm broad, but is a little broader (up to 4 mm) just below each dichotomy, with distinctly dentate margins being the teeth almost evenly spaced. The mature plant has from 8 to 10 dichotomies. These are irregularly spaced (from 1 up to 1,5 cm). Sometimes the lower ones are longer, sometimes the middle or upper ones are the longest. The angle between the two arms of the dichotomy is acute being the two branches placed almost parallel to one another. This feature is very characteristic of this recently described species. The frond measures about 95 micra thick.

The plurilocular male gametangia (antheridia) are produced in distinct sori. These are fertile in the center, forming sterile unicellular projections (non developed antheridia) on each border. The plurilocular gametangium is about 77.3 micra high and has a diameter up to 26.1 micra.

This is the first record of this species outside the Caribbean region.

Halymenia duchassaigni (J. Agardh) Kylin

References: Kylin 1932, p. 29; Taylor 1960, p. 419, pl. 52, fig. 2.

Plate III, figs. 1-3.

Plants fixed to the substratum by a small holdfast, growing isolated. The cylindrical very short basal portion expands rapidly into the laminar blade. This has an irregular outline, can be entire or cleft in irregular lobes. The entire plant measures up to 11 cm and is about 3,5 cm in its broadest portion. The vegetative frond is about 263 micra thick. Structurally one finds a very loose medular region traversed by diversely oriented filaments, some of them running from one margin to the other. There follows in both surfaces a region with somewhat rounded or elongated cells. The subcortex is composed of about two or three layers of rounded not closely placed cells being the inner ones larger and the outer ones smaller. There follows the cortex composed of a single layer of somewhat radially elongated cells, more or less closely placed.

The cells have a diameter of about 4.8 micra and are from 9.6 to 12 micra tall.

The largest medullary cells have a diameter varying from 30.4 to 57 micra.

This species shows a very peculiar characteristic which distinguishes it from all other species of the genus. The plant shows on both sides of the lamina, small papillae which give a peculiar appearence to the plant, resembling certain fertile species of *Gigartina* or *Meristotheca*.

Our plants were collected washed ashore in a place known as Mar Grande, Itaparica Island, Salvador, Bahia.

This is the first reference of the occurrence of this species in the American South Atlantic.

Corynomorpha clavata (Harvey) J. Agardh

References: Taylor 1928, p. 197; 1960, p. 429, pl. 64, fig. 3; Harvey 1853, p. 196 (as *Acrotylus clavatus*).

Plates I, III, figs. 3-4, 4-6.

Plants erect growing in small colonies fixed to the substratum by a small roundish holdfast. The thallus is an entire or a bifurcate solid clavate cylinder, measuring up to 9 cm high and up to 6 mm wide. It has a firm cartilaginous texture and has a rosy-pink greenish colour when alive.

Structurally the plant is composed of a very lax medullary region and a more compact cortex. In the inner medullary region one sees few ramified filaments, composed of much longer than broad cells and here and there intercalary, colourless, 3 or 4-armed, stellate cells. Outwardly the medulla is not so lax, being the stellate colourless cells more abundant. From these cells on begin the radially placed filaments that compose the inner cortical region, which is still formed by colourless, somewhat angular cells. There follows the outer cortical filaments formed by 2 or 3 rows of radially disposed, chromatophore-bearing, elliptical or ovoid cells. These

small surface cells have a diameter of about 2.4 micra and are from 9.6 up to 12 micra high (as seen in cross section) .

Tetrasporangia cruciately divided borne in a nemathecium-like sorus. This sorus appears as an annular discolored swelling in the middle portion of the thallus. The nemathecium alone is up to 92.5 micra thick. The tetrasporangia have a diameter varying from 12 up to 14.4 micra and are from 36 up to 38.4 micra thick.

This is the first time that the tetrasporangia are found in this species (Kylin 1960, p. 221). A very similar disposition of the tetrasporangia was recently described in *C. prismatica* (J. Agardh) J. Agardh by Balakrishnan (1962) who established a new family for the genus.

The nemathecium-like outer cortex of the tetrasporangial sorus is also present in other genera of the family *Grateloupiaceae*. Apparently this is the only member of that family to have such a distinct sorus of tretrasporangia in a very restrict zone around the thallus.

This is the first reference of the occurrence of this species outside the Caribbean region and the first one on continental South America. The plant was collected at Guarapari, Espírito Santo State and Paracuru, Ceará State, in the intertidal zone.

Spermothamnion gorgoneum (Montagne) Bornet

References: Collins 1901, p. 258; Collins and Hervey 1917, p. 132; Taylor 1928, p. 195; 1960, p. 521, pl. 65, fig. 2; Mazé and Schramm 1870-1877, p. 141 (as *Callithamnion gorgoneum*).

Plates III, IV, figs. 7-9, 1-4.

Plants filamentous of a deep red colour when alive, growing epiphytically on *Codium* sp. forming a dense covering. The plant is composed of an uniseriate prostrate rhizomatous portion fixed to the substratum by uni or multicellular rhizoids, and erect ramified filaments. These are branched mainly near the base. The prostrate axis has a diameter varying from 22.8 to 38 micra and the cells are from 133 to 190 micra long, being the wall from 7.2 to 9.6 micra thick. The erect filaments are from 1.200 to 2.000 micra high with a diameter varying from 24 to 36 micra, and with cells varying from 84 up to 144 micra long.

The polysporangia are to be found near the base of the erect filaments. They are produced terminally in short fasciculated lateral branches. They have a diameter varying from 72 to 84 micra and are from 81.6 to 84 micra high. The wall measures up to 7.6 micra thick.

The antheridial stand is formed terminally in a special branch of about 3 cells being the inferior one partially involved (at its distal portion) in the production of spermatia, remaining the inferior naked portion as a stalk. The antheridial stand measures about 82.5 micra long and has a diameter of about 38 micra.

The carpogonial branch is formed subapically being the fertile pericentral cell cut off from the subapical cell. This same cell also produces one sterile pericentral cell. The carpogonial branch has 4 cells, the upper one provided with a long tricogyne. The cystocarp has no involucral filaments and produces few pear-shaped carpospores.

This species was found with polysporangia, spermatangia and carposporangia, borne in different plants during the month of July. It was collected growing upon *Codium* sp. washed ashore at Mundaú, Ceará State. This is the first reference of the occurrence of this species in the American South Atlantic.

Crouania attenuata (Bonnemaison) J. Agardh

References: Harvey 1846, pl. 106; 1853, p. 226, pl. 31 C, figs. 1-4; Mazé and Schramm 1870-1877, p. 145; Collins 1901, p. 258; Borgesen 1917, p. 230, figs. 219-221; Collins and Hervey 1917, p. 142; Taylor 1928, p. 193, pl. 27, figs. 7-9, pl. 32, fig. 9; Taylor and Arndt 1929, p. 662; Feldmann-Mazoyer 1940, p. 272; Taylor 1954, p. 105; 1960, p. 495.

Plates IV, V, figs. 5-8, 1-3.

Plants growing epiphytically or directly on rocks, isolated, of a rosy-red colour when

alive and of a very soft, almost slippery mucous texture. Our plants measured from 0,5 to 1 cm high. The plant has a decumbent portion, similar to the erect ones, fixed to the substratum by pluricellular rhizoids borne directly by the axial cells. The plant is structurally formed by an axial row of large cells and verticillately placed short lateral branches. Each node bearing usually 3 short ramified branchlets.

The erect branches have a diameter varying from 96 to 150 micra. The axial cells of these are from 50 to 75 micra long and have a diameter varying from 17.5 to 22.5 micra.

The axial cells of the prostrate axis have a diameter of about 100 micra and are about 200 micra long. The indeterminate branches are borne directly by the axial cell. The determinate branchlets are trifurcately branched and have basal cells measuring 20 to 25 micra long and with a diameter from 15 to 22.5 micra. The terminal cells of these branchlets are from 10 to 17.5 micra long and with a diameter varying from 5 to 7.5 micra.

The tetrasporangia are borne isolated from the basal cell of the determinate branchlet. They are from 62.5 to 75 micra long and with a diameter from 57.5 to 67.5 micra.

The plant was found growing over the blade of *Avrainvillea* sp. and also directly upon rocks. It was collected in the reef of Mar Grande, Itaparica Island and at the beach of Itapoan near the lighthouse, at Salvador, Bahia. This is the first reference of the occurrence of this species in the American South Atlantic area.

Nitophyllum wilkinsoniae Collins et Hervey

References: Collins and Hervey 1917, p. 115, pl. I, fig. 8, pl. II, fig. 9, pl. V, figs. 32-33; Taylor 1960, p. 552, pl. 69, fig. 1.

Plates V, VI, figs. 4-6, 1.

Plants of a bright-red colour when alive growing epiphytically over *Rhipilia* sp. The thallus is a foliaceous strapshaped blade measuring up to 2,5 cm high, irregular dichotomically ramified and with somewhat undulated margins. These show characteristic small pointed teeth, formed by two little cells. There is no indication of nerves or venulae in any portions of the thallus.

A cross section shows that the thallus is composed of a single layer of somewhat elongated cells. Here and there one of these is transversely end equally divided in two. The blade measures about 78.2 micra thick and the cells are about 48.6 micra wide. The tetrasporangia are produced in groups at the surface. They are relatively large for the plant, measuring up to 76 micra and are tetrahedrically divided.

The plant was found in a tidal pool behind a coral reef at Mar Grande, Itaparica Island, Salvador, Bahia.

This is the first reference of the occurrence of this species outside the type region.

Thuretia borneti Vickers

Reference: Taylor 1960, p. 568, pl. 70, figs. 6-7.

Plates I, VI, figs. 5, 2-5

Plants growing fixed to rocks, usually covered by larger algae, tufted, several erect branches starting from a cushion-shaped holdfast.

The plant-clump is up to 1,5 cm high. The erect cylindrical branches are one or twicely branched. At the upper portion there are a few short cylindrical branches crowded together. The main erect axis has a diameter up to 2 mm.

Each branch is composed of an uniseriate central axis, covered by pericentral cells and these in turn are covered by a dense cortex of small cells.

From this axis start many radial and spirally disposed uniseriate branchlets having a diameter varying from 38 up to 45 micra. These are repeatedly ramified and are fused together were the apex of a branch touches another cell, forming a tridimensional net around the polysiphonous axis. This has a diameter of about 90 micra.

The mesh of the net is very irregular in size and shape.

The tetrasporangia are formed in stichidia developed from terminal branchlets. Usually the stichidium at its basal portion is part of the net having also uniseriate apex. This apex can in turn build the net again.

The stichidium has an irregular shape, measures up to 570 micra high and is much broader than the sterile net filaments, having a diameter up to 150 micra. The tetrasporangia are produced in verticills of threes or fours. They are tetrahedrically divided and measures from 45.6 up to 57 micra.

The plant was collected at Paracuru, Ceará-State and at Guarapari, near Victoria, Espírito Santo State. It was found with tetrasporangia in the month of May.

Dictyurus occidentalis J. Agardh

References: Collins 1901, p. 257; Borgesen 1919, p. 327, figs. 329-331; Taylor 1960, p. 567, pl. 70, figs. 1-2.

Plates I, VI, figs. 6, 6-8.

Plants gregarious growing in dense tufts, measuring up to 18 cm high, of a peculiar brick somewhat gray-red colour when alive. The plant is very delicate, it is composed of a ramified cylindrical axis, covered by four dense, tetrastically and spirally placed rows of short branchlets bearing a delicate net, in such a way that the erect portions are a four-cornered screwed structure of a beautiful construction, having a diameter varying from 5 to 7 mm.

The main axis has four pericentral cells and these are covered by a many layered cortex which completely hiddens the polysiphonous construction when viewed from the surface. It has a diameter varying from 1 to 2 mm. This axis bears the short laterals which are also polysiphonous. These last order polysiphonous branches are completely hidden by the delicate net formed by the fusion between cells of a branchlet that touches others. The meshes that are formed are very irregular in shape and size. The branchlets of one system fuse in the same way with branchlets of other systems and in this way constructing the 3-dimensional net. The net branchlets are monosiphonous and have a diameter varying from 75 to 120 micra.

The tetrasporangia are formed in stichidia. These are produced at the apex of a polysiphonous branch and are usually found in groups of 6 to 8.

The stichidia measure up to 947.3 micra high and have a diameter of about 238.1 micra. Each whorl has two or three tetrasporangia. They have a diameter varying from 52.6 to 78.9 micra and are tetrahedrically divided. The plant was found with tetrasporangia in the month of July. The plant was collected in a reef at "Praia do Futuro" near Fortaleza, Ceará State, where it was exposed at low tide and also at Cabo Branco, Paraíba State. This is the first reference of the occurrence of this species outside the Caribbean region.

3 — ACNOWLEDGEMENTS

This paper was made possible through the cooperation of several institutions and persons. The travel expenses involved were paid by a special grant given the senior author by the "FUNDAÇÃO DE AMPARO À PESQUISA DO ESTADO DE SÃO PAULO" (FAPESP) and by the "ESTAÇÃO DE BIOLOGIA MARINHA" of the University of Ceará. Part of the drawings used to illustrate this paper were done by an artist paid by a special fund (Contract UNESCO/NS/2017/64) provided by the Oceanographic Office of the UNESCO (Paris). We are also very indebted to the following friends who have facilitated in every respect our work during the visit made by the senior author and Mr. Oliveira Filho to Fortaleza: Prof. Dr. Melquíades Pinto Paiva, Director, Marine Biological Station, Prof. Dr. Aílton Gondim Lóssio, Director, and Profs. Drs. Maria Artemísia Braga Arraes and Francisco José de Abreu Mattos, of the Faculty of Pharmacy, all of the Ceará University.

4 — SUMMARY

The present paper gives information concerning the first findings of the following species of marine algae along the Brazilian shores:

Struvea anastomosans, Caulerpa scalpelliformis f. *denticulata, Acetabularia crenulata, Dictyota jamaicensis, Halymenia duchassaigni, Corynomorpha clavata, Spermothamnion gorgoneum, Crouania attenuata, Nitophyllum wilkinsoniae, Thuretia borneti* and *Dictyurus occidentalis*. All species except *Caulerpa scalpelliformis* are known in the Ca-

ribbean area. This last named plant is known to occur in certain places in the Indo-Pacific region, being this reference the first one in the Atlantic Ocean. This is the first time that the tetrasporangia are described in this species of *Corynomorpha*. Several drawings are provided showing certain features including reproductive structures of nearly all species considered.

5 — SUMÁRIO

O presente trabalho refere pela primeira vez a ocorrência das seguintes espécies de algas marinhas na costa brasileira: *Struvea anastomosans, Caulerpa scalpelliformis* f. *denticulata, Acetabularia crenulata, Dictyota jamaicensis, Halymenia duchassaigni, Corynomorpha clavata, Spermothamnion gorgoneum, Crouania attenuata, Nitophyllum wilkinsoniae, Thuretia borneti e Dictyurus occidentalis*. Os principais pontos de coleta foram Fortaleza, CE e arredores, Salvador, BA e arredores e Guarapari, ES. Tôdas as espécies encontradas, com exceção de *Caulerpa scalpelliformis*, são espécies referidas para a região do Mar das Caraibas. A última espécie mencionada só tem sido encontrada até agora na região Indo-Pacífica, sendo esta a primeira referência do seu achado no Oceano Atlântico. Algumas pranchas com numerosos desenhos completam o trabalho. É apresentada pela primeira vez a descrição de tetrasporângios na espécie *Corynomorpha clavata*.

6 — BIBLIOGRAPHY

Balakrishnan, M. S. — 1962 — Studies on Indian Cryptonemiales II. **Corynomorpha** J. Agardh. **Phytomorphology, 12** (1): 77-86.

Borgesen, F. — 1913 — The marine algae of the Danish West Indies. I. Chlorophyceae. **Dansk. Bot. Arkiv, 1** (4): 1-158 + Map., Kobenhavn.

Borgesen, F. — 1917 — Idem III. Rhodophyceae 3. Idem, 3 (1c): 145-240, Kobenhavn.

Borgesen, F. — 1919 — Idem IV. Rhodophyceae 5. Idem, 3 (1c): 305-368, Kobenhavn.

Borgesen, F. — 1940 — Some marine algae from Mauritius I. Chlorophyceae. **Kgl. Danske Vidensk. Selskab. Biol. Meddel., XV, 4**: 1-18 + 2 pls., Kobenhavn.

Collins, F. S. — 1901 — The algae of Jamaica **Proceedings of the American Academy of Arts and Sciences, XXXVII** (9): 231-270, Boston.

Collins, F. S. and A. B. Hervey — 1917 — The algae of Bermuda. **Proceedings of the American Academy of Arts and Sciences, LIII**: 1-195 (incl. 6 pls.), Cambridge.

Durairatnam, M. — 1961 — Contribution to the study of the marine algae of Ceylon. **Bull.** 10: 1-181 (incl. 32 pls.).

Falkenberg, P. — 1901 — Die Rhodomelaceen des Golfes von Neapel und der angrenzenden Meeres-Abschnitte. **Fauna und Flora des Golfes von Neapel. Monogr., 25**: 1-754 + 24 T., Berlin.

Feldmann-Mazoyer, G. — 1940 — Recherches sur les Céramiacées de la Méditerrannée occidentale: 1-510 + IV pls., Alger.

Harvey, Wm. H. — 1846 — Phycologia Britannica **I**: VIII + 1-120 pls., London.

Harvey, Wm. H. — 1853 — Nereis Boreali-Americana. II. Rhodospermae. **Smithsonian Contrib. to Knowledge**: 1-258 + 25 pls., Washington.

Harvey, Wm. H. — 1858 — Nereis Boreali Americana. III. Chlorospermae. **Smithsonian Contrib. to Knowledge**: 1-140 + 14 pls., Washington.

Joly, A. B. — 1956 — Additions to the marine flora of Brazil I. **Bol. Fac. Fil. Ciênc. Letr. Univ. S. Paulo, 209. Botânica 13**: 7-21 (incl. 3 pls.), São Paulo.

Joly, A. B. and M. Cordeiro — 1962 — Idem II. Idem 257, **Botânica, 18**: 223-237 (incl. 4 pls.), S. Paulo.

Joly, A. B., M. Cordeiro, M. L. Mendoza, N. Yamaguishi and Y. Ugadim — 1963 — Idem III. Idem 288. **Botânica, 20**: 7-37 (incl. 8 pls.), S. Paulo.

Joly, A. B., M. Cordeiro, N. Yamaguishi and Y. Ugadim — 1965 — Idem IV. **Rickia, 2**: S. Paulo.

Kylin, H. — 1932 — Die Florideenordnung Gigartinales Lunds Univ. Arsskr., **N. F. Avd. 2, 27** (11): 1-48 + 20 pls., Lund.

Kylin, H. — 1956 — Die Gattungen der Rhodophyceen. **XV** + 1-673, Lund.

Mazé, H. and A. Schramm — 1870-1877. — Algues de la Guadaloupe. Facsimile Edition 1905: 1-283, Ed. W. Junk, Berlin.

Solms-Laubach, H. von — 1895 — Monograph of the Acetabulariae. **Trans. Linn. Soc. Bot.** 2nd ser., V: 1-39 + 4 pls., London.

Taylor, Wm. R. — 1928 — The marine algae of Folrida with special references to the Dry Tortugas. **Papers from the Tortugas Lab. of the Carnegie Inst. Wash. 25. Carnegie Inst. Wash. Publ., 379**: 1-219 + 37 pls., Washington.

Taylor, Wm. R. — 1960 — Marine algae of the eastern tropical and subtropical coasts of the Americas: **XXI** + 1-870 (incl. 80 pls.), Ann Arbor.

Taylor, Wm. R. and C. H. Arndt — 1929 — The marine algae of the southwestern peninsula of Hispaniola. **Am. Jour. Bot., XVI**: 651-662, Lancaster.

Weber Van Bosse, A. — 1898 — Monographie des Caulerpes. **Ann. Jard. Bot. Buitenzorg, 15**: 243-401, pls. 20-34, Leiden.

PLATES

PLATE I

Fig. 1 — *Caulerpa scalpelliformis*. Habitus.

Fig. 2 — *Dictyota jamaicensis*. Habitus.

Fig. 3 — *Corynomorpha clavata*. Habitus of two plants, one ramified.

Fig. 4 — *Corynomorpha clavata*. A tetrasporic plant. Note the even discolored swelling in the middle of the thallus.

Fig. 5 — *Thuretia borneti*. Habitus.

Fig. 6 — *Dictyurus occidentalis*. Habitus of part of a plant.

PLATE II

Figs. 1-4 — *Struvea anastomosans*. Habitus of a very young plant; apex of a young blade, note the incipient net; detail of the net; haptera in great detail.

Figs. 5-7 — *Acetabularia crenulata*. Apex of two rays, note the apiculum; frontal view of the corona superior, note the large scars; frontal view of the corona inferior.

Figs. 8-9 — *Dictyota jamaicensis*. Transverse section of a blade; Transverse section of a blade passing by a sorus of plurilocular gametangia (antheridia).

PLATE III

Figs. 1-3 — *Halymenia duchassaigni*. Habitus of a plant; detail of a part of the frond showing the papillae; transverse section.

Figs. 4-6 — *Corynomorpha clavata*. Part of a cross-section of a sterile frond, note the pigmented cells in the outer cortex; part of the central region of the same section as above; part of a cross-section passing by the nemathecium-like zone, showing cruciately divided tetrasporangia.

Figs. 7-9 — *Spermothamnion gorgoneum*. Carpogonial branch, note one sterile pericentral cell; young and developing gonimoblasts.

PLATE IV

Figs. 1-4 — *Spermothamnion gorgoneum*. Cystocarp with few, pear-shaped carpospores; antheridial stand; part of the creeping axis with few erect branches, note the polysporangia; detail of two polysporangia.

Figs. 5-8 — *Crouania attenuata*. Habitus of a very young plant; detail of the branching; two cross-sections of the axis showing the verticillately placed short laterals.

PLATE V

Figs. 1-3 — *Crouania attenuata*. Detail of the branching; detail of the determinate branchlets; tetrasporangium.

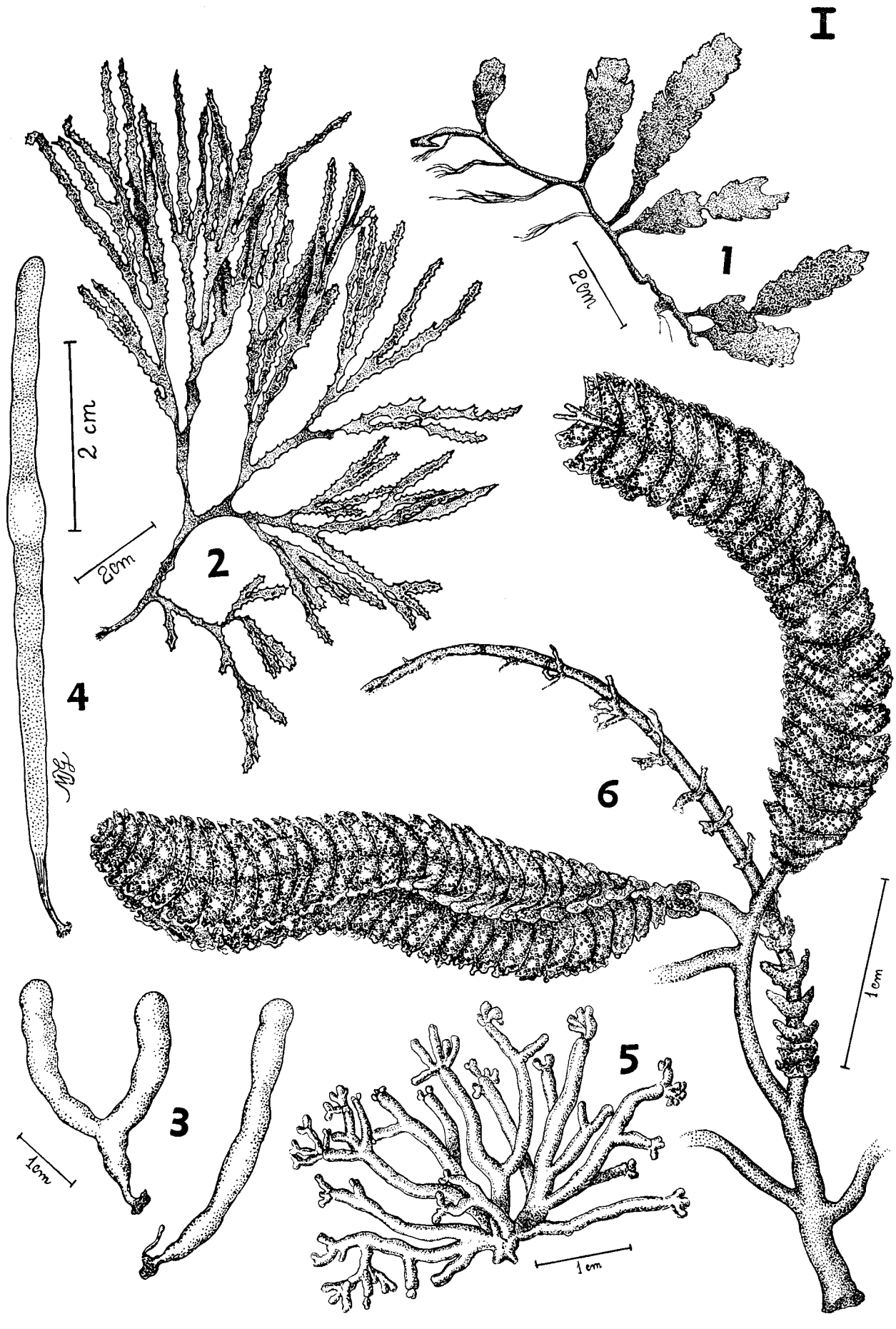
Figs. 4-6 — *Nitophyllum wilkinsoniae*. Habitus of a tetrasporic plant, note the fertile areas; detail of the margin of the fronde, note the tooth; detail of the sporangial area.

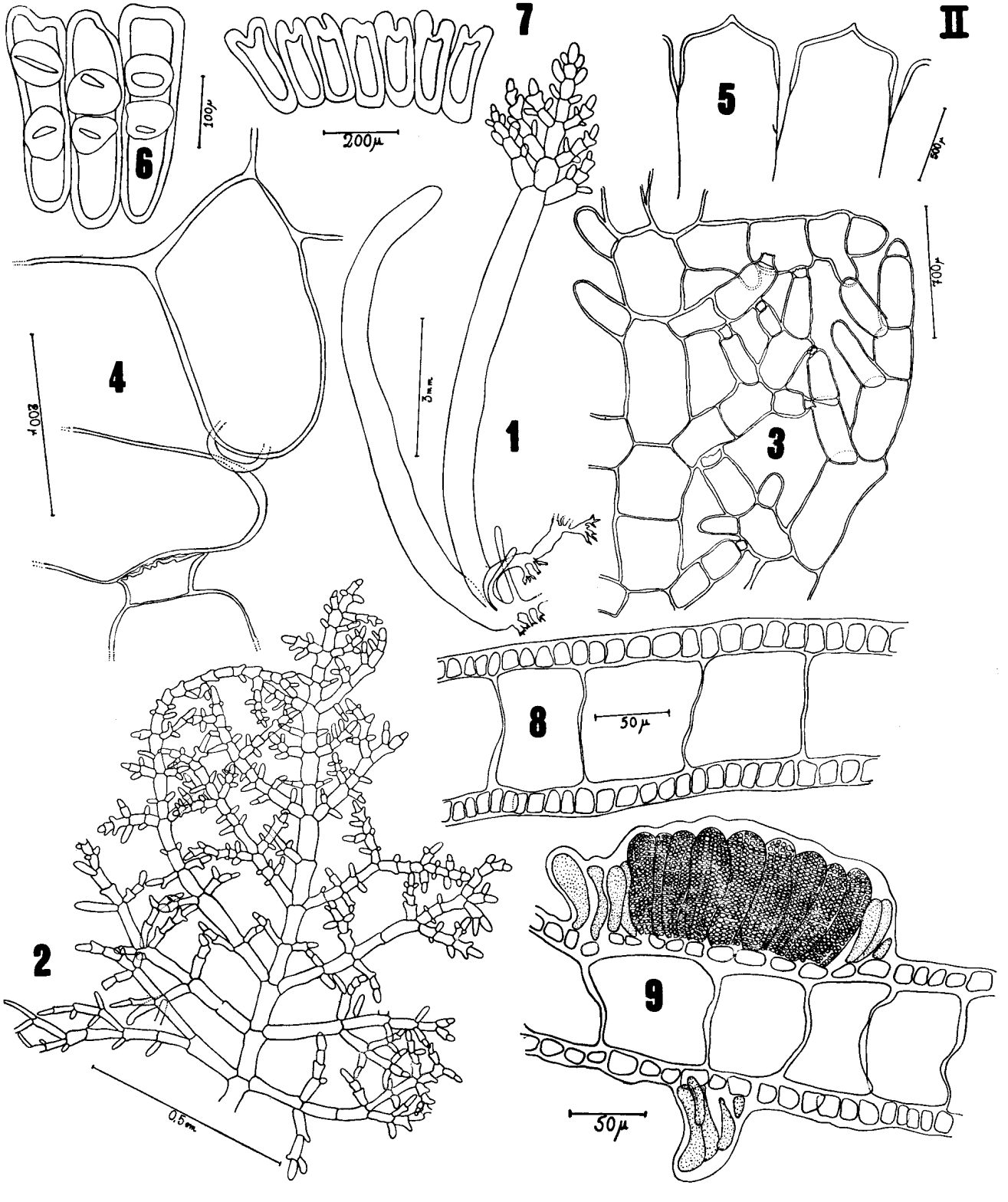
PLATE VI

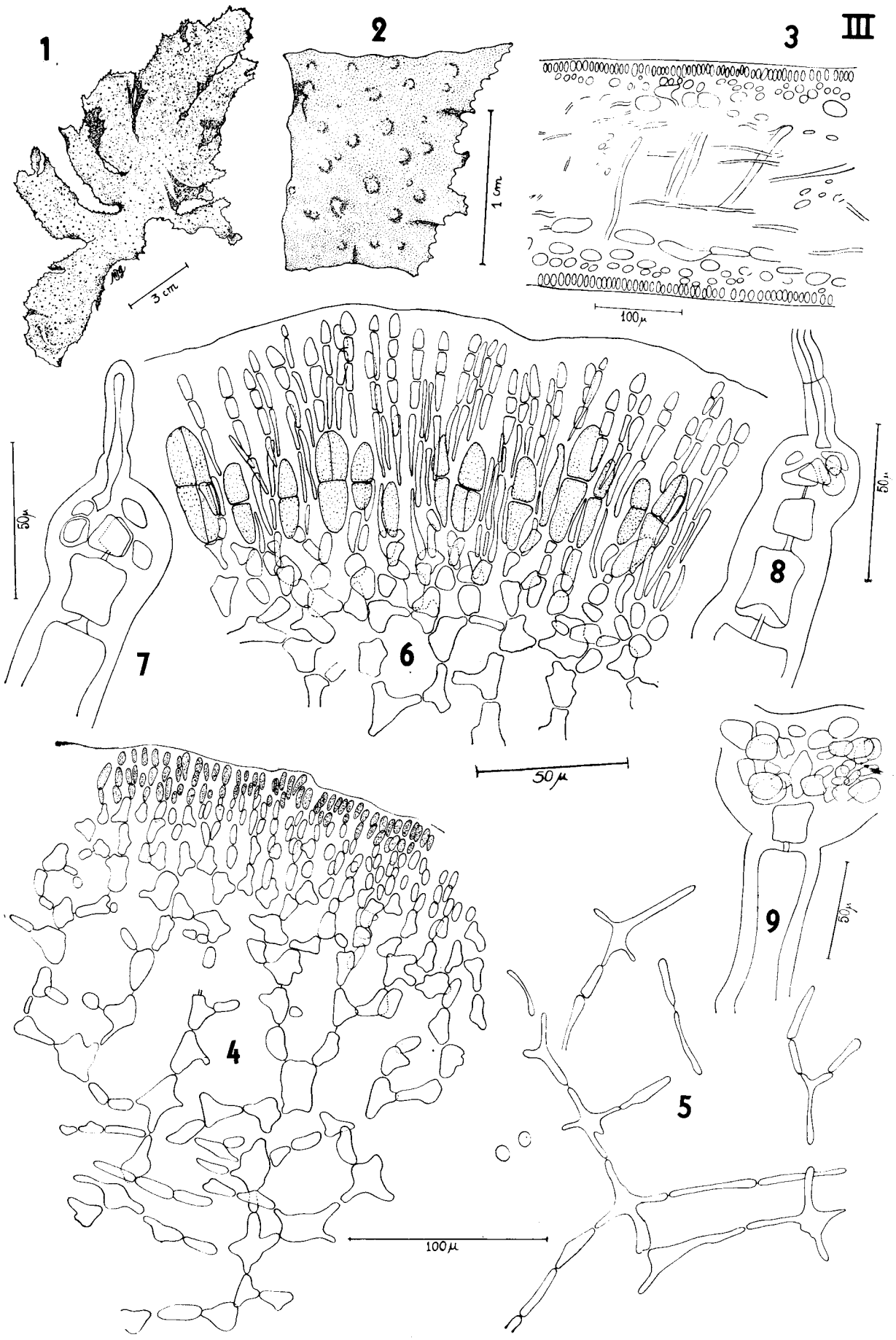
Fig. 1 — *Nitophyllum wilkinsoniae*. Cross-section of the blade.

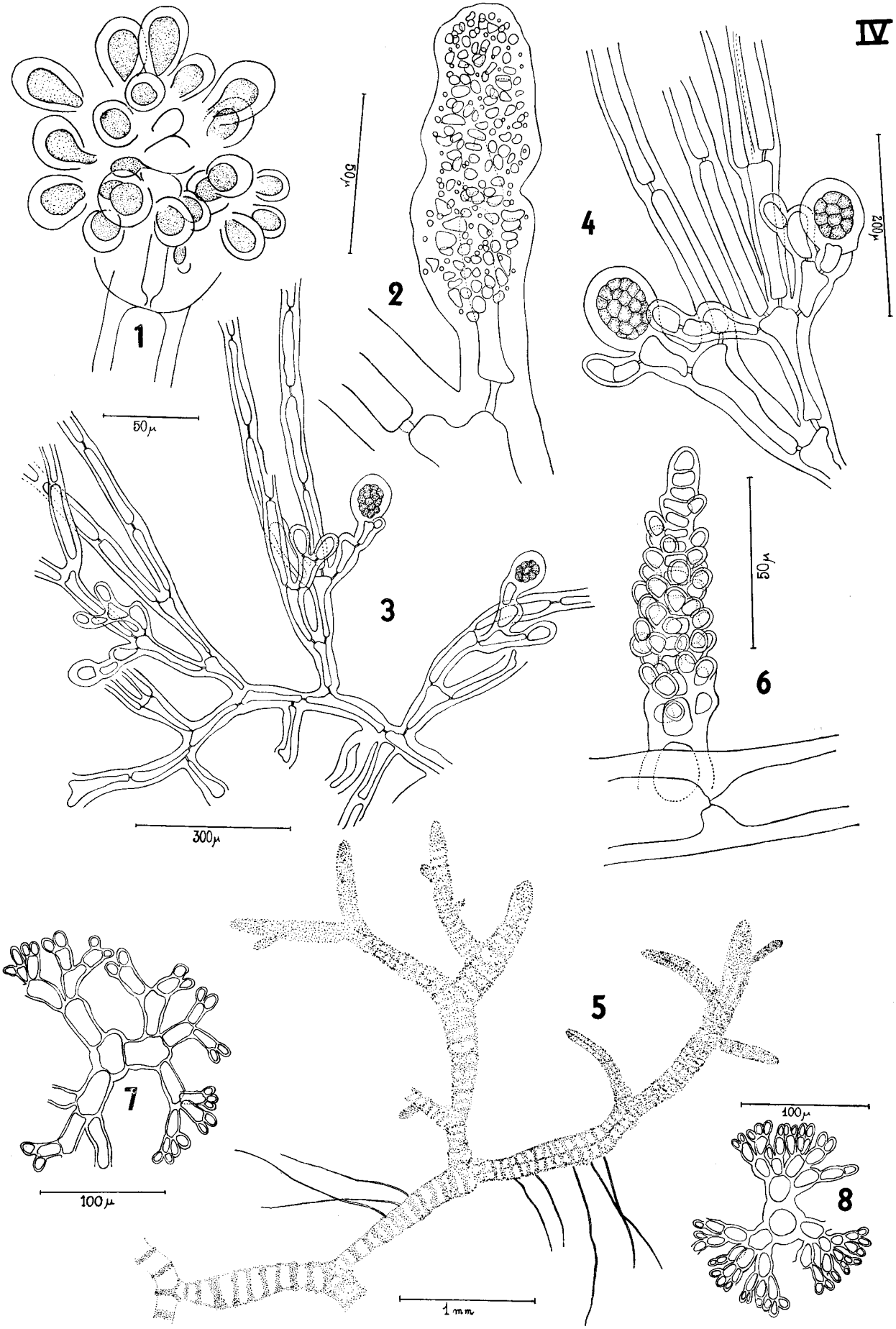
Figs. 2-5 — *Thuretia borneti*. Part of a longitudinal section of an axis; frontal view of the net; detail of the net; stichidium.

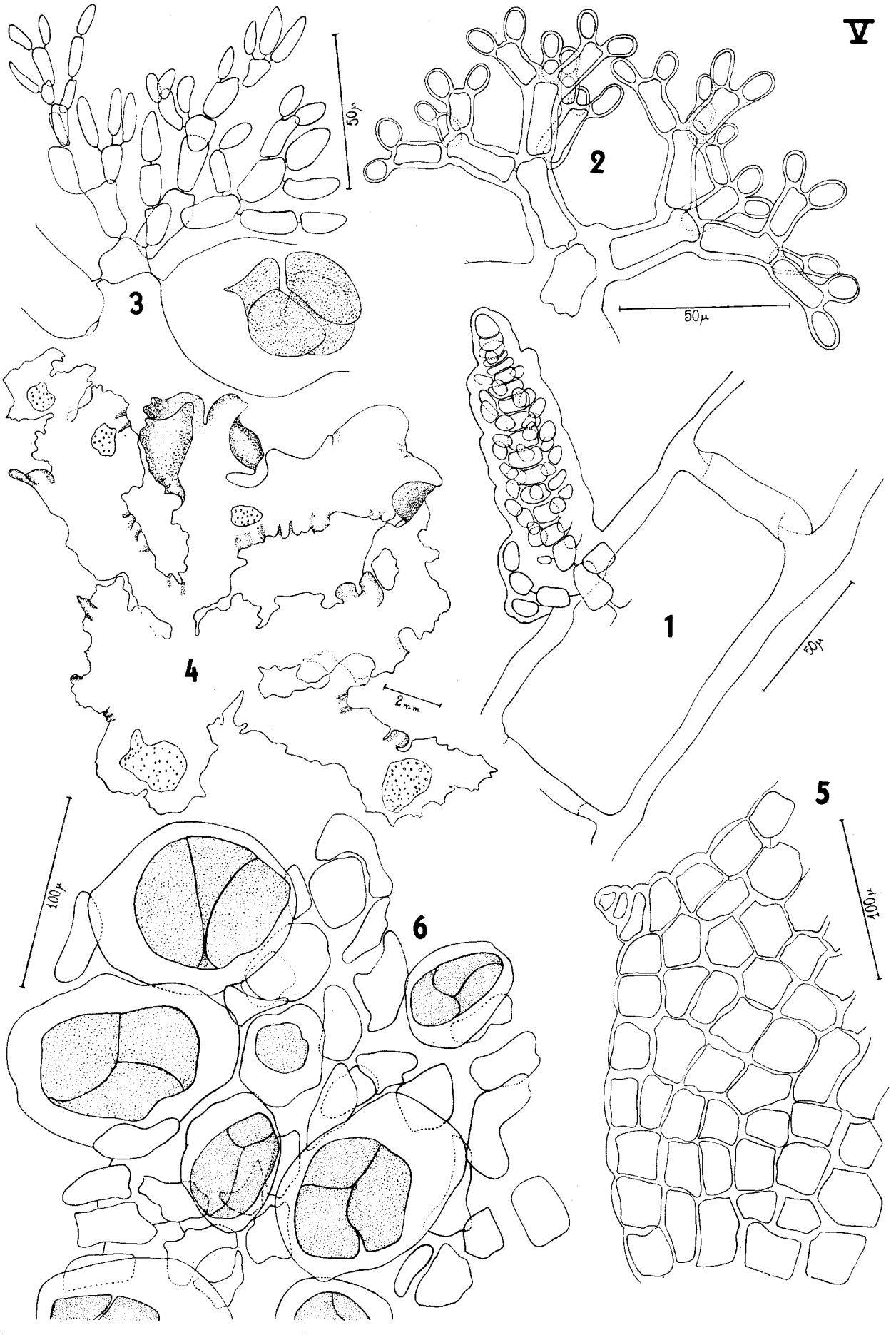
Figs. 6-8 — *Dictyurus occidentalis*. Cross-section of an axis, note four pericentral cells; detail of the net; stichidia.

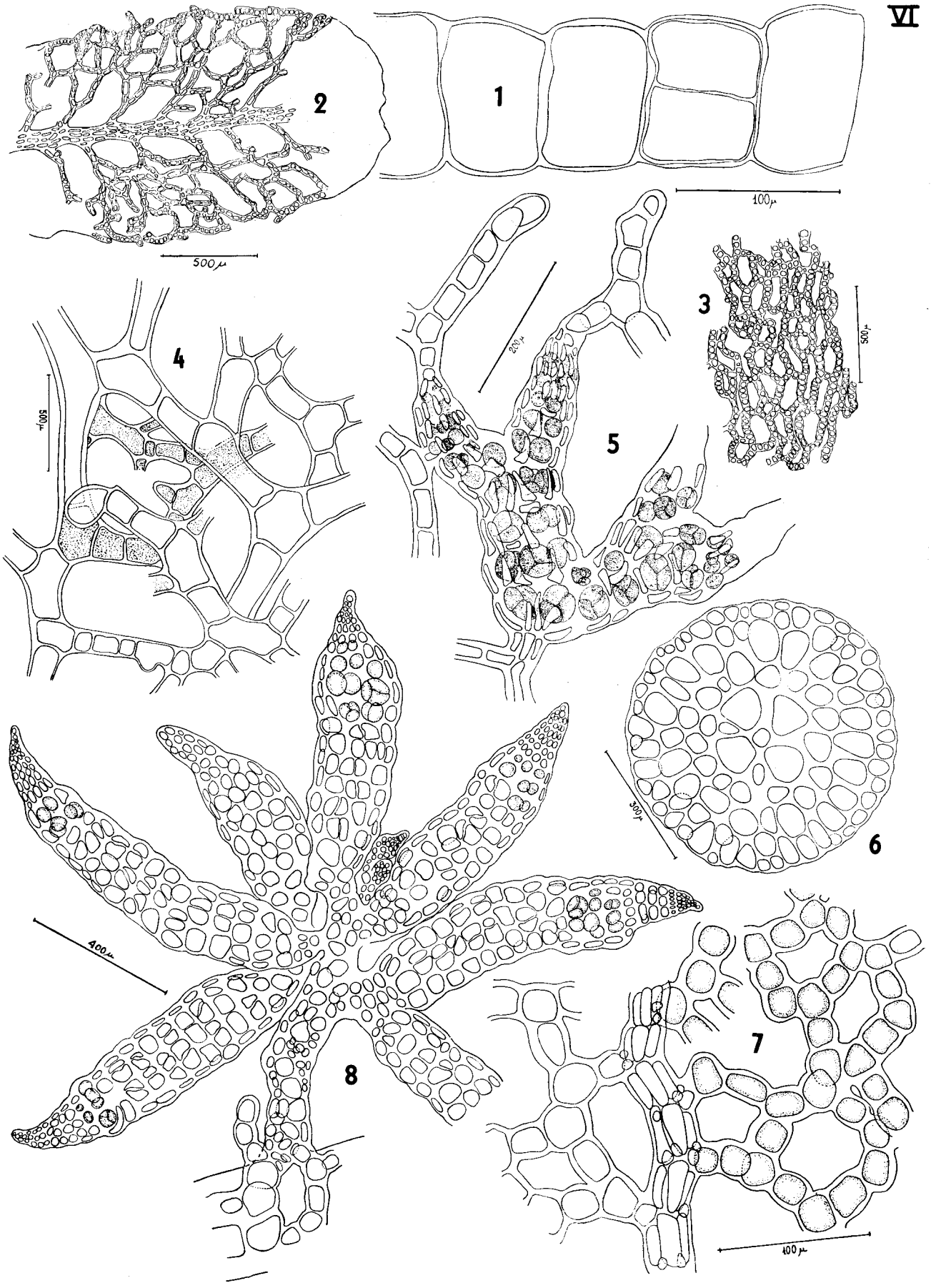

I
1
2 cm
2
2 cm
4
6
1 cm
3
1 cm
5
1 cm


II
7
6
5
4
1
3
2
8
9
100µ
200µ
200µ
400µ
700µ
3mm
50µ
0.5mm
50µ


III
1
3 cm
2
1 cm
3
100 µ
7
50 µ
6
50 µ
8
50 µ
4
100 µ
5
9
50 µ


IV
1
50µ
2
50µ
3
300µ
4
200µ
5
1 mm
6
50µ
7
100µ
8
100µ


V
1
2
3
4
5
6
50µ
50µ
50µ
2mm
100µ
100µ


VI
1
100µ
2
500µ
3
500µ
4
500µ
5
200µ
6
300µ
7
400µ
8
400µ