

NOTES ON NEW OR LITTLE-KNOWN MARINE ALGAE FROM BRAZIL

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TWO PLATES AND SIXTEEN TEXT FIGURES

The following report is based chiefly upon a small number of dried specimens of marine algae obtained by dredging off the coast of Brazil, mainly near Cabo Frio, in 1872, by the so-called Hassler Expedition. The Hassler was the name of a steamship belonging to the Coast Survey of the United States. Professor Louis Agassiz of Harvard University was invited to accompany the Hassler on a voyage from Boston to San Francisco by way of the Straits of Magellan. In his general narrative of the expedition, published in the Annual Report of the Board of Regents of the Smithsonian Institution for the year 1872 (pp. 87-92), Agassiz states:

I was invited by Professor Peirce to take passage in the Hassler, while she was going to the field of her duty on the coast of California, as surveying vessel, provided that my expenses were borne by other parties, so that the Coast Survey should not be put to any additional outlay. In consideration of this proposition, my friends in Boston liberally subscribed \$20,000 to enable me to make as thorough a series of investigations of animal life and other physical objects as possible, and a little more than this sum was expended. . . . We left Boston on the 4th of December, 1871.

One member of his small party was Count Pourtalès, who had charge of the dredging operations. Dr. Thomas Hill, an ex-President of Harvard University, was in charge of the chemical and physical work of the general expedition and of him Agassiz remarks:

I should not forget to mention that Dr. Hill made, also, a most valuable and admirably preserved collection of marine plants, gathered at every anchorage where time was allowed for landing.

Probably the actual labor of preparing the specimens of marine algae described below fell to the lot of this distinguished ex-President of Harvard University. This, with the dredging under the supervision of Count Pourtalès, and with the eminent Agassiz as general director and inspirer of the biological operations, seems to invest these few marine plants of Brazil with unusual distinction. The specimens, preserved in the Cryptogamic Herbarium of Harvard University and apparently unstudied since their collection nearly sixty years

ago, were recently entrusted for naming to the junior author, who invited the coöperation of the senior author. The specimens, as preserved at Harvard University, were without numbers. The numbers cited have been assigned to them by the junior author. The names of the new species herein described and one of the new combinations appear as *nomina nuda* in a paper published by the junior author entitled: Algae of the Hassler, Albatross, and Schmitt expeditions—I. Marine algae from Brazil. *Am. Jour. Bot.* 17: 627-634. 1930.

In connection with this study of the algae collected by the Hassler Expedition, the authors have found it highly desirable to see the types of several species collected on the shores of Brazil by St. Hilaire, and described by Greville in 1833. Through the kindness of Professor William Wright Smith, Regius Keeper of the Royal Botanic Garden in Edinburgh, we have been able to examine these and through the courtesy of the officials of the Muséum d'Histoire Naturelle in Paris we have also been able to see photographs of several of the cotypes there preserved.

Liagora?? dichotoma Grev. *St. Hil. Voy. Dist. Diam. Brésil* 2: 44. 1833.

The type specimen (fig. 1), preserved in the Greville Herbarium, is evidently a *Galaxaura* of the *Braehycladia* section, and appears to be indistinguishable from *G. frutescens* Kjellm., which was from Bahia, while the *Liagora?? dichotoma* was from the vicinity of Aldea Velha. The specific name *dichotoma* would not be available in the genus *Galaxaura* on account of the existence of the older *G. dichotoma* Lamour. Moreover, it is extremely doubtful whether either of these plants can be satisfactorily distinguished from *Galaxaura marginata* (Ell. & Sol.) Lamour., originally described from the Bahama Islands.

Callophyllis divaricata (Grev.) Howe & Taylor, comb. nov.

Chondrus divaricatus Grev. *St. Hil. Voy. Dist. Diam. Brésil* 2: 448. 1833.¹

Sphaerococcus divaricatus Mont. *Ann. Sci. Nat. Bot.* II, 12: 43. 1839.

Frondibus 4-7 cm. altis, caespitosis, intricatis, complanatis, subcartilagineis, 0.2-0.5 mm. crassis (specimine originali indurato-sicco madefacto) repetito subdichotomis, segmentis 1-4 mm. latis, plus minusve divaricatis, oblongis vel linearibus, interdum lobatis, obtusis.

"Playe près Aldea Velha," Province of Espiritu Santo, Brazil, Voyage of Auguste de Saint-Hilaire, 1816 to 1821. The original

¹ The algae described as new in the place cited, under names given by Greville, appeared also under *nomina nuda* in a review of the work published the same year by St. Hilaire (*Archives de Botanique* 2: 448-450. 1833).



FIG. 1. The type specimen of *Liagora* ?? *dichotoma* Grev., from near Aldea Velha, Brazil, natural size—manifestly a species of *Galazaura*.

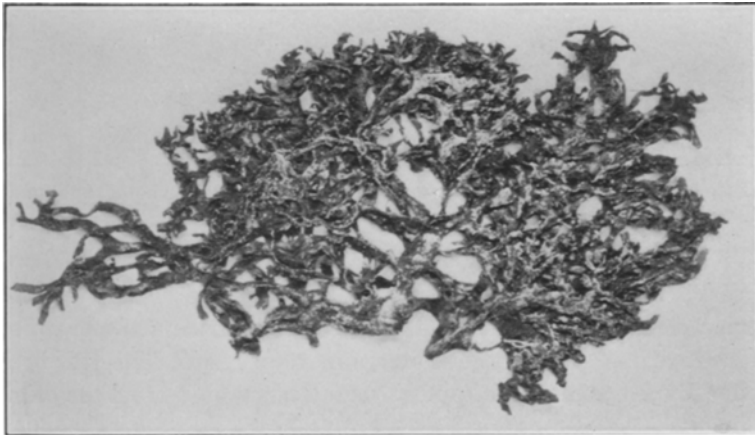


FIG. 2. The type specimen of *Chondrus divaricatus* Grev., from near Aldea Velha, Brazil, natural size. Its microscopic structure indicates its reference to the genus *Callophyllis*.

specimen² (fig. 2) is well preserved in the Greville Herbarium in the Royal Botanic Garden of Edinburgh. It shows immature tetrasporangia scattered in the cortex. There is a smaller, more densely caespitose cotype in the Herbarium of the Muséum d'Histoire Natur-



FIG. 3. *Callophyllis microdonta* (Grev.) Falkenb. A photograph, natural size, of the type specimen of *Odonthalia* (?) *microdonta* Grev., from near Aldea Velha, Brazil.

elle of Paris, bearing a tag inscribed 1060 S. We do not venture to describe color from specimens that have been dried for more than a hundred years. The species was apparently not collected by the Hassler Expedition and it appears to be known only from the original specimens.

² Probably collected in 1818. The date 1832, borne by most of the St. Hilaire specimens in the Greville Herbarium, appears to be the date of Greville's receipt of the specimens from St. Hilaire.

Callophyllis microdonta (Grev.) Falkenb. Rhodomel. 602. 1901.

Odonthalia (?) *microdonta* Grev. St. Hil. Voy. Dist. Diam. Brésil 2: 448. 1833.

?*Rhodymenia variegata* Mont. β *atrosanguinea* Hook & Harv. Fl. Antaret. 476. 1847.

?*Callophyllis atrosanguinea* (Hook. & Harv.) Hariot, Jour. de Bot. 1: 73. f. A, B. 1887; Miss. Sci. Cap Horn 75. pl. 8; pl. 9, f. 1, 2. 1889.

Dredged, Cabo Frio, *Hassler Expedition 1035*. St. Hilaire's original specimen (fig. 3) came from near Aldea Velha, a few miles north of Cabo Frio. We have not seen the original of the Hooker & Harvey var. *atrosanguinea* from Kerguelen's Land or of Hariot's *Callophyllis atrosanguinea* from the Straits of Magellan, but Schmitz (*fide* Falkenberg, *loc. cit.*) had identified Hariot's plant with

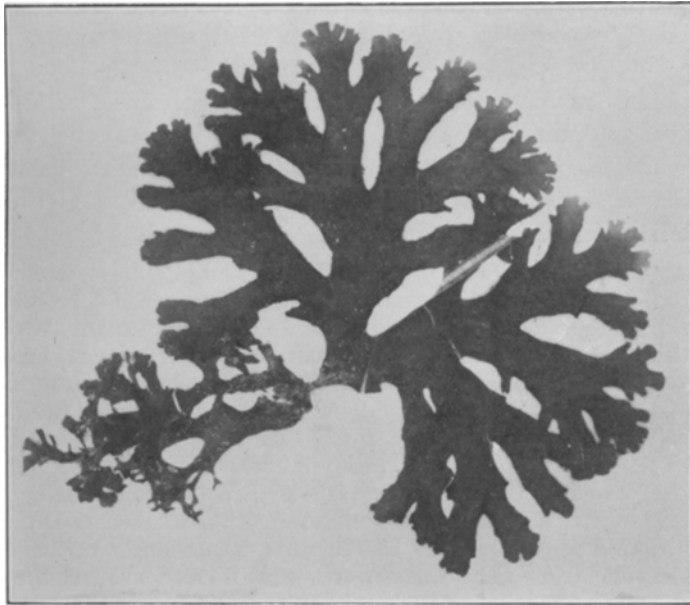


FIG. 4. *Callophyllis microdonta* (Grev.) Falkenb. Photograph, natural size, of a specimen (1035) dredged by the Hassler Expedition near Cabo Frio, Brazil.

Greville's. The range from the tropics of Brazil to the Straits of Magellan (S. Lat. 56°) and to Kerguelen's Land would be a wide one, but the existing ocean currents might make such a distribution plausible. Hariot's colored plate shows a considerably larger, redder, and less flabelliform plant than the Brazilian; the darkest parts of Hariot's plate represent fairly well the color of the Brazilian specimens. The Hassler Expedition material (fig. 4) has, for the most

part, broader segments and larger less numerous lobes than the original.

Rhodophyllis gracilarioides Howe & Taylor, sp. nov.

Thallo brevi-stipitato; stipite 10–12 mm. longo, cuneato a basi subtereti, marginibus aliquando brevi-proliferentibus; fronde plana, rubra, infra palmato-dichotoma, supra subpinnata vel subbipinnata, 150–250 μ crassa (madefacta), segmentis primis 3–6 mm. latis, venulis obscurissimis, lobis ultimis lanceolatis, deltoideis, vel subteretibus, acuminatis; medulla frondis 2–4 series irregulariter dispositas cellularum 50–260 μ diam. max. (sectione transversali) monstrante; strato corticali plus minusve monostromatico, cellulis partim angularibus, 15–26 μ diam. max. a superficie visis, partim majoribus et plus rotundatis, cellulis subcorticalibus 35–55 μ , superficie frondis veterioris reticulata, maculis multo majoribus quam illis obscuris circum cellulas corticales majores formati, parietibus exterioribus (vel membrana superficiali extracellulari) cellularum corticalium firmis, 8–20 μ crassis, scabriusculis, raro subpapillatis; ceteris ignotis.

Ad oras Brasiliae (Cabo Frio, Exped. Hassleriana). *Rhodophyllis gracilarioides* ad sectionem *Leptophyllum* spectare et proxima *R. dichotomae* (Lepech.) Gobi esse videtur. A specie dicta habitu plus *Gracilariam lacinulatam* (*G. multipartitam*) simulante et defectu essentiali proliferationum differt.

Thallus short-stipitate; stipe 10–12 mm. long, cuneate from a subterete base, the margins occasionally short-proliferous; frond plane, palmately dichotomous below, subpinnate or subbipinnate above, 150–250 μ thick (when soaked out), the main segments 3–6 mm. broad, the veins very obscure or invisible, the ultimate lobes lanceolate, deltoid, or subterete, acuminate; color (dried) hydrangea-red or deep Corinthian red;³ medulla of frond of 2–4 rather irregularly disposed layers of large cells 50–260 μ in max. diam. in cross section; cortex submonostromatic, its cells partly angular, 15–26 μ in longer diameter in surface view, partly larger and more rounded,⁴ the subcortical cells 35–55 μ in diameter, the surface in older parts obviously reticulate, the meshes much larger than the obscure ones formed around the larger cortical cells, the outer walls (“surface jelly”) firm, 8–20 μ thick, roughened, occasionally subpapillate; other parts unknown. (Fig. 5; pl. 2, figs. 4 and 5.)

Dredged, Cabo Frio, *Hassler Expedition 1036 b*, with *Nitophyllum uncinatum*.

³ Ridgway, Color Standards and Color Nomenclature, pl. 27.

⁴ The smaller cortical cells often jut over and partly cover these larger ones, giving the latter the appearance of being subcortical cells that have usurped a position in the superficial layer.

Rhodophyllis gracilarioides probably belongs in the subgenus *Leptophyllum* and near *R. dichotoma* (Lepech.) Gobi, from which it differs in the more Gracilarioid habit and in the essential absence (in our one specimen) of marginal proliferations.



FIG. 5. *Rhodophyllis gracilarioides* Howe & Taylor. Photograph, natural size, of the type specimen, dredged by the Hassler Expedition near Cabo Frio, Brazil.

Faucheia Hassleri Howe & Taylor, sp. nov.

Thallo tenui (sicco), lubrico et 150–280 μ crasso (madefacto), saturate rubro, radianti- et subdivaricati-dichotomo, segmentis primis 1–4-ies furcato, axillis plerumque rotundatis, ambitu thalli 4–6 cm. lato (aut supra?), segmentis oblongis vel obcuneatis, plerumque 2–5 mm. latis, aliquando 10–12 mm. sub fureis, apicibus fere subtruncatis vel obtusis, marginibus integris (cystocarpis exceptis); medulla frondis 1–3 series cellularum magnarum paene vacuarum, plerumque ovalium vel ellipticarum et 100–260 $\mu \times$ 60–130 μ sectione transversali monstrante, transienti abrupte in stratum tenue subcorticale plerumque serie una cellularum 15–22 μ diam. max.; strato corticali perspicue filamentoso, filamentis 2–4-cellularum simplicibus et antichinalibus vel basi parce et subdivaricate ramosis, cellulis (protoplastis) minutis, 3–6 μ diam. max., parietibus hyalinis, gelatinosis, confluentibus; cystocarpis marginalibus, sessilibus, verrucaeformibus-truncatis vel subhemisphericis, 0.75–1 mm. latis.

Ad oras Brasiliae (Cabo Frio, Exped. Hassleriana). Habitu et structura *Faucheia Hassleriana* ad *F. mollem* M. A. Howe sterilem ab

"Gulf of California" accedit, sed thallo plus regulariter dichotomo, concrecentiis specie absentibus, strato corticali laxiori et plus filamentoso, parietibus cellularum mollioribus, etc., differt.

A *Fauchea repente* (Ag.) Mont. & Bory, specie typica generis, *F. Hassleri* thallo tenuiori plus gelatinoso, furcis crebrioribus, filis corticalibus minus anticlinalibus valde differt.

Thallus thin when dry, lubricous and 150–280 μ thick when moist, deep Corinthian red,⁵ radiately and subdivaricately dichotomous, the main segments 1–4 times forked, the axils mostly rounded, the spread of the thallus 4–6 cm. (or more?), the segments oblong or obcuneate, mostly 2–5 mm. broad, sometimes 10–12 mm. under the dichotomies, the apices usually subtruncate or obtuse, the margins entire (except for cystocarps); medullary layer of 1–3 series of large nearly empty cells, these mostly oval or elliptic and 100–260 $\mu \times$ 60–130 μ in cross section, passing abruptly to a thin subcortical layer of usually a single series of cells 15–22 μ in long diameter; cortical layer distinctly filamentous, the filaments 2–4 cells long, anticlinal, or subdivaricately branched at base and giving a cross-hatched effect in a section, the cells (protoplasts) minute, 3–6 μ in long diameter, immersed in a copious collode;⁶ cystocarps marginal, sessile, verrucaeform-truncate or subhemispheric, 0.75–1 mm. in diameter. (Fig. 6; pl. 2, figs. 2 and 3.)

Dredged, Cabo Frio, *Hassler Expedition 1045*.

In habit and structure, *Fauchea Hassleri* bears some resemblance to the sterile *Fauchea* (?) *mollis* M. A. Howe⁷ from the Gulf of California, but it manifestly differs from that in being more regularly dichotomous, in apparent lack of concrescences, in the looser, more filamentous cortex, the much softer collode, etc.

From *Fauchea repens* (Ag.) Mont. & Bory, the type of the genus, it departs widely in the thinner, more gelatinous thallus, the more frequent dichotomies, the often criss-cross (less anticlinal) cortical filaments, etc.

Plocamium brasiliense (Grev.) Howe & Taylor, comb. nov.

Thamnophora brasiliensis Grev. St. Hil. Voy. Dist. Brésil 2: 448. 1833.

Plant hellebore-red, vernonia-purple, or Indian Lake,⁸ 5–9 cm. (or more ?) long, two or three times pinnate, ecostate or lightly costate at extreme base, pinnae in alternating pairs, one (the lower) of each

⁵ Ridgway, *op. cit.*, pl. 27.

⁶ In our material, as we soak it out in water, the outer parts of the collode are often exfoliated, leaving the cortical filaments exposed.

⁷ Bull. Torrey Bot. Club 38: 507. pl. 32; pl. 33, f. 6. 1911.

⁸ Ridgway, *op. cit.* pls. 38, 26.

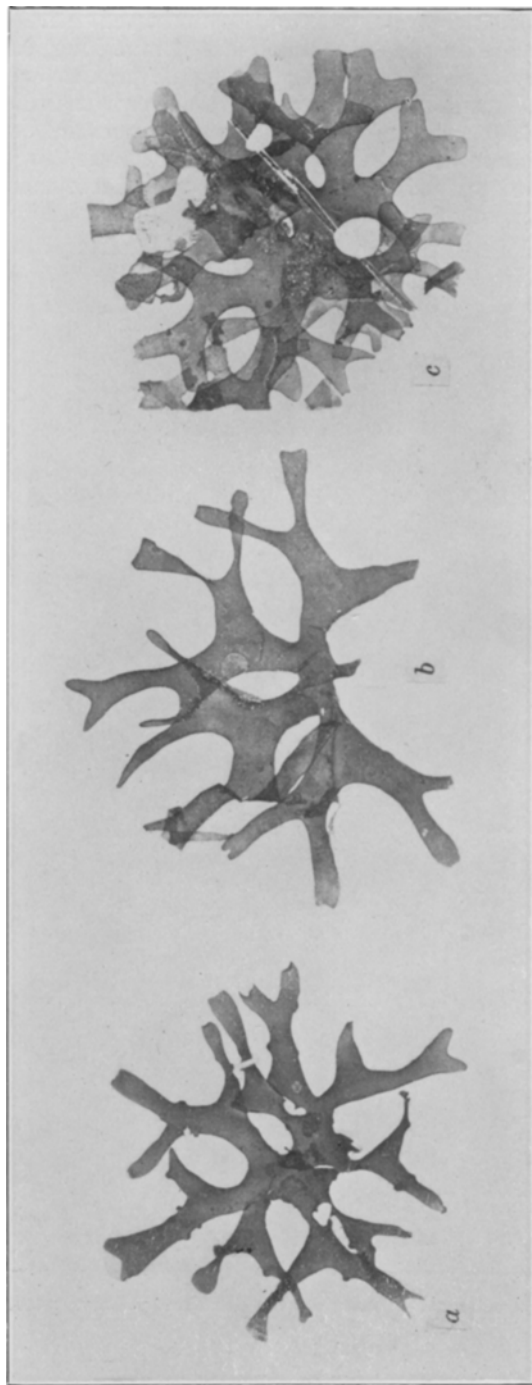


FIG. 6. *Fauchea Hassleri* Howe & Taylor. Photograph, natural size, of the type specimens, dredged by the Hassler Expedition near Cabo Frio, Brazil.

pair falcate, lanceolate, or long-deltoid, acuminate, entire or lightly crenulate-denticulate on the outer margin, 2–4 mm. long, 0.5–1.5 mm. in greatest width (at base), the other of the pair pinnate or pinnatifid in much the same fashion as the larger branch or remaining subsimple; thallus 130–300 μ thick in median parts; superficial cells mostly 10–35 μ in maximum diameter in surface view, the large cells of medulla and subcortex usually showing through the cortex and 50–125 μ in maximum diameter; sporangiophylls (immature?) simple or



FIG. 7. Type specimen of *Thamnophora brasiliensis* Grev., natural size.

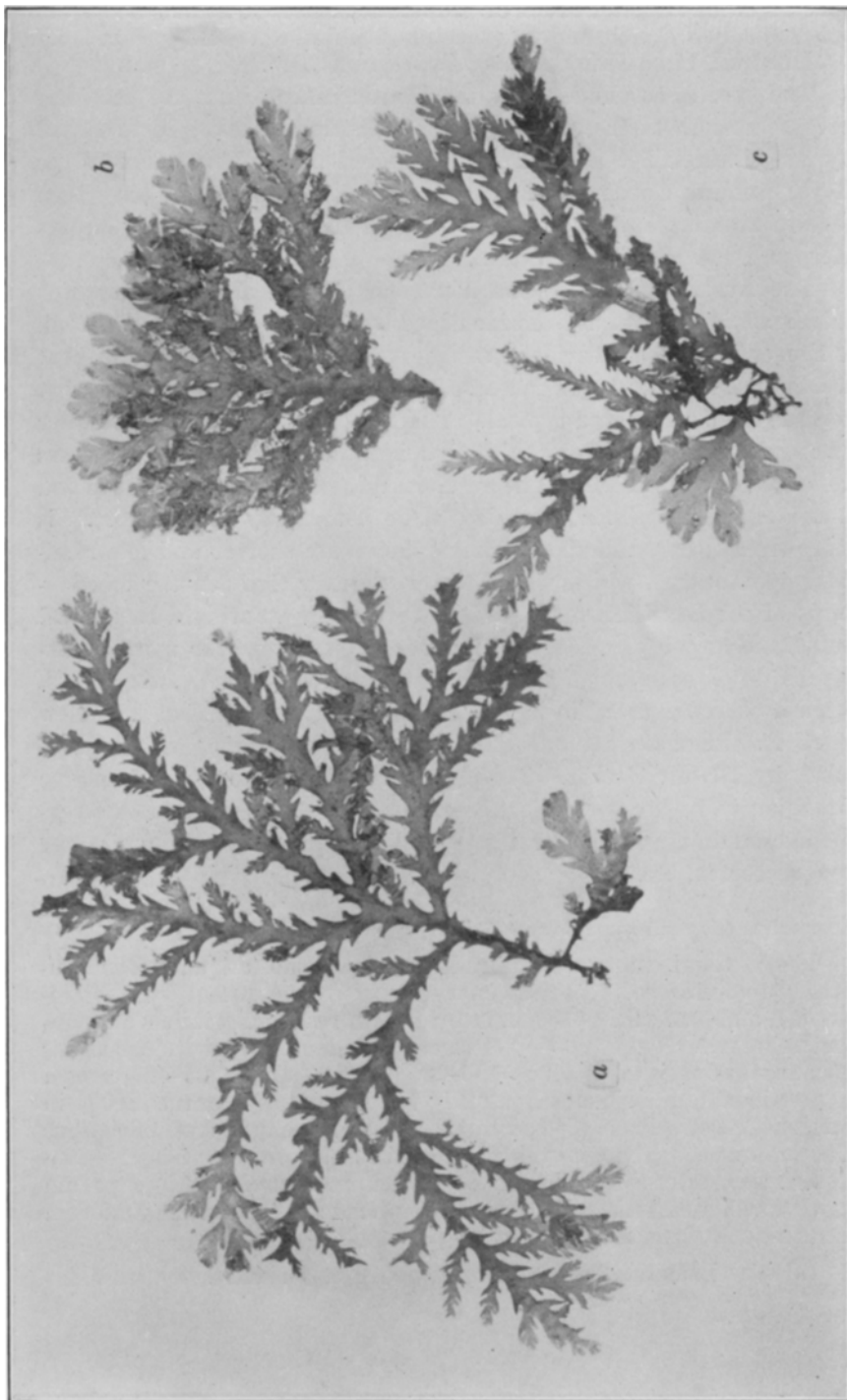


FIG. 8. *Plocamium brasiliense* (Grev.) Howe & Taylor. Photograph, natural size, of specimens dredged near Cabo Frio, Brazil, by the Hassler Expedition.

once or twice furcate, ovoid or ellipsoid, obtuse, 150–230 μ long, the sporangia in a double series; other parts unknown. (Figs. 7 and 8.)

Dredged, Cabo Frio, *Hassler Expedition 1047*.

The specimens obtained by the Hassler Expedition are considerably coarser in their cutting than is the original collected in Brazil by St. Hilaire (fig. 7) and now preserved in the herbarium of the Royal Botanic Garden of Edinburgh, which specimen we have been able to examine and photograph through the courtesy of the Regius Keeper, Prof. W. Wright Smith.

The Australian *Plocamium Mertensii* (Grev.) Harv., with which this Brazilian plant has been identified by J. Agardh and by De-Toni, is represented in herbaria by a wide variety of forms, and, without seeing Greville's original, it would be difficult to determine just what form is to be considered typical. The Brazilian plants are all smaller when considered as wholes, although individual pinnae and pinnules may not be any smaller. The outer margins of the larger pinnae and pinnules are more nearly entire, often completely so, the cortex is more translucent, and the sporangiophores are shorter and less ramified. Cystocarps, which would throw a better light on the relationships of the Brazilian plant, are unfortunately wanting. In general habit, the larger plants of the Hassler Expedition bear more resemblance to *Plocamium Fullerae* Schmitz from The Kowie, South Africa, as represented by a specimen in the herbarium of The New York Botanical Garden, distributed under that name, with printed label, by Dr. H. Becker. This specimen differs, however, from the Brazilian in its browner color, its strongly dentate-crenulate or irregularly glandulose outer margins of the larger pinnae and pinnules, the opaque cortex, etc.

Acrosorium odontophorum Howe & Taylor, sp. nov.

Thallo tenui, subsessili, subradianti-dichotomo, aliquando subpin-nato, fulvo-vinaceo, ecostato, enerve, obscure venuloso (sub microscopio), ambitu thalli 7–10 cm. lato (aut supra?), marginibus aliquantum regulariter denticulatis vel serrulatis, denticulis deltoideo-acutis vel subacuminatis, majoribus 150–225 μ altis; lamina 25–42 μ crassa in partibus tenuioribus saepe uni- vel bi-stratosis, usque 250 μ in partibus crassioribus (5–7 cellulas crassis), cellulis superficialibus plus minusve hexagonis vel pentagonis a superficie visis, 25–80 μ diam. max., cellulis venularum obscurarum anastomosantium parum angustioribus, cellulis apicalibus denticulorum et lobularum juniorum manifestis; ceteris ignotis.

Ad oras Brasiliae (Cabo Frio, Exped. Hassleriana).

Thallus thin, nearly sessile, subradiately dichotomous, here and there subpinnate, deep brownish-vinaceous,⁹ ecostate, enervate, very obscurely veined (the veins scarcely visible under a hand-lens), spread of thallus 7–10 cm. (or more?), the margins rather regularly denticulate or serrulate, the teeth deltoid-acute or subacuminate, the older 150–225 μ high; lamina 25–42 μ thick in thinner, often unistratose or bistratose parts, up to 250 μ (5–7 cells) in thicker parts, the cells more or less hexagonal or pentagonal in surface view, 25–80 μ in maximum diameter, those of the obscure anastomosing veins slightly narrower, apical cells of the younger teeth and lobes distinct; other parts wanting. (Figs. 9 and 10.)

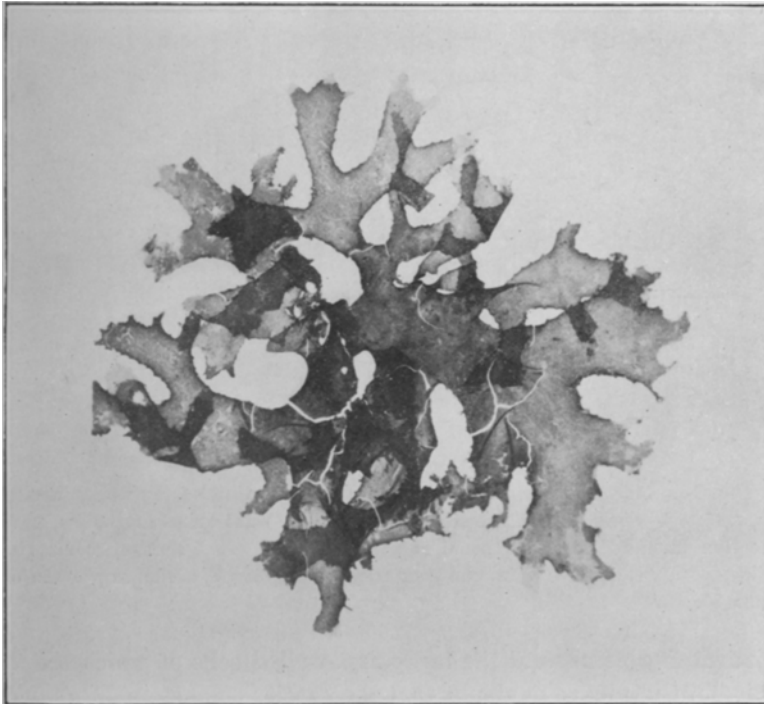


FIG. 9. *Acrosorium odontophorum* Howe & Taylor. Photograph, natural size, of the type specimen, dredged near Cabo Frio, Brazil, by the Hassler Expedition.

Dredged, Cabo Frio, *Hassler Expedition 1033*.

The apical cells are as obvious and as well developed as in some of the species of *Delesseria* in the older sense, but the general habit of the plant, the absence of a midrib, the presence of microscopic

⁹ Ridgway, *op. cit.* pl. 39.

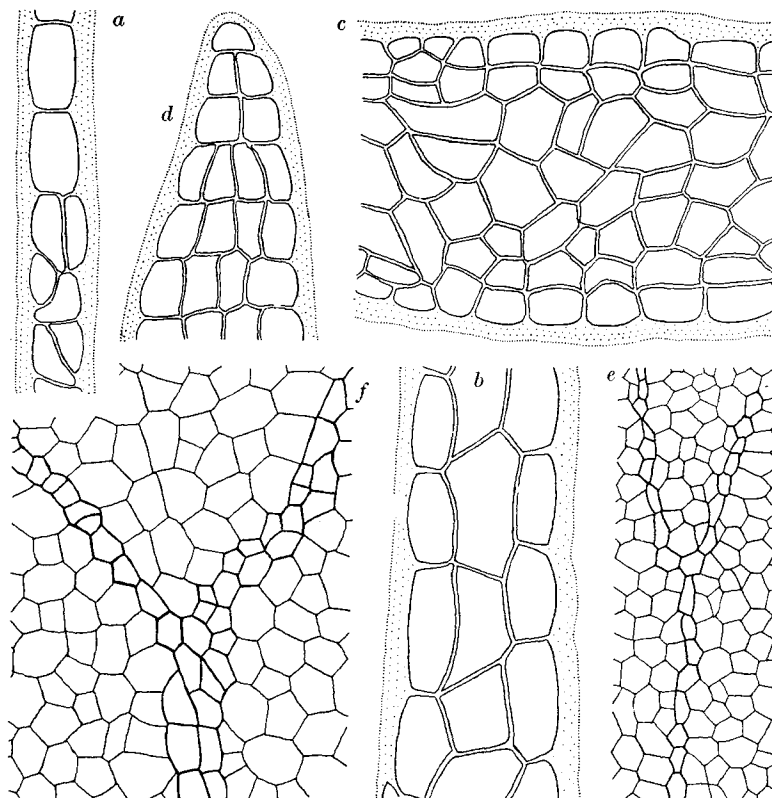


FIG. 10. *Acrosorium odontophorum*; a, cross section of thallus, thinner portion, $\times 150$; b, cross section showing more usual (?) thickness of thallus, $\times 150$; c, section in more thickened basal region, $\times 150$; d, cross section of margin of thallus, $\times 150$; e, surface view, showing forked vein, 80; f, a similar view in older part, $\times 80$.

anastomosing veins, and the large firm-walled cells of which the thallus is built up, leave no doubt that the species belongs in *Nitophyllum* in its current broad application, and, more particularly, in the group *Acrosorium*, which has recently been revived as a generic name by Kylin.¹⁰ The species is evidently not closely related to the New Zealand *Nitophyllum denticulatum*, or the Australian *N. serrulatum*, two species in which the presence of marginal teeth has been signaled in specific names. These two are referred by Kylin to *Myriogramme*.

¹⁰ Studien über die Delesseriaceen. Lunds Univ. Årsskr. II. 20(6): 76. 1924.

Laurencia lata Howe & Taylor, sp. nov.

Fronde stipitata, complanata, 15 cm. (plus minusve) longa, 4–10 mm. latitudine maxima, distiche bi- (tri-) pinnata, saturate rubra, in vinaceo-fulvum pallescenti; pinnis alternis vel interdum suboppositis, patentibus, aliquantum parce pinnatis (vel bipinnatis), pinnulis ultimis fere elliptico-oblongis, oblongis, vel subspathulatis, 2–15 mm. longis, 1.5–3.5 mm. latis, obtusis vel emarginato-obtusis, axillis utriusque lateris a intervallis 7–13 mm. longis vulgo separatis; fronde 175–380 μ in partibus mediis crassis, 115–135 μ in marginibus; cellulis superficialibus in partibus maturis vulgo 40–90 μ diam. max.; ceteris ignotis.

Ad oras Brasiliae (Cabo Frio, Exped. Hassleriana).

Laurencia lata cum formis *L. spectabilis* Post. & Rupr., incolae orarum Americae-Borealis occidentalis, latioribus et minus ramosis fortasse comparanda est, sed etiam latior et minus ramosa, pinnulis ultimis latioribus plus elliptico-oblongis et minus clavato-spathulatis est.

Fronde stipitate, complanate, 15 cm. long (more or less), 4–10 mm. in maximum width, distichously bi- (tri-) pinnate; color deep hellebore-red, fading to vinaceous-russet;¹¹ pinnae alternate or occasionally subopposite, patent, rather sparingly pinnate (or bipinnate), the ultimate pinnules mostly elliptic-oblong, oblong, or subspatulate, 2–15 mm. long, 1.5–3.5 mm. wide, obtuse or emarginate-obtuse, 7–13 mm. usually measuring the interval between two successive axillary sinuses of the same side; frond 175–380 μ thick near median line, 115–135 μ at margins; superficial cells in mature parts mostly 40–90 μ in long diameter; other parts wanting. (Fig. 11; pl. 1, fig. 7.)

Dredged, Cabo Frio, *Hassler Expedition 1044*.

Laurencia lata may be compared with the broader less ramified conditions of the Pacific North-American *Laurencia spectabilis* Post. & Rupr., but it is even broader and less freely branched and the ultimate pinnules, besides being broader, are more elliptic-oblong and less clavate-spatulate. Possibly the *Chondria pinnatifida* reported from Brazil by Martius and the *Laurencia pinnatifida* reported by Greville (*fide* St. Hilaire) belong here, although, at first sight, the Hassler plant did not suggest to us *Laurencia pinnatifida* or even the genus *Laurencia*.

Dasya sertularioides Howe & Taylor, sp. nov.

Fronde (aliquantum decolorata) ochraceo-fulva, 6–20 cm. (an plus?) longa, ramificatione primaria irregulari, secundaria subpinnata,

¹¹ Ridgway, *op. cit.* pls. 38, 28.



FIG. 11. *Laurencia lata* Howe & Taylor. Photograph, natural size, of the type specimen, dredged by the Hassler Expedition near Cabo Frio, Brazil.

ramulis ultimis dichotomis irregulariter quadrifariis vel irregulariter spiralibus, falso distichis in siccitate; partibus basalibus caulis et ramorum principalium denudatis ad 1–10 cm., valde corticatis, 0.8–1.5 mm. diam. (madefactis), caule sub apice nonnihil abrupte evanescenti ad ca. 100–160 μ fastigato, strato corticali sensim tenuiori, sed persistenti paene ad apicem, cellulis pericentralibus translucidis aliquantum inaequalibus, facile visibilibus in partibus distalibus, ca. 90–160 μ longis, septa nodalia aliquantum incrassata monstrantibus; ramulis ultimis 3–6-ties dichotomis, 0.75–1 mm. longis, patentibus vel erecto-patientibus, a apicibus saepe stipatis et ocellatis, dichotomiis angulos 35–70° efficientibus, cellulis infimis 46–54 μ latis, 2–2½-plo longioribus, parietibus 13–26 μ crassis, cellulis exterioribus plerumque 20–40 μ latis, 3–5-plo longioribus, parietibus 5–8 μ crassis, cellulis ultimis acuminatis vel aculeatis, vel multis in coma apicali ad pilos terminales leviter flexiles demum 1–2 μ latos; ceteris ignotis.

Ad oras Brasiliae prope insulam “Abrolhos” dictam (Exped. Hassleriana).

Dasya sertularioides cum *Dasya corymbifera* J. Ag. fortasse comparanda est. A plantis Europaeis sic nominatis in ramulis valde rigidioribus (parietibus cellularum infimarum 13–26 μ vs. 4–8 μ crassis) et plus divaricate dichotomis, cellulis pericentralibus minus aequalibus, cellulis ultimis plus aculeatis (vel plus filiformi-attenuatis).

Plant (bleached?) avellaneous or ochraceous-tawny,¹² 6–20 cm. long (or more?), the primary branching irregular, the secondary sub-pinnate, the ultimate dichotomous branchlets irregularly quadrifarious or irregularly spiral, apparently but falsely distichous on drying; basal parts of stem and main branches soon denudate for 1–10 cm., strongly corticated, 0.8–1.5 mm. in diameter (when soaked out), stem tapering to about 100–160 μ below the rather abruptly vanishing apex, the cortications becoming gradually thinner but persisting almost to apices, the translucent pericentral siphons somewhat interlocking at the nodes (not quite regularly or evenly fastigate), the central siphons easily visible in distal parts, about 90–160 μ long, showing somewhat thickened nodal diaphragms; the ultimate branchlets 3–6 times dichotomous, 0.75–1 mm. long, patent, becoming erecto-patient, often crowded and somewhat “ocellate” at apices, the dichotomies forming angles of 35–70°, the basal cells 46–54 μ broad, 2–2½ times as long, their walls 13–26 μ thick, the more distal cells mostly 20–40 μ broad, 3–5 times as long, their walls 5–8 μ thick, the ultimate cells acuminate or aculeate, or many of them in the apical coma tapering down to diaphanous lightly flexuous terminal trichomes finally only 1–2 μ in diameter; other parts wanting. (Figs. 12 and 13.)

Dredged, near the Abrolhos, *Hassler Expedition 1061*.

¹² Ridgway, *op. cit.* pls. 40, 15.

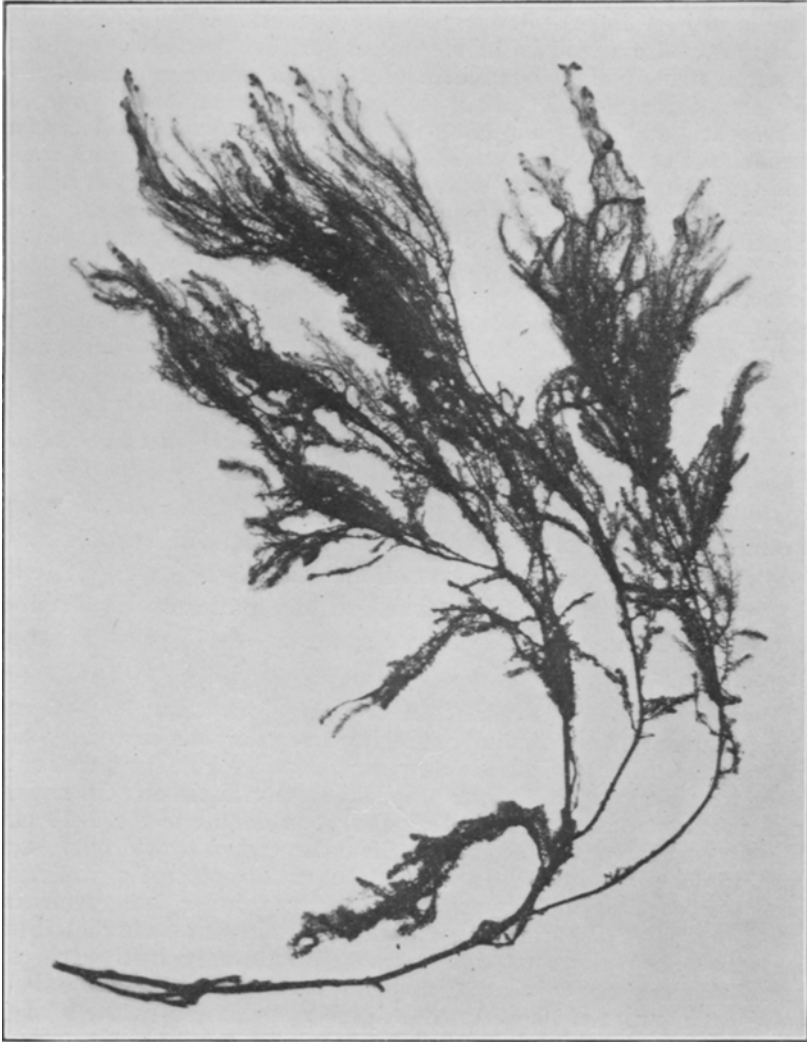


FIG. 12. *Dasya sertularioides* Howe & Taylor. Photograph, natural size, of the type specimen, dredged near the Abrolhos, Brazil, by the Hassler Expedition.

Dasya sertularioides is perhaps best compared with plants from Europe and the West Indian region that are currently referred to *Dasya corymbifera* J. Ag. From the European plants so named, it differs obviously in the much more rigid (walls of basal cells 13–26 μ vs. 4–8 μ thick) and more divaricately dichotomous branchlets, the

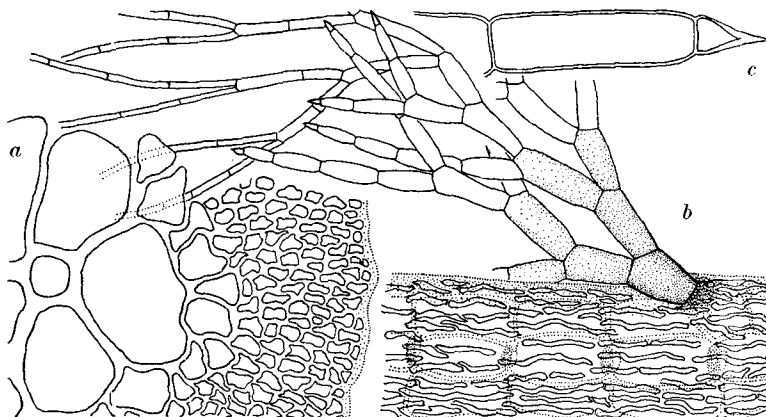


FIG. 13. *Dasya sertularioides*; a, part of cross section of main axis, $\times 80$; b, portion of young pinna, showing forking ramulus, $\times 150$; c, aculeate tip of ultimate branchlet, $\times 375$.

less evenly fastigiata pericentral siphons, the more aculeate (or more filiform-attenuate) terminal cells, etc. West Indian plants occasionally approach it in rigidity of the branchlets and in their somewhat divaricate dichotomies. We have seen no other specimens in which, under proper illumination, the row of central siphons is so readily visible.

***Halymenia integra* Howe & Taylor, sp. nov.**

Thallo brevi-stipitato; stipite 1–6 mm. longo, inferne subtereti, superne cuneato; fronde plana, membranacea, gelatinosa, 125–300 μ crassa (madefacta), obovata vel oblongo-obovata, 3.5–18.5 cm. longa, 1–6 cm. lata, integra vel crenulato-undulata, raro irregulariter paucilobulata et interdum proliferationes paucas ovoideas vel tereti-conicas superficiales aut marginales 1–3 mm. longas, ferente, apice frondis acuta, subacuminata, vel obtusa, superficie nitente vel subnitente, colore (speciminibus siccis) rubro; medulla frondis laxa filamentosa, filamentis homogeneis, saepe flexuosis vel sinuosis, plerumque 1–5.5 μ diam. (protoplastis solis—parietibus paene invisibilibus exclusis), parce ramosis, aliquando ad modum litterae-H anastomosantibus, passim tortis; strato corticali frondis gelatinoso pellucido plus minusve monostromatico, cellulis (protoplastis) superficialibus ovoideis vel angularibus a superficie visis, 6–18 μ diam. max. (hoc superficiei plerumque parallelo), spatiis latis (saepe 5–10 μ) separatim, parietibus exterioribus (vel membrana superficiali extra-cellulari) 8–10 μ crassis; strato subcorticali per stratum corticale visibili, 2–3-stromatico, cellulis ellipsoideis, ovoideis, vel subglobosis, a processibus gracilibus connexis, cellulis extimis 20–50 μ diam. max., intimis maximam par-

tem subglobosis, 100–180 μ , facile separabilibus, tum 8–12 processus plerumque molles vel flexuosas aut sua vestigia monstrantibus; ceteris ignotis.

Ad oras Brasiliae (Cabo Frio, Exped. Hassleriana) Ab *H. echinophysa* Collins et Howe, species colore, frondis forma, fronde crassiore, cellulis superficialibus majoribus, cellulis intimis subcorticalibus minus echinatis, etc., differt.

Thallus short-stipitate; stipe 1–6 mm. long, cuneate from a subterete base; frond plane, membranous, gelatinous, 125–300 μ thick (when soaked out), obovate or oblong-obovate, 3.5–18.5 cm. long, 1–6 cm. wide, entire or crenulate-undulate, rarely with one or more irregular lobules and occasionally bearing a few ovoid or cylindric-conic superficial or marginal proliferations 1–3 mm. long, the apex acute, subacuminate, or obtuse, the surface nitent or subnitent, color (dried) brick red or Indian red;¹³ medulla of frond loosely filamentous, its filaments homogeneous, often flexuous or sinuous, mostly 1–5.5 μ in diameter (protoplasts only—excluding the almost invisible walls), rather sparingly branched, with occasional H-like (or more complex) anastomoses, sometimes locally twisted and associated in loose skeins; cortex of frond gelatinous, translucent, submonostromatic, the superficial cells (protoplasts) ovoid or angular in surface view, 6–18 μ in maximum diameter (this usually parallel to the surface), widely spaced (separated 5–10 μ ; at least the frequent groups of 2–4), their outer walls (“surface jelly”) 8–10 μ thick;¹⁴ subcortex easily visible through the cortex, consisting of 2 or 3 layers of ellipsoid, ovoid, or subglobose cells connected by slender processes, the outer cells 20–50 μ in maximum diameter, the inner mostly subglobose, 100–180 μ , easily separable and then showing 8–12 usually soft or flexuous processes or their vestigia; other parts unknown. (Fig. 14; pl. 1, figs. 5 and 6.)

Dredged, Cabo Frio, *Hassler Expedition 1042*.

In structure, the present species is perhaps most nearly allied to *Halymenia echinophysa* Collins & Howe, which was dredged in “31 fathoms, off Bermuda” by the Challenger Expedition and reported as “*Kallymenia reniformis* J. G. Agardh.” The present plant differs from that very much in form and color, and it would never be mistaken for *Kallymenia reniformis*, suggesting rather an entire-fronded *Grateloupia* or an *Aeodes*, from both of which genera it departs widely in structure. From *H. echinophysa*, it differs also in the thicker thallus,

¹³ Ridgway, *op. cit.* pls. 13, 27.

¹⁴ In soaking out the dried material, as it comes to us after about 60 years of preservation, the outer cell walls deliquesce very rapidly, leaving the more persistent parts of the wall only 3–5 μ thick.

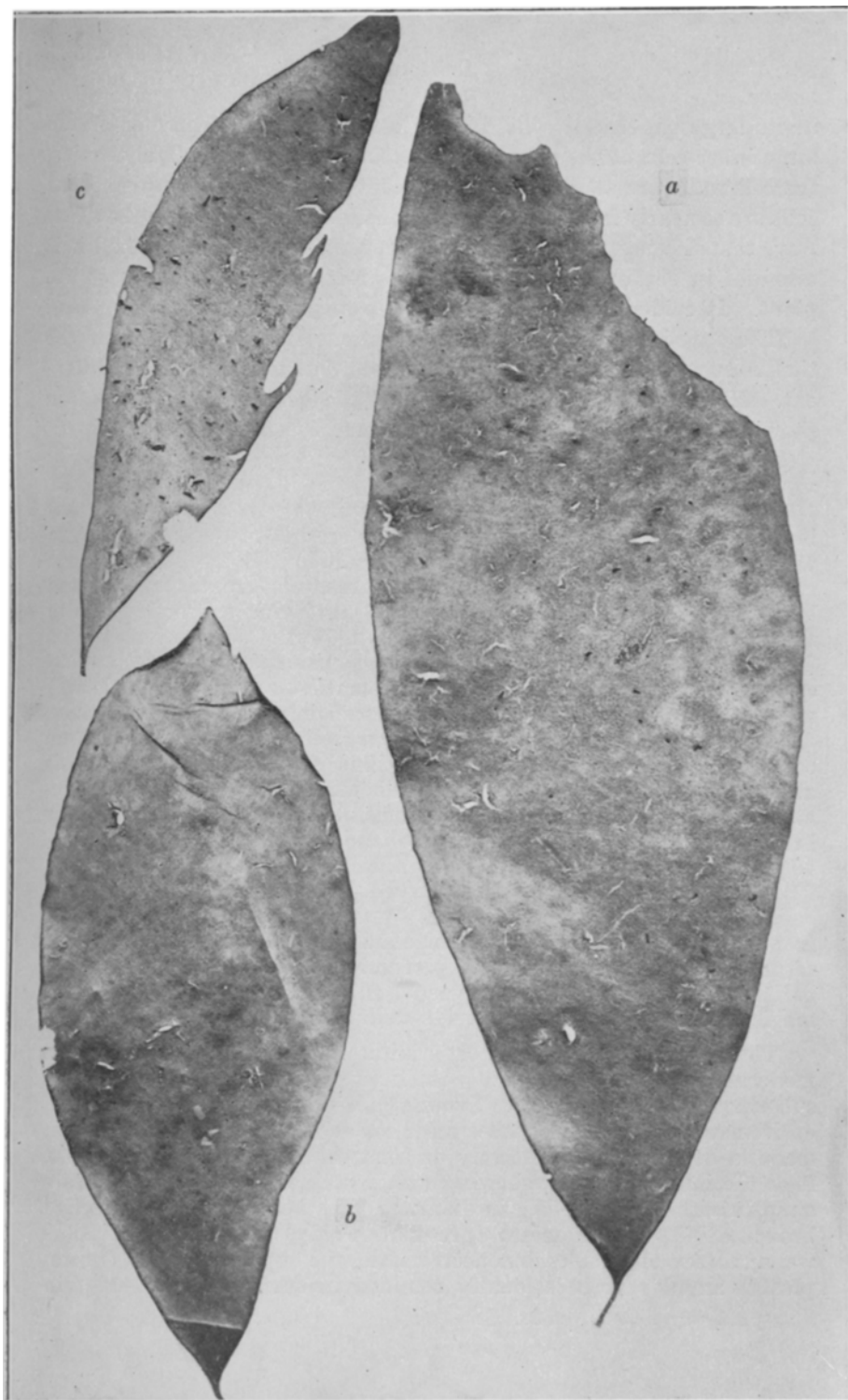


FIG. 14. *Halymenia integra* Howe & Taylor. Photograph, natural size, of the type specimens, dredged near Cabo Frio, Brazil, by the Hassler Expedition.

in its large superficial cells, in the less "echinate" character of the large inner cells of the subcortex, etc. As in most of the *Halymenias*, the cell walls are so soft and translucent and the inner unpigmented cells are so nearly invisible when examined microscopically in the usual way, that the use of some staining reagent, such as haematoxylin is essential in obtaining any precise knowledge of the structure of the plant. It evidently belongs in the *Hymenopsis* section of the genus.

The occasional presence of proliferations from the surface of the thallus suggests affinity with *Meristotheca*, but the structure is different. *Halymenia Floresia*, the type of the genus *Halymenia*, often shows similar, though longer proliferations.

***Halymenia rosea* Howe & Taylor, sp. nov.**

Thallo aliquantum abrupte brevi-stipitato; fronde plana, membranacea, ad modum gelatinosa, 50–180 μ crassa (madefacta), obovata vel suborbiculari, 4.5–6 cm. longa (juvenili?) 3–4 cm. lata, integra, rotundato-obtusa, rubra, haud nitente; medulla frondis aliquantum laxe vel paulo dense filamentosa, ea aut strato intimo subcorticali multa fila stellata, nodis 20–55 μ diam., quoque 1–16 ramulos longiarticulatos 8–13 μ diam. (protoplastis solis) ferente, monstrante (si tineta); strato corticali frondis plus minusve monostromatico, cellulis (protoplastis) angulatis vel aliquando rotundatis, a superficie visis, 4–10 μ diam. max. (hoc plerumque superficiei parallelo, marginibus exceptis), ad modum compactis, a 1.5–3 μ separatis, parietibus exterioribus 2–5 μ crassis aliquantum firmis; strato subcorticali maximam partem monostromatico, cellulis ovoideis vel ellipsoideis, 40–65 μ diam. max., a filis brevibus radiantibus connexis et aliquando a cellulis minoribus (15–40 μ) maximam partem angulatis consociatis; cetera desunt.

Ad oras Brasiliae (Cabo Frio, Exped. Hassleriana).

Species *Halymeniae latifoliae* Crouan proxima, sed differt frondis forma (obovata vel suborbiculari quam oblonga), colore magis saturate rubra vel rosea, fronde plerumque crassiore, strato subcorticali crassiore, medulla minus vacua, filis stellatis multis majoribus magis crebri-ramosis (7–16- vs. 4–6-stellatis).

Thallus rather abruptly short-stipitate; frond plane, membranous, moderately gelatinous, 50–180 μ thick (when soaked out), obovate or suborbicular, 4.5–6 cm. long (young?), 3–4 cm. wide, round-obtuse, entire-margined, the surface dull; color¹⁵ (dried) hellebore-red; medulla of frond rather loosely or somewhat compactly filamentous, it or the inner subcortex showing (when stained) many large stellate ganglia with nodes 20–55 μ in diameter, each bearing 7–16 long-celled branches 8–13 μ in diameter (protoplasts only) with almost invisible walls; cortex of frond submonostromatic, the superficial cells (protoplasts) angular or occasionally rounded in surface view, 4–10 μ in

¹⁵ Ridgway, *op. cit.* pl. 38.

maximum diameter (this usually parallel to the surface except at margins), moderately compact (protoplasts separated $1.5-3\ \mu$), their outer walls rather firm ($2-5\ \mu$ thick); subcortex mostly of one layer of cells, these ovoid or ellipsoid, $40-65\ \mu$ in maximum diameter, connected by short radiating filaments and occasionally accompanied by smaller, mostly angular cells $15-40\ \mu$ in greatest diameter; other parts unknown. (Fig. 15a; pl. 1, figs. 3, 4.)

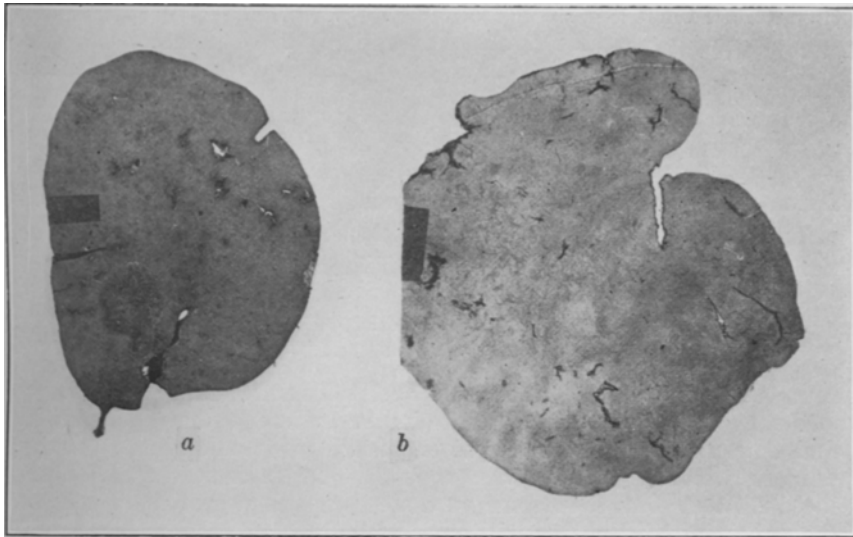


FIG. 15. a, *Halymenia rosea* Howe & Taylor. Photograph, natural size, of the type, dredged near Cabo Frio, Brazil, by the Hassler Expedition. b, *Platoma tenuis* Howe & Taylor. Photograph, natural size, of the type, dredged near Cabo Frio, Brazil, by the Hassler Expedition.

Dredged, Cabo Frio, *Hassler Expedition 1043* (a and a').

Halymenia rosea is closely allied to *H. latifolia* Crouan, originally described from Brest, France, and since reported from northern Africa and the Balearic Isles. It differs from that in the shape of the frond, which is obovate or suborbicular rather than oblong, in its darker color, in the usually thicker frond, in the thicker subcortex, in the less vacuous medulla, and in the larger, more numerous, and more numerous pronged medullary ganglia. In *Halymenia latifolia*, the rather rarely occurring stellate ganglia, so far as observed, have only 4-6 (instead of 7-16) radiating branches.

***Halymenia vinacea* Howe & Taylor, sp. nov.**

Thallo brevi-stipitato a basi cuneata; fronde plana, membranacea, ad modum gelatinosa, $50-150\ \mu$ crassa (madefacta), ovata, integra vel

parce lobata, 3.5–18.7 cm. longa, 1.6–8 cm. lata, rotundati-obtusa, haud nitente, colore (sicco) saturate vinaceo; medulla frondis laxe filamentosa vel subvacua, filis longi-articulatis, maximam partem 3–8 μ diam., plerumque numerosos nodos stellatos 25–50 μ diam., quoque 5–12 ramulos longos ferente monstrantibus (si tincta); strato corticali frondis plus minusve monostromatico, cellulis (protoplastis) maximam partem angularibus a superficie visis 6–13 μ diam. max., protoplastis a 2–5 μ separatis, parietibus exterioribus 2–3 μ crassis mollibus; strato subcorticali tenui 1–2 series cellularum minorum 10–20 μ (plerumque 15 μ) diam., paucis filis gracilibus subjacentibus, monstrante; sporangiis (protoplastis) 14–18 μ diam., decussatim divisis; ceteris ignotis.

Ad oras Brasiliae (Cabo Frio, Exped. Hassleriana). Ab *Halymenia rosea* Howe & Taylor, eodem loco natali, *Halymenia vinacea* forma et colore frondis, cellulis subcorticalibus minoribus et paucioribus, medulla paene vacua, etc., differt. Forsitan *H. ulvoideae* Zanard. propinqua, sed valde diverso videtur.

Thallus short-stipitate, from cuneate base; frond plane, membranous, moderately gelatinous, 50–150 μ thick (when soaked out), ovate, entire or sparingly lobed, 3.5–18.7 cm. long, 1.6–8 cm. wide, rounded-obtuse, the surface dull; color (dried) dark vinaceous;¹⁶ medulla of frond loosely filamentous or subvacuous, the long-celled filaments mostly 3–8 μ in diameter, showing (when stained) usually numerous stellate ganglia with nodes 25–50 μ in diameter, each bearing 5–12 long branches, some of these connecting with inner cells of the subcortex and others with similar ganglia; cortex of frond submonostromatic, the superficial cells (protoplasts) mostly angular in surface view, 6–13 μ in maximum diameter, protoplasts separated by 2–5 μ , the outer walls 2–3 μ thick,¹⁷ soft; subcortex thin, of one or two layers of small cells, these mostly 10–20 μ (mostly 15 μ) in diameter, with a few slender subjacent filaments; sporangia (protoplasts) 14–18 μ in diameter, the spores decussately (often irregularly) paired. (Fig. 16; pl. 1, figs. 1 and 2.)

Dredged, Cabo Frio, *Hassler Expedition 1034* (b, b', and c), apparently with 1043a (*Halymenia rosea*).

The thin cortex (including subcortex) and the almost empty medulla are suggestive of the genus *Halarachnion*, but the presence of sporangia and of well-developed medullary stellate ganglia seems to determine the position of our plant as a *Halymenia*. Like its associate, *Halymenia rosea*, it is doubtless a member of the *Hymenopsis*

¹⁶ Ridgway, *op. cit.* pl. 27.

¹⁷ In our specimens, the outer layers deliquesce easily on being soaked out; living material might show a thicker "surface jelly."



FIG. 16. *Halymenia vinacea* Howe & Taylor. Photograph, natural size, of the type, dredged near Cabo Frio, Brazil, by the Hassler Expedition.

section of the genus, and it is perhaps more nearly related to that than to any previously described species. From *Halymenia rosea*, however, it manifestly differs in the form and color of the thallus, in the smaller and fewer cells of the subcortex, in the nearly vacuous medulla, etc. In some respects it suggests *Halymenia ulvoidea* Zanard.,¹⁸ of the Mediterranean Sea, but, if we may judge from Zanardini's description and figures, it departs from that widely in form as well as in color, being entire-margined except for three entire-margined lobes in one specimen. A specimen, apparently named by F. Heydrich and collected by him at Acireale, Sicily, has a short-filamentous cortex and its numerous medullary filaments show no traces of stellate ganglia.

Platoma tenuis Howe & Taylor, sp. nov.

Thallo subsessili, plana, maxime molli et gelatinosa, tenui, 60–90 μ crassa (imperfecte madefacta), prope orbiculari vel subreniformi, 1.5–6.5 cm. longo aut lato, subintegro vel parce et plus minusve convenienter lobato, aliquando minute undulato-crenulato, purpureo-vinaceo, superficie haud nitente, saepe (sicco) sub lente scrobiculato-reticulata; medulla frondis aliquantum dense filamentosa, filis homogeneis, maximam partem 0.5–3 μ diam. (protoplastis solis); strato corticali laxo, filis dichotomo-fastigiatis, plerumque ter vel quater furcatis, cellulis (protoplastis) plerumque obovoideis vel pyriformibus, superficialibus 3–5 μ altis (longis), intimis 6–10 μ longis; cystocarpis immersis, minutis, circa 50 μ diam., nudis vel paucis filis involucratissimis instructis.

Ad oras Brasiliae (Cabo Frio, Exped. Hassleriana).

Species fortasse *P. cyclocolpae* (Mont.) Schmitz proxima, sed thallus planior et integrior est.

Thallo subsessili, plana, maxime molli et gelatinosa, tenui 60–90 μ thick (when imperfectly soaked out), nearly orbicular or subreniform, 1.5–6.5 cm. long or wide, subentire, or sparingly and more or less conformably lobed, here and there minutely undulate-crenulate, the surface dull, often scrobiculate-reticulate under a lens after drying; color (dried) purplish-vinaceous¹⁹ or vinaceous; medulla of frond rather compactly filamentous, its filaments homogeneous, mostly 0.5–3 μ in diameter (protoplasts only), the rather loose cortex of dichotomo-fastigate filaments, these mostly three or four times forked, their cells (protoplasts) usually obovoid or pyriform, the superficial commonly 3–5 μ high, the inner 6–10 μ in long diameter; cystocarps imbedded, minute, about 50 μ in diameter, naked, or with a few

¹⁸ Homonym of *Halymenia ulvoidea* (Sond.) Kütz.

¹⁹ Ridgway, *op. cit.* pls. 39, 27.

peripheral filaments suggesting a very rudimentary pericarp. (Fig. 15b; pl. 2, fig. 1.)

Dredged, Cabo Frio, *Hassler Expedition 1043g* and *1043g'*, apparently associated with *Halymenia rosea* and *H. vinacea*. Type, the larger specimen (*1043g*).

Platoma tenuis has a vegetative structure closely resembling that of Bermuda plants currently referred to *Platoma cyclocolpa* (Mont.) Schmitz. The thallus is, however, more distended and plane and more nearly entire than in that, or, we believe, in any other species previously referred to the genus *Platoma*.

EXPLANATION OF THE PLATES

PLATE 1.

1. *Halymenia vinacea*. Cross section of thallus, partial, $\times 250$.
2. *Halymenia vinacea*. Medullary ganglion, $\times 250$.
3. *Halymenia rosea*. Cross section of thallus, partial, $\times 250$.
4. *Halymenia rosea*. Medullary ganglion, $\times 250$.
5. *Halymenia integra*. Cross section of thallus, partial, $\times 250$.
6. *Halymenia integra*. Anastomosis of medullary filaments, $\times 250$.
7. *Laurencia lata*. Cross section of thallus, partial, $\times 125$.

PLATE 2.

1. *Platoma tenuis*, cortical filaments, $\times 615$.
2. *Faucheia Hassleri*. Surface of thallus, $\times 375$.
3. *Faucheia Hassleri*. Cross section of thallus, partial, $\times 375$.
4. *Rhodophyllis gracilarioides*. Surface of thallus, $\times 375$.
5. *Rhodophyllis gracilarioides*. Cross section of thallus, partial, $\times 375$.
6. *Halymenia vinacea*. Surface of thallus, $\times 375$.
7. *Halymenia rosea*. Surface of thallus, $\times 375$.
8. *Halymenia integra*. Surface of thallus, $\times 375$.

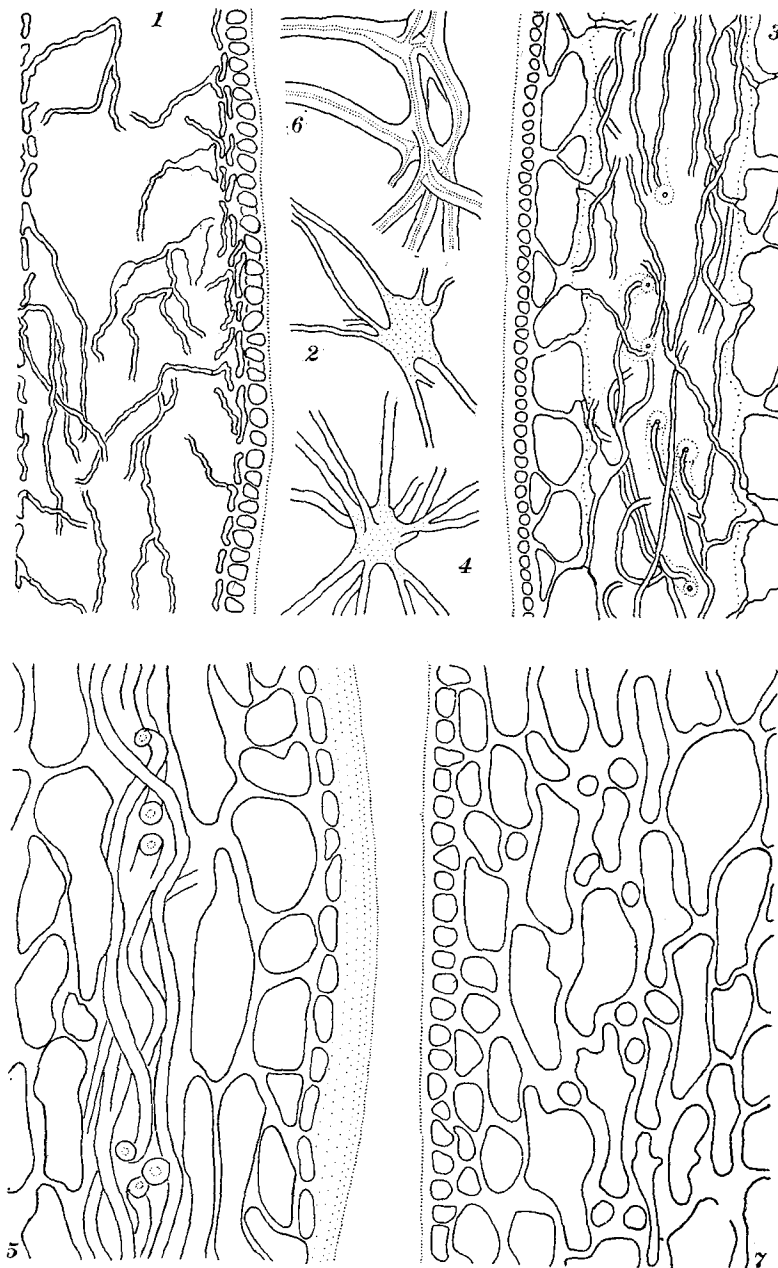


PLATE 1.

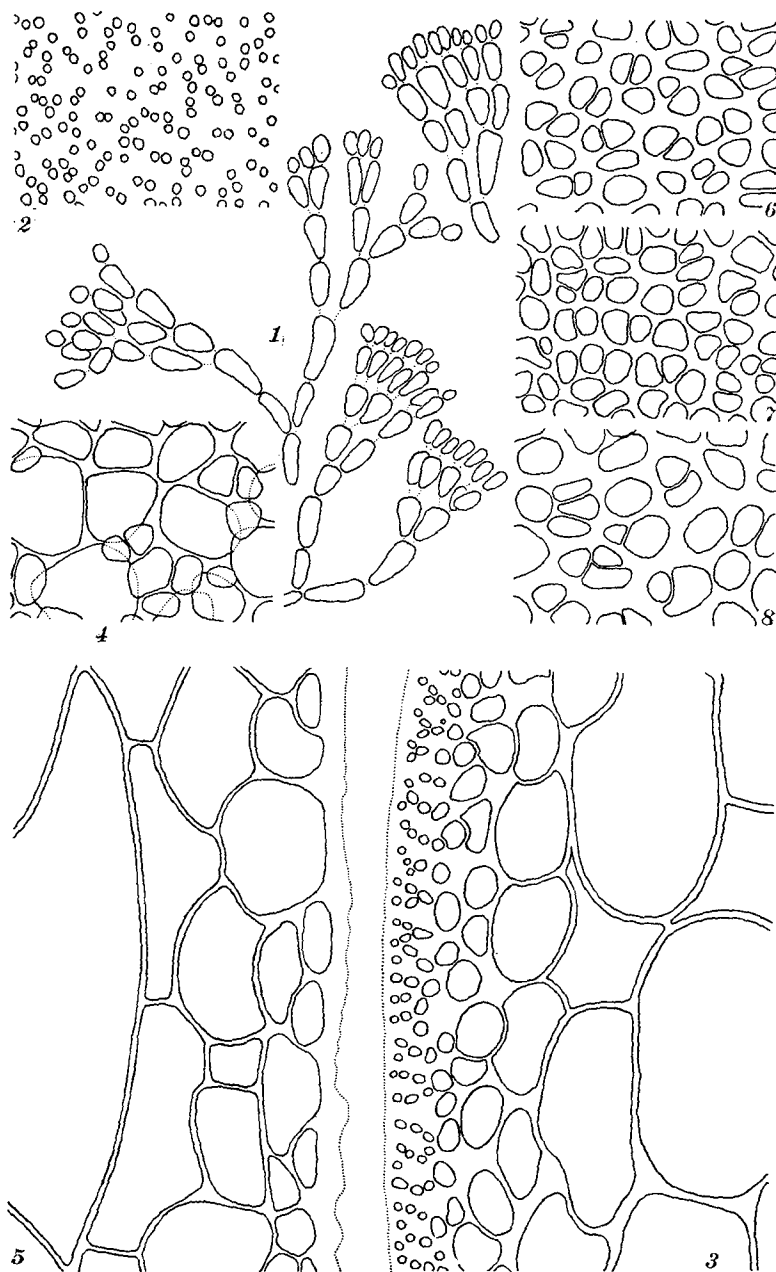


PLATE 2.