Some New Species of Marine Benthic Algae from the Caroline Islands, Western-Central Pacific

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A number of interesting species of algae were encountered during a floristic study (Trono, 1968, 1969) of the marine benthic algae of the Caroline Islands. Some of these are described as new species in the present account. All materials included in this study were collected by Mr. Ernani G. Meñez. Type specimens are deposited in the Herbarium of Dr. Maxwell S. Doty in the Department of Botany, University of Hawaii, Honolulu, Hawaii.

Boodleopsis carolinensis sp. nov.
Pl. 1, Figs. 1–10

Boodleopsis sp. *In* Trono 1968:154.

Filaments forming felted mass on surface of substratum, consisting of colorless filaments below and pigmented filaments on the upper surface; rhizomatous main axis irregularly branched, 60–80 μ in diameter with irregularly thickened walls, concealed by the upper felted mass of filaments; main axis gives rise to more slender secondary branches, also irregular in diameter, the latter giving rise to the horizontal and semi-erect photosynthetic systems; rhizoids are produced from the main axis without any arrangement.

Semi-erect system consists of irregularly branched basal portion becoming regularly dichotomous, sometimes trichotomous, towards the ultimate branches; deep constrictions present, equally placed above the dichotomies; deep interdichotomal constrictions also present; diameter of the filament 15 to 25 μ; unconstricted filaments of the semi-erect system slightly thicker in diameter and densely filled with chloroplasts, and associated with the reproductive structures.

Horizontal system consists of dark green filaments, irregularly and sparsely branched, may be dichotomous, alternate, or opposite or secund; deep constrictions at unequal distance above the dichotomies present; interdichotomal constrictions also frequent.

Colorless filaments deep in the felted mass very irregularly branched, dichotomous, opposite or secund; diameter of the filament 14–20 μ; constrictions above the dichotomies, or at bases of branches distinct; filaments devoid of chloroplasts or starch grains.

Sporangia borne at, or near the tips of the unconstricted filaments of the semi-erect system, 110–130 μ in diameter, 160–175 μ long, subspherical to obovate,

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stalked; cross walls separate the contents of the sporangia from the rest of the filament; young sporangia homogenously filled with dense, small, spherical to subspherical chloroplasts; in later stages the sporangial content becomes partitioned into smaller segments about 30 μ in diameter; spore spherical, about 40–45 μ in diameter, gives rise to long, rhizoid-like filaments which later develop into vegetative filaments.

Filamenta massam coactam in superficie substrati formantia, massa e filamentis infra incoloratis atque in superficie superiore pigmentiferis constans; axis principalis rhizomatosus irregulariter ramosus, 60–80 μ diam., membranas irregulares incrassatas habens, massa coacta filamentorum superiore celatus; axis principalis ramos secondarios tenuiores, diametro necnon irregulares efficiens, hi rami systemata photosynthetica horizontalis atque semi-erecta efficientes; axis principalis rhizoidea sine dispositione efficiens.

Systema semi-erectum e parte basali irregulariter ramosa, versus ramos ultimos regulariter dichotoma, interdum trichotoma facta, constat; constrictiones profundae super dichotomias aeque positae; constrictiones interdichotomae profunde necnon apparent; filamentum 15–25 μ diam.; filamenta non-constricta systematis semi-erecti paululo crassiora et chloroplastis conferte plena, cum structuris reproductivis consociata.

Systema horizontale e filamentis atroviridibus constans, irregulariter et parce ramosum aut dichotomum aut alternatum aut oppositum aut secundum; constrictiones profundae super dichotomias irregulariter dispositae; constrictiones interdichotomae necnon frequentes.

Filamenta incolorata intra massam coactam profunde sita irregularissime ramosa, dichotoma, opposita aut secunda, 14–20 μ diam., constrictiones manifestas supra dichotomias aut ad bases ramorum praebentia, sine chloroplastis aut granis amyli.

Sporangia ad aut prope cacumina filamentorum non-constrictorum systamitis semi-erecti portata, 110–130 μ diam., 160–175 μ long., subspherica ad obovata, stipitata; septa contentum sporangii a filamento reliquuo seiungunt; sporangia iuvenia chloroplastis densis parvis sphericis ad subsphericos homogenee plena; postea contenta sporangii in segmenta minora c. 30 μ diam. divisa; sporae sphericae, c. 40–45 μ diam., efficientes filamenta longa rhizoidiformia quae postea in filamenta vegetativa evolvunt.

TYPE: D23773, collected above tide level below an over-hanging ledge, near Malakal Pass, Malakal Is., Palau Group, West Caroline, September 6, 1960.

In 1911 A. and E. S. Gepp described a new genus, *Boodleopsis*, represented by one species, *B. siphonacea*. The authors described the habit of this species as forming caespitose tufts on the substrate, and the much branched, short, straight, slender ramuli are extensively and loosely intricated. The present species never form caespitose tufts and the filaments are compactly intricated, but like their material the present species is also uncalcified and abundantly ramified. Also, the present material does not show a distinct erect system coming from the hori-

zontal main axis as shown by Gepps' Figures 147 and 150 for *B. siphonacea.*

From *B. pusilla* (Collins) Taylor, Joly, and Bernatowicz (by transfer from *Dichotomosiphon* in 1952) the present species differs by the smaller diameter of its filaments and the terminal filaments never forming rhizoid-like structures, the coralloid mass (colorless filaments) never associated with the photosynthetic filaments, the presence in my specimens of a creeping branched system densely filled with chloroplasts, and the absence of cross walls except at the base of the mature sporangia.

Of the known species of *Boodleopsis*, the newly described *B. hawaiiensis* Gilbert (1965) resembles the present proposed species. *B. carolinensis*, however, differs from the above-mentioned species by the possession of a rhizomatous system, the absence of deeper filaments which are very remotely branched and without constrictions, the presence in *B. carolinensis* of a creeping system with branches which are wide angled and densely filled with chloroplasts, and the presence of interdichotomal constrictions. Although the size measurements of the two species overlap each other, this is of little significance when one considers the distinct morphological differences discussed above.

Cladophoropsis palauensis sp. nov.
Pl. 2, Figs. 1–7

Clodophoropsis sp. 1 *In* Trono 1968:159.

Filament tightly intertwined forming small clumps; main filaments 400–600 μ in diameter, twisted or curved, never straight; branches cylindrical although cells of the main filament found deeper in the mass somewhat inflated or generally with bumps or short branches; branches simple, secund, sometimes alternate, without cross walls at the base; cells of the main filament 2–4 times longer than wide with stratified, thick walls, about 70–140 μ; base of the main filaments modified into rhizoid-like structures provided with many, small hapteroid cells; hapteroid cells not limited to the basal portions of the filaments but also present at the tips of the branches, or on the sides of the filaments in contact with the substratum or with other filaments; hapteroid cells small, hard to see, provided with tough, hyaline, thin end walls which are either lobed or finger-like.

Filamenta arcte implicata, fasciculos parvos formantia; filamenta principalia 400–600 μ diam., torta curvatave, numquam recta; rami cylindrici, cellulae filamenti principalis, autem, ultra intra massam paulum inflatae aut plerumque tuberibus aut ramis brevibus praeditae; rami simplices, secundi, interdum alterni, sine septis ad basim; cellulae filamenti principalis 2–4 plo longiores quam latae, membranas stratifactas crassas, c. 70–140 μ habentes; basis filamentorum principalium in structuras rhizoidiformes, cellulis hapteroides parvis multis praeditas, mutata; cellulae hapteroideae non solum in partibus vasalibus filamentorum, praesentes, autem, in cacuminibus ramorum, aut in lateribus filamentorum substratum contingentibus, aut cum filamentis aliis; cellulae hapteroideae parvae, minus visibiles, membranis terminalibus tenacibus hyalinis tenuibusque, aut lobatis aut digitiformibus, praeditae.

TYPE: D15108, collected from reef flat with sandy rocky substratum at Iwayama Bay, Palau Is., West Caroline, August 22, 1960. Additional collections, D151132 from the western seaward reef flat at Urak Is., Mokil Group, June 29, 1960 and D15119, D15188, from northern seaward reef flat at Mokil Is., June 29, 1960, were also studied.

The specimens resemble the genus *Cladophoropsis* with regards to their type of branching and the absence of cross walls at the base of the branches. The presence of small hapteroid cells reminds one of the genus *Dictyosphaeria*.

Cladophoropsis carolinensis sp. nov.
Pl. 3, Figs. 1–5

Cladophoropsis sp. 2 *In* Trono 1968:160.

Thalli forming soft, loose mats, extensive or mixed with other algae; filaments deeper in the mat lighter in color, appearing crispy and robust; main filaments 95–140 μ in diameter, irregularly branched, secund, alternate to subopposite; branches slightly but distinctly tapering from their bases toward the apices; length of the cells very variable, 4–10 diameters long in certain portions, or up to 50 diameter long in others; filaments attached to the substrate or to each other by means of short 2(3)-celled branches, the tip cells modified into holdfast cells with lobed to branched tips, the protoplast of which are connected to the mother cells; the latter may be modified into a thin rhizoidlike structure.

Thalli tegetes molles laxas formantes, late patentes aut cum algis aliis mixtas; filamenta quae profundiora in tegete repriuntur dilutius colorata, crispata robustaque apparentes; filamenta principalia 95–140 μ diam., irregulariter ramosa, secunda, alterna ad subopposita; rami a basibus versus apices paulum sed perspicue attenuati; cellulae longitudine magnopere varientes, 4–10 plo longiores quam latae in quibusdam partibus, usque 50 plo longiores quam latae in aliis partibus; filamenta per ramos breves 2(3)-cellulares substrato aut inter se affixa; cellulae terminales horum ramorum in cellulas hapteroideas cacuminibus lobatis ad ramosa praeditas mutantur; protoplasti cacuminum cellulae-matri connexi; cellula-mater in structuram rhizoidiformem tenuem interdum mutata.

TYPE: D23616, collected from reef flat near Utwa Village, Kusaie Is., July 7, 1960. An additional collection, D21027 collected from Falas Is., Truk Group was also studied.

The most interesting character of this species is the extremely variable length of the cells. The main filament may give rise to a branch which grows very long, up to 50 times its diameter without producing cross walls, then interrupted by very much shorter cells, 4 to 10 diameters long which give rise to branches. A branch from the main filament may grow and develop like those described above, and produce branchlets which are quite distant from the main filament, or the tips of the same branch system may develop into very long non-septate tube; or the branch may produce two or a series of secondary lateral branches one of which may grow and produce short and nonseptate branchlets; or the branch may produce long, non-

septate secondary lateral branches without developing ultimate branchlets.

Based on the measurements of the cells and the form of branching, the nearest comparable species of *Cladophoropsis* are *C. sudanensis* and *C. gracillima*, the former has the same size and the secund type of branching of the filaments. However, Boergesen's Figure 1 (1935) and Dawson's Figure 8a–b (1956) for *C. sundanensis* show more or less clavate tips of the branches whereas my specimens are slightly but distinctly tapering towards their distal ends. Besides the length of the cells of Boergesen's materials are very much shorter than those of the present species. Also compare my figures with those of Dawson's Figure 8a–b for *C. sundanensis* from the Southern Marshall Islands.

The present materials resemble the figures for *C. gracillima* described by Dawson (1956) from the southern Marshall Islands, but the type of branching and the thickness of the stratified wall does not in any way resemble those of my materials. The wall of the cells of my material is thin and not stratified. It was also noted that the filaments regain their natural shape and form when soaked in water.

Boodlea trukensis sp. nov.
Pl. 4, Figs. 1–4

Boodlea sp. *In* Trono 1968:162.

Thalli soft, forming yellowish-green, firm mat, less than a centimeter tall consisting of the sub-erect main filaments from which prostrate and erect branches arise; basal portions and tips of the prostrate branches attached to the substratum or to each other by small hapteroid cells; main axis 80–110 μ thick, tapering slightly to about 70 μ in the branches; length of cells variable, 2–15 diameters long, short in portions bearing branches; tips of the prostrate filaments tend to curve to the substratum with one or two hapteroid cells at their ends; branching more or less on all planes but commonly secund on prostrate filaments; branches with cross walls at their bases although sometimes absent in younger ones; hapteroid cells may be small and short, or long, slender and rhizoid-like in appearance.

Thalli molles, tegetem solidam flavo-viridem, minorem quam 1 cm. alt., efficientes, teges e filamentis principalibus sub-erectis e quibus rami prostrati erectique oriuntur constans; partes basales atque cacumina ramorum prostratorum per cellulas hapteroideas parvas substrato aut inter se affixa; axis principalis 80–110 μ crass., in ramis ad c. 70 μ paululum attenuatus; cellulae longitudine varientes, 2–15 plo longiores quam latae, in partibus ramos ferentibus breves; cacumina filamentorum prostratorum ad substratum curvare solent et unam vel duas cellulas hapteroides ad extremitates habent; ramificatio plus minusve in omni plano, in filamentis prostratis, autem, saepius secunda; septa ad basis ramoru, interdum nulla in ramis iunioribus; cellulae hapteroideae parvae brevesque aut longae tenues rhizoidi-formesque.

TYPE: D23458.2, collected from reef between Falo and Moen Is., Truk Group, July 29, 1960.

The materials studied are distinct from other known species of *Boodlea* by the

much smaller diameter of the filaments, irregular branching which may be alternate or sometimes opposite but generally secund, and the presence of long cells in the main filaments which are 12 diameters long or more which seldom produce branches; also by the presence of two forms of hapteroid cells described above.

Microdictyon mokilensis sp. nov.
Pl. 5, Figs. 1–2

Microdictyon sp. *in* Trono 1968:163.

Blades small about 1 centimeter across; main filaments not prominent but easily recognizable; 360–420 μ in diameter; cells 1/3 to 2 diameters long; blades characterized by the distinct stellate branching of the segments; meshes formed by segments very close and appear to be pseudo-parenchymatous; walls of segments 10–12 μ thick; ultimate segments 280–300 μ in diameter with fimbriate extensions of the walls at the tips; segments short, not tapered, with blunt ends; rhizoids are produced at the basal portions, or at the margins of the blades.

Laminae parvae, c. 1 cm diam.; filamenta principalia non perspicua sed facile agnoscibilia, 360–420 μ diam.; cellulae 1/3 ad 2 plo longiores quam latae; laminae proprie ramificationem segmentorum stellatam manifestam praebent; maculae per segmenta formatae crebrissimae et aspectu pseudoparenchymatosae; membranae segmentorum 10–12 μ crass.; segmenta ultima 280–300 μ diam., extensiones fimbriatas membranarum ad cacumina praebentia segmenta brevia, non attenuata, extremitatibus abtusis; rhizoidea ad partes basales aut ad margines laminarum producta.

TYPE: D15183, attached on rocks, collected from the northern seaward reef flat of Mokil Is., June 6, 1960.

The materials studied consist of eight small blades about one centimeter across. The size of the segments and the thickness of the wall overlap that of *M. setchellianum* Howe (*In* Egerod, 1952). The walls are also stratified but the size of the blades and the meshes formed are very much smaller. Also, the segments are inflated and not cylindrical like those of the species mentioned above. The peripheral branches are short and do not taper.

To *M. pseudo-hapteron* as described and illustrated by Setchell (1929), Figure 71, my materials show a certain resemblance in the stellate branching, but the wall of this species are thin, with the ultimate branches distinctly tapering. Dawson's (1956) Figure 12 for *M. pseudo-hapteron* (reproduced from Gepp's original illustration of the type) shows the characteristic stellate branching but then his materials have very much smaller filaments with a maximum diameter of only 200 μ.

The distinct character of my specimens is the pseudoparenchymatous appearance of the blades produced by the very close meshes formed by the segments.

Derbesia padinae sp. nov.
Pl. 6, Figs. 1–2

Derbesia sp. *In* Trono 1968:164.

Filaments minute, about 1.5 mm tall, epiphytic on *Padina*; composed of siphonaceous horizontal and erect filaments; horizontal filaments variable in diameter, very laxly tortuous, commonly from 15 to 40 μ in diameter; sometimes a short portion of the horizontal filament becomes knob-like; erect filaments very much attenuated from the thick base, about 50–60 μ thick to very thin ultimate branches, 6–8 μ in diameter; lower portion of the erect filament unbranched for a distance of about 280 to 450 μ from the base, the upper portion 2 to 3 times dichotomously branched with very narrow angles; the erect arborescent filament may be solitary, or in series along the long horizontal creeping axis; in the latter, the erect filaments are about 650 to 1800 μ from each other; no fruiting bodies were observed.

Plantae minutae, c. 1.5 mm alt., in *Padina* epiphyticae, e filamentis siphonaceis horizontalibus erectisque compositae; filamenta horizontalia diametro variantia, laxissime tortuosa, vulgo 15–40 μ diam.; parte brevi filamenti horizontalis interdum modiformi facta; filamenta erecta a basi crassa c. 50–60 μ ad ramos ultimos tenuissimos 6–8 μ valde attenuata; pars inferior filamenti erecti per c. 280–450 μ a basi non ramosa, pars superior 2–3 dichotome ramosa, angulis angustissimis; filamentum erectum arborescens aut singulum aut in seriebus cum intervallis 650–1800 μ secundum axem repentem horizontalem longum; fructificationes non observatae.

TYPE: D15576.1, growing on *Padina sp.*, Koror Is., Palau Group, October 5, 1960; other materials examined; D15645.1, D15548.1, D15586.1, all on *Padina sp.*, Iwayama Bay, Palau Group, August 22, 1960.

The materials studied are somewhat similar to *D. attenuata* described by Dawson (1954) from Viet Nam but are very much shorter and have a pronounced attenuation of the erect arborescent filaments. Also, the horizontal filament of the present materials are laxly tortuous and very irregular in diameter.

Chlorodesmis dotyi sp. nov.

Pl. 7, Figs. 1–6

Chlorodesmis sp. *In* Trono 1968:174.

Filaments up to 5 cm tall forming soft green tufts, consisting of a thick prostrate, rhizomatous basal portion at the apical portion of which many erect filaments arise; rhizomatous filament well developed, thick walled, irregular in diameter to about 300 μ, slightly moniliform, and covered with densely packed rhizoids; rhizoidal filaments moniliform near their bases to cylindrical near their apices; both rhizomatous and rhizoidal portions densely packed with chloroplasts; branching of the rhizomatous filament irregular giving rise to irregularly branched and moniliform secondary branches which are strongly constricted at their dichotomies; upper erect filaments cylindrical, about 60 to 80 μ thick, dichotomous to trichotomously branched in alternate planes, deeply and equally constricted above the dichotomies; internodal constrictions present especially at the lower portions; dichotomies and trichotomies abundant below and fewer above.

Filamenta usque ad 5 cm alt., caespites molles virides formantia, caespites e parte crassa rhizomatosa basali, ad cuius partem apicalem multa filamenta erecta

oriuntur, constantes; filamentum rhizomatosum bene evolutum, membranas crassas habens, irregulare diametro, usque ad 300 μ paululum moniliforme, et rhizoideis arcte contiguis tectum; filamenta rhizoidea moniliformia prope bases ad cylindrica prope apices; partes et rhizomatosae et rhizoideae chloroplastis arcte impletae; ramificatio filamenti rhizomatosi irregularis, ramos secondarios irregulariter ramosos et moniloformes, ad dischotomias valde constrictos, efficiens; filamenta superiora erecta cylindrica, c. 60–80 μ crass., in planis alternis dichotome ad trichotome ramosa, super dichotomias profunde et aequa constricta; constrictiones internodales adsunt, praecipue ad partes inferiores; dichotomiae trichotomiaeque infra abundantes et super pauciores.

TYPE: D15183, attached on rocks, collected from the northern seaward reef of Mokil Is., June 6, 1960.

The presence of the large rhizomatous filaments distinguishes this species from other previously described species of *Chlorodesmis*. The only comparable species with regards to the habit of the alga is *C. bulbosa* but unlike this species in which the stipe is made up of several compacted bases of the erect filaments, the rhizomatous portions of my specimens consist of large prostrate filaments bearing numerous compacted mass of moniliform to cylindrical rhizoidal filaments. Also, unlike that of Figure 2 of Ducker (1965) for *C. bulbosa* in which the basal portion of the erect filaments forming the stipe are unmodified, those of the present materials are very large in comparison to the upper erect portions of the filaments, up to 5 times the diameter of the latter, aside from being moniliform and packed with dense chloroplasts.

Also, in the present species the filaments remain nonseptate at the constrictions above the dichtomies where the walls become thickened to nearly occlude the lumen of the filaments in many cases.

This alga is named in honor of Dr. Maxwell S. Doty of the Department of Botany, University of Hawaii, my highly respected and beloved mentor.

Avrainvillea hollenbergii sp. nov.
Pl. 8, Figs. 1–6

Avrainvillea sp. *In* Trono 1968:176.

Thallus brownish ash-grey, to 9 cm tall; stipitate from a bulbuous holdfast; stipe cylindrical, 10 to 20 cm long, 3 to 5 mm thick; frond consists of a main, thin blade from which secondary proliferations arise either from the margin or from the flat side of the blade; blade appears irregularly zonate composed of irregular, alternating brown and greyish bands, made up of strongly interwoven filaments; main filaments of the blade 12 to 14 μ in diameter, irregularly and slightly moniliform, filled with brownish green chromatophores; filaments conspicuously constricted above the dichotomies, the constrictions somewhat unequal, one of which is long-necked; surface filaments of the blade distinctly finer than the inner filaments, 4 to 5 μ in diameter, colorless, not markedly constricted at the dichotomies, cylindrical, tortuous with blunt ends and compacted together into a pseudo-cortex;

surface filaments of the stipe very compact and hard to tease; inner filaments of the stipe slightly larger than those of the blade but more tortuous, 15–18 μ in diameter; inner filaments of the rhizome very much larger than the stipe and the blade, to 70 μ in diameter, yellowish brown and filled with starch grains, irregularly but distinctly torulose, averaging 55 μ in diameter; secondary branch filaments of the rhizome about 40 to 55 μ in diameter; surface filaments of the rhizome torulose to sub-moniliform but becoming cylindrical and very tortuous towards the apices which are 8–10 μ in diameter.

Thallus brunneo-cinereus, usque ad 9 cm alt., ex haptero bulboso stipitatus; stipes cylindricus, 10–20 cm long., 3–5 mm crass.; frons e lamina principali tenui constans; proliferationes secondariae e margine aut latere plano laminae enascentes; lamina irregulariter zonata apparens, e taeniis alterne brunneis cinereisque composita, e filamentis valde intricatis constans; filamenta laminae principalia 12–14 μ diam., irregulariter atque paululum moniliformia, chromatophoris brunneo-viridibus impleta; filamenta super dichotomias perspicue constricta, constrictionibus aliquantulum inaequis, una collum longum habente; filamenta in superficie laminae perspicue tenuiora quam filamenta interiora, 4–5 μ diam. incolorata, ad dichotomias non manifeste constricta, cylindrica, tortuosa, in extremitatibus obtusa, in pseudocorticem spisse ordinata; filamenta in superficie stipitis compactissima aegre discissa; filamenta stipitis interiora paululuo maiora quam ea laminae, tortuosiora, autem, 15–18 μ diam.; filamenta interiora rhizomatis multo maiora quam ea stipitis laminaeque, usque ad 70 μ diam., flavo-brunnea, granis amyli plena, irregulariter sed manifeste torulosa, 55 μ med. diam.; filamenta ramorum secondariorum rhizomatis torulosa c. 40–55 μ diam.; filamenta superficiei rhizomatis torulosa ad submoniliformia, versus apices, autem, cylindrica tortuosissimaque facta; apices 8–10 μ diam.

TYPE: D23123, collected from sandy-rocky substratum on reef at eastern side of Ifaluk Is., Ifaluk Group, August 10, 1960.

Its size, habit and internal anatomy set this species apart from the previously described species of *Avrainvillea*.

This alga is named in honor of Dr. George J. Hollenberg of the University of Redlands, Redlands, California who is known to his colleagues and students as "Uncle George".

Spyridia velasquezii sp. nov.
Pl. 9, Figs. 1–2; Pl. 10, Fig. 3

Spyridia sp. *In* Trono 1969:72.

Thalli irregularly branched, basically alternate but sometimes opposite, the larger and smaller branches mixed; main axis fully corticated, cortications made up of a series of alternating tiers of short and longer cells; the shorter tiers consist of rectangular cells, 26 μ broad and about 50 μ long; longer tiers consist of somewhat uniformly elongated, slender cells, about 13 μ broad and about 75 μ long; determinate branches corticated only at the nodes; terminal spines of the deter-

minate branches absent; tetrasporangia spherical, about 50 to 60 μ in diameter, sessile on the cortical bands of the determinate branches, single, or as many as four in a node.

Thalli irregulariter ramosi, natura alterni, interdum, autem oppositi, ramis maioribus minoribusque mixtis; axis principalis plene corticatus, corticationibus e serie stratorum alternantum cellularum brevium longiorumque compositis; strata breviora e cellulis rectangularibus, 26 μ lat., c. 50 μ long. consistantia; strata longiora e cellulis aequius elongatis, c. 13 μ lat., c. 75 μ long. constantia; rami determinati solum ad nodos corticati, sine spinis terminalibus; tetrasporangia spherica, c. 50–60 μ diam., in taeniis corticalibus ramorum determinatorum sessilia, singulis aut usque ad quattuor in nodo.

TYPE: D15654.7, collected from reef at Koror Is., Palau Group, West Caroline, September 5, 1960.

This species differs primarily from *S. filamentosa* in the absence of the spines at the tips of the determinate branches and also in the untapered apical portions of the determinate branches.

This alga is named in honor of Dr. Gregorio T. Velasquez, Professor Emeritus, Department of Botany, University of the Philippines, a respected mentor and colleague.

Ceramium kororensis sp. nov.
Pl. 9, Figs. 3–4

Ceramium sp. *In* Trono 1969:78.

Thalli epiphytic on larger algae; attached by rhizoids arising from the nodes of the basal prostrate portion of the filaments; branching dichotomous; diameter of the middle portions of the erect filaments somewhat larger than the basal and terminal portions, to about 95–115 μ at the cortical bands; branches tapered towards the furcipate apices; cortical bands about 50 μ tall, about twice as broad as tall, consisting of large rounded to slightly angular cells which are about 25–30 μ in diameter, cutting off smaller angular surface cells which are irregularly disposed in the middle of the cortical band; those at the lower and upper margins of the cortical bands forming a horizontal row of rectangular cells which are vertically disposed; the lower 2/5 of the cortical bands in the older portion of the filaments become slightly separated from the upper 3/5 by an indistinct, irregular transparent line; the lower portion of the cortical band is made up of one or two rows of squarish to rectangular cells about 15–16 μ tall, 13–14 μ broad which may cut off smaller triangular cells in one or both of their lower or upper corners; no reproductive structures seen.

Thalli in algis maioribus epiphytici; per rhizoidea quae e nodis partis basalis prostratae filamentorum enascuntur, affixi; ramificatio dichotoma; partes mediae filamentorum erectorum paululo maiores diametro quam partes basales terminalesque, usque ad c. 95–115 μ ad taenias corticales; rami versus apices furcipatos attenuati; taeniae corticales c. 50 μ alt., c. 2 plo latiores quam altae, e cellulis

tapering horns from their thicker bases, the thicker body and the stalk which is tapered towards the base. Besides, in the present species, propagula with three horns are of common occurrence. Also, the erect filaments are simple, or sparsely branched and in this aspect recalls the habit of *S. axillaris* from Japan.

Summary

The following new species are reported: *Boodleopsis carolinensis, Cladophoropsis palauensis, C. carolinensis, Boodlea trukensis, Microdictyon mokilensis, Derbesia padinae, Chlorodesmis dotyi, Avrainvillea hollenbergii, Spyridia velasquezii, Ceramium kororensis* and *Sphacelaria carolinensis.*

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PLATE 1

Boodleopsis carolinensis sp. nov.

Fig. 1. Upper semi-erect photosynthetic filament showing irregular branching (upper scale).

Fig. 2. Colorless and irregularly branched filaments found deep in the felted mass of filaments (upper scale).

Fig. 3. A portion of the main rhizomatous filament found deep in the felted mass of filaments (upper scale).

Fig. 4. Upper portion of the semi-erect filament showing di- and trichotomous type of branching (lower scale).

Fig. 5. A portion of the filament showing mature sporangium (lower scale).

Fig. 6. A young sporangium (lower scale).

Fig. 7. A portion of the horizontal filament found on the upper surface of the felted mass densely filled with chloroplasts (upper scale).

Figs. 8–10. Stages in the development of the spores (upper scale).

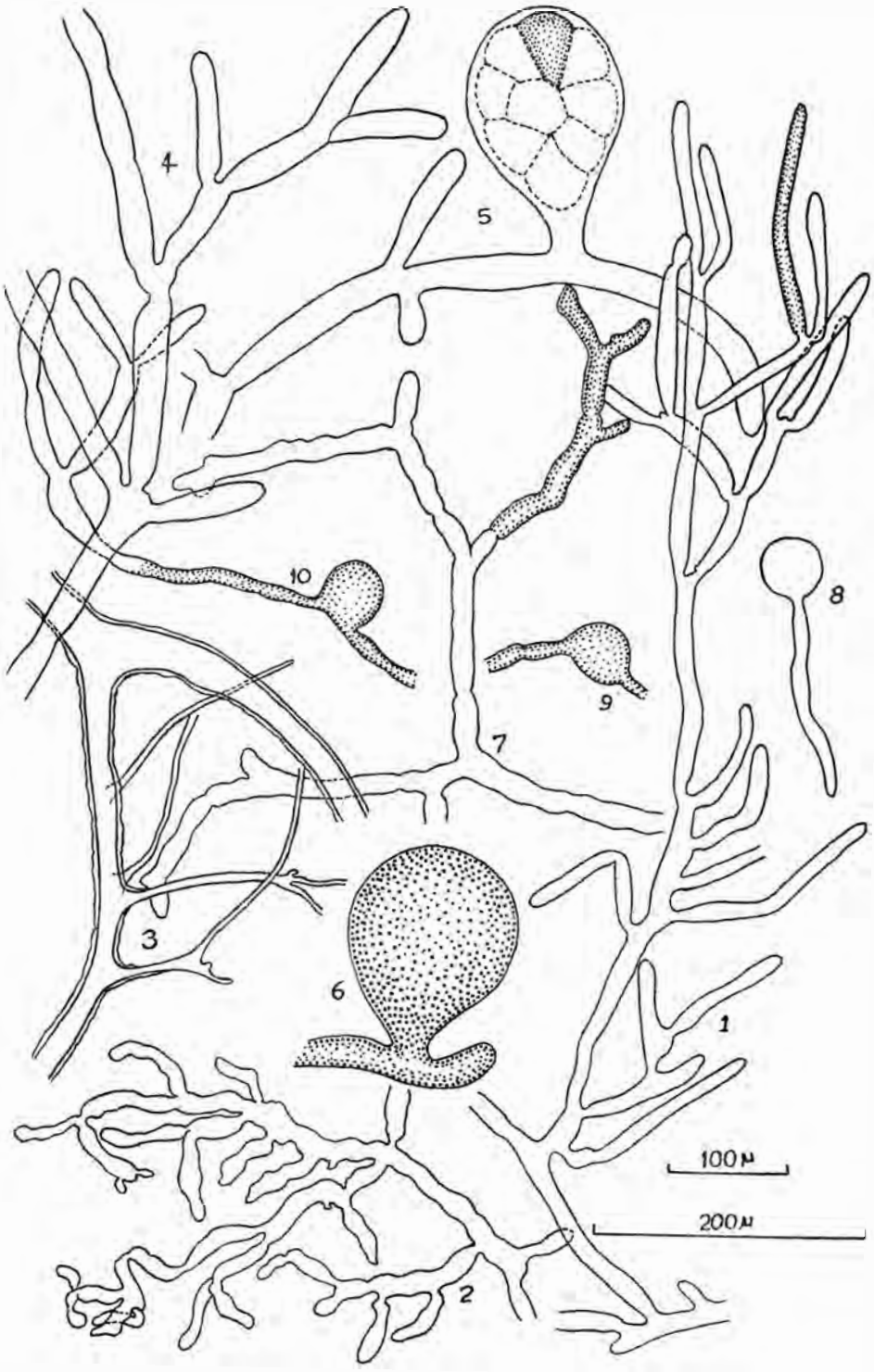
4
5
10
8
9
7
3
6
1
100μ
200μ
2

PLATE 2

Cladophoropsis palauensis sp. nov.

Fig. 1. A portion of the thallus showing the twisted filament and interrupted branching.

Fig. 2. A portion of the filament exposed at the outer surface of the clump showing secund and crowded branches.

Fig. 3. A portion of the filament found deeper in the clump showing inflated cells.

Fig. 4. A portion of the filament found deeper in the clump showing the *Rhizoclonium*-type extensions of the cells.

Fig. 5. Base of the filament modified into a rhizoid provided with many, small disc-like hapteroid cells.

Fig. 6. A detailed drawing of a portion of the filament showing the thick stratified walls, non-septate bases of the branches, and surface view of the hapteroid cells.

Fig. 7. A detailed side-view drawing of a hapteroid cell showing its attachment to the wall of the main filament.

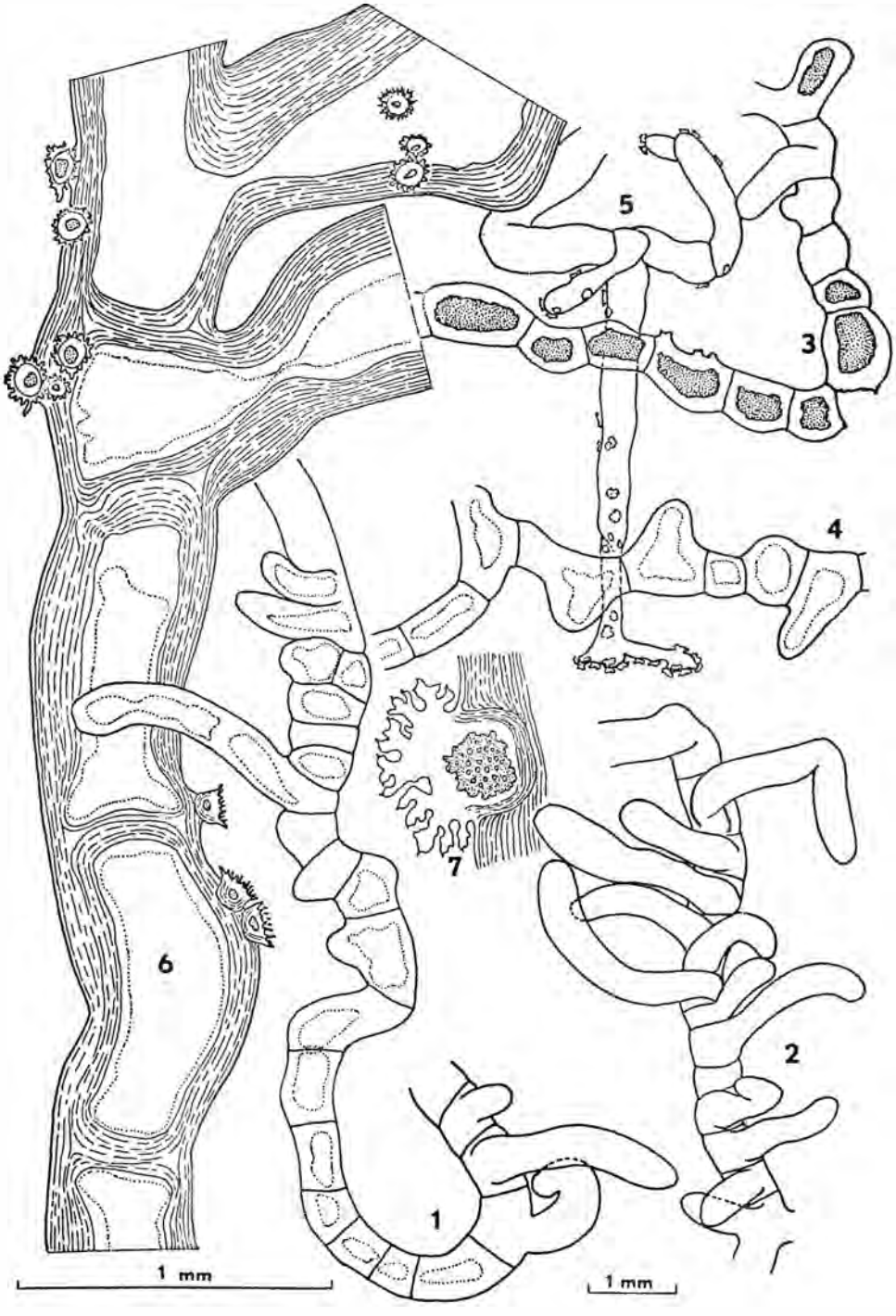
5
3
4
7
6
2
1
1 mm
1 mm

PLATE 3

Cladophoropsis carolinensis sp. nov.

Fig. 1. A branch showing the main filament with very long non-septate basal portion with several lateral branches at its distal end (upper scale).

Fig. 2. A branch from the main filament showing a septate basal portion with small branches and very long non-septate apical end (upper scale).

Fig. 3. A branch from the main filament bearing a proliferous secondary branch and long non-septate branch without proliferations (upper scale).

Fig. 4. A branch system showing non-septate and non-proliferous secondary branches (upper scale).

Fig. 5. An enlarged drawing of a holdfast cell (lower scale).

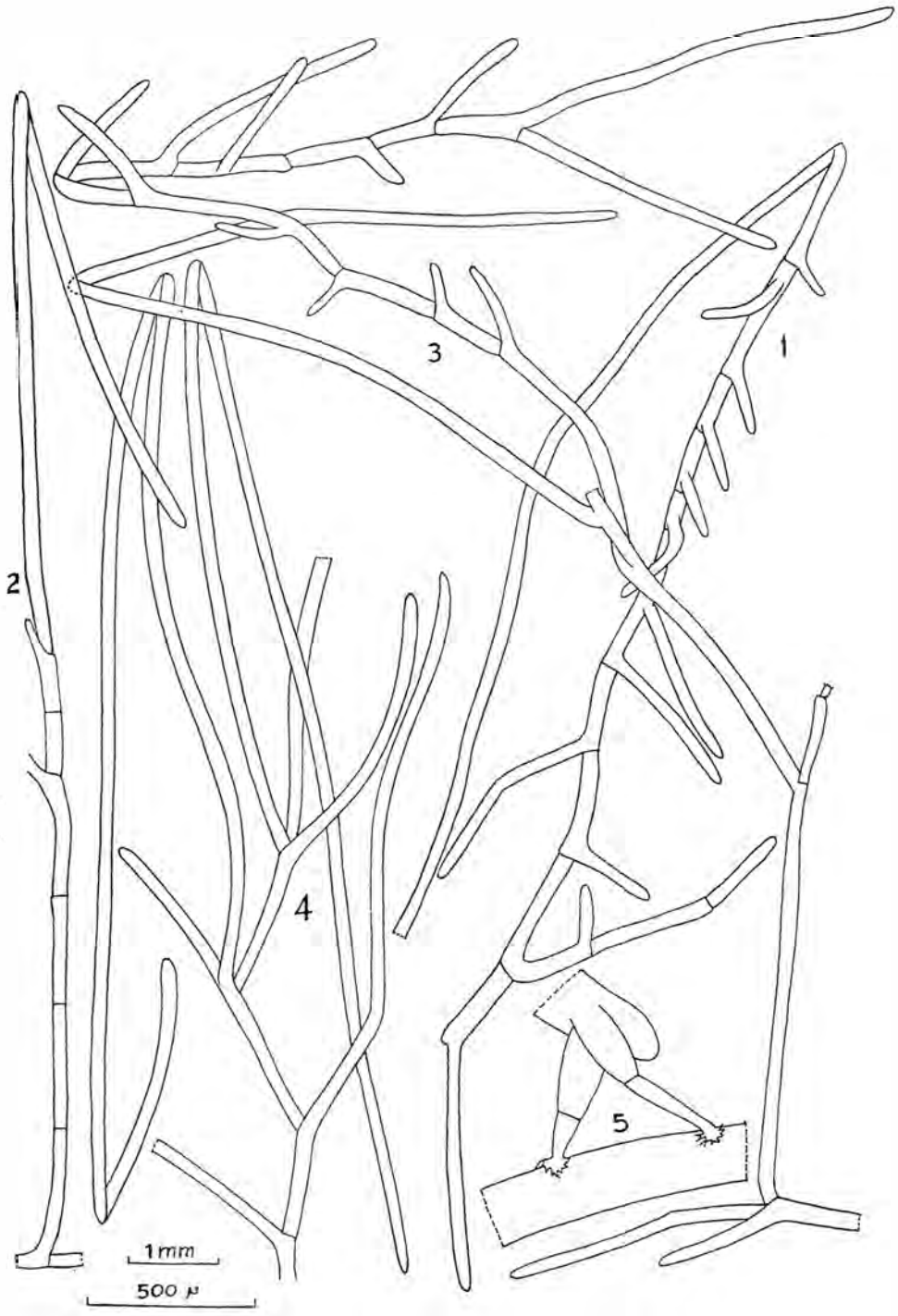
1
2
3
4
5
1mm
500 μ

PLATE 4

Boodlea trukensis sp. nov.

Fig. 1. A portion of the thallus showing the irregular type of branching (upper scale).

Fig. 2. A portion of the thallus showing the presence of many hapteroid cells at the tips of the branches of the prostrate filament in contrast to their absence in the exposed or sub-erect branches (upper scale).

Fig. 3. An enlarged drawing of a one-celled lateral branch with two hapteroid cells (lower scale).

Fig. 4. An enlarged drawing of a tip of a branch modified into long and rhizoid-like cell (lower scale).

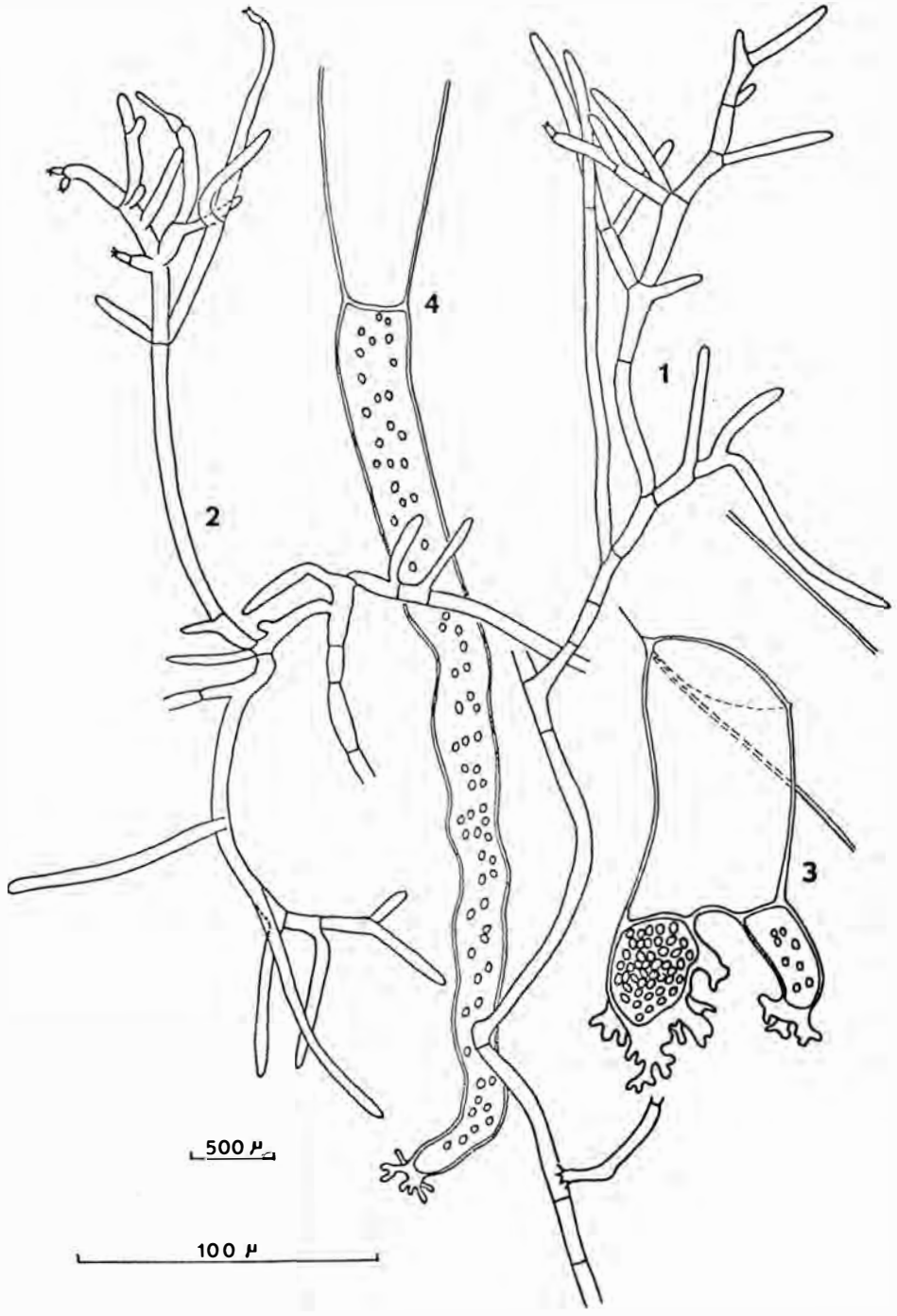
1
2
3
4
500 μ
100 μ

PLATE 5

Microdictyon mokilensis sp. nov.

Fig. 1. A small portion of the blade showing the habit.

Fig. 2. A detailed drawing of a portion of the blade showing a much compacted blade appearing pseudo-parenchymatous under low magnification.

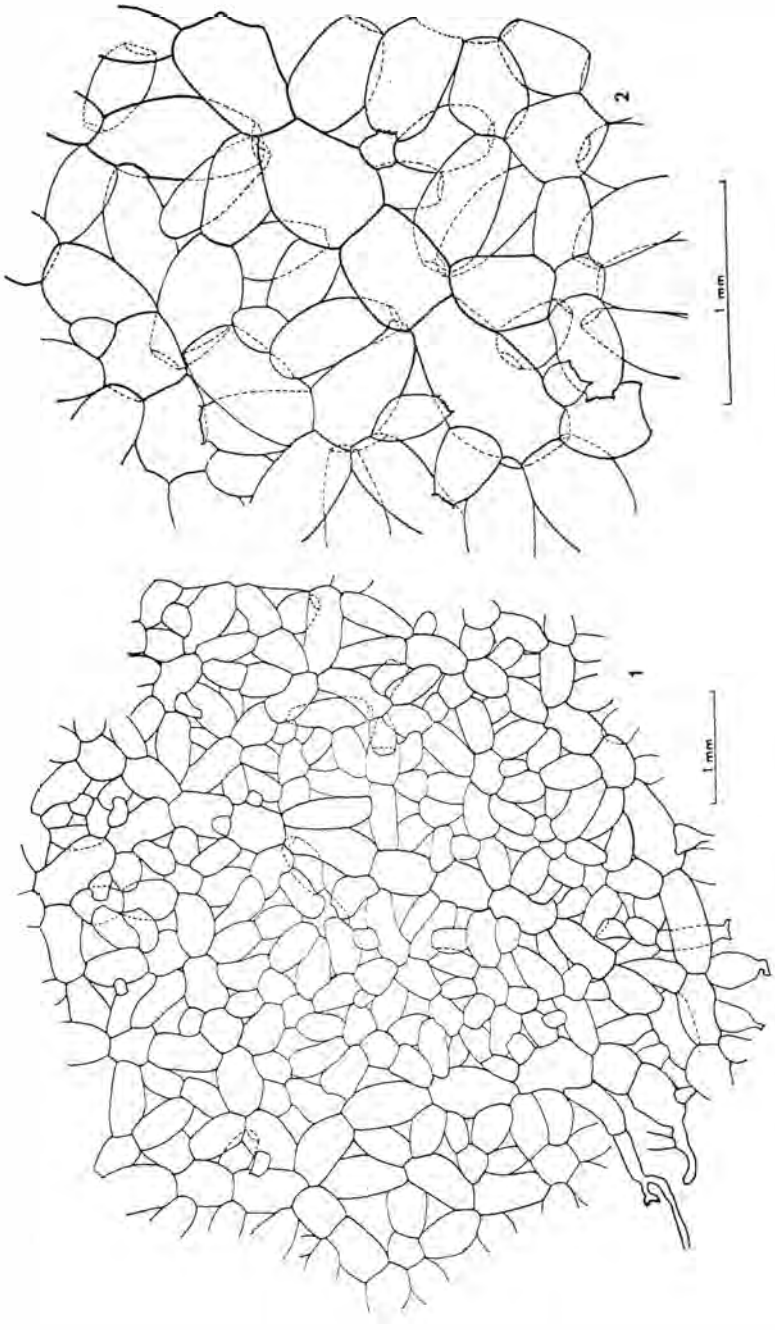
2
1 mm
1
1 mm

PLATE 6

Derbesia padinae sp. nov.

Fig. 1. Habit of the alga showing the horizontal and erect filaments (Lower scale).
Fig. 2. A detailed drawing of a portion of the filament (Upper scale).

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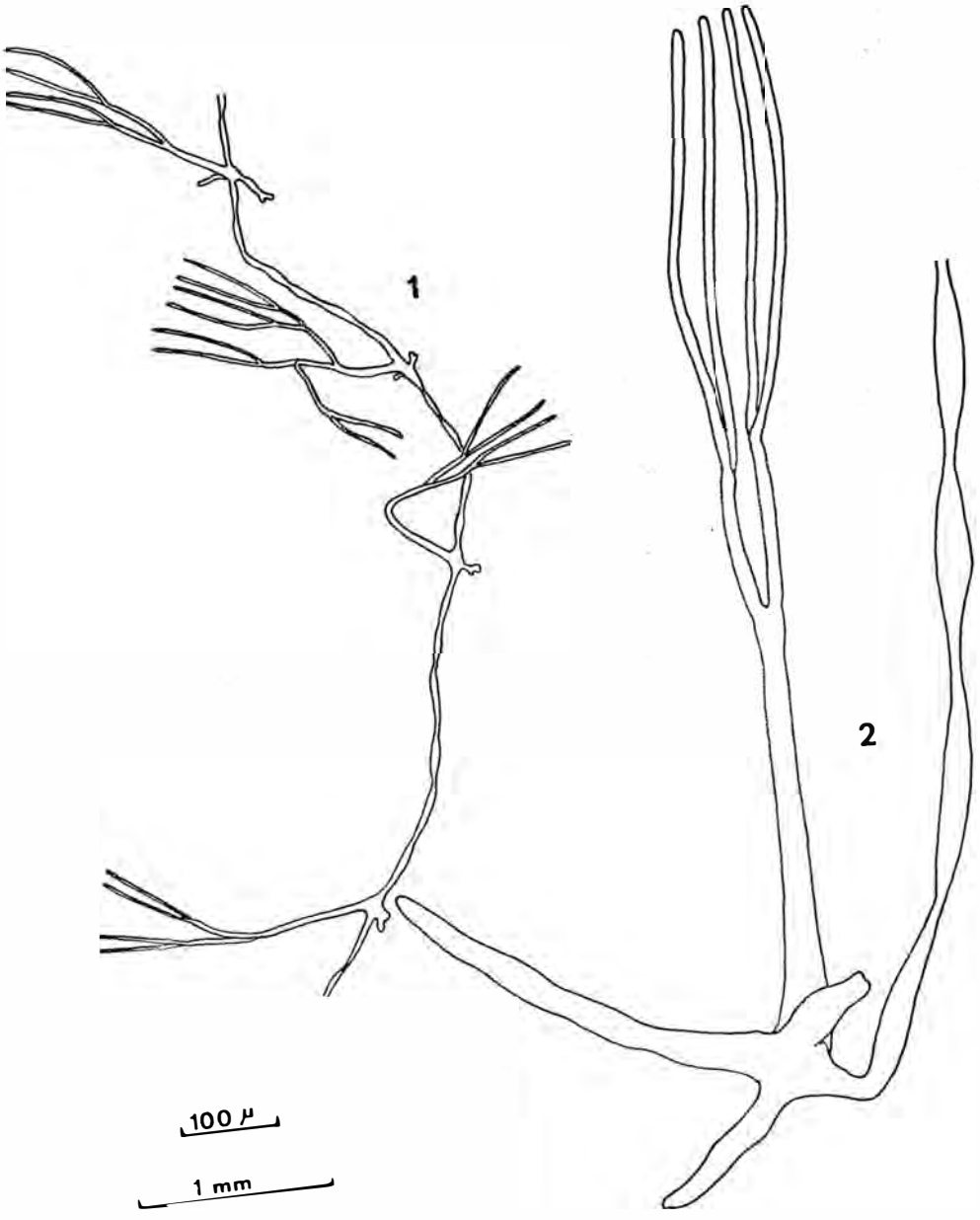


PLATE 7

Chlorodesmis dotyi sp. nov.

Fig. 1. A portion of the thallus showing the habit of the alga.

Fig. 2. A portion of the prostrate rhizomatous filament showing the rhizoidal branches (same scale as figures 4 and 5).

Fig. 3. An enlarged drawing of the irregular moniliform portion of the rhizoid.

Fig. 4–5. Basal portion of the erect branches devoid of rhizoids showing the type of branching and the constrictions above the dichotomies.

Fig. 6. Upper portion of the filament showing trichotomy and branching at different planes.

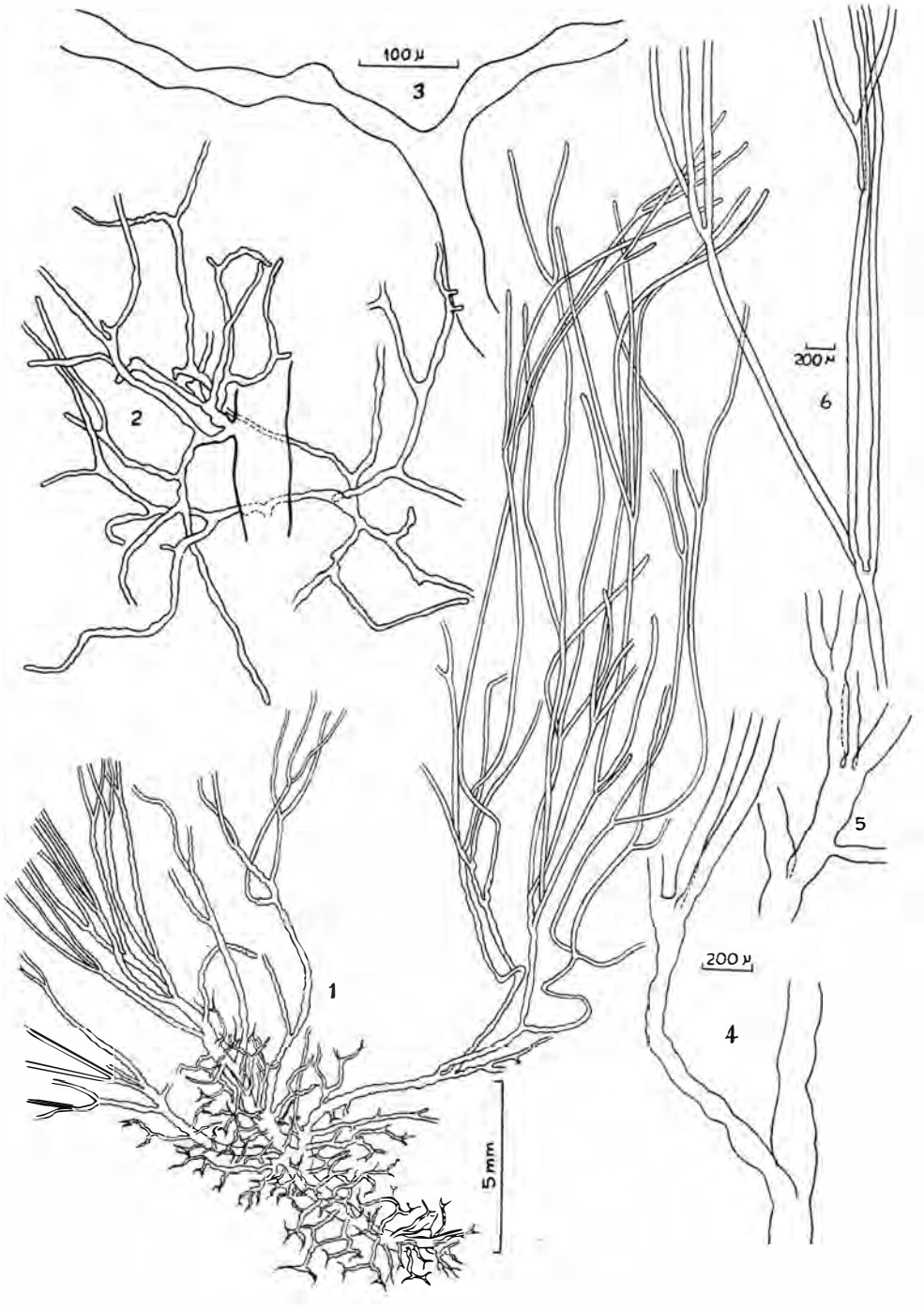

100 µ
3
2
200 µ
6
5
200 µ
4
1
5mm

PLATE 8

Avrainvillea hollenbergii sp. nov.

Fig. 1. Habit of the alga (×1).
Fig. 2. A portion of the secondary filament from the rhizome.
Fig. 3. A portion of the main filament from the stipe.
Figs. 4–5. A portion of the main filament from the blade showing unequal constrictions above the dichotomy one of which is long-necked.
Fig. 6. A portion of the colorless surface filament of the blade.

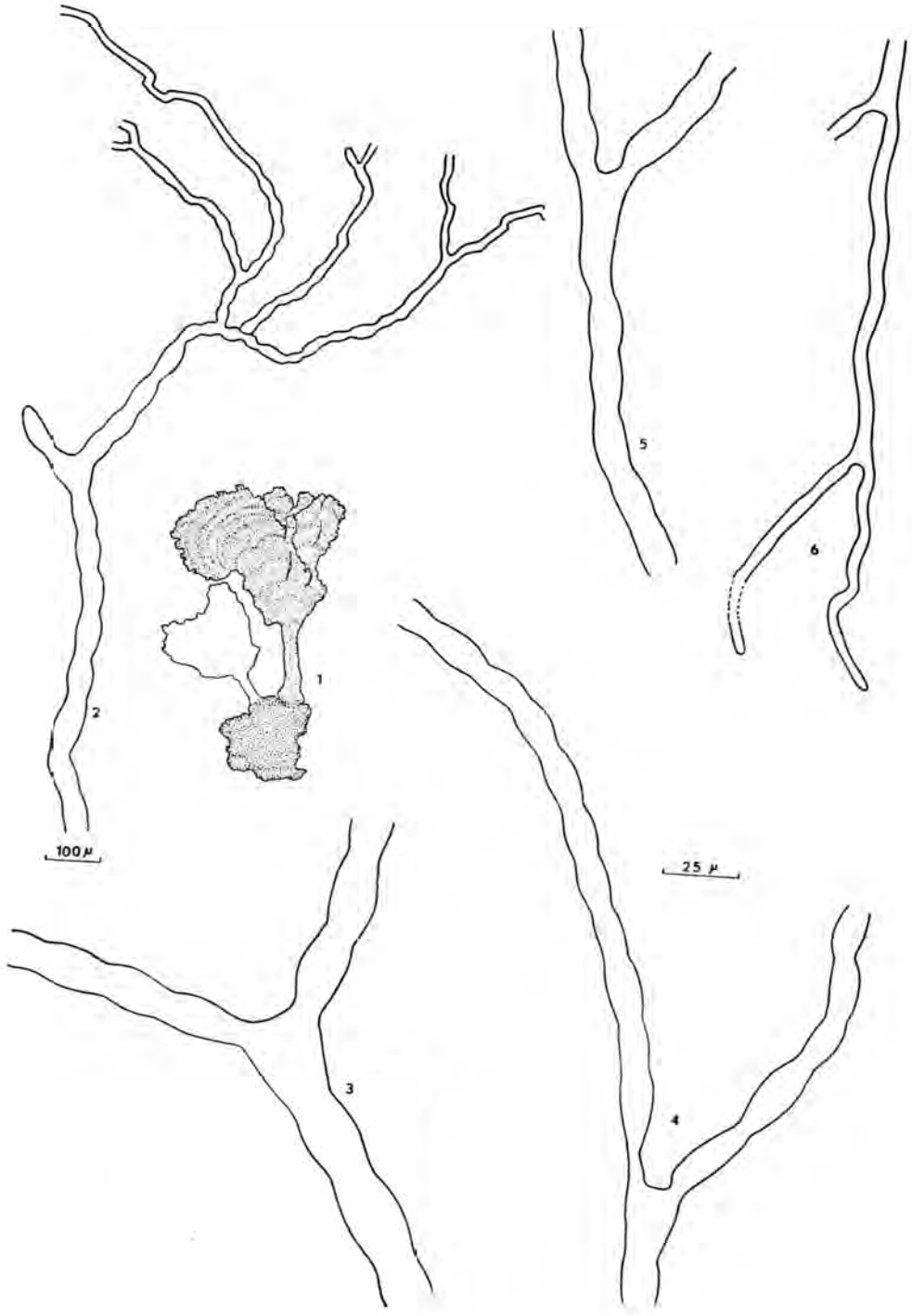

1
2
3
4
5
6
100 μ
25 μ

PLATE 9

Spyridia velasquezii sp. nov.

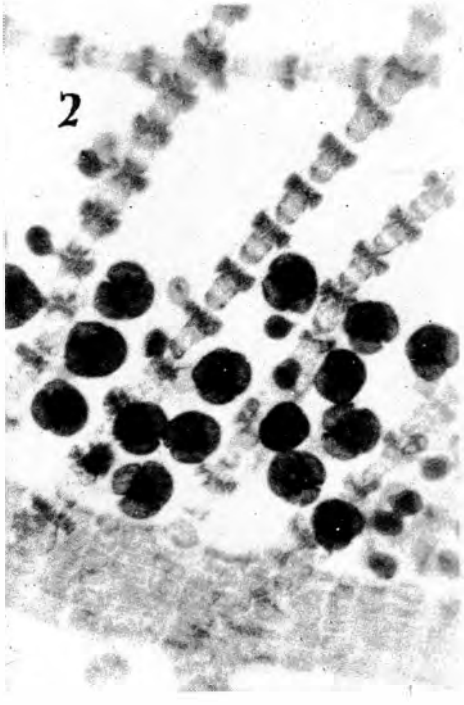
Fig. 1. Tip of a branch showing the determinate branches without spines.
Fig. 2. Middle portion of a branch showing determinate branches with tetrasporangia (ca. 50–60 μ in diameter).

Ceramium kororensis sp. nov.

Fig. 3. A portion of the filament (ca. 95–115 μ in diameter) showing furcipate tip.
Fig. 4. A magnified picture of the nodal cortication.


1


3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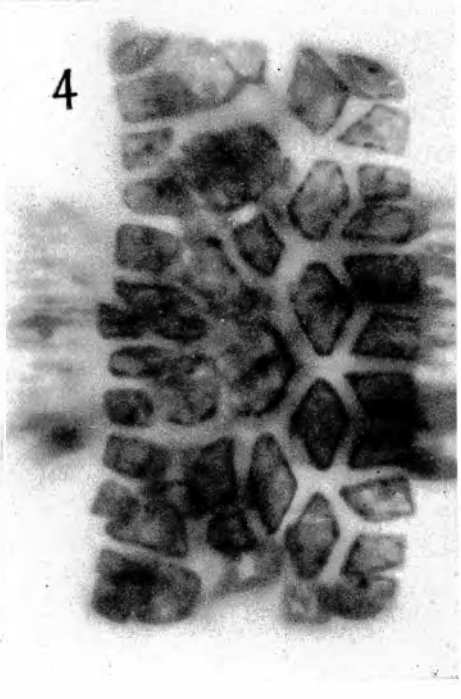

4

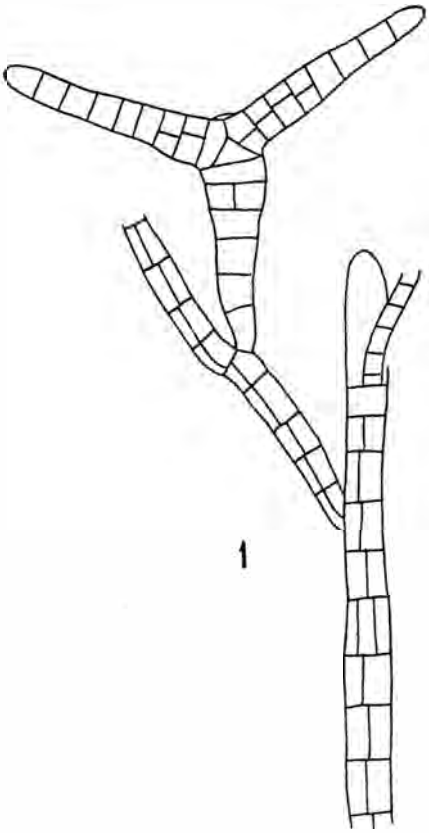
PLATE 10

Sphacelaria carolinensis sp. nov.

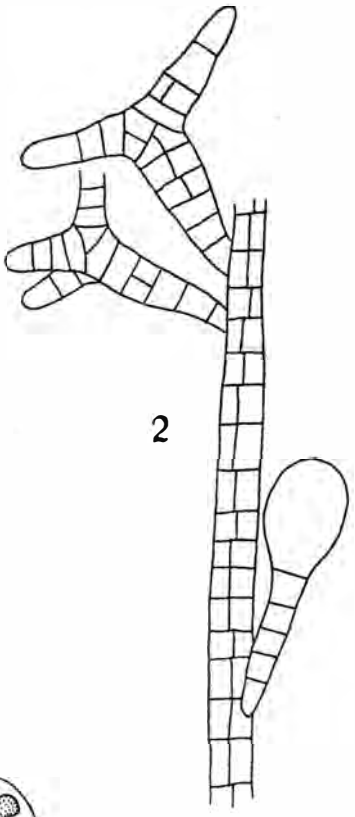
Figs. 1–2. Portions of the erect filaments (ca. 20–26 μ in diameter) showing propagulae.

Spyridia velasquezii sp. nov.

Fig. 3. A detailed drawing of the determinate branch without terminal spine (40–50 μ in diameter).



1



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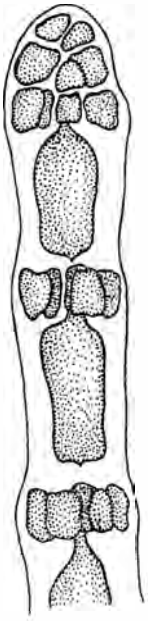

3