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JANUARY, 1906



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES
HEPATICS AND LICHENS

EDITOR
ANNIE MORRILL SMITH

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THE BRYOLOGIST

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DEVOTED TO THE STUDY OF NORTH AMERICAN
MOSSES, HEPATICS AND LICHENS

ALSO OFFICIAL ORGAN OF
THE SULLIVANT MOSS CHAPTER

EDITOR

MRS. ANNIE MORRILL SMITH

ASSISTED BY

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THE SULLIVANT MOSS CHAPTER

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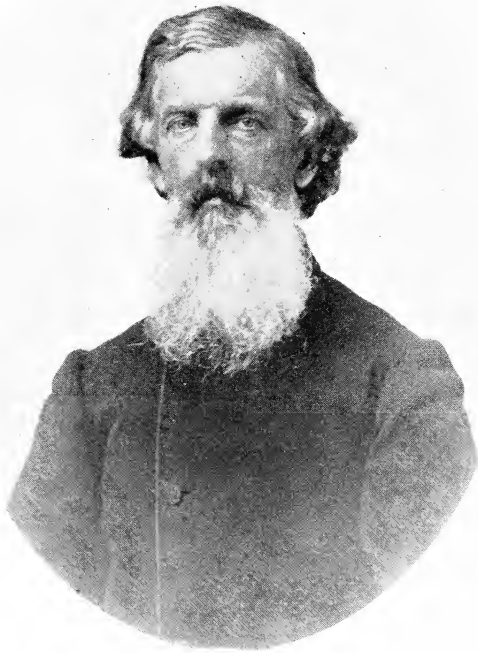


Plate 1. EDWARD TUCKERMAN, 1817-1886.

THE BRYOLOGIST.

VOL. IX.

JANUARY, 1906.

No. 1.

EDWARD TUCKERMAN—A BRIEF SUMMARY OF HIS WORK.

BRUCE FINK.

In a paper entitled "Two Centuries of North American Lichenology," the present writer has called the time from 1847 to 1888 "The Tuckermanian Period." During this time everything in American lichenology was colored by the views of Tuckerman. Indeed Tuckerman stands out so pre-eminently as an American lichenist that something of his history is a proper part of the history of American lichenology. Born in 1817, he obtained his bachelor's degree in 1837, and two years later finished the law course at Harvard. In 1841 and 1842 he traveled in Europe and met the great lichenist, Elias Fries, at Upsala. Returning to this country, he accompanied Asa Gray to the White Mountains and began the difficult exploration which has rarely been excelled for completeness. That he began his botanical studies in early life and devoted himself chiefly to lichens from the first appears from the fact that his first "Enumeration of Some Lichenes of New England" was published when he was not more than twenty-two years old, and appears to have been read the year before. Excepting Halsey's "Synoptic View" this was the first work by an American, entirely devoted to lichens.

Tuckerman's writings, even from the first, contained careful notes which show that he was possessed of a genuine love of botany and a marked adaptability for the work. Thus his meeting with Fries was not merely an incident of his first European trip, and his visits and excursions with this greatest lichenist of his time must have been a great inspiration in those days when botanists were few in number. Indeed, we can hardly estimate the value of this visit to American lichenology. In 1847, nearly ten years after Tuckerman began his work on lichens, appeared his "Synopsis of the Lichenes of New England, and other Northern States and British America." This work was the first to give descriptions and a classification of our lichens, and though it contained but two hundred and ninety-five species, with twenty new, it was of great importance as it formed a basis from which others could work. At the same time Tuckerman began to issue his "Lichenes Americae Septentrionalis Exsiccatae," the first issue of American specimens giving authentic plants with which collectors could compare their lichens.

Tuckerman was more than a lichenist as his knowledge of the general botany of his day was quite comprehensive, while he was a widely read and scholarly man. His professorship in botany at Amherst began in 1858 and continued till his death, twenty-eight years later. But we must confine our attention to his work upon the lichens. In this field his activity continued to the time of his death, and collections were determined by him, not only from all portions of the Western Hemisphere, but also from the Eastern Hemisphere and from the islands of the sea. How much labor and self-

sacrifice is involved in such a task will be appreciated by those who have attempted a similar one even though upon a smaller scale, in some field of taxonomic study. This work brought Tuckerman a knowledge of lichen species possessed by very few even of the European lichenists, and culminated in his two great contributions to North American lichenology, the "Genera Lichenum" in 1872 and the "Synopsis," the first volume of which appeared in 1882 and the second in 1888. Of these two great works, we may venture a few words. The author was conservative in his view of genera and species and seemed to have followed Fries very largely in his classification of the American lichens. His views as to system of classification and as to generic and specific limitations can scarcely be expected to endure in all particulars. Yet his conservatism was by no means a fault, and has no doubt greatly aided in the study of lichens.

Tuckerman was to lichenology what Asa Gray was to the study of our seed-plants, and we cannot pay too high a tribute to the labors of these two men. Tuckerman's contributions to North American lichenology consist of forty-eight titles, but the number by no means measures the amount of work involved, for he aided others continually and much of his labor received no public recognition. Conservative as he was, his new species and varieties numbered some three hundred and sixty-five, about two hundred and fifty of these being found on the North American continent, some sixty of the remainder on the island of Cuba, and nearly an equal number from various parts of the world and not to be regarded as North American. Including the Cuban lichens named by Tuckerman, the number of species and varieties described in the two volumes of the "Synopsis" for North America, is approximately one thousand and fifty, and this number is no doubt considerably below the whole number of North American lichens known by Tuckerman.

Tuckerman was pre-eminently a systematist, but some words are in order regarding his views on some other questions of lichenology. In regard to the theory of Schwendener as to the dual nature of lichens, he was more guarded in his statements than many of the other systematic lichenists of his day. While he readily admitted that there were some arguments in favor of the theory, he seems finally to have adopted the views of Minks, and like Müller and some others of his day, thought that he had himself demonstrated the existence of the "microgonidia." This he regarded as establishing a boundary line between lichens and fungi. It is pleasant to note, however, that during the years of sharp debate, Tuckerman was always careful and considerate in his treatment of the question. It is also quite as pleasant a task to record that in a short paper entitled, "Can Lichens be Identified by Chemical Tests," Tuckerman remarks that his own observations have led him to believe that such tests are scarcely reliable, a view which doubtless meets the approval of later lichenists generally, since we have reached more definite knowledge regarding the anatomy of these plants.

Excellent memoirs of Tuckerman by Willey, Gray and Farlow give much more detail than can be incorporated here. Grinnell, Iowa.

LICHEN NOTES No. 2.

G. K. MERRILL.

It is no unusual event for the collector to observe lichen species growing in situations utterly discordant with their natural habitat, but the recent finding by the writer of *Umbilicaria pustulata*, Hoffm., b. *papulosa*, Tuck., attached to one of the lower limbs of a young spruce seems worthy of a few words

It is to be noted that the genus *Umbilicaria* is typically saxicoline, and the occurrence of an individual on any other substratum is distinctly a departure from habit. The plant was normal in appearance, well fruited, perhaps 60 mm. in major diameter, firmly attached to the branch, and apparently in no wise physiologically affected by its untoward surroundings. The branch was four feet from the earth, living and thrifty, and the tree was one of numbers growing in the vicinity. The locality was ledgy and numerous outcroppings supported myriad *Umbilicariae* of similar and diverse species. Speculating on how the plant received its start in an uncongenial habitat, it is inconceivable that it should have been a nomad. While well known that fragments of lichen thallus, wind blown or moved by other agencies, may and do become attached to new supports, it is equally a fact that the anchorage of the *Umbilicariae* is very secure whether in their younger stages or as matured. Then again we have no observations to prove that a new attachment may be formed once the old is broken, either through the same umbilicus or by growth of a new one. It seems a safe conclusion that our plant originated precisely as others of its kind do, and in situ. It has been mentioned that the spruce was a young tree, and the consideration suggests itself that a fairly accurate idea of the lichen's age might be deduced should that of the tree be ascertained. This was found to be slightly less than thirty years, but the information in establishing one limit fails to furnish a minimum. While reasonable to infer that from the branch being one of the largest, it was also one of the oldest, assumption can scarcely go further, and certainly not to that limit of fixing a time for the meeting of the proto-thal-line film with its algal affinity. We can be sure that the tree had passed its juvenile stage, that the branch had acquired some size and a developed cortex. All this may have acquired ten years; if so, how extraordinarily moderate are the functional activities of a lichen only attaining to a diameter of 60 mm. in twenty years. That lichens derive their inorganic components from the substrata has long been asserted, the rhizoids supposedly furnishing the *deus ex machina*. If this be true of *Umbilicaria* (it seems incredible) our plant evidently found the assimilated products of the host branch entirely to its liking, and if so, why should it have been unattended? Why not more individuals on the same branch, other branches of the same tree, or other trees of the same species and locality? Indeed the same interrogations might be made if it were a known fact that lichens derive their nutrition solely from meteoric sources.

A very curious lichen received during the summer of 1904 from Mrs. L. A. Carter, of Laconia, N. H., finds a name, the result of a recent examina-

tion of the Cetrariae in the Tuckerman herbarium. The plant was collected in Central Point, Oregon, by Mrs. Agnes Ashworth, and as we are informed by Mrs. Carter, grew inmixt with *Evernia vulpina*. While the thalline characters were obviously those of Cetraria, patient search on our part failed to find a specific name. A portion of the specimen sent to Prof. Fink drew a statement that it was new to him, "that it seemed nearest to *Cetraria Richardsonii*," although he was not sure. In May, 1905, through the kindness of Prof. John Macoun, we received a suite of the lichens collected by him during the summer of 1904 in the Rocky Mountains. No. 7 of the set from Glacier, British Columbia, found on bushes, proved to be like the Oregon plant above mentioned, except a better specimen. Prof. Macoun had marked the packet *Cetraria sæpincola*, but admitted a doubt of the correctness. More search and study on our part still failed in satisfactory reference, and our final word in the interchange of opinion with Prof. Macoun was, that if *Cetraria Islandica* was known ever to grow on trees or shrubs, our plant might be that form. At a later date, gathering from Th, Fries, Lich. Scan. Pt. I. p. 98, that small forms of the species were sometimes to be found on wood, we were quite prepared to find that Tuckerman knew the form, although this habitat was not mentioned in the Synopsis. The specimens appearing in Tuckerman's collection all come from West America, and in addition to being marked *C. Islandica* have a qualifying sub-label "*aboricola*." It is not believed that the word is used to designate a particular variety or form of *C. Islandica* but merely as descriptive of its habitat. This opinion is borne out by Tuckerman's frequent use of "*aboricola*" throughout his herbarium to designate corticoline forms. Unlike the Umbilicariae of our first topic, which presented no divergence from normal appearance, this plant varies not a little, as may be seen by comparison of the appended description with Tuckerman's a.

CETRARIA ISLANDICA (L.) Ach.

*M. ARBORIALIS (conditional nomination).

Thallus cartilagineous, foliaceous, sub-erect or now appressed; lacinae plane, variously and irregularly divided, the apices commonly obtuse, from narrowed to sometimes four mm. in breadth, very smooth and shining or sub-opaque: greenish-olivaceous or olivaceous-fucescent, the margins of the lacinae either spinulose or not, in the later case sometimes white-sorediate. Apothecia not observed.

The lacinae seem to be held to the twigs not by rhizinae, but by an obscure adglutinated intergrowth. No trace of the sanguineous color characteristic of the basal portion of the type plant is observed. The resemblance of the plant to some forms of *C. ciliaris* is sufficiently marked to suggest the thought of its being factorial in the phylogeny of that species. It is rather remarkable that Tuckerman gave no space to the form, and it might be taken that he considered it of no importance. However this may be, the plant varied sufficiently in habit to be extremely puzzling to the writer, and on present evidence diverges enough from the normal presentments of *C. Islandica* to be regarded as a distinct form. Rockland, Maine.

*M=modification.

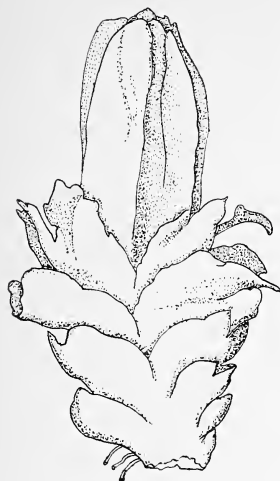


Fig. 2

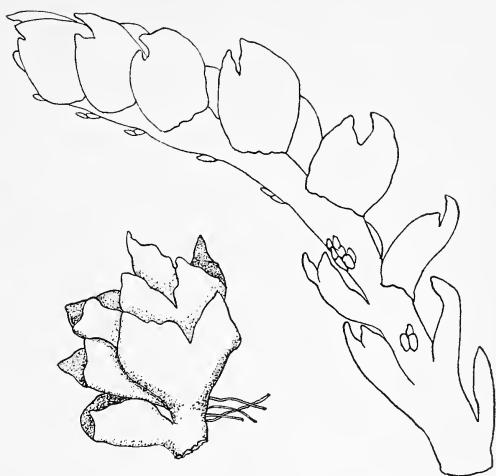


Fig. 3

Fig. 1

Fig. 1—*Cephalozia Francisci*, leafy stem $\times 130$.

Fig. 2—Perianth and involucre $\times 42$.

Fig. 3—Male plant $\times 70$. Reduced $\frac{1}{5}$.

CEPHALOZIA FRANCISCI (HOOK.) DUMORT.

Cephalozia Francisci being an American as well as European species [see Torrey, 3:40. Mr. 1903, in which I recorded the fact of having detected it in a collection made by Mrs. Alice R. Northrop, near Prospect Harbor, Maine], I have thought I would publish some drawings of it as it has never been figured in our books. In its habit this *Cephalozia* shows the same characteristics as the genus *Odontoschisma*, except in its regularly bifid leaves and a few minor details; the obtuse lobing of the leaves, however, is unusual among the *Cephalozia*. Even this exception loses some of its importance when it is remembered that both *O. Sphagni* and *O. prostratum* show, in very rare cases, bifid leaves obtusely lobed. Its upright flagella-like gemmiparous branches recall those of *O. denudatum*, in miniature. Dr. Evans has given the above facts in the *Botanical Gazette* (36:337, N. 1903) and shown it to be one of the connecting links between the two genera; he also mentions that it was principally on account of this species that Spruce included *Odontoschisma* among the sub-genera of *Cephalozia*. The specimens found in Maine grew on a shady path in company with *C. bicuspidata* (L.) Dumort, and formed little compact tufts, showing perianths with immature sporogonia and immature androecia. I am in hopes of soon hearing of its occurrence at other stations and add a short description of it.

The pallid-green plant is sometimes tinged a clear wine-color; leaves oval to orbicular, alternate, strongly imbricate at apex, spreading at base, obliquely attached, concave, sinus acute, lobing very obtuse: erect stems bear-

ing many crowded, imbricate leaves, prostrate stems with leaves scattered, all bifid one-fourth their length; leaf cells large and pellucid, 30-49 μ with small trigones, cell walls otherwise slightly thickened; underleaves delicate, bifid, appressed or spreading. Dioicous. Androecium suberect, bracts large, four to five pairs, bifid, imbricate and each bract complicate, lobes wide-spreading, apices rounded, obtuse to apiculate, these bracts all having rhizoids, excepting apical pair; antheridia small, oval, short-stalked. Perianth 10-12 mm. long by 5 mm. wide, almost three-carinate from base, mouth six-plicate, repand. Spruce says that the perianth at base is three cells, in middle two cells thick: in the Maine plant I found it to possess a thinner wall, two cells thick one-third its length; bracts in about three pairs, large, bifid, recurved: capsule dark reddish-brown, oval-cylindrical: gemmae green, triangular, in globose mass at apex of flagellate branch, with scattered spreading leaves. Spruce mentions rose-colored gemmae, Hooker, green.

CAROLINE COVENTRY HAYNES,

16 East 36th street.

NEW OR UNRECORDED MOSSES OF NORTH AMERICA

By J. CARDOT AND I. THÉRIOT.

Translated and condensed from The Botanical Gazette, May, 1904.

Descriptions of new species given in full. See BRYOLOGIST, January, March, July and September, 1905.

BRYUM DISTANTIFOLIUM Card. & Thér.

Tufts soft, brownish, about 5 cm. high. Stems erect, sparingly radiclese, simple or sending out 5-5 slender innovations above. Leaves dimorphous, all entire, narrowly but distinctly decurrent; margins plane or subrevolute at base only, the lower leaves distant, small, short acuminate often obtuse or subobtuse, 0.9 mm. long, 0.5 mm. broad, border wanting or indistinct, costa not excurrent, the middle and upper leaves less remote, larger, 2-2.4 mm. long, 0.9 mm. broad, lanceolate, long acuminate, costa 70 μ thick at the base, short excurrent in a reddish cusp; median cells rectangular, 60-80 μ long, 15 μ broad, marginal cells narrow, linear, forming a border of two or three rows. Other characters unknown. Plate XXI.

Assiniboia: Wood Mountains (Macoun, 1895. Sent as *B. erythrophyloides* Lindb.)

Somewhat recalling the slender forms of *B. pallens* Sw., but differing by its dimorphous leaves, which are plane on the margins or nearly so. The leaves decurrent at base, the upper distinctly limbate, at once distinguish this moss from Kindberg's *B. erythrophyllum* and *B. erythrophyloides*.

BRYUM DIMORPHOPHYLLUM Card. & Thér.

Apparently dioicous, rather robust. Tufts compact, cohering, yellowish-green above, densely rufus-tomentose within. Stems erect, 4-5 cm., frequently branching. Leaves erect when dry on twisted branches, erecto-patent when wet, dimorphous, the lower very concave long-ovate or oblong from a long decurrent base, costa vanishing below the apex, upper leaves larger and

narrower, 2.2 mm. long, 0.8 mm. broad, lanceolate, acuminate, acute, less decurrent, costa percurrent or shortly excurrent; margins all entire and revolute from the base to near the apex; cells quadrate, short-rectangular or rhomboidal, 30μ long, 14μ broad, slightly chlorophyllose, with thick walls, marginal cells narrower and linear. Perichaetial leaves smaller, narrower, acute; costa shortly excurrent. Capsule nodding or pendulous, narrowly subpyriform, 3 mm. long, 0.9 mm. thick, slightly constricted under the mouth both when wet and when dry; operculum concave-conic. Seta dark reddish-brown about 2 cm. long. Annulus broad, triple. Membrane of the inner peristome high, cilia 2-3 appendiculate. Spores smooth, unequal, some frequently 11μ in diameter, others more rarely 18μ in diameter. Male plants unknown. Plate XIX.

N. W. Montana: Mt. Lottie Stanton and Mt. Trilby, in the vicinity of Lake MacDonald, Flathead Co., 1100-1800 alt. (J. M. Holzinger and J. B. Blake, 1898).

Belongs to the group of *B. pseudotriquetrum* Schw., but is at first sight distinguished from all the other species of this group by its dimorphous leaves.

AULACOMNIUM PALUSTRE Schw. var. DIMORPHUM Card. & Thér.

Stems densely branched above. Leaves dimorphous, stem leaves elongated acutely acuminate, apex sinuate, subdenticulate, strongly papillose; branch leaves much shorter, obtuse, entire, less papillose, sometimes smooth.

Colorado: Near Breckenridge, 175 km. from Denver, alt. 3000 m. (J. M. Holzinger, 1896).

A similar form is recorded by Mr. Dixon in his admirable Handbook of British Mosses, p. 282.

AULACOMNIUM PALUSTRE Sch. var. LINGULATUM Card. & Thér.

Slender, in the larger forms similar to *A. androgynum*. Leaves linguulate, all obtuse, entire or faintly sinuate at the apex.

Colorado: Bog near Chamber's Lake (C. S. Crandall, 1894; herb, J. M. Holzinger).

Distinguished from the var. *imbricatum* Br. Eur. by its smaller size and its longer not imbricated leaves.

FONTINALIS SUBCARINATA Card.

Soft, yellowish or dirty green. Stems 15-20 cm. long, denudate in the lower part; branches elongated, erect, attenuate, subcuspidate. Leaves soft four-ranked, erect, 4-5 mm. long, 1-2 mm. broad, narrowly lanceolate, long acuminate, entire or subdenticulate at the apex, nearly all distinctly sulcate in the middle, the lateral leaves subconduplicate; cells very long and narrow, the alar cells few, small, hardly distinct, often nearly wanting. Other characters unknown. Plate XXIII.

Assinoboia: Cypress Hills, Battle Creek (Macoun, 1895. Sent as *F. Lescurii*).

This species belongs to the Sect. *Malacophyllae*, and is closely allied to

F. seriata Lindb., but differs from it by its plicate leaves, with less distinct alar cells.

CLIMACIUM AMERICANUM Brid. var. *pseudo-Kindbergii* Card. & Thér.

Habit in all respects of *C. Kindbergii* but the areolation agrees exactly with *C. Americanum*.

Missouri: Paw Paw Junction, on old log; Pleasant Grove, on wet bank (C. F. Bush, 1897 and 1899).

Contrary to the opinion of Dr. A. J. Grout, we think that *C. Kindbergii* cannot be distinguished specifically from *C. Americanum*. We have specimens on which the distinctive characters become attenuated. The plant of which we make the variety *pseudo-Kindbergii* is just one of these forms.

BRACHYTHECIUM SUBASPARRIMUM Card. & Thér.

Loosely intricate-caespitose, yellowish-green, rather glossy. Stem slender, 3-6 cm. long, prostrate, radiculose; branches unequal, attenuate, ascending, pinnate. Stem leaves erecto-patent, deltoid from a decurrent base, gradually longly and narrowly acuminate scarcely plicate, nearly smooth, 1.8-2 mm. long, 0.75 mm. broad, margin slightly reflexed at base: subentire or slightly serrulate at base: costa narrow, 36μ thick at base; median cells linear, narrow, $60-85\mu$ long, 6μ broad, basal cells laxer, hyaline, rectangular or subhexagonal; branch leaves oblong, long and narrow-acuminate, neither deltoid nor decurrent, more distinctly plicate, 1.6 mm. long, 0.5 mm. broad, margins revolute for a greater or less distance, minutely denticulate above. Perichaetial leaves ecostate, ovate from a clasping base, abruptly narrowed into a long slender, entire, spreading or reflexed acumen. Capsule inclined or subhorizontal: ovate-gibbous, slightly constricted under the mouth when dry, 1.7 mm. long, 0.8 mm. broad; operculum unknown. Seta dark red, 1.5 cm. long, very rough, densely covered with high papillea. Peristome perfect, cilia appendiculate. Spores 15μ thick. Apparently dioicous (male flowers unknown). Plate XXIV.

British Columbia: New Westminster (A. J. Hill, 1902: herb, C. F. Baker).

By the habit, dioicous inflorescence and very rough pedicel this moss stands near *B. asperrimum* (Mitt.) Kindb. and *B. Washingtonianum* Eaton, differing from both in having the leaves scarcely plicate, almost smooth with the acumen much longer and narrower, and the borders very slightly denticulate or subentire and partly revolute.

PLAGIOTHOECIUM SULCATUM Card. & Thér.

Monoicous in rather lax, depressed tufts, glossy. Stems slender, creeping; branches ascending, subarcuate, about 1 cm. long, rather flattened. Branch leaves loosely subdistichous-homomallous, 1.2-1.5 mm. long, 0.4-0.5 mm. broad, not at all decurrent, lanceolate, gradually long-acuminate, margins plane, serrulate from the middle, sometimes from the base: costa double, short or sometimes longer with one fork reaching almost to the middle; cells narrowly linear, $70-90\mu$ long, 6μ broad, the lower cells shorter, laxer, not porose, $20-40\mu$ long, $12-15\mu$ broad. Male flowers growing near the female.

Perichaetial leaves erect, appressed, ecostate, short-ovate, apex rounded, abruptly short-opiculate. Capsule sub-horizontal or inclined, 2 mm. long, 0.7 mm. thick, subcylindric, arcuate constricted below the orifice when empty, deeply sulcate in both young and mature stages; operculum obtuse conical. Seta pale-red, delicate, flexuous, 2 cm. long. Annulus double, Peristome perfect, 0.42 mm. long, cilia nodose, minutely papillose. Spores smooth, 12μ in diameter. Plate XXIV.

North Minnesota: On Fall Lake, near the foot of Kawasatchong Falls, 11 km. north of Ely (J. M. Holzinger, 1897. Sent as *P. Muehlenbeckii* Br. Eur.).

This moss seems somewhat intermediate between *P. striatellum* Lindb. (*P. Muehlenbeckii* Br. Eur.) and *P. silesiacum* Br. Eur., differing from the former by its non-decurrent leaves, narrower at base, with a more distinct costa, its much longer cells, the basilar ones not porose, its more arcuate capsule, and the form of its perichaetial bracts; and from the latter by its capsule being deeply sulcate, even when young, and its more compressed branches. According to the description, *P. pseudosilesiacum* Sch. differs from our species by its much shorter pedicel (1 cm.), and its costate leaves.

PLAGIOTHECIUM GROUTH Card. & Thér.

Monoicous, delicate, glossy, in rather dense depressed tufts. Stems slender, prostrate with numerous short complanate branches. Leaves minute flattened distichous, erecto-patent, 0.7-0.8 mm. long, 0.3-0.35 mm. broad, not decurrent; oblong lanceolate, the lateral subcultriform, with a shorter and broader acumen; margins plane, ecostate, stem leaves subentire or obsoletely denticulate, branch leaves in the upper third or from near the middle, minutely but distinctly serrulate; median cells linear, very narrow, 60-90 μ long, 6 μ broad, the upper cells shorter, the lower rectangular, the lowest larger and subdilated. Perichaetial leaves oblong, abruptly short-cuspidate, subentire or the lowest with sinnolate tip. Capsule horizontal inclined or sub-erect, ovate, minute, hardly 1 mm. long, 0.5-0.7 mm. thick, smooth, not contracted under the orifice when dry; column short; operculum rostrate. Seta slender, erect, reddish, 1-1.5 mm. long. Spores irregular, 8-20 μ in diameter. Plate XXIV.

Hempstead, Nassau Co., N. Y.: Depression in base of a chestnut tree (A. J. Grout, 1899).

Allied to *P. elegans* Sch., but easily distinguished from it by its short leaves, more abruptly and broadly acuminate, the rameal rather strongly denticulate in the upper third, the perichaetial bracts subentire with a shorter acumen, the capsule smaller, the beak of the lid thinner and the monoicous inflorescence.

AMBLYSTEGIUM LAXIRETE Card. & Thér.

Belonging to the group of *A. riparium*, quite robust, floating, dull-green, as much as 10 cm. in length, remotely pinnate, branches unequal, slightly spreading, attenuate, laxly foliose. Leaves flattened, distichous, spreading, ovate-lanceolate a little more shortly acuminate, about 3 mm.

long, 1 mm. broad, margins plain, entire; costa strong, 100μ thick at base, vanishing far above the middle, areolation lax, cells $60-80\mu$ long, 12μ broad, walls thin and soft. Other characters unknown. Plate XXV.

Missouri. Monteer, in spring (B. F. Bush, 1899).

The leaves shorter acuminate, the longer and thicker costa and chiefly the loose areolation, at first sight distinguishes this moss from *A. riparium*. The last character also separates it from *A. vacillans* Sulliv. From *A. Kochii* Br. Eur. it differs by its larger leaves and its much stronger and longer nerve.

HYPNUM MALACOCCLADUM Card. & Thér.

Monoicous, fine, soft, rather lax, yellowish-green. Stems filiform, prostrate, denuded; branches ascending, about 1 cm. long. Leaves quite distant, soft, concave, spreading, 0.8-1.1 mm. long, 0.4-0.5 mm. broad, strongly narrowed from an ovate base or oblong, very broadly or shortly acuminate, apex rounded or subacute, margins plane, entire, costa thin, simple, extending to the middle or beyond, sometimes subfurcate above, $35-40\mu$ thick at base; alar cells rectangular or subhexagonal hyaline, but not forming distinct auricles; median cells shorter rhomboidal, with thicker walls. Perichaetial leaves erect, longer acuminate, costate; capsule horizontal or obliquely erect, short, gibbous, 1-1.5 mm. long, 0.7 mm. thick; operculum convex-apiculate, Seta short, rather thick, reddish, 8-10 mm. long. Annulus simple, distinct. Peristome 0.4 mm. long, segments of the inner peristome narrowly gaping at the keel, slightly papillose above; cilia 1-2. Spores 12μ in diameter. Plate XXV.

North America: Without locality or name of collector, in herb. L. Debat.

This species somewhat resembles *H. Goulardi* Sch., from which it differs by its longer leaves with a single long costa. It is also distinguished from *H. Closteri* Aust. (*Amblystegium Holzingeri* Ren. & Card.) by its greater size and longer costa.

THE END.

BOOK REVIEWS.

ORGANOGRAPHY OF PLANTS, especially of the Archegoniatae and Spermatophyta, by Dr. K. Goebel, Professor in the University of Munich. Authorized English Edition by Isaac Bayley Balfour, Professor of Botany in the University of Edinburgh. Published at The Clarendon Press, Oxford.

The first volume of the English translation appeared in 1900. Part II was issued last summer. A brief synopsis of the references to the *Bryophyta*, in both volumes, may be of interest and stimulate to further study of the living plants.

New Formation of Organs in Regeneration: "In mosses the propagative capacity is uncommonly great; one may almost say that nearly every cell of the vegetative body in mosses and liverworts, and in fact also the

cells of the sporogonium which is generally still capable of development, can give rise to a new plant. In the regeneration of the mosses a new plant is not produced directly, but a *protonema* is first formed from which the plant arises, in the same way as the juvenile stage of the plant is developed from the germination of the spore." This is contrasted with the liverworts and suggestions are made for further experiment. A few instances of phenomena of propagation in Bryophyta are cited, such as *Marchantia*. Dorsiventral organs are described and orthotropous and plagiotropous positions are illustrated by *Hylocomium splendens* and *Mnium undulatum*. Anisophylly, or the differences in size between upper and lower leaves is illustrated by *Cyathophorum pennatum* and reference is made to *Rhacopilum* and *Hypopterygium*. Several hepatics are also cited.

Juvenile forms and stages of development are illustrated in *Lejeunia Metzgeriopsis*, *Ephemerum serratum* and *Funaria hygrometrica*, and a cushion of protonema of a species of *Bryum* in Fig. 90 is a remarkable instance of an unusually large development of this stage of growth.

Investigations on the directive influence of light in the polar differentiation of the spores of many Bryophyta and its influence in the formation of roots are still wanting. The question of the influence of light on the position of the capsules in mosses still requires experimental investigation. Differences are cited between *Sphagnum*, *Orthotrichum* and *Grimmia* and *Buxbaumia* and *Diphyscium*, *Barbula*, *Catharinea* and *Bryum*.

The first section of the second volume deals with the sexual organs of the Bryophyta with illustrations from *Marchantia polymorpha*, *Phascum cuspidatum*, *Funaria hygrometrica*, *Catharinea undulata*, *Monoclea dilatata*, *Sphaerocarpus*, *Blyttia*, *Jungermannia*, and *Mnium undulatum*.

The vegetative organs of the Hepaticae, the asexual propagation, the phenomena of adaptation in order to retain water and resist drought are described and figured in detail as well as the protection of their sexual organs and the types of sporogonia and their development, and the germination of the spores.

The life history of various mosses is described from the germination of the spore, the development of the protonema, the formation of roots, stems and leaves, their special forms and functions, their arrangements for retaining water, and resisting drought: their relation to light, the development of the sexual organs; the structure of the sporogonium and its various types and adaptations for shedding the spores.

A few quotations will suffice to show how suggestive of further study and experiment these chapters on the Bryophyta are: "There is wanting in the musci the wealth of adaptation in the form of the leaf in relation to the retention of water that is so manifest in the Hepaticae: the complex auricles are absent. Outgrowths of their surface, such as mamillae or papillae, occur in species growing in dry sunny places, such as *Hedwigia ciliata*, but not on hygrophilous species, and would probably disappear if cultivated in moisture and shade. The method of sponge construction by means of empty cells with perforated walls, is well shown in *Sphagnum* and *Leucobryum*; one is fitted to evaporate water rapidly, the other to retain it."

A list of the illustrations would be too lengthy as there are ninety-seven of the Hepaticae and thirty-three of the mosses.

The connection between the Bryophyta and the Pteridophyta is discussed, although positive results have not been reached.

This book promises to be very stimulating to the student of mosses and hepatics as living organisms, and will encourage further study along the lines so clearly indicated.

ELIZABETH G. BRITTON,
N. Y. Botanical Gardens.

THE FERN ALLIES OF NORTH AMERICA, north of Mexico, by Willard N. Clute.

With more than one hundred and fifty illustrations and eight colored plates, by Ida M. Clute. Published by Frederick A. Stokes Co., New York City, at \$2.00.

This is a companion volume to the author's "Our Ferns in Their Haunts," and describes in technical language the scouring-rushes, horsetails, running-pines, club-mosses, water-ferns, pillworts, water-peppers, quillworts and the various other plants included among the Fern Allies. The illustrations are most helpful, especially the black and white cuts. The claim is made that here *all* our species are illustrated and many for the first time. The book also contains a check-list of the North American species with synonymy, a complete glossary, and seven keys to the genera and species based on the most noticeable characters. In the matter of nomenclature our author claims to have adapted a somewhat conservative treatment, using for the most part the names common in other works of this class. This notice is intended merely to call the attention of our readers to a good book to add to their equipment for next season's outdoor work and not as a critical analysis. The book is well made up, though the printing as to type is not all one could desire. The black and white drawings are clear and characteristic of the species treated. The colored plates in our opinion add nothing to the value of the illustrations.

A. M. S.

SULLIVANT MOSS CHAPTER NOTES.

The list of members elsewhere printed numbers one hundred fifty-six. Four have qualified for membership during December making our total one hundred and sixty on January 1, 1906: Prof. E. E. Bogue, Agricultural College P. O., Michigan. Prof. John Macoun, Sussex street, Ottawa, Canada. Mr. R. S. Gray, 508 Montgomery street, San Francisco, Calif. Mrs. Ella L. Horr, Wor. Nat. Hist. Soc., 12 State St., Worcester, Mass.

CHAPTER NOTE.

In connection with the admission to membership in the Sullivant Moss Chapter of persons who are not resident in the United States or Canada, the question has arisen as to how they may participate most easily in the offerings published in each issue of the BRYOLOGIST. In view of the fact that foreign letter postage is more than double that of domestic, it seems unfair to impose upon our foreign friends the added cost of transportation. Hence the following scheme is put forward:

Members offering specimens are requested to send to me at the address below a quantity of their offerings sufficient to meet the demands of the foreign members. Then if those members who are not residents of the United States or of Canada, will send me a list of such specimens as they wish to have, accompanied by stamps, even of their own countries, I will forward to them the specimens desired. If the foreign members wish to offer specimens, they may, if they wish, send me their entire offering and I will gladly undertake the distribution of the same. In each case, those specimens which are not distributed will be returned to the owners if they so desire.

This scheme is, of course, not obligatory, it being proposed merely as a means to facilitate the exchange of specimens.

EDWARD B. CHAMBERLAIN, President,
1830 Jefferson Place, Washington, D. C.

SULLIVANT MOSS CHAPTER ANNUAL REPORTS.

REPORT OF THE JUDGE OF ELECTIONS.

MISS MARY F. MILLER,

Secretary Sullivant Moss Chapter.

The following report of the election of officers of the Chapter for the year 1906 is respectfully submitted:

Whole number of ballots cast	16
For President—Mr. E. B. Chamberlain	16
For Vice-President—Mr. G. K. Merrill	15
For Vice-President—Mrs. C. W. Harris	1
For Secretary—Dr. John W. Bailey	16
For Treasurer—Mrs. Annie M. Smith	16

Mr. Chamberlain, Mr. Merrill, Dr. Bailey and Mrs. Smith are elected.

Respectfully submitted,

CORA H. CLARKE.

REPORT OF THE PRESIDENT.

TO THE MEMBERS OF THE SULLIVANT MOSS CHAPTER:

During the year just ended the affairs of the Sullivant Moss Chapter have progressed most satisfactorily. The increase in membership has been constant, the quality of the work done has steadily improved, and the members have shown a rapidly increasing ability to determine their own collections.

The most noteworthy happening is the welcome decision to admit to membership persons not residents of the United States or Canada. At the present writing eight foreign members are on the Chapter roll. This fact to me seems most hopeful, inasmuch as it marks a decisive step towards broadening the usefulness of the Chapter and facilitates keeping in touch with bryological and lichenological activity elsewhere. For the present at least, the main efforts of the Society must be directed towards the stimulation of a

broad and active interest in the study of North American lichens, hepatics and mosses, yet it is equally important never to lose sight of the fact that only through intimate relationship with workers in other fields can any problem be solved.

Another pleasant indication is the interest shown by many members in the careful exploration of their local floras. It is difficult to overestimate the importance of such work. Miss Haynes' note upon *Telaranea* in the November BRYOLOGIST well illustrates the ignorance of distribution which exists in the study of the hepatics; among the students of mosses and lichens similar conditions obtain. It is not so much the knowledge of new species that is needed, as a clearer understanding of the variability and distribution of those species which have already been described. Hence I suggest, as a most profitable field for work, the intensive study by the members of those species which occur in their own regions, the notes made being supplemented by specimens in each case.

One other point needs a word of emphasis. It is the importance of preparing neat, representative specimens of common species. Almost anyone will take pains with a rare specimen: few use the same care when preparing plants from their own dooryard. Many workers have been greatly annoyed at the receipt of specimens of the larger mosses, such as *Polytrichum commune*, with the setae broken and the stems so bent and curled that "wad" seemed the only word applicable.

In closing I wish to extend my hearty thanks to the members for their many kindnesses during the past year. To all members, new and old, I extend my best wishes for the new year. EDWARD B. CHAMBERLAIN,

President.

REPORT OF THE SECRETARY.

During 1905 the Chapter has gained twenty-three new members and has lost but three, making the present membership one hundred and fifty-six. No deaths have been reported.* We have representatives in twenty-five States, the District of Columbia, British America, England, France, Japan, and Australia.

The Chapter Herbarium has also increased in size and value, and consists of one thousand, six hundred and thirty specimens—four hundred and eighty-one species and varieties, and one hundred and twelve genera. Three hundred and thirty specimens have been added this year, one hundred species being new to the Herbarium. Beginners have been supplied with authentic specimens, and they in turn have sent in many interesting species for determination. Dr. Grout, Mr. Cresson, Mr. Hill, Miss Wheeler, and many others have contributed largely to the Chapter Herbarium.

Ninety-one specimens—sixty-seven mosses, twelve hepatics, and twelve lichens—have been offered in the BRYOLOGIST during the year. It has been suggested that each member of the Chapter should try to offer "at least one specimen a year," as uncommon as possible, and if this suggestion were acted upon, it would greatly facilitate the work of the Secretary, who would

by these voluntary offerings be spared the necessity of sometimes making personal application for them. During the past year twenty-eight members have distributed specimens, a little over one-sixth of the entire membership. It seems hardly fair that this willing sixth should be allowed to do all of this kind of work, and I have ventured to bring the matter to the attention of the members, some of whom are probably unaware that such offerings would be acceptable. I would also urged them to remember the Chapter Herbarium more frequently. Possibly some who would gladly distribute specimens are deterred by thinking they have not enough of any one species; and perhaps it would be as well to state that a package of moss or lichens or hepatics, collected as suggested by Mr. Chamberlain in the BRYOLOGIST for November, 1905, that will make from twenty-five to thirty fair-sized specimens will generally be sufficient for an offering.

In retiring from office, I wish to express to the officers and to the other members my grateful appreciation of their unflinching kindness and courtesy; I shall always recall with pleasure my official connection with the Moss Chapter, and thank my many correspondents for their expressions of appreciation and good will.

I know that all join me in extending a hearty welcome to our new officers, Mr. Merrill and Dr. Bailey, both far too well known to the members of the Chapter to need any further introduction.

Respectfully submitted,

MARY F. MILLER.

TREASURER'S REPORT.

The following statement for the year beginning December 1, 1904, and ending December 1, 1905, is respectfully submitted:

RECEIPTS:

By cash on hand December 1, 1904.....	\$ 28.92
By dues from members.....	150.35

	\$179.27

DISBURSEMENTS:

To the BRYOLOGIST.....	\$123.90
To Secretary, (Postage, Stationary, Herbarium supplies),.....	7.58
To Treasurer, (Postage and Stationary).....	7.20

	\$138.68
Cash on hand December 1, 1905.....	40.59

	\$179.27

ANNIE MORRILL SMITH,
Treasurer.

*Miss Harriet B. Bailey died November 25, 1905

REPORT OF THE HEPATIC DEPARTMENT.

It is my pleasant duty to report the steady interest in the Hepaticae, evinced by the members. The several large collections sent in from Washington, Maryland, New York, New Hampshire, Maine, Canada, and Nova Scotia have, with the smaller ones, made up into five hundred pockets. Of these two hundred and thirty-two are duplicates, which are ready for exchange. Some of these collections I shall hope to dwell upon later, for they have added many interesting and several rare species to the Herbarium. I would like also to mention our obligations to Dr. A. W. Evans for his courteous and kindly assistance in verifying and determining a number of the specimens.

Respectfully submitted,

CAROLINE COVENTRY HAYNES.

REPORT OF THE LICHEN DEPARTMENT.

Interest in the Lichens is sustained, and much material has been sent in for determination. Many of the members have accumulated really commendable collections of their local flora. More could be accomplished if a good elementary manual was accessible. In this connection it is strongly urged that those interested work out their known species by aid of Mr. Sargent's "Key" in the November BRYOLOGIST. No glossary will be required other than a good dictionary. The exercise will be found entertaining and helpful. The series of papers by Mrs. Harris should not be neglected, they are valuable guides when used intelligently. The remarks of Mr. Chamberlain in the BRYOLOGIST, 8:6, 1905, are as Joshua Redearth says, "pintedly good medicin' but hard to swallow." It will be well for those contemplating an offering to send in their material for verification, or if such a course is inadvisable, state on the label that the specimen is determined by comparison (and by yourself) with one submitted to the authority. All interested in the Lichens are assured of our hearty co-operation in furthering their knowledge of species or any other factor of the study.

G. K. MERRILL.

OFFERINGS.

(To Chapter Members only. For postage).

- Mr. H. Dupret, Seminary of Philosophy, Montreal, Canada (U. S. postage taken). *Hypnum capillifolium* Warnst., st.; *Hypnum filicinum* L. st.; *Bryum Schleicheri* Schwaegr., st. Collected near Montreal.
- Miss Alice L. Crockett, Camden, Maine. (Four cents postage). *Polytrichum strictum* Banks., c.fr.; *Sphagnum acutifolium* Ehrh. forma, c.fr.; *Philonotis fontana*, (L.) Brid., c.fr.; *Hypnum fertile* Sendt., st.; *Hypnum cupressiforme* L., c.fr. Collected in Camden.

- Mrs. Horace C. Dunham, 53 Maple St., Auburndale, Mass. *Climacium dendroides* (L.) W. & M., c.fr.: *Trematodon ambiguus* (Hedw.) Hornsch., c.fr. Collected in township of Moosehead, Maine.
- Mr. Edward B. Chamberlain, 1830 Jefferson Place, Washington, D. C. *Eurhynchium strigosum* (Hoffm.) Br. & Sch., c.fr. Collected near Langley, Va.
- Miss Caroline C. Haynes, 16 East 36th St., New York City. *Plagiochila asplenoides* (L.) Dumont.; *Radula complanata* (L.) Dumont.
- Mr. G. K. Merrill, 564 Main St., Rockland, Maine. *Sticta crocata* (L.) Ach. Collected in Knox Co., Maine, by Mr. Merrill. *Ramalina reticulata* (Noehd.) Krenpelh. Collected in New Westminster, B. C., by Mr. A. J. Hill.
- Mr. Severin Rapp, Sanford, Orange Co., Fla. *Raphidostegium microcarpum* Brid. & Jaegr.: *Thuidium minutulum* (Hedw.) Br. & Sch. Collected in Sanford.
- Miss C. M. Carr, R. F. D. 3, South Framingham, Mass. *Pannaria lanuginosa* (Ach.) Koerb. Collected in Sudbury, Mass.

WANTED.—Specimens (New England preferred) of *Ramalina calicaris* and *R. calicaris canaliculata*. Will also buy or exchange or correspond regarding specimens of the genus *Ramalina*.

Address, REGINALD HEBER HOWE, JR.,
Concord, Mass.

LICHENOLOGY FOR BEGINNERS, by Frederick LeRoy Sargent, which recently appeared in *THE BRYOLOGIST*, is now published in convenient pamphlet form by the Harvard Co-operative Society, Cambridge, Mass.

This pamphlet may be obtained of them, postpaid, for fifty cents.

MUSCI ACROCARPI BOREALI-AMERICANI.

Century two of this series is complete. Quite a number of species are represented by several pockets illustrating different stages or conditions. Several new species, as well as a number quite rare, are distributed so far in this series. A pamphlet, like the one for century one, will be prepared and sent to recipients.

To cover actual expenses, future fascicles, as well as all new subscriptions to the entire series, will be sold at TWO DOLLARS each fascicle. It is expected that two or three fascicles of century three will appear during 1906.

JOHN M. HOLZINGER.

LIST OF SULLIVANT MOSS CHAPTER MEMBERS.

Adams, Miss Carrie E	Hinsdale, N. H.
Adams, Mr. F. M.	337 Greene Ave., Brooklyn, N. Y.
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 Harris, Mr. Wilson P. Brooklyn, N. Y.
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 House, Mr. Homer D. U. S. National Museum, Washington, D. C.
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 Koyama, Genji. Kioto, Japan.
 Krout, Prof. A. F. K. Glenolden, Delaware Co., Pa.
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O'Connor, Mrs. J. T.....	Garden City, N. Y.
Oleson, Mr. O. M.....	Fort Dodge, Iowa.
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Smith, Mrs. Annie Morrill.....	78 Orange St., Brooklyn, N. Y.
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Stevens, Mrs. O. H.....	32 Pleasant St., Marlboro, Mass.
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MARCH, 1906



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES

HEPATICS AND LICHENS

EDITOR

ANNIE MORRILL SMITH

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MOSSES, HEPATICS AND LICHENS

ALSO OFFICIAL ORGAN OF
THE SULLIVANT MOSS CHAPTER

EDITOR

MRS. ANNIE MORRILL SMITH

ASSISTED BY

MR. A. J. GROUT, PH.D. MOSSES
MR. G. K. MERRILL LICHENS
MISS CAROLINE COVENTRY HAYNES . . . HEPATICS

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THE SULLIVANT MOSS CHAPTER

Invites all interested in the study of Mosses, Hepatics and Lichens, to join. **Dues, \$1.10 a year**—this includes a subscription to THE BRYOLOGIST. Send dues direct to Treasurer. For further information address the Secretary.

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THE BRYOLOGIST.

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No. 2.

FURTHER NOTES ON CLADONIAS. VI.

Cladonia cariosa.

BRUCE FINK.

As promised in the last paper of this series (BRYOLOGIST, 8: 3, 1905.) we will consider *Cladonia cariosa* in the present one. And in so doing we shall depart somewhat from the views of Wainio regarding species. The method of making a specific description stand for a compound conception, such as a genus or a subgenus, is manifestly bad and allowable only when our studies will not enable us to make a closer analysis. Dr. Wainio has employed the method of deliberately recognizing compound species and then adding varieties which are supposed to cover all known forms, designating the varieties by various names prefixed by alpha, beta, etc. After so doing, he frequently has determined species for the present writer without referring to any one of his varieties. This is the case in the present species, the large majority of the specimens sent Dr. Wainio being simply returned as *Cladonia cariosa*. Thus it appears that after devising a uniform and cumbersome system, Dr. Wainio has by no means always found it best to follow it in the determination of specimens. The present writer has thus far followed the plan of the "Monographia Cladoniarum Universalis" in part, without reference to its objectionable features, but working on the supposition all the time that there is a real species, often with true varieties.

Oftentimes the study of our American forms has involved no difficulty, since species and varieties stand out distinctly enough, in other instances no varieties being recognized in our area. So no difficulty will arise in the use of this series of papers, except perhaps in *Cladonia fimbriata* and *Cladonia gracilis*, our most difficult species, of which an adequate exposition has not yet appeared. Regarding the last species, further study of specimens indicates that our paper left too much under the specific description. Indeed, it now appears plainly enough that Wainio's so-called variety *dilatata* is the prevailing form, standing at the centre of variation, and that it should stand for the species under the name *Cladonia gracilis* simply. *Cladonia fimbriata* is beyond us for the present, and we can offer no remedy. As to *Cladonia furcata*, it is not so certain whether the first variety, alpha, of Wainio's system, should stand for the species or not, but this seems probable. Regarding *Cladonia verticillata*, the variety *evoluta* would seem to be the species according to its position as assigned by Wainio, and the geographical distribution that he gives it as well. But so far as specimens seen from our territory are concerned, this is not the case, the plant plainly standing as a variety, and the form, with one or two exceptions, ranks as the species, as was given in our paper.

Concerning the present species, the variety alpha, *cribosa* of Wainio, is plainly the species, including nearly all specimens within our territory, and being the most common by far according to the distribution given it by Wainio. Also after looking through the species yet to be considered in this series of papers, it is apparent that there will be no difficulty in following the method inaugurated in the present paper, while the explanations given above regarding the species disposed of in previous papers of this series will clear up any difficulties, and enable workers to use this portion of the series in the same manner as the papers to follow.

The feeling that a change must be made has been growing as studies of the *Cladonias* have progressed, and defense for the procedure is ample. We may not be able often to ascertain elementary species by taxonomic methods, but we should at least make our systematic species conform as nearly as possible to the biological species. In so doing we must employ the parallelistic method of considering both form and function in the selection of our specific marks, when two morphological characters are equally prominent, giving more prominence to the one that is more useful. Then, too, if we are ever to approximate to true species, we must use some definite criterion and come to some agreement as to chief differentials. The statistical method proposed by Davenport and Blankinship, in a recent joint paper, seems to the writer to contain much of suggestion. We must not be content to base our views on a few herbarium specimens, but modes or centres of variation must be established in the field, by examining a *multitude* of specimens, then we must determine ranges of variation and degree of isolation for various forms encountered before deciding upon the limits of species and varieties. And nowhere is this sort of study more necessary than in the variable and plastic *Cladonias*. By this method, a worker may establish species and varieties in the areas studied with some degree of mathematical certainty. Then, by comparing results of such work in various regions, we may hope to establish world-wide conceptions of species of much greater value than those of the present time, discarding many of the "historical types," which are doubtless in many instances not true species, but varieties instead, and establishing true or "specific types." De Vries has given instances in which systemists have found the elementary species, or at least true biological species, as opposed to compound conceptions, and we may hope by proper methods to approximate and often realize such results.

While the results to follow in this series of papers must rest upon the study of herbarium material very largely, no pains will be spared to make the species and varieties recognized conform as nearly to true biological species as can be done.

CLADONIA CARIOSA (Ach.) Spreng. Linn Syst. Veg. 4:272. 1827. Primary thallus persistent or replaced by new squamules, composed of irregularly lacinate, incised or crenate, concave, flat, involute or revolute, ascending or suberect, clustered or rarely scattered squamules, which are small or medium sized, 1-6 mm. long and 1-5 mm. wide, pale sea-green above, varying toward olivaceous, whitish below or brownish toward the base, the cortex continuous



or more or less sorediate above and along the margin. Podetia arising from the surface or margin of the squamules, 5-30 mm. long and 1-4 mm. in diameter, subcylindrical or thickened toward the top, cupless and always terminated by apothecia, usually freely branching and sometimes even from the base, the branches spreading or more usually suberect, the sides commonly more or less fissured or grooved, clustered or subsolitary, usually suberect, the cortex areolate and the areoles scattered, rarely squamulose toward the base, pale sea-green or whitish, the decorticate portions between

the areoles whitish. Apothecia usually medium sized, 1-2 or even 4 mm. in diameter, clustered-conglomerate, frequently perforate, borne at the apices of the podetia, flat or becoming convex and immarginate, lighter or darker brown or possibly rarely reddish-brown. Hypothecium pale. Hymenium brownish above and pale or brownish below. Paraphyses simple or rarely branched, thickened and brownish toward the apex. Asci clavate or cylindrico-clavate,

On various soils and rarely on old wood; in open or more or less shaded places. Distributed throughout North America, but much more common toward the north, apparently being largely replaced toward the south by *Cladonia mitrula*, which will be considered in the next paper of this series. Examined by the writer from Massachusetts and Maine (Clara E. Cummings), South Carolina (H. A. Green, whose specimen was received under the name, *C. caespiticia*), Tennessee (W. A. Calkins, and determined as *C. subolescens* Nyl.), Iowa (Bohumil Shimek and Bruce Fink), Minnesota (Bruce Fink), Colorado (Baker, Earle and Tracy, originally determined as *C. symphylicarpa*, but changed by Wainio), California (H. E. Hasse), Wyoming (Avon Nelson), and several localities in British America (John Macoun). J. W. Eckfeldt lists from Greenland, T. A. Williams from the Black Hills, Mrs. Carolyn W. Harris from Montana, and Henry Willey from Illinois. Following Tuckerman's Synopsis, Dr. Wainio's distribution would add Oregon, New Mexico, and two or three arctic or subarctic stations.

A number of specimens have come to the writer's herbarium from American localities, under the name *Cladonia symphylicarpa* Fr., which was recognized as a distinct species by Tuckerman. Few of these specimens seen are in condition for determination, usually being without podetia, and though the squamules are frequently rather large, it seems probable that Wainio is right in assigning such material to the present species.

CLADONIA CARIOSA CORTICATA Wainio, Mon. Clad. Univ. 2: 53. 1894. The cortex subcontinuous or partly areolate with the areoles contiguous.

Examined from Indiana (L. M. Underwood) and from Tacoma Park, D. C. (T. A. Williams). Also a peculiar form from Maine (G. K. Merrill) doubtless belongs here, though squamules are present at the tops of the podetia. The specimens seen are less branched than the usual forms of the species. Miss Clara E. Cummings also lists this variety from Alaska, and Dr. Wainio thinks that most of the forms given by Tuckerman under *C. symphycarpa* probably belongs here. Known also in Europe.

CLADONIA CARIOSA SQUAMULOSA (Müll.) Wainio Mon. Clad. Univ. 2: 57. 1894. Squamules of the primary thallus somewhat elongated, and squamules present on the podetia. Cortex of podetia sometimes subcontinuous. Podetia sometimes simple.

A specimen sent by Prof. John Macoun, collected on the lower St. Lawrence, in Ontario, is this at least in part, squamules being quite numerous on some of the podetia, even to the top. Collected on humus over rocks. Known elsewhere only in Europe. Grinnell, Iowa.

MUSCI ACROCARPI BOREALI-AMERICANA.

(Prepared and Distributed by Prof. J. M. Holzinger.)

Prof. Holzinger has just issued the last fascicle of Century II, of this interesting and valuable series. In the last two fascicles we note the following interesting species: *Oligotrichum parallelum* (Mitt.) Kindb., *Pogonatum erythrodontium* Kindb., *Fissidens Ravenelli* Sulliv., *Blindia acuta flexipes* R. & C., *Distichum inclinatum* (Ehrh.) Bry. Eur., *Grimmia glauca* Card., *G. Muhlenbeckii* Sch., *Rhacomitrium patens* (Dicks.) Hueb., *Scouleria marginata* E. G. B., *Barbula amplexa* Lesq., *B. Bakeri* Card. & Thér., *Pottia Nevadensis* Card. & Thér., *Aphanorhegma serratum* (Hook. & Wils.) Sulliv., *Orthotrichum papillosum* Hpe., *Schlotheimia Sullivantii* C. M., *Ulota phyllantha* Brid., *Timmiella anomala* (Bry. Eur.) Limpr., *Splachnum sphaericum* L., *Tayloria serrata* B. & S., *Pyramidula tetragona* Brid., *Bartramia glauco-viridis* C. M. & K., *Bryum Baileyi* Holz., *B. polycladum* Card. & Thér., *Rhizogonium spiniforme* Bruch.

Dr. J. W. Bailey and Mr. A. S. Foster in the Northwest, and Mr. Severin Rapp in Florida, are doing remarkably good work as collectors, and are adding extensively to our knowledge of the moss flora of their respective regions.

Several other members of the Sullivant Moss Chapter have contributed to Century II, and it is safe to say that Prof. Holzinger's Exsiccati, as well as my own, have been very greatly indebted to the work of the Chapter. Mr. Rapp, living in one of the most interesting regions bryologically of all North America, is doing specially fine work.

To my own Exsiccati he has contributed such things as *Hookeria varians*, *Leptodon trichomitrium immersum*, *Pilotrichella cymbifolia*, *Papillaria nigrescens*, *Clasmatodon parvulus*, *Entodon Drummondia*, and others of equal interest.

A. J. GROUT.

MOSES AT THE CONGRESS OF NEW ENGLAND NATURAL HISTORY SOCIETIES.

CORA H. CLARKE.

In the middle of October, 1905, there was held in Boston a Congress of Natural History Societies, it being thought that it would benefit isolated societies in the different New England States to come together and learn what others are doing. There was an exhibition of specimens, contributed by the different organizations, open for three days, and on the last day, October 14th, was held a meeting at which there was a roll call of all the societies represented, and a delegate from each gave statistics as to its meetings, membership, and work. Many of the organizations studied but one section of Natural History, (Geology, Entomology, Ornithology or Botany). In all there were twenty-nine societies represented, with thirty-one exhibits by members of fourteen societies.

That the Congress was felt to be a success we may infer from the fact that a committee was appointed to arrange for a Federation of the Societies and for the holding of future meetings.

In the exhibition room were to be seen minerals, crystals, fossils, land snails, insects, bird skins, birds preserved in glass tubes, spiderwebs preserved between glass plates, inexpensive apparatus for collecting and preserving plants and insects, a book of photographs of tracks on sand, one of photographs of wild flowers, ecological specimens of Phenogams, two sets of water-colors of fungi (hung on a net draped over one wall), also fungi fresh, fungi pressed, and fungi in bottles, pressed algae in books and on separate sheets, and finally, three exhibits of mosses and one of lichens. The lichens and the companion box of mosses was the work of our Sullivant Chapter member, Mrs. Dunham (who also showed a book of water-colored sketches of mosses). Her mosses are dried in tufts just as they grow, and the green foliage, golden setae, and brown capsules make a very pleasing color-combination. Each species stood in a small tray, and the trays were fitted into a large, flat box, with a lid. Mosses too tall for the box were laid on their sides. Her lichens were arranged in the same way, and of course these two boxes were but a sample of her whole Herbarium.

The next set of mosses to attract attention bore the name of Miss M. Edna Cherrington, though she disclaimed merit for them, and said they were the work of the whole Botany Class of the Teachers' School of Science, and represented about a year's study and excursions; many of them were named in the field. We noted that there were about one hundred species, nearly all from Eastern Massachusetts, some from Maine and New Hampshire; that the dates ran from April to November, 1904, including a few gathered in August, September, and October, 1905. These mosses were put up so as to occupy but little space, to be handled with perfect safety, examined with a magnifier on each side; and could be taken out in an instant, to put under a high power, and return to the same envelope. These envelopes or slides are made of a

*Simplex Mount Co., Wellesley, Mass.

transparent, flexible material,* which in this case were 65 mm. \times 75 mm., some larger sizes being used for the larger mosses; a pressed specimen of the moss, with a narrow label, being laid into the envelope, the front flap is slipped under a ridge, or fold, and everything is secure. A white card alternated with each transparent envelope, to form a background, and groups or families were tied together with cords passed through perforations at the base, so that the whole could be turned back and forth like the leaves of a book.

In the third set of mosses, the species were gummed on full-size herbarium sheets, this being the beginning of a Collection of Mosses to go to the Herbarium of the Massachusetts Horticultural Society, where it is no object to save space. A fruiting spray of *Fontinalis Dalecarlica* covered a whole sheet, but with the small, common species, like *Dicranella heteromalla*, or *Georgia pellucida*, there were six or eight gatherings, from as many different months, to show seasonal change. Only about sixty species were as yet in this set. On many of the sheets a packet or envelope contained moss sprigs that could be taken out and examined.

We do not know how it was with the other exhibits, but we know that several pleasant introductions took place over the moss tables, followed by a correspondence which has been of advantage to all the parties concerned.

Boston, Mass.

ADDITIONS TO THE BRYOPHYTE FLORA OF LONG ISLAND.

A. J. GROUT.

Since the publication of Dr. Jelliffe's "Flora of Long Island" in 1899, the following additions to the mosses and hepatics have been made by various collectors. Some of these were published in *Torreyia*, April, 1902, and July, 1904. Unless otherwise credited the additions were made by the author.

HEPATICAÆ.

RICCIA LUTESCENS Schw. Forest Park.

BAZZANIA TRILOBATA (L.) S. F. Gray. Cold Spring.

LEPIDOZIA SYLVATICA Evans. Frequent.

LOPHOCOLEA MINOR Nees. Common in Queens County in swampy woods.

ANTHOCEROS PUNCTATUS L. Forest Park.

It is probable that the *Lepidozia setacea* of Jelliffe's List is *L. sylvatica*, and that the *Odontoschima Spagna* is *O. prostratum* (Swartz.) Trevis., this last species being common.

MUSCI.

POLYTRICHUM JUNIPERINUM ALPINUM Schimp. Miss M. L. Sanieel (Dr. Jelliffe, in *Torreyia*, 4:7, 1904.).

BUXBAUMIA APHYLLA L. Jamaica South, Cold Spring, A. J. G. Lawrence, Miss Brainerd.

BRUCHIA SULLIVANTII Aust. Lawrence; Cold Spring.

DICRANUM FLAGELLARE MINUTISSIMUM Grout. Lawrence. (See Mosses with Hand-Lens and Microscope, p. 105, Fig. 47).

PLEURIDIUM PALUSTRE Schimp. Flushing. This grew on wet swampy soil, while *P. alternifolium* and *P. subulatum* grow on drier sandy soil.

PLEURIDIUM SUBULATUM (L.) Rabenh. Common.

TREMATODON AMBIGUUS (Hedw.) Hornsch. Jamaica.

ACAULON MUTICUM of Jelliffe's List is undoubtedly *A. rufescens* Jaeg., although I have not seen specimens.

ASTOMUM SULLIVANTII Schimp. Frequent.

TORTULA PAPILLOSA Wils. Kings County, Brainer. This is entered in Jelliffe's List as *Rhacomitrium aciculare*, as I determined from specimens in the Museum of the Brooklyn Institute.

ORTHOTRICHUM SORDIDUM Sulliv. & Lesq. On bark of elm, Cold Spring.

MNIUM PUNCTATUM ELATUM Schimp. Jamaica.

MNIUM ROSTRATUM Schrad. On soil, Jamaica.

MNIUM AFFINE RUGICUM B. & S. Lawrence. A very peculiar sterile, stoloniferous form, determined by good authority but about which I feel very uncertain.

POHLIA NUTANS (Schreb.) Lindb. Cold Spring.

THELIA ASPRELLA (Schimp.) Sulliv. Bark of tree, Cold Spring.

THELLIA LESCURIИ Sulliv. Rockville Center. Sandy soil by R. R. Lynbrook.

THUIDIUM PALUDOSUM (Sulliv.) Rau & Hervey. Frequent in swamps.

THIDIUM SCITUM (Beauv.) Aust. Flushing.

AMBLYSTEGIUM LESCURIИ (Sulliv.) Aust. In brook, Cold Spring.

BRACHYTHECIUM ACUTUM (Mitt.) Sulliv. Frequent in swamps.

“ FLEXICAULE R. & C. Jamaica.

“ NOVEBORACENSE Grout. Bryologist 3: July, 1900. On soil in swamp. Valley Stream.

BRACHYTHECIUM OXYCLADON (Brid.) J. & S. Forest Park.

“ POPULEUM (Hedw.) B. & S. Jamaica.

BRYHNNIA NOVAE-ANGLIAE (Sulliv. & Lesq.) Grout. Common in swamps.

EURHYNCHIUM STRIGOSUM PRAECOX (Hedw.) Husnot. On soil, Prospect Park.

CLIMACIUM KINDBERGII (R. & C.) Grout. Common in swamps.

HYPNUM CHRYSOPHYLLUM Brid. Common in swamps.

“ CORDIFOLIUM Hedw. Frequent in bare wet spots in swamps.

“ CRISTA-CASTRENSIS L. Cold Spring. Rare on Western Long Island.

HYPNUM FLUITANS GRACILE Boul. Floating and nearly filling a small pond or large pool west of the road from R. R. station to Cold Spring Harbor.

HYPNUM MOLLUSCUM Hedw. Frequent on shaded soil.

“ PATIENTIAE Lindb. Frequent on soil in swamps.

“ PRATENSE Koch. Determined by Renauld. Swampy soil, Jamaica.

PLAGIOTHECIUM SULLIVANTIAE Schimp. forma PROPAGULIFERA (Ruthe). Base of trees in swamp, Valley Stream, This was determined by Dr. Best with some doubt expressed. It grows associated with *P. Ruthei*, but usually higher up on the soil at base of trees, and has a markedly different facies.

PLAGIOTHECIUM LATEBRICOLA (Wils.) B. & S. Base of trees in swamp, Flushing.

PLAGIOTHECIUM MICANS (Sw.) Par. Flushing, Jamaica, Lawrence.

“ RUTHEI Limpr. Abundant on hummocks in swamp at Valley Stream. Frequent in swamps.

PLAGIOTHECIUM STRIATELLUM (Brid.) Lindb. Common in swamps.

“ GROUTH Card. & Thér. Depression in base of chestnut tree, Hempstead. See BRYOLOGIST 9: Jan. 1906. Probably=*P. micans* (Sw.) Par. forma.

PYLAISIA SCHIMPERI R. & C. Bark of apple trees. Cold Spring, Flushing.

RAPHIDOSTEGIUM ADNATUM (Mx.) B. & S. Base of trees, Jamaica.

“ RECURVANS (Mx.) J. & S. Frequent.

FONTINALIS ANTIPIRETTICA GIGANTEA Sulliv. Valley Stream, Rev. George Hulst. Brooklyn, N. Y.

BOOK REVIEWS.

MOSS EXCHANGE CLUB. CENSUS CATALOGUE OF BRITISH HEPATICS. Compiled by Symers M. Macvicar. Pp. 23. 8vo. York: 1905.

This catalogue is both concise and serviceable. Schiffner's System of Classification in Engler & Prantl's Die Natürlichen Pflanzenfamilien is followed. The county and vice-county divisions of the British Isles are given, each division having its number. Then follows the list of Hepatics, from page seven. Stations where the species given have been found are indicated by numbers, which correspond to the various divisions mentioned above. An Index of Genera is appended. The List contains seventy genera and two hundred and forty-nine species. Copies of this catalogue may be had from W. Ingham, 52 Haxby Road, York, England, @ 9d., each.

CAROLINE COVENTRY HAYNES.

Ch. Lacouture ancien professeur de sciences naturelles au Collège Saint-Clément, de Metz. Hepatiques de la France. TABLEAUX SYNOPTIQUES DES CARACTERES SAILLANTS DES TRIBUS, DES GENRES ET DES ESPECES. Avec plus de 200 figures représentant toutes les espèces de la Flore française. Paul Klincksieck, Librairie des Sciences Naturelles, 3 rue Corneille, Paris, 1905. Prix 10 francs.

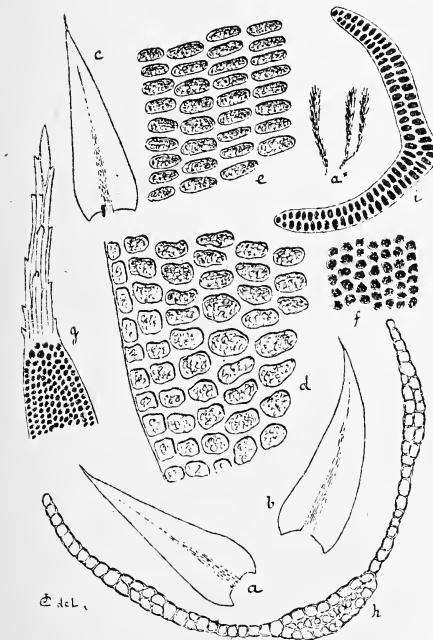
This popular guide to the hepatics of France is very fully illustrated with figures showing the vegetative organs, stem and leaves, of the leafy hepatics, and the thallus and reproductive organs and spores of the thalloid forms, with magnifications of from one to fifty diameters; in the case of spores, three hundred diameters. The student with a leafy hepatic, unknown to him, starts with the first table of the Key and determines whether the specimen possesses succubous or incubous, entire, lobed or divided, etc. leaves, and places it in its family. The second part of the Key leads him to see if it possesses lobules or underleaves: to observe the shape and placing of the perianth, the root-hairs, etc., until the genus to which it

belongs becomes apparent. Turning then to the third part of the Key, he observes the general aspects of the plant, color, texture, relations of the plant to substratum, cellular structure, habitat, etc., and with the accompanying illustrations to aid finds its specific name. The thalloid liverworts are first examined with regard to the shape of the thallus, whether the dorsal side possesses stomata or gemmae, and whether there are scales on the ventral side; the shape and placing of the involucre, whether immersed, sessile or stipitate; the shape of the opened capsule. The species of the family Ricciaceae are illustrated with outline drawings of the whole plant and with cross-sections of the thallus; while the species of the genus Fossombronia are determined by the characteristic markings and shape of the spores. There are two hundred and fourteen species given. So many of the French species are also inhabitants of America that this quarto should prove serviceable to our own students of the Hepaticae. CAROLINE COVENTRY HAYNES.

GRIMMIA GLAUCA.—A NEW SPECIES OR A HYBRID.

JOHN M. HOLZINGER.

Under this title Mr. Jules Cardot, in Rev. Bryol. 1905, p. 17, discusses and describes a sterile *Grimmia* found by him and Mr. Longuet near Charleville, in the Ardennes, northern France. On Aug. 23, 1905, the writer collected a sterile *Grimmia* on a ledge of lime rock left exposed by the general glacial mantle, and strewn with detached boulders of the same material, standing above the general level of the prairie, three miles due south of Lewiston, Winona County, Minn., about twenty miles from Winona, on the C. & N. W. Ry. The plants occurred quite abundantly, in loose cushions one to three inches in diameter. Their appearance suggested *G. leucophaea*, which was collected by the writer at Taylor's Falls, on the eastern border of Minnesota, and in the valley of the Upper Min-



From Cardot's illustration in Revue Bryologique.

nesota River, both at Montevideo and at Ortonville, on the western border of the State. But it was recognized, even in the field, that these plants were

smaller than the known species. Microscopic examination proved them quite different, nor could they be referred to any described species, so far as there was time for comparison.

Under the circumstances it was deemed advisable to submit some of this material for critical study to Mr. H. N. Dixon, who on previous occasions had kindly taken the trouble to examine other Grimmiads. Being recognized as an able and conservative bryologist, his judgment deserves to be put on record. He says of this plant:

"The leaf base and general appearance are precisely those of *G. leucophaea*, from which I think it differs only, but very markedly, in the tapering points of the leaves. In fact it is almost identical with *G. glauca* Card., only differing in the larger, very rough hair points. It constitutes in fact an intermediate stage between that plant and *G. leucophaea*. And some of your plants have the leaves slightly less tapering, and therefore still more like the latter plant. I would suggest that you send a specimen to M. Cardot; I think he will be interested to see it. I am inclined to think that it somewhat confirms his suggestion that *G. glauca* may be a hybrid resulting from a crossing of which *G. leucophaea* is one parent."

The writer accordingly sent both the letter, from which the above extract is taken, and some of the *Grimmia* in question to Mr. Cardot, who writes: "Your *Grimmia* is clearly my *G. glauca*, as Mr. Dixon thought. It differs from the type from Charleville only by its longer, stouter, rougher hair point, and also by its less glaucous color. But there is no doubt about its being this plant. Is this a hybrid, or a species? This question will probably remain unanswered so long as the fruit is not found."

Sterile *Grimmiads* are at best difficult to determine, usually requiring the examination of leaf sections, both near the base and apex. In the case of the moss in question, it has, therefore, seemed advisable to make accessible to all interested bryologists the independent judgment of the two students above quoted, both well known for their ability and achievements.

It appears that neither in Mr. Dixon's nor Mr. Cardot's judgment there is so far decisive evidence that this is either a good species or a hybrid, unless the recognized variation, in the Minnesota plant, of the stouter and frequently longer hair point may be held to lead to the view that it really is a hybrid. In the face of this uncertainty the writer ventures to suggest that the geographical distribution of the plant—its occurrence in two isolated areas, one in Northern France, the other in the Upper Mississippi basin, on a knoll in Southeastern Minnesota—tends to argue for its value as a good species. It should be recalled, in this connection, that Winona County lies in the northwest portion of the Driftless Area. This Area, as the writer has shown in a former note, harbors *Grimmia teretinervis* Limpr., not known again till one reaches the Austrian Alps, *Claytonia Chamissoi* Ledeb., a thousand miles to the east, and 4000-5000 feet below its normal home in the Rocky Mountains, and other plants of similar remarkable distribution. The addition of *Grimmia glauca* Card. to this list of plants marooned, as it were in the Driftless Area, in the penumbra of which lies Winona County, is thus

a matter of interest both geographical and botanical. It also constitutes an argument for the specific value of Mr. Cardot's plant, unless it be admitted that a hybrid may exist, and persist, for several thousand, even several times ten thousand years, in such widely separated areas. And further, the substratum for *G. leucophaea*, so far as the writer's observations go, is trap and granitic rocks; *G. glauca* occurs here on the sedimentary dolomitic limestone of Lower Silurian age. Nor yet could hybridization have taken place, at least so far as the American station goes to show: the knoll near Lewiston, E. Minn., is over a hundred miles from either of the Minnesota stations known to the writer. Whether the degree of isolation and substratum, of this plant of the French station, agrees with the above data, it will be interesting to learn from Mr. Cardot.

Following is Mr. Cardot's description translated from Rev. Bryol, 1905, pp. 17-18:

"Plants forming dense tufts or cushions, not cohering, of a glaucous green color when dry, of a lively green when moist. Stems simple or divided from the base, 5-10 mm. long. Leaves straight, closely imbricated when dry, lanceolate, long, and gradually tapering-acuminate nearly from the base, quite concave, channelled above, terminating in a short-toothed hair; about 2 mm, long, .6-.75 mm. wide: borders plane, quite entire: blade in all the upper portion, except on the borders, formed of two layers of small very chlorophyllose cells rounded or subhexagonal seen in a face view, but higher than wide seen in cross section; cells of the basilar portion in a single layer: at the angles are found numerous transversely enlarged cells, disposed in regular rows, becoming then square and passing gradually into the small cells of the upper leaf part; costa depressed, formed at the base in a cross section of two layers of the epidermal element analogous to the cells of the blade, between which is observed a layer, more or less developed, of smaller cells with thicker walls; the costa becomes indistinct towards the apex, where it is ordinarily reduced to a single cell lying between the two halves of the blade.

"By its leaves with plane margin, by its tissue, and by the structure of the costa, this moss evidently leans strongly toward *G. leucophaea*. But it is easy to distinguish the plant by the *shape of the leaves*; while in *G. leucophaea* they remain quite broad to near the apex, where they are *abruptly* narrowed into a very long hair, in *G. glauca* they are narrowed *gradually* and end in an elongated apex overtopped by a short hair. This last character, it is true, is not of great value, for forms of *G. leucophaea* with short hair points are quite frequently met with; but the *form of the upper part* of the leaf is quite distinctive, and does not permit of confusing *G. glauca* with *G. leucophaea*."

Winona, Minn.

Miss A. L. Crockett, Camden, Maine, has discovered that through a misunderstanding at the Post-office a letter from a Sullivan Moss Chapter member to her was returned to the sender as unclaimed. If any others were similarly treated will they please write again.

RAMALINA RIGIDA ON THE RHODE ISLAND COAST.

To aid in the clearer understanding of the distribution of this species, it may be of interest to note its occurrence at Middletown, Rhode Island. During September, 1905, I collected several specimens, and in November received, through the kindness of Mr. Edward Sturtevant, several more. It grows commonly on the Red Cedar (*Juniperus Virginiana*), the tree which mainly comprises the Paradise Woods, which back the Second Beach sand dunes.

My determination of the species was corroborated by Dr. W. G. Farlow, after careful comparison with specimens in the Cryptogamic Herbarium of Harvard University, where, at his request, a specimen was placed, as the Herbarium contained no Rhode Island specimens.

Wiley recorded in 1892 the presence of *Ramalina rigida* Pers. in the region of New Bedford, which is some twenty miles to the northeast.

Concord, Massachusetts.

REGINALD HEBER HOWE, JR.

ENCALYPTA PROCERA.—A CORRECTION.

The punctuation or better perhaps the lack of it in my copy of Die Natürlichen Pflanzenfamilien led me in the article on *Encalypta procera* Bruch, in the November, 1905, BRYOLOGIST, to ascribe to Brotherus an opinion that he evidently does not hold, namely, that *E. Selwini* Aust. is identical with *E. procera* Bruch. In a paragraph in which both are mentioned the final sentence on *E. procera* is not separated from the one beginning with "*E. Selwini*" by any mark of punctuation, which led me rather hastily to infer that they were one species. A closer attention to the custom of placing a synonym in a parenthesis after the name of the species with which it is identified would have prevented the mistake, even with the faulty reading. I am indebted to Prof. Holzinger for calling my attention to the error.

Chicago, Ill.

E. J. HILL.

SULLIVANT MOSS CHAPTER NOTES.

Chapter members will please take notice of the following remarks. Our Secretary, Dr. J. W. Bailey, Walker Building, Seattle, Wash., has charge of the Chapter *Moss Herbarium* and all specimens designed for it, and all correspondence regarding contemplated offerings of mosses in the BRYOLOGIST should be addressed directly to him as well as all mosses for determination.

Miss C. C. Haynes, 16 East 36th street, New York City, has custody of the *Hepatic Herbarium* and all specimens of material for determination, and correspondence regarding the work of this section should go directly to her.

Mr. G. K. Merrill, 564 Main street, Rockland, Maine, our Vice-President, has the *Lichen Herbarium*, and all that pertains to the subject of lichens should be addressed directly to him.

Our President, Mr. E. B. Chamberlain, 1830 Jefferson Place, Washing-

ton, D. C., we reserve to attend to all matters of general interest regarding Chapter management, determination of hard knots, etc.

The Treasurer takes all the money both for the Chapter and the BRYOLOGIST and gives the proper receipts therefore.

CHAPTER NOTE.

The officers and the members of the Sullivant Moss Chapter wish to express by this note their appreciation of the services which the retiring Secretary, Miss Mary F. Miller, has rendered. No other officer comes into such close touch with the individual members as the Secretary. It is felt, therefore, that to Miss Miller's devotion to the interests of the Chapter is due in no small degree, its present prosperous condition. It is the purpose of this note to extend to the retiring Secretary the best wishes of the Chapter and the most sincere thanks for the many kindnesses of the past two years.

E. B. C.

The following names are to be added to the list of Chapter Members: Mr. L. Russell Reynolds, Box 1293, Seattle, Wash.; Prof. Alfred Ely Day, Professor of Botany in the Syrian Protestant College, Beirut, Syria; Mr. Wm. Moir, 73 Boylston street, Jamaica Plains, Boston, Mass.; Miss R. B. Fisher, Johnson, Vermont.

OFFERINGS.

(To Chapter Members only. For postage.)

- Mr. N. L. T. Nelson, 3968 Laclede Ave., St. Louis, Mo. *Desmatodon arenaceus*, S. & L.
- Dr. John W. Bailey, Seattle, Wash. *Scleropodium colpophyllum* (Sulliv.) Grout; *S. caespitosum* (Wils.) B. & S.
- Miss Annie Lorenz, 96 Garden street, Hartford, Conn. *Diplophylleia apiculata* Evans.
- Miss C. C. Haynes, 16 East 36th street, New York City. *Lepidozia reptans* (L.) Dumort.; *Lophocolea heterophylla* (Schrad.) Dumort.
- Mrs. Mary L. Stevens, 39 Columbia street, Brookline, Mass. *Cladonia turgida* (Ehrh.) Hoffm. m. *stricta* Nyl. Collected in Sanbornton, N. H.
- Mr. G. K. Merrill, 564 Main street, Rockland, Maine. *Sphaerophorus fragilis* (Pers.). Collected on Mt. Washington, N. H.
- Miss C. M. Carr, R. F. D., No. 3 South Framingham, Mass. *Physcia tribacia* (Ach.) Tuckerm.
- Mr. Keginald Heber Howe, Junior, Middlesex School, Concord, Mass. *Umbilicaria Pennsylvanica* Hoffm.; *Cetraria lacunosa* Ach.; *C. Islandica* (L.) Ach.
- Prof. Thomas A. Bonser, 02217 Monroe street, Spokane, Wash. *Bartramia pomiformis* Hedw.

AUSTRALIAN MOSSES.

Some Locality Pictures.

REV. W. WALTER WATTS.

The Editor has suggested to me that brief "pen pictures" of Australian Moss localities might interest readers of the *BRYOLOGIST*; and with that object in view, and with the added purpose of assisting the cause of Australian bryology, I shall be glad to send an occasional paper to a publication that has interest, not only in America and Europe, but even in these far-off Southern lands.

I begin with the district in which I am at present located, the district of Young, in New South Wales,—not my first, but my latest, bryological love.

The town of Young lies a few miles northwest of the main Southern line from Sydney to Melbourne. "As the crow flies" it is about 150 miles from the coast, 200 miles from Sidney, and stands 1400-1500 feet above sea-level. It was formerly an important gold field, and the vicinity of old watercourses has been honey-combed by the alluvial miner. The district is diversified with hill and hollow. Our chief products are wool and wheat,—and rabbits. The climate is healthy. Such rains as we get fall mainly in the Winter; the Summer is usually hot and dry. The temperature ranges from a few degrees of frost in Winter, bringing us very rarely a touch of snow, up to as much as 115-120 degrees in the middle of Summer. Our mosses are mostly denizens of rock and ground, and must be looked for during the Winter and the early Spring, say July to October.

Outcrops of granite occur in all parts of the district. In some directions they develop into high rocky hills; humbler outcrops, with the grass growing to their base, are a distinguishing feature on every hand. Where the land has not been cleared, the characteristic "gum" tree lends picturesqueness to the view.

I propose a visit to one of these granite outcrops, choosing a spot where the rocks, worn with the weather of unknown centuries, are flanked by open country that stretches down to rich alluvial flats. It is the month of August, when the moss-fruits are rapidly hastening to maturity, some of them already displaying their open capsules, while others still retain the veil.

Examining first the rocks themselves, we find that the most obtrusive species are Taylor's *Grimmia cygnicollis*, and *G. leiocarpa*. The first of these, Mitten identified with *G. pulvinata*, var. *obtusa* (Brid.), and Brotherus, in Bryales, follows him. Wilson regarded *G. leiocarpa*, Tayl., as a var. of *G. leucophaea*, Grev. Brotherus agrees, but merges *G. leucophaea* in *G. campestris*, Burch. I cannot yet throw off the familiar names. We shall also find, perhaps in large quantities, *Hedwigia albicans* (Web.) Lindb. (*H. ciliata*, Ehrh.). C. Mueller regarded the Australian moss as a new species, *H. microcyathea*, C. M. *Hedwigidium imberbe*, Sm., is also here, but without any trace of fruit; *Pseudoleskea calochlora*, C. M., and *Tortula princeps*, DeNot. If we follow Brotherus in his conclusions regarding the two Grimmias, we shall be struck with the remarkably northern character of this rock

flora. *T. princeps*, though sometimes growing on the bare rock, prefers hollows or crevices where a little soil has collected.

Still keeping to the rocks, we may find in obscure corners, sheltered and half-hidden by some overhanging projection, the unique and beautiful *Fabronia Tayloriana*, Hamp., perhaps in the form *foliis integris*, Broth. *Fabronia Scottiae*, C. M., may also be found, a species wide-spread in N. S. W., and which was first collected by Miss Scott, now Mrs. Forde, a lady who in her earlier years spent much time and showed much skill in making drawings of many of our Australian mosses. In the crevices of the rocks we shall find a few species of *Bryum*, but, in the absence of fruit, for they are mostly sterile, some of them are not yet determinable. We may note, however, *B. subatropurpureum*, C. M., *B. peraristatum*, C. M., (a beautiful species), *B. erythropyxis*, C. M., and perhaps *B. pachythea*, C. M., which last is exceedingly plentiful throughout the district, growing mostly upon the ground, where, mixed with *Funaria hygrometrica*, it forms a perfect picture, with its thick, dark-red, hanging capsules, a typical *Doliolidium*.

Turning now to the ground at the base of the rocks, generally damp and shaded, we shall find probably specimens of *Breutelia affinis* (Hook.) Mitt.; *B. commutata* (Hamp.) Par.; *Bartramia papillata*, H. f. W.; *B. gymnostoma*, Broth., sp. nov., in appearance very much like *B. papillata*, but distinguished, as the name implies, by its want of a peristome; *Bryum calodictyon*, Broth., sp. nov., a most distinctive and dainty species of the *Argyrobryum* group; *Triquetrella papillata* (H. f. W.): perhaps also *Tr. albicuspes*, Broth., sp. nov.; *Weisia flavipes*, H. f. W.; *Hymenostomum Sullivani*, C. M. (rarely); *Encalypta tasmanica*, Hamp. et C. M.; *Funaria hygrometrica* (L.) Sibth., var. *sphaerocarpa* (M; as sp.); *F. tasmanica*, Hamp., a fine species with very distinctive characters; *F. (Entosthodon) apophysata* (Tayl.); *F. (Entosth.) aristata*, Broth., very similar to the preceding, but differing in its percurrent nerve; *Fissidens elamellosus*, Hamp. et C. M.; *F. macrodus*, Hamp.; the inevitable *Ceratodon purpureus*; possibly *Campylopus Woollsii*, C. M., *Ditrichum affine*, C. M., and two or three species of Pottiaceae which anticipate those growing on the open ground that slopes down to the richer flat country.

Leaving then the rocks, we turn our attention to the hard ground, where the grass grows scantily and bare spaces of water-washed soil provide treasure spots for the bryologist. If one has been previously accustomed to the luxuriating coastal mosses, especially the fine, tree-loving, sub-tropical forms of the Northern Rivers, he will simply revel in the rarities here displayed. Dignity he will throw to the winds; he will not even go down upon his hands and knees; he will lie flat upon the ground, and, lens in hand, forget the world and its cares in the delighted contemplation of the rich garden of Nature spread out before him. The Pottiaceae are particularly in evidence, as they are throughout the district. Probably *Tortula atrovirens* (Sm.), will be the first thing to greet our eye; then *Barbula calycina* Schwgr., and perhaps *B. torquata*, Tayl. Before turning to the minuter mosses that constitute the special attraction of the spot, we take note of *Bryum pachythea*

and the *Entosthodon*s already mentioned. Then the tiny capsules of *Pottia brachyodus*, Hamp., or *P. brevicaulis* (Tayl.), or even both of them. We shall not have far to look for *Acaulon Sullivani*, C. M.: while, growing with it or in separate clusters, we may see *Acaulon robustum*, Broth., sp. nov., easily distinguished by its larger and stronger form. *Astomum cylindricum*, Tayl., and *Pleuridium nervosum* (Hook.), are almost sure to be there, and, more rarely, *Pleuridium gracilentum*, Mitt. and *Eccremidium pulchellum*, H. f. W. But, most attractive of all, we shall see the lovely *Gigasparnum repens* (Hook), with its large white transparent perichaetial leaves, and *Goniomitrium enerve*, Hook. et Wils., with its distinctive calyptra; possibly *G. acuminatum*, Hook. et Wils., may also be there, as it occurs (rarely) in the district. Then, if we are fortunate in our choice of a spot, we may see a rarity indeed: *Trachycarpidium Novae Valesiae*, Broth., sp. nov. At first glance we may mistake it for a *Goniomitrium*; but we shall readily notice the absence of the angles in the veil, and the long Archidium-like leaves that surround the fruit. This species is the second of the new genus that Brotherus, in Bryales, founded upon a New Caledonian moss. It has proved to be widespread in the district. I collected it only last week in the Cowra district, nearly fifty miles from here. You may be fortunate enough to find in this spot, though they are rare and have only been found by me occasionally, *Barbula acrophylla*, C. M., *B. australasiae* (Hook. et Grev.), *B. chlorotricha* (Broth. et Geh. Par.), *B. austro-unguiculata*, C. M., and *Tortula evanes-cens*, Broth., sp. nov.

Coming down to the flat country, if we take a fallow paddock, we shall find over again many of the ground mosses already discovered, but probably in finer condition than on the hill-slopes, especially the Acaulons and the *Pleuridium*s. *Pl. gracilentum* seems to prefer the lower, damper habitat. We may find too, probably by accident if we are not looking specially for it, the minutest of all the species of this district; *Ephemerum cristatum* (H. f. W.) a truly beautiful moss, of which I have collected good material in fruit. *Bryum argenteum*, var. *niveum*, will be found plentifully, and possibly the rare *Funaria pilifera*, Broth.

Cutting its way through this flat country we may find a creek so-called: and among the grass of its banks we may find, in addition to many of the foregoing, *Hypnum patulum*, Hamp., and *H. tenuifolium*, H. f. W., often in association with *Breutelia commutata*. Close by we may find some old, partially filled mining shafts, and on their damp shady banks we shall discover such species as *Bryum calodictyon*, Broth, the *Firidentes*, *Fungriae*, *Bartramiae*, etc. already mentioned, as well as *Brachythecium rutabulum*, *Stereodon cupressiformis* and a *Philonotis* not yet determined.

Aug. 29, 1905

(To be Continued)

Young, N. S. W.



MAY, 1906



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
 NORTH AMERICAN MOSSES
 HEPATICS AND LICHENS

EDITOR
 ANNIE MORRILL SMITH

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ALSO OFFICIAL ORGAN OF
THE SULLIVANT MOSS CHAPTER

EDITOR

MRS. ANNIE MORRILL SMITH

ASSISTED BY

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THE SULLIVANT MOSS CHAPTER

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PLATE II. *Dendroalsia abietina* (Hook.) E. G. B.

THE BRYOLOGIST.

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No. 3.

NOTES ON NOMENCLATURE VI.

ELIZABETH G. BRITTON.

The most notable advance made at the Botanical Congress in Vienna (1905) was the unanimous adoption of the priority of the oldest specific name, and the total extinction of the varietal name as a factor in priority. The oldest generic name and the determination of the type species for every genus has not yet been adopted, but we hope that at the next Congress, five years hence, the committee on the Nomenclature of Cryptogams will not only see the importance of this rule, but also that the subgeneric name as a factor in priority will also become extinct.

M. Cardot, Prof. Brotherus and myself are members of the commission to decide on questions of nomenclature for the mosses at the next Botanical Congress at Brussels, and it is hoped that some logical agreement will be reached. M. Cardot is still following the Paris Code of 1867, Section 58, and is giving the oldest subgeneric name priority over a later generic name, but he is not doing this consistently for, if he adopts *Cryphadelphus* (C. M.) he should also adopt *Aptychus* of the same author. In Engler & Prantl, Pflanzenfamilien, Prof. Brotherus has also adopted two changes of subgeneric to generic names, and he has called my attention to a duplication of names which has occurred, each of us coming to the same conclusion individually and separating, almost simultaneously, the genus *Alsia* into two genera.

In the following notes, all changes affecting North American mosses are listed and illustrations of two genera, new to the United States, are reproduced, from parts 222 and 223 of Engler and Prantl Pflanzenfamilien, which were delayed in reaching us.

Erpodium (Brid.) C. M. Bot. Zeit. 1: 774. 1843.

In the Bulletin of the Torrey Botanical Club for May, 1905, I have called attention to the error in citing Bridel as the author of this generic name. He printed it as a subgenus of *Anoetangium*, and it was Carl Müller who raised it to generic rank. *E. Domingense* (Brid.) C. M., is the type species from Santo Domingo, and it has also been collected in Jamaica and Porto Rico. *E. Cubense*, E. G. Britt. from Cuba, *E. Pringlei*, E. G. Britt. from Mexico, and *E. biseriatum* (Aust.) Aust. from Georgia, have been described by me. (Bull. T. B. C. 32:266, 1905, and Bryologist 8:71, 1905). Dr. Max Fleischer has examined the type of *E. diversifolium*, C. M., at Berlin, and thinks it is referable to *E. Domingense*. *E. Paraguense* Besch. has been described. (Mem. Soc. Nat. de Cherbourg 21:265, 1877.)

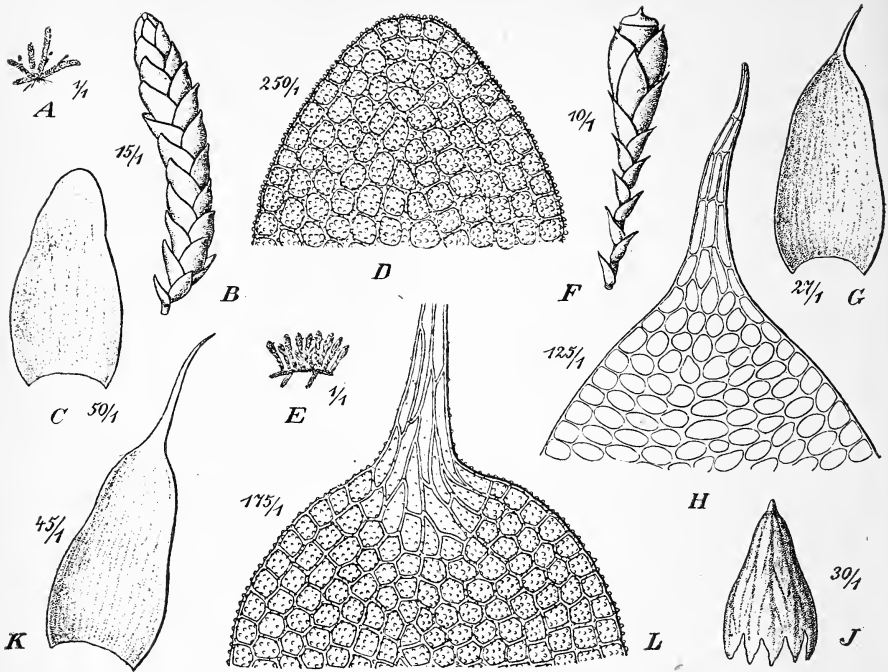


Fig. 531. A-D *Erpodium domingense* (Spreng.). A Fruchtende Pfl. (1/4); B Steriles Astchen im trockenen Zustande (15/4); C Stengelb. (50/4); D Blattspitze (250/4). - E-J *E. Holstii* Broth. E Fruchtende Pfl. (1/4); F Fertiler Spross im trockenen Zustande (10/4); G Stengelb. (27/4); H Blattspitze (125/4); J Haube (30/4). - K-L *E. Joannis Meyeri* C. Müll. K Stengelb. (45/4); L Blattspitze (175/4). (Originale.)

FIG. 531. From Engler & Prantl. Part 222. p. 708.

Hedwigia albicans (Web.) Lindb. Both Limpricht and Brotherus accept this the oldest specific name for *H. ciliata* Ehrh.

Pseudobraunia (Lesq. & James) Broth. E. & P. Pflanzenfam. 1.3.715. 1905.

Braunia, subgenus *Pseudobraunia* Lesq. & James Man. 153. 1884.

P. Californica (Lesq.) Broth. is the only species recognized.

Brachelyma Sch. Syn. Musc. 2d. Ed. 557. 1876.

Cryphæadelphus (C. M.) Cardot Rev. Bryol. 31:6. 1904.

Neckera Dichelyma (*Cryphæadelphus*) C. M. Syn. Musc. 2:145. 1851.

The type localities of both North American species are in Georgia. *B. subulatum* Sch., and *B. robustum* (Cardot) E. G. B. Bryologist 7:48. 1904.

Climacium Web. & Mohr.

Only two species are recognized for North America, *C. dendroides* and *C. Americanum*; *C. Kindbergii* and *C. pseudo-Kindbergii* are omitted, and

from recent investigations it becomes evident that they are only aquatic forms of *C. Americanum* and should have been given the name that they were distributed under by Austin in his Musci Appalachiani No. 289. *C. Americanum* var. *fluitans* (p. 49. 1876).

Pleuroziopsis Kindb. Check List Eu. & N. A. Moss. 19 1894.

Girgensohnia Kindb. Sp. Eu. & N. A. Bryin. 1:43. 1896.

Climacium Sect. *Girgensohnia* Lindb. Act. Soc. Fenn. 10:248. 1872.

This is another instance of the replacing of a generic by a subgeneric name. *P. ruthenicum* (Weinm.) Kindb. is our West Coast species found also in Asia and Japan.

Cryphæa Ravenellii Aust. has been referred by Kindberg (Br. Eu. & N. A. 1:7. 1897) to *Forsstroemia* and Brotherus has accepted this opinion. I have already stated (Bull. T. B. C. 32:263. 1905) that Austin was quite right in placing it in *Cryphæa*.

Dendropogonella E. G. Britton, new name.

Dendropogon Sch. Bot. Zeit. 1:377. 1843. not Raf. Neogenyt. 3:1825.

As Rafinesque's genus has been taken up recently by Dr. Small for *Tillandsia usneoides* L. (Flora S. E. United States 244. 1903.) Schimper's name succumbs to the fate which seems to await a homonym, hence I have added a syllable in order to distinguish the genus of the true mosses from our common "Florida Moss." Only one species is known from Mexico and the Island of St. Thomas, *Dendropogonella rufescens* (Sch.) E. G. B.

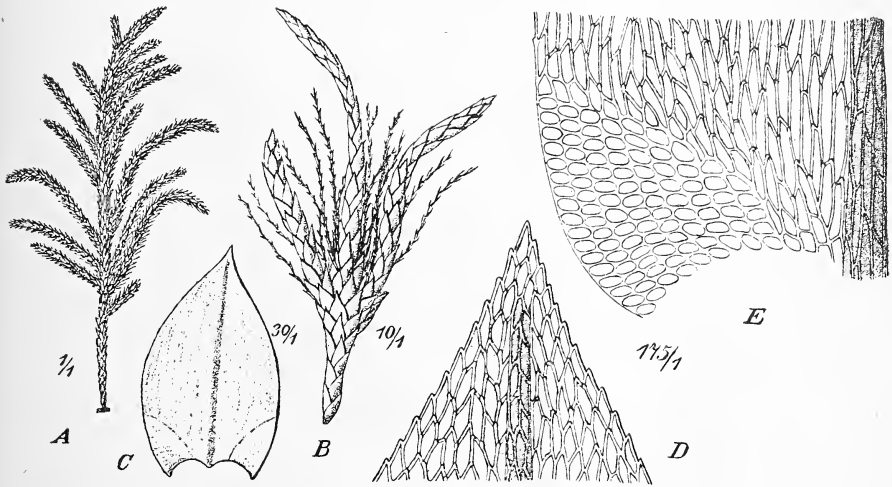


Fig. 562. *Leucodon domingensis* Spreng. A Sterile Pfl. (1/1); B Astchen mit Flagellen im trockenen Zustande (10/1); C Laub. (30/1); D Blattspitze (175/1). (Original.)

Pseudocryphæa flagellifera (Brid.) E. G. B. Bull. T. B. C. **32**:261.1905.

Pilotrichum flagelliferum Brid. Bryol. Univ. **2**:259.1827.

Leucodon domingensis Mitt. Journ. Linn. Soc. **12**:409.1869.

It is interesting to note that on page 751, Brotherus says that this is undoubtedly a distinct genus, but he failed to name it, or to adopt its oldest specific name. It has been collected at five stations in Florida, and is found in the West Indies and in the northern part of South America.

This species has also been collected by Mr. R. S. Williams in Bolivia, and was referred to *Acrocryphæa*, from which it differs in the elongated cells of the upper part of the leaves and the much more prominent basal differentiation of the cells.

Antitrichia Brid. Sect. I. *Macouniella* Kindb. p. 756.

This is the way that Brotherus disposes of *Macouniella*. Cardot has called my attention to the fact that *A. Californica* var. *flagellifera*, E. G. Britt. Bull. T. B. C. **32**:266.1905, is unknown to him. It is evidently a mistake for *Alsia Californica flagellifera* R. & C.

Pterogonium ornithopodioides (Huds.) Lindb. replaces *P. gracile* Sw., of Lesq. & James Manual, p. 290.

Forstroemia Lindb. Ofv. K. Vet. Forh. **19**:605.1862.

Leptodon Mohr L. & J. Man., p. 278. 1884.

Five species, *F. nitida* Lindb., *F. trichomitria* (Hedw.) Lindb., *F. immersa* (Sull.) Lindb., *F. Ohioensis* (Sull.) Lindb., and *F. Floridana* (Lindb.) Kindb. are listed and *Cryphæa Ravenellii* (p. 742) is omitted, as it should be.

Alsia Sull. Proc. Am. Acad. Arts & Sci. **3**:185.1855.

Antitrichia Kindb. Check List of Eu. & N. Am. Mosses, p. 9, 1894.

A. Californica, and the variety *flagellifera* R. & C., are listed. *Alsia longipes* Sull is said to be a *Thamnum*. This species has recently been included in the following genus by me. (Bull. T. B. C. **32**:265.1905.)

Dendroalsia E. G. Britton Bull. T. B. C. **32**:263. May, 1905

Groutia Brotherus E. & P. Pflanzenfam. Lief. **223**.760. Aug., 1905,

D. abietina (Hook.) E. G. Britt. and *D. circinnata* (Sull.) E. G. Britt. have been included in *Alsia* Sull. & *Groutia* Broth; they seem to me to be sufficiently distinct and to include *Alsia Macounii* Kindb.

These specimens from Lake Pond d'Oreille, Idaho, collected by J. B. Leiberger, are the finest that have ever been collected of this species. The accompanying photograph (Plate II) shows the size on the herbarium sheet on which they are mounted.

Eucladium verticillatum (L.) Br. & Sch. on rocks in a spring near the Holston River, at Marion, Va. June 6, 1892. This moss has only been recorded from the Western States, California. It occurs also in Bermuda.

New York Botanical Garden.

AUSTRALIAN MOSSES—SOME LOCALITY PICTURES

REV. W. WALTER WATTS,

(Concluded)

This may be allowed to end our trip. But, to complete my records for the district, I must add one or two notes.

Some parts of the district produce native pine trees; and, so far, these are the only bush trees on which I have found any trace of mosses. The species are *Tortula vesiculosa*, C. M., a species so-named on account of the vesiculose character of the green brood-bodies that abound on the nerve of the leaf; and *Tortula Baileyi*, Broth., which produces elongated brood bodies, very beautiful to see, at the tip of the stem. These two mosses occur on the poplars planted in the town of Young T. *vesiculosa* most plentifully.

At one spot 12 miles from Young, I collected *Bryum tasmanicum*, f. *seta brevior*, Broth. From Weedallion Mountain, 30 m. from Young, comes *Bryum sublaevigatum*, Broth., sp. nov. *Polytrichum juniperinum*, Willd., is not uncommon. At Grenfell, 32 m. away, on the sides of an excavation of rock, I collected *Dawsonia longiseta*, Hamp.; on the Wedden Mountain, a locality which I intend to explore later, *Pohlia nutans* (Schreb.) Lindb.

Finally, at Koorawatha, some 25 m. from Young, in a deep valley among the mountains, I collected *Stereodon cupressiformis* (L.); *Mielichhoferia Forsythi*, Broth.; *Mielichhoferia turgens*, Broth., sp. nov.; *Grimmia apocarpa*; *Racopilum convolutaceum*, C. M.: and the interesting *Pilonotis remotifolia*, H. f. W., a moss which has so much the appearance of a Thuidium that, when first found, it was named *Hypnum (Tamaris cella) scabrifolium*. Sullivant, who first received the fruit, named it *Bartramia exigua*, and that name is retained by C. M. in his Genera Muscorum. At one time H. et W. called it *Philonotis appressa*; but the name was subsequently abandoned as inappropriate to the female plant. Brotherus, in Bryales, gives precedence to Ph. *Scabrifolia* (H. f. W.).

Other species, especially of Bottiaceae and Bryaceae, are certain to be found in this district; but this paper will give a good general view, I trust, of the Moss Flora of this part of N. S. Wales. I may add that for many determinations I am indebted to S. Brotherus.

Aug. 29th, 1905.

Young. N. S. W.

(Concluded)

THIRD BOTANICAL SYMPOSIUM.

The third annual meeting of the Botanical Symposium will be held from July 2d to 9th, at Mountain Lodge, Little Moose Lake, Old Forge, New York. Through the courtesy of the members of the Adirondack League Club, the privilege of occupying the Club House for one week is extended to the members of the Conference. Tickets should be bought to Fulton Chain Station, on the Adirondack Division of the N. Y. C. & H. R. R. Single fare from New York City \$6.46. Board \$2.50 to \$3.00 a day. Stages will meet

the party at Fulton Chain Station, to which point all baggage should be checked. Mrs. Hugh M. Smith and Mrs. N. L. Britton will act as guides.

Sullivant Moss Chapter Members are requested to notify *them* if they intend to attend the Symposium. For further information address, Mr. Joseph Crawford, 2824 Frankford Avenue, Philadelphia, Pa., Secretary of the Symposium.

“WHEN DOCTORS DISAGREE.”

(Before reading this note, please turn to the BRYOLOGIST 7:78. Sept. 1894, and read carefully the article under this caption, noting dates mentioned.)

In my herbarium are two packets of mosses labeled as follows:

Thelia Lescurii Sulliv., Sandy soil, Rockville, L. I., Dec. 1, 1899. Coll. A. J. G., type of *P. Groutii*, No. 196, N. Am. Musci Pleurocarpi. Depression in base of chestnut tree. Hempstead, L. Id., Dec. 1, 1899.

In my collection of letters from Mrs. Britton, I find one from which the following is an extract.

“Bedford Park, Dec. 4, 1899.

“Your packet of mosses is received. *Thelia Lescurii* occurs on West Rock, at New Haven, where Prof. Eaton collected it, and I think it has been found at other places in New England, but I should have to look this up at the herbarium. The *Plagiothecium* you send is a pretty little species, *conspicuous for its resemblance to the laxer forms of H. recurvans*, which it resembles in its small capsules, which are horizontal, and its recurved leaves. I think it will go under one of the varieties of *H. denticulatum*, either *laetum* or *aptychus*. Send it to Dixon for an opinion. It answers pretty well to No. 361, Aust. Musci App., which was distributed as *P. dent.* var. *pusillum*, *which he says grows on the roots of trees in dry woods* - - - - .

“I shall be writing to Dixon soon about another matter, and will send this to him, as I should like his opinion on them.”

The italics are mine. I may add that at this date, the Dec. 1899 collection of *Thelia Lescurii* was the first and only collection of the species I had ever made.

I will draw no inferences, for I feel that my readers will be amply able to do that for themselves.

A. J. GROUT.

BRYOLOGICAL NOTES

A. J. GROUT.

POGONATUM BRACHYPHYLLUM Michx. None of the available descriptions of this species allude to the great difference between the capsules of this species and those of *P. brevicaulis*. The capsules of the latter are erect and almost or quite symmetric, while those of *P. brachyphyllum* when fresh are inclined about as much as those of *P. alpinum*, and are oblong-ovoid and strongly unsymmetric. This difference is much less apparent in herbarium specimens.

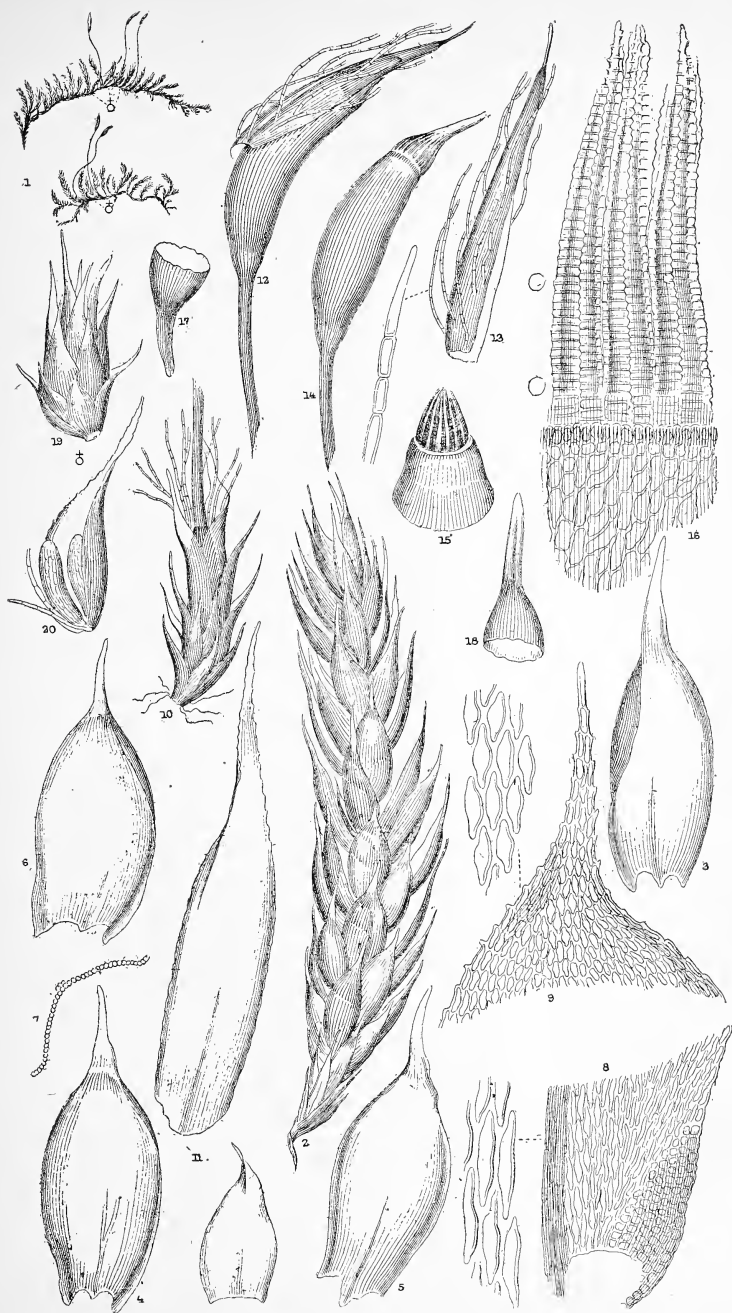


PLATE III. *Homalothecium subcapillatum*. From The Icones. Pl. 90.

TETRAPLODON AUSTRALIS Sulliv. & Lesq. Some specimens of this species sent me from Thomasville, Ga., by Mrs. A. P. Taylor, were so unlike any of the descriptions, that I at first thought they must belong to a different species and perhaps a different genus. The leaves were entire and as long, and slenderly acuminate as in *T. angustatus*; the columella was distinctly exerted, the teeth reflexed, and the hypophysis so reduced as to make only a moderate sized neck. An examination of Sullivant & Lesq. Musci Boreali-Americani, Edition 1, No. 151, in the Columbia University Herbarium revealed at least one capsule with an exerted columella and at least one capsule in which the hypophysis is as reduced as in the Thomasville specimens. No. 227 of the Second Edition has many exerted columellae and many capsules with small hypophyses, but has leaves as strongly serrate as those figured in the Icones. An examination of the other specimens in the combined collections of Columbia University and the New York Botanical Gardens showed that the small hypophysis and exerted columella are common variations found intermingled with plants like those figured by Sullivant. The presence of nearly entire leaves in rare cases is noted in the Manual. The teeth seem to be normally reflexed in perfectly ripened capsules. These observations indicate that the species is an exceedingly variable one, intermediate between *Tetraplodon* and *Tayloria*, and suggest that it may perhaps be better referred to the latter. More exhaustive knowledge of the two genera than I at present possess is needed to decide this.

ANACAMPTODON SPLACHNOIDES (Fröl.) Brid. Specimens of *Anacamptodon* sent by Mrs. A. P. Taylor, from Thomasville, Ga., have the costa somewhat thinner and almost percurrent; the seta longer and the capsule slightly larger than in the ordinary run of specimens; the operculum is scarcely more than conic in most of the specimens. Dr. Best suggests that it may be a transition form between *A. splachnoides* and *A. Cubensis* Sulliv. which is based on Wright's No. 66. *A. Cubensis* is said to be closely related to *A. splachnoides*, but smaller with a percurrent costa and a conic-acute operculum. (See Jour. Linn. Soc. 12:540). I should not be surprised to find that the Georgia moss is identical with *A. Cubensis*. Until this can be definitely settled, I propose that this form be known as **ANACAMPTODON SPLACHNOIDES Tyloriae**.

BRACHYTHECIUM NOVEBORACENSE Grout. A continued study of this species in the field has shown that this species is a derivative of *B. rivulare*, and is common in Long Island swamps. The gametophyte characters given in the original description (Bryologist 3:36. 1900) are generally characteristic of the species but the capsules figured there were abnormally straight, and the seta is less papillose than in most specimens.

Burnettia fabrofolia n. sp.

Closely resembling *B. subcapillata*, but with branch leaves broadly lanceolate to ovate-lanceolate, much more gradually narrowed to a longer and more slender acumination; median leaf cells about $1/5$ larger, $60-80 \times 8\mu$, quadrate alar cells fewer and larger, about 16μ wide; capsule less gibbous and less plainly narrowed at the mouth.

On bark at roots of trees, near Thomasville, Ga. Coll. by Mrs. A. P. Taylor, Oct. 20, 1905. Type in the herbarium of the author. Co-type in the Herbarium of Columbia University.

The fruiting plants were few and closely intermingled with *Raphidostegium adnatum*. In order that perfect capsules might be left with the type as few peristomes as possible were studied. One of these seemed to have the teeth united at base in pairs. I am greatly indebted to Dr. G. N. Best for assistance in the study of this plant, although he is in no way responsible for this publication. He says that this plant has the capsules of *Homalotheciella*, and the leaves of *Fabronia*. No calyptra were found.

As most of the available descriptions of *B. subcapillata* are inadequate, a fairly complete account of that species is appended to enable students to distinguish between the two.

BURNETTIA SUBCAPILLATA (Hedw.) Grout. Bryologist 6:65. 1903.

Pterogonium subcapillatum Schwaegr. Suppl. 1:107. 1811.

Pterigynandrum brachycladon Beauv. & Brid., in Brid. Musc. Recent. Part 4:130. 1819.

Pterogonium decumbens Schwaegr. Suppl. 2:32, pl. 110. 1823.

Lasia subcapillata Brid. Bryol. Univ. 2:202. 1827.

Hypnum subcapillatum C. Müll. Syn. 2:352. 1851.

Homalothecium subcapillatum Sulliv. Gray's Man. Ed. 2:663, pl. 5. 1856, and Icones Musc. 41, pl. 90. 1864. See Plate 111.

Platygyrium brachycladon Kindb. Can. Rec. Sci. 21. 1894.

Homalothecium (Homalotheciella) subcapillatum Cardot. Bull. Herb. Bois. 7:374.

Monoicous, in light-green, thin glossy mats; stems a few centimeters long, irregularly dividing, creeping, subpinnately branching; branches about 5 mm. in length; branch leaves often somewhat homomalous, loosely imbricate, ovate to elliptical-oblong. .9-1.2 x .3-3.5 mm; abruptly long acuminate, more or less serrate above, smooth, concave; costa extending to middle or beyond; median cells linear-fusiform, 8-9 times as long as broad, quadrate alar cells about 10 μ wide, numerous, bordering the lower 1/4 of the leaf. Stem leaves ovate, short or long; acuminate, costa short or sometimes almost wanting; paraphyllia absent; antheridia large, obovoid, short stipitate, inner perigonial leaves ovate-lanceolate, concave, acute to acuminate, bordered by a row of narrow cells, nearly or quite ecostate. Perichaetium 1.5 mm. long, loosely sheathing, slightly spreading; inner leaves oblong to oblong-spatulate, gradually long-acuminate, serrate above, short costate, loosely areolate, leaf cells at base rectangular to rhomboidal; paraphyses unusually long and numerous. Seta about 1 cm. long, rough, twisted to the right; calyptra cucullate, hairy; capsule brown suberect to horizontal, gibbous to slightly curved, with a narrow mouth, slightly constricted under the mouth, and lightly striate when dry and empty, 1.7 mm. long, length 2-3 times the diameter; operculum convex-conic, rostrate; collumella apparently not persistent; annulus none; peristome double; the teeth linear-lanceolate, united at base, brownish-yellow, closely and regularly articulate, hyaline

margined by the adherent segments. Spores roughened, 25μ , maturing in autumn.

Type locality, Pennsylvania. On bark of trees and decaying trunks, in woods. Widely distributed throughout the U. S. east of the Mississippi, but not very abundant.

Illustrations: Sulliv. l. c. & Icones Pl.90; Hedw. l. c.: Suppl. pl.110 (*Pterogonium decumbens*) and pl. 243 (*P. ascendens*).

Exsiccati Sulliv. Musc. Allegh. 83 (*Pterigynandrum*): Sulliv. & Lesq. Musc. Bor. Am. Ed. 2. 384. Aust. Musc. Appl. 295. Drummond Musc. Am. (S. States) 88. Ren. & Card. Musc. Am. Sept. Exs. 236. Grout N. Am. Musci Pleur. 108.

The variation in length of leaf is due largely to the variation in the length of the acumination. Brooklyn, N. Y.

SOME LICHENS OF MT. WATATIC, MASSACHUSETTS.

REGINALD HEBER HOWE, JR.

No one thing has further advanced the knowledge of the distribution of birds than a very general publication of local lists during the past decade. Less than a dozen titles would, I think, complete the bibliography of such New England lists of Lichens. It is for this reason that the present list appears, and it is hoped that it will be but the first of many to follow. The words "southern," "eastern," as applied to North America, now answer for the distribution of many species, and these terms might be made more specific if authentic local lists from many points were accessible.

May I be permitted, though a comparatively recent and yet ignorant student of Lichens, to speak humbly of Lichenology. I entered its field from that of Ornithology, and examined its state with a somewhat trained scientific mind, and *nullius addictus jurare in verba magistri*. At once I felt, as a very sane lichenist put it to me recently, that unfortunately the study of Lichens has a peculiar magnetism for the posing scientific "crank." Secondly that no manual existed for the army of field students, often "unscientific," as the expression is, but nevertheless often the ones, from their very numbers, to contribute much of real value, on question of distribution, habitat, etc., not to say as collectors. Thirdly, the marked tendency toward verbosity and *overdone* scientific descriptions found throughout Lichenological literature, and lastly the unprecedented use of tri-nomials and quadri-nomials for mere contingent phases.

These statements will, I know, be considered by some to reflect upon my ignorance as a Lichenist, yet I feel somewhat strengthened to withstand comment, from the fact that my views are those also of one of the recognized and truly scientific Lichenologists of New England.

Mt. Watatic is one of the highest of the group of foothills, known as the Peterboro Hills. It occupies a position in the northwestern-most corner of Middlesex County, a little over a mile from the New Hampshire line, in the township of Ashby. Its altitude is about 1875 feet. Spruce covers its north-

west slopes to nearly the summit, while its southwest side is comprised of rough pastures and stump-lands. The double summit is bare and rocky for a few square rods. The Lichens enumerated below were collected on one ascent to its summit, December 28, 1905.

LIST.

1. *Ramalina calicaris* (L.) Fr. a. *fraxinea* Fr. Common on the elms at the foot of the mountain.
2. *Ramalina calicaris* c. *canaliculata* Fr. Two examples were found on the elms at the base of the mountain.
3. *Cetraria ciliaris* (Ach.) Tuckerm. Not uncommon on spruces and dead wood on the mountain sides. Sterile.
4. *Cetraria lacunosa* Ach. Common on spruces. The specimen was found on a ledge almost at the summit. Sterile.
5. *Cetraria Oakesiana* Tuckerm. One specimen was found on a moss covered rock at 1500 ft. elevation.
6. *Evernia prunastri* (L.) Ach. Found on a fallen stump, and on spruces up to 1500 ft. Sterile.
7. *Usnea barbata* (L.) Fr. a. *florida** *hirta* Fr. Sterile, on spruces nearly to the summit of the mountain.
8. *Alectoria jubata* (L.) Tuckerm. b. *chalybeiformis* Ach. On fallen stumps at about 1500 ft.
9. *Parmelia perlata* (L.) Ach. Sterile, on rocks at the summit.
10. *Parmelia tiliacea* (Hoffm.) Floerk. Not uncommon on maples, about 1500 ft. Fruited.
11. *Parmelia Borreri* Turn. b. *rudecta* Tuckerm. Common on pines. Sterile.
12. *Parmelia saxatilis* (L.) Fr. b. *sulcata* Nyl. Common on a few scattered oaks near the summit. Sterile.
13. *Parmelia physodes* (L.) Ach. Common on spruces, and in one spot on the ground with *Stereocaulon*. Sterile.
14. *Parmelia olivacea* (L.) Ach. Not uncommon on maples. Sterile.
15. *Parmelia caperata* (L.) Ach. Common on rocks and trees. Sterile.
16. *Physcia speciosa* (Wulf., Ach.) Nyl. The specimen collected on an unpainted barn. 1000 ft. elevation. Fruited.
17. *Physcia aquila* (Ach.) Nyl. b. *detonsa* Tuckerm. Common on oaks near the summit. Fruited.
18. *Pyxine sorediata* Fr. Two examples on oaks near summit. Sterile.
19. *Umbilicaria Muhlenbergii* (Ach.) Tuckerm. Common on igneous rocks at summit.
20. *Umbilicaria vellea* (L.) Nyl. b. *tylorhiza* Nyl. (?) Rare on igneous rocks about 1500 ft.
21. *Umbilicaria pustulata* (L.) Hoffm. b. *papulosa* Tuckerm. Common on igneous rocks at summit.
22. *Sticta amplissima* (Scop.) Mass. One fruited specimen on oaks near summit.

23. *Sticta pulmonaria* (L.) Ach. Common on the base of oaks near the summit. Sterile.
24. *Peltigera canina* (L.) Hoffm. b. *spongiosa* Tuckerm. One specimen on rocks. 1500 ft. elevation. Sterile.
25. *Lecanora pallida* (Schreb.) Schær. On oaks at the summit.
26. *Lecanora subfusca* (L.) Ach. Common on deciduous trees.
27. *Lecanora pallescens* (L.) Schær. On a fallen log. 1800 ft.
28. *Pertusaria velata* (Turn.) Nyl. On oaks near the summit.
29. *Stereocaulon paschale* (L.) Fr. On stone wall. Sterile.
30. *Stereocaulon* (*tomentosum* ?) (Fr.) Th. Fr. On earth on ledges at summit. Sterile.
31. *Cladonia cenotea* (Ach.) Schær. b. *furcellata* Fr. Found among moss near brook. About 1200 ft. elevation.
32. *Cladonia uncialis* (L.) Fr. *obtusata* (Ach.) Found sparingly about 1600 ft.
33. *Cladonia gracilis* (L.) Nyl. *dilacerata* Floerk. On rocks about 1200 ft.
34. *Cladonia furcata* (Huds.) Fr. Common on ground about 1500 ft.
35. *Cladonia rangiferina* (L.) Hoffm. b. *sylvatica* L. Common on ground nearly to the summit.
36. *Cladonia cristatella* Tuckerm. Common on fallen logs.
37. *Lecideia enteroleuca* Fr. Common on deciduous trees.
38. *Graphis scripta* Ach. On oak trees near summit.

Specimens which were observed, as *Physcia stellaris*, for example, are not enumerated, only those actually collected. The *Cladonias* in the above list were determined through the kindness of Mr. G. K. Merrill. The specimens are for the most part in my own Herbarium. Concord, Mass.

A LIST OF FOLIACEOUS AND FRUTICOUS LICHENS.

Collected at Chilson Lake, Essex Co., New York. Altitude 1200 ft.

By CAROLYN W. HARRIS.

RAMALINA CALICARIS (L.) Fr.

“ “ var. *FRAXINEA* Fr.

“ “ “ *FASTIGIATA* Fr.

“ “ “ *CANALICULATA* Fr. On trees, both evergreen and deciduous.

RAMALINA CALICARIS var. *FARINACEA* Schær. Found on rocks, especially rocky cliffs with a northern exposure.

RAMALINA POLLINARIA (Ach.) Tuckerm. Found on dead trees and on rocks.

RAMALINA RIGIDA (Pers.) Tuckerm. On trees.

CETRARIA ISLANDICA (L.) Ach. On the earth, rare.

“ *CILIARIS* (Ach.) Tuckerm. Very common, especially on dead evergreens.

- CETRARIA LACUNOSA Ach. Very common, growing with *C. ciliaris*.
“ GLAUCA (L.) Ach. On trees, abundant.
“ OAKESIANA Tuckerm. Found on dead trees and occasionally
on rocks.
CETRARIA AURESCENS Tuckerm. On evergreens, usually dead or dying.
EVERNIA FURFURACEAE (L.) Mann. Found on dead arbor vitae.
“ PRUNASTRI (L.) Ach. On dead trees, very abundant.
USNEA BARBATA (L.) Fr.
“ “ var. FLORIDA Fr.
“ “ “ HIRTA Fr.
“ “ “ CERATINA Schær.
“ “ “ DASYPOGA Fr.
“ “ “ PLICATA Fr.
“ “ “ RUBIGINEA Michx.
“ ANGULATA Ach.
“ TRICHODEA Ach.
“ LONGISSIMA Ach. Found on dead or dying evergreens, especially
in swampy dense woods.
CETRARIA JUNIPERINA (L.) Ach.
“ “ var. PINASTRI Ach. Collected on dead wood.
ALECTORIA JUBATA (L.) Tuckerm.
“ “ var. CHALYBEIFORMIS Ach.
“ “ “ IMPLEXA Fr. Found on dead trees and fence rails.
THELOSCHISTES CHRYSOPHTHALMUS (L.) Norm. Collected on trees.
“ PARIETINUS (L.) Norm. Very common on trees.
“ POLYCARPUS (Ehrh.) Tuckerm. Common on trees and rocks.
THELOSCHISTES LYCHNEUS (Nyl.) Tuckerm. On living deciduous trees.
“ CONCOLOR (Dicks.) Tuckerm.
“ “ var. EFFUSE Tuckerm. Collected on trees.
PARMELIA PERLATA (L.) Ach. On granitic rocks, very abundant.
“ PERFORATA (Jacq.) Ach. Found on dead or dying conifers.
“ TILIACEA (Hoffm.) Floerk. Very common on dead wood.
“ BORRERI Turn.
“ “ var. RUDECTA Tuckerm. Collected on trees both
dead and living.
PARMELIA SAXATILIS (L.) Fr.
“ “ var. SULCATA Nyl.
“ “ “ PANNIFORMIS (Ach.) Schær.
“ “ “ OMPHALODES Fr. On dead wood and rocks.
“ PHYSODES (L.) Ach. Abundant on dead spruce and hemlocks.
“ COLPODES (Ach.) Nyl. On trees and dead wood.
“ OLIVACEA (L.) Ach.
“ “ var. ASPIDOTA Ach.
“ “ “ SOREDIATA (Ach.) Nyl. On trees and rocks.
“ CAPERATA (L.) Ach. Very common on living trees, dead wood,
and rocks.

- PARMELIA CONSPERSA (Ehrh.) Ach. Very abundant on trees and rocks.
PHYSICIA SPECIOSA (Wulf., Ach.) Nyl. On rocks with moss.
 " AQUILA (Ach.) Nyl.
 " " var. DETONSA Tuckerm. Found on trees and rocks.
 " PULVERULENTA (Schreb.) Nyl.
 " " var. LEUCOLEIPTES Tuckerm. On trees and rocks.
 " STELLARIS (L.) Tuckerm. Found on trees and fence rails.
 " " var. AIPOLIA Nyl. On granite rocks.
 " TRIBACIA (Ach.) Tuckerm. On trees and granite rocks.
 " HISPIDA (Schreb., Fr.) Tuckerm. On dead wood.
 " OBSCURA (Ehrh.) Nyl. Found on living trees, dead wood, and rocks.
PHYSICIA SETOSA (Ach.) Nyl. On rocks among mosses.
 " ADGLUTINATA (Floerk.) Nyl. Collected on shrubs.
PXYPHOMA SOREDIATA Fr. On granite rocks.
UMBILICARIA MUHLENBERGII (Ach.) Tuckerm. Found on rocks.
 " VELLEA (L.) Nyl. On damp rocks.
 " DILLENII Tuckerm. On granitic rocks.
 " PENNSYLVANICA Hoffm. On granite rocks.
 " PUSTULATA (L.) Hoffm.
 " " var. PAPULOSA Tuckerm. Found on rocks.
STICTIA AMPLISSIMA (Scop.) Mass. On rocks, very common.
 " PULMONARIA (L.) Ach. On trees and rocks.
 " CROCATI (L.) Ach. Rocks among mosses.
 " SCROBICULATA (Scop.) Ach. On rocks with mosses.
NEPHROMA TOMENTOSUM (Hoffm.) Koerb. On mossy rocks.
 " HELVETICUM Ach. On mossy rocks.
 " LÆVIGATUM Ach. Found on rocks.
 " " var. PARILE Nyl. On mossy rocks.
PELTIGERA APHTHOSA (L.) Hoffm. On damp earth.
 " HORIZONTALIS (L.) Hoffm. On damp rocks.
 " POLYDACTYLA (Neck.) Hoffm. Found on rocks and earth.
 " PULVERULENTA (Tayl.) Nyl. On rocks.
 " RUFESCENS (Neck.) Hoffm. On rocks and earth.
 " CANINA (L.) Hoffm. On rocks and earth.
 " " var. SPONGIOSA Tuckerm. Among mosses.
 " " " SOREDIATA Schær.
SOLORINA SACCATA (L.) Ach. On calcareous earth.
PANNARIA LANUGINOSA (Ach.) Koerb. On rocks with moss.
 " RUBIGINOSA (Thunb.) Delis. Found on trees.
 " BRUNNEA (Sw.) Mass. On earth.
 " MICROPHYLLA (Sw.) Delis. On rocks.
 " MOLYBDÆA (Pers.) Tuckerm.
 " " var. CRONIA Nyl. On mossy earth.
 " LEUCOSTICTA Tuckerm. On granite rocks.
COLLEMA FLACCIDUM Ach. On granite rock.
 " NIGRESCENS (Huds.) Ach. On dead wood.

LEPTOGIUM LACERUM (Sw.) Fr. On rocks near water.
 “ PULCHELLUM (Ach.) Nyl. On mossy rocks.
 “ TREMELLOIDES (L. fil.) Fr. On rocks with moss.
 “ MYOCHROUM (Ehrh., Shær.) Tuckerm. Found on decayed
 wood.

PLACODIUM ELEGANS (Link.) DC. On perpendicular rocks.
 “ AUEANTIACUM (Lightf.) Naeg. & Hepp.
 “ VITELINUM (Ehrh.) Naeg. & Hepp.

STEREOCAULON CORALLOIDES Fr. On rocks and earth.
 “ PASCHALE (L.) Fr. Very common, on rocks and earth.

The foregoing have followed Tuckerman's order. The Cladonias are given in alphabetic order as they have been variously determined.

CLADONIA AMAUROCRÆA (Fl.) Schær. On earth.

“ BACILLARIS (Del.) Nyl. On decayed wood.
 “ CÆSPITICIA (Pers.) Flk. On rocks.
 “ CARIOSIA (Ach.) Spreng. On earth.
 “ CORNUCOPIOIDES (L.) Fr. On decayed wood.
 “ CRISTATELLA Tuckerm. On decayed wood.
 “ DEFORMIS (L.) Hoffm. On earth.
 “ DELICATA (Ehrh.) Fl. On decayed wood.
 “ FURCATA (Huds.) Fr.
 “ “ var. CRISPATA Fr.
 “ “ “ PARADOXA Wainio. On earth with moss.
 “ “ “ RACEMOSA Fl. On earth.

“ FIMBRIATA (L.) Fr.
 “ “ var. CONIOCRÆA (Flk.) Wainio.
 “ “ “ SIMPLEX (Spreng.) Flk. On decayed wood.
 “ GRACILIS (L.) Nyl.
 “ “ var. DILATATA (Hoffm.) Wainio.
 “ “ “ HYBRIDA Schær.
 “ “ “ VERTICILLATA Fr. Collected on earth.

CLADONIA MITRULA Tuckerm. On earth.

“ PYXIDATA (L.) Hoffm. On earth.
 “ “ var. CHLOROPHÆA (Spreng.) Floerk. On rocks and
 earth.

CLADONIA PYXIDATA var. NEGLECTA (Flk.) Schær. On mossy rocks.

“ RANGIFERINA (L.) Hoffm.
 “ “ var. ALPESTRIS L.
 “ “ “ SYLVATICA L. On earth.
 “ SQUAMOSA (Scop.) Hoffm. On earth with mosses.
 “ TURGIDA (Ehrh.) Hoffm. On earth.
 “ UNCIALIS (L.) Web.
 “ VERTICELLATA Hoffm.
 “ “ var. EVOLUTA Th. Fr.

BÆOMYCES ÆRUGINOSUS (Scop.) D.C. On decayed wood.

“ ROSEUS Pers. On earth.

ENDOCARPON FLUVIATILE D.C. On wet earth in brook.

“ MINIATUM Ach.

“ “ var. AQUATICUM Schær.

“ “ “ COMPLICATUM Schær.

Specimens of the above list are in the author's herbarium.

Brooklyn, N. Y.

BOOK NOTICES AND REVIEWS

Dr. Albert Schneider has published two books on Lichens, one a “Text-Book of Lichenology,” published by Willard N. Clute & Co., Binghamton, N. Y., is the standard work, and contains 76 full page plates. The more elementary work, “A Guide to the Study of Lichens,” is published by Knight & Millet, Boston, Mass.

Reginald Heber Howe and Marion Appleton Howe, have begun the publication of “Common and Conspicuous Lichens of New England.” The work is to appear in parts, and part second has just been received. The authors intend that the work shall be “A Field Book For Beginners,” and the two parts already published give assurance that it will serve its purpose well. However, we must warn the beginner against supposing that he can ever get a comprehensive knowledge of the *Lichenes*, without the aid of a microscope, as many of the plants can not be determined by the best lichenist, without careful microscopical study. The marginal illustrations are good, and will, with the aid of the short, but well worded diagnoses, prove very helpful to the beginner. The half tones are by no means all that could be desired, but we will hope for better ones in the future issues. The work will surely help teachers and others beginning to study lichens, and aid them in becoming acquainted with the more conspicuous species.

BRUCE FINK.

“Lichenology for Beginners” by Prof. Sargent, which was printed in THE BRYOLOGIST during 1905, has been issued as a pamphlet and may be obtained by sending fifty cents to the Publishers, The Harvard Co-operative Society, Cambridge, Mass.

SULLIVANT MOSS CHAPTER NOTES.

Seven names are to be added this month to our list of Chapter Members: Mr. G. Henschen, 269 Herr Street, Harrisburg, Pa.; Dr. John L. Sheldon, Prof. Bach. W. Va. Univ. Ag. Ex. Station, Morgantown, W. Va.; Miss Lydia Prichett Borden, Manoa, Delaware Co., Pa.; John W. Eckfeldt, M.D., 245 N. 65th Street, Cor. Vine Street, Philadelphia, Pa.; Mr. Samuel Spring Talbot, 392 Spring Street, Portland, Maine; Mrs. Hannah Streeter, 504 North Marshall Street, Philadelphia, Pa.; Rev. Canon H. W. Lett, Aghaderg Glebe, Loughbrickland, Co. Down, Ireland. Our total membership is now 171.

MEETING OF THE SULLIVANT MOSS CHAPTER.

A meeting of the Sullivant Moss Chapter will be held in New York, this coming December, in connection with the annual meeting of the American Association for the Advancement of Science.

In addition to a programme of papers on subjects of interest to the chapter, it is desired to have as complete a representation as is possible of the works of the chapter members. To this end *all* members are urged to contribute material for exhibition purposes. Drawings, paintings, collections of mosses, lichens or hepatics from various localities, methods of mounting specimens, rare or interesting species, anything, in fact, pertaining to the chapter work will be very acceptable. It is especially urged that members prepare lists of the mosses, lichens and hepatics growing in their respective localities, in order to furnish a basis for a more accurate knowledge of the distribution of these plants. If in addition to these lists, actual specimens for verification can be contributed, the value of the work will be greatly increased.

This notice is published early in order that all may have due notice, and that all may be watching during the coming summer for useful material for the exhibit. The officers of the society will be very glad to answer questions relative to the meeting. Further information will be given later in the BRYOLOGIST.

EDWARD B. CHAMBERLAIN, President.

OFFERINGS.

(To Charter Members only. For postage.)

Mr. H. Dupret, Seminary of Philosophy, Montreal, Canada. *Fontinalis flaccida* R. & C.

Miss Annie Lorenz, 96 Garden Street, Hartford, Conn. *Dicranum Muhlenbeckii*. B. & S. c. fr. Coll. Vernon Centre, Conn. Det. Mrs. Britton.

Dr. John W. Bailey, Walker Block, Seattle, Wash. *Mnium venustum*; *M. Menziesii*; *M. medium* and *M. glabrescens*.

Miss Alice L. Crockett, Camden, Maine. *Buellia geographica* (L.) Tuckerm. Coll. in Camden, Maine.

Mr. G. K. Merrill, 564 Main Street, Rockland, Maine. *Cladonia alpestris* (L.) Rabenh. Coll. in Rockport, Maine.

Miss Caroline C. Haynes, 16 E. 36th Street, New York City. *Radula complanata* (L) Dumort; *Ptilidium Californicum*, Underw. & Cook.

In sending for the "Offerings," judgment should be exercised as to whether to send stamps or an addressed envelope. As a general rule, the mosses and many of the hepatics would carry as well in a good sized envelope, but the lichens require a box or straw boards in order not to be broken. It has been suggested by one careful member to moisten the lichen slightly before mailing. A postal card acknowledging receipt is no more than common courtesy.

The Curator for the cryptogamic section of the Herbarium Boissier at Chambésy, near Geneva, Switzerland, desires to exchange mosses and hepatics with American and Canadian Bryologists. The Herbarium Boissier has a large collection of duplicates, mostly European with some exotics. For further particulars address Monsieur G. Colomb-Duplan, Les Tordils, Ouchy-Lausanne, Switzerland.

RAMALINA RIGIDA IN MASSACHUSETTS.

Since I published my note on this species (Bryologist, Vol. IX., No. 2, Mar. 1906, p. 32.) I have had some ample and more typical specimens sent me from the Island of Martha's Vineyard where it grows with *Usnea b. ceratina* on *Juniperus*. In Decades of North American Lichens, Cummings, Williams and Seymour, No. 199, I find specimens from Brewster, Massachusetts, collected on November 10, 1904, by L. A. Crocker. *Ramalina rigida* Pers. seems to have a New England range almost identical with the Seaside Sparrow (*Ammodramus maritimus*), an Upper Austral species, and the plant may evidently be looked for over the entire Cape and south shore region of Massachusetts, as well as along the coasts of Rhode Island and Connecticut.

REGINALD HEBER HOWE, Junior.

Concord, Massachusetts.

NOTES ON THE LIFE HISTORY OF THE MNIUMS.

PHEBE M. TOWLE.

The study of the life history of some of the mosses which was begun in the spring of 1905, has been continued during the past year. The observations for 1903 upon the Hair-caps gave for *Polytrichum commune* and *P. juniperinum* the time of maturing of antheridia and archegonia and their contents in April, and the time of the maturing of the sporophytes in August of the following year, a period of about sixteen months. The observations of 1904 upon *Catherinea undulata* gave the time of maturity of the antheridia and archegonia and their contents in May, and the time of the maturity of the sporophytes in the following March and April, a period of about eleven months.

The observations for 1905 have been chiefly upon the Mniums and upon these we have made only a good beginning. There are only three Mniums on this list and the work on one of these is unsatisfactory. It is hoped that careful observation in 1906 may make this clear and complete the list.

Mnium sylvaticum grows in shady places, in the woods near the brooks, and in damp, rocky places. It is a beautiful bright green moss in early spring. On April 13th, the sporophytes were shedding their spores. On June 20th, *M. sylvaticum* heads which are bisexual were examined. Neither antheridia nor archegonia when undisturbed were open, but disturbed antheridia discharged sperm mother cells. About three weeks later, July 14th, in one head, two archegonia had grown to twice the height of the others.

A second head had one archegonia twice the height of the others. The bases of these taller ones were light green, evidently owing to the development of the new sporophyte within. On August 9th, the sporophytes showed with a hand-lens, and on Sept. 22d they could be plainly seen with the unaided eye, being about $\frac{1}{4}$ inch high. On Nov. 5th, the sporophytes were a little taller, averaging about $\frac{3}{8}$ inches high. The stems were reddish brown. The calyptra came off easily and the part underneath the calyptra was bright green. By Nov. 28th, they had grown to $\frac{1}{2}$ inches high, but had not otherwise changed in appearance.

While the observations for the season were not sufficiently full to justify final conclusions on all points, it was found that the maturing of the sperm and egg cells is between June 20th and July 14th or better, during the latter part of June, for the sporophytes had begun to grow by July 14th, and that the sporophytes were discharging spores during the latter half of April. So we may conclude that in *Mnium sylvaticum* the time from the maturity of the antheridia and archegonia and their contents to the maturity of the sporophytes is about ten months.

Mnium affine ciliare grows in nearly the same places as *M. sylvaticum*. The shedding of the spores from the sporophytes of *Mnium affine ciliare* was recorded for May 16th. On May 23d antheridia were open and discharging sperm mother cells. The motile sperm cells were very active. This is a dioicous moss. On June 5th, four archegonia of one tuft were open, and on June 20th in one archegonial head eight archegonia were dark, dead, five were open and two were not open but bright. On July 14th, in one archegonial head all but two were dark. In another all but one were dark. These living ones were about three times as tall as the dead ones. They were bright green nearly to the tip. These were the new sporophyte plants. On September 22d the new sporophytes could be plainly seen. Nov. 5th they were $\frac{5}{8}$ inches high. The stems were reddish brown to the calyptra underneath which they were bright green. During November the moss plants put forth a vigorous growth of stem and leaf.

From the season's observations *Mnium affine ciliare* appears to begin to mature its sperm and egg cells in the latter part of May, continuing the work through most of June, and the sporophyte maturity comes during the following May. So for *M. affine ciliare* the time from the maturity of the antheridia and archegonia and their contents to the maturity of the sporophytes is about eleven months.

Mnium Drummondii.—Closely associated with *M. affine* in locality, and closely resembling it in appearance was a bisexual moss which I took to be *M. Drummondii*. This moss was shedding spores on May 16th, as was *M. affine*. On May 30th in one head, showing both archegonia and antheridia two archegonia were open. No antheridia were open. On June 1st, another head was examined, a few archegonia were open but more were closed. All the antheridia were closed. On August 9th, four little sporophytes were seen with the aid of a hand-lens in one head of *M. Drummondii*.

I have no later observations on this moss. But these observations indi-

cate the fruiting seasons to be the same as in *M. affine ciliare*, with a period of eleven months from the maturity of the antheridia and archegonia and their contents in June, to the maturity of the sporophotes in the following May. This similarity of location, appearance and fruiting time between *M. affine ciliare* and *M. Drummondii* suggest the question of relationship between them, and if there is a relationship how close is it?

The question will lend an added interest to the observations of the coming season.

Burlington, Vermont, Feb. 28, 1906.

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THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES
HEPATICIS AND LICHENS

EDITOR
ANNIE MORRILL SMITH

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ALSO OFFICIAL ORGAN OF
THE SULLIVANT MOSS CHAPTER

EDITOR

MRS. ANNIE MORRILL SMITH

ASSISTED BY

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THE SULLIVANT MOSS CHAPTER

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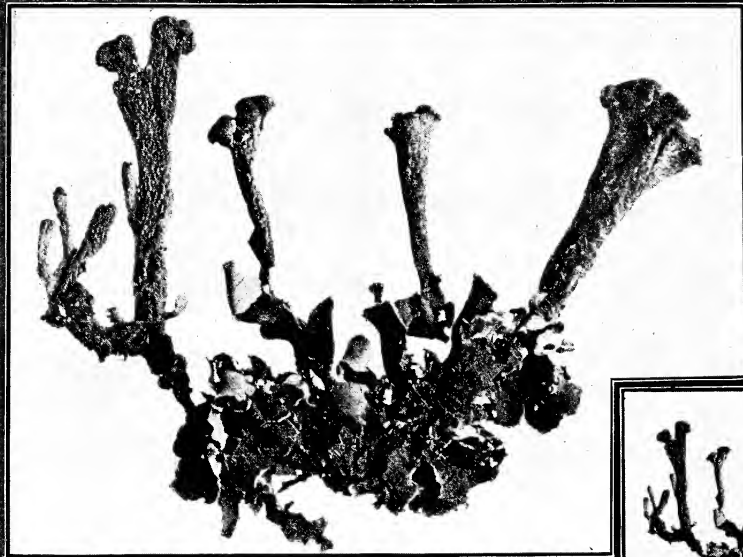


FIG. 1.A.



FIG. 1.B.

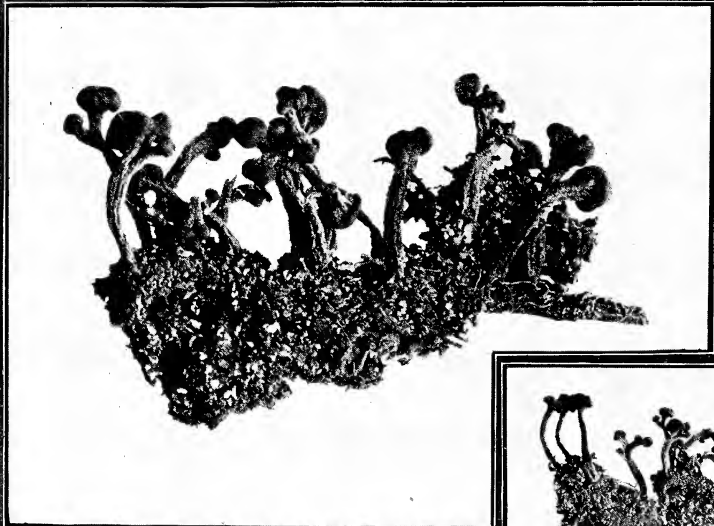


FIG. 2.A



FIG. 2.B.

PLATE IV. Fig. 1. *Cladonia subcariosa*, a. $\times 3$. b. Nat. size.
Fig. 2. *Cladonia mitrula*, a. $\times 3$. b. Nat. size.

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FURTHER NOTES ON CLADONIAS. VII.

Cladonia subcariosa, Cladonia mitrula and Cladonia leptophylla.

BRUCE FINK.

Perhaps the first of our three species to be considered in this paper might better have been disposed of in the last paper of this series with *Cladonia cariosa*, to which species it is closely related. It certainly would seem that *Cladonia mitrula*, a very characteristic and common American species, should have first place in the considerations of the present paper; and this species must be regarded as the central and important feature, the other two species as yet being very rare North American forms. However, in spite of its relative unimportance to the student of our Cladonias, *Cladonia subcariosa*, because of its closer relation to the species considered in the last paper, is entitled to first place in the caption, and in the considerations to follow.

CLADONIA SUBCARIOSA (Nyl) Wainio Mon. Clad. Univ. 2:38. 1904. Primary thallus persistent or rarely disappearing, composed of subdichotomously divided, irregularly lacinate or crenate sinuate, flat, ascending or suberect, aggregated squamules, which are large or medium sized, 3-17 mm. long and nearly as wide, sea-green above or varying toward ashy or olivaceous, below whitish or finally dirty-brownish especially toward the base, the cortex continuous and no soredia present. Podetia arising from the margin, or rarely from the upper surface of the squamules, about 5-15 mm. long (rarely 30 mm.) and .5-4 mm. in diameter, subcylindrical or thickened toward the top, cupless and always terminated by apothecia, simple or rarely furcate and often very shortly digitate, sides entire, finally fissured or rarely conspicuously rimose, the axils likewise usually closed or at length fissured, clustered or scattered, suberect or rarely ascending, cortex subcontinuous or areolate, the areoles when present subcontinuous or quite close and scarcely elevated or elevated wart-like, without squamules or soredia or rarely sparsely squamulose, dull sea-green varying toward olivaceous or greenish, or the decorticate portions pale or whitish. Apothecia usually medium sized, .5-4 mm. in diameter, clustered-conglomerate, often somewhat lobed at the apex of the podetia or on their short branches, soon becoming convex and immarginate, brown or perhaps rarely varying toward reddish. Hypothecium pale. Hymenium brownish above and pale or brownish below. Paraphyses simple or rarely branched toward the thickened and brownish apex. Asci clavate or cylindrico-clavate.

This species may best be known from *Cladonia cariosa* by the larger squamules and by their shorter, unbranched or slightly branched podetia, which show a less marked carious appearance and less commonly and conspicuously

fissured sides and axils. The present species also bears a strong resemblance to the next below, from which it may be distinguished by the larger squamules and by the stouter, more nearly continuously corticate and sometimes more loosely apically branched, lighter colored podetia. Reference was made in the last paper to specimens called *Cladonia symphy carpia* Fr., by American workers, and referred to *Cladonia cariosa* by Dr. Wainio, to whom the material was submitted by the present writer. However, some of these specimens with large or very large and much cut squamules, Dr. Wainio referred to *Cladonia subcariosa*, and this, in one or two instances, with few podetia, thus depending mainly upon the squamules, which in these specimens, at least, are very markedly different from those of *Cladonia cariosa*. By way of illustration of the squamules of the present species we give a few of these squamules from the plant noted below and collected in the Lookout Mountains by W. W. Calkins (his No. 85 of "North American Lichens") and distributed by him as *Cladonia symphy carpia* Fr. For the podetia we give illustration from a few separated from cespitose clusters as exhibited in a specimen in the writer's herbarium, collected in Germany by Dr. F. Arnold, in 1897, which illustrates the podetia much better than any American material at hand (Plate IV. fig. 1, b).

On earth, especially on sand in open places. Determined by Dr. Wainio from the writer's herbarium as follows: Tacoma Park, D. C. (collected Mabel E. Williams), and distributed in "Lichenes Boreali-Americani" (No. 178) as *Cladonia symphy carpia*, and Lookout Mountains, collected by W. W. Calkins, who distributed it in his "North American Lichens (Nos. 85 and 94) as *Cladonia symphy carpia*. As for further North American distribution, Dr. Wainio adds Massachusetts, Texas and some adjacent islands. Known in all grand divisions.

CLADONIA MITRULA Tuck. in Darl. Fl. Cestr. 444. 1853. Primary thallus commonly persistent, composed of subdichotomous, irregularly or subdigitately lacinate or crenate, flatish, ascending or suberect, clustered, small or middling sized squamules, which are 1.5-4 mm. in length and nearly or quite as wide, ashy to sea-green above and whitish below. Podetia arising from the margin or from the surface of the squamules, 3-12 mm. long and .4-1.6 mm. in diameter, cylindrical and cupless, always terminated by apothecia, simple or branched toward the apex, the branches erect or spreading, sometimes fissured longitudinally, the axils sometimes open, clustered or subsolitary, erect, context continuous or composed of contiguous or subcontiguous areoles, or rarely partly decorticate and somewhat sorediate, sometimes sparingly squamulose, ashy to sea-green or the decorticate portions whitish. Apothecia small or middling sized, 1-2 mm. in diameter, solitary or clustered, sometimes perforate, at first flat and marginate but usually becoming convex and immarginate, brown varying toward paler or reddish-brown. Hypothecium pale or brownish. Hymenium pale or brownish below, and brownish above. Paraphyses usually simple, commonly thickened and brownish toward the apex. Asi clavate (Plate IV. Fig. 2, a. b.).

On naked earth, frequently sandy soil, or rarely on old tree trunks in

more shaded places. Distributed throughout the United States, especially southward, being replaced largely northward by *Cladonia cariosa* (see last paper), but reported as far north as Alaska ("Lichens of Alaska," by Clara E. Cummings). Examined by the writer from Massachusetts (Clara E. Cummings and Henry Willey), Maryland (T. A. Williams), North Carolina (C. Russell), South Carolina (H. A. Greene), Lookout Mountains in Tennessee (W. W. Calkins, who distributed it as *Cladonia cariosa*), Florida (W. W. Calkins), Louisiana (A. B. Langlois), Ohio (E. E. Bogue), Illinois (G. P. Clinton, W. W. Calkins and Bruce Fink), Iowa and Minnesota (Bruce Fink), Missouri (C. Russell and B. F. Bush), Nebraska (T. A. Williams), and British America (J. Macoun). Dr. Wainio's Monograph would add Texas, New Jersey, New England, Pennsylvania and Mexico. Known also in South America.

Dr. Wainio calls the typical form on earth *Cladonia mitrula imbricata* (Nyl) Wainio, and says the form on trees in somewhat open places is *Cladonia mitrula abbreviata* Wainio Mon. Clad. Univ. 2:16. 1894. The last he cites from Brazil, and distinguishes it by smaller podetia, which are only .5-5 mm. long and .3-.5 mm. in diameter. We may well look for this diminutive form in our territory.

H. A. Green's specimen from South Carolina, referred to *Cladonia cariosa*, is perhaps nearer the present species.

CLADONIA LEPTOPHYLLA (Ach.) Flk. Clad. Comm. 19. 1828. Primary thallus commonly persistent, composed of subrotund, entire, crenate or rarely incised, flat or more or less convex, appressed or ascending, clustered squamules, which are .5-2 mm. in length and width, whitish or pale sea-green above and pale below. Podetia arising from the surface of the primary thallus, 2-9 mm. long and 1-2 mm. in diameter, subcylindrical, cupless, always terminated by apothecia, simple or rarely fastigiately branched and the branches suberect, the sides commonly more or less open, the axils sometimes fissured, clustered or scattered, erect, commonly decorticate and more or less finely soerediate, rarely more or less squamulose, whitish or pale sea-green. Apothecia small or middling sized, 1-3 mm. in diameter, subsolitary at the apices of the podetia or on the branches, commonly convex and immarginate, brown or pale reddish brown. Hypothecium pale or pale-brownish. Hymenium pale or pale-brownish below and brownish above. Paraphyses commonly simple and frequently thickened and brownish toward the apex. Asci clavate or cylindrico-clavate.

This species is by no means easily distinguished from the last from any description. But the squamules are only about half as large, are not so irregular in form and are never suberect, being flat or ascending. The podetia are on the whole shorter and thicker, and more inclined to ecorticate and soerediate conditions. The first material sent to Europe by the present writer was sent to L. Scriba, who sent part of it to Dr. Wainio. It was sent as *Cladonia mitrula*, to which Scriba agreed, Wainio calling it *Cladonia leptophylla*. The writer afterward submitted again to Dr. Wainio material from a packet, which Mr. Scriba had returned to him with some European cladonias, the packet being part of the material originally sent to Scriba, collected all in

one cluster on a clay bank. Dr. Wainio this time called the material *Cladonia mitrula*. This statement is submitted primarily to show that the species is difficult to distinguish and that the Iowa material is not certain, and in no sense to cast reproach on the work of any other lichenist. It is only those of very limited experience in taxonomic work, or who have very poor powers of observation, who suppose that a really good worker may not sometimes make different diagnosis of material that is intermediate between two species, the difference being due rarely to incomplete consideration of every diagnostic character, and no doubt more often to the fact that material from the same *Cladonia* cluster may often show a considerable amount of variation.

Material from Battle Lake and Leaf Hills, in Minnesota, collected by the present writer, is like the Iowa material, which is in turn doubtful. Henry Willey reported the species in his "New Bedford Lichens," but Dr. Wainio seems not to have known of this material. Dr. Wainio cites a single American specimen in his Monograph. This is cited doubtfully from Carolina. Thus there is room for doubt as to whether this species has really been found in America. The plant occurs on soil, especially clay, and is known in Europe and Asia. Grinnell, Iowa.

MOUNTING MOSSES—SOME HINTS.

J. FRANKLIN COLLINS.

In the September, 1903, issue of this journal Mr. Chamberlain described the method which was employed a few years ago to fasten moss envelopes to herbarium sheets in the Brown University Herbarium. It may be of interest to readers of *THE BRYOLOGIST* to learn of the method which has superseded it. The latter method has been used more than two years in the University Herbarium, as well as in my own private one. Gummed wafers are utilized instead of pins. The particular wafers which we use are made of a half-inch circle of white paper, well gummed on both sides. They may be obtained for a few cents a thousand from almost any stationer. To use them to the best advantage a single wafer is grasped by the edge, with slender pointed forceps, and moistened on both sides. It is then thrust between the envelope and mounting paper, the former having been placed in the proper position on the latter before the wafer is moistened. A firm finger-pressure for one or two seconds over the wafer is sufficient to cause it to adhere securely. The forceps points are withdrawn as soon as the pressure with the finger is applied. Unless the envelope is a large one a single wafer is generally sufficient.

In case the envelope has to be transferred to another sheet it is instantly removed by one sweep of a paper knife, or other blunt-edged instrument, beneath the envelope. The wafer usually splits, leaving part on the sheet and part on the envelope. This slight disfigurement of the sheet, which is often soon covered by another envelope, may be regarded by some as an objection to the use of the wafers. This disfigurement only occurs, however, when

an envelope has been removed, and even then is not much greater than that caused by several pin holes and the accompanying wrinkles in the paper. To the writer the only real argument against the use of the wafer lies in the fact that when an attached envelope is grasped by the edges and lifted away from the paper (a condition which never ought to occur, perhaps, in a carefully handled herbarium) the wafered envelope is—as is shown by tests—much more easily detached than the pinned one: the ratio of energy required to detach it being 1.6. To offset this, when an attempt is made to detach an envelope by pulling it along the surface of the sheet without lifting it, the wafered one necessitates more than twice the energy required by the pinned one (7:3). The advantage is also most decidedly with the wafered envelope (10-15:1) when a twisting strain is applied.

Some of the obvious advantages in using wafers—when compared with pins—are as follows: The envelope does not have to be opened when it is being fastened to the sheet, nor during its removal; the wafered envelope is more quickly and easily fastened, and its removal is even more quickly accomplished; the wafers cost considerably less than the pins; neither paper nor envelope is perforated; the back of the sheet is smooth, with no pin shanks to rub specimens beneath. Although the pin shanks rarely harm specimens beneath, the *danger of their doing so exists nevertheless*.

In a moss herbarium which is to be constantly consulted there are obvious advantages in having a portion of each specimen mounted on the herbarium sheet, outside the envelope. Much time, which would otherwise be utilized in opening and closing envelopes, is thus saved. This is really quite an item when one's time is all too limited, and a hand-lens examination of several or many specimens becomes necessary or desirable. The writer's method of mounting such specimens is not essentially different from that in common use for mounting seed-plants in most of the large herbaria. Liquid glue is brushed in a thin layer over a plate of glass. For mosses this glass need not necessarily be larger than 6 x 8 or 8 x 10 inches. Into this film of glue the specimen is pressed until the glue touches the essential portions of the under surface of the specimen. The latter is now lifted with forceps and laid on the mounting sheet in the position desired, and finally a suitable light pressure applied until the glue sets. A few words of caution to those who have never used this method for mounting mosses may be helpful. The commercial liquid glue should be diluted more or less, as experience dictates, with either water or vinegar—about equal parts of glue and vinegar is the proportion commonly used by the writer. It must be borne in mind that water and vinegar moisten the moss and often cause more or less of a change from the typical dry state in such parts as come in contact with either fluid. Consequently, care should be taken to allow only the lower surface of the specimen to touch the glue-covered plate. It is almost equally important not to allow the specimen to remain in contact with the glue longer than required to touch the desired parts, as otherwise there is danger that the glue will creep or filter through to the upper surface of the specimen—not only moistening that surface but often leaving unsightly films or spots. This is a simple

and efficient method of mounting *most* mosses, especially such as have been somewhat flattened while drying under slight pressure. At certain other times it may be more advantageous to apply the glue directly to the back of the specimen.

Many bryologists have been exceedingly annoyed by the disfiguring particles of sand or soil which rattle or rub out from the matted stems and rhizoids of certain mosses, when mounted on paper. This annoyance is especially pronounced in plants which grew on sandy or clayey soil, or in such plants as *Bruchia*, and others of similar habitat, where it is desirable to retain, with the plant in the herbarium, a block of clayey substratum. Fortunately, there is a simple method of mitigating this evil and, in most cases, of entirely overcoming it. After the specimen is mounted in the ordinary way apply a few drops of diluted white shellac to the parts which are expected to prove troublesome in this respect. Care should be taken to apply the shellac to only one side of the substratum (not to the specimen) or an unsightly shiny spot *may* be evident when the solution dries. The writer has on his work table a small (1 oz.) reagent bottle with a rubber-topped dropping tube. This bottle is about half full of a mixture of shellac (1 part) and 95 per cent. alcohol (about 3 parts) which is used for the purpose mentioned. If, after drying, a thin film of shellac is obvious on the substratum or specimen, it is probably due to the fact that the shellac was not sufficiently diluted, or else too much of it was used. The moral is obvious. In most cases dissections will be made from specimens left in the envelope. Sometimes, however, it may become necessary to dissect specimens which have been treated with shellac. The preliminary application of a few drops of alcohol, or even a rinsing in that fluid, is then advisable. Providence, Rhode Island.

A LIST OF HEPATICS

Collected in the Vicinity of Little Moose Lake, Adirondack League Club Tract, Herkimer Co., New York.

BY CAROLINE COVENTRY HAYNES.

Marchantiaceae

Conocephalum conicum (L.) Dumort.

Marchantia polymorpha L.

Metzgeriaceae

Riccardia latifrons (Lindb.) Lindb.

“ *sinuata* (Dicks.) Trevis

Metzgeria conjugata Lindb.

Pellia epiphylla (L.) Corda

Jungermanniaceae

Bazzania triangularis (Schleich.) Lindb.

“ *trilobata* (L.) S. F. Gray

Blepharostoma trichophyllum (L.) Dumort.

Cephalozia bicuspidata (L.) Dumort.

“ *curvifolia* (Dicks.) Dumort.

- Cephalozia divaricata* (Smith) Dumort.
" *lunulæfolia* Dumort.
" *myriantha* Lindb.
" *serriiflora* Lindb.
Chiloscyphus ascendens Hook. & Wils.
" *polyanthos rivularis* (Schrad.) Nees
Cololejeunea Biddlecomiæ (Aust.) Evans
Frullania Asagrayana Mont.
" *Eboracensis* Gottsche

Jungermanniaceae

- Geocalyx graveolens* (Schrad.) Nees
Harpanthus scutatus (Web. & Mohr.) Spruce
Jamesoniella autumnalis (DC.) Steph
Jungermannia lanceolata L.
Kantia trichomanis (L.) S. F. Gray
Lejeunea cavifolia (Ehrh.) Lindb.
Lapidozia reptans (L.) Dumort.
Lophocolea heterophylla (Schrad.) Dumort.
Lophozia alpestris (Schleich.) Evans
" *barbata* (Schrad.) Dumort.
" *gracilis* (Schleich.) Steph.
" *incisa* (Schrad.) Dumort.
Marsupella emarginata (Ehrh.) Dumort.
Nardia hyalina (Lyell.) Carringt.
Plagiochila asplenioides (L.) Dumort.
Porella platyphylla (L.) Lindb.
Ptilidium pulcherrimum (Web.) Hampe.
Radula complanata (L.) Dumort.
Scapania apiculata Spruce
" *nemorosa* (L.) Dumort.
" *subalpina* (Nees.) Dumort.
" *undulata* (L.) Dumort.
Sphenolobus exsectæformis (Bridl.) Steph.
" *exsectus* (Schmid.) Steph.
" *Hellerianus* (Nees) Steph.
" *Michauxii* (Web.) Steph.
" *minutus* (Crantz.) Steph.
Trichocolea tomentella (Ehrh.) Dumort. New York City.

A LIST OF MOSSES.

Collected on the Adirondack League Club Tract, Herkimer Co.,
New York.

BY ANNIE MORRILL SMITH.

- Amblystegium minutissimum* Sull. & Lesq.
" *radicale*, Beauv.

- Amblystegium serpens* B. & S.
Anomodon apiculatus B. & S.
“ *attenuatus* Hueben.
Brachythecium accuminatum (Hedw.) Kindb.
“ *flexicaule* Ren. & Card.
“ *lætum* B. & S.
“ *plumosum* B. & S.
“ *rivulare* B. & S.
“ *rutabulum* B. & S.
“ *salebrosum* Hoffm.
Bryum binum Schreb.
“ *nutans* Schreb.
“ *pendulum* Schimp.
Buxbaumia aphylla L.
“ *indusiata* Brid.
Campylium hispidulum Brid.
Catharinea angustata Brid.
“ *undulata* W. & M.
Ceratodon purpureus Brid.
“ *minor* Aust.
Climacium Americanum Brid.
Cynodontium virens Wahlenbergii B. & S.
Dicranella heteromalla Schimp.
Dicranum Drummondii Muell.
“ *flagellare* Hedw.
“ *fulvum* Hooker.
“ *fuscescens* Turn.
“ *longifolium* Hedw.
“ *montanum* Hedw.
“ *scoparium* Hedw.
“ “ *squarrosum* Sull. & Lesq.
“ “ *scoparoides* Schimp.
“ *undulatum* Turn.
“ *viride* Schimp.
Dicranodontium longirostre B. & S.
Eurhynchium strigosum Hoffm.
Fissidens adiantoides Hedw.
Fontinalis antipyretica gigantea Sulliv.
“ *Dalicularica* B. & S.
Funaria hygrometrica (L.) Sibth.
Hedwigia ciliata Ehrh.
Hylocomium parietinum Lindb.
“ *proliferum* (L.) Lindb.
“ *Schreberi* DeNot.
“ *triquetrum* (L.) Lindb.
Hypnum chrysophyllum Brid.

- Hypnum crista-castrensis* L.
“ *curvifolium* Hedw.
“ *fertile* Sendt.
“ *Haldanianum* Grev.
“ *hispidulum* Brid.
“ *imponens* Hedw.
“ *palustre* Hedw.
“ *pratense* Koch.
“ *reptile* Rich.
Leucobryum albidum (Brid.) Lindb.
“ *glaucum* (L.) Schimp.
Limnobia molle Dicks.
Mnium affine Bland.
“ “ *elatum* B. & S.
“ *cuspidatum* Hedw.
“ *punctatum* Hedw.
“ *rostratum* Schwaegr.
“ *spinulosum* B. & S.
“ *subglobosum* B. & S.
“ *sylvaticum* Lindb.
Neckera oligocarpha B. & S.
“ *pennata* Hedw.
Plagiothecium demissum Limpr.
“ *denticulatum* (L.) Sch.
“ *depressum* Dixon.
“ *latebricola* Sch.
“ *Muhlenbeckii* Sch.
“ *pulchellum* (Dicks.) Sch.
“ *silesiacum* B. & S.
“ *striatellum* Lindb.
“ *sylvaticum* (Huds.) Sch.
Pogonatum brevicaulis (Menz.) E. G. B.
“ *urnigarum* Beauv.
Polytrichum commune L.
“ *gracile* Menz.
“ *juniperinum* Willd.
“ *Ohioense* Ren. & Card.
“ *piliformum* Schreb.
Pylaisia intricata Schimp.
Sematophyllum recurvum (Michx.) E. G. B.
Tetraphis pellucida Hedw.
Thuidium scitum aestivale Aust.
Trematodon ambiguus Hornsch.
Ulota crispa Brid.
“ *Ludwigii* Brid.
Thuidium delicatulum Best.

Thuidium microphyllum (Lindb.) Best.

“ *recognitum* B. & S.

Sphagnum cymbifolium (Ehrh.) Hedw.

“ *squarrosus* Pers.

“ *acutifolium* Ehrh.

“ “ var. *rubellum* (Wils.) Russ.

“ “ “ *quinquefarinum* Lindb.

“ *intermedium* Hoffm.

“ *cuspidatum* Ehrh.

Brooklyn, N. Y.

LICHEN NOTES No. 3.

“Chemical Tests” in Determining Lichens.

G. K. MERRILL.

In 1866 the late Dr. William Nylander published the results of his experiments regarding the behavior of certain aqueous chemical solutions, when applied to the cortical and medullary layer of the lichen thallus. The chemical menstrua found most effective and useful were potassium-hydrate and calcium hypochlorite, symbolized as KHO and CaCl. The results obtained hinged on a capacity of the solutions employed to produce a coloration on application to that portion of the thallus to be tested. Dr. Nylander claimed to have found that different lichen species were differently affected by the reagent employed, but that individuals of one species were constant in the production of a given reaction. The object of the test was to assist “in not only the discrimination of many difficult and closely allied species, but also in associating varieties with their proper species, and in some instances in defining the affinities of genera.”

The novelty of constituting botanical varieties on purely chemical grounds aroused antagonism at the time, which has persisted more or less to the present day, but the unquestionable value of the discovery as an aid in the determination of established species, made converts of nearly the whole body of European lichenists. Among those to negative the value of “chemical tests” from the first, was the late Prof. Edward Tuckerman, and it is regretfully stated that his views were adopted with great uniformity by the later American investigators. It will be of interest to quote from the published words of those Americans who have written on this topic.

In the American Naturalist for April, 1868, Tuckerman first voiced the disapproval, and we will selectively quote from his paper. Under the caption, “Can Lichens be Identified by Chemical Tests?” he says: “I have gone through a large part of my North American and exotic lichens in the light afforded by these (Nylander’s) experiments and found the facts, if sometimes suggestive of more than is stated, generally clear; much clearer than the value attributed to them. Is it not indeed safe to say at once that species are not determined in botany by such tests?” “The observations cited are however incomplete; and derive from this not a little of their inter-

est. *Parmelia perlata* is thus said to differ from its var. *olivetorum* Ach. by failing to show any red tinge with chloride of lime, the difference already recognized being regarded as sufficiently corroborated by the new one. But all specimens of *P. olivetorum* are not so distinguishable. It is much the same with *P. laevigata* and its var. *revoluta* Nyl. (Syn. p. 385), the last being now taken and on better evidence to be distinct in species from the first. We have here a better marked difference in botanical character, one which commended itself as sufficient to Floerke, and at one time to Borrer; and there seems to be no doubt that the original *P. revoluta* Flk. is discrepant from common states of *P. laevigata* in the chemical respect also."

The learned author goes on to say that all his European specimens of *P. tiliacea* afford a distinct reaction, with which only two or three of the relatively abundant American forms are concurrent. He also finds that Arctic, Tropical and Texan forms of *P. caparata* give a plus reaction when they should be minus; that *P. physodes Japonica* Tuckerm. is plus when the *physodes* group is conceded to be minus; and that while *P. Borreri* is recorded as plus, no reaction is observable with the specimens in his herbarium. The concluding lines of the paper are interesting, for Tuckerman affirms that, "these results given with due respect to the experienced authors whose observations have been considered, sufficiently indicate that the writer inclines to emphasize the doubts with which Dr. Fries has received the supposed new criteria of distinction. It remains none the less likely from what evidence we have that the reagents named, capable as they are of instructive application to imperfect fragments, may sometimes afford clues to affinity where there is little to direct; and thus deserve a place besides the better known solution of Iodine on our working tables."

In the Genera Lichenum, 1872, Tuckerman in discussing the tendency of the Europeans toward species splitting, reiterates his disapproval of chemical tests. Referring to what he terms a "laxity of conception" regarding specific delimitation, he says, "This is seen at least in the very generally assumed value of recent experiments on the behavior of lichen-tissues with certain chemical tests: species having come at last to have no other meaning than a chemical one; namely, that they exhibit (so far, it is important to say, as the examination has gone) a different reaction from forms with which, in every other respect, they are admitted to agree."

In his Synopsis, Pt. 1, 1882, Tuckerman makes no general allusion to chemical tests, such remarks as are noted being limited to instances of perversion from the recorded results of the Europeans. It is easy to see that chemical tests are viewed with hostility, although his attitude is evidently a passive one. In an extract from the Botanical Gazette, April, 1896, Mr. Henry Willey, of New Bedford, Mass., briefly takes up the matter of chemical tests in relation to the genus *Parmelia*. The paper, which is entitled, "Notes on Some North American Species of *Parmelia*," catalogues the reactions for a number of species, the reagents employed being potassium-hydrate and calcium hypochlorite. Willey remarks, "Of the chemical relations I am unable to attach absolute specific value to them. There are

exceptions to their constancy, some of which were pointed out by Tuckerman in a paper in the *Am. Nat.*, April, 1868. It is possible that a lichen may possess different chemical constituents at different stages of growth, or under different conditions of soil, climate, etc. Experiment on the same plant at different periods of its development is necessary to confirm the deductions from simple examination. Still, the reactions appear to be constant in most of the species of *Parmelia* and may serve as an aid in their determination, while the exceptions remain to be accounted for. Where there appears to be an exception we may best say that *perhaps* the specimen belongs to a distinct species."

Prof. Albert Schneider, in his *Text Book of Lichenology*, 1897, says of chemical reactions: "For some years the chemical behavior of lichens to certain reagents has been considered of great importance in delimiting species. After careful testing I have finally decided to abandon the use of these reagents since they are practically valueless for the purpose recommended. That there are marked chemical reactions cannot be denied: for example, the blue Iodine reaction of the thecial wall of the majority of lichens. This reaction is, however, so general in its occurrence that it cannot possibly be of any value in establishing species, and the coloration varies in different individuals of the same species, or even of the same plant at different periods of development. The same may be said of the other reactions as those with solutions of potassium-hydrate and calcium hypochlorite. That these reactions should be unreliable is evident when we consider the life history of lichens; different individuals of one and the same species may develop on substrata of widely different composition. These chemically different substances adhere to the lichens, and some soluble constituents are also taken up by the fungal symbiont which accounts for the difference and unreliability of the chemical reactions.

Prof. Bruce Fink, in his Presidential address to the Iowa Academy of Sciences, pays his respects to the subject through an allusion to Dr. Nylander. He says: "Nylander was doubtless too much given to species making, and it is unfortunate that he depended too much on chemical tests in his determinations." A few pages further on Fink, in alluding to Tuckerman's expressed opinion of the unreliable nature of chemical tests adds, that such is "a view which I suppose meets the approval of later lichenists generally, since we have reached more definite knowledge regarding the anatomy of these plants." In another paper presented before the same Institution entitled, "Notes on American *Cladonias*," Prof. Fink says, "as to chemical tests it is extremely doubtful whether they are of diagnostic value in any lichen." The writer will add to these excerpts of American opinion on chemical tests, the information communicated by Prof. W. G. Farlow, of Harvard University, that Tuckerman "never changed his opinion in later years with regard to use of chemical tests in distinguishing species of lichens. He did not consider that species could be distinguished in that way."

To summarize the foregoing expressions of opinion is to assort belief into two groups. Schneider and Fink are associable in the first, for both repu-

ciate chemical tests altogether. Tuckerman and Willey comprise the second, each conceding the chemical test to be of more or less value in determining established species, but dissenting from the view that the establishment of specific botanical varieties on chemical grounds is possible without such are confirmed by morphological characteristics. The writer has no personal knowledge of the extent to which Fink and Schneider have carried their experiments with reagents. The latter indeed says that his investigations were pursued to a point where he was convinced of their futility, but Fink fails to specify. It might be assumed from the fact that neither gentleman is at all reserved in his statements, that they have delved deeper than did Tuckerman or Willey. It would be an interesting contribution to American lichenological literature if one or both should set forth *ab initio* the successive discoveries leading to their conclusions as published.

With the guardedness which was characteristic of the man, Tuckerman, in the 1868 paper, after having boldly condemned chemical tests, is finally found to qualify his conclusions. In the concluding lines he admits that the "instructive application of reagents to imperfect fragments might sometimes afford clues to affinity." If chemical tests may be relied on in determining fragments, it is suggestive that if the investigator were working on a satisfactory specimen the results might be proportionally superior.

Dr. Th. M. Fries, whom Tuckerman quotes as offering opposition to the new tests, according to Leighton soon came to believe in their value, and his personal experiences are found incorporated in "Lichenes Spitzbergenses," and "Lichenographia Scandinavica." After Tuckerman's death Willey entered into closer relations with the European lichenists. One result of his correspondence with Nylander may be gathered by a perusal of the notes on *Parmelia*, l. c. In this paper Willey states that "there appear to be known about forty species" of *Parmelia* in North America, as contrasted with nineteen mentioned in Tuckerman's Synopsis. He acknowledges that many of the new names were the result of Nylander's examination of New Bedford and other material, and that the separation hinged on "chemical or other grounds." The paper contains some admissions that might easily be taken as evidence that Willey had shaken off the mantle of conservatism and joined the enemy, if it were not for his explicit statement of inability to "attach absolute specific value" to the chemical relations. All who have had any personal acquaintance with Willey will agree that if he ever attached to the specimens of his herbarium a name prompted by Nylander it was done with full knowledge of the masters' position on the chemical phase of species making; and such a course must be regarded as a tacit avowal of belief. A curious point may be made from Willey's paper to illustrate the notorious diversity of results obtained with reagents in the hands of different experimenters. Tuckerman referred to his results with various species of *Parmelia* to show their discrepancy from published findings; and Willey remarks that the "reactions appear to be constant in most of the species of *Parmelia*," and then adds that the fact "may serve as an aid to their determination." Here is a clear discordance of opinion with no explanation ready at hand. It is

difficult to believe that the lack of conformity is due to a difference in interpretation of fact, nor is it thought to be an effect of similar specific lichen forms furnishing dissimilar phenomena. A possible explanation may be that Willey, under the guidance of Nylander, came to have a better knowledge of *Parmelia* species than did Tuckerman, and a more exact conception of the things to be recognized in chemical testing.

The student on first taking up the subject of chemical criteria is apt to find it difficult to exactly determine what constitutes a satisfactory test. The manuals contain fairly clear directions, but mere words only convey an outline, leaving experience to supply the details. There are some temperamentally unfitted to make use of the tests, and others, solitary workers, without guidance except for the books. Both fail from obvious reasons. In their inception chemical tests were only recommended as aids to the characterization of lichens, and much of the early antagonism to their employment is attributed to a misapprehension of their point. In the *Annals and Magazine of Natural History*, 1869, Rev. W. A. Leighton (Not. Lich. XVIII) in reviewing Dr. Th. M. Fries' *Lichenes Spitzbergenses*, takes occasion to say, "With much satisfaction we observe that the learned author has overcome his prejudice against the application of chemical tests in lichens, and has made ample use of them with very satisfactory results. He, however, still appears to labor under a misapprehension that the advocates of chemical tests wish to inculcate that species may be distinguished by chemical means alone (*hac sola nota*). All that has ever been ascribed to them is that they are most useful and indispensable aids as affording confirmatory characters and in discriminating doubtful or externally allied species. In the *Cladoniae* he has almost uniformly confirmed the results of our own examination of the tribe. But it may be well here to correct a doubt which seems to exist in consequence of the chemical test producing in certain species a slight degree of fuscescence only, by explaining that when the proper reaction takes place it does so instantly, and that the fuscescence which is in some instances observable is not to be regarded as a reaction at all."

In the same publication for 1869, Leighton (Not. Lich. XXIX) again writes, "The student is especially warned against misconception as to chemical tests constituting a sole specific character. All that has ever been asserted respecting them is that they afford an *additional* and *confirmatory specific character*. And in those cases where external characters are similar or approximate, and doubt necessarily exists, their value as such will be abundantly apparent." Leighton then proceeds to quote from a paper by Dr. Nylander, aptly designating the citation as an "admirable caution." The learned Doctor says: "The analysis of lichens made by chemists often fail through the neglect of an exact determination of the species, and probably not less often by the mixture of specimens confounded together and incorrectly assigned to one single species. For the chemist no less than for the physiologist it is of the greatest importance to know exactly what is the plant we have under observation—that is, to have well determined the plant which we are studying." In other words, returning to Leighton, "he must not

place implicit confidence on the attached labels as indicating undoubted accuracy, or on his own preconceived notion of the particular diagnosis, but by careful observation and comparison thoroughly satisfy himself that the plant under review is really that which the label indicates it to be. Then apply the chemical test and doubt will be exchanged for certainty."

Leighton is far from clear in the last sentence—perhaps his meaning is that in the hands of the other experimenters, comparison of their own results with records of accurate work might produce a feeling of certainty. A determination that is established beyond question on other grounds, needs no chemical bolstering. In the light of the foregoing the whole question of the usefulness of chemical tests to lichen students resolves itself on the real or presumed ability and knowledge of whomsoever may have made the primary series of tests. No one will gainsay Dr. Nylander's standing as a lichenist, or question his knowledge of lichen species, whatever the aspect. Is it not reasonable to say as Nylander was learned beyond all men in lichenology, and well enough acquainted with species to be enabled at all times to dispense with chemical tests, that whatever conclusions he reached in his searching investigations into reagents and their application, should be regarded as convincing? If Nylander, or, for that matter, any accomplished lichenist, should examine an extended series of specimens of a morphologically proven species, these from widely separate localities and various substrata, and on application of reagents find that all gave the same coloration, how might the sceptic best refute such results? Would the statement of the doubting one, that in his hands no such uniformity was obtained, have any controversial value? We think not, except to himself. Tuckerman was primarily responsible for the determination of most of our American lichen species, and up to the time of his death very few looked beyond his opinion. It then seems like a violation of things sanctified to express the belief that no small part of the failure of our students to obtain concurrent reactions in tests, has been due to application of reagents to plants of species other than what the investigator supposed he was examining.

The writer will add a few notes on matters of practice in using the reagents. Instead of employing a glass brush as recommended by Leighton, a medicine dropper is used. In cases where no distinct coloration of thallus or medulla is observable on application of the solution, if it is withdrawn from the surface of the specimen within the tube it will sometimes be found tinged and may then be taken for a very delicate test. It is advisable in testing with calcium hypochlorite, after application, to examine the thallus where abraded, with a hand-lens. The coloration is sometimes very faint, and only thus to be distinguished. In conclusion, it may be said that in our hands chemical tests have proven all that the French lichenists assert, but we desire it to be understood that in no way are we in sympathy with "chemical species."
Rockland, Maine.

SULLIVANT MOSS CHAPTER NOTES.

Four names are to be added this month to our list of Chapter Members: Mr. Hollis Webster, 16 Prentiss street, North Cambridge, Mass; Mr. Shutai Okamura, 1st Middle School, Kochi, Kochi-Ken, Japan; Mons. T. Renauld, 3 Rue Miron, Nice, France; Miss Mary A. Brackett, 50 Remsen street, Brooklyn, N. Y. Making our total membership now 175.

TWO ANOMALIES AND A CURIOUS SIGHT.

B. D. GILBERT.

In Dixon's Handbook of British Mosses, under the description of *Leucobryum glaucum*, it is said that "A curious state from Hedsor forms spheroidal balls or cushions, entirely unattached, consisting from stems radiating outwards from a central point, and showing no lack of vigorous growth in spite of the freedom from anything like attachment, which obviously must have lasted for a considerable period." During the summer of 1905 I was on the west branch of the Unadilla River, in the northwestern part of Otsego Co., New York, hunting for mosses. In the hemlock woods a great deal of *Leucobryum glaucum* grew upon the ground. I stooped to pick up a tuft of it, and it proved such a "cushion" as is described in above quotation. It is about $1\frac{1}{4}$ inches deep and $3\frac{1}{4}$ inches across. It is almost perfectly round on the edges, and both above and below the growing ends of the stems are shown. They truly "radiate outward from a central point." The fact, however, which Mr. Dixon did not know, not having seen the plant *in situ*, is that the cushion grew in a matrix of its own diameter and about half an inch deep. But it was entirely unattached to the soil or any substratum, and must have derived its material for growth from the atmosphere and the rain which fell upon it. This is my first anomaly.

In August of the same year I visited Caroga and Canada Lakes in Fulton Co., N. Y. The western end of Caroga Lake is very deep, and the shore is lined with large rocks that extend down into the water so that one can row directly alongside them, and occasionally land upon them. Many mosses grow on these rocks, and one of the rocks in particular, a very large one with a steeply inclined surface, was chiefly covered with *Sphagnum acutifolium*, probably the variety *quinquefarinum*, a short form but well fruited. Dixon says of this moss that it grows "very fine and well marked on wet rocks in mountain woods." The surface of the rock was kept constantly moistened by water that trickled down over it from damp ground above. The anomaly here was that the *Sphagnum* grew freely on a rock which contained no covering of soil. Of course the trickling water explains the apparent anomaly.

The mountains around Canada Lake are much higher than at Caroga, and there several cliffs at the summit. On West Canada, one of the landing places goes by the name of "Big Rock" camp. It is so called from a big rock lying up the hill about forty rods from the water. It is as large as a good-sized house, and probably thirty feet high. The face, which fronts down hill, is nearly vertical, and this front is well covered, from five feet above the ground upward, with separate fronds of the lichen *Umbilicaria Dillenii* Tuckerm. Each drab colored button is centrally attached to the rock from which it is easily detached entire. The edges of the fronds do not touch each other, and the sight of this large surface so completely studded with them is one not often encountered save by the lichenist in search of specimens. The rock appears to be of Plutonic or Archaean origin, and consequently unstratified. I am not familiar enough with lichens to know whether the species is confined to this class of rocks or not, but it grows there with great luxuriance, and is a sight well worth seeing. Clayville, N. Y.



SEPTEMBER, 1906



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES
HEPATICIS AND LICHENS

EDITOR
ANNIE MORRILL SMITH

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MOSESSES, HEPATICS AND LICHENS

ALSO OFFICIAL ORGAN OF
THE SULLIVANT MOSS CHAPTER

EDITOR

MRS. ANNIE MORRILL SMITH

ASSISTED BY

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MISS CAROLINE COVENTRY HAYNES		HEPATICS

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THE SULLIVANT MOSS CHAPTER

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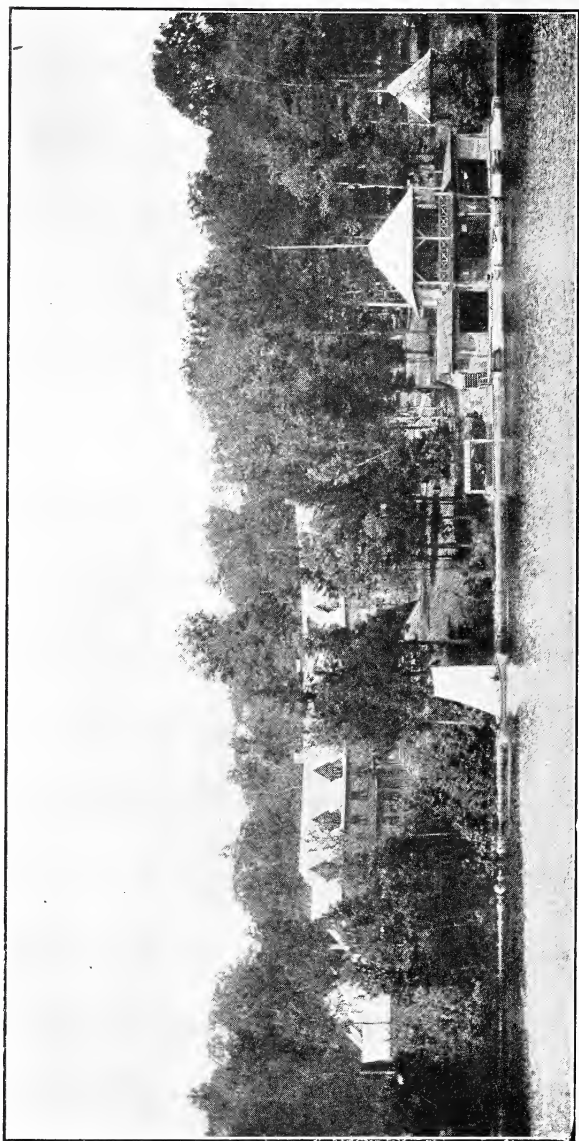


PLATE V.—Mountain Lodge, Little Moose Lake, Adirondack League Club.

THE BRYOLOGIST.

VOL. IX.

SEPTEMBER, 1906.

No. 5.

THIRD BOTANICAL SYMPOSIUM.

JOSEPH CRAWFORD.

The very successful Summer Botanical Symposium, recently held at Little Moose Lake, in the Adirondacks, was a graceful compliment to Mrs. Hugh M. Smith, who not only secured permission for us to use the forest preserve of the Adirondack League Club, but planned expeditions to various points for our special work and maintained the agreeable role of hostess throughout the week, very ably assisted by Miss Masters, another League member.

The headquarters were established in Mountain Lodge, delightfully situated on the north shore of Little Moose Lake, with easy trails in all directions, by land and water, though one or two guides were necessary many times for obvious reasons, with an extra supply to act as ferrymen when the start was made across the lake.

Being a preserve, the forest is intact as far as we could penetrate, and while we reached no great altitude, the highest, Panther Mountain, being only 2460 ft., the northern mountain flora was everywhere evident. The hardwoods were of the maples, beeches and birches; the cone-bearing, the spruces, balsam, arbor-vitæ, hemlock and larch; the undershrubs of hobblebush and huckleberry serving as a cover to the ever-present mountain sorrel and lycopods.

Most of the lakes are deep and protect little vegetable growth, though some small ones with quaking-bog borders were quite prolific in orchids, sundews, heaths and sedges. Ferns were very evident everywhere and ranged from the small moonwort to the enormous fronds of bracken nearly six feet across. The most common fern was the variety *intermedia* of *Dryopteris spinulosa*. The northern orchids were also abundant, many species just approaching the flowering stage. The mosses, hepatics and lichens were remarkably abundant and in excellent condition but we could not add a whit to Mrs. Smith's very complete catalogue of them. Owing to the forest formation the grasses had very slim chances, likewise the sedges except in bogs and other moist places.

It is yet too soon to go into detail of the work done during the week; but the energy displayed then and there will have a great showing from, and including, the porcupine feast and funeral to the continuous mosquito smudge and punkie dope. There is an unwritten law distributed among us that each year we must prove in the field, existence of new species, this year notwithstanding the presence of several well known makers of genera and species there were times when they were out of sight, and the evidence of the amateur became pronounced.

The evening sessions were held in the large room over the boat house and were manifestly interesting, topics of the day's observation and collections so freely discussed that the scientific part of the Symposium lost nothing on account of the sociability which it fostered ; in fact both features have now become so pronounced that there is little doubt that the next meeting will be more than a week's duration.

The whole atmosphere of Mountain Lodge has the greatest homelike moral medium about it, that to breathe it is simply delightful and reflects great credit upon Mr. A. G. Shepard, Jr., the trustee in charge, and on Mr. and Mrs. Studor, the managers, and we trust they may always be so successful in maintaining it. Philadelphia, Pa.

The plate here reproduced is by courtesy of the Club.—ED.

BOOK REVIEW.

A REVISED KEY TO HEPATICS OF THE BRITISH ISLANDS. By Symers M. Macvicar, 20 pp. 8vo. Eastbourne, 1905. Published by V. T. Sumfield, Station street, Eastbourn, @ 9d.

A review of the Census Catalogue of British Hepatics appeared in the March, 1906, number of THE BRYOLOGIST and recently we have received another work by the same author, entitled as above. The Preface contains some useful hints in practical working for the beginner. We have had no chance to tests the keys but they appear to be carefully worked out. As stated they are intended to give beginners an indication to the species so as to enable them to identify their specimens from the description in a text book. A. M. S.

SOME CHARACTERISTICS OF *LOPHOZIA INFLATA* AND *CEPHALOZIA FLUITANS*.

CAROLINE COVENTRY HAYNES.

The above mentioned species with *Lophozia inflata* (Huds.) M. A. Howe var. *heterostipa* Lindb. share the following traits: in being aquatic, though the Lophozias are also terrestrial in habit; in showing the same prostrate manner of growth; in possessing bifid leaves with obtuse lobes; in being dioicous. On closer examination, however, this *Cephalozia fluitans* (Nees.) Spruce, will be found to possess characteristics peculiar to this genus, such as the position of the perianth on a short lateral branch, the numerous stout flagella arising from the axils of the underleaves in a truly postical manner; the linear-fusiform thin perianth with tristichous involucrel bracts toothed at the base, the innermost embracing the perianth.

On the other hand, the delicate flagella of the Lophozias arise variously from the mid-axil of a leaf or from its postical angle; the perianths occur at the apex of a stem or of a long leafy branch; the involucrel bracts are distichous and are similar to the stem leaves, often smaller and are remote from

the perianth, which is so completely exerted as to appear almost stipitate; the perianth itself is pyriform, inflated and obscurely 4-5 plicate only at the very apex, with a mouth connivent, denticulate. This genus shows two methods of reproduction, first, by the branching of shoots and the dying of the stem in between, and second, producing gemmæ on the tips of the leaves. The first method is very limited in *L. inflata*, stems with fertile perianths and those with androecia, also those sterile are generally unbranched; while one or two subfloral innovations are to be found on stems with unfertilized perianths; no gemmæ are found on this species or its variety and it was difficult to understand its wide-spread distribution.

Right here I would like to refer to a very interesting paper on *Lophozia inflata* by Herr Schiffner, published in Ascherson's Festschrift. A translation of this was very kindly furnished me by Miss J. T. Emerson. Dr. Evans, in calling my attention to this paper summarized it as follows: "the deciduous perianths in *L. inflata* really represent organs of vegetative reproduction, new shoots arising from their cells, and he finds that they serve the same purpose in var. *heterostipa* but not in *C. fluitans*." Schiffner says that these easily detached perianths are produced in great profusion and develop normally to the point where the fertilization of the enclosed archegonia takes place; at this stage it is impossible to foretell whether they will become fertile or so called sterile perianths. The slightest touch sufficing to break off these latter, their buoyancy keeps them afloat and they are carried off, some to the shore to which they attach themselves and start growing, sending out rhizoides and shoots which when mature are the typical *inflata*.

The illustrations were made from fresh material furnished me by the following: Miss Lucy MacIntyre, the *L. inflata*, collected in a bog at Long Branch, New Jersey. The abundant perianths were very deciduous, the plants were growing with *Pallavicinia Lyellii* (Hook.) S. F. Gray; the var. *heterostipa* was collected by Mr. A. S. Foster at Hamilton, Wash., and was growing with *Mylia anomala* (Hook.) S. F. Gray, this latter species being new to this state; Miss Annie Lorenz and Mr. E. B. Chamberlain, collected the *C. fluitans* in New Hampshire and Maine, respectively. All these specimens form part of our Chapter Herbarium and it is hoped that students will be on the lookout for these tiny and interesting species and contribute duplicates of their finds.

Highlands, New Jersey.

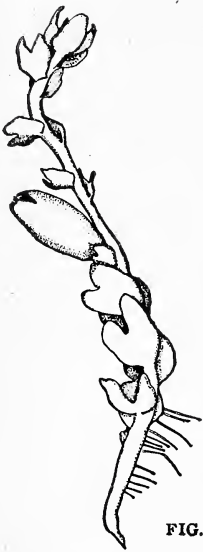


FIG. 1.



FIG. 2.



FIG. 3.

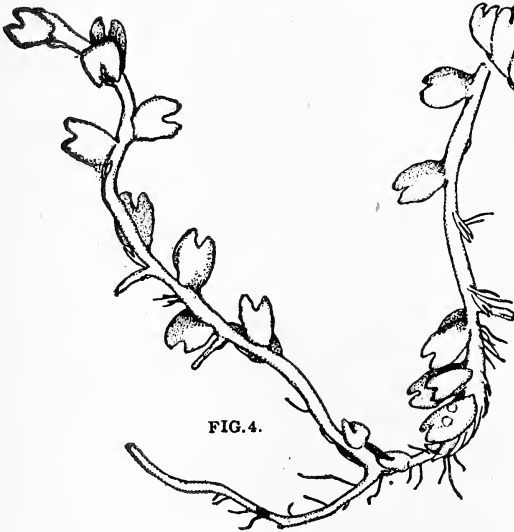


FIG. 4.

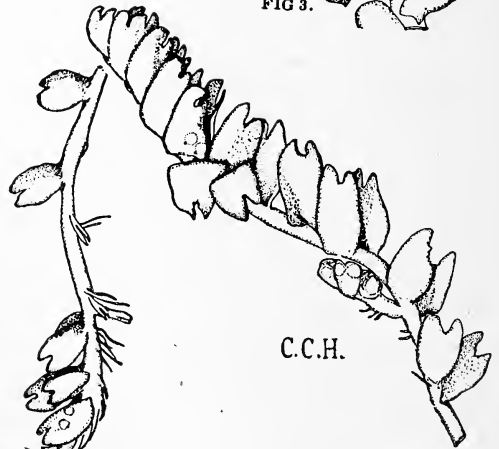


FIG. 5.

C.C.H.

PLATE VI.—Figs. 1 and 2, *Lophozia inflata*. Fig 3, *L. inflata* var. *heterostipa*. Figs. 4 and 5, *Cephalozia fluitans*. All mag. 22 times. Reduced $\frac{1}{2}$.

LEPIDOZIA SYLVATICA.

ALEXANDER W. EVANS.

(Taken from *Rhodora*, September, 1904. For illustration refer to above *Journal*. Plate 57.)

LEPIDOZIA SYLVATICA sp. nov. *L. setacca* Auct. (in part). Growing in more or less compact tufts, often in company with other minute hepatics. brownish or yellowish green, varying to pale green: stems 0.08 mm. in diameter, ascending, irregularly pinnate or bipinnate; leafy branches usually lateral, very rarely postical, obliquely or widely spreading; flagelliform branches scanty, usually postical but sometimes terminating a lateral leafy branch; rhizoids sparsely developed, mostly restricted to the lower parts of the leafy axes and to the flagelliform branches: leaves transversely inserted, distant to loosely imbricated; stem-leaves averaging 0.21×0.18 mm., deeply trifold or quadrid to within two or three cells of the base, segments entire, subulate, usually more or less incurved but sometimes straight and squarrose, two cells wide (rarely three or four cells wide) in basal portion and tipped with a row of from two to four cells; branch-leaves similar to the stem-leaves but smaller and usually bifid or trifold; leaf-cells averaging $16 \times 14 \mu$, walls slightly and uniformly thickened, cuticle smooth or very indistinctly verruculose: underleaves of the stem trifold (or very rarely quadrid) to within one or two cells of the base, 0.15 mm. long, 0.065 mm. wide at base, segments when well developed similar to those of the leaves, one or two of the segments regularly aborted and reduced to one or two cells in length; underleaves of the branches smaller and often only twice divided: inflorescence dioicous: Female inflorescence borne on a very short postical branch, often with no leaves except those of the involucre; bracts and bracteoles in two or three rows, scarcely distinguishable from one another, those of the innermost row ovate, 1 mm. long and 0.35–0.5 mm. wide, usually bifid about one-fourth with acuminate and denticulate or ciliate divisions and a sharp and narrow sinus, rarely undivided, entire or sparingly toothed near base, cells longer and with thinner walls than in the leaves, cuticle more distinctly verruculose; bracts and bracteoles of second and third rows successively smaller and more regularly bifid: perianth narrowly ovoid or cylindrical, 2.7 mm. long, 0.6 mm. in diameter, terete below, bluntly trigonous above, the keels separated by narrow grooves, mouth more or less contracted, ciliate, the cilia one to four cells long and one or two cells wide at the base, cells of the perianth similar to those of the bracts; Male inflorescence borne on a short postical or, more rarely, lateral branch, usually proliferating at the apex into a leafy axis: bracts in four or five pairs, strongly concave, ovate, 0.35 mm. long, 0.2 mm. wide, bifid about one-half, the divisions acuminate, short-ciliate on the margins. sinus sharp, bracteoles mostly bifid with subulate divisions; antheridia solitary, oval; yellowish brown, 0.9 mm. long, 0.5 mm. in diameter: spores minutely verruculose, yellowish brown, 12μ in diameter; elaters reddish brown, with two spirals, 9μ in diameter.

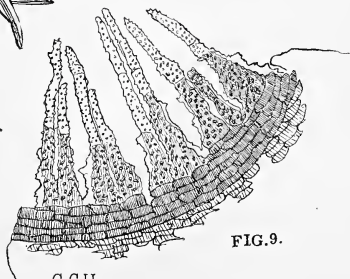
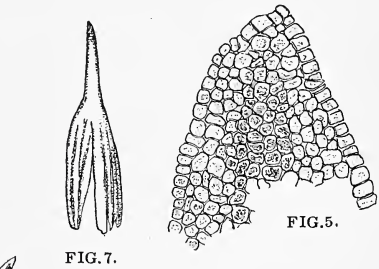
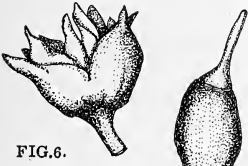
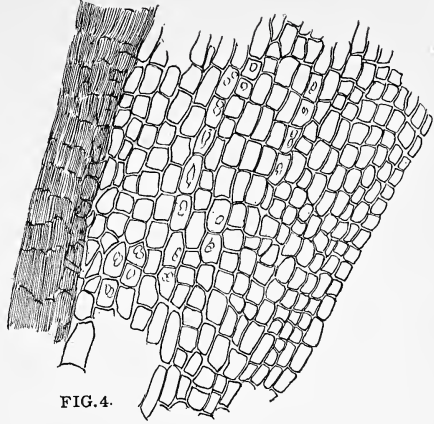
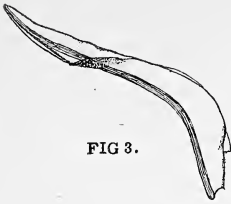
On shaded banks and rotten logs. New Hampshire: White Mountains (*Oakes*). Massachusetts: Woods Holl (*A. W. E.*): Amesbury (*J. W.*

Huntington); West Newbury (*Miss C. C. Haynes*). Connecticut: Westville (*R. Veitch, A. W. E.*); New Haven and Orange (*D. C. Eaton*); Hamden (*D. C. Eaton, A. W. E.*); New Haven and Orange (*D. C. Eaton*); Hamden (*D. C. Eaton, A. W. E.*) The Westville specimens collected by the writer in April, 1903, may be designated the type. The following stations beyond the limits of New England may also be noted: Quaker Bridge, New Jersey (*A. W. E.*); Washington, D. C. (*J. M. Holzinger*); Tibbs Run, West Virginia (*A. LeRoy Andrews*); Dickey's Creek, Virginia (*Mrs. Britton & Miss Vail*); Enterprise, Florida (*L. M. Underwood*).

The leaf subtending a lateral branch in *L. sylvatica* is sometimes bifid and sometimes undivided; in other cases there is no subtending leaf whatever. The latter condition in fact is normally found on one side of a branching axis while subtending leaves occur on the other. The absence of such a leaf indicates that the whole, instead of a part, of an apical segment has entered into the formation of the branch. This substitution of a branch for an entire leaf is of special interest and has not before been noted in the Hepaticae, although its occurrence was long ago suspected by Leitgeb. The subtending leaves are sometimes found on the left, according to the direction of the spiral. Similar variations also occur in *L. setacea*.

In their vegetative organs *L. setacea* and *L. sylvatica* resemble each other very closely, and it is sometimes difficult to determine sterile and poorly developed material. Usually, however, the leaves and especially the underleaves offer a few reliable points of difference. Under favorable conditions *L. setacea* is more robust, and its leaves are more regularly quadrifid; in many cases the antical segment bears an accessory tooth on its free margin, a condition which is exceedingly rare in *L. sylvatica*. Occasionally a bifid subtending leaf will show an accessory tooth of this character on each side. The cuticle of *L. setacea* is distinctly verruculose while that of *L. sylvatica* is smooth or very indistinctly roughened. Unfortunately in slender forms of *L. setacea* these differences are not always apparent.

New Haven, Conn.



C. CH.

PTYCHOMITRIUM LEIBERGII n. sp.

G. N. BEST.

In loose tufts, olive green above, ferruginous below: stems 1 cm. long, erect, central strand small, distinct; leaves thickish, crispate-incurved when dry, erect-spreading when moist, somewhat undulate, entire, margins plane, 3.5 to 5 mm. long, .6 to .8 mm. wide; from a concave, suboval base gradually linear-lanceolate, acute or blunt pointed: nerve thick, reddish, disappearing at apex; lamina mostly unistratose, bistratose in streaks above and on the margins; leaf cells uniform, somewhat distinct, median chlorophyllose, roundish-quadrate, 10μ , basal broadly rectangular, pellucid; monoicous: antheridial buds at base of pedicels, stipitate; perichetial leaves similar to but larger than stem leaves: pedicels reddish, 5 mm. long; capsules erect, elliptical, 1.3 mm. long, .7 mm. wide, wrinkled when dry; annulus broad, 3 rowed, separating readily and in fragments: exothecal cells thin-walled, polymorphous, 3 to 5 rows about the mouth thick-walled, reddish, flattened; peristome simple, teeth narrowly linear-lanceolate from a broader articulate base, yellowish, coarsely papillose, more or less irregularly divided, sometimes nearly entire; operculum acicular, 1 mm. long, zigzag on margin; calyptra campanulate, deeply lobed, plicate, rough at apex: spores minutely roughened, 13 to 16μ ; matures in the early part of February: on rocks, collected by John F. Lieberg, in whose honor it is named, near the south end of Baboquivara range, Arizona, February, 1906: altitude 4000 ft. Cotype in the Herbarium of the New York Botanical Garden.

Ptychomitrium Leibergii differs from *P. Gardneri* by its smaller size, entire leaves, somewhat undulate but not plicate, and by its peristomial teeth not divided to the base into filiform segments. The leaves in *P. incurvum* are bistratose above the middle, leaf cells smaller and less distinct and the peristomial teeth entire.*

In *P. Drummondii* the leaves are denticulate-serrate, the peristomial teeth shorter and broader and split at apex and the annulus wanting. The leaves in the Mexican *P. rugosum* (Mitt.) Jaeg. are serrate above and reflexed below.

It would therefore seem that so far as the North American species of *Ptychomitrium* go *P. Leibergii* is well marked and quite distinct. Unfortunately it is described from a single collection. Future collections may show variations not recognized in this description. Mr. Leiberg assures me that it is "common in the mountains of southern New Mexico and Arizona from the Floridas in the former territory to the Baboquivara range in the latter, and probably extending much farther westward: southward into Mexico, not observed north of Southern Pacific R. R." I am indebted to Mrs. Britton for an examination of this moss and for the opinion that it is an undescribed species.

Rosemont, New Jersey.

*Mrs. Britton claims that *P. pygmaeum* is only *P. incurvum* (Bull. Tor. Bot. Club, 21:497). However this may be I am of the opinion that we have two species passing as *P. incurvum* differing in size, basal cells and peristomial teeth, possibly connected by intergrading forms.

PLATE VII.—Fig. 1, Plant *Ptychomitrium Leibergii*. Fig. 2, Same $\times 22$. Fig. 3, Leaf. Fig. 4, Base of leaf. Fig. 5, Apex of same. Fig. 6, Perichetial bud. Fig. 7, Calyptra. Fig. 8, Spores. Fig. 9, Peristomial teeth.

[Lichen]

**SOME ADDITIONS TO THE FLORA OF MIDDLESEX COUNTY,
MASSACHUSETTS.**

REGINALD HEBER HOWE, JUNIOR.

The following plants were not included among the Lichens attributed to this County by Messrs. L. L. Dame and F. L. Collins in their List, published in 1888. The preface to the "Lichens" in the above work, will show that these additions are only a few, compared with those that may still be added, and are in no way remarkable. For the records from Sudbury, I am indebted to Miss C. M. Carr.

1. *Ramalina calicaris fraxinea* Fr.

This subspecies is not uncommon in Concord and Carlisle, on ash and elm trees. In only a few instances are the plants absolutely typical, the majority being somewhat intermediate between *fraxinea* and *fastigiata*.

2. *Cetraria Oakesiana* Tuckerm.

Not uncommon in Concord, on base of conifers and birch. Reported from Sudbury.

3. *Usnea barbata florida rubiginosa* Michx.

Not uncommon in Concord, growing in a reduced state on black spruces, white pines, and particularly on rocks. Always sterile.

4. *Usnea barbata ceratina* Schær.

I have one example referable here.

5. *Usnea barbata florida strigosa* Ach.

Uncommon. Collected in Concord and Bedford on Maples. Fertile.

6. *Alectoria jubata implexa* Fr.

Reported from Sudbury, growing on larches in swamps.

7. *Physcia pulverulenta leucoleiptes* Tuckerm.

Common on elms, ash, oak, and apple trees. Rarely fertile.

8. *Physia obscura endochrysea* Nyl.

Reported from Sudbury, on Rocks.

9. *Peltigera scutata* (Dicks.) Leight.

One unfruited and poor specimen collected in Concord, was with some doubt referred here by Dr. W. G. Farlow and Mr. G. K. Merrill.

10. *Stereocaulon condensatum* Hoffm.

I have collected one example of this species in Concord, on an old stump, and it is reported as not uncommon in Sudbury.

11. *Stereocaulon pileatum* Ach.

One example was found on a rock in Carlisle. I am indebted to Dr. Farlow for the determination.

12. *Cladonia papillaria* (Ehrh.) Hoffm.

Through the kindness of Miss Carr, I am able to report this species from Sudbury, where she found it in several places. The determination of her specimen was corroborated for me by Dr. Farlow. Mr. Walter Gerritson, of Waltham, allows me also to report it from that township, where he has collected it on barren soil. Mr. Merrill determined his examples.

Since the Middlesex Flora was published the genus *Cladonia* has undergone such a revision that the status of its species in the country is exceedingly difficult. The following have been collected in Carlisle and Concord, and may be included or not in those given for the region under less specific names or by other titles. For the determinations I am indebted to Prof. Bruce Fink and Mr. Merrill.

13. *Cladonia pyxidata chlorophaea* (Floerk.) Wainio

14. *Cladonia fimbriata coniocrea* (Flk.) Wainio.

15. *Cladonia fimbriata apolepta* (Ach.) Wainio.

16. *Cladonia verticillata evoluta* Th. Fr.

17. *Cladonia cenotea furcellata* Rabenh.

18. *Cladonia furcata paradoxa* (Wainio) Fink.

19. *Cladonia pityrea* (Floerk.) Fr.

20. *Cladonia squamosa denticollis* (Hoffm.) Floerk.

21. *Cladonia Boryi* Tuckerm. (Sudbury.)

22. *Cladonia gracilis elongata* (Jacq.) Floerk. (Sudbury.)

23. *Lecidea enteroleuca* Fr. Not uncommon, and fertile on deciduous growths in Concord.

24. *Mycoporum pycnocarpum* Nyl. One fertile example collected on maple in Concord. Concord, Mass.

MICROSCOPICAL TECHNIQUE.

Many persons who have to use the microscope in their studies find it desirable to do much of the work at night and to such a good working light is not an unimportant matter. A very excellent light may be arranged by the very simple expedient of placing a piece of white cardboard six or eight inches behind a incandescent electric lamp and using the reflection from its surface. A piece of botanical mounting paper answers the purpose nicely and for the moss student is usually at hand. If an electric light is not available a good student lamp may serve in place of it. Such a light is almost if not quite as good as daylight reflected from a white cloud which, of course, has no superior. Sometimes it is well to shade the lamp in front by another small piece of cardboard. This suggestion may be old to many readers of the BRYOLOGIST, but those who have never tried it will easily solve the problem of a desirable light for microscopic work.

J. P. NAYLOR,
Greencastle, Ind.

LICHEN NOTES No. 4.

A Study of *Umbilicaria vellea* and *Umbilicaria spadochroa*.

G. K. MERRILL.

The statement made by Nylander (Synopsis, Pt. II, p. 9) that sterile specimens of *U. vellea* are not easily determinable, is one to surprise an American student of lichens. The late Prof. Tuckerman long furnished us with our opinions on the taxonomy and specific delimitations of lichens, and his treatment of the *Umbilicaria* in Synopsis presented no difficulties whatever, once one came to know the commoner species. Tuckerman cites only two species of ash-colored *Umbilicaria* for America, *U. vellea* (L.) Nyl. and *U. hirsuta* (Ach.) Stenh. Of these two, *U. vellea* only is common, and our students have unhesitatingly referred all specimens of the ash-colored, whitish or brownish-ash-colored *Umbilicaria*, when black and hirsute below to this species. If, as Nylander asserts, specimens of *U. vellea* must be fertile to be identified with accuracy, it is evident that the distinguishing characters are apothecial, not thalline. This deduction is confirmed by the author's statement of its resemblance to *U. spadochroa* and of a difference in spore measurements. The spores of *U. vellea* are said to measure 9-12 by 6-7 μ , those of *U. spadochroa* 18-29 by 10-18 μ , a very considerable discrepancy.

Nylander credits *U. vellea* to Acharius, Methodus, p. 109, citing the amended diagnosis for the species found in *Lichenographia Universalis*, p. 673, as excellent. No mention is made of *U. vellea* as being a Linnæan species, nor is allusion made to its citation in the Acharian Prodrômus. This is the more remarkable as Acharius himself duly credits the plant to Linnæus, with the synonym of *Lichen velleus*. It is thought that but few of the early lichenists rightly understood *U. vellea*, even Hoffman who was responsible for the generic name of *Umbilicaria*, and numbers of its species, miscalled and figured *U. polyrrhizos* for *U. vellea* in his *Plantae Lichenosae*. However the name figures in several of the eighteenth century floras. It is apparent on comparing the descriptions of *U. vellea* and *U. spadochroa* in the Prodrômus and Methodus, that Acharius had no true conception of either species. The diagnoses are much alike, some of the characters at a later period held to distinguish the two, being used indiscriminately. Acharius must have been acquainted with *U. vellea* as found in the Linnæan herbarium, and it is really difficult to understand his uncertainty unless a word from Wainio explains,

In a paper entitled "Revisio lichenum in herbario Linnæi asservatorium," the latter records p. 7. that the specimens of *Lichen velleus* as found were sterile, and thus uncertain. Sterility or fertility counted for but little to the early species makers, the grosser differences at once apparent seeming to their minds the surer guide. While on the subject of the Acharian comprehension of *U. vellea*, it will be of interest to cite from Leighton's "Monograph of the British *Umbilicariae*," the results of his examination of authentic specimens of *U. hirsuta* and *U. vellea*, communicated by Acharius to Borrer, and found in the latter's herbarium. Leighton declares that the

two appear to be identical, that *U. vellea* only was fertile, with spores double the size of *U. polyrrhiza* or 18-22 by 10-12 μ . If these specimens from Archarius were identified before he reached definite conclusions regarding the specific limits of *U. vellea*, comment is unnecessary. But if they were determined on characters set forth in Li. Um. p. 673 l. c. there may be several inferences. Either Nylander is in error and *U. vellea* should have large spores; or large spores are concomitant to both *U. spadochroa* and *U. vellea*; or, the other physical characters of one or both plants may be inconstant, or finally the arbitrary separation of the two on sporal or other differences may be without justification. The delimitation of two lichens identical in other respects, because of difference in size of the spores is abhorrent to a conception of natural species. The thallus of an ash-colored Umbilicaria sp. on which are ultimately developed the apothecia of *U. vellea* and *U. spadochroa* is none the less specifically one or the other despite its infertility, and if the thought is carried further until the larger spores of *U. spadochroa* have assumed their full size, may it not be proper to call the species *U. vellea*?

An endeavor to learn something of *U. vellea* from the writings of Linnæus is frustrated by the terseness of his descriptions. In "Species Plantarum," 3d Edition, p. 1617, *Lichen velleus* is described as "Lichen foliaceus umbilicatus subtus hirsutissimus" and quoting himself in "Fl. Lapp." the author amplifies with "Lichen folio subrotundo feltato margin fere integro, subtus maxime hirsutus." Linnæus cites the illustration in "Historia Muscorum of Dillenius," Fig. 5, pl. 82, as representative of the form, and the Rev. J. M. Crombie proves to us that the Linnæan guess or Dillenian drawing were both good. In his "Lichens of Dillenius Historia Muscorum, illustrated by his herbarium," Crombie says "that the specimen of *U. vellea* in Herb. Dill. to which is attached the descriptive label of 'Lichenoides coriaceum latissimo folio umbilicato et verrucoso' is sterile, and "the specimen of which the figure is not at all good, represents a very large and old state of the species."

One wonders how Crombie recognized a "sterile" state of *U. vellea* with the certainty indicated by his words, but that must remain a mystery so far as present knowledge helps. It may be pointed out as a curious consideration at this juncture that while type specimens of *U. vellea* (L.) Nyl. have been preserved, no one can state with definiteness whether they are representative of *vellea* or *spadochroa* as those plants are now understood. Acharius in Li. Um p. 673 l. c. was first to make the effort of clearly marking limits for each of the two species. It is conceivable from Nylander's words (Syn. l. c.) that the Archarian dissociation impressed him as being fundamental. Th. Fries, "Lichenographia Scandinavica," considers that while Acharius rightly knew *U. vellea*, his recognition of *spadochroa* might be questioned. Whatever view is taken of the Acharian conclusion, the uselessness of going behind his amended diagnosis had been made apparent.

As the early writers delimited species almost entirely on macroscopic characters, it will be a matter of interest to learn if possible in what respect,

and to what degree the two species—very near one another as all have agreed—were found to differ. There seems no better way to accomplish this end, than to take the diagnoses of Archarius, E. Fries, Schaerer, Nylander, Th. Fries and Tuckerman for a basis, and frame a composite description for each species. Such an abstract would naturally comprehend all of the individual variations noted by the several observers for each form.

U. vellea.:—Thallus ash-colored, brownish, greenish or whitish ash-colored or whitish-pruinose; ample to large; leathery, rigid or thickened; smooth, scarcely elevated-punctate, or minutely rimulose-areolate; monophyllous and irregularly repand. Thallus below, brownish, brownish-black, blackish, or black; granulose-unequal, subhirsute, hirsute to very hirsute. Apothecia marginal, (sessile, Ach.) (patelliform, E. Fries), superficial, appressed, plane, small, margined, becoming convex, immarginate, or finally excluding the margin, or with a tumid margin; concentrically or gyrose-plicate, and E. Fries states that the disc may be papillose.

U. spadochroa.:—Thallus greenish, brownish, or whitish-ash-colored, or quite white; small to large; rigid, subcoriaceous and thickened; smooth or elevated-punctate; monophyllous. Thallus below, pallid-ash-colored, brownish, brownish-black, blackish or black; areolate-granulate, denudate, exasperate, scabrid, papillose, lacerate or more or less hirsute. Apothecia marginal, plane, subsimple appressed, lecideine, the margin thickened or subpersistent, contracted or even extended, smoothish or sparsely gyrose-plicate; papillate from the center of the disc, or the verrucae deficient, when there may be a central depression.

A comparison of the foregoing descriptions will disclose that so far as color of upper surface is concerned the two species are much alike, and the same may be said of the size, texture and lobation. The upper surface of *U. spadochroa* is said to be smooth (Th. Fries) elevated-punctate and delicately rimose (Ach. Li. Um. p. 229) but the latter describes both species as elevate-punctate, and the rimulose-areolate characteristic is known to be a product of age and habitat. The under surface presents greater disparities, unimportant in color, but marked in other respects. It will be noted that *U. vellea* as described is usually hirsute with the range of variation from "granulose-unequal" (Nyl. Syn.) to very hirsute; and that *U. spadochroa* as mentioned is not commonly so well provided with rhizinae, may even be "denudate" (Schaer. Eu.) or conditioned variably to "densely rhizinose" (Th. Fries Li. Scan.). In apothecial characters much diversity is shown, according to Acharius (Li. Um. p. 672) *U. vellea* has constantly plane marginate apothecia with the disc concentrically plicate: while those of *U. spadochroa* are said to be marginal, usually plane, the margin thickened and contracted, the disc not uncommonly plicate and solitarily papillate from the center. E. Fries (Li. Eu. Ref.) asserts that the apothecia of *U. vellea* may be papillate, a statement only explicable by the inference of his having mistakenly described *U. spadochroa*. The plicate of the apothecia are indifferently concentric or gyrose; and that organ may be appressed in both species.

In brief the differences between the species as here summarized are really inconsiderable, except that one of discordance in apothecial conformation. This factor in itself would scarcely seem of sufficient importance to separate the two, but Nylander and others have found that the papillate apothecia of *U. spadochroa* afford large spores. An instance of crude botany reinforced by modern histology. With Nylander first to point out sporal differences, the labors of other lichenists seemed to become confirmatory, if Hepp is excepted. In the latter's work on the spores of European lichens, are figured and micrometrically recorded the spores of *U. vellea* and *U. spadochroa* as examined in the Exsiccati of Moug. & Nest, E. Fries and Schaerer. In plate XXXIV, fig. 306 Hepp's Sporen, the spores of *U. spadochroa* (Ehrh.) Ach. Li. Um. p. 229, are alleged to be illustrated. The figures and measurements are derived from examination of E. Fries, Li. Suec. Exs. No. 130; Moug. & Nest, Exs. Nos. 540 and 746, and Schaerer, Exs. Nos. 141 and 142. All have small spores, viz. 9-11 by 5-8 μ , and by modern interpretation belong to *U. vellea* and not *U. spadochroa*.

Nylander avowedly, and Th. Fries inferentially based their diagnosis of *U. spadochroa* on the Acharian conception, and both the former definitely accept the papillate apothecia as distinguishing. Is it not strange that the various specimens from those exsiccati examined by Hepp, doubtless all determined on the Acharian data, and conjecturally all provided with the papillate apothecia of the species, should have yielded small spores? It is reasonably certain from the description, that *U. vellea* of E. Fries (Li. Eu. Ref.) is *U. spadochroa* as now understood. If No. 130 of Fries Exs. Li. Luec. is representative of that author's var. b. *spadochroa* as may be inferred from the text, with its determination based on the Acharian conception, then Nylander's assumption of small spores for *U. vellea* is really inexplicable. Schaerer (in Eu.) affirms No. 130, Fries Exs. to be equivalent to *U. cirrhosa* Hoffm., and Wainio (Revisio Lich. Hoffmannianorum, p. 16), finds the specimens of *U. cirrhosa* in Hoffman's herbarium to be *U. spadochroa* (Ehrh.) Ach.

Some one has erred, but on whom shall the burden rest? No. 141 of Scharer's Exs. is his form d. *rupta* of *U. vellea* var. *spadochroa*, and No. 142 represents his form *cinereo-rufescens*. Schaerer cites the latter as synonymous with *U. spadochroa* DC., *U. vellea* Ach., and *Lichen velleus* Ehrh.! Plate XIV, fig. 117 of Hepps's Sporen is said to figure the spores of *U. vellea* (L.) Ach. Syn. p. 68. The specimens examined were from Moug. & Nest, Exs. No. 344, and Schaerer's Exs. Nos. 137, 138, 139 and 140. All have large spores viz. 18-24 by 8-13 μ , and several numbers by Nylander and others would be referred to *U. spadochroa*. Schaerer lived a little early to fully avail himself of the manifold advantages of the compound microscope, and he variously distributes the above cited examples to his Enumeration, they appearing to have been very dissimilar externally. No. 344 Moug. & Nest, Exs. is referred to his *U. vellea* var. a, *hirsuta*. *U. hirsuta* as now understood has spores of 9-12 by 4-8 μ , or small. Nos. 137, 138, 139 and 140 of his Exs. Schaerer defines as form b, *vellei-formis*, f. c. *vulgaris*, f. d.

abortiva, and f. e. *rupta* respectively of his *U. vellea hirsuta*. From the descriptions of Nos. 137 and 139 (Eu. l. c.) both can be easily placed with *U. spadochroa* on their macroscopic characters, the other two are doubtful however.

Reviewing what has been written, it will be perceived that each author prior to Nylander's Synonymy, in dealing with *U. vellea* and its ally, became a law unto himself with respect to their specific limits. It is questionable if Nylander himself constituted his diagnosis of *U. spadochroa* on a clear knowledge of the early herbarium examples, although no man had ampler opportunities to acquire information. It is conceivable that *U. spadochroa* as considered in Synopsis is a purely arbitrary creation, based on the observation that large spores are concomitant with papillate apothecia. If this were an established fact, with no ascertainable record of deviation, a fairly good warrant for specific rank would ensue. The writer has found, however, through examination of an extended series of American ash-colored Umbilicariae that specimens are not uncommonly met with, provided with *distinctly papillate* apothecia which *do not* yield large spores! In fact the measurements accord with those of *U. vellea*. As the specimens are black and very hirsute below and bear every other characteristic of the species they may with assurance be referred to *U. vellea*.

In the final analysis it is seen that all the characters of *U. spadochroa* except its large spores may be shared by *U. vellea*. On this distinction alone it is believed that the form scarcely deserves specific rank, and should be reduced to a variety or modification of the older *U. vellea*. No. 198 Decades of N. Am. Lichens, issued as *U. spadochroa* Hoffm., in our copy affords small spores only, and being unprovided with papillate apothecia should be considered as representative of *U. vellea*. Prof. John Macoun collecting in 1905, on the St. Lawrence below Quebec, found an Umbilicaria sp. which in the specimen submitted to the writer, offers characteristics at once suggestive of *U. Dillenii* Tuckerm., on the one hand, and *U. vellea* on the other. The plant is brownish at the circumference as in *U. Dillenii*, whitish-pruinose at the center as in *U. vellea*, and like the latter hirsute below. The apothecia and spores are those of *U. Dillenii*, but the upper surface is rimulose-areolate as in *U. vellea*. Prof. Macoun suggests that the form be given a varietal name, but it is hardly thought desirable to do so at present.

Rockland, Maine.

SULLIVANT MOSS CHAPTER NOTES.

If any members of the Sullivant Moss Chapter have collected the lichen, *Solorina saccata*, I shall be very glad to hear from them and to exchange specimens with them. I should also be glad to hear from any one who has specimens of *Solorina saccata* in his herbarium, giving me the locality where they were collected.

Address, Mrs. CAROLINE W. HARRIS,
125 St. Marks Avenue, Brooklyn, N. Y.

It has come to the notice of the officers of the Chapter that in several instances stamped envelopes have been sent requesting the current "Offerings" and have met with no response. It is hardly possible that the same member would have his missive go astray more than once. It would also seem to be the obvious thing to do if a request comes after the material is exhausted for the person offering, to use the envelope to reply stating the fact.

The December meeting of the S. M. Chapter, in connection with the A. A. A. S., will be held either at the New York Botanical Garden at Bronx Park, on Saturday afternoon, Dec. 29th, or at Columbia University on Monday afternoon, Dec. 31st, as the other meetings of Botanists will be divided between the two places at the times stated.

The November number of this journal will contain the definite information as to place and date and hour of meeting.

OFFERINGS.

To Chapter Members only. For postage.

- Miss C. C. Haynes, Highlands, New Jersey. *Metzgeria conjugata* Lindb. and *Frullania Californica* (Aust.) Evans. Collected, Seattle, Wash., by Dr. J. W. Bailey.
- Miss Alice L. Crockett, Camden, Maine. *Biatora chlorantha* Tuckerm. Collected in Camden.
- Mr. G. K. Merrill, 564 Main street, Rockland, Maine. *Cetraria lacunosa* Ach. var. *stenophylla* Tuckerm. Collected by Mr. J. B. Flett, on Mt. Constitution, Wash.
- Miss Annie Lorenz, 96 Garden street, Hartford, Conn. *Dicranodontium longirostrae* B. & S. Collected Waterville, New Hampshire.
- Mr. B. D. Gilbert, Clayville, N. Y. *Umbilicaria Dillenii* Tuckerm.
- Mr. Charles C. Plitt, 1706 Hanover street, Baltimore, Md. *Trichocolea tomentella* Dumort.
- Dr. J. F. Brenckle, Kulm, North Dakota. *Physcomitrium Kellermanii* E. G. Britton.
- Dr. J. W. Bailey, 405 Walker Building, Seattle, Wash. *Eurhynchium stoloniferum* (Hook.) Card.; *Dicranum majus* Turn.
- Mr. H. Dupret, Seminary of Philosophy, Montreal, Canada (U. S. postage taken). *Fontinalis antipyretica gigantea* Sulliv.; *Camptothecium nitans* Schreb. *Brachythecium Novae-Angliae* (S. & L.) J. & S.
- Mr. A. S. Foster, 282½ Second street, Portland, Oregon. *Ptychomitrium Gardneri* Lesq.; *Camptothecium megaptilum* Sulliv.; *Hypnum occidentale* Sulliv. & Lesq.



NOVEMBER, 1906



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES
 HEPATICS AND LICHENS

EDITOR
ANNIE MORRILL SMITH

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EDITOR

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THE SULLIVANT MOSS CHAPTER

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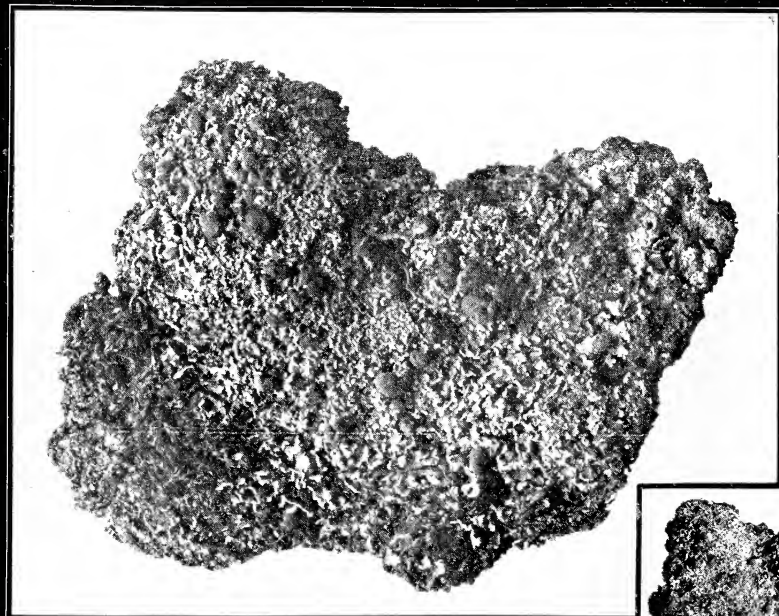


FIG. 1. A.

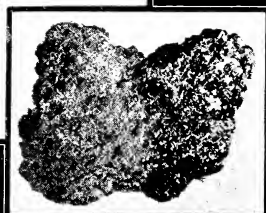


FIG. 1. B.

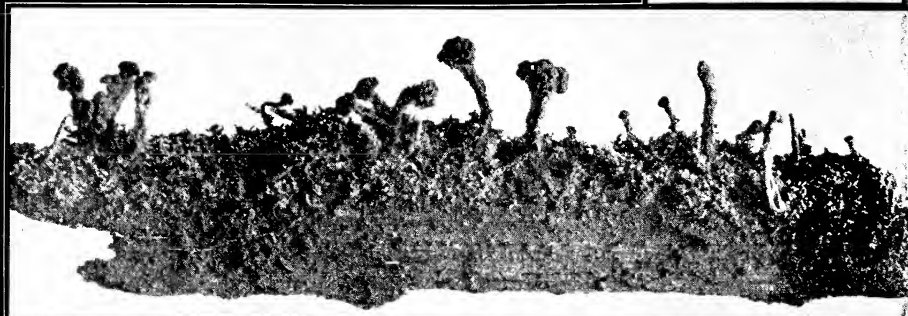


FIG. 2. A.



FIG. 2. B.



FIG. 3. A.



FIG. 3. B.

PLATE VIII.—Fig. 1 A, *C. caespiticia* $\times 3$. B. Natural size. Fig. 2 A, *C. delicata* $\times 3$. B. Natural size, Fig. 3 A, *C. botrytes* $\times 3$. B. Natural size.

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No. 6.

FURTHER NOTES ON CLADONIAS. VIII.

Cladonia botrytes, *Cladonia caespiticia*, and *Cladonia delicata*.

BRUCE FINK.

There may be considerable doubt about a very close relationship between the species considered in this paper and those disposed of in the last one (BRY. 9, July, 1906), and it may also be doubted whether the first species to receive consideration below stands very near to the second and third. Both Tuckerman and Wainio have placed *Cladonia caespiticia* and *Cladonia delicata* in close relationship, but both have seen fit to remove *Cladonia botrytes* far from these. Nor have these authors placed *Cladonia botrytes* near *Cladonia mitrula*, to which species it bears enough of superficial resemblance so that one might easily pass the former species over as a small form of the latter, growing on wood. However, the *Cladonias* exhibit a most bewildering series of relationships, combining the various species in an inextricable network, and all arrangements must be regarded as more or less artificial. Doubtless the words of Dr. L. M. Underwood, regarding a similar difficulty in the classification of the *Agaricales*, or gill fungi, apply here, as follows:—"A part of the difficulty, however, is due to the fact that we have here an extensive evolution of comparatively recent origin in which very many of the steps of the progression are still in existence" (Moulds, Mildews and Mushrooms, p. 129). Again, both Tuckerman and Wainio give considerable prominence to the paler fruit, in removing *Cladonia botrytes* far from *Cladonia mitrula*. However remotely related the two species may be, the difference in color can have little weight in determining.

But passing the first species considered below, we are on surer ground, lichenists generally admitting the close relationship of the other two species and that of both of these to *Cladonia squamosa*, which species we will consider in the next paper of this series.

Finally, the writer is willing to let comparisons of the two descriptions, and better the study of specimens, speak further for the relationship of *Cladonia botrytes* and *Cladonia mitrula*, the latter description to be found in the last paper of this series and the former to follow immediately.

CLADONIA BOTRYTES (Hag.) Willd. Fl. Berol. 365. 1787.

Primary thallus commonly persistent, composed of crenate, incised or variously lacinate, flat, involute or rarely convex, commonly ascending, scattered or rarely clustered squamules, which are 1-3 mm. long and of about the same width, sea-green varying toward straw-colored or olivaceous above and white below, sometimes sparsely sorediate or granular. Podetia arising from the surface of the squamules, 2-18 mm. long, rather slender, cylindrical,

or subcylindrical, rarely and abortively scyphiform, variously branched toward the apex or simple, or rarely branched toward the base, the branches commonly short or very short, the sides frequently rimose, the axils sometimes open, solitary or in groups, erect or variously curved or flexuous, cortex verrucose or divided into rather small areoles, which are contiguous or scattered, sometimes more or less squamulose, especially towards the base, varying from straw-colored to sea-green, or the decorticate portions straw-colored or whitish. Apothecia terminating all of the podetia or branches, small or rarely middling sized, commonly .4–2 mm. in diameter, rounded or irregular, sometimes perforate, frequently clustered or conglomerate, or rarely solitary, flat and margined with lighter colored exciple, or more commonly convex and immarginate, from pale flesh-colored to pale brown, rarely somewhat pruinose. Hypothecium pale or cloudy. Hymenium pale throughout or slightly colored above. Paraphyses simple, the apex frequently thickened but showing little or no color. Asci clavate or cylindrico-clavate.

On rotting trunks, especially of conifers, but rarely also on other wood and dry humus. Plants from British America, New York, Virginia, Wisconsin and Louisiana are referred here by Dr. Wainio in his Monograph, and he has also determined the plant for the writer from Minnesota, where it is found on dead coniferous wood throughout the northern portion of the State. The "pale fruited form" of *Cladonia mitrula* distributed as No. 187, "Lichenes Boreali-Americani," seems quite close to the present species, but on submitting the number to Dr. Wainio he agrees with authors of Lich. Bor. Amer. Known also in Europe and Asia. Plate VIII. Figs. 3 A and 3 B. CLADONIA CAESPITICIA (Pers.) Flk. Clad. Comm. 8. 1828.

Primary thallus persistent and composed of subdigitately-laciniate, incised or crenate, ascending flat or rarely involute squamules, which are middling sized, 2–10 mm. long and 1.5–8 mm. in width, commonly clustered and thus forming larger or smaller patches, sea-green varying toward whitish or olivaceous, the cortex continuous, frequently sorediate below where the color is white. Podetia arising from the surface of the primary thallus, abortive or 1–5 mm. long and .4–1.5 mm. in diameter, subcylindrical or clavate, cupless, simple or rarely branched, the apices obtuse and always bearing apothecia, usually ashy in color. Apothecia medium sized or larger, .75–3 mm. in diameter, at the apices of podetia or rarely sessile, solitary or slightly clustered, thinly margined or immarginate, flat or convex, brown or reddish-brown. Hypothecium pale. Hymenium pale below and pale or brownish above. Paraphyses simple, the apices enlarged and pale or brownish. Asci cylindrico-clavate.

On soil, usually sandy, or, on rocks. Rarely on dead trunks in dry places. Examined by the writer from New York (E. A. Burt and Carolyn W. Harris), Ohio (E. E. Bogue and det. *Cladonia symphylicarpa epiphylla* by Dr. J. W. Eckfeldt), Iowa and Minnesota (Bruce Fink), and Newfoundland (A. C. Waghorne and called *Cladonia fimbriata* by Dr. F. Arnold). Reported from Alabama by Charles Mohr, from Montana by Mrs. Carolyn W. Harris, and from Massachusetts and Illinois by Henry Willey.

Wainio's Monograph adds to this distribution Tennessee and South Carolina. This gives a general distribution throughout North America, east of the Rocky Mountains, except in extreme regions. Known also in Europe, where also absent from arctic regions. Plate VIII. Figs. 1 A and 1 B.

CLADONIA DELICATA (Ehrh.) Flk. Clad. Comm. 7. 1828.

Primary thallus commonly persistent, composed of small lacinate, erose or crenate squamules 1–2.5 mm. long and wide, ascending, flat or involute, commonly clustered and frequently forming a crust, ashy, sea-green or olivaceous above, below white and usually more or less soresiate, the cortex continuous above. Podetia arising from the surface of the primary thallus, 3–10 mm. long .5–1 mm. in diameter, cupless, subcylindrical, clavate or irregularly turgescens, usually simple or slightly branched at the apex, but rarely quite freely branched lower down, the axils, the apices and the sides sometimes more or less fissured, scattered or clustered, erect, commonly more or less soresiate and decorticate, the apices usually apothecia-bearing and obtuse, but rarely sterile and subulate. Apothecia small, .3–1.5 mm. in diameter, borne in clusters or solitary at the apices of the podetia or branches, thinly margined or immarginate, flat or convex, brown or rarely reddish-brown. Hypothecium pale or pale-brownish. Hymenium brownish and darker above. Paraphyses simple or branched, the apices frequently thickened and pale-brownish. Asci clavate or cylindrico-clavate.

On rotting wood or on earth in swampy places. Examined by the writer from Massachusetts (E. A. Burt), Washington, D. C. (T. A. Williams), Ohio (H. L. Jones), and from Iowa and Minnesota (Bruce Fink). W. W. Calkins and Henry Willey both list it from Illinois, and J. Macoun from Quebec and Ontario. Wainio's Monograph adds Indiana, South Carolina, Alabama and Louisiana. This gives a North American distribution very similar to that of the last species. Known in all the grand divisions. Plate VIII, Figs. 2 A and 2 B.

Miami University, Oxford, Ohio.

PLATE VII.—*Ptychomitrium Leibergii* n. sp. by Dr. G. N. Best in the BRYOLOGIST, September, 1906, page 81, should have contained the following magnifications: Fig. 1. Plant of *P. Leibergii* $\times 2$. Fig. 2. Same $\times 22$. Fig. 3. Leaf $\times 22$. Fig. 4. Base of leaf $\times 240$. Fig. 5. Apex of same $\times 365$. Fig. 6. Perichetial bud $\times 42$. Fig. 7. Calyptra $\times 22$. Fig. 8. Spores $\times 650$. Fig. 9. Peristomial teeth $\times 240$. All reduced $\frac{1}{2}$. The plant was named in honor of Mr. John B. Leiberg, not John F. as printed on page 60. Ed.

A STUDY OF TETRAPLODON AUSTRALIS.

By I. HAGEN.

Tetraplodon australis Sulliv. & Lesq. has been very little studied. This fact is accounted for by the circumstance that the specimens in the various herbaria were collected for the most part too late in the season and hence in a condition unfavorable for study. I am, however, happily in possession of fine material collected at my request by Mr. Severin Rapp, at Sanford, Florida, during the month of December, 1904. An examination of this material has furnished the details which enable me to determine its relationship decisively.

Why the authors of the last half of the nineteenth century placed this species in the genus *Tetraplodon*, I have never been able to comprehend, and a study of Mr. Rapp's collections has shown me that this genus is precisely that one of the sub-family Splachnae with which it has least in common. There are important differences in nearly all parts of the sporophyte: — the seta is soft and hyaline in *T. australis*, solid and colored in the other species of the genus; the columella is exerted in the former, included in the latter; the teeth which are bigeminate in the other species of *Tetraplodon* are geminate only in *T. australis*, and, in addition, in this latter they have central cavities, though solid in the other, a condition which is due to a difference in the number of layers of cell tissue from which they originate; the calyptra is elongated below the operculum, cucullate or rarely campanulate in true *Tetraplodon*, while it is conical and covers only the top of the operculum in *T. australis*.

Nor can our species be *Haplodon*, because of its exerted columella and geminate teeth with interior cavities. There remains then only the genus *Splachnum*, and with this it agrees in all the characteristics cited, as separating it from the two other genera of the same sub-family. But if the descriptions of the stem structure of *Splachnum* found in literature be compared with the facts noted in studying the stem of our *Tetraplodon* there appear to be differences. The cross section of the stem in *T. australis* shows false leaf-traces, while in the case of *Splachnum* there are said to be true leaf-traces. But the information furnished by literature upon this point is not exhaustive and the generic difference between *Splachnum* and *Tetraplodon australis* actually non-existent. Lorentz, who had studied the structure of the stem in the two *Splachnums*, *S. sphaericum* and *S. luteum*, says after describing it in *S. sphaericum* (Flora, 1867, p. 537): "We find this structure of the stem also in the following species of our genus," i. e. *S. luteum*, "not, however, in *Tayloria* nor in *Tetraplodon*. It is perhaps not too bold to assume that this characteristic occurs also in other species of the genus and furnishes an excellent generical distinction from the other Splachnaceae." This general conclusion made by him with reservation, is reproduced without restriction by Limpricht. (Laubm. Fl. Deutschl. Oesterr. u. d. Schweiz. (II. p. 164.). But if this is true in the species examined by Lorenz, it is however incorrect in *S. ampullaceum* and *S. vasculo-*

sum, both these species having false leaf-traces in the stem precisely as in *T. australis*. Here we see the danger of generalizing too far.

T. australis agrees exactly with certain *Splachnums* in another characteristic taken from the vegetative parts, namely in the structure of the costa. It is Lorenz again who has given some hints on this subject. According to him the costa of the *Splachnaceae* is composed of two large ventral cells ("guides"), of a certain number of large dorsal cells, and of a central cellular body whose principal element and characteristic is a bundle of thin-walled, angular cells of the kind he has called "comites:" in addition, one usually finds between these "comites" and the large dorsal cells a larger or smaller number of cells which he designates as "intercalary" cells, formed sometimes like the guides, sometimes difficult to distinguish from the "comites," sometimes thin-walled, sometimes rather incrassate. In *Tetraplodon* he observes that these intercalary cells are present, at least in the most developed part of the costa, and that they are nearly stereid; as regards *Splachnum* he describes the same structure in *S. sphaericum*, while in *S. luteum* he finds a bundle of "comites" surrounded by numerous, rather large, polygonal, thin-walled cells. In *S. vasculosum* and in *S. ampullaceum*, I have observed a little different structure: the "comites" form here a band, which extends between the ventral and the large dorsal cells along the median line of the costa; at each side appear, usually, some large rounded, thin-walled intercalary cells, having nearly the aspect of the ventral ones. These intercalary cells are wanting, however, in *S. ampullaceum*, in the upper part of the leaf where the central cellular body is consequently represented by the "comites" alone. The same structure is found in *T. australis*, (and likewise in *Haplodon*) in all parts of the costa which is composed here also of "comites" surrounded by the large ventral and dorsal cells. We have here another characteristic which distinguishes *T. australis* from true *Tetraplodon* and at the same time connects it with *Splachnum ampullaceum*.

That *T. australis* belongs to the genus *Splachnum* is thus set beyond doubt, and it becomes apparent that it is *S. ampullaceum* with which it is most nearly allied. This relationship is in fact so close that without encroaching on its specific claims, we can characterize it as an *S. ampullaceum* with hyaline seta, apophysis reduced to a minimum and narrower, deeply dentate leaves.

It goes without saying, that this conception should be expressed in the name. In transferring it to the genus *Splachnum*, however, I take the advantage of the occasion to restore to it the oldest specific name, so long unnoticed and revived only in 1883 by Lindberg, who was convinced by his studies of the herbarium of Dillenius that the type of *Phascum caulescens* L. is the same plant as *Tetraplodon australis* Sulliv. & Lesq.

SPLACHNUM CAULESCENS (L.) Dicks. in Trans. Linn. Soc. III, p. 239 (1797)

Synon.:

Sphagnum foliis tenuibus, gramineis, pellucidis Dill. Hist. Musc. p. 550, (1741).

Phascum caulescens L. Sp. pl. ed. I. p. 1570 (1753) non in herb.

Bryum Pennsylvanicum Brid. Musc. Rec. IV, p. 36 (1803) nec. Mant. Musc. p. 119, (1819).

Splachnum setaceum Hook. & Wils. in Drumm. Musc. Amer. Bor. ed. II. No. 27, (1841) fide Sulliv.

Tetraplodon australis Sulliv. & Lesq. Musc. Bor. Am. No. 151 (1856).

Tetraplodon caulescens Lindb. Krit. Gransk. af Moss. uti. Dill. Hist. Musc p. 14, (1883).

Delin.:

Dill. l. c. Tab. 85, fig. 15; Dicks. l. c. Tab. 20, fig. 2; Sulliv. Icon. Musc. Tab. 58.

Exsicc.

Drum. l. c.; Sulliv. & Lesq. l. c.; Holz. Musc. Acro. Bor.—Am. No. 68.

Regarding the citation from Linnaeus it should be noted that his *Phascum caulescens* of Sp. pl. is founded on Dillenius' plant, but in reality he did not know this species as Schimper's examination of his herbarium shows (Journ. Linn. Soc. XI, p. 246). According to this distinguished bryologist, a specimen labeled "*Phascum caulescens* lectum in Lapponia cit. Dillen, 550, T. 85. f. 15," belongs partly to *Splachnum angustatum*, partly to *Cynodontium Bruntoni*; and another specimen of which Schimper cites the label as follows: "*Splachnum*—North America, sec. Smith, *Splach. caulescens* Dicks." is, according to him, a *Tetraplodon angustatus* forma *gracilescens*. I interpret the latter label as if the word "*Splachnum*—" alone is due to Linnaeus, the rest added by Smith, who had bought his herbarium. However that may be, it follows from the examination of Schimper, that Linnaeus did not have a correct idea of *Phascum caulescens*, and that the name does not refer to his herbarium but exclusively to Sp. pl. Dickson on the contrary seems to have correctly recognized the plant in question; he says in his "Observations on the genus of *Porella* and the *Phascum caulescens* of Linnaeus": "The *Splachnum* which I received at the same time with the above when compared with Dillenius' specimen, proved to be the *Sphagnum* figured on Tab. 85, f. 15; the figure is remarkably stiff. This is made a *Phascum* by Linnaeus, but with equal impropriety, it being a true *Splachnum*."

Opdal, Norway, May, 1906.

VANCOUVER ISLAND BRYOLOGY, No. 1

DR. JOHN W. BAILEY.

Vancouver Island, which lies off the west coast of British Columbia, is mountainous, well wooded with evergreens on the highlands, and with alder and maple in the bottom lands. During seven months of the year it is shrouded with fog and bathed with gentle rains on the coast, while heavy snows fall in the interior. At this time every hillside depression becomes a rivulet and every ravine a rushing mountain torrent. On account of the amount of moisture in the atmosphere and the equibility of the climate, it presents an ideal habitat for many species of mosses, nearly all of which fruit abundantly. There is but little limestone on the island. Conglomerates, sandstone and shales are found associated with the coal deposits in the neighborhood of Nanaimo and Cumberland on the East Coast. My collecting was done at the latter place, forty miles south of the fiftieth parallel of latitude.

Cumberland is near Comox, a locality which Macoun visited some years ago for bryological purposes. Thirty miles to the south the extinct crater of Mt. Arrowsmith rises to an altitude of 5,600 feet, from whose sides and summit Macoun brought many interesting mosses. In this region the tree mosses are the first to attract one's attention. The maple trees (*Acer macrophyllum*) are covered with great mats or pillows of them. *Neckera Menziesii* prefers the trunks of these trees while *N. Douglasii* is found on the upper branches, though they grow intermingled. Nothing bryological is handsomer than the delicate orange colored capsules of *N. Douglasii* lying among the pale green leaves of the plant. *N. Douglasii* prefers moist shady localities for developing its spherophyte. *N. Menziesii* fruits at low altitudes wherever found. Its pinnae are a coppery red color, the capsule inserted and dark red in color.

Antitrichia curtispindula gigantea occurs in great cushions, more often on the horizontal limbs of trees. It grows on the evergreens as well as on the deciduous trees. The stoloniferous portion of the plant bears the capsule and it, like *Neckera Douglasii*, prefers dark cool situations in which to develop it. In late winter or early spring the growing tips of this moss are a golden yellow and the sombre forest takes on a new aspect, when these fresh yellow points begin to cover the brown cushions of previous years. I found very little *Antitrichia Californica*, and judged that Cumberland was out of its range.

Eurhynchium stoloniferum is found near the coast, at higher altitudes it disappears. Probably none of our coast mosses is more variable. It grows on wood or rocks. There are four distinct forms of it growing about Cumberland; the stoloniferous (var. *substoloniferum*) in long hairy masses on limbs of trees; a very large form growing in dark damp woods; a smaller tawny colored form growing on rocks in canons but not stoloniferous. This hung in long festoons over the rocks; a julaceous form, which when dry simulated *Scleropodium obtusifolium*, found on rocks in brooks wet by the spray of the rushing water, growing just above high water mark. Although

the various forms are so different in appearance, under the microscope the leaves are identical. The coarse doubly dentate margins, the strong midrib, and the punctate cells in the lower leaf angles are the same in all.

Cladopodium crispifolium is common on rocks and trees. It is indistinguishable from *C. Bolanderi* except under the microscope. *C. Bolanderi* is found on rocks, while *C. Whippleanum* is found on rocks and soil and resembles *Plagiothecium elegans*.

Dendroalsia abietina is rare. Besides *E. stoloniferum* three Eurhynchiums are common, *Oreganum*, *praelongum* with its variety *Stokesii*, and *fallax*. *E. fallax* was to be found only at high altitudes. Growing at lower altitudes and hidden away about the roots of cedars is to be found a large Eurhynchium with variegated copper colored pinnae. One never obtained very much of it as it was hard to find. It belonged to the blunt leaved division of Eurhynchia. Its capsule was a beautiful chestnut red.

Plagiothecium undulatum is plentiful in proper locations. On humus or rotten logs, and *P. denticulatum* is common.

The Heterocladiums, *H. heteropteroides* and *H. procurrens*, are highland mosses and are found on rocks. On vertical rocks, where there is plenty of water, *H. heteropteroides* assumes the variety *filescens*. On flat rocks it grows with short pinnae and fruits freely. *H. procurrens* is easily recognized by its complanate leaves and feathery pinnae and at altitudes of one thousand feet it becomes the commonest of the rock mosses.

Amblystegiids are rare in my locality though several are accredited to the island.
Seattle, Wash.

NOTES ON THE MOSSES OF WATERVILLE, NEW HAMPSHIRE.

ANNIE LORENZ.

The settlement of Waterville, N. H., lies in the Mad River Valley, at 1550 ft. altitude, north of Sandwich Dome, with Mt. Osceola (4352 ft.) forming the northern end of the valley. Very little collecting appears to have been done there. The only specimens seen by the writer are a few in the hotel herbarium, collected by Mrs. Helen E. Jelliffe in August, 1896.

Waterville is a granite-and-drift region, the absence of limestone making peculiar gaps in the flora, phanerogamous as well as cryptogamous. The most unusual place in the region is the ravine known as the "V" on the southern slope of Mt. Tripyramid. It consists of two steep granite slopes, meeting at an angle of 90 degrees, and running west by north. The southern side has a rich cover of Sphagna, various Hypna and Hylocomia, Philonotis, Scapania, and such, all heavily fruited. The best thing there is *Blindia acuta* (Huds.) B. & S. in good fruit.

The summit of Mt. Osceola is a crumbly trachytic granite, cushioned with *Polytrichum strictum* Banks, with *Dicranum fuscescens* Turn. and *D. longifolium* Ehrh. on the scrub balsam, although *Lophozia gracilis* (Schleich.) Steph. is really the principal product. Sphagna are abundant, but only casually examined by the writer. *Andreaea petrophila* Ehrh. is com-

mon, not only on the summits, but on the rocks along the brooks, and usually heavily fruited, particularly on the north sides of the rocks.

One of the most interesting features of the bryophytic flora is the occurrence of *Dicranodontium longirostre* B. & S. exemplifying, as it does, the writer's theory as to its habitat,—namely, that it grows near water not above 45 degrees temperature. Of three stations, the largest is at Tyler's Spring (45 deg.) where it grows very abundantly on the banks near by, which are full of rotten wood. The second station is in a similar place by a spring (40 deg.) between the two Greeley Ponds: the third station is on a rock, near a cold stream feeding the upper Greeley Pond. *Dicranodontium* is instantly known by its intense green color, and its moulting when touched. “*Folia—quam maxime fragilia.*” (Bry. Eur.) The writer has so far always found it sterile in New England: it prefers banks full of old wood, but is sometimes found upon rocks.

On account of the exclusively siliceous formations, the Tortulaceae, Saelania, Fissidens, etc. are lacking. Bryum is mostly absent, the lack of *B. proliferum* (L.) Sibth., being rather noticeable, but *Pohlia nutans* (Schreb.) Lindb., and *P. elongata* Hedw. are frequent.

Mnia are abundant, but of few species. *Trematodon ambiguus* (Hedw.) Hornsch. is frequent, in dry fields, or by sandy roadsides. The Polytrichaceae are well represented, with five species of *Polytrichum*, three of *Pogonatum*, and one *Catharinaea*.

The sphagnum bogs are almost pure stands, without the *Camptothecium*, the various Hypna, *scorpioides* L., *stellatum* Schreb., *revolvens* Swz. *Thuidium Blandowii* (W. & M.) B. & S. etc. of calcareous bogs. *Homalia Jamesii* Sch. is quite common on the north and northwest sides of granite boulders, also *Plagiothecium Muellerianum* Sch. in similar but more elevated situations.

Of the Marchantiaceae, only *Marchantia* and *Conocephalum* appear. *Diplophyllia taxifolia* (Wahl.) Trevis. is rather common along the bases of rocks in stations above the level of the valley itself. *Lophozia gracilis* (Schleich.) Steph. is ubiquitous, and *L. incisa* (Schrad.) Dum. is somewhat frequent on old stumps, *L. barbata* (Schreb.) Dum. is apparently absent.

The numerous trout streams have an abundant, but not particularly varied flora, *Scapania*, *Fontinalis*, *Rhaconitrium aciculare* Brid., *Hypnum eugyrium* B. & S., *H. dilatatum* Wils. with *Marsupellae* in the upper reaches.

In general, the list makes a good showing for a non-calcareous region, although it cannot compare with one in which both calcareous and siliceous formations are found.

These are merely notes of a several-week's stay, to be regarded as preliminary only, and not as exhausting the possibilities of a region which will well repay further exploration.

Hartford, Conn.

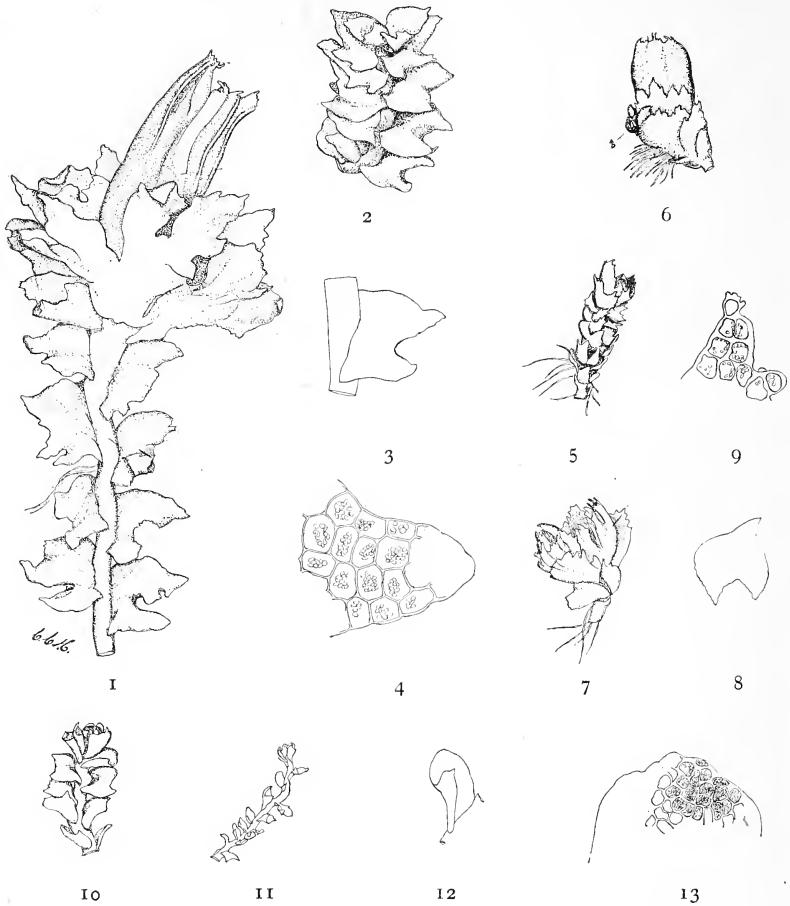


PLATE IX.

FIGS. 1-4, *Lophozia Marchica*. 1—Plant showing perianth, dorsal view x 22. 2—Stem, dorsal view x 22. 3—Leaf, dorsal view x 70. 4—Leaf cells x 365.

FIGS. 5-9, *Lophozia bicrenata*. 5—Stem, dorsal view x 22. 6—Female plant showing perianth and male plant x 22. 7—Involucral bracts x 22. 8—Leaf, dorsal view x 70. 9—Leaf cells x 365.

FIGS. 10-13, *Lophozia excisa*. 10—Stem, dorsal view x 22. 11—Another dorsal view x 22. 12—Leaf, dorsal view x 70. 13—Leaf cells x 365.

All reduced two-thirds.

TEN LOPHOZIAS

SELECTED AND ILLUSTRATED BY
CAROLINE COVENTRY HAYNES.

[From "Notes on New England Hepaticae," by Dr. A. W. Evans in *Rhodora*.
By permission.]

Lophozia Marchica (Nees.) Steph. *Rhodora*, Nov. 1902, p. 211.

Lophozia bicrenata (Schmid.) Dumort. *Rhodora*, Nov. 1902, p. 209.

Lophozia excisa (Dicks.) Dumort. *Rhodora*, February, 1906, p. 34.

These Lophozias have been illustrated in various publications, but for two reasons I have figured them again; for the student as a handy reference as well as for the sake of showing their comparative size. One magnification having been used, namely, $\times 22$ in all figures of plants; $\times 70$ in all figures of leaves; $\times 365$ in all figures of cell structure.

Lophozia Marchica was drawn from material, No. 172 Hepaticae Americanae-Jungermannia Novae-Caesareae. Collected by Dr. A. W. Evans, Atsion, New Jersey, Aug. 1892. Also from material collected by Miss C. C. Haynes, Great Island, near Elizabethport, New Jersey, Aug. 2, 1902.

Lophozia bicrenata. Collected by Dr. W. A. Evans, Huntington, Fairfield Co., Conn., March 8, 1906. Herb. Sulliv. Moss Chap.

Lophozia excisa. Collected by Dr. A. W. Evans, Peter's Rock, North Haven, Conn., May 5, 1906. Herb. Sulliv. Moss Chap.

LOPHOZIA MARCHICA (Nees.) Steph. Bull. de l'Herb. Boissier, II. 2:48, 1902.

Stephani has recently reduced to this species, as a synonym, *Jungermannia Mildeana* Gottsche,* a form which most European writers have considered distinct. If this reduction is made, and it certainly seems justifiable, then the writer's *J. Novae-Caesareae*,† although recognized by Stephani, should apparently share the same fate. Accepting *L. Marchica* in this broad sense it is now known from three New England stations: Beach Mt., Mt. Desert Island, Maine (*E. L. Rand*); Woods Holl, Massachusetts (*A. W. E.*); East Haven, Connecticut (*A. W. E.*). The species is essentially a bog-plant and is commonly found creeping through tufts of *Sphagnum*; in some cases however the plants may be completely covered with water, while in other cases, especially when growing in sandy bogs, they may be exposed to dryness. The plants vary markedly according to the amount of water which they receive, a liberal supply producing elongated stems with scattered leaves while a scanty supply produces short stems with closely crowded leaves. The cell-structure is also variable. Protected and shaded leaves show thin and delicate walls, while leaves exposed to the sun show thickened yellowish walls with more or less conspicuous trigones. A single leaf in fact may show these variations in cell-structure. The dark purple stems which are characteristic of typical *L. Marchica* are paler in some of the other forms and sometimes show no trace of purple; in other cases the color is limited to the bases of the rhizoids and the adjacent parts of the stem. Underleaves are occasionally present in all the forms among the stem-leaves, but they are often very few in number and have the appearance of being abnormal or adventitious. Floral underleaves or bracteoles are of course invariably present. Plate IX. Figs. 1—4.

*Verhandl. der k. k. zool.-botan. Gesellschaft in Wien. 17: 626. pl. 16. 1867.

†Bull. Torrey Club, 20: 308. pl. 163. 1893.

LOPHOZIA BICRENATA (Schmid.) Dumort. Recueil d'Obs. sur les Jung, 27, 1835.
Jungermannia bicrenata Schmid, Ic. Plant. 3: 250. pl. 64. f. 2. 1797.

By most American authors this species has been referred to *J. excisa* Dicks., and it is described under this name in the sixth edition of the Manual. It is probable that the true *J. excisa* was a composite species including among others the *J. bicrenata* of Schmidel, but there is so much uncertainty about it that some European writers have given up the name altogether while others reserve it for *J. capitata* Hook. (= *J. intermedia* Lindenb.), a very different species from *Lophozia bicrenata*. *J. capitata* is described in the Manual as *J. excisa*, var. *crispa* Hook. and has not yet been definitely reported from New England. *L. bicrenata* on the contrary is not uncommon and is usually found growing on the earth in woods or along their borders. It has been collected from near the coast to an altitude of 5000 ft. in the White Mountains and does not vary markedly in different localities. To the description given in the Manual it may be added that the inflorescence is parioicous and that the plants, which are usually more or less tinged with reddish, commonly give off a peculiar aromatic odor. New England specimens from the following stations are in the writer's herbarium: Crawford Bridal Path and Jackson, New Hampshire (*A. W. E.*); Andover, Vermont (*W. G. Farlow*); Woods Holl, Massachusetts (*A. W. E.*); Orange and Hamden, Connecticut (*A. W. E.*). Plate IX. Figs. 5—9.

LOPHOZIA EXCISA (Dicks.) Dumort.. Recueil d'Obs. sur les Jung. 17. 1835.
Jungermannia excisa Dicks. Pl. Crypt. Brit. 3: 11. 1793. *J. excisa* var. *crispata* Hook. Brit. Jung. pl. 9. 1816. *J. capitata* Hook. l. c. pl. 80. *J. intermedia* Lindenb. Nova Acta Acad. Caes. Leop. Carol. 14, suppl.: 83. 1829. *J. intermedia* γ *capitata* Nees, Naturgeschichte der europ. Leberm. 2: 125. 1836. *Lophozia capitata* Macoun. Cat. Can. Pl. 7: 18. 1902. Thorn Mt., Jackson, New Hampshire (*A. W. E.*)

In a note on *Lophozia bicrenata** the writer made the statement that the true *L. excisa*, with which *L. bicrenata* has been confused in North America, had not been definitely reported from New England. The specimens recorded above, however, were already collected but through an error had been referred to another species. *L. excisa* agrees with *L. bicrenata* in its parioicous inflorescence. It is distinguished by its larger size and more delicate texture, the leaf-cell being thin-walled, except for the small trigones at the angles, instead of being uniformly thick-walled throughout. It also lacks the brownish or reddish pigmentation and the peculiar aromatic odor which are usually associated with *L. bicrenata*. In general appearance it bears considerable resemblance to small forms of *L. ventricosa*. Its parioicous inflorescence will at once separate it from this species, and it is usually easy to recognize the perigonal bracts, even after the antheridia have disappeared, by the small pocket or inflexed tooth at the antical base. In spite of the uncertainty connected with the original *J. excisa* of Dickson, most recent writers associate this name with the present plant. Plate IX. Figs.

*RHODORA, 4:209. 1902.

NOTES ON POLYTRICHUM COMMUNE.

J. FRANKLIN COLLINS.

(Reprinted by permission from "Preliminary Lists of New England Plants" in *Rhodora*, 8: July, 1906.)

No species in the list has been more difficult to interpret than *Polytrichum commune* with its many forms and variations. The species, as described by Dillenius, Linnaeus, Bruch and Schimper, Dixon, Limpricht, Roth, Lesquereux and James, and others, appears to be much less common than has been generally supposed. It is impossible at the present time to place satisfactorily some of the forms of this species, yet certain conclusions have been reached which would seem to justify preliminary publication, especially as it is very desirable that the attention of collectors be called to the necessity of getting abundant material from various habitats and localities—more particularly perhaps from bogs, swamps, and other wet places. The writer would be very glad to get specimens from any and all parts of the country—especially from New England—with a view of attempting to clear up the uncertainty in regard to several varieties and forms, the identities of which are at present too problematical to appear in the above list. It is quite possible that the interpretation of *P. commune*, as outlined here, may have to be revised when more material is at hand. Briefly, *P. commune*, as here restricted, is the fairly tall plant of moist shaded places with the gametophyte normally at least 10 cm. high, stems mostly simple, leaves remote, the upper free part (blade) about 1 cm. long and appressed when dry but having the apex recurved and the shining leaf-bases conspicuous; seta 6–11 cm. and capsule 5 mm. (4–7) long; calyptra golden brown.

The var. *perigoniale* is a smaller plant (4–8 cm. high) of drier and more exposed situations, with leaves smaller and more crowded, so that, when dry and appressed, the leaf-bases are ordinarily not seen; seta and capsule shorter (the latter 3–4 mm. long). As a rule this variety is darker colored in all its parts and more compact than is the species, suggesting a more xerophytic plant. The perichaetial leaves, although usually more conspicuous and more prominently hyaline, are not necessarily any larger than in the species. This variety undoubtedly occurs in Vermont though no record of its occurrence there has been found.

The var. *uliginosum* is just such a variation as might be expected in a very moist, well shaded, and humid situation; that is, with elongated and more or less flexuous stems, longer and most distant leaves. In the dried state a very pronounced character is the abruptly squarrose upper portion of the leaf, the apex of which is often somewhat recurved or even circinate. It should be expected in all the New England states.

From an examination of some thousands of leaf sections of *P. commune* and its allies during the past year it is quite evident that there is much more variation in the lamellae than might be expected from reading standard descriptions; for instance, the end-cells in sections may vary from strongly crescentric to circular in the same leaf, depending respectively upon whether the section is cut near the middle of the leaf or down near the sheath. Like-

wise, the heights of the lamellae vary. Again, the lamellae of immature leaves differ from those of mature ones. The leaves and lamellae of new shoots differ from those of the old shoots when the amount of humidity or soil moisture is altered. This can easily be shown experimentally by transferring a plant from a moderately dry situation to a dish of water under a bell jar and later comparing the leaves of the new shoots with those of the old. The thickness of the outer wall of the end cell is also a variable quantity. In fact it is quite evident that certain external factors (climatic and edaphic as well as physiographic) play no small part in determining the form and structure of the lamellae, the leaves, and even the whole plant. The query suggests itself, "Are these factors alone wholly responsible for the existence of any of the varieties which have received distinctive names?" Here is a good field for experimentation.

Polytrichum formosum was reported from various New England states prior to 1885. Undoubtedly the bulk of the material so reported must be referred to *P. Ohioense* as has been repeatedly shown in various articles and catalogues since the date mentioned.

Polytrichum gracile was reported from Massachusetts and New Hampshire in 1847 by William Oakes (Hovey's Magazine, 13: 174). Dr. A. J. Grout writes me that the only specimens of this species which he has were collected in Vermont, so the New Hampshire locality mentioned in RHODORA (1: 53) is undoubtedly an error. The Vermont plants were collected on both Willoughby Mt., and on Mt. Mansfield by Dr. G. G. Kennedy.

Polytrichum Jensenii is a plant which is known from Lapland, Finland, Spitzbergen, Greenland, Alaska, and the Yellowstone Park. The Maine plant which is here referred to this species grew amongst sphagnum in a bog at Presque Isle. It differs mainly from authentic material, kindly loaned by Mr. J. M. Holzinger, in having longer and somewhat flexuous stems, less rigid leaves, and thinner-walled marginal cells of lamellae.

Brown University.

DIE EUROPÄISCHEN TORFMOOSE.

By G. ROTH, VERLAG VON WILHELM ENGELMAN, LEIPZIG.

Herr G. Roth, whose exhaustive work on the European mosses was ably reviewed by Prof. Holzinger in the pages of THE BRYOLOGIST last year (Vol. viii, p. 113), has placed students of bryology under further obligations by the publication of his work on the European Sphagnaceae. This work consists of eighty pages of letter press with eight plates, uniform in size and method of reproduction with his "*Europäische Laubmoose*," and it is published at the very moderate price of 3.20 marks.

After an introduction, giving a concise account of the intimate structure of these remarkable plants, Herr Roth, in the systematic portion of his work, follows very largely the lines taken by Dr. C. Warnstorf, familiar to many English students, in Mr. S. C. Horrell's "*European Sphagnaceae*," and lately further amplified by Dr. Warnstorf himself, in his "*Leber und Torfmoose der Mark Brandenburg*."

The researches of M. Meylan, in the Jura, on the *Sphagna* of the *acutifolium* group (Rev. Bry., 1906, p. 17, et seq.) have, I think, thrown some doubt on the permanent validity of some of the species recently put forward in this group. Herr Roth, however, is fully aware of the unsatisfactory character of some of the species, since he draws attention to the fact that most of the species are connected by intermediate forms. Whatever view may ultimately be adopted in reference to the species within this group, students will be grateful to Herr Roth for bringing together and collating the views of various authors on the modern lines, where collation presents more than usual difficulty.

The plates give the general facies of the plant, with details of the leaves, cells and pore structure and add very materially to the usefulness of the work. A Key is given to the species of the *cymbifolium* group, but this system is not extended to the other groups, which, indeed, for the most part, do not readily lend themselves to this method of treatment. The descriptions of the species are carefully done and the whole distribution of the species is given, so far as it is known to the author, and, as in most cases, the species are common to Europe and North America, the book will be found useful by students on both sides of the Atlantic. Four new species are added to the list of the European *Sphagna*, bringing the total number up to fifty-three.

The new species are: *S. Schliephackei* (Röll), *S. pseudorecurvum* (Röll) and *S. pseudocuspdatum* Roth, of the *cuspdatum* group, and *S. pungens* Roth, of the *subsecundum* group. Moreover, *S. rufescens* Bry. Germ. is split up into two species: *S. rufescens* Bry. Germ. and *S. cornutum*, Roth; the latter characterized by numerous ringed commissural pores, like strings of pearls, both on the inner and outer surfaces of the leaves.

Purists in the matter of language will be glad to find that the somewhat mongrel name, "*crassicladum*," has given way to the older name *turgidum* C. M., while many will be pleased to find that the familiar *S. laricinum* Spruce, has been re-instated.

In conclusion the author explains a simple method of staining by the use of Methyl violet, which acts very rapidly and enables the more intimate structure and position of the spores to be readily observed.

WM. EDW. NICHOLSON,
Lewes, August, 1906.

SULLIVANT MOSS CHAPTER NOTES.

I shall be very grateful if members of the Chapter will send me complete data of all the New England specimens of *Ramalinas* in their Herbariums with extreme measurements of thallus, width and length of each species or form and if possible with remarks on distribution and characteristic growth, substratum, etc. in their particular region. Proper acknowledgment will be made for all such aid which is asked for by Dec. 15, 1906.

Address MR. REGINALD HEBER HOWE, JR.
Middlesex School, Concord, Mass.

MEETING OF THE SULLIVANT MOSS CHAPTER.

The meeting of the Sullivant Moss Chapter, already announced in the *MAY BRYOLOGIST*, will take place at the New York Botanical Garden, Bronx Park, New York City, on Saturday, Dec. 29th, at 2 p. m. It is not possible at this writing to specify the room in which the meeting will be held.

A most gratifying response has been received to the circular letter of June 22d, and a program of much interest is assured, consisting of informal papers, discussions, and the exhibition of material. Those members who will contribute are requested to send notice to the President before Dec. 1st in order that an outline program may be sent to the Chapter by the end of the first week in the month. If those members who will attend the meeting, and all who can be urged to do so, will inform the President or the Treasurer of their intentions at the earliest date possible, it will be greatly appreciated.

EDWARD B. CHAMBERLAIN,
President.

Parts III and IV of "Common and Conspicuous Lichens of New England," by Reginald Heber Howe, Jr. and Marion Appleton Howe, have been received. Parts I and II were reviewed in the *BRYOLOGIST* for May by Prof. Bruce Fink. In it he calls attention to the fact that the half tones are not quite all that could be desired and it is a pleasure to notice a great improvement in them, especially in the last part issued. A. M. S.

The attention of all field workers is called to the article on *Polytrichum commune* by Prof. J. Franklin Collins in this issue, and especially to the desire of the author for material from all sections of the country.

We welcome two new members this month, Mrs. H. E. Young, Atlin, British Columbia, Canada, and Prof. Wm. P. Holt, 1004 Jefferson Avenue, Toledo, Ohio. This makes our membership 177.

NOTICE—ELECTION OF OFFICERS FOR 1907.

The members of the Sullivant Moss Chapter are requested to forward ballots AT ONCE to the Judge of Elections, Prof. J. Franklin Collins, 468 Hope street, Providence, R. I. Polls close November 30th. The following candidates have signified their willingness to serve, if elected. Members, however, are at liberty to vote for any other candidates, should they prefer to do so.

For President—Mr. Edward B. Chamberlain, 519 West 121st street, New York City.

For Vice-President—Mr. G. K. Merrill, 564 Main street, Rockland, Maine.

For Secretary—Dr. John W. Bailey, Walker Building, Seattle, Wash.

For Treasurer—Mrs. Annie Morrill Smith, 78 Orange street, Brooklyn, N. Y.

THE DECEMBER CHAPTER MEETING.

As we go to press a letter from the secretary of the local committee of arrangements for the American Association for the Advancement of Science has been received, stating that Friday afternoon, December 28th, would be the most convenient time for the meetings of several of the smaller affiliated societies, including the Sullivant Moss Chapter. The meeting to be held at Columbia University, at 2 P. M.—**not** at the New York Botanical Garden as stated on the previous page.

Therefore, reserve Friday afternoon, December 28th, and be at Columbia University at 2 P. M. Notice of the room and further details will be sent later by card to members.

EDWARD B. CHAMBERLAIN, President,
518 West 121st street,
New York City.

MUSCI ACROCARPI BOREALI-AMERICANI.

(Prepared and Distributed by Prof. J. M. Holzinger.)

We have just received numbers 201-225 of Prof. Holzinger's *Exsiccata* and consider this fascicle one of the best yet issued. It contains:

- Bruchia Donnellii* Aust.
- Bruchia Drummondii* Hpe.
- Dicranum longifolium subalpinum* Milde.
- Camphylopus subleucogaster* Lesq. & J.
- Grimmia calyptrata* Hook.
- Ptycomitrium Gardneri* Lesq.
- Orthotrichum laevigatum* Zett.
- Tayloria tenuis* (Dicks.) Sch.
- Physcomitrium acuminatum* B. & S.
- Physcomitrium Drummondii* E. G. B.
- Entosthodon Drummondii* Sulliv. var. *obtusifolia* Holz. var. nov.
- Webera Lescuriana* Sulliv.
- Bryum purpurascens* R. Br.
- Polytrichum gracile* (Dicks.) Menz.

No. 224 *Bryum purpurascens* R. Br. is from Sweden and looks a little peculiar under *Boreali-Americani*, but the specimens of this species are very good and all will be glad to get them. Georgia and Florida, Vermont and Canada, Washington and Oregon, Kansas and many other states between these named are represented. Prof. Holzinger's work is a valuable contribution to science and will rank with the classical *Musci Boreali-Americani* of Sullivant and Lesquereux.

A. J. GROUT.

NORTH AMERICAN MUSCI PLEUROCARPI.

By DR. A. J. GROUT.

The eleventh fascicle of the above exsiccata, issued by Dr. A. J. Grout, appeared during the past summer and contains numbers 251 to 275, besides additional material of certain earlier numbers. Special attention should be called to the interesting material from Florida and from the west coast, which is being issued in these sets. The following species are of especial note in the present fascicle: *Alsia Californica*, Sull., (c. fr.), *Brachythecium lampochryseum*, C. M. & K., *B. salebrosum mamilligerum* (Kindb.) Grout, *B. splendens*, Aust., *Fontinalis Neo-Mexicana Columbica*, Card. (type collection), *Hookeria cruceana*, Duby, *Hypnum Bestii*, Ren. & Bryhn, *H. occidentale*, Sull. & Lesqr., *Leptodon Floridanus*, Lindb., *Raphidostegium Kegelianum Floridanum*, Ren. & Card. EDWARD B. CHAMBERLAIN.

OFFERINGS.

To Chapter Members only. For postage.

- Mrs. Mary A. Stevens, 39 Columbia street, Brookline, Mass. *Ulota phyllantha* Brid.
- Mr. Edward B. Chamberlain, 519 West 121st street, New York City. *Neckera pennata* Hedw.
- Dr. John W. Bailey, 405-406 Walker Building, Seattle, Wash. *Fissidens rufulus* B. & S.; *Hypnum circinale* Hook.
- Mrs. Annie Morrill Smith, 78 Orange street, Brooklyn, New York. *Plagiothecium undulatum* (L.) B. & S.; *Neckera Menziesii* Hook.; *Hylocomium loreum* (L.) B. & S.; *H. triquetrum* (L.) B. & S. Collected by A. J. Hill in British Columbia.
- Prof. J. Franklin Collins, 468 Hope street, Providence, R. I. *Paludella squarrosa* (L.) Brid. st. Collected in the Gaspé Peninsula.
- Dr. John L. Sheldon, Morgantown, West Virginia. An odd form of *Scapania nemorosa* Dumort. Duplicate det. by Müller. Collected at Sabraton, W. Va.
- Miss Mary F. Miller, 1109 M. street, Washington, D. C. *Umbilicaria pustulata* (L.) Hoffm.; *U. Dillenii* Tuckerm. Collected at Gapland, Md. top of Elk Ridge Mt.



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ERRATA.

Page 2, line 1, for *aomi* read *domi*.

Page 8, line 12 from below, for Prangl read Prantl.

Page 8, line 3 from below, for Scandinarian read Scandinavian.

Page 14, line 4 from below, for Breckle read Brenckle.

Page 16, line 8, for 1803 read 1903.

Page 16, line 13, for Merriel read Merrill.

Page 66, line 21, for *dilicata* read *delicata*.

Page 100, line 17 from below, for *Pterygynandrum* read *Pterigynandrum*.

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AN ILLUSTRATED BIMONTHLY DEVOTED TO

NORTH AMERICAN MOSSES

HEPATICS AND LICHENS

EDITOR

ANNIE MORRILL SMITH

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THE SULLIVANT MOSS CHAPTER

EDITOR

MRS. ANNIE MORRILL SMITH

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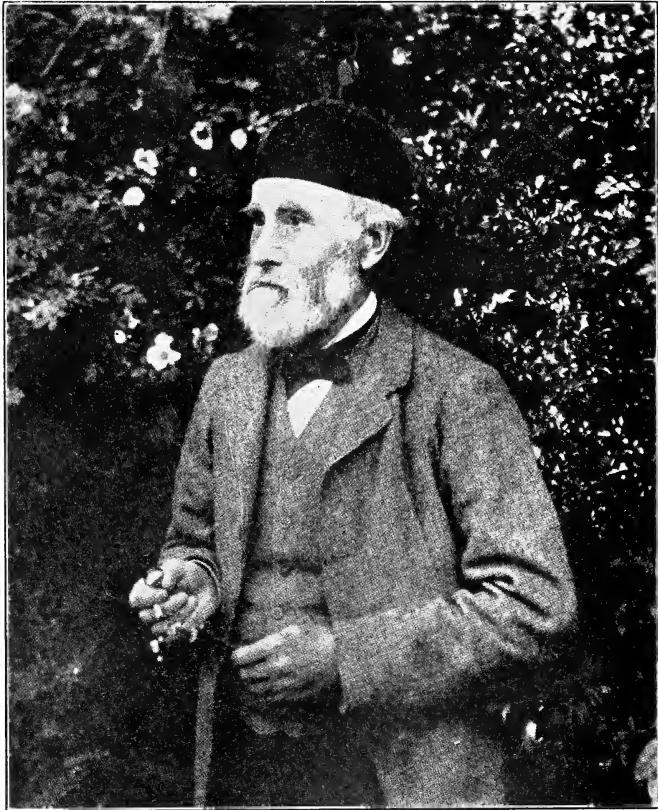
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WILLIAM MITTEN

1819 -- 1906

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from the Journal of Botany, October, 1906.

THE BRYOLOGIST.

VOL. X.

JANUARY, 1907

No. 1.

WILLIAM MITTEN.

A Sketch with Bibliography.

WILLIAM EDWARD NICHOLSON.

The bryological world is the poorer to-day by the loss of the veteran bryologist, William Mitten. Born at Hurstpierpoint, in the County of Sussex, the 30th November, 1819, he was in his 87th year when he passed away on the 20th July last.

By profession a pharmaceutical chemist, he was in early life apprenticed at Lewes in the same county to a chemist of the name of Saxby, who carried on business at a shop which has long since disappeared. He soon evinced a strong taste for various [branches of natural history, and a story is still current in the town that, somewhat to his master's annoyance, those numerous pigeon holes, so general in a chemist's shop, with the mysterious labels Rh. Zingit, etc., etc, were frequently found to harbor "specimens" by no means corresponding to the label outside.

A fortunate acquaintance in early life with William Borrer, a well-known Sussex botanist, and Sir William Hooker caused him to turn his attention to the study of mosses and hepatics, and as early as May, 1843, he recorded the discovery from near Erith of *Aulaacomnium androgynum* Schwgr, in fruit, a very rare condition in Europe, while in 1846 he discovered near Hurstpierpoint the rare and interesting *Weisia (Astomum) Mittenii*, which was named after him, and soon afterwards described by the authors of the *Bryologia Europea*, then in course of publication. Shortly after this Mitten turned his attention to the study of exotic mosses and hepatics, and in 1851 he published, in Hooker's *Journal of Botany*, "a Catalogue of cryptogamic plants, collected by W. Jameson in the vicinity of Quito." From this time, until a few years before his death, his work on exotic bryology was continuous, as will be seen from the subjoined list of his principal publications, and during this period most of the collections of mosses and hepatics received at Kew passed through his hands for determination. I regret my inability to discuss Mitten's work on exotic bryology, as I have not had the leisure or opportunity for studying mosses over a wide field. A general review of his work by a more competent pen would be most useful.

Mitten was on the side of the "splitters" rather than of the "lumpers," but in dealing with a group where there was so much new ground to be covered, such an attitude is in many ways justifiable, and it may reasonably be left to a later generation to take a more synthetic view. In any event, Mitten was fully aware that much yet remained to be done in this direction. Shortly before his death he told me that he had been looking through his North American *Brachythecia* with, I believe, a view to their revision, though I am not aware that this group particularly needs reduction or that Mitten's project took any definite shape.

The demands of his business and the *res angusta domi* rarely allowed Mitten to leave his home, and in these days of constant traveling it is strange to read of one who, as Mr. W. B. Hemsley informs us, told Sir William Hooker in 1854, had only been away from home for two week-days for five years. When his daughter Flora, in later years, relieved him of some of his business, he had more leisure, and on one occasion he made a visit to Switzerland, of which he cherished very pleasant recollections, and in the course of which he gathered many things previously only known to him in herbarium specimens. He told me of the particular interest which he had found in visiting the district, in which Schleicher had botanized.

It was not until late in the autumn of his long life that I had the privilege of a personal acquaintance with Mitten. My first letters from him, dated in the early part of the year 1895, are in reference to *Pottia caespitosa* and other rare Sussex mosses which he most kindly directed me to find. His letters are models of that painstaking accuracy which, I believe, characterized his work generally, and they were also full of encouragement to me, who was little more than a beginner at the time, as he concluded his first letter with the remark: "I shall always be glad to hear of any new or strange moss you may meet with, and hope you may find as much to interest you in mosses as I have for so many years." The implied promise of assistance was amply redeemed in our subsequent correspondence.

My opportunities of seeing Mitten were few and far between, but it was always a pleasure to look in and see him in his quiet home, surrounded by his garden in which he took so much interest, and which harbored many rare and curious plants. On the last occasion on which I saw him he was regretting the wild luxuriance of several rare British plants which had spread beyond all bounds and which, as he observed, wanted all the place to themselves. On another occasion, in 1903, I had the pleasure of showing him fresh specimens of *Weisia Mittenii*, which I had recently found and in which he was much interested, as it had not, I believe, been gathered since his original discovery of it in 1846.

Mitten was an associate of the Linnean Society of London, to which he was elected in 1847, an honorary member of the Linnean Society of New South Wales, and of the New Zealand Institute, and also of the Brighton Natural History Society, and the South Eastern Union of Scientific Societies.

Mittenia Gottsche was a genus of hepaticae allied to *Pallavicinia* (Ann. Sci. Nat. Ser. 5, I. 1862), and Lindberg in 1863 put forward the genus *Mitlenia* of mosses as a substitute for *Mniopsis* already in use.

There is an excellent portrait of Mitten in the October number of the Journal of Botany, accompanying an interesting notice of him by Mr. W. Botting Hemsley, from which I have borrowed a few details. I am also indebted to his daughter, Miss Flora Mitten, for assistance in compiling these notes, and to Mr. A. Gepp, of the British Museum, for a greater part of the subjoined list of Mittens' publications, mostly taken from the Royal Society's catalogue. Mitten leaves a widow who is 93 years of age, three unmarried daughters, and a fourth who is the wife of the famous naturalist

Dr. A. R. Wallace, co-discoverer with Darwin of the principle of Natural Selection.

The following is a list of the principal publications of William Mitten on bryology. His most important work is No. 31, on the Mosses of South America, which occupies the whole of the twelfth volume of the Journal of the Linnean Society:

1. Some remarks on Mosses, with a proposed new arrangement of the genera. *Ann. Nat. Hist.* VIII, 1851, pp. 51-59.
2. A list of all the Mosses and Hepaticae hitherto observed in Sussex. *Ann. Nat. Hist.* VIII, 1851, pp. 305-324, 362-370.
3. Catalogue of cryptogamic plants collected by W. Jameson in the vicinity of Quito. *Hook., Journ. Bot.* III, 1851, pp. 49-57, 351-361.
4. [Musci and Hepaticae in] Dr. F. Weluritsch's Some Notes upon the cryptogamic portion of the plants collected in Portugal, 1842-1850; London, 1853, pp. 14-24.
5. [Hepaticae in] J. D. Hooker's *Flora Novae-Zelandiae*, II, 1855, pp. 125-172.
6. On some undescribed species of Musci belonging to the genera *Mnium* and *Bryum*. *Hook., Journ. Bot.* VIII, 1856, pp. 230-233.
7. A list of the Musci and Hepaticae collected in Victoria, Australia, by Dr. F. Müller. *Hook., Journ. Bot.* VIII, 1856, pp. 257-266.
8. A list of some Mosses and Hepaticae collected by the Rev. Charles Parish at Moulmein. *Hook., Journ. Bot.* VIII, 1856, pp. 353-357.
9. Enumeration of the Mosses collected in India by Dr. J. D. Hooker and Dr. T. Thomson, with their habitats, elevations, and the numbers under which they have been distributed (written in collaboration with W. Wilson). *Hook., Journ. Bot.* IX, 1857, pp. 289-300, 321-333, 363-370.
10. [Hepaticae of Panama in] B. Seemann's, *The Botany of the Voyage of H. M. S. Herald*, 1845-1851; London, 1852-1857, pp. 245-6.
11. A few notes on some new or rare British Mosses. *Phytologist*, II, 1857-1858, pp. 177-180.
12. *Musci Indiae Orientalis*: an enumeration of the Mosses of the East Indies (1858). *Linn. Soc. Journ.* III, 1859 (Bot.) Suppl.
13. [Hepaticae in] J. D. Hooker's *Flora Tasmaniae* II, 1860, pp. 221-241.
14. Descriptions of some new species of Musci from New Zealand and other parts of the southern hemisphere, together with an enumeration of the species collected in Tasmania by William Archer, arranged upon the plan proposed in the *Musci Indiae Orientalis* (1859). *Linn. Soc. Journ.* IV, 1860 (Bot.) pp. 64-100.
15. *Musci et Hepaticae Vitienses*. *Bonplandia*, IX, 1861, pp. 365-367; X, 1862, pp. 19-20.
16. *Hepaticae Indiae Orientalis* (1860) *Linn. Soc. Trans.* V, 1861, (Bot.) pp. 89-128.
17. On some new species of Musci and Hepaticae in the Herbarium of Sir W. J. Hooker, collected in tropical Africa, chiefly by the late Dr. Vogel and Mr. Barter (1860). *Linn. Soc. Trans.* XXIII, 1862, pp. 51-58.

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21. On *Anisostichium*, a proposed new genus of Musci. Linn. Soc. Journ. VII, 1863, (Bot.) pp. 119-120.
22. A new genus of Hepaticae. Journ. Linn. Soc. VII, (1864). pp. 243-244.
23. Some observations on the Moss known to British bryologists as *Hypnum pratense*. Journ. of Bot. II, 1864, pp. 122-123.
24. Descriptions of New British Mosses: *Hypnum imponens*, *Funaria microstoma*, *Seligeria calcicola*, *S. calcarea*, *S. pusilla*. Journ. of Bot. II, 1864, pp. 193-196.
25. Contributions to cryptogamic flora of the Atlantic Islands (1863). Linn. Soc. Journ. (Bot.) VIII, 1865, pp. 1-10.
26. The Bryologia of the Survey of 49th parallel of latitude (1864). Linn. Soc. Journ. (Bot.) VIII, 1865, pp. 12-55.
27. On some new species of Musci and Hepaticae, additional to the floras of Japan and the coast of China (1864). Linn. Soc. Journ. (Bot.) VIII, 1865, pp. 148-158.
28. A few notes on some British mosses allied to *Tortula fallax* Hedw. Journ. of Bot. V, 1867, pp. 324-329.
29. New or rare British Mosses: *Trichostomum flavovirens*, *T. diffractum*, *T. littorale*. Journ. of Bot. VI, 1868, pp. 97-99.
30. A list of the Musci collected by the Rev. Thomas Powell in the Samoa or Navigators' Islands (1867). Linn. Soc. Journ. (Bot.) 1869, pp. 166-195.
31. Musci Austro-Americani, sive enumeratio muscorum omnium Austro-Americanorum mihi hucusque cognitorum, eorum praecipue in terris Amazonicis Andinisque a Ricardo Spruceo lectorum (1868). Linn. Soc. Journ. Bot. XII, 1869, pp. 1-632.
32. [Musci, Hepaticae in] F. Du Cane Godman's Natural History of the Azores. London, 1870, pp. 288-328.
33. Observations on the species of *Pottia* allied to *P. truncata*, with descriptions of three new species: *P. littoralis*, *P. asperula*, *P. viridifolia*. Journ. of Bot. IX, 1871, pp. 2-5.
34. Descriptions of new species of Musci collected in Ceylon by Dr. Thwaites (1872). Linn. Soc. Journ. XIII, 1873 (Bot.), pp. 293-326.
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36. On the Aloina section of the genus *Tortula*. Journ. of Bot. 3, 1874, pp. 139-142.
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39. The Musci and Hepaticae collected by H. N. Mosley, Naturalist to H. M. S. Challenger (1875). Linn. Soc. Journ. (Bot.) 15, 1877, pp. 59-73.
40. List of the Musci and Hepaticae collected in Kerguelen's Island by the Rev. A. E. Eaton (1876). Linn. Soc. Journ. (Bot.) 15, 1877, pp. 193-197.
41. List of Hepaticae collected by the Rev. A. E. Eaton at the Cape of Good Hope (August and September, 1874,) (1877). Linn. Soc. Journ. (Bot.) 16, 1878, pp. 187-196.
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43. [Musci Maroccani in] J. Ball's Spicilegium Florae Maroccae (1877). Journ. Linn. Soc. (Bot.) XVI, 1878, pp. 737-739.
44. [Transit of Venus Expeditions, 1874-1875.] Enumeration of the plants hitherto collected in Kerguelen Island, etc. II, Musci, III, Hepaticae. Phil. Trans., 168 (Extra Vol.) 1879, pp. 24-45.
45. [Transit of Venus Expeditions, 1874-1875. Collections from Rodriguez]. Musci, Hepaticae. Phil. Trans. 168 (Extra Vol.) 1879, pp. 388-401.
46. Record of new localities of Polynesian Mosses, with descriptions of some hitherto undefined species (1882), New South Wales. Linn. Soc. Proc., 7, 1883, pp. 98-104.
47. [Muscineae in] Mason and Theobald's Burma, its people and productions, Vol. II, Hertford, 1883, pp. 36-55.
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49. [Muscineae in] W. B. Hemsley's Report on Botany of H. M. S. Challenger. I, 1885, pp. 88-93, et passim.
50. Notes on the European and North American species of mosses of the genus Fissidens (1885), Journ. Linn. Soc. (Bot.) XXI, 1886, pp. 550-560.
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52. The Mosses and Hepaticae collected in Central Africa by the late Right Rev. James Hannington, Bishop of Mombasa, F.L.S., F.G.S., etc., with some others, including those gathered by Mr. H. H. Johnston on Kilimanjaro (1886). Journ. Linn. Soc. (Bot.) XXII, (1887) pp. 298-329.
53. [Musci in] W. B. Hemsley's Report on the Vegetation of Diego Garcia (1886). Journ. Linn. Soc. (Bot.) XXII (1887), pp. 339-340.
54. Musci of Roraina Expedition of 1884. Trans. Linn. Soc. II, pp. 296-297, 1887.
55. [Muscineae in] J. B. Balfour's Botany of Socotra, in Trans. Roy. Soc. Edinburgh, Vol. XXXI, 1887, pp. 330-336.
56. An Enumeration of all the species of Musci and Hepaticae recorded from Japan (1889) Trans. Linn. Soc. London (Bot.), III, 1890, pp. 153-206.
57. [Muscineae in] Dr. O. Stapf's, On the Flora of Mount Kinabalu, in North Bornea (1903) in Trans. Linn. Soc. London (Bot.) IV. 1903, pp. 255-261 (in conjunction with C. H. Wright).

NOTES ON VERMONT BRYOPHYTES—1906.

BY A. J. GROUPE.

Although the flowering plants and ferns of Mt. Mansfield have been carefully studied and listed, the bryophyte flora has received less attention. Mr. C. G. Pringle, who first explored this region with thoroughness, collected many mosses and hepatics, but it was his custom to collect only fruiting plants. Mrs. Britton, Dr. Evans, Dr. Kennedy and myself, have done some collecting of bryophytes on the mountain and in its vicinity.

This season it was my pleasure to attend the meeting of the Vermont Botanical Club on the mountain and to spend a week on the summit, engaged chiefly in collecting mosses.

Dr. Kennedy had previously reported *Tayloria tenuis*, but I came upon such quantities of it as to be able to supply Prof. Holzinger with enough for his Musci Acrocarpi Bor.-Am. and have an abundant supply left. It grew along the banks of a little rivulet into which the Summit House sewer discharges, but far enough down so that it was not offensive. *Schistostega* is abundant in the deep clefts in overhanging rocks on the northeast side of the mountain, below a point in the road about a quarter of a mile from the hotel: I also found it in a crevice about ten feet to the left of the cave in the north face of the "Nose." These high, damp, creviced north-facing cliffs of the "Nose," near the hotel, are an ideal collecting place for rare and interesting mosses. Here *Swartzia montana* is very fine and abundant and fruits freely; in damp crevices in overhanging rocks is an abundance of *Amphidium Lapponicum*. In the deepest, darkest, and dampest clefts was a limited supply of *Rhabdoweisia denticulata* and *Cynodontium gracilescens*. On the wet soil at the base of overhanging cliffs is a variety of *Plagiothecium denticulatum* near var. *obtusifolium*; with this and in similar places was an abundance of *Pohlia cruda*, mostly sterile. In spots similar to those mentioned last is an *Amblystegium* which I made *A. vacillans*. On these cliffs *Andreaea petrophila* is abundant and fruits freely. While abundant on rocks all about the summit, it seems not to fruit to any great extent on the more exposed portions of the mountain.

I thought I had some knowledge of *Pohlia nutans*, but here I found it so variable that I collected it a dozen times, thinking each time that I had something different from the previous collections. If any one with the species-making instinct, like that which has recently dealt with Thorn Apples and Violets, ever takes hold of *Pohlia nutans*, I tremble for the result. There were large robust forms and small slender forms, forms with small capsules and forms with large capsules, forms with seta long and slender and others with seta short, forms with leaves typical and others with lower leaves shortly oblong-ovate and rather short acuminate. One form common on the summit in wet places, such as the edge of rain pools, resembles the form described by Mr. Dixon in his notes under this species. This fruits rather sparingly, but certainly is paroicous. Sterile specimens have been issued by Prof. Holzinger in his Musci Acrocarpi Bor.-Am. as *Webera commutata*.

Hypnum stramineum is abundant in bogs on and near the summit of the mountain, and associated with it, in the bog back of the house, I found *Dicranum Bonjeani*, which is also distributed in Prof. Holzinger's sets. *Plagiothecium elegans* grew nearly out of reach in the "Snow Cave." near the "Lips." *Bryum pseudotriquetrum* was collected by Mr. Stewart H. Burnham beside the road near the summit.

Species New to the State from Other Localities.

Andreaea Rothii W. & M. Jamaica, Frank Dobbin, com. S. H. Burnham.

Mnium cinclidioides (Blytt.) Hueben. In a slow mountain brook with Fontinalis, Newfane.

Philonotis Muhlenbergii (Schwaegr.) Brid. Brookline. There is also a specimen of this moss in the collections of Columbia University from Jonesville. The perigonal leaves of this species are erect, lanceolate and acute, with the costa percurrent in the inner leaves. In *P. fontana* the perigonal leaves are spreading, broadly triangular-ovate, the inner often obtuse and rounded at apex.

Pohlia prolifera (Lindb.) Correns. On Newfane Hill, fruiting.

Amblystegium vacillans Sulliv. and *Plagiothecium elegans* (Hook.) Schimp., mentioned above, are also new to the state. A species of *Ditrichum*, believed by Dr. Best and myself to be new, was collected in good condition and in considerable quantity on Newfane Hill.

Additional Localities for Rare or Interesting Species.

Anacamptodon splachnoides. Knothole in apple tree, Newfane.

Barbula convoluta on old brick, Newfane. On limekiln waste, Stratton.

Pohlia cruda is abundant in cool, moist ravines and crevices of cool, shaded cliffs in Newfane, and probable throughout the state. It fruits infrequently, but may be distinguished from the other species of the genus by the very long and narrow areolation.

Rhabdoweisia denticulata. North-facing cliffs, Newfane Hill. Of the specimens from this locality Dr. Best says: "The *Rhabdoweisia* has the leaves of *fugax* but the peristome is that of *denticulata*. It is probably Boulay's *R. fugax subdenticulata* which Limpricht refers to *denticulata*. My own opinion is that both are forms of one and the same specific type and represent the extremes of a series, and yours is an intermediate form."

NOTES ON NOMENCLATURE VII.

ELIZABETH G. BRITTON.

Parts 224 and 226 of Engler & Prantl Pflanzenfamilien were received in May and October, 1906. They include the following orders: *Spiridentaceæ*, *Lepyrodontaceæ*, *Pleurophascaceæ*, *Neckeraceæ* and *Lembophyllaceæ*; including twenty-three genera having species in North America of which the following are found within the limits of the United States:

Pirea Card. Bull. Soc. bot. Belg. 32: 175. 1893.

The type species of this genus are from Central America, but Brotherus adds two West Indian species and transfers to it *Neckera cymbifolia* and *N. Luddoviciae* of the manual, removing them from the *Meteoriae* to the *Pterobryae*. As the distinctions between these two tribes are based on the peristome and neither of these species has been found in fruit, their true affinity still remains somewhat problematical. They have previously been referred to *Pilotrichella* (C. M.) Besch. which includes thirteen species from the West Indies and Central America.

Papillaria C. M. includes thirteen species from the West Indies and Central America with *P. nigrescens* (Sw.) Jaeg. from Florida and Louisiana extending into Mexico, Costa Rica, Jamaica and the Antilles.

Meteorium (Brid.) Mitt. Journ. Linn. Soc. 12: 427, 1869.

Pilotrichum Sect. *Meteorium* Brid. Bryol. univ. 2: 264. 1827.

The citations for this genus, as given by Brotherus, are puzzling and misleading. Bridel originally included under this section two species from Nepal, India, of which one is transferred to *Papillaria* (*P. fuscescens*) leaving *P. filamentosum* as the type of *Meteorium*.

This species is not retained in the genus either by Fleischer or Brotherus, but placed in *Aerobryidium* Fleischer, a new genus. Four species from Mexico and the West Indies are retained in *Meteorium*. *Meteorium pendulum* Sull. is transferred to the following genus:—*Floribundaria* C. M. Linnæa 40: 267. 1876. One North American species, *F. pendula* (Sull.) Fleisch. is distributed in Louisiana, Japan, China, Formosa and Java.

Neckera Hedw. Fund. 2: 93. 1782, is maintained with twenty-six North American species.

Under *Thamnia* Brotherus recognizes five genera of which four include North American species. He continues to use the generic name of *Thamnium* Br. & Sch. (1852) in spite of its being antedated by three homonyms dating back to 1799, 1825 and 1838. *Porotrichum* (Brid.) Dozy & Moelk. is also maintained, and the two genera are separated on the character of the teeth, whether transversely striate above or below. Nine Central American and West Indian species are listed under *Porotrichum* and seven under *Thamnium*, with two from the United States under the latter genus *Th. Alleghaniense* and *Th. Leibergii*.

Bestia Brotherus in Engler & Prangl Pflanzenfamilien 226, 858. 1906, is dedicated to Dr. George N. Best. This a new generic name the synonymy of which is as follows:—

Alsia longipes Sull. & Lesq.

Dendroalsia longipes E. G. Britt. Bull. Torr. Bot. Club 32:265, 1905.

This is a rare and beautiful California species, and Dr. Best is to be congratulated on having his name associated with it.

New York Botanical Garden.

Mr. Herman S. Simmons, Lund, Sweden, desires to sell his Moss Herbarium. It contains collections made by various Scandinavian bryologists: Lindberg, Kaurin, Hagen, Jensen, and others. For information as to price, etc., address Mr. Simmons as above.

TEN LOPHOZIAS.

From "Notes on New England Hepaticae."

DR. A. W. EVANS IN RHODORA.

Selected and Illustrated by Caroline Coventry Haynes.
[By permission.]

"LOPHOZIA FLOERKII (Web. & Mohr) Schiffn.; Engler & Prantl, Nat. Pflanzenfam. 1³: 85. 1893. *Jungermannia Floerkii* Web. & Mohr, Bot. Taschenb. 410. 1807. *J. Naumannii* Nees; Martius, Fl. Crypt. Erlang. 143. *pl. 4, f. 16*. 1817. *J. barbata*, var. *Floerkii* Nees, Naturgeschichte der europ. Lebermoose, 2: 168. 1836. *J. lycopodioides* var. *Floerkii* Lindb. Musc. Scand. 7. 1879. Mt. Washington, New Hampshire (*W. G. Farlow, A. W. E.*)" Evans, Rhodora 4: 210, 1902,

Plate II. Figs. 1-4. 1—Male plant $\times 22$. 2—Plant, ventral view showing conspicuous underleaves, $\times 22$. 3—Leaf, dorsal view $\times 70$. 4—Leaf cells $\times 365$. Drawn from material collected by Mr. A. Grape in Sweden. Sulliv. Moss Chapter Herb.

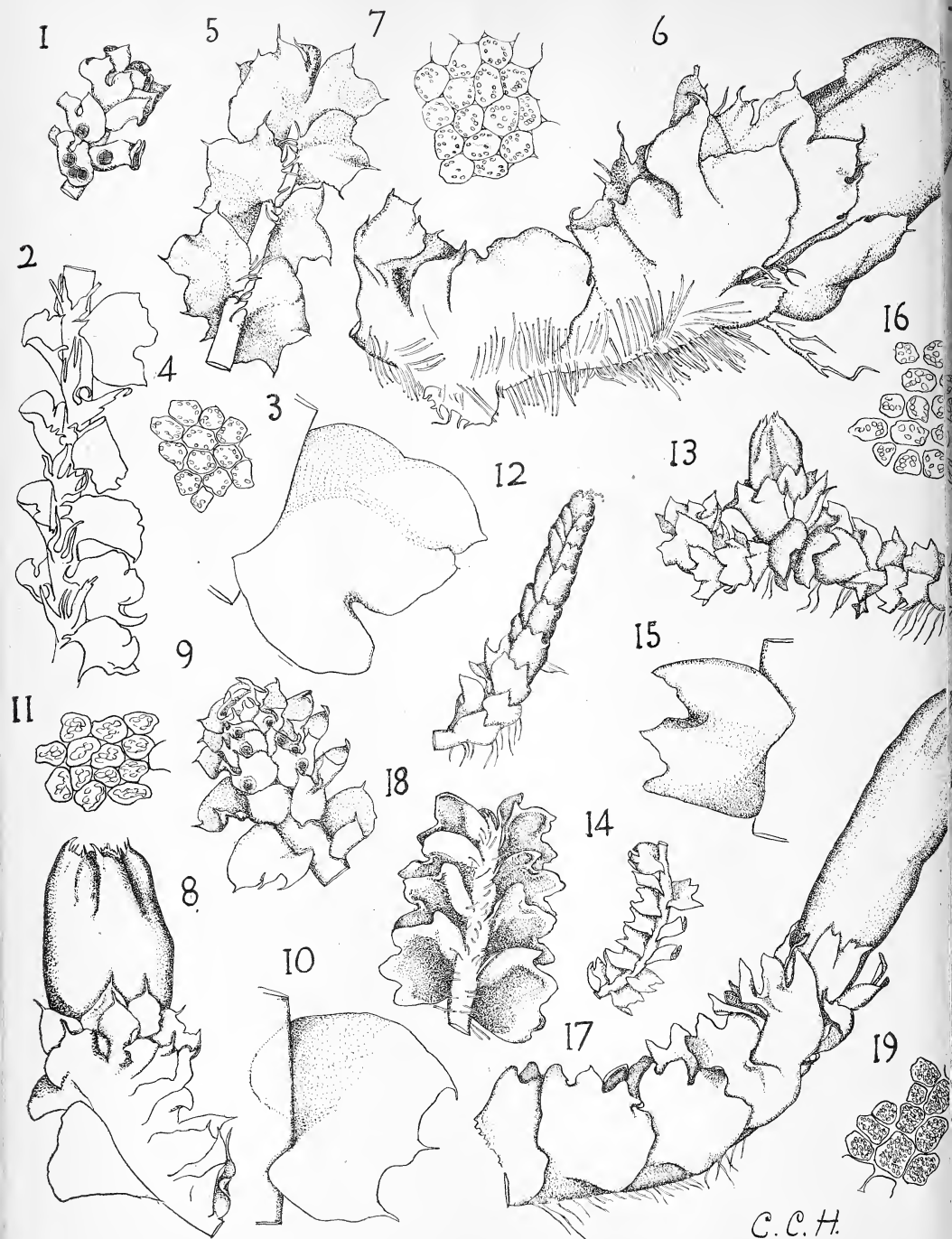
"LOPHOZIA LYCOPODIOIDES (Wallr.) Cogn. Bull. Soc. roy. Bot. de Belgique 10: 278. 1872. *Jungermannia lycopodioides* Wallr. Fl. Crypt. Germ. 1: 76. 1831. *J. barbata*, var. *lycopodioides* Nees, Naturgeschichte der europ. Lebermoose, 2: 185. 1836. Mt. Katahdin, Maine (*J. F. Collins*); Thorn Mt. and Carter Dome, New Hampshire (*A. W. E.*)" Evans, Rhodora 4: 210, 1902.

Figs. 5-7. 5—Plant, ventral view showing fine cilia at base of leaves $\times 22$. 6—Plant showing perianth, ventral view $\times 22$. 7—Leaf cells $\times 365$. Drawn from material collected by Underwood and Selby, near Ouray, Colorado, Sept. 9, 1901, New York Bot. Garden Herbarium.

"LOPHOZIA LYONI (Tayl.) Steph. Bull. de l'Herb. Boissier, II, 2: 157. 1902. *Jungermannia quinqueidentata* Huds. Fl. Angl. 511. 1762? Web. & Mohr, Bot. Taschenb. 430. 1807? *J. barbata*, var. *quinqueidentata* Nees, Naturgeschichte der europ. Lebermoose, 2: 196. 1836. *J. Lyoni* Tayl. Trans. Bot. Soc. Edinburg, 1: 116, *pl. 7*. 1844. *Lophozia quinqueidentata* Cogn. Bull. Soc. roy. Bot. de Belgique, 10: 279. 1872. Mt. Kineo, Moosehead Lake, Maine, (*M. L. Fernald*); Jackson, New Hampshire (*A. W. E.*); Mt. Mansfield, Vermont (*W. G. Farlow*); Meriden, Connecticut (*A. W. E.*)" Evans, Rhodora 4: 210, 1902.

Figs. 8-11. 8—Plant, showing perianth $\times 22$. 9—Male plant, dorsal view $\times 22$. 10—Leaf, dorsal view $\times 70$. 11—Leaf cells $\times 365$. Drawn from No. 185 Hep. Amer. collected by Dr. A. W. Evans, Jackson Spr., N. H., under name *Jungermannia quinqueidentata* Huds.

"The three species just quoted together with *L. gracilis* (Schleich.) Steph. (= *Jungermannia barbata*, var. *attenuata* Mart. of the Manual) have sometimes been regarded as distinct species, sometimes as well marked varieties of *L. barbata* (Schreb.) Dumort. Nearly all recent writers hold to the former view, recognizing five northern species in the "*barbata*"—group, but Pearson recognizes only four species looking upon *L. Floerkii* as a variety of *L. lycopodioides*, an opinion which has the sanction of Lindberg. With a little



C. C. H.

PLATE II. Lophozias. All reduced $\frac{1}{2}$.

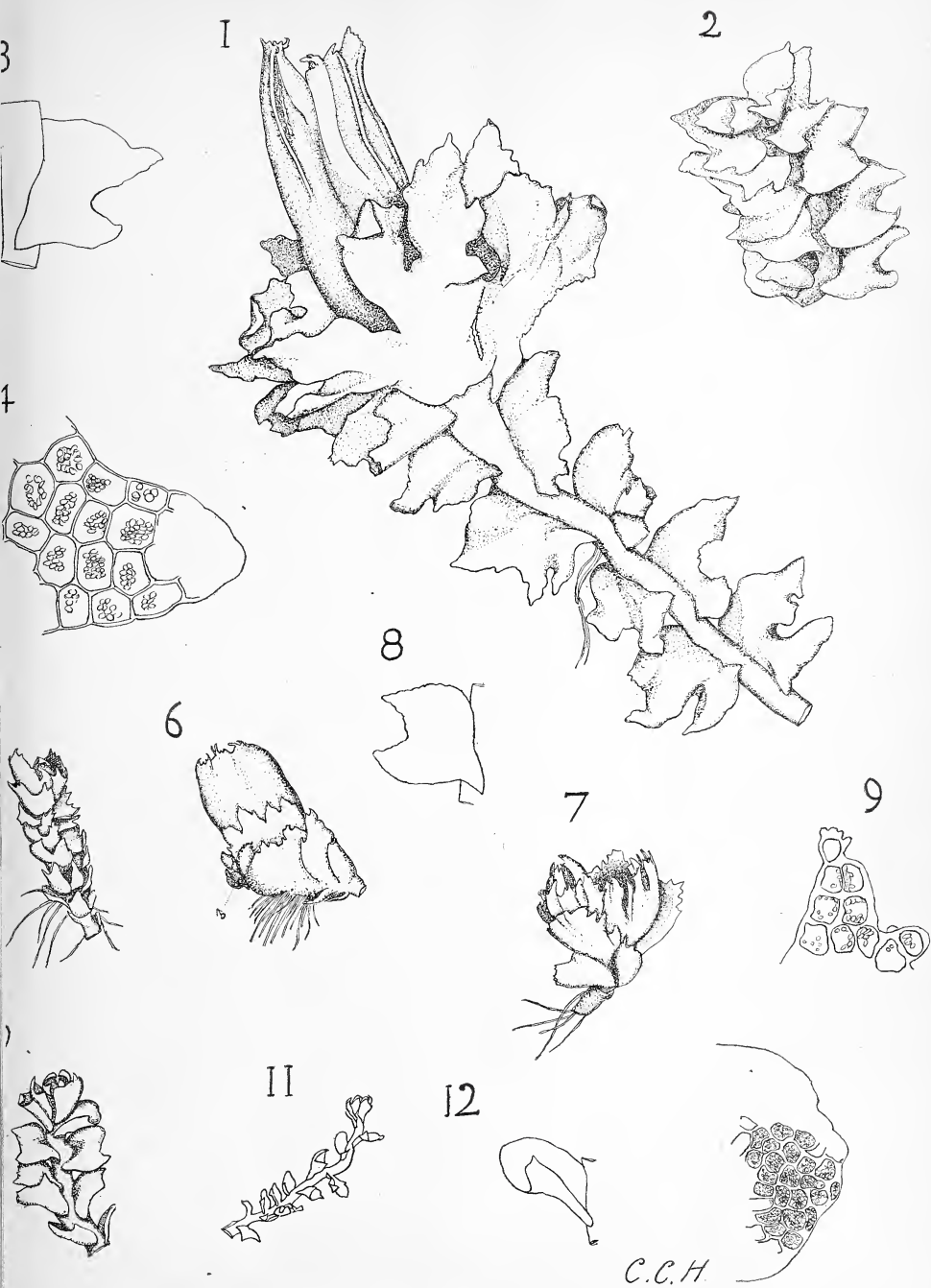


PLATE III. Reproduction Plate IX, Bry. Nov. 1906. Mag.=PLATE II.

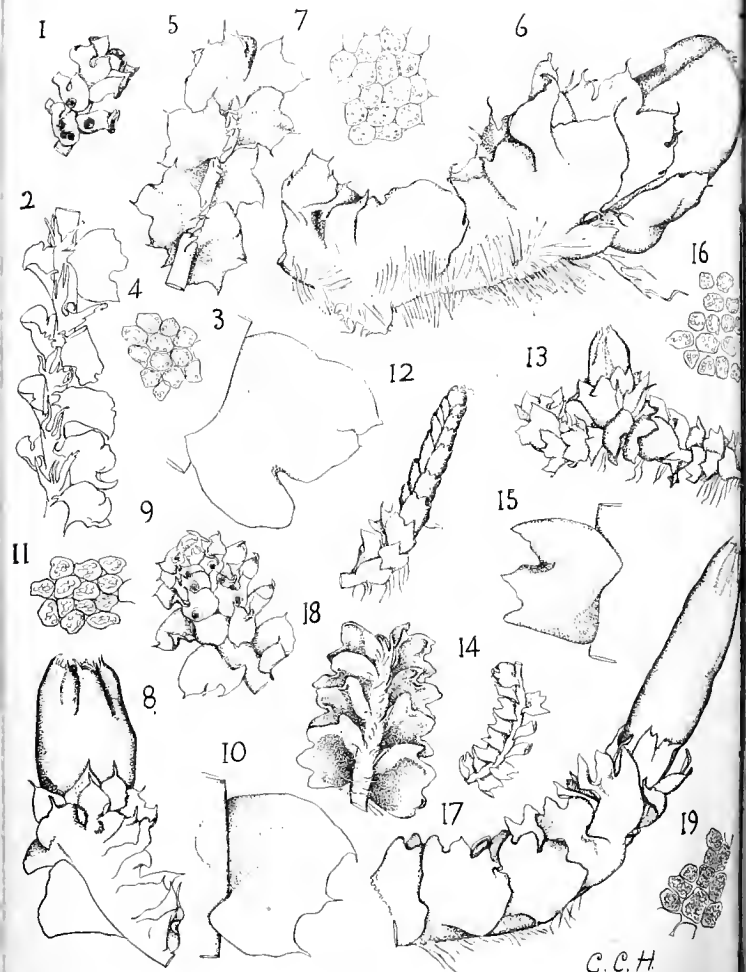


PLATE II. Lophozias. All reduced $\frac{1}{2}$.

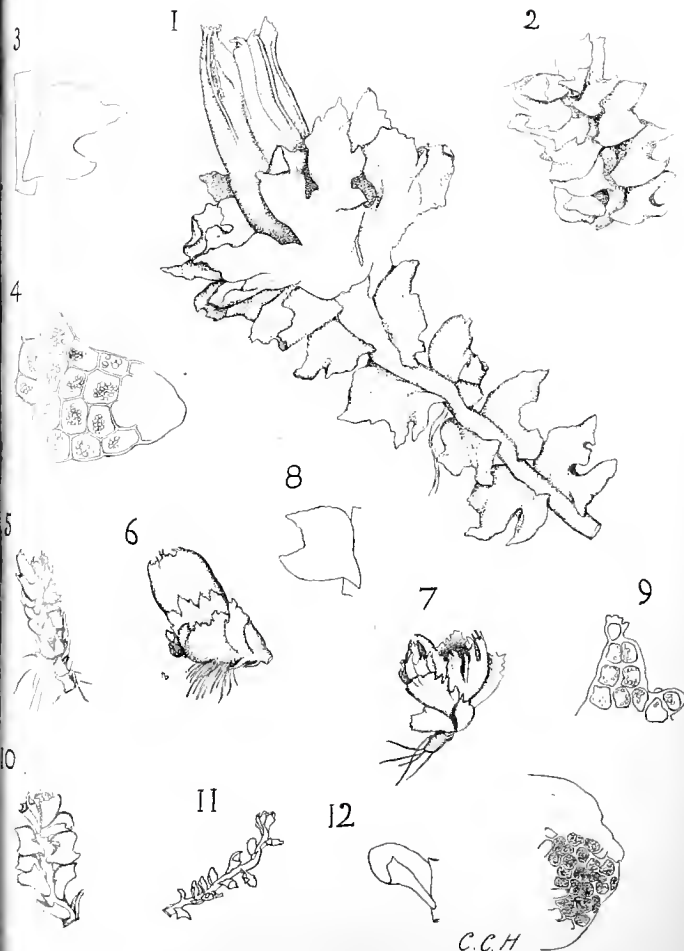


PLATE III. Reproduction Plate IX, Bry. Nov. 1906. Mag. = PLATE II.

care it is not difficult to distinguish these five species, and, with the exception of *L. Floerkii* and *L. lycopodioides*, they show no tendency to vary into one another. *L. gracilis* is not uncommon in mountainous regions and is the smallest species of the group. It may usually be recognized at a glance by its upright flagelliform branches which bear gemmae near the apex and closely appressed leaves in the lower part. These branches, which are similar in appearance to the gemmiparous branches of *Odontoschisma denudatum* and *Kantia Trichomanis* are sometimes very abundant, covering over an entire tuft of the plant, but sometimes they are very sparingly produced.

Of the other four species *L. barbata* and *L. Lyoni* agree with each other in having inconspicuous or obsolete underleaves and in lacking marginal appendages of any sort near the postical bases of the leaves, while *L. Floerkii* and *L. lycopodioides* agree in having large and conspicuous bifid underleaves and in developing clusters of slender branched cilia near the postical leaf-bases. *L. barbata* is rather more robust than *L. Lyoni*, but the most reliable differential characters are drawn from the leaves. In *L. barbata* these have their antical and postical margins of about the same length and approximately parallel, while the teeth at the truncate apex are three or four in number, subequal in size and obtusely or subacutely pointed. If we should pass a straight line through these teeth, it would lie parallel or nearly so with the axis of the stem. In the leaves of *L. Lyoni* the postical margin is strongly curved and is much longer than the antical, the sharply pointed teeth are commonly three in number and the postical tooth is considerably larger than the others. If we should pass a straight line through these teeth, it would form an acute angle with the axis. *Lophozia Lyoni* is commonly known as *L. quinquedentata*, but there is so much doubt as to what the original *Jungermannia quinquedentata* really was that it seems best to discard the name altogether, as both Pearson and Stephani have recently done, and to take up the later name of Taylor, about which there is no doubt whatever.

The differences between *L. lycopodioides* and *L. Floerkii* are those of degree rather than kind. *L. lycopodioides* is the more robust of the two, its leaves are larger and more crispate, the teeth are often mucronate instead of being bluntly pointed, the basal cilia are more abundant and more finely divided and the divisions of the underleaves are more conspicuously ciliate. Typical specimens can be distinguished from each other at a glance, but one occasionally meets with forms which are difficult to refer definitely to either species and which apparently represent intermediate forms. As has already been noted both species are almost universally recognized in spite of this fact." Evans, *Rhodora* 4: 210, 211, 1902.

Figs. 12-16 *Lophozia gracilis*. 12.—Gemmiparous plant $\times 22$. 13—Plant showing perianth $\times 22$. 14—Plant, dorsal view $\times 22$. 15—Leaf, dorsal view $\times 70$. 16—Leaf cells $\times 365$. Drawn from 48 Hep. Bor. Am. New York Bot. Garden Herb., and from material collected by C. C. Haynes, Adir. Mts., May 31, 1904.

Figs. 17-19 *Lophozia barbata*. 17—Plant showing perianth $\times 22$. 18—Plant, ventral view $\times 22$. 19—Leaf cells $\times 365$. Drawn from material collected by Mrs. L. A. Carter at Laconia, N. H., May, 1905, and Mr. H. Dupret, near Montreal, Canada.

New York City.

(To be Continued)

“DIE EUROPAEISCHEN TORFMOOSE.”

A Correction. In my notice of this work in the November issue of the *BRYOLOGIST* (Vol. IX, p. 102) there is an unfortunate slip as to the number of plates. There are eleven and not eight as stated in my notice.

WM. EDW. NICHOLSON,
Lewes, 17th Nov., 1906.

IS *PHYSCOMITRIUM IMMERSUM* A GREGARIOUS MOSS?

JOHN M. HOLZINGER.

This pygmy in the genus to which it is referred, according to Mrs. E. G. Britton's account in her Revision of the Genus *Physcomitrium* in Bull. Tor. Club, Vol. 21, No. 5, May 25, 1894, has an extensive range from New York to Kansas, from Colorado to Quebec. I have had it under observation near Winona, Minn., for over twelve years, looking up its haunts annually. In all these years I have never succeeded in finding more than a few plants in a tuft, the little plants seemingly preferring to stand alone, *isolated*, among the hepatics which seek the same moist substratum. The three hepatics, among which I uniformly find it, were recently determined for me by Dr. A. W. Evans as *Ricciocarpus natans* (L.) Corda, *Riccia fluitans* L., both terrestrial forms, and *Anthoceros Macounii* M. A. Howe, which last determination Dr. Evans had verified by Dr. Howe himself. Incidentally, Dr. Evans points out, this extends the range of *Anthoceros Macounii* into the United States, its type station being in Canada. One or the other of these terrestrial hepatics, and in some cases even all of them, may be found associated with *Physcomitrium immersum* sent out by me, and indeed the nature of its recurrence here compels me to include an excess of these hepatics with a relatively scant amount of the *Physcomitrium*. Another plant that will frequently be found in the pockets is *Ephemerum crassinervium* with its great abundance of protonema. *Physcomitrium immersum* will be distributed in fascicle ten of my Musci Acrocarpi, now in process of preparation.

Winona, Minn.

SULLIVANT MOSS CHAPTER ANNUAL REPORTS.

REPORT OF THE PRESIDENT.

The past year has been one of great prosperity for the Sullivant Moss Chapter: a gain of thirteen per cent. has been made in the membership; the intensive study of local floras has increased; especial interest has been manifested in the study of the lichens and hepatics, as is shown by the increased space devoted to them in the last volume of the *BRYOLOGIST*; and the various herbaria belonging to the Chapter are fast becoming of consulting value to students of the distribution of North American Plants.

At the founding of the Chapter, one purpose was to bring the various isolated moss students throughout the country into closer touch with one another. As evidence of the success of this plan, it is only necessary to consider the contributions which are constantly being made by Chapter mem-

bers to the exsiccatae issued by Dr. Grout and Prof. Holzinger. In addition to this, however, it is increasingly evident from the letters of individual members, that a spirit of service is rapidly developing which augurs well for the future prosperity of the Chapter.

The character of the offerings made in each issue of the BRYOLOGIST also deserves notice. During the past year there has been a gratifying increase in the number of rarer species offered. Every effort should be made to develop this department, not only for the value of the exchanges, but also because familiarity with the appearance of rarer species undoubtedly leads to their detection in new localities. Members are urged when making offerings to be especially careful to specify the locality in which the specimens were collected. This practice enables those desiring specimens to choose offerings with greater ease, and prevent the receipt of the same species from localities already well represented in the applicant's herbarium. The same species, moreover, often varies greatly in exchange value and in appearance, according to whether it comes from the center of its known range or from a point near the limit. It is but courteous, therefore, that those making the offerings give some indication of the origin of the specimens.

In my last report I mentioned the value of local flora work. While it is perhaps too soon to attempt any correlation of the distribution of mosses, lichens, or hepatics, with the underlying geological formation, yet the various local lists which have recently been published in the BRYOLOGIST, or notes such as that of Prof. Holzinger upon *Grimmia glauca*, with its mention of the remarkable features of the driftless area in Minnesota, lay foundations upon which future workers will build.

Finally, I wish to extend my sincere thanks to the members for their ready response to the circular letter sent out in June, and for their willing co-operation in making the third meeting of the Chapter a success.

Respectfully submitted,

EDWARD B. CHAMBERLAIN,
President.

REPORT OF THE SECRETARY.

During the past year the Chapter has added twenty-three to its membership, ten have withdrawn, four died, giving a total of one hundred and sixty-five as listed in this number of the BRYOLOGIST.

The herbarium has been increased by a large number of interesting additions. The Rev. Mr. Watts, of Young, South Australia, has sent us a large collection of mosses from his locality. Mr. Nickolson, of England, has sent us specimens from England and the Continent. Mr. Haydock sends many from the White Mountains; Mr. Foster a lot from Wallowa, Oregon, with notes on the geological formation. Dr. Grout, Rev. Dupret, Cannon Lett of Ireland, Prof. Bonser of Spokane, Dr. Breckle of North Dakota, Miss Miller of Washington, D. C., and many others are contributors.

Thro the courtesy of Prof. Frye, of the University of Washington, many of our Pacific slope mosses have been obtained.

The southwestern portions of the United States and the Rocky Mountain regions, both north and south, are but poorly represented.

The herbarium is in good condition, but in order that it may remain so some provision should be made for the future. It should be kept in a tight wooden or tin lined box, possibly two boxes. In its present quarters, a large dry-goods box, it is open to the attacks of mice and insects. The herbarium is rapidly increasing in value and should be insured. This costs but little, and in case of fire, altho we all appreciate that no money can altogether replace a collection of this kind, the Secretary's mind would thereby be relieved.

The matter of offerings cannot be too strongly urged upon Chapter members; there is no locality that does not present something of interest to some other member. Generally about twenty-five specimens are sufficient for an offering, and from one to three species are enough at a time.

The Secretary wishes to thank the officers for their help and suggestions during the year, and wishes here to call attention to the work of his predecessor, Miss Miller, who was evidently a worker and had the Chapter affairs so systematized that the present incumbent has had little to do but to follow in her footsteps.

Attention should be called to the fact that the herbarium is always at the disposal of Chapter members and they can obtain loans of specimens at any time.

Seattle, Wash.

Respectfully,

JOHN W. BAILEY.

REPORT OF THE HEPATIC DEPARTMENT.

It is certainly gratifying to note the lively interest taken in this department. In response to my request several have sent in collections from various states. The largest sets have come from the following: Mr. E. B. Chamberlain, from Maine and Rhode Island; Mr. A. S. Foster, from Washington and Oregon; Dr. J. W. Bailey, from Washington; Mrs. E. B. Taylor, from Georgia and Florida; Miss M. F. Miller, from the Catskill Mts., New York; Mr. J. L. Sheldon, from West Virginia; Dr. A. J. Grout, from various localities. These, with many smaller collections, are substantial evidence of the efforts to make our Chapter Herbarium of practical value. By exchange we have acquired the following sets: Messieurs Grape and Arnell, thirty-six herbarium specimens from Sweden and Norway, capable of being divided into more than double that number, and these duplicates will bring in new sets. Messieurs Potier de la Verde and Charles Lacouture, sixteen and twenty-four herbarium specimens from France also capable of division. Mr. E. B. Chamberlain has given nineteen specimens from l'Herbier Boissier. Dr. Bailey's material from Washington has been devoted to offerings, by request, reserving a set for the herbarium. Sufficient material for eight hundred and thirty pockets was sent in this year, representing three hundred and thirty-one herbarium specimens, the remainder being duplicates. Again we acknowledge with pleasure our indebtedness to Dr. Alexander W. Evans for determinations and verifications of troublesome species. It is hoped that members will continue their generosity, and that their example will be a stimulus to others to collect and to study these charming forms. I shall be glad to give small sets to facilitate the work of those taking up the study of hepatics.

Respectfully submitted,

CAROLINE COVENTRY HAYNES.

REPORT OF THE LICHEN DEPARTMENT.

Interest in the lichens is unabated and many of the students have carried their explorations after specimens to a point beyond that of cursory examination. The more than three thousand specimens submitted for identification or verification during the past year have committed this department to considerable labor, but the time and effort have been cheerfully given. That portion of the Chapter Lichen Herbarium accumulated prior to Jan. 1, 1803, is in our charge. Accessions to the collection, except for an individual contribution of one hundred specimens, have been limited to three (3) numbers. It is to be regretted that voluntary gifts to the herbarium are not more numerous, but this does not diminish our thanks to those who have remembered.

Respectfully,
G. K. MERRIEL.

REPORT OF THE TREASURER.

The following statement for the year beginning December 1, 1905, and ending December 1, 1906, is respectfully submitted:

RECEIPTS.

By cash on hand December 1, 1905.....	\$ 40.59
By dues from members.....	166.90
	<hr/>
	\$207.49

DISBURSEMENTS.

To the BRYOLOGIST.....	\$136.80
To Miss Miller (express, etc.).....	13.75
To Mr. Chamberlain (printing, etc.).....	6.14
To Treasurer (postage, etc.).....	3.00
	<hr/>
	\$159.69
To cash on hand December 1, 1906.....	47.80
	<hr/>
	\$207.49

ANNIE MORRILL SMITH, Treasurer.

REPORT OF JUDGE OF ELECTION.

Whole number of votes cast.....	15
For President—Mr. E. B. Chamberlain.....	15
For Vice-President—Mr. G. K. Merrill.....	14
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For Secretary—Dr. J. W. Bailey.....	15
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Respectfully submitted,
J. FRANKLIN COLLINS.

OFFERINGS.

To Chapter Members only. For postage.

Mrs. Carolyn W. Harris, 125 St. Marks Ave., Brooklyn, N. Y. *Ramalina reticulata* (Nochd.) Krempelh. Collected by Mr. A. J. Hill, Victoria,

B. C.

- Mrs. Elizabeth M. Dunham, 53 Maple street, Auburndale, Mass. *Hylocomium proliferum* (L.) Lindb.; *H. triquetrum* (L.) B. & S. *Sphagnum squarrosum* Pers. Collected, Middle Dam, Maine.
- Miss Alice L. Crockett, Camden, Maine. *Sphagnum acutifolium* Ehrh. var. *pulchrum* Rl. forma *purpureum* Sch.; *S. recurvum* Pal. var. *majus* Angs. forma *fusco-virens*.
- Dr. J. F. Brenckle, Kulm, N. D. *Dicranella varia* (Hedw.) Schimp.; *Hypnum aduncum* Hedw.; *Amblystegium serpens* (L.) B. & S.
- Mr. A. S. Foster, Cathlamet, Oregon. *Pogonatum erythrodontium* Kindb.; *Alectoria Fremontii* Tuckerm. Collected, Mt. Hood, Oregon.
- Mrs. Mary L. Stevens, 39 Columbia street, Brookline, Mass. *Hypnum crista-castrensis* L.; *Brachythecium reflexum* Starke.
- Rev. H. Dupret, Seminary of Philosophy, Montreal, Canada. *Amblystegium riparium* var. *longifolium* Sch. *Hypnum ochraceum* Turn. Collected near Montreal. U. S. postage accepted.
- Miss Mary F. Miller, 1109 M. street, Washington, D. C. *Scapania nemorosa* (L.) Dumort.; *Bazzania trilobata* (L.) S. F. Gray. Collected, Shandaken, New York. *Frullania riparia* Hampe. Collected, Rileyville, Va.
- Dr. J. W. Bailey, 405 Walker Bl., Seattle, Wash. *Dicranum strictum* Schleike.

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VOLUME X

NUMBER 2



MARCH 1907



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES
HEPATICS AND LICHENS

EDITOR
ANNIE MORRILL SMITH

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MAR 5 1907

THE BRYOLOGIST

Bi-monthly Journal

DEVOTED TO THE STUDY OF NORTH AMERICAN
MOSESSES, HEPATICS AND LICHENS

ALSO OFFICIAL ORGAN OF
THE SULLIVANT MOSS CHAPTER

EDITOR

MRS. ANNIE MORRILL SMITH

ASSISTED BY

MR. A. J. GROUT, PH.D.	}	MOSESSES
DR. J. W. BAILEY			
MR. G. K. MERRILL		lichens
MISS CAROLINE COVENTRY HAYNES		HEPATICS

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THE SULLIVANT MOSS CHAPTER

Invites all interested in the study of Mosses, Hepatics and Lichens, to join. **Dues, \$1.10 a year**—this includes a subscription to THE BRYOLOGIST. Send dues direct to Treasurer. For further information address the Secretary.

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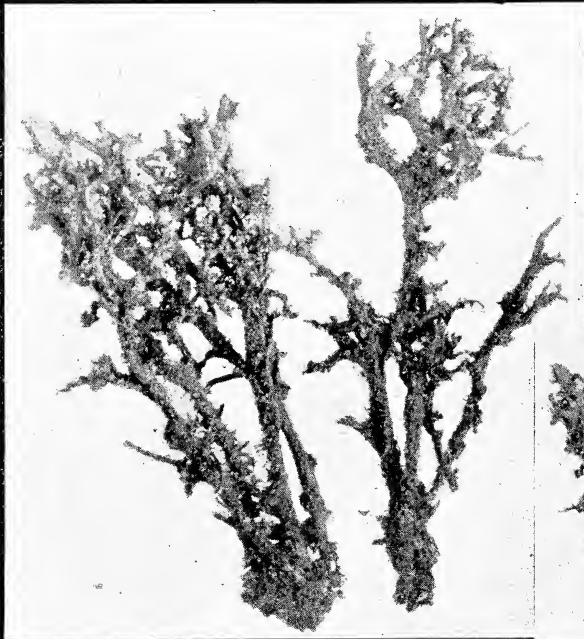


FIG. 1.A.



FIG. 1.B.

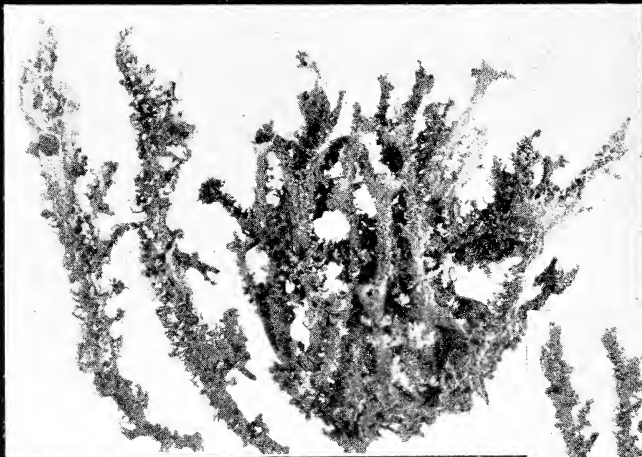


FIG. 2.A.

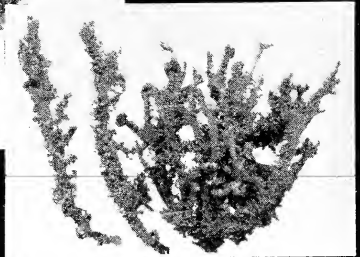


FIG. 2.B.

PLATE IV. — Fig. 1. A *Cladonia squamosa denticollis* f. *squamosissima* × 2. B Natural size.
Fig. 2. A. *C. squamosa phyllocoma* × 2. B Natural size.

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No. 2.

FURTHER NOTES ON CLADONIAS. IX.

Cladonia squamosa and *Cladonia subsquamosa*.

BRUCE FINK.

As promised in the last paper of this series (Bry. 9; Nov., 1906) the species to be considered next in order is *Cladonia squamosa*. A somewhat close relationship seems to exist between this species and two of those considered in the last paper, viz *Cladonia caespiticia* and *Cladonia delicata*. When we consider the differences that appear in the horizontal thallus of the three species, we can hardly think that we have a possible immediate genetic line in these species, but the relation is close enough to cause frequent confusion on the part of persons reasonably well acquainted with lichens. If the considerations below and preceding, with the accompanying figures, aid in alleviating the difficulties encountered in the study of these plants, the writer will have accomplished his purpose.

The close relationship between *Cladonia squamosa* and *Cladonia subsquamosa* is generally admitted by lichenists, and the two species are therefore considered in succession in the present paper.

There is still one other difficulty that will be met in the study of *Cladonia squamosa*, and that is confusing certain forms of this species with forms of *Cladonia furcata*. The squamules, both of the primary thallus and the podetia, should furnish sufficient means for differentiation, to say nothing of the podetia, and yet the separation is not always easy to make. As good cladoniologists as Dr. Wainio and L. Scriba failed to agree on a form of *Cladonia furcata* collected by the writer at Fayette, Iowa. Mr. Scriba thinking it might be a form of *C. squamosa* rather than *C. furcata*, but surely all one species, and Dr. Wainio thinking from the material examined that both species were represented in the material sent. Repeated studies at the spot where the plant grows fully convinced the writer that all belonged to the one species, *C. furcata*. A considerable portion of this material is still in the writer's herbarium, and specimens will be sent to any persons sufficiently interested to send for them.

CLADONIA SQUAMOSA (Scop.) Hoffm. Deuschl. Fl. 2: 125. 1796. Primary thallus commonly persistent, composed of middling sized or rarely large, crenate, irregularly-subdigitate or subpinnate-laciniate squamules, which are 1.5-7 mm. long and 1-5 mm. wide; ascending, flat or involute; scattered or clustered and rarely cespitose so as to form a compact crust; sea-green varying toward ashy or brown above; below white; the cortex continuous. Podetia arising from the surface of the primary thallus, rarely dying at the base; 10-85 mm. long and 2-5 mm. in diameter; subcylindrical or rarely trumpet shaped; irregularly turgescens; clustered, erect, ascending, decumbent or irregularly flexuous; rarely simple or commonly more or less irregularly or radiately branched, the branches erect or spreading, the axils fre-

quently open; decorticate or sparsely areolate-corticate, or subcontinuous toward the base, the areoles sometimes scattered or entirely disappearing above where the podetia are sometimes sorediate: the corticate portions commonly squamulose with frequently lacinate squamules; ashy, sea-green, olivaceous or brown, or these colors variegated; commonly cup-bearing. Cups abruptly dilated, medium sized or small, usually perforate, the margin commonly repeatedly proliferate. Apothecia small, 0.5–0.7 mm. in diameter; on the margin of the cups or at the ends of branches or proliferations; subsolitary or clustered; thinly margined or immarginate; flat or becoming convex; brown or rarely pale brown or possibly approaching brick-red. Hypothecium pale. Hymenium pale or pale-brownish below and commonly brownish above. Paraphyses usually simple, sometimes thickened and brownish toward the apex. Asci clavate or cylindrico-clavate. Plate IV. Figs. 1. A and B.

On soil, especially humus, or on rocks partly covered with soil, rarely on rotting wood. Grows best in shaded moist places. Examined by the writer from New Bedford, Mass. (H. Willey, who determined as *C. delicata*), Washington (W. W. Calkins, who determined as *C. decorticata*), Newfoundland (A. C. Waghorne), White Mountains (W. G. Farlow), New York (E. A. Burt and Carolyn W. Harris), Ohio (E. E. Bogue), North Carolina (H. A. Green), New Hampshire (Clara E. Cummings and G. K. Merrill), Maine (collector unknown), Missouri (Colton Russell), Nebraska (T. A. Williams), Iowa, Minnesota, Illinois, Ohio, Puget Sound, Alberta and British Columbia (Bruce Fink), Ontario (A. C. Waghorne), Alaska (Wm. Trelease). Listed from Florida by Eckfeldt and Calkins, and Wainio adds Greenland, Vancouver Island, Alabama, and Louisiana. For further wide distribution in British America see John Macoun's "Catalogue of Canadian Plants," part VII. The above gives a general North American distribution, and the plant is also known in all the grand divisions.

The plants listed above, so far seen by the writer, seem to be var. *denticollis* (Hoffm.) Flk., which is common in Europe and America and must stand for the species.

CLADONIA SQUAMOSA MURICELLA (Del.) Wainio Mon. Clad. Univ. 1: 431. 1887. Podetia cupless, commonly almost completely decorticate, sometimes sparsely sorediate, more or less squamulose.

Cited by Wainio from Vancouver Island, and listed from Massachusetts by H. Willey. The writer has seen the variety from Alaska, collected by Wm. Trelease, Known also in Europe, Asia and South America,

CLADONIA SQUAMOSA MULTIBRACTIATA (Flk.) Wainio Mon. Clad. Univ. 1: 437. 1887. Podetia cup-bearing and almost destitute of squamules, corticate.

Determined from Rainy Lake City, northern boundary of Minnesota, by Dr. Wainio. The plants were small, the podetia being 10–25 mm. long and 1–2.5 mm. in diameter, with irregular and proliferate cups. H. Willey regards this the common form at New Bedford, Massachusetts, and the writer has found it in Iowa. Not known elsewhere in North America, and only found elsewhere in Europe.

CLADONIA SQUAMOSA PHYLLOCOMA Rabenh. Clad. Eur. 1860. Podetia cup-bearing subcontinuously or areolate corticate, more or less squamulose. The squamules are said to be rather large, but this is not true of the plant determined by Dr. Wainio from Minnesota and figured herein.

A single collection from Emo, Ontario, along the northern boundary of Minnesota, has been placed here by Dr. Wainio. A European variety, not known elsewhere in North America. Plate IV. Figs. 2. A and B.

CLADONIA SUBSQUAMOSA (Nyl.) Wainio, Mon. Clad. Univ. 1: 445. 1887. Primary thallus composed of middling-sized squamules, which commonly disappear sooner or later. Podetia arising from the surface of the squamules, 12–35 mm. long in ours and becoming twice as long in foreign plants; subcylindrical or tubaeform; sometimes cup-bearing; irregularly branched or rarely simple; axils sometimes perforate: the apices cup-bearing, obtuse and perforate or rarely subulate; erect, the cortex verrucose or areolate or almost wholly decorticate; sometimes squamulose towards the base and squamulose-scaly higher up; whitish-sea-green or varying toward brownish; the base sometimes dying and becoming dark colored. Cups when present perforate, and the margin becoming repeatedly proliferate. Apothecia commonly small, 0.5–0.7 mm. in diameter; subsolitary or more or less aggregated at the apices of the branches; flat and thinly margined or becoming convex and immarginate, brown. Hypothecium pale. Hymenium pale below and brownish above. Paraphyses with thickened apices. Asci clavate. Specimens seen sterile and apothecial characters taken wholly from Dr. Wainio.

A single collection from the same locality as the last variety was placed here by Dr. Wainio. The specimen was collected on earth over rocks. Previously known in North America only from Vancouver Island and Alaska. A rare plant, Dr. Wainio citing a single locality from each of the following grand divisions,—Europe, South America and Australia.

In closing this paper, a word is in order regarding the photographs for illustration. These have been furnished thus far, in part, by Mr. C. J. Hibbard, Dr. E. T. Harper and Mr. G. K. Merrill, and in part by the BRYOLOGIST. The writer spent a summer with Mr. Hibbard photographing lichens, and it was through this connection that Mr. Hibbard was called upon to illustrate the first paper. Since then, Mr. Merrill has furnished the photographs for four papers, Dr. Harper for one and the BRYOLOGIST for the other two. During the session of the University of Washington Marine Station, for the summer of 1906, the writer was with Dr. Harper, who was doing a large amount of photographing of lichens and fungi, and gained his consent to illustrate the remainder of the papers of this series. So we are under obligations to Dr. Harper until the series is finished.

Our illustration of *Cladonia squamosa* is from a specimen sent by L. Scriba of his own collecting in Germany, and named by him *Cladonia squamosa* var. *denticollis*, form *squamosissima* Flk., while that of the var. *phyllocoma* is from the specimen collected by the writer at Emo, and determined by Dr. Wainio.

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THE GENUS CALYPOGEIA AND ITS TYPE SPECIES.

BY ALEXANDER W. EVANS.

Dr. Emilio Levier, of Florence, a careful student of the Hepaticae, has recently given excellent reasons why the generic names *Kantia* and *Cinclinulus* should be set aside in favor of *Calypogeia*.¹ Since *Kantia* has been accepted in North America for several years, a discussion of these reasons may perhaps be of interest to American botanists.

The genus *Calypogeia* of Raddi was published in 1818.² In its original form it was composed of two divisions or sections, the first, A (examphigastriatae), for species without underleaves, the second, B (amphigastriatae), for species with underleaves. In the section A, Raddi placed two species, *C. erictorum* and *C. flagellifera*, the first proposed as new, the second based on one of Micheli's prelinnaean species. In the section B, he placed a single species, *C. fissa* (with the variety *integrifolia*), but quoted under this species, as synonyms, the following: *Mnium fissum* L., *Jungermannia sphaerocephala* With., *Jungermannia Trichomanis* Dicks., a prelinnaean species of Dillen, a species of Micheli, also prelinnaean, and *Jungermannia calypogea* Raddi, the last-named species having been published ten years previously.³

The *Jungermannia Trichomanis* which is here given as a synonym was based on *Mnium Trichomanis* L. At the time Raddi wrote, *M. Trichomanis* and *M. fissum* were not considered distinct from each other, and both may be found quoted as synonyms of *Jungermannia Trichomanis* in Hooker's British Jungermanniae, published in 1816. There is nothing surprising, therefore, in the fact that Raddi made no attempt to keep them apart.

Three years after the appearance of *Calypogeia*, S. F. Gray proposed the genus *Kantia* (or *Kantius*), with the single species *K. Trichomanis*.⁴ Under this species, following the example of Hooker, he gave both *Mnium Trichomanis* and *M. fissum* as synonyms. The following year the genus *Cinclinulus* of Dumortier was published,⁵ also with a single species, *C. Trichomanis*, which was the precise equivalent of *Kantia Trichomanis* S. F. Gray. Both Gray and Dumortier were at that time ignorant of the earlier work of Raddi, and Dumortier was also ignorant of the work of Gray.

In 1829 Corda recognized the genus *Calypogeia* and proposed the name *C. Trichomanis*.⁶ He based his species on *Jungermannia Trichomanis* Dicks. and, like his predecessors, included under this species both *Mnium Trichomanis* and *M. fissum*. Why he chose *Trichomanis* as the specific name and discarded *fissa*, which Raddi had already chosen, is not stated. Perhaps it is because *M. Trichomanis* precedes *M. fissum* in the Species Plantarum of Linnaeus, where these names first appear.

In 1836 Nees von Esenbeck also accepted the genus *Calypogeia* but saw

1 Bull. Soc. Bot. Ital. 1902: 92-98.

2 Mem. Soc. Ital. delle Sci. in Modena 18: 42. 1818.

3 Atti dell'Accad. delle Sci. in Siena 9: 236. pl. 3, f. 4-6. 1808.

4 Nat. Arr. British Plants 1: 706. 1821.

5 Comm. Bot. 112. 1822.

6 Opiz, Beitr. zur Naturg. 653. 1829.

the necessity for dividing it into two genera corresponding to Raddi's sections, A and B. He proposed the generic name *Gongylanthus* for section A, and reserved the name *Calypogeia* for section B.¹ In the Synopsis Hepaticarum the two genera are understood in this same sense, and they continued to be so understood for nearly thirty years.

Early in the seventies Lindberg revived the generic name *Kantia* and applied it to the genus *Calypogeia* as restricted by Nees von Esenbeck. At the same time he discarded the name *Gongylanthus* and restored to this genus the name *Calypogeia*.² In other words, while recognizing the two genera into which Nees von Esenbeck had divided the original genus, he reserved the name *Calypogeia* for Raddi's section A, and applied to the section B the next oldest available name *Kantia*.

Since this time there has been considerable diversity in the usage of the names. Some botanists have followed Nees von Esenbeck; others have followed Lindberg; still others, while accepting *Calypogeia* in Lindberg's sense, have repudiated the name *Kantia* in favor of the later name *Cincinnulus*. The course to be adopted naturally depends upon which of Raddi's three original species ought to be considered the type of the genus.

From the fact that Raddi quotes *Jungermannia calypogea* as a synonym of *Calypogeia fissa*, Levier draws the conclusion that *C. fissa* is the species which furnished to the new genus not only its characters but even its name, and that it constituted the primordial type of *Calypogeia* ten years before the other two species, *C. ericetorum* and *C. flagellifera*, were established. On this basis he asserts that it would not be justifiable to emend or restrict the genus in such a way that *C. fissa* should be excluded. Of course it was precisely this result which was brought about by Lindberg when he reserved the name *Calypogeia* for Raddi's section A.

Levier's position is fully supported by the International Rules of Nomenclature adopted at Vienna by the recent Botanical Congress. Unfortunately these rules do not discuss directly the important subject of generic types, but Article 45 provides fully for the present case. The first two sentences of this article are as follows: When a genus is divided into two or more genera, the name must be kept and given to one of the principal divisions. If the genus contains a section or some other division which, judging by its name or its species, is the type or the origin of the group, the name is reserved for that part of it. Applying these rules to Raddi's genus it is clear that the emended *Calypogeia* must be reserved for section B, because this section contains the species *Jungermannia calypogea*, even though this species be treated as a synonym.

The Code of Botanical Nomenclature which was recommended by the Commission appointed by the Botanical Club of the American Association for the Advancement of Science treats the matter of generic types more fully. Under Canon 15 (e) the statement is made that "the application to a genus of a former specific name of one of the included species, designates the

1 Naturg. der europ. Leberm. 2: 405. 1836; 3: 7. 1838.

2 See Acta Soc. Sci. Fenn. 10: 506. 1875.

type." The type of the genus *Calypogeia* would therefore be *C. fissa*, because a former specific name of this species was *calypogea*. The fact that this specific name has an adjective form while the generic name includes an additional letter to convert it into a substantive can hardly be offered as an objection to this conclusion.

It thus becomes evident that neither *Kantia* nor *Cincinnulus* can be maintained, because both these genera were based upon a species which is clearly congeneric with *Calypogeia fissa*. It is equally evident that Raddi's section A must bear the generic name *Gongylanthus* of Nees von Esenbeck, and that section B must represent the genus *Calypogeia* in its restricted sense. It is a noteworthy fact that these views are becoming more and more widely held by European botanists, and it is probable that they will be accepted by everybody in time.

The selection of *Calypogeia fissa* as the type of the genus is beset with certain difficulties but is based on definite principles. It introduces the student at once, however, to difficulties of a more subtle nature, due to the fact that European writers interpret *C. fissa* in very different ways. By some its validity is unquestioned; by others it is considered a variety or even a mere form of *C. Trichomanis*; by others the name has been applied to plants which are evidently distinct from those originally described by Raddi; by still others, who recognize its distinctness in a provisional sort of a way, transitional forms are alluded to which connect it with *C. Trichomanis*.

It has already been noted that *C. Trichomanis* and *C. fissa* were both based on Linnaean species of *Mnium*. Whether Linnaeus actually distinguished these two species is doubtful. When he first published them he drew their characters entirely from the writings of his predecessors, and it is natural to assume that he based them upon these writings rather than upon a personal study of the plants themselves. As Howe justly remarks the only way in which these species can now be interpreted is by means of the prelinnaean descriptions which Linnaeus quotes.¹

Under *Mnium Trichomanis* the only species referred to is the "*Mnium trichomanis facie, foliolis integris*" of Dillen;² under *M. fissum* two species are quoted, viz.: "*Mnium trichomanis facie, foliolis bifidis*" of Dillen³ and "*Jungermannia terrestris repens, foliis ex rotunditate acuminatis bifidis: apertura pene visibili*" of Micheli.⁴ Dillen's herbarium is preserved at Oxford, and the hepatics which it contains were carefully examined by Lindberg over thirty years ago. The results of this examination have been published in three distinct reports, which appeared in 1874, 1877, and 1883, respectively.⁵ Unfortunately these reports are at variance with one another, at least so far as *Mnium Trichomanis* and *M. fissum* are concerned. In all probability, however, the last report represents Lindberg's latest views on the subject, and will be the only one here quoted.

1 Mem. Torrey Club 7: 135. 1899.

2 Hist. Musc. 236. *pl. 31, f. 5.* 1741. 3 L. c. 237. *pl. 31, f. 6.*

4 Nov. Plant. Gen. 8. *pl. 5, f. 14.* 1729.

5 Not. Sällsk. pro F. et Fl. Fenn. Förh. 13: 353-356. 1874; Hepaticologiens Utveckling, Helsingfors, 1877; Kritisk Granskning af Mossorna uti Dilleni Historia Muscorum, Helsingfors, 1883.

Among the specimens labeled "*Mnium Trichomanis facie, foliolis integris.*" Lindberg found two species, which he referred to *Kantia calypogea* (Raddi) Lindb. and *K. fissa* (L.) Lindb., respectively.¹ Dillen's figure, however, is said to represent the first of these species only. Among the specimens labeled "*Mnium Trichomanis facie, foliolis bifidis,*" he also found the same two species but states that this time *K. fissa* is the one represented by Dillen's figure. Lindberg had already identified the second species quoted by Linnaeus under *M. fissum* as *K. calypogea*,² but no implication is made that this determination was based on a study of Micheli's specimens. It should perhaps be emphasized that *Kantia fissa* Lindb. is by no means the same as *Calypogeia fissa* Raddi, but represents instead the species which is commonly known as *C. arguta* Nees & Mont. *K. calypogea*, on the other hand, was supposed to be the same as *Calypogeia fissa*.

It is clearly apparent from these statements that *Mnium fissum* L. is an aggregate species, but it is difficult to defend Lindberg's action in restricting the name *fissum* to one of the component parts when Raddi had already appropriated it for the other. Perhaps it was because he considered the name more applicable to *C. arguta* than to what he called *K. calypogea*, perhaps because Dillen's species was first published³ earlier than Micheli's. The second reason might have weight even at the present day, were it not for the fact that Dillen's species, on Lindberg's own showing, was based on an indefinite specific type. That Lindberg had an accurate conception of *C. arguta* is evident from the full description of this species which he published.⁴ That he had an equally accurate conception of Raddi's *Jungermannia calypogea* is not so clear. Although he has never given a full description of his *K. calypogea*, he has repeatedly emphasized the inflorescence as yielding important differential characters between this species and *K. Trichomanis*. According to his statements *K. calypogea* is characterized by an autoicous inflorescence and *K. Trichomanis* by a paroicous inflorescence. Why he applied the latter name to a paroicous species after he had shown that the Dillenian plant upon which it was based was autoicous is a question raised by Howe, but this question becomes of minor importance in the light of some of the recent studies which have been made on *C. Trichomanis*. From a study of a large series of specimens of this species, Douin⁵ has shown that its inflorescence is exceedingly variable, and that autoicous, synoicous and dioicous individuals occur along with the paroicous. In fact he regards an autoicous inflorescence as perhaps the most normal type for the species. These researches show that differences in the inflorescence are insufficient by themselves to separate species in this genus, and they therefore cast much suspicion on certain of Lindberg's determinations, making it probable that some of the specimens which he called *K. calypogea* would

1 Krit. Gransk. 12.

2 Hepat. Utv. 28.

3 In Ray, Syn. Meth. Stirp. Brit. 79. 1724 (Ed. III.).

4 Not. Sällsk. pro F. et Fl. Fenn. Förh. 13: 363. 1874.

5 Rev. Bryol. 31: 107, 108. 1904.

now be included under *C. Trichomanis*. For these reasons Lindberg's interpretation of the two Dillenian species of *Mnium* can be accepted only with reservations.

At the present time the Continental botanists who recognize *C. fissa* as a species, although ascribing to it an autoicous inflorescence, no longer make this the basis for separating it from *C. Trichomanis*, and it is worthy of mention that they had ceased to do so even before the appearance of Douin's paper. They emphasize rather certain peculiarities found in the leaves and underleaves. According to these writers the leaves are variously bidentate at the apex, the teeth being sometimes large and conspicuous and sometimes barely apparent. The underleaves are relatively small but are characterized by being broader than long; they are deeply bifid with the sinus often extending beyond the middle, and their distant and usually blunt lobes, although sometimes undivided, often show a blunt supplementary tooth on the outside. One of the best of the recent descriptions is that published by C. Müller, of Freiburg.¹

The British hepaticologists, who also recognize the species, emphasize the characters which have just been noted. For some reason, however, they call the plant *Kantia Sprengelii* (Mart.) Pears.,² instead of applying to it the specific name of Raddi. The writer has been able to demonstrate this fact by comparing a specimen of *K. Sprengelii*, collected by Slater at Castle Howard in Yorkshire, with a specimen of *C. fissa*, collected by Levier in the vicinity of Florence. These specimens fully agree with each other. Whether they represent the *Jungermannia Sprengelii* of von Martius³ is a much more doubtful matter. This species was originally described from specimens collected near Nuremberg and was said to differ from *J. Trichomanis* in its smaller and more deeply bifid underleaves with acute laciniae, and in its less frequently emarginate leaves. *J. Sprengelii* was recognized as a species by Dumortier⁴ and also by Hübener,⁵ but Nees von Esenbeck reduced it to a variety under *C. Trichomanis* and did not consider it very clearly marked. Until very recently the plant has been scarcely recognized by either French or German botanists. In 1899, however, Héribaude⁶ applied the name *Sprengelii* to what he considered a slender variety of *Cincinnulus Trichomanis*, growing among Sphagna, and Boulay⁷ and Douin⁸ have adopted it in the same sense. It is hardly probable that either this interpretation or the very different one arrived at by the British botanists was based on a study of the original *J. Sprengelii*, and a comparison of Pearson's figures with those of von Martius will show at once that they could hardly have been drawn from the same plant. Apparently a complete understanding of

1 Beihefte Bot. Centralbl. 13: 98. 1902.

2 Hep. British Isles 138. pl. 52. 1900.

3 Fl. Crypt. Erlang. 133. pl. 3, f. 6. 1817.

4 Syll. Jung. 73. 1831 (as *Cincinnulus Sprengelii*).

5 Hep. Germ. 63. 1834.

6 Musc. d'Auvergne 492. 1899.

7 Musc. de la France 2: 51. 1904.

8 Mem. Soc. Sc. Nat. Cherbourg 35: 271. 1906.

J. Sprengelii has not yet been reached, but there seems to be no good reason for applying this name to the *Calypogeia fissa* of Raddi.

In the opinion of the writer *C. fissa* should be recognized as a species, although its close relationship to *C. Trichomanis* cannot be denied. All writers agree that the latter species is extremely variable, and it is probably on this account that *C. fissa* has been so long overlooked or misunderstood. Certain forms of *C. Trichomanis* are especially puzzling because they fail to show the characters of the species clearly and even simulate some of the characters which have been assigned to *C. fissa*. In typical forms the leaves are imbricated, undivided at the apex and scarcely or not at all decurrent at the base, while the underleaves are large and orbicular with a shallow apical sinus and rounded undivided lobes. Under conditions which interfere with normal development the leaves tend to become scattered and long-decurrent, thus changing their form completely, and the underleaves become smaller and more deeply bifid, and sometimes show acute divisions. The leaves even show a tendency at times to be bidentate, but this is usually most strongly marked on slender branches or at the base of a normal branch and is frequently associated with the formation of gemmae. In all probability these bidentate leaves represent a reversion to a primitive or juvenile condition rather than a normal variation. In *C. fissa* the bidentate leaves are found on robust individuals, and although not invariably formed they are sufficiently frequent to yield a striking specific character. When they are found associated with small and deeply bifid underleaves there will be little danger of failing to distinguish the species. The synonymy of *C. fissa* may be given as follows:

CALYPOGEIA FISSA (L.) Raddi.

Mnium fissum L. Sp. Plant. 1114. 1753 (in part).

Jungermannia fissa Scop Fl. Carn 2: 348. 1772 (Ed. II.).

Jungermannia sphaerocephala With. Bot. Arr. British Pl. 3: 854, 1796 (Ed. III.).

Jungermannia calypogeia Raddi, Atti dell' Accad. delle Sci. in Siena 9: 236. pl. 3, f. 4-6. 1808.

Calypogeia fissa Raddi, Mem. Soc. Ital. delle Sci. in Modena 18: 44. pl. 6, f. 3. 1818.

Calypogeia Trichomanis repanda Nees, Naturg. der europ. Leberm. 3: 89. 1838.

Kantia Trichomanis fissa Lindb. Acta Soc. Sci. Fenn. 10: 508. 1875.

Kantia calypogeia Lindb. Hepat. Urv. 20. 1877.

Calypogeia Trichomanis fissa Bernet, Cat. des Hépat. Suisse, etc. 108. 1888.

Kantia Sprengelii Pears. Hep. British Isles 138. pl. 52. 1900. Not *Jungermannia Sprengelii* Mart.

Cincinnulus calypogeia C. Müll. Frib. Beihefte Bot. Centralbl. 13: 98. 1902.

Cincinnulus Trichomanis fissa Boulay, Musc. de la France 2: 51. 1904.

Calypogeia fissa is known to have a wide geographical distribution in Europe although its range has not yet been very definitely ascertained. It seems on the whole to flourish best in warm climates. Scarcely anything is

known about its distribution on this side of the Atlantic, where it seems to be much rarer. Pearson notes the occurrence of his *Kantia Sprengelii* in North America but gives no stations for it, and at the present time the author is able to record only two localities, viz.: Lafayette, Louisiana, *Langlois*, and Devonshire Marsh, Bermuda, *Mrs. Britton*. Specimens from the first locality were distributed in *Hep. Amer.* 179 (as *Kantia Sprengelii*), and the Bermuda specimens have already been listed by the writer (as *K. Trichomanis*).¹ Doubtless its true range is much more extensive than these meager records would seem to indicate.

There is perhaps some danger of confusing *C. fissa* with *C. Sullivantii* Aust.,² a species which has an extensive range in the eastern part of the United States, especially along the Atlantic coast. *C. Sullivantii* is also characterized by bidentate leaves and by small and deeply bifid underleaves, each division of which commonly bears a small supplementary tooth on the outside. It is, however, smaller and more delicate than *C. fissa* and usually grows scattered among other plants or in loose thin tufts, instead of in compact mats. Its underleaves are often squarrose or even reflexed, and their divisions and supplementary teeth are acute. In the majority of cases each division is tipped with a row of two or three cells and each tooth consists of a single projecting cell, but of course these numbers are subject to some variation. The cuticle of the leaf-cel's yields another differential character of importance, being minutely verruculose or striulate, instead of smooth as in *C. fissa*. *C. Sullivantii* seems to be the North American representative of the European *C. arguta*, the two species agreeing in nearly all respects. The most important difference between them is to be found in the teeth of the leaves. In *C. Sullivantii* these teeth are small and usually parallel with each other, the sinus being narrow: in *C. arguta* they tend to be larger and are more or less divergent, the sinus being broad and shallow. *C. arguta* has been reported from a greenhouse in Philadelphia,³ but there is no evidence that it is native in this country.

Another North American species which is even more closely related to *C. fissa* than those so far considered is the West Indian ***Calypogeia portoricensis*** (Steph.) comb. nov.⁴ This species was originally described from Porto Rican specimens but is now known from St. Vincent, Dominica and Jamaica. It seems to be most at home on logs in moist forests, especially at rather high altitudes, and under these conditions frequently forms pure mats of considerable extent. *C. portoricensis* is more robust than *C. fissa*, and its large leaves are rounded at the apex but yet bear two minute teeth separated by a shallow sinus. These teeth exhibit comparatively little variation in size. The underleaves are less deeply bifid than those of *C. fissa* and are attached by a more highly arched line; in most other respects the two species resemble each other closely.

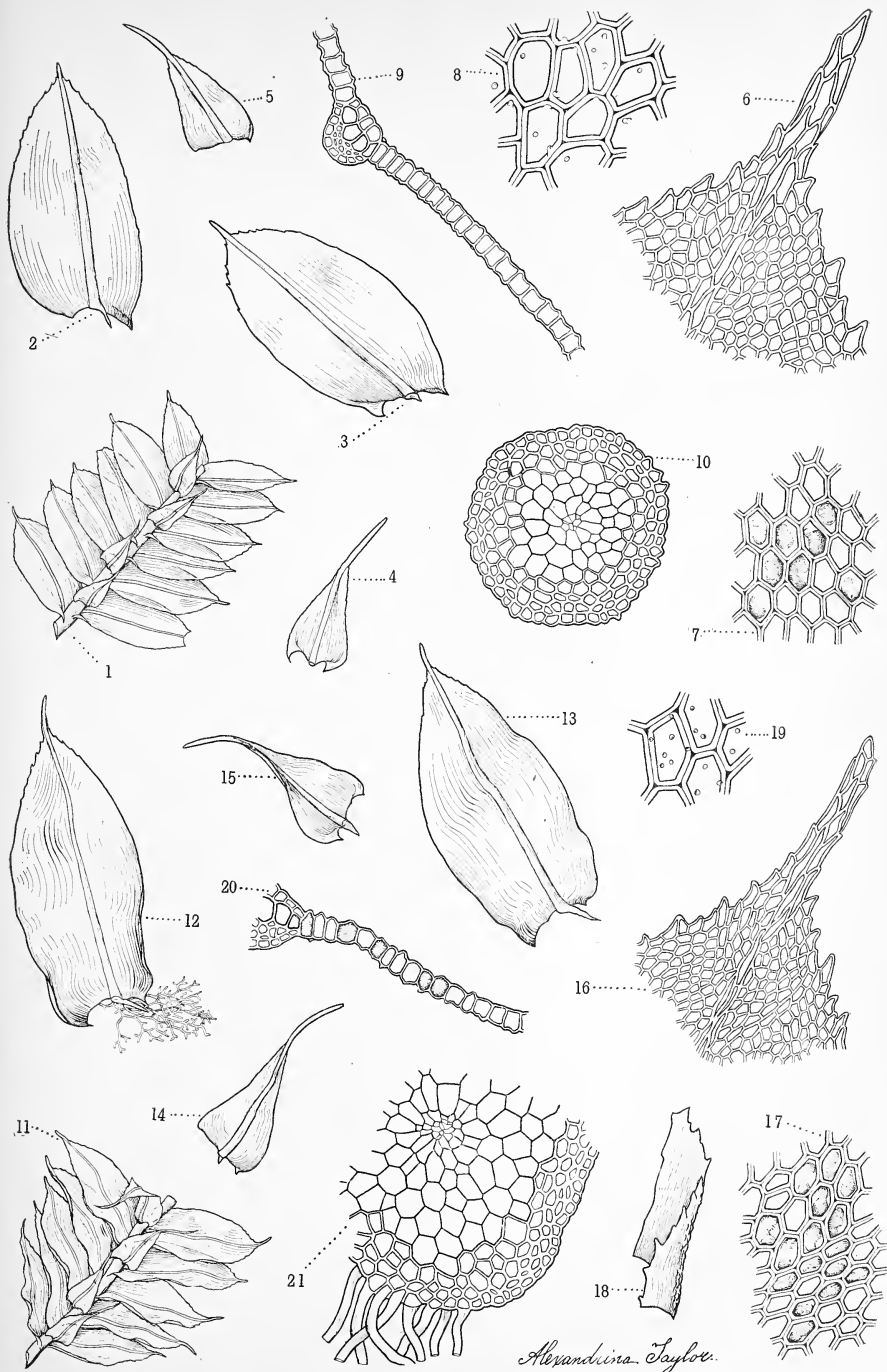
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1 Bull. Torrey Club 33: 131. 1906.

2 Bull. Torrey Club 6: 18. 1875. *Kantia Sullivantii* Underw. Bot. Gaz. 14: 196. 1889.

3 See Underwood, Bull. Torrey Club 19: 300. 1892.

4 *Kantia portoricensis* Steph. Hedwigia 27: 280. pl. 11, f. 1-3. 1888. According to Spruce (Jour. Linn. Soc. Bot. 30: 355. 1894), a synonym of this species is *Kantia vincentina* H. Wright, Jour. Bot. 28: 106. 1891.



Alexandrina Taylor.

PLATE V. *Rhacopilum tomentosum* (Sw.) Brid.

RHACOPILUM TOMENTOSUM (Sw.) BRID.

ELIZABETH G. BRITTON.

This genus and species are not recorded within the limits of the United States in Lesquereux and James' Manual, though Rau and Hervey listed them in their catalogue of 1880. Specimens were first collected at Donaldsonville, Louisiana, by Dr. Charles Mohr in November, 1856, and named for him by Dr. Carl Müller, who indicated its wide tropical and subtropical distribution. This species was described as *Hypnum* by Swartz in 1788 and the type locality was Hispaniola, presumably from the western part of Haiti or Santo Domingo.

Scraps of the type material have been examined at Kew and the British Museum, and a duplicate West Indian specimen from Swartz has been found in the Mitten Herbarium. Drawings have been made by Miss Taylor from one of these co-types and from the specimens collected by Dr. Charles Mohr in Louisiana for the accompanying plate.

My first acquaintance with this species was made in Bermuda in September, 1905, where it was found in great abundance in Church Cave, growing on damp rocks in shade and fruiting. Since then it has been found in Jamaica, and all the West Indian and Central American specimens have been carefully studied and compared. This seemed imperative for the names, synonyms and varieties given by Paris Index Ed. 2. 4: 164. 1905, indicated that there was a mixture and very wide distribution with considerable variation.

The synonymy of the North American species is as follows:

Rhacopilum tomentosum (Sw.) Brid. Bryol. univ. 2: 719. 1827.

Hypnum tomentosum Sw. Prod. Fl. Ind. occid. 141. 1788.

Hypnum tomentosum Hedw. Musc. frond. 4: 48, t. 19. 1797.

Plants dark green; stem creeping, branching and tomentose with brown radicles; branches erect; leaves curled and twisted when dry, the upper smaller than the lower; lower leaves 1-2 mm. long by half as broad, vein excurrent with a subulate awn, upper leaves fewer, smaller with points nearly as long as the blade; margins more or less coarsely and unevenly serrate above the middle; cells hexagonal, basal oblong, slightly decurrent, median cells 0.008-0.017 mm. \times 0.008-0.012 mm., inflated or slightly mamillate, occasionally minutely papillose. Monoicous, perichaetial leaves smaller and long-subulate. Seta 2-3 cm. long, stout and red; calyptra 2 mm. long, cucullate and hairy; lid conic-rostrate, annulus simple, falling with the lid, neck slightly strumose; capsule curved, 5 mm. long, walls ribbed when dry, with 4-10 rows of quadrate collenchymatic cells alternating with narrower, longer parenchymatic cells; peristome double; teeth brown with paler papillose tips; endostome white and papillose, carinate segments split; cilia appendiculate and papillose; spores green, 0.013-0.016 mm., smooth.

On decaying trunks of trees in deep woods and Cypress swamps. On the shore at the Bay of Bayou Lafourche, Donaldsonville, Louisiana, Chas. Mohr. November and December, 1856.

Type locality: "Hispaniola," O. Swartz. "On roots of trees near

ivers." Widely distributed in the West Indies, from Bermuda, Cuba, Haiti, St. Domingo, Jamaica, Guadeloupe and Trinidad. Also in Central America from Mexico, Panama, Costa Rica, Guatemala and Nicaragua. Also in South America from Venezuela, Columbia, Ecuador, Brazil, Bolivia to the Argentine Republic and Paraguay. Also credited to Africa and Asia and Java by Paris.

New York Botanical Garden.

EXPLANATION OF PLATE V.

The figures were drawn with a magnification three times greater than that indicated and the resulting figures were reduced one-third.

RHACOPILUM TOMENTOSUM, FROM ST. DOMINGO. CO-TYPE SWARTZ.

- Fig. 1. Branch showing arrangement of large and small leaves, $\times 6\frac{2}{3}$.
Figs. 2, 3. Outlines of large leaves, $\times 12\frac{1}{3}$.
Figs. 4, 5. Outlines of small leaves, $\times 12\frac{1}{3}$.
Fig. 6. Apex of large leaf showing excurrent costa, $\times 80$.
Fig. 7. Median cells from large leaf, $\times 195$.
Fig. 8. Surface view of cells showing papillae, $\times 333\frac{1}{3}$.
Fig. 9. Cross section of large leaf, $\times 138\frac{1}{3}$.
Fig. 10. Cross section of stem, $\times 80$.

RHACOPILUM TOMENTOSUM FROM LOUISIANA, DR. MOHR.

- Fig. 11. Branch showing arrangement of large and small leaves, $\times 6\frac{2}{3}$.
Figs. 12, 13. Outlines of large leaves, $\times 12\frac{1}{3}$.
Figs. 14, 15. Outlines of small leaves, $\times 12\frac{1}{3}$.
Fig. 16. Apex of large leaf showing excurrent costa, $\times 80$.
Fig. 17. Median cells from large leaf, $\times 195$.
Fig. 18. Outline of curved leaf showing wavy surface caused by rounded cells and papillae, $\times 58\frac{1}{3}$.
Fig. 19. Surface view of cells from large leaf showing papillae, $\times 333\frac{1}{3}$.
Fig. 20. Cross section of large leaf, $\times 138\frac{1}{3}$.
Fig. 21. Cross section of stem, $\times 80$.

MISS CLARA E. CUMMINGS.

Hunnewell Professor of Cryptogamic Botany at Wellesley College.

On the day of our recent Chapter meeting at Columbia, Dec. 28th, one of our most valued members died. There is a brief notice in "Science," Jan. 11, 1907, page 77. The following obituary appeared in the "Boston Evening Transcript," Monday, Dec. 31, 1906:

MISS CLARA E. CUMMINGS.

HUNNEWELL PROFESSOR OF CRYPTO GAMIC BOTANY AT WELLESLEY COLLEGE.

Miss Clara Eaton Cummings, Hunnewell professor of cryptogamic botany, Wellesley College, died in Concord, N. H., Friday, after an illness of several months. The funeral services were held Dec. 30th, at the house of her niece, Mrs. Worthen, 24 Fayette street, Concord, N. H.

Professor Cummings has been to a peculiar degree identified with the history of the college, which she so loyally served. Entering as a student in

1876, a year after the first opening of Wellesley, she at once showed so marked a talent for the study of botany, especially for the identification of cryptogamic flora, that she was retained as a permanent member of that department of study, bearing the title of curator of the museum, 1878-79, instructor in botany, 1879-86. After a period of study in Zurich, Miss Cummings returned to the college as associate professor of cryptogamic botany. In 1905 she became Hunnewell professor of botany, with temporary charge of the department. In 1906 her title was changed to that of Hunnewell professor of cryptogamic botany, in recognition of the closely specialized work in which she had reached distinction, and with the hope that freed from the burden of administrative cares she would gain strength for new enterprises in her chosen field. Her health, however, proved to be seriously impaired.

Among the published works of Professor Cummings are "Lichens of Alaska and Labrador;" she also edited "Decades of North American Lichens," and was associate editor of "Plant World;" she was fellow of the American Association for the Advancement of Science; a member of the Society of Plant Morphology and Physiology (vice president in 1904), of the Mycological Society, Torrey Botanical Club, Boston Society of Natural History and Boston Mycological Club. Her studies were quickened and exalted by a passionate love of nature in its loftier forms. Especially dear to her was the mountain region of North Woodstock, N. H., her summer home. To those who knew her in those inspiring scenes, she seemed one with the genius of the place. Affectionate, gentle, trusting, brave of heart and blithe of spirit, she was in her life blessed by the devoted attachment of noble friends to whom her death brings lasting sorrow."

LESCURAEA FRIGIDA IN VERMONT.

ANNIE LORENZ.

The species in question was collected by Dr. A. J. Grout and the writer on Mt. Mansfield, Vt., July 6, 1906, during the summer meeting of the Vermont Botanical Club.

The specimens grew on the eastern face of a granite rock, on the path to the Ice Cave on the "Upper Lip" of the mountain, at about 4300 ft. alt.

They were of a bronze-golden color, quite closely appressed to the rock, and were sterile. They were hastily collected as *Pterigynandrum*, but upon examination by Mrs. Britton and the writer it proved to be a *Pseudoleskea* of such puzzling appearance that it was submitted to Dr. Best.

He reports it as *Lescuraea frigida* Kindb. very close to his own *Pseudoleskea substriata*, which however is a British Columbian species, and he prefers to keep Kindberg's name for the eastern form.

Lescuraea frigida Kindb. Eu. & N. Am. Bryineae 1: 26, 1897.

"Leaves from subovate base nearly gradually narrowed to the long subulate or filiform-pointed acumen, recurved to it and distinctly decurrent; cells sublinear except the quadrate alar; costa sometimes long-excurrent. Stem-leaves generally entire; branch-leaves serrulate at the whole acumen, sometimes short-acuminate and faintly mamillöse. Capsules unknown. Stem

subpinnate. Tufts dark brown or blackish, not glossy. Very distinct in serrulate branch-leaves and very narrow leaf-cells. Amer. r. Can., Northern Labrador; Macoun, 1896."

Lescuraea frigida was described by Kindberg from specimens collected at Clearwater Lake, northern Labrador, in 1896, (Mac. Cat. VII. p. 273. 1902.) but this is the first report from New England.

It ought to occur among the White Mountains, as well as in Vermont, as it is not dependent upon limestone, but being sterile, it has probably hitherto been overlooked.

Hartford, Conn.

REPORT OF THE SULLIVANT MOSS CHAPTER MEETING.

The fourth public meeting of the Sullivant Chapter was held at 2 p. m. on December 28, 1906, in Schermerhorn Hall of Columbia University, New York City, in connection with the American Association for the Advancement of Science. Owing to a most interesting discussion, under the direction of the Botanical Society of America, held in an adjoining room at the same hour, the number in attendance varied, many coming to us before the hour of the formal opening and others giving a portion of the time. Through the kindness of Prof. Underwood, a room was placed at our disposal for the day. Mr. Chamberlain and Miss Haynes were present early in the morning to arrange the exhibit. The walls were hung with mounted sheets of mosses, hepatics and lichens, and with photographs of noted scientists.

The exhibits were as follows: Mrs. M. L. Stevens showed two volumes of mosses collected during the summer of 1906. Miss Alice C. Kendall sent water-color sketches, with mounted specimens of the mosses colored. A similar book of water-color sketches was sent by Mrs. Dunham. Mr. Hill, of New Westminster, B. C., sent a valuable series of mounted mosses and lichens, accompanied by notes. These specimens are to be added to the Chapter Herbarium. Mr. Hill intended to present a descriptive paper, but a serious accident prevented its completion. Miss Cora Clarke was present and presided over a unique exhibit, her own invention. Numerous herbarium sheets, each devoted to a single species of moss, were ruled into twelve squares marked for the months of the year, and specimens of a moss from a given locality, collected during as many different months as possible, were mounted in the proper squares. The Monthly Chart thus shows, at a glance, the varying stages of the moss and the comparative development of different species. The execution of the work was most artistic. Miss Lorenz exhibited a series of mounted mosses from Willoughby, Vermont. Microscopes were furnished and Miss Haynes presided over her exhibit of slides of rare hepatics and of original drawings. Mrs. Smith exhibited a series of artist's drawings with the half-tone proofs from each, also plates from original specimens and from photographs showing the various methods of illustrating THE BRYOLOGIST. Mr. Rapp presented a series of specimens collected in Florida. Prof. Holzinger sent a large number of duplicates from his *Musci Boreali Americani Exsiccati*, to be given away as souvenirs. Last, but by no means least in interest, was a long line of photographs of native as well

as of foreign lichenists, loaned by Prof. Bruce Fink, who also presented to the Chapter sixty rare lichens.

The meeting was called to order by the President, Mr. Edward B. Chamberlain, and the following program offered, the reading of reports and other formalities being dispensed with.

Dr. A. W. Evans, "Species of Calypogeia New to North America."

Miss Annie Lorenz, "On the Genus Catharinaea in Hartford County." A discussion followed this paper.

Mrs. E. G. Britton gave an informal talk on matters of general botanical interest and exhibited mounted specimens illustrating the beautiful moss flora of Jamaica, with comments on some West Indian genera. She passed around for examination a rare fossil moss, found by Prof. Cockerell in Nebraska, which she has determined as a species of *Grimmia*. This is the fifth fossil moss that has been described and the first ever found in fruit.

Miss Emerson described a possible new species of moss, *Andreaea Toccoae*, showing specimens and drawings.

Prof. Bruce Fink gave a brief survey of the noted lichenists, whose photographs he exhibited, with a tribute to Wainio, and followed this by an interesting account of recent collecting trips in the Canadian Rockies.

Dr. Grout gave an informal talk on the ways in which amateurs may render valuable contributions to botany.

Mr. R. S. Williams closed the formal program with an account of the recent purchase of the Mitten Herbarium by the New York Botanical Garden, and showed various genus covers illustrating Mitten's method of work. A discussion followed.

On account of lack of time, the following papers were read by title: "Notes on *Pogonatum tenue* (Menz.) Britton," by B. F. Bush; "A List of Missouri Mosses, with Notes," by Rev. Charles H. Demetrio; "Common Mosses of Central New York," by Mr. B. D. Gilbert; "Moss Notes," by Mrs. Lamprey, and "A New List of North American Species of *Parmelia*," by Mr. G. K. Merrill. Much to our regret, Mr. Reginald Heber Howe, Junior, was detained by illness and, therefore, his paper with lantern illustrations was not given. Mrs. Harris, too, was unable to present her paper on account of illness. Dr. Best, though urged, declined to speak, saying that he came only to enjoy the good things prepared.

At the close of the regular program a delightful social hour was passed, greeting old and new friends, and examining the exhibits.

Secretary pro tem.

SULLIVANT MOSS CHAPTER NOTES.

Eight names have been added to the list of Chapter Members since January 1st. No. 166. Mr. Wilbur H. Wright, 6338 Ellis avenue, Chicago, Ill. No. 167. Mr. Stewart H. Burnham, Assistant State Botanist, Geological Hall, Albany, N. Y. No. 168. A. H. MacKay, LL.D., Education Office, Halifax, Nova Scotia. No. 169. Miss Anna Jenks, Secretary Botanical Club Southern Pines, N. C. No. 170. Mr. W. F. Copeland, Clark University, Worcester, Mass. No. 171. Mr. George E. Nichols, 596 Yale P. O., New Haven, Conn. No. 172. Mr. A. Bruce Jackson, Mapledene, Newbury, England. No. 173. Ernest I. Morgan, Esq., 314 Main street, Worcester, Mass.



MAY 1907



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
 NORTH AMERICAN MOSSES
 HEPATICS AND LICHENS

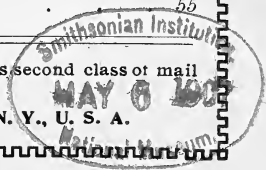
EDITOR
 ANNIE MORRILL SMITH

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THE SULLIVANT MOSS CHAPTER

EDITOR

MRS. ANNIE MORRILL SMITH

ASSISTED BY

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DR. J. W. BAILEY		
MR. G. K. MERRILL		LICHENS
MISS CAROLINE COVENTRY HAYNES		HEPATICS

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THE SULLIVANT MOSS CHAPTER

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PLATE VI--PROF. CLARA EATON CUMMINGS

THE BRYOLOGIST.

VOL. X.

MAY, 1907

No. 3.

A MEMOIR OF CLARA E. CUMMINGS.

BRUCE FINK.

To the writer has been assigned the sad duty of adding to the statements that have already appeared regarding our lamented member of the Sullivant Moss Chapter. More especially, the request made was that something should be written regarding her work as a botanist. It was my good fortune to have met Miss Cummings several times at Wellesley College and elsewhere, so that to the impressions that came from correspondence was added that knowledge of personality which comes only through meeting a co-worker. That hers was a rare spirit was manifest, both in the personal touch and in correspondence. There was a very manifest unselfishness, frankness and devotion to the work that she did because she loved it. The earnestness, patience, enthusiasm and friendliness which made her the ideal teacher also conduced to her success in aiding in the advancement of botanical science. All who have come into intimate relations with her in either capacity must have felt her delight in service.

Miss Cummings was a botanist in the highest sense, thoroughly in sympathy with all that is best in her chosen science. Her reputation was by no means confined to our own country, but she was well known in Europe through personal acquaintance and correspondence. She will be remembered especially on account of her contributions to Lichenology, and it is in the main our present task to place before botanists a somewhat adequate view regarding her labors in this special field; but we could do no greater injustice than to do this without referring to her more general knowledge of botany, and to the strength of character and breadth of culture and sympathy, which touched the lives of those who came in contact with her as friend, teacher or co-worker in botany.

We have read with keenest appreciation the statement in the "Wellesley College News", for February 6, 1907, regarding Miss Cummings' life work as a teacher in Wellesley College and as a contributor to botanical research, and we can only hope to enlarge somewhat upon the latter. Miss Cummings' first paper was the "Catalogue of Musci and Hepaticae of North America, north of Mexico," which appeared in 1885. Just when she began her work on the mosses can not be ascertained, but I find in my herbarium specimens of her "New England Mosses" collected as early as 1880, and specimens of her "Mosses of North America" collected early in 1884. The packets are not numbered, and the writer does not know how many plants were distributed in each of these two sets of exsiccati. Their existence, however, if it may be assumed that the same accuracy which characterized her later work on lichen exsiccati obtained, demonstrates that their author possessed a knowledge of mosses before she began her more extended work on lichens.

Miss Cummings also issued a set of "New England Lichens." Just when she began the distribution of this set, also unnumbered, is not known to the writer, but he finds in his herbarium specimens from these exsiccati collected in 1884. This indicates that she possessed a considerable knowledge of lichens at this time, and it appears that the surroundings of her New England home inspired an interest in mosses and lichens quite early. Born at Plymouth, New Hampshire, July, 1855, doubtless Miss Cummings was at work on these plants before or during her years as a student in the New Hampshire Normal School in her native village, previous to entering Wellesley College in 1876. At least it is stated that she showed excellent ability in the determination of lower plants at this early date, and we are justified in the conclusion that there was an earlier period of preliminary study of these plants.

The list of papers on lichenology, written by Miss Cummings and published in her own name contains only three titles, all published during the last five years of her life. The other papers given in the bibliography contain lists of lichens made by her and published in papers by other botanists, either from material which she had determined or examined, or as compilations from the work of Tuckerman, Willey and others. Whatever part she may have had in the making of these lists, the labor involved in their preparation was doubtless insignificant in comparison with that which must have been necessary in the preparation of exsiccati and "The Lichens of Alaska."

The labor involved in issuing "Decades of North American Lichens" and "Lichenes Boreali-Americani," together with the large amount of determining for others that Miss Cummings kept up for years in connection with this work, is surely her best contribution to lichenology,—a contribution quietly performed and much of it entirely unknown, except to the persons for whom she must have spent many weary hours in determining their specimens. It is well known that the names of A. B. Seymour and T. A. Williams have appeared in the two sets of exsiccati, but these sets of lichens are after all very largely the work of Miss Cummings. In conjunction with Mr. Seymour, she began issuing the decades in 1892, and the sets reached three hundred and sixty numbers. The second edition, "Lichenes Boreali-Americani," began to appear in 1894, and the name of T. A. Williams was added as co-worker. This series of exsiccati reached two hundred and eighty numbers. Early in 1905, Miss Cummings began negotiations with the writer regarding taking the place of Mr. Williams in issuing the sets of exsiccati, but because of the long-continued illness of the originator of the sets, the work did not go forward. On account of these later plans, Miss Cummings' only list of the two sets of exsiccati, arranged alphabetically by genera, has been in the hands of the writer since August, 1905. This list might be of some interest, but it is too long to include in the bibliography at the close of this paper.

I am able to testify from personal experience to the great care which Miss Cummings exercised in the determining of lichens for her friends. Our

correspondence began in February, 1893, when the writer sent specimens to her asking her views regarding some of his determinations. From that time forward, about sixty letters were received and preserved, besides whatever unimportant ones may have been destroyed. In all of the discussions regarding species, Miss Cummings showed care and accuracy. She had access to the Tuckerman herbarium, and every uncertain thing was subjected to careful comparison before she ventured a positive statement, whether collected for her exsiccata or sent for her opinion of the species.

This correspondence was always interesting and helpful to the writer, and is but one of the many instances in which Miss Cummings sacrificed herself without stint for the benefit of her friends. Some gleanings from these letters and postals received may be given here without impropriety. There was the very frequent appeal to try to interest others in the study of lichens, and the statement that she was sacrificing herself in issuing exsiccata and in her correspondence for the good of the science of lichenology and for the love of her work. As early as 1900 she wrote of being hard at work on the Alaska lichens, and especially the lichens of the Harriman expedition. The writer has since examined critically many of these Alaska specimens passed on by Miss Cummings and finds in them even greater evidence of careful work. The Pringle Mexican lichens were mentioned several times, the purpose being to make a series of special sets of them. This seems never to have been accomplished. In 1894, when the writer was inclined to turn from lichenology, there was made the same earnest appeal which no doubt came to many another worker to continue in the work. The offers to loan literature and aid in any possible way continued even after the time in 1899, when came the first statements regarding ill health. She wrote several times of her work which appeared in papers by other persons, among other things, stating that she did all of the work on the lichens in Charles Mohr's "Plant Life of Alabama," except the preliminary statement.

Besides her other work, Miss Cummings found time to do a large amount of lichen collecting in such widely separated portions of the United States as New England, Florida, Colorado and California. She also collected on adjacent islands, and I find in my herbarium an occasional specimen of her collecting in Switzerland and Italy as long ago as 1887.

Miss Cummings was conservative in all of her work. Her conservatism appears most plainly in her review of Dr. Albert Schneider's "Text-book of Lichenology," and in her latest and best published contribution to lichenology, "The Lichens of Alaska." In the paper just named she clings very closely to the Tuckermanian view regarding genera, in such genera as *Buellia*, *Biatora* and *Lecanora*, placing species having very different spore characters in the same genus. In the treatment of the *Cladonias* only does she depart to any considerable extent from Tuckerman's method, her work here following Dr. Wainio more largely. The same conservative spirit manifests itself in her small number of new species, the two published in her last contribution being the only ones due to her work, though she had collected much where others seem to find new species very readily. A more

radical person might have had a larger output, but with her nothing was to be done hastily, and no changes were to be made without most careful consideration. Her work was constantly gaining in quality and influence as is readily enough seen in improvements in manner of issuing the exsiccata and in the character of her latest publication. In her early death, December 28, 1906, at a time when she had many unfinished plans for work in lichenology and was most able to do efficient work, lichenology and botany sustain a severe loss.

Others have written of Miss Cummings' life work as a teacher at Wellesley College, of the recognition given her, and of various honors conferred upon her. So it only remains to append a list of her papers, either published wholly in her own name, or appearing in the writings of others. The two numbered sets of lichen exsiccata are added after the papers, but not the earlier distributions of mosses and lichens.

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_____ and Seymour, A. B. Decades of North American Lichens. 1892 to 1905. Three hundred and sixty numbers were issued.

_____, T. A. Williams and A. B. Seymour. Lichenes Boreali-Americani. 1894 to 1905. Two hundred and eighty numbers were issued.

Miami University, Oxford, Ohio.

FURTHER NOTES ON CLADONIAS. X.

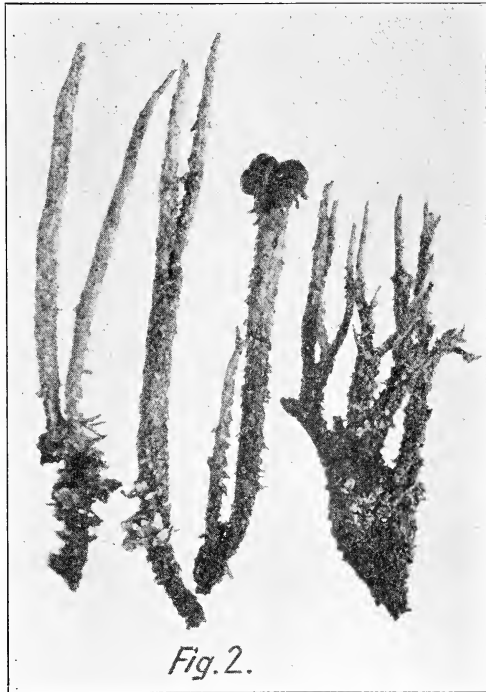
Cladonia decorticata and *Cladonia degenerans*.

BRUCE FINK.

As to the relationships of *Cladonia decorticata*, it has been considered a variety of *Cladonia pyxidata*, to be considered in the next paper of this series and has also been placed as a variety of *Cladonia pityrea*. From material in the writer's herbarium, it is apparent enough that specimens might easily be confused with little-branched and decorticate conditions of *Cladonia squamosa* as well as with some conditions of *Cladonia furcata scabriuscula*. It seems to the writer that, of the species considered in this series, the nearest relationship is with *Cladonia squamosa*, though Dr. Wainio has placed several of the other species already considered or to follow in the series between. The relationship with *Cladonia furcata scabriuscula*, especially its less branched and more decorticate forms, seems quite near, while that with *Cladonia pityrea* is not at all close. Examination of an excellent series of European specimens of *Cladonia pityrea*, received from L. Scriba, reveals a closer relationship than the last, and yet it does not appear that *Cladonia decorticata* should be confused with *Cladonia pityrea*.

A practical difficulty in distinguishing between certain forms of *Cladonia degenerans* and *Cladonia gracilis dilatata* is mentioned below, and the writer has also had difficulty in separating certain specimens from forms of *Cladonia crispata*. However, this difficulty will not often be met.

It is certain enough that the two species considered in this present paper are not so closely related to each other, as is each one to some other *Cladonia*, but it is impossible, in the present state of knowledge of the genus, if at all, to place the Cladonias all in any probable continuous genetic series.



CLADONIA DECORTICATA $\times 2$.

CLADONIA DECORTICATA (Flk.) Spreng. Linn. Sust. Veg. 4:271. 1827. Primary thallus finally disappearing and usually more or less replaced by similar lacinate or crenate, somewhat concave or involute, scattered or clustered squamules, which are usually small, 1-4 mm. long, and 1-2 mm. wide, light sea-green above varying toward olivaceous, below whitish or brownish toward the base. Podetia arising from the surface of the primary thallus; 9-42 mm. long and 0.75-2 mm. in diameter; cylindrical, cupless, simple or more or less dichotomously or irregularly branched, the branches commonly erect or spreading; the fertile apices often dilated, the sterile ones obtuse or subulate; the sides sometimes fissured; clustered or subsolitary, erect or rarely ascend-

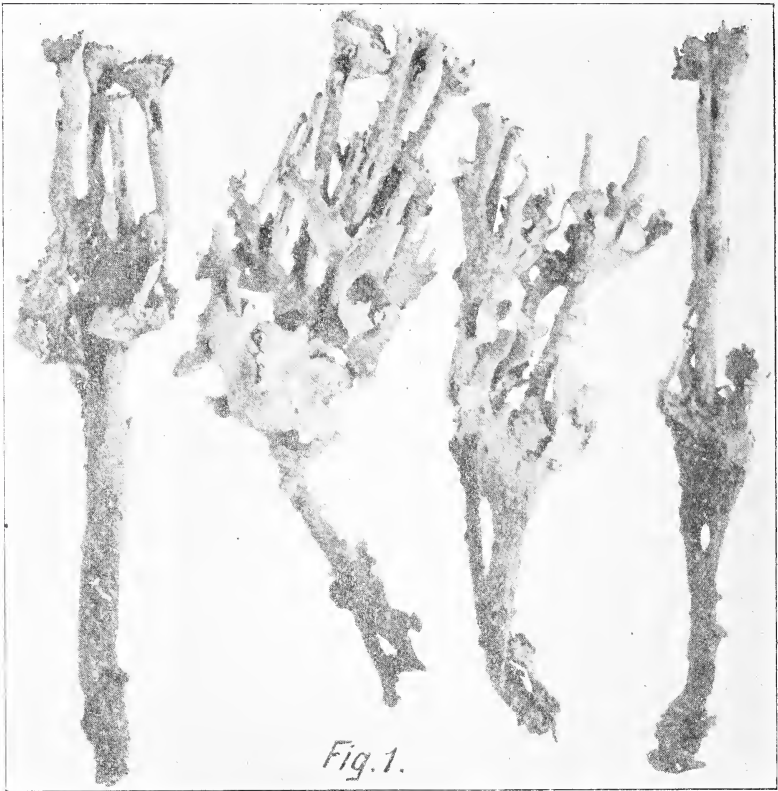
ing, or even decumbent; variously sorediate, areolate and squamulose, the latter especially toward the base; more or less decorticate between the areoles or squamules even toward the base; pale sea-green or brownish, the decorticate portions white. Apothecia middling sized, 0.75-6.5 mm. in diameter; confluent or conglomerate, at the apices of the podetia or branches; concave, flat or convex; thinly margined or finally immarginate: usually brown. Hypothecium pale. Hymenium pale or pale-brownish below and brownish above. Paraphyses usually simple, commonly thickened and brownish toward the apex. Asci clavate or cylindrico-clavate. Fig. 2.

On various kinds of soil, especially in dry sunny places. My own collections in Minnesota on thin earth over rocks. Seen by the writer from Canada (J. Macoun) and from Minnesota (Bruce Fink). Wainio places Tuck. Lich. Amer. Exs. no. 124, from the White Mountains here. J. Macoun's Cat. Canadian Plants, Part VII, records the plant from various parts of British America and from Newfoundland, Alaska and adjacent islands. Known also in Europe, Asia and Africa.

The plant used for illustration was collected by the writer at Kettle Falls, Minnesota, and determined by Dr. Wainio.

CLADONIA DEGENERANS (Flk.) Spreng. Linn. Syst. Veg. 4: 273. 1827. The primary thallus more or less evanescent, composed of usually medium sized, irregularly laciniately lobed, flat or somewhat involute or convolute, ascending, scattered or clustered squamules, which are 2-12 mm. long and 1.5-10 mm. wide; sea-green varying toward olivaceous above and white below or darkening toward the base. Podetia arising from the surface of the primary thallus; 10-55 mm. long and 0.5-3.5 mm. in diameter; more or less irregularly cylindrical or turbinate; erect or ascending; the cortex areolate with commonly elevated and frequently scattered areoles, the portions between the areoles subtomentose; sometimes squamulose; sea-green varying toward ashy or olivaceous, the decorticate portions white; the sides rarely more or less grooved and perforate; occurring in larger or smaller clusters, frequently cup-bearing and proliferate. Cups 1.5-8.5 mm. in diameter, abruptly or gradually dilated; usually more or less irregular; urceolate or shallow; commonly dentate or proliferate, the proliferations arising either from the margin or from the center of the cup and either solitary or radiately arranged; the ranks 1-5 in number and the lowest 3-20 mm. long; the sterile apices scyphiform, cornute or rarely subulate. Apothecia small to medium sized 0.5-2.5 mm. in diameter; regular or finally lobate and perforate; solitary or variously clustered at the apices of podetia or proliferations; convex or flat, immarginate; brown, varying toward pale or reddish-brown. Hypothecium pale. Hymenium pale below and pale-brownish above. Paraphyses simple or branched, frequently thickened and brownish toward the apex. Asci cylindrico-clavate. Ours sterile and the spore and apothecial characters taken from European material. Fig. 1.

On earth in open, dry places or rarely in dry woods. Rarely on earth over rocks. Examined by the writer from Wyoming (Aven Nelson), from Alaska (Wm. Trelease) and from several localities in Minnesota (Bruce



CLADONIA DEGENERANS $\times 3$

Fink). Wainio's distribution adds Port Clarence, Greenland, Newfoundland, Miquelon, White Mountains, Massachusetts, Virginia and several localities in British America. The above distribution indicates that the plant is to be looked for throughout the northern portion of the United States and northward, but still it is not well known. Found in all the grand divisions.

Dr. Wainio has seen fit to divide the species into four forms, two of which he has recognized in material sent him by the writer from Minnesota. Of eight of these specimens submitted, Dr. Wainio referred two to the first form below, one to the second below and five to the species without attempting to refer to a form. Dr. Wainio admits in his Monograph that the four forms are scarcely constant or distinct enough to be of any taxonomic value. So we can do no better for the present than to record below two forms to which our three American forms have been referred by the best authority on the Cladonias. Future world-wide study of the species may enable workers to understand the species and its varieties.

CLADONIA DEGENERANS EUPHOREA (Ach.) Nyl. Syn. Lich. 1: 200. 1858. Podetia without squamules, or the lower portion sparsely squamulose, the sterile cups regular and the fertile ones subregular, sometimes proliferate.

The plants determined by Dr. Wainio were collected at Kettle Falls and at Harding, both in northern Minnesota. Not known elsewhere in America. Well known in Europe. One of our specimens submitted to Dr. Wainio looked suspiciously like *Cladonia gracilis dilatata*, and was submitted a second time with the result that it was returned simply *Cladonia degenerans*. We can not question Dr. Wainio's determination and now see why he placed the plant as he did, but the practical difficulty for the ordinary worker in distinguishing such forms is very great. For the illustration of this form, we give in one figure plants from each of the two collections. A glance at the figure will show those acquainted with *C. gracilis*, which plants of the figure resemble it most strongly.

CLADONIA DEGENERANS CLADOMORPHA (Ach.) Wainio, Mon. Clad. Univ. 1: 141. 1894. Podetia without squamules or sparsely squamulose toward the base, cup-bearing, the cups irregular with lacerate and sometimes proliferate margins, or sometimes abortive or disappearing in the proliferations.

A single collection made at Emo along the northern boundry of Minnesota, was placed here by Dr. Wainio. Not known elsewhere in America. Frequent in Europe. Oxford, Ohio.

CATHARINEA IN HARTFORD COUNTY.

ANNIE LORENZ.

Hartford County, in the Connecticut valley, lies chiefly in a Triassic region, although the Eastern Highlands enter the southeast corner of the county at South Glastonbury.

The main formations are sandstones and shales, but the trap dykes are the most conspicuous features of the landscape. The country east of the river is largely sand-plain, extending to the foothills of the Highlands. This, with its western exposure, gives East Hartford a rather warmer climate than that of the western side of the river, and produces a flora in some respects curiously resembling that of the shore of Long Island Sound. This makes a good variety of soils, as the trap, a lime-and-soda feldspar, furnishes the modicum of lime which is necessary to so many species.

From a geological standpoint, mosses may be roughly divided into three classes according to their habitat: those requiring lime in the substratum on which they grow; those that sedulously avoid limestone, *Kalkmeidend*, as the Germans say, and those that are not particular. Kerner holds that it is not that certain species like the limestone, but that they can tolerate it, while the others cannot. However that may be, a region containing any limestone has always a much richer flora than one without. This applies with equal emphasis to the Hepaticae.

The third class above mentioned includes most of the commoner cosmopolitan mosses, and among them the Catharineae.

Of our three eastern Catharineae, all occur in the county. *C. augustata* is much more common than *C. undulata*, while in England the reverse is the case.

Dixon says that the two are separated "by a combination of characters rather than by any one clearly-defined character."

C. augustata chooses drier ground, and usually fruits abundantly, while *C. undulata* prefers to grow in big cushions along the edges of shady swamps or streams, and does not fruit as freely as the former. Then, *C. augustata* usually has more or less dark red about it, particularly about the fruit, and the leaves are of an olive-green, while *C. undulata* has fruit of a brown ochre, and clear green leaves (about Hooker's green No. 1).

No. 5 of the writer's specimens are male plants of *C. undulata*, or rather the first flowering of the young plants, as the species is parocious. They were collected in June; the antheridia are full-grown, but still immature. The perigonal bracts resemble the leaves of *Hylocomium brevirostre* in size and shape, they have five lamellae, like the leaves.

No. 199 approaches *C. undulata* v. *minor* W. & M. It grew on an old stump, but is good *C. undulata*. The plants are less than 1 cm. high, lamellae 5, capsules brown, erect, 2-3 mm. long, seta 2-2.5 cm.

Catharinea crispa, while probably common along the Sound shore, is not so inland. East Hartford, collected Mr. C. A. Weatherby, is, according to Mr. Collins, the first station reported from the State, but it is undoubtedly overlooked, or not reported from other places.

East Hartford has the very sandy soil which *C. crispa* requires, and it has been found in two quite different parts of the township, in big patches beside brooks in the woods. Dixon says that the plants are frequently buried up to the tops of the stem in sand, which is the case with the plants at the School St. station. He further gives its habitat as "sides and beds of rocky streams, among grass or in sand." Dr. Grout says, "Common in swamps along the south shore of Long Island."

The East Hartford stations are in the woods, on sandy banks of streams, but not in swamps, nor is there a rock larger than a drift pebble in East Hartford. Sterile *C. crispa* can easily be taken for *Mnium hornum*, which is more than likely to be its next neighbor on the bank where found, but lamellae can be demonstrated with a little care, although they are few, 1-4, and more or less inconspicuous.

The capsules mature slightly later than those of the other species, they are dark olive instead of dark red.

These data apply to the typical forms, rather than the abnormal ones, caused by variations in climate or habitat.

List of Specimens.

C. augustata Brid.

No. 1. Collected, Hartford, 96 Garden street, Oct. 15, 1901.

No. 181. Collected, W. Hartford, Nov. 4, 1906. 600 ft. On trap ledge, in ravine above Reservoir 3.

No. 187. Collected, Burnside, Nov. 7, 1906. 100 ft. Sandy bank in Laurel Park. Good material.

No. 200. Collected, W. Hartford, Dec. 2, 1906. 400 ft. Roadside. Reservoir 3.

C. undulata (L.) W. & M.

No. 2. Newington Mt., March 14, 1902. 200 ft. Good sized fertile material.

No. 6. Pomperaug Valley, June 9, 1906. Young plants, male heads, first flowering.

No. 188. Burnside, Nov. 7, 1906. Laurel Park. Sterile plants, usual form.

No. 188b. Fertile plants, same station.

No. 199. West Hartford, Nov. 25, 1906. 350 ft. On old stump, edge of swamp. Reservoir 5. Ad *v. minor* M. & M.

C. crispa James.

No. 173. Burnside, Oct. 30, 1906. School street, woods. Bank of stream in woods. Capsules barely mature. Hartford, Conn.

[Read at the S. M. C. Meeting, Columbia University, Dec. 28, 1906.]

NOTES ON RECENT LITERATURE.

A. J. GROUT.

CONOCEPHALUM CONICUM (L.) Dum. Ever since I was a mere lad I have noticed a pungent aromatic smell when traveling along the moist banks of our Vermont brooks in search of trout or other pleasures, but I never discovered the source of the odor until this last summer (1906). The odor is given forth by the crushed or bruised fronds of *Conocephalum*. So far as I can ascertain this remarkably strong odor is not mentioned in any of our American works. Lett, in his "Hepaticae of the British Islands," mentions the odor as comparable to that of bergamot. In Beihefte Bot. Centralblatt, 18¹: 327-408, 1905, Eugene Bolleter has a very complete account of exhaustive studies on this plant; of this paper we hope soon to have a full review. In it the odor of the plant is mentioned but it is called "turpentine-like." Go and smell and take your choice between turpentine and bergamot. To me it is like neither, but has the pungency of turpentine without its quality.

* * *

We are interested to note an article to help beginners in the study of mosses, entitled, "A Word for Mosses," by Prof. Wm. W. Bailey, in the Am. Botanist, Dec. 1905. After a rather brief description of methods of study and an explanation of some common terms, comes a list of living students of merit. We recommend the perusal of this list to those who wish to become familiar with the methods of the editor of the Am. Botanist, for we attribute some obvious peculiarities of this list to the editor, not the author.

* * *

FREAKS IN MOSSES. In the Bot. Gazette for August, 1903, Miss Mary C. Bliss, of Wellesley College, records finding an archegonium of *Polytrichum juniperinum* with two distinct venters, one above the other, "The lower venter containing two nuclei, which probably represent the egg cell and the ventral canal cell. The upper venter has doubtless been developed from the first neck canal cell and contains but a single nucleus. Directly above in the neck of the archegonium, is the nucleus of second neck canal cell." In the February number of the same journal W. C. Coker recorded the occurrence of two egg cells in the archegonium of *Mnium*. From her own observations and those of Coker, Miss Bliss is led to believe that the neck canal cells are potential egg cells and that the egg cell and the neck canal cell have a common origin.

In Hedwigia, 45: 178-181, plates X and XI, Prof. W. Mönkemeyer describes a number of interesting freaks, such as a cleistocarpous capsule of *Bryum saxonicum* Hagen, and ten abnormal capsules of *Pogonatum nanum*, varying from completely cleistocarpous to operculate, with traces of a peristome attached to the lid. All the capsules of *Pogonatum* were globular and had broken through the calyptra instead of tearing it off at the base and carrying it up on the top of the sporophyte in the normal way. The setae were bent and the hairy calyptras attached to their sides. Those of our readers who have read Dr. R. H. True's paper on "The Physiology of the Sporophyte of *Funaria* and *Mnium*" in Beihefte Bot. Centralblatt, 19¹: 34-44, 1905, will at once infer that the entire abnormality may have followed from the breaking through the archegonium by the young sporophyte and the consequent inability to develop, like that found by True in *Funaria* when the operculum was removed.

A full account of Dr. True's conclusions will be published in the BRYOLOGIST at an early date.

Prof. Mönkemeyer also records several cases of two or three peristomes in the same capsule, one above the other. In one case in *Dicranella varia*, between the urn and the true operculum was inserted a hollow cylinder; inside this were two peristomes attached by the slender tips of the teeth, the upper being inverted with its base attached to the lid. In a specimen of *Bryum saxonicum* there were two hollow cylinders, one above the other, and three peristomes, the two upper being inverted. In the same species there was also a case like that of *Dicranella varia* but the upper portions of the teeth were not so fully developed. There was an annulus at the base of each peristome but the inner peristome appeared as merely a delicate yellow membrane.

* * *

In the Botanical Gazette for August, 1906, Prof. George J. Peirce, of Stanford University, gives an account of work with "Anthoceros and its Nostoc Colonies," and of field observations on the same. He concludes that *Anthoceros* does better without the *Nostoc*, although he is not able to say that the *Nostoc* is parasitic.

* * *

Authentic and complete lists of mosses of limited areas are of great value and interest to the systematist, and also to the general biologist by reason of the bearing of plant distribution on the problems of evolution. Of course absolutely complete lists are an impossibility, they can only be complete as far as recorded observation goes.

The Bryophyta and Pteridophyta of Pennsylvania by the late Prof. T. C. Porter, edited by Dr. John K. Small, and published by Ginn & Co., is one of the best of such lists. It seems unfortunate to the reviewer that certain changes in nomenclature have been made, but in spite of the efforts for uniformity there seems still to be a wide variation of taste in the matter.

In Rhodora for May, 1906, A. LeRoy Andrews gives a list of "New England Sphagnaceae," with some notes. It may be of interest to our readers to know that Mr. Andrews has consented to take up work on the *Sphagnaceae* with the Sullivant Moss Chapter on his return from Europe.

In the same journal for July, 1906, Mr. J. Franklin Collins gives a similar list of the *Buxbaumiaceae*, *Georgiaceae* and *Polytrichaceae*. Some reference to this list has previously been made in the BRYOLOGIST (9: 101) and some extracts from his notes reprinted.

NORTH AMERICAN MUSCI PLEUROCARPI ISSUED BY DR. A. J. GROUT.

JOHN M. HOLZINGER.

Century III of this splendid series, published by Dr. A. J. Grout, Brooklyn, N. Y., has just been completed, the twelfth fascicle having come to hand at this writing, Jan. 30, 1907. A general review of this work is demanded at this juncture, both on account of the work itself, and also for the benefit of all whom the author has placed under lasting obligation by his long sustained, painstaking effort on this collection. This work has been made possible only by much self-sacrifice on the part of the author, aided, to be sure, by the generous help of all contributors in various parts of the country. The writer has himself contributed a number of species, but he knows from experience that the collecting is the lesser task by far. Dr. Grout's work looms up larger and larger in my appreciation as I experience what such a publication requires in time and sacrifice of pleasures and neglect of routine and social duties.

This twelfth fascicle is accompanied by a four page pamphlet, more than three pages of which are taken up with the alphabetical enumeration of Centuries I-III. The last page contains critical notes on Century III. Similar lists of notes accompanied Centuries I and II after each was completed. Since this series is widely distributed among European as well as American bryologists, there is no doubt that further critical notes and certainly critical references will appear in the future in bryological journals on both sides of the Atlantic. No scientific institution in which work along this line is carried on can well afford to do without this help. Time and lack of space forbid the enumeration of the new and rarer species so far distributed. Any one really interested and desiring to know about this collection will surely

wish to see the author's full alphabetical list, which can be obtained by applying to the author at 360 Lenox Road, Brooklyn, N. Y. For the purpose of stimulating field workers further to turn their attention toward Dr. Grout's needs, for he doubtless proposes to continue this series, and also to show rather definitely the geographical gaps in which new collectors are desired to arise, I have compiled the following tabulation showing the distribution of States and collectors represented:

- Maine—Miss Alice L. Crockett.
- Vermont—Mrs. J. B. Clapp.
- Vermont, New Hampshire, New York—A. J. Grout.
- Vicinity of Catskill Mountain House—C. F. Austin and E. A. Rau.
- New York—B. D. Gilbert, J. W. Martens.
- Pennsylvania—D. A. Burnett.
- Connecticut—Mrs. J. D. Lowe.
- Massachusetts—Miss Cora H. Clarke, Mr. Walter Gerritson, Mr. J. W. Huntington.
- Maryland—Wm. R. Maxon.
- District of Columbia—Miss Mary F. Miller
- South Carolina—Prof. H. A. Green.
- Georgia—Mrs. A. P. Taylor.
- Florida—S. Rapp.
- Missouri—N. L. T. Nelson.
- Illinois—L. M. Umbach, F. E. McDonald.
- Wisconsin—L. S. Cheney, J. M. Holzinger.
- Colorado—J. M. Holzinger and C. F. Baker. (This should be the reading on the label No. 176.)
- Montana—J. M. Holzinger and J. B. Blake.
- California—M. A. Howe, M. S. Baker and F. P. Nutting.
- Oregon—A. S. Foster.
- Washington—J. W. Bailey, A. S. Foster, T. C. Frye, J. B. Flett.
- British Columbia—J. W. Bailey, E. Wilson.
- Canada—H. Dupret, J. Macoun.

This list shows that about thirty-four collectors, working in twenty-two states and provinces have co-operated with the author, Dr. Grout, in achieving this notable result. Though much has been accomplished, a moment's consideration of the great tracts still awaiting even cursory exploration will convince any one that the half is not yet done. Less than half the number of states of the Union, and only a small corner of the vast Canadian region, to say nothing of Alaska. The choicest, rarest things are yet waiting to be discovered, among them doubtless scores of species still undescribed. It is safe to state that one lifetime, even with five times the support so generously given to the author, will hardly suffice to approximate the completion of this task. Yet whatever fraction of it is done is a distinct gain for bryology; for it is sure to make possible a uniform understanding of critical and little known species by furnishing to most widely separated investigators uniformly identical material recognized as typical by the most competent stu-

dents of mosses in the world. The possession of such a classical collection by comparative beginners in this study, at any price, is a privilege which is now for the first time available. It will aid in the more rapid mastery of the rudiments and in earlier initiation of the tyro into the critical study of difficult groups of mosses, a field in which the workers are as yet all too few, and for which it is hoped the younger generation of students will train themselves in rapidly growing numbers by such splendid aids as Dr. Grout's North American Pleurocarpi. Winona, Minn.

DIE EUROPÄISCHEN TORFMOOSE.

Nachtragsheft zu den Europäischen Laubmoosen, beschrieben und gezeichnet von Georg Roth. 80 s. 11 Taf. Leipz. (Engelmann) 1906. Preis M. 3.20.

Roth has given us in the above a supplement to his two volumes upon the European mosses, in which the sphagna were lacking, with descriptions and illustrations upon the same plan. The book fills a much felt want, as Braithwaite's admirable work (1880) is inadequate to an understanding of the forms that have been segregated into species in the past few years, while the illustrative work of Warnstorf has been scanty, diagrammatic and in so far unsatisfactory. The drawings of Roth are on the other hand realistic in the extreme, treat admirably the critical points, notably the stem leaves and the pore system of the branch-leaves, and should help to dissipate the uncertainty with which bryologists have been prone to regard the group. Of the fifty-seven described European specimens forty-three are definitely known from North America, while most of the others are to be expected there, so the work is hardly of less value to the American than to the European bryologist. The work follows in the main Warnstorf, with consideration of the author's own observations and other contributions upon the subject, a very good bibliography of which is given at the outset. Especially has the author sought to make available the work of Röhl, which has been neglected owing to its divergent and isolated nomenclature.

As compared with Warnstorf's latest treatment the following new names are to be noted: *S. Schliephackei* (Röhl) Roth, including as variety *S. Schultzii* Warnst., *S. pseudorecurvum* Röhl and *S. pseudocuspdatum* Roth, an attempt as the names indicate to dispose of some of the troublesome connecting links between *S. cuspidatum* and *S. recurvum*. *S. pungens* Roth inserted between the already closely related *S. inundatum* Russ. and *S. Gravetii* Russ. (= *S. auriculatum* Schpr.), *S. turgidum* (C. M.) Roth for Warnstorf's *S. crassicladum*, and *S. cornutum* Roth for what Warnstorf had treated as typical *S. rufescens* Bryol. Germ. As an apparent omission, I would note the failure to allude to the recently proposed species *S. ochraceum* Glowacki from Carinthia (Jahrb. d. Naturhist. Mus. von Kärnten, XXVII, Klagenfurt, 1904, accordance to reference).

An illustration of the pore-structure of the American *S. Mendocineum* Sulliv. is contributed by way of pointing out its distinction from the several

related Scandinavian species detected by Harald Lindberg. A valuable hint as to staining of plants for demonstration of the pore-structure is appended, while the prefatory note that the author's drawings of non-European mosses preparatory to his publication of the world's species have reached the number of 3,940, is of general interest. The book is to be commended as well for its cheapness as its excellence to all interested in our own sadly neglected American sphagna.

A. LEROY ANDREWS.

Kiel, Germany.

BOOK NOTICES.

LICHENS OF MOUNT MONADNOCK, NEW HAMPSHIRE, by Reginald Heber Howe, Junior. (Reprint from *Am. Nat.* **40**: 661-665. Sept. 1906.)

This is an annotated list of seventy-one species and varieties collected by the author April 5th and 6th, 1906, upon the slopes and summit of Mount Monadnock (3166 feet) in Cheshire Co., N. H. The notes give the distribution in the Transition, Sub-Canadian, and Canadian floral zones occurring on the mountain, the relative abundance of each species, and the substratum. Specimens of all species listed are in the author's herbarium.

CENSUS MUSCORUM AUSTRALIENSIMUM. A classified Catalogue of the Frondose Mosses of Australia and Tasmania, collated from available Publications and Herbaria Records, by the Rev. W. Walter Watts and Thomas Whitelegge, F. R. M. S. In two parts. (*Proc. Linn. Soc. N. S. W.* **27**: Pt 3, Supp. pp. 1-90, and **30**: Pt. 4, Supp. pp. 91-163. Sidney, N. S. W. 1902 and 1906.)

These two pamphlets, which are issued under the auspices of the Linnean Society of New South Wales at the price of five shillings sixpence for the two, comprise in convenient form a list of the Australian acrocarpous mosses, including the Sphagnaceae and Andreaeaceae. The introduction reviews briefly the circumstances that led to the preparation of the list, and the work which has been done upon the moss-flora of this region by Mitten, Wilson, C. Mueller, Brotherus, and others. This is followed by an outline of the classificatory scheme used, which is, in the main, that of Dixon and Jameson's "Handbook of British Mosses." Regarding the inclusion of certain names the author says: "It cannot, unfortunately, be claimed that there are no synonyms, nor *nomina nuda*, in this Census. The inaccessibility of specimens, and even, in some cases, of descriptions, the differing principles of determination adopted by specialists, and the large number of new species of which we know nothing except the names, make an unchallengeable list of Australian Mosses impracticable at the present stage."

In spite of these difficulties, nine hundred and eighteen mosses are listed, exclusive of varieties. No new species are described. The species and varieties are accompanied by notes, which are by no means bare records of places and collectors' names. Much historical matter, discussions of the identity of doubtful species, frequent references to the original descriptions, with abundant synonymy, render these notes of great value to the student.

Such work, while showing upon the surface little evidence of the labor needed for its performance, will be of the greatest assistance to future workers in untangling the difficult web presented by the Australian Musci. A list of references, publications consulted, abbreviations, and a generic index add greatly to the convenience of the work. It is to be hoped that the authors may be able to complete their undertaking by issuing a list of the pleurocarpous mosses.

EDWARD B. CHAMBERLAIN.

POGONATUM TENUE.

B. F. BUSH.

While exploring a deep, moist, shady ravine on the high bluff of the Missouri river, at Sibley, Missouri, on October 10, 1906, I noticed near the bottom of the ravine on the opposite side, a stratum of hard, reddish-yellow sand, which appeared to be covered at one place with a deep green scum. Jumping down in the bottom of the ravine, I was very much surprised and pleased to see that the green scum was the prothallium of *Pogonatum tenue* (Menz.) Britton, which was now fruiting abundantly.

The bluff at this place is at least three hundred feet above the river, and about one thousand feet above the Gulf of Mexico, and the stratum of sand in the ravine is about two hundred and fifty feet below the top of the bluff.

This is the second time I have collected this species in Missouri, the other being at Pleasant Grove, Ripley County, in Southeastern Missouri, in precisely the same sort of situation on a sand stratum at about four hundred feet elevation.

The only other time I collected this species was at Spring Hill, Alabama, in a deep ravine back of the hotel, in exactly the same sort of situation, on a stratum of sand, in a deep ravine, about two hundred feet above the Gulf of Mexico.

NOTE ON CATHARINEA ROSULATA.

T. C. FRYE.

An examination of type material, that is, material collected by type collector at type locality and date, indicates that *Catharinea rosulata* (C. M. & K.) (*Atrichum rosulatum* C. M. & K.) described in Macoun's Catalogue of Canadian Plants, Part VI., p. 148, 1892, is simply *Catharinea Selwyni* (Aust.) Kindb. (*Atrichum Selwyni* Aust.). The short stem ascribed to *C. rosulata* is often found in *C. Selwyni*, and in such cases the leaves are rosulate since they cannot be well otherwise, thus agreeing with *C. rosulata*. The leaves in two plants agree in the undulation, dentation, areolation, form, their scales at the back, and the height and number of their lamellae. *C. rosulata* is said to have a leaf which is not margined, but in the material examined they are margined in their upper part where they are dentate. It agrees in this with *C. Selwyni* in which some of the leaves are margined to the base, others to the middle, and very young ones not at all. Thickened margins in young leaves would interfere with the normal development of the

leaf, since cells with thick walls rarely divide or enlarge. The leaves of corresponding ages in *C. rosulata* and *C. Selwyni* are margined the same. I feel sure no one could separate type *C. rosulata* from my authentic *C. Selwyni* if I were to mix them.

University of Washington, Seattle.

March 15, 1907.

CLIMACIUM AMERICANUM IN DECORATION.

A. BRUCE JACKSON.

Until recently I was unaware that *Climacium Americanum* had any decorative value. It is, however, frequently used by English florists for wreaths and crosses, the dendroid stems being tied in bunches with a pleasing effect. The much to be regretted practice of dyeing, which is as usual resorted to, will not however commend itself to a bryologist. A Newbury florist tells me that *Climacium* comes to him from the Oriental dealers in a dried condition and is called "Resurrection Moss," a name given I suppose because it has the property with other mosses of expanding when moistened. Two bunches of the moss colored, one olive-green and the other a hideous dark red, are before me as I write. A friend sent me two or three years ago specimens of species obtained from the same shop, and on one of these there are two capsules, a somewhat rare condition. As five shillings is charged for a cross made up solely of this moss, its commercial value must be considerable. I am indebted to Mr. H. N. Dixon for the identification.

Newbury, England.

WEBERA SESSILIS AND ANTS.

CHARLES C. PLITT.

A year ago, I learned that ants were very fond of the spores of *Webera sessilis* (Schmid.) Lindb. Finding a pretty specimen of this interesting little moss, I brought it home. Not being able to put specimen away as soon as I reached home, it was left over night in the vasculum; in fact, it was several days, before I again got the time to examine the specimen. What was my surprise to find it over-run with ants! Examining the specimen I found that a piece had been gnawed out of the side of nearly every one of the capsules and that the spores had been removed. Every body familiar with this moss, with its large capsules, readily sees what an especially fine inducement it offers for such a depredation.

This at once raised the question, whether such depredations ever occur in a state of nature. I was almost convinced that such do occur, but it was only recently that I found further proof that they actually do occur. On one of my trips during the early part of the present month (Oct. 1906), I came upon a pretty little patch of the *Webera*. Taking up a small portion of it, I saw that it was immediately over an ant's nest. I at once examined the capsules and found them gnawed, just as I found that the ants last year had gnawed the capsules of the plants left in the vasculum.

That this moss is thus pilfered at times, seems pretty evident. It would

be interesting to know to what extent. Is it a common occurrence, or is it only a rare one? It would also be interesting to know, if any other mosses are likewise thus attacked. That moss spores should be an especial dainty to these little insects, is not at all improbable. Baltimore, Md.

A RED *ANDREÆA*.

CORA H. CLARKE.

On July 3rd, 1906, I was climbing a rocky path in the woods at Manchester, Mass., not far from the ocean, nor much above sea-level, when my eye was caught by the very dark red color of some small cushions of moss on a bit of outcropping rock. At least, they appeared red, or a dark red-brown, by contrast with the other mosses on the same rock. The largest cushion was but little over an inch across. Some of the cushions bore a little fruit, which I did not at first recognize to be that of *Andreæa*; there were spores in some of the capsules.

On July 21st, a visit to this same rock showed the *Andreæa* in a dry condition, and therefore almost black. Not far off was an almost vertical rock-wall, of considerable extent, but with growths of moss here and there. Here again was *Andreæa* but not so much in cushions as in patches with a flat surface. The color was not red at all but black when dry—dark green when wet—with little fruit.

Both forms answer to the description of *Andreæa rupestris*, a species not new to Massachusetts since Mr. Edwin Faxon found it in Franklin Park, Boston, Nov. 25th, 1886. His specimens were red rather than dark green, and showed signs of having borne abundant fruit earlier in the season.

Boston, Mass.

SULLIVANT MOSS CHAPTER NOTES.

Dr. A. J. Grout, 360 Lenox Road, Brooklyn, N. Y., would like to arrange for a Sullivant Moss Chapter exploration of Mt. Washington, N. H., some time during next July. Those interested please address as above.

Miss Lydia Prichett Borden, Manoa, Pa., under date Jan. 11, 1907, writes that she found *Mnium spinulosum* B. & S. in full fruit and many plants with the spores apparently perfectly ripe on January 1st, this year. A friend also found *M. sylvaticum* in fruit and a few other species which usually fruit in spring. These were all found in Delaware County within a few miles of Philadelphia.

Since March 1st the following persons have qualified as Chapter members: No. 174. Dr. Marshall A. Howe, New York Botanical Garden, Bronx Park, New York City. No. 175. Mrs. L. E. C. Rohrabacher, Hotel Stand-er, Seattle, Wash. No. 176. Rev. C. H. Waddell, The Vicarage, Saintfield, Co. Down, Ireland. No. 177. Dr. I. Hagen, Natural History Museum, Trondhjem, Norway. No. 178. Dr. V. F. Brotherus, Helsingfors, Finland, Sweden.

In opening a new set of books it has been found advisable to send out all

unpaid accounts both to Chapter members and subscribers. This is not to be taken as a regular order of procedure, as the understanding is that all bills become due on the first of each January, and are to be paid without individual notice. Receipts are, however, always returned.

OFFERINGS.

(To Chapter Members only. For postage.)

- Rev. H. Dupret, Seminary of Philosophy, Montreal, Canada. *Dicranum fulvum* Hook.: *Paludella squarrosa* Brid., from near Montreal.
- Dr. J. F. Brenckle, Kulm, North Dakota. *Tortula mucronifolia*, B. & S., *Pterygoneurum cavifolium* (Ehrh.) Jur.
- Prof. Thomas A. Bonser, E. 12 Nora Avenue, Spokane, Wash. *Hypnum uncinatum* var. *symmetricum* R. & C. From Spokane.
- Dr. J. W. Bailey, 4541 Fourteenth Avenue, Seattle, Wash. *Dicranoweisia cirrhata* Lindb. From western Washington.
- Mr. E. B. Chamberlain, 35 West 59th street, New York City. *Plagiochila asplenoides* (L.) Dum.: *Preissia quadrata* (Scop.) Nees. Collected Pleasant Ridge, Maine.

AMERICAN HEPATICAE

When Prof. L. M. Underwood discontinued the issue of the Hepaticae Americanae he had a good deal of material on hand originally intended for future issues; he has very kindly turned this over to me and I am working it up, with Prof. A. W. Evans' valuable assistance in verifying and determining the species whenever necessary. This, with material of my own collecting, I propose to issue from year to year under the title of AMERICAN HEPATICÆ.

The first issue comprising decades I-II, is ready for distribution. Price, \$1.50. As only twenty sets of these decades are issued it will be necessary for subscribers to indicate their wishes at once.

VOLUME X

NUMBER 4



JULY, 1907



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES
HEPATICS AND LICHENS

EDITOR
ANNIE MORRILL SMITH

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MOSESSES, HEPATICS AND LICHENS

ALSO OFFICIAL ORGAN OF
THE SULLIVANT MOSS CHAPTER

EDITOR

MRS. ANNIE MORRILL SMITH

ASSISTED BY

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DR. J. W. BAILEY }
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THE SULLIVANT MOSS CHAPTER

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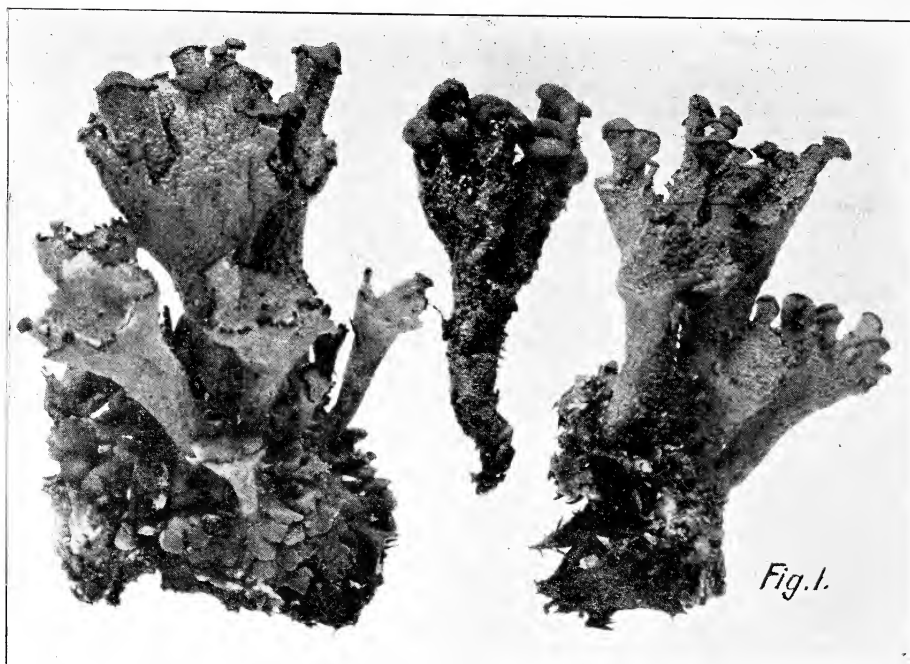


Fig. 1.



Fig. 2.

Plate VII—Fig. 1. *Cladonia pyxidata* $\times 3$
Fig. 2. *Cladonia pityrea* $\times 2$

THE BRYOLOGIST.

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No. 4.

FURTHER NOTES ON CLADONIAS. XI.

Cladonia pyxidata and *Cladonia pityrea*.

BRUCE FINK.

Cladonia pyxidata is perhaps as easy to distinguish as any of our Cladonias, but it is sometimes confused with forms of *Cladonia fimbriata*, especially *C. fimbriata simplex*, which has rather short podetia and large cups for the species. Some of our best workers in American lichenology have also confused *Cladonia pyxidata* with immature and sterile specimens of *Cladonia deformis*. This species could likewise be confused easily with the northern alpine *Cladonia carneola*.

Cladonia pityrea is little known in America, and the writer can only state his own difficulties with the species. Of the forms submitted to Dr. Wainio, he had supposed the one from Iowa to be an unusual condition of *Cladonia cristatella*, two of those from Minnesota had been doubtfully referred to *Cladonia fimbriata*, and the others were recognized as very unusual Cladonias, and sent without attempt at determination.

After a careful study of the effects of KOH on the thalli of Cladonias, the writer is convinced that in many instances these chemical tests are of considerable supplementary value in spite of differences due to age of thalli, differences in substrata, etc. However, in all of the species mentioned above, the KOH test is always or most usually negative or nearly so, so that its use in diagnosis, would be of very little or no value. In a supplementary paper, at the close of this series, the writer will give the results of his studies with KOH so that they may be used to supplement the diagnoses.

The specimen of *Cladonia pyxidata* that furnishes the illustration for this paper was collected by the writer at Tower, Minnesota, and determined by Dr. Wainio. That for *Cladonia pityrea* was collected near Hofheim, Germany, by L. Scriba, and determined by him as follows: "*Cladonia pityrea* (Flk.) Fr. inter 5. cladomorpham Floerk. et 6. hololepidem (Flk.) Wainio."

CLADONIA PYXIDATA (L.) Hoffm. Deutschl. Fl. 121. 1796. Primary thallus commonly persistent, composed of irregularly or digitately incised or lobate, flat, concave or rarely convex, commonly ascending, clustered or scattered squamules, which are 2-8 mm. long and 1.5-6 mm. wide, sea-green above or varying toward whitish or olivaceous, commonly lighter and sorediate below. Podetia arising from the surface of the primary thallus, 3.5-30 mm. long and 3-4.5 mm. in diameter; turbinate or tubaeform, erect; the cortex areolate, or verrucose, or subcontinuous toward the base; frequently more or less decorticate toward the top, rarely more or less squamulose; sea-green varying toward ashy or olivaceous: the decorticate portion white or ashy-brown; frequently closely clustered; cup-bearing. Cups 1-7 mm. in diameter, regular or irregular; on well developed podetia or the dila-

tion beginning just above the primary thallus: the cavity non-perforate and wholly or partly corticate: entire, dentate or proliferate from the margin, the proliferations one or more; the ranks 1-3. Apothecia medium sized, 1-4 mm. in diameter; solitary or conglomerate; regular or irregular; sessile on the margins of the cups or on longer or shorter pedicels: flat and thinly margined or more commonly convex and immarginate; commonly brown and ours all some shade of brown; scarcely common. Hypothecium pale or pale-brownish. Hymenium pale or pale-brownish below and brownish above. Paraphyses simple or rarely branched, commonly thickened and brownish toward the apex. Asci clavate. Plate VII. Fig. 1.

On earth or rocks, or rarely on old wood, usually in places only moderately moist and shaded. Examined by the writer from New Hampshire (G. K. Merrill and R. H. Howe, Jr.), Massachusetts (H. Willey), Maine (Clara E. Cummings and G. K. Merrill), Long Island (H. von Schrenk), New York (Carolyn W. Harris and E. A. Burt), Ohio (E. E. Bogue and M. Foltz), North Carolina (H. A. Green and determined as *Cladonia turgida*), Louisiana (A. B. Langlois), Missouri (Colton Russell), Minnesota, Iowa, Ohio, Washington and Alberta (Bruce Fink), Kansas (H. Willey), Nebraska (T. A. Williams), Colorado (C. F. Baker and H. H. Butler), Wyoming (Aven Nelson), Montana (R. S. Williams, L. H. Pammel and M. J. Elrod), New Mexico (F. S. Earle), Newfoundland (A. C. Waghorne), Alaska (Wm. Trelease), California (H. E. Hasse). Listed from Alabama by C. Mohr and from many localities in British America by J. Macoun. But Mr. Macoun has not recognized the first variety below, and doubtless some of his material belongs there. Willey and Calkins both list from Illinois, and Eckfeldt and Calkins from Florida. Wainio adds nothing to the general North American distribution given above.

The plants listed above are those which Dr. Wainio would place for the most part under *Cladonia pyxidata neglecta*, simply calling certain poorly developed forms by the specific name only. So far as examined by the writer the great majority of all specimens belong here, and this form should stand for the species.

CLADONIA PYXIDATA CHLOROPHAEA (Spreng.) Flk. Clad. Com 70. 1828. The podetia more or less decorticate and sorediate toward the top.

Examined by the writer from Maine (G. K. Merrill), Massachusetts (R. H. Howe, Jr.), New York (Carolyn W. Harris), Iowa, Minnesota, Washington and Ohio (Bruce Fink), Tennessee (W. W. Calkins), Montana (M. J. Elrod), Colorado (C. F. Baker and L. H. Pammel), Newfoundland (A. G. Waghorne). Also listed from California by H. E. Hasse. Dr. Wainio's distribution adds Great Bear Lake, Miquelon Island and Pennsylvania. No doubt generally distributed over North America, but by no means so abundant as the species. Known in all the grand divisions.

CLADONIA PYXIDATA POCILLUM (Ach.) Wainio. Mon. Clad. Univ. 2:241, 1894. Primary thallus of rather large and thick, round-lobed or somewhat incised, closely adnate or slightly ascending squamules, which are more or less imbricated and closely packed into a commonly olivaceous or brownish crust. Podetia partly decorticate above, but not sorediate. Examined by the writer

from Minnesota and Alberta (Bruce Fink). W. W. Calkins lists from Illinois, T. A. Williams lists as common at Rapid City, South Dakota, H. Willey has listed from Massachusetts, H. E. Hasse from California, and J. W. Eckfeldt and W. W. Calkins from Florida. John Macoun gives several localities in British America, and Wainio's distribution indicated that the plant is confined almost exclusively to arctic or alpine regions. In view of this, the distribution in the United States, as given by American workers in recent years, may well be considered with careful re-examination of material. Found in Europe, Asia and Africa.

CLADONIA PITZYREA (Flk.) Fr. Nov. Sched. Crit. 21, 1826. Primary thallus finally disappearing, when present composed of subdigitate, lacinate or crenate, involute concave or flat, ascending, clustered or scattered squamules, which are 1-3 mm. long and 0.5-2 mm. wide, sea-green or olivaceous above and white below and rarely more or less sorediate-granulose. Podetia arising from the surface of the primary thallus, 3.5-50 mm. long and 0.5-4 mm. in diameter, tubaeform, turbinate or subcylindrical; scattered or clustered into small patches; usually erect; the cortex subcontinuous and verrucose, or composed of small areoles, the areoles raised and contiguous, or the surface almost entirely decorticate and frequently sorediate-granulate; sometimes more or less squamulose; sea-green varying toward ashy or olivaceous, the decorticate portions commonly white, sometimes cup-bearing, the cupless and sterile apices obtuse or subulate, simple or digitately or irregularly branched. Cups 0.5-3 mm. in diameter, gradually or abruptly dilated, commonly more or less irregular, often oblique, the cavity rather shallow; the margin dentate, lacerate or proliferate, the proliferations one or more and the ranks 1-3. Apothecia small or medium sized, 0.5-4.5 mm. in diameter, often conglomerate; usually on short pedicels on the margins of the cups or at the cupless apices; the disk flat and thinly margined or becoming convex and immarginate; commonly brick-red (but ours are more commonly a dark brown). Hypothecium pale or pale brownish. Hymenium of same color or darker brownish above. Paraphyses simple or branched, commonly thickened and brownish toward the apex. Asci clavate or cylindrico-clavate. Plate VII. Fig. 2.

The only American specimens examined by the writer are a half dozen specimens submitted by him to Dr. Wainio, five from Minnesota and one from Iowa. Of the six, four were referred by Dr. Wainio to some of the various forms which he recognizes, and two, one from Iowa and one from Minnesota, were returned marked simply *Cladonia pityrea*. Dr. Wainio recognizes the species from Vancouver Island, Oregon, Massachusetts, South Carolina, Cuba, Porto Rico, Mexico, and one or two other small islands. This would give the plant a wide North American distribution, though it does not seem to be recognized by American lichenists, except those plants determined for the writer by Dr. Wainio. The species is doubtless a compound conception, but we can do no better, in the present state of knowledge, than to simply record below the three forms which Dr. Wainio has been able to recognize in the specimens sent him by the writer. While this treatment is far from sat-

isfactory, it is hoped that it will enable American workers to recognize the species and perhaps the forms given below. For other forms that are perhaps quite as likely to occur with us, the reader is referred to Dr. Wainio's Monograph.

CLADONIA PITYREA PHYLLOPHORA (Mudd.) Wainio Mon. Clad. Univ. 2: 355, 1894. Podetia cupless, only 10-30 mm. in length, more or less squamulose, corticate and without soredia. But Dr. Wainio admitted here one of our forms, more or less decorticate. Specimens collected at Emo, on the northern boundary of Minnesota and on Oak Island, in the Lake of the Woods, were placed here by Dr. Wainio. Elsewhere recognized only in Europe.

CLADONIA PITYREA SUBACUTA Wainio Mon. Clad. Univ. 2: 355, 1894. Podetia cupless, 10-35 mm. in length, wholly granulose, or verrucose or areolate-corticate toward the base, almost devoid of squamules.

A single specimen from Emo was placed here by Dr. Wainio. Not known elsewhere from North America. More or less common in Europe.

CLADONIA PITYREA CLADOMORPHA (Flk.) Wainio Mon. Clad. Univ. 2: 255, 1894. Podetia cup-bearing, the ranks quite short (about 12 mm.), granulose or sorediate, often verrucose or areolate-corticate toward the base, devoid or almost devoid of squamules.

The great similarity of the last two varieties or forms is apparent enough from the descriptions, and Dr. Wainio referred the cupless podetia of the collection from Emo to the last variety above, and those having cups to the present one. The taxonomic value of such forms may be doubted, but we record them, leaving the future to decide as to their value. A specimen collected in California by Dr. Given (1869) and sent to the writer as *Cladonia pyxidata* was referred to the present form by Dr. Wainio. Except for these two forms submitted to Dr. Wainio, not recognized in America. Several European exsiccata have been placed here.

Miami University, Oxford, Ohio.

NOTES ON RECENT LITERATURE II.

Notes on the Physiology of the Sporophyte of *Funaria* and *Mnium*.

A. J. GROUT.

(R. H. True in Beihefte Bot. Centralblatt 19¹: 34-44, 1905.)

This is an account of interesting experiments to discover the exciting cause of curvature of the seta in *Funaria hygrometrica* and *Mnium cuspidatum* Hedw. Dr. True concludes that "The young sporophyte, prior to the development of a distinct capsular rudiment, is either positively heliotropic or negatively geotropic, and tends to assume a perpendicular position which is fixed by the further development of the tissues. When in the young sporophyte the capsular rudiment has begun to develop, a sharp curvature appears just below the capsule, turning the capsular rudiment into the perpendicular position of either a positively geotropic or of a negatively heliotropic reaction."

Further experiments "seem to make it clear that in the case of *Mnium*,

and probably of *Funaria* also, the 'nodding' of the capsules is brought about by the stimulating action of gravity, since the direction of the illumination does not interfere with the tendency of the capsules to assume the 'nodding,' or in the case of *Mnium*, the pendulous position seen in nature." "The directive influence of illumination is clearly marked in determining the plane in which the capsular rudiment shall fall. Sometimes the apex of the capsule falls toward the light, sometimes from it."

"In an early growing stage the young sporophytes seem to react somewhat to gravity in a negative sense, tending to bend upward toward the perpendicular whether lighted from above or below."

The following were incidental observations in connection with the experiments. The entire zone of elongation of the sporophyte (in *Funaria*) is situated inside the calyptra. The zone of elongation is limited to a space within 2 mm. from the apex, the most rapid growth being found about 0.8 mm. from the tip. "The young seta was found to have reached its complete diameter at any given point as soon as its growth in length was completed."

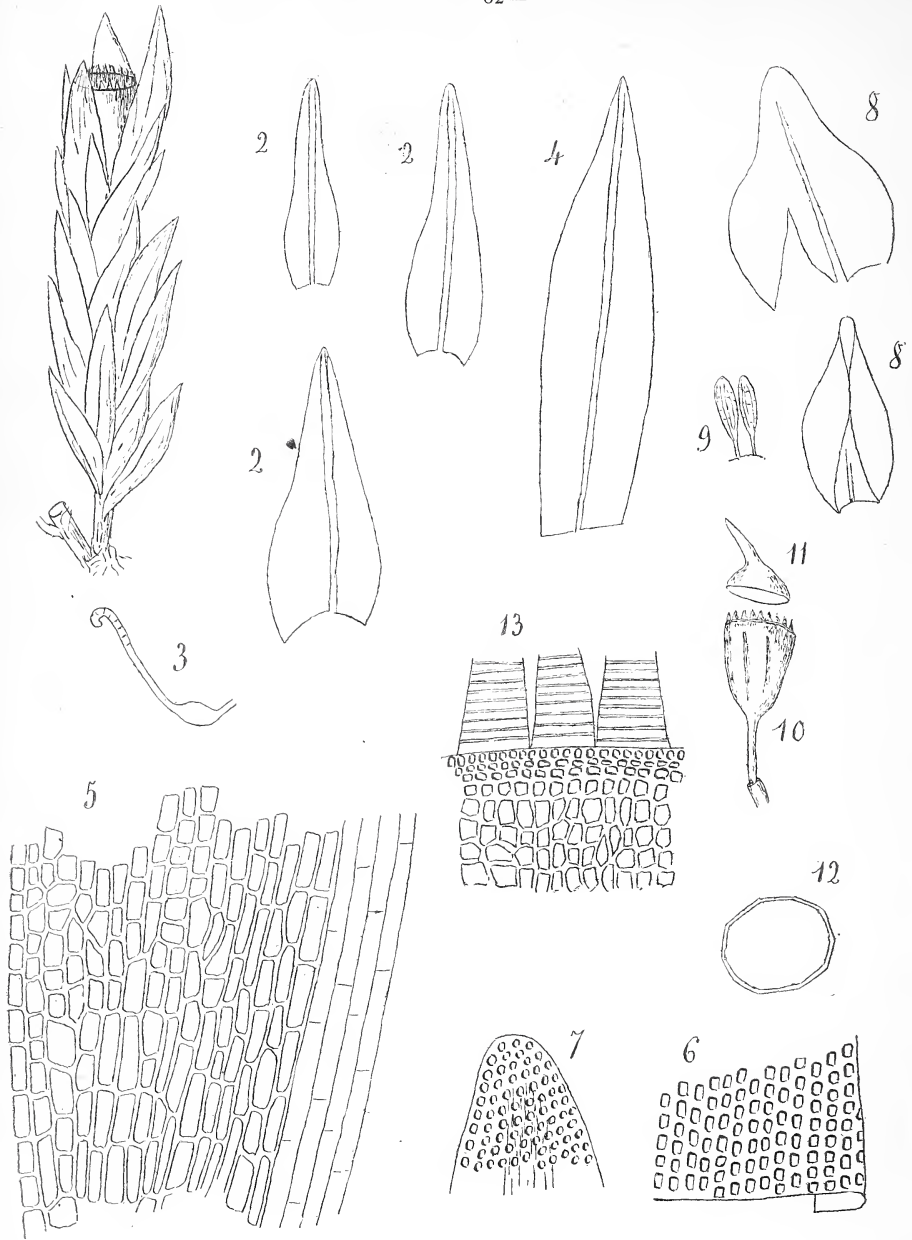
The calyptra appears to serve a very important purpose in preventing the drying up of the young sporophyte tip. In *Funaria*, because of the more dry and exposed habitat of the species, it is only after the capsules are half grown that they are able to survive the drying out of a few days of hot dry weather. "Hence the season for sporophyte formation falls in the moist season of the year when the temperature is sufficient to allow rapid growth." In *Funaria* the young calyptra consists of a long beak-like distal portion, an enlarged sac-like portion contracted at base into a short collar-like portion which clasps the seta very tightly. Although this sac-like calyptra be removed with extreme care the sporophyte will not develop unless the capsules be half grown. Dr. True infers that this is due largely, if not entirely, to the drying out of the capsule after the removal of the calyptra. The cells of the calyptra have abundant chloroplasts, and Dr. True believes that it has powers of independent nutrition, but is somewhat in doubt as to the source of its water supply, which is apparently the minute quantity of water usually to be seen in the upper part of the calyptra during the earlier stages of sporophyte development. As *Mnium cuspidatum* grows in moist situations its calyptra can be, and is, spared much earlier. Brooklyn, N. Y.

DO YOU WANT YOUR POLYTRICHACEAE IDENTIFIED?

In the course of some work on the Polytrichaceae of western North America, to be published later, the writer has had occasion to attempt the elaboration of serviceable keys to the species of the family. To test these keys, and to get a wider acquaintance with the variations in the group the writer would be pleased to receive for determination, verification, or simply for examination, collections of Polytrichaceae, including the genera Catharina (Atrichum), Oligotrichum, Bartramiopsis, Polytrichadelphus, Pogonatum, Polytrichum.

T. C. FRYE,

State University, Seattle, Washington.



J. Chérot del.

GRIMMIA DUPRETI, N. SP.

I. THÉRIOT.

EXPLANATION OF PLATE VIII.

Grimmia Dupreti n. sp.

1. Entire plant $\times 18$.
 - 2, 2, 2. Leaves $\times 32$.
 3. Transverse section of a leaf $\times 95$.
 4. Perichaetial leaf $\times 32$.
 5. Basal aerolation of a leaf $\times 208$.
 6. Aerolation in the middle $\times 208$.
 7. Aerolation of the apex $\times 208$.
 - 8, 8. Perigonial leaves $\times 32$.
 9. Antheridia $\times 32$.
 10. Capsule in dry state $\times 18$.
 11. Lid $\times 18$.
 12. Transverse section of the capsule $\times 32$.
 13. Portion of the peristome $\times 95$.
- All figures slightly reduced. About one-fifth.

Monoica, obscure viridis, densiuscule caespitosa. Caulis simplex, brevissimus, erectus, 3-4 mm. longus. Folia sicca imbricata, madida erecto-patentia, 1.2 mm. longa, 0.40-0.45 mm. lata, lanceolata, breviter acuminata, carinata, obtusa, marginibus integris revolutis, costa basi angusta 24μ lata, ad apicem dilatata, sub summo apice evanida, cellulis inferioribus rectangulis, hyalinis a basi et marginibus, 30-40 μ longis, 10-12 μ latis, caeteris parvis, quadrato-rotundatis, valde chlorophyllosis, parietibus incrassatis, 6-8 μ latis, laevibus, unistratis. Folia perichaetialia subsimilia caulinis, sed multo majora, acuta, apicibus breviter hyalinis, basis longius hyalinis, revoluta in dimidio superiore, 1.5-1.8 mm. longa, e basi semi-vaginate. Capsula in pedicello brevi, 0.6 mm. longo, recto, immersa, erecta, ovato-subglobosa, parva, basi rotundata, dilatata ori post maturitatem, sicca plicatula, paulo angulosa, deoperculata, 0.8 mm. longa, 0.40-0.44 mm. crassa, operculo convexo oblique sat longe rostrato. Peristomii dentes 16, integris, rubescentes, laeves; annulus non observari. Calyptra ignota. Sporae laeves, 12-14 μ crassae. Flos masculus sub femineo sessilis, foliis perigonialibus brevibus, ovatis, obtusis, latissimis, valde concavis, cum nervis tenuibus et angustis; 5-6 antheridiis.

Hab. On mill stone grit, Oka, near Montreal (Canada). Leg. H. Dupret, 2 August, 1905, No. 95.

Pretty small species, remarkable by its perichaetial leaves much larger than the stem leaves, its very small capsule, its seta nearly equal to the capsule and consequently more developed than in most species of the subgenus *Schistidium*.

It resembles by some characters the *Grimmia atricha* Kdb., from which it is easily distinguished by its revolute leaves, its smaller capsule, its longer seta and its peristome with red teeth.

• Havre, France, le 10 janvier, 1907.

[The Editor is responsible for the following translation.]

GRIMMIA DUPRETI Thér & Card.

Monoicous, dark green, rather densely caespitose. Stems simple, very short, erect, 3-4 mm. high. Leaves imbricate when dry, erecto-patent when moist, 1.2 mm. long, 0.40-0.45 broad, lanceolate, short-acuminate, carinate, obtuse, margins entire, revolute; costa narrow at base, 24μ broad, dilated towards the apex, vanishing below the tip; lower cells rectangular, hyaline at base and margins, $30-40\mu$ long, $10-12\mu$ broad, other cells small, quadrate-rounded, strongly chlorophyllose, walls incrassate, $6-8\mu$ broad, smooth, unistratose. Perichaetial leaves similar to stem leaves, but much larger, the short hyaline apex acute, hyaline base longer, revolute in upper half, 1.5-1.8 mm. long, from a semi-vaginant base. Capsules immersed on a short straight pedicel 0.6 mm. long, erect, ovato-subglobose, small, rounded at base, dilated at orifice when old, plicatulate when dry, slightly angular, deoperculate, 0.8 mm. long, 0.40-0.44 mm. in diameter; operculum obliquely convex, rather long rostrate. Peristome teeth 16, entire, rufescent, smooth. Annulus not observed. Calyptra unknown. Spores smooth, $12-14\mu$ in diameter. Antheridial buds, sessil, below the perichaetial leaves, perigonal leaves short, ovate, obtuse, very broad, strongly concave with thin narrow costa; antheridia 5-6.

LICHENS OF THE ADIRONDACK LEAGUE CLUB TRACT.

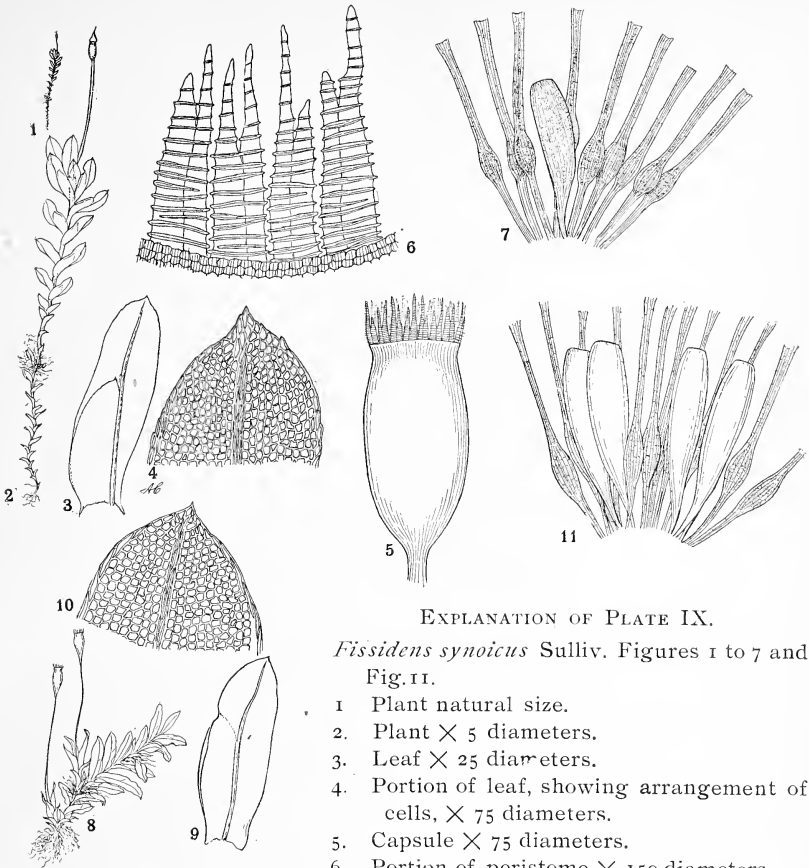
CAROLYN W. HARRIS.

The following species and varieties of Lichens were collected in June, 1905, by Annie Morrill Smith and the writer in the vicinity of Little Moose Lake, Herkimer County, New York. The altitude varies from 1788 feet at the level of Little Moose Lake, Mountain Lodge Club House, to 2460 feet at the summit of Panther Mountain. The nomenclature and order follow that of Tuckerman's Synopsis, except in the genus *Cladonia*, in which the species are arranged alphabetically, as no one authority is adhered to in the determinations. All specimens are in the herbarium of the collectors.

1. *RAMALINA CALICARIS* (L.) Fr. var. *FASTIGIATA* Fr. On dead spruce. Panther Mountain, Alt. 2460 ft.
2. *CETRARIA CILIARIS* (Ach.) Tuckerm. On dead spruce. Mountain Lodge, Little Moose Lake, Tote Road to Twin Lake, Alt. 1788 ft.
3. *CETRARIA LACUNOSA* Ach. On dead spruce. Trail to Fish Hatchery and the River, Mountain Lodge.
4. *CETRARIA GLAUCA* (L.) Ach. On branches of dead hemlock. Panther Mountain.
5. *CETRARIA OAKESIANA* Tuckerm. On dead yellow birch. Trail to Little Moose River, Panther Mountain.
6. *EVERNIA FURFURACEA* (L.) Mann. var. *CLADONIA* Tuckerm. On branches of dead hemlock, Panther Mountain.
7. *EVERNIA PRUNASTRI* (L.) Ach. On dead spruce. Panther Mountain.
8. *USNEA BARBATA* (L.) Fr. var. *FLORIDA* Fr. On dead spruce. Panther Mountain, Trail to First Lake, Tote Road to Twin Lake.

9. *USNEA BARBATA* (L.) Fr. var. *PLICATA* Fr. On dead spruce. Same localities as above.
10. *PARMELIA PERLATA* (L.) Ach. On decayed wood. Trail to Fish Hatchery, Panther Mountain.
11. *PARMELIA BORRERI* Turn. var. *RUDECTA* Tuckerm. Tote Road to Twin Lake, Trail to Little Moose River.
12. *PARMELIA SAXATILIS* (L.) Fr. On old logs. Trail to First Lake, Road to Twin Lake, Little Moose Lake.
13. *PARMELIA SAXATILIS* (L.) Fr. var. *SULCATA* Nyl. On decayed logs. Trail to Little Moose River, Road to Twin Lake, Panther Mountain, Trail to First Lake, Little Moose Lake.
14. *PARMELIA PHYSODES* (L.) Ach. On decayed wood. Little Moose Lake, Road to Twin Lake, Panther Mountain, Mountain Lodge.
15. *PARMELIA OLIVACEA* (L.) Ach. On beech trees. Trail to Panther Lake.
16. *PARMELIA OLIVACEA* (L.) Ach. var. *PANNIFORMIS* Nyl.
17. *PARMELIA CAPERATA* (L.) Ach. On dead wood. Mountain Lodge.
18. *PARMELIA CONSPERSA* (Ehrh.) Ach. On mossy rocks. Little Moose Lake.
19. *PHYSICIA SPECIOSA* (Wulf., Ach.) Nyl. On beech trees. Trail to Little Moose River, Panther Mountain.
20. *PHYSICIA GRANULIFERA* (Ach.) Tuckerm. Little Moose Lake.
21. *PHYSICIA AQUILA* (Ach.) Nyl. var. *DETONSA* Tuckerm. On decayed logs. Panther Mountain, Little Moose Lake, Trail to First Lake.
22. *PHYSICIA OBSCURA* (Ehrh.) Nyl. Panther Mountain, Little Moose Lake.
23. *PYXINE SOREDIATA* Fr. Trail to First Lake, Panther Mountain, Trail to Little Moose River, Road to Twin Lake.
24. *UMBILICARIA DILLENII* Tuckerm. On rocks in Little Moose Lake at outlet.
25. *UMBILICARIA PUSTULATA* (L.) Hoffm. var. *PAPULOSA* Tuckerm. On same rocks and growing with above.
26. *STICTA AMPLISSIMA* (Scop.) Mass. On dead yellow birch. Trail to Little Moose River, Panther Mountain, Trail to First Lake.
27. *STICTA PULMONARIA* (L.) Ach. On dead yellow birch, also on logs with mosses. Panther Mountain, Trail to Little Moose River.
28. *NEPHROMA HELVETICUM* Ach. On decayed logs. Trail to Panther Lake, Trail to Panther Mountain.
29. *PELTIGERA HORIZONTALIS* (L.) Hoffm. On earth with mosses. Trail to First Lake, Panther Mountain.
30. *PELTIGERA POLYDACTYLA* (Neck.) Hoffm. On earth with mosses. Trail to Little Moose River, Panther Mountain.
31. *PANNARIA LANUGINOSA* (Ach.) Koerb. On decayed wood. Panther Mountain, Trail to Little Moose River.
32. *LECANORA PALLIDA* (Schreb.) Schaer. On dead beech trees. Panther Mountain, Trail to First Lake, Little Moose Lake.

33. *LECANORA PALLIDA* (Schreb.) Schaer. var. *CANCRIFORMIS* Tuckerm. On birch trees. Fish Hatchery.
34. *LECANORA SUBFUSCA* (L.) Ach. On bark of living trees. Fish Hatchery.
35. *LECANORA ATRA* (Huds.) Ach. On beech trees. Near Fish Hatchery.
36. *LECANORA VARIA* (Ehrh.) Nyl. On trees. Fish Hatchery.
37. *LECANORA ELATINA* Ach. On dead spruce. Near Fish Hatchery.
38. *PERTUSARIA VELATA* (Turn.) Nyl. On dead wood. Trail to First Lake.
39. *PERTUSARIA COMMUNIS* DC. On beech trees. Trail to First Lake.
40. *STEREOCAULON PASCHALE* (L.) Fr. On granite rock. St. Louis Point, Little Moose Lake.
41. *CLADONIA CAESPITICIA* (Pers.) Fl. On the earth. Trail to Fish Hatchery, Little Moose Lake.
42. *CLADONIA CRISTATELLA* Tuckerm. On earth. Tote Road to Twin Lake.
43. *CLADONIA FIMBRIATA* (L.) Fr. var. *CONIOCRAEA* (Flk.) Wainio. On earth. Panther Mountain.
44. *CLADONIA FIMBRIATA* (L.) Fr. var. *TUBAEFORMIS* Fr. On the earth. Panther Mountain.
45. *CLADONIA FURCATA* (Huds.) Schrad. On earth. Little Moose Lake.
46. *CLADONIA GRACILIS DILICATA* (Hoffm.) Wainio. On decayed wood. Trail to Fish Hatchery.
47. *CLADONIA PYXIDATA CHLOROPHAEA* (Spreng.) Flk. On old log. Fish Hatchery.
48. *CLADONIA PYXIDATA NEGLECTA* (Flk.) Schaer. On old log. Fish Hatchery.
49. *CLADONIA RANGIFERINA* (L.) Hoffm. On earth. Trail to Little Moose River.
50. *CLADONIA SQUAMOSA* Hoffm. On earth. Trail to Fish Hatchery.
51. *CLADONIA TURGIDA* (Ehrh.) Hoffm. On the earth. Trail to Fish Hatchery.
52. *CLADONIA VERTICILLATA* Fr. On decayed wood. Trail to Fish Hatchery.
53. *BIATORA LAURERI* (Hepp.) Tuckerm. On beech trees. Fish Hatchery.
54. *BIATORA RUBELLA* (Ehrh.) Rabenh. Same as above. Fish Hatchery.
55. *BIATORA CHLORANTHA* Tuckerm. On spruce trees. Fish Hatchery.
56. *BUELLIA PARASEMA* (Ach.) Th. Fr. On dead wood. Fish Hatchery.
57. *ARTHONIA EXCEDENS* Nyl. On trees. Fish Hatchery.
58. *PYRENULA NITIDA* Ach. On dead yellow birch. Little Moose Lake, Trail to First Lake.
59. *GRAPHIS SCRIPTA* Ach. On beech trees. Panther Mountain, Fish Hatchery.
60. *GRAPHIS SCRIPTA* Ach. var. *RECTA* (Humb.) Nyl. On yellow birch Brooklyn, New York.



EXPLANATION OF PLATE IX.

Fissidens synoicus Sulliv. Figures 1 to 7 and Fig. 11.

- 1 Plant natural size.
- 2. Plant $\times 5$ diameters.
- 3. Leaf $\times 25$ diameters.
- 4. Portion of leaf, showing arrangement of cells, $\times 75$ diameters.
- 5. Capsule $\times 75$ diameters.
- 6. Portion of peristome $\times 150$ diameters,
- 7. Synoicus flower $\times 150$ diameters.
- 11. Flower of *Fissidens synoicus* $\times 150$ diameters.

Fissidens inconstans Schimp Figures 8 to 10.

- 8. Plant $\times 5$ diameters.
 - 9. Leaf $\times 25$ diameters.
 - 10. Portion of leaf $\times 75$ diameters.
- All reduced one-half.

THE VALIDITY OF SOME SPECIES OF FISSIDENS.

E. J. HILL.

Among the species of *Fissidens* which I have observed in the prosecution of field work none have had so varied a treatment as the following: *F. inconstans* Schimp., *F. synoicus* Sulliv., *F. minutulus* Sulliv. and *F.*

exiguus Sulliv. For comparison with these there have been furnished from the Herbarium of Columbia College, New York City, *F. inconstans* Schimp. Cheyenne Cañon, Colorado, 1872; *F. Bambergeri* Schimp., collected by Milde at the original station, Meran, Tirol; *F. bryoides* Hedw. Erb. Critt. Ital.; *F. bryoides* Hedw. from near Durlach, Baden; *F. bryoides* var. *intermedius* Ruthe=var. *gymnandrus* Buse. (No. 1160 of Rabenhorst, Bry. Eur., collected by R. Ruthe, locality not given. This No. 1160 Warnstorf in Kryp. Fl. Mark Brand. Laubmoose 2: 171, 1906, gives as *F. impar* Mitt.). From the Sullivant Herbarium at Cambridge, Mass., *F. synoicus* Sulliv. San Marcos, Texas, Ch. Wright, 1847. From the Field Columbian Museum, Chicago, *F. bryoides* Hedw. Collected by Gmelin, Stuttgart, No. 84879; *F. bryoides* Hedw. Jura franconia, P. Reinsch, No. 84987; *F. incurvus* Schwaegr. Vogesengebiet am feuchten Waldenorten, P. Reinsch, Nos. 84986 and 116238; *F. exiguus* Sulliv. Ex. Musci Allegh No. 84199. The other specimens used are of my own collection, the oldest *F. minutulus* Sulliv. Kankakee, Illinois, 1872, determined for me by the late Thomas P. James. This has been the species most frequently found since, and occurs in examples from Minnesota, Illinois and New York. All my other examples, *F. exiguus*, *F. inconstans*, *F. synoicus*, *F. incurvus* Stark, 1807 (= *F. incurvus* Schwaegr. 1816), are from northern Illinois.

F. inconstans in the Manual of Lesquereux and James seems to be limited to the collection of Wright at San Marcos, Texas. It is the only example cited, and *F. synoicus* Sulliv. is made a synonym. No reference is made to its presence elsewhere as is usual in the case of rare species. The Colorado specimens were collected by T. C. Porter, July 11, 1872. They are labeled "*F. inconstans* Schimp., Ed. 11 (*F. bryoides* var. *inconstans* Limpr-Laubmoose)." Why it was not referred to in the Manual published in 1884¹ is not evident. It may have been due to the uncertainty of its standing in the opinion of one of the authors, Mr. James, or have been overlooked. The following note of his (fide Mrs. Britton) accompanies the specimens: "*F. Porteri* n. sp. provisional. Stems branched, the branch bearing the fruit-stalk is attached to the main stem about one-fourth its length. The capsule small, oval, almost rotund. The male organs are axillary on the main stem (Monoecious). Can it be a hybrid between *F. incurvus* and *F. bryoides*?"* *A Fissidens* which I cannot specifically separate from this I have twice found at a single station at Glenwood, Ill.

Fissidens inconstans was described by Schimper in 1876 from specimens found by H. Boswell near Oxford, England, in 1863 (Synop. Mus. Europ. Ed. 11, 114, 1876.). Its fruit is said to mature in March. Schimper states that it is very inconstant in the position of its fruit, which is sometimes terminal, sometimes lateral and axillary, the capsule smaller than in *F. incurvus*, "always suberect or erect." "Whether a species near to the very polymorphic *F. incurvus* is really distinct or not is doubtful," he adds. Warnstorf, one of the latest authorities, gives it specific rank, grouping it in his Ueber-

*In the Synopsis of the Flora of Colorado, by Thomas C. Porter and John M. Coulter, Washington, D. C., 1874, to which the article on Musci was contributed by Leo Lesquereux, no species of *Fissidens* is given. The list includes, among new ones described, those collected by Porter and others in 1872 and 1873.

sicht der Arten with *F. bryoides* (L.) Hedw. and *F. gymnanthus* Buse, of which he makes a species also. It is marked by an asterisk as not yet found but likely to occur within the area his work embraces, and consequently is not fully described. (Kryp. Flora der Mark Brand. Laubmoose 2: 166, 1906.) This rank I take to be given it also by the way it is labeled in the Herbarium of Columbia College. Roth makes it a variety of *F. bryoides*, as also Limpricht; Husnot a variety of *F. incurvus*; Boulay one of cycle of forms, including *incurvus*, *crassipes*, *pusillus* and *Bambergeri*, all closely allied to *F. incurvus*. Dixon considers it a form or sport of *F. bryoides*; Barnes both this and *F. synoicus* sports of *F. incurvus*. (A Revision of North American Species of Fissidens, Bot. Gaz. 12: 31, 1887.) Here are three main conclusions, (a) a species, (b) a variety, form or sport of *F. bryoides*, (c) a variety or sport of *F. incurvus*.

Since I did not obtain specimens of *F. inconstans* from any European locality, the statements in this paper so far as based on examination of plants refer to the collections from Colorado and Glenwood. There is the possibility that they may not be the equivalents of the European moss, though this seems probable. From the provisional name proposed by James he had his doubts. The plants at Glenwood were first collected October 24, 1899. Having found the synoicous plants in a packet of *Gymnostomum calcareum* obtained at Lockport, Ill., June 29, 1905, but examined some months later, I again visited the Glenwood station April 12, 1906, and fortunately found mature plants, since the first collections were all immature. They were in full fruit, the opercula mostly gone, the capsules frequently injured or broken off from rough usage in the winter. They showed a moss fruiting in the cold season of the year, quite in contrast with the synoicous form from Lockport, not so far advanced the last of June. They were associated with *F. cristatus*, *Dicranella heteromalla*, *Mnium cuspidatum* and a species of *Anomodon*. A full description of the Glenwood and the Colorado specimen is given below, illustrated by a drawing of plant, leaf, and its terminal portion from the Glenwood specimens, Plate IX. Figs. 8-10.

FISSIDENS INCONSTANS Schimp. Plants caespitose or gregarious, bright green. Stems 2-10 mm, high (mostly 3-6 mm.), declined at base or ascending, with copious rhizoids, some as long as the stems. Leaves 6-20 pairs, linguulate to oblong-lanceolate, acute to obtuse and apiculate, 0.9-1.6 × 0.2-0.4 mm. with a paler cord-like margin 2-4 cells wide extending to the point or ceasing just below, sometimes wanting on the lower part of the dorsal lamella, frequently loosened and detached part way. Vaginant lamina extending to the middle of the leaf-complex or a little beyond. Costa percurrent. Cells irregularly quadrate to polygonal, 8-14 μ in diameter, the basal larger, nearly quadrangular, 15-30 μ long. Autocious. Male flowers axillary on the middle or lower part of the stem; antheridia few, 1-2 or more, without paraphyses. Perigonal leaves 2-4, broad oval, abruptly narrowed to a point. Inner perichaetial leaves short, ovate to broad oval, acute or acutish, the outer like the stem leaves. Archegonia 2-8, slender, without paraphyses. Sporophyte terminal on the main stem or on short lateral branches. Seta dark red to pur-

ple, 2-3 mm. long. Capsule erect, greenish, slightly oblong to broad oval or suborbicular, 0.8×0.45 mm. (some 0.35×0.3 mm.), a little narrowed below the orifice when dry. Operculum conic-rostrate, brownish, oblique or curved, sometimes as long as the capsule, 0.3-0.35 mm. Calyptra long pointed, split on one side to the middle. Teeth long and slender (0.135-0.215 mm.), very papillose, yellowish, with darker or brownish yellow base, divided about four-fifths their length, the parts near the middle spirally banded and more or less thickened. Spores pale yellow, globular, 9-18 μ in diameter. Annulus indistinct, adhering to base of operculum, the small cells with the vertical diameter greater.

Clayey bank of ravine, Glenwood, Ill., Oct. to April, E. J. Hill. Cheyenne Cañon, Colorado, July, 1872, T. C. Porter.

Fissidens synoicus was published in 1856 in a separate, entitled: "The Musci and Hepaticae of the United States east of the Mississippi River, contributed to the Second Edition of Gray's Manual of Botany by William S. Sullivant."* It includes "Additions and corrections" that were to be made to the Manual, whose pagination for the part containing the Musci and Hepaticae ends with page 702. On page 103 of the separate, which would be page 703 of the Manual, was the following description, to be added to those on page 24 (page 624 of the Manual), following No. 3 of the genus *Fissidens* or *F. exiguus* Sulliv.:

"3 b. *Fissidens synoicus* (n. sp.) — Hermaphrodite; stems simple, inclined, 3"-6" long; leaves 12-14 (pairs ?), oblong-lanceolate, oblique, shortly acuminate, bordered except at the denticulate apex, the blade shorter than the duplicature, the dorsal wing vanishing above the base: costa continuous; capsule terminal, oval-oblong, erect; operculum rather long-rostrate. San Marcos, Texas. *Wright*.—A small species, distinct by its whitish green leaves with a close areolation, regular erect capsule, and hermaphrodite inflorescence."

Prof. W. G. Farlow writes me that the only writing on the specimen in Herb. Sulliv. is that given above where the specimen is cited. As seen by the direction given in the separate it was to be placed between *F. exiguus* and *F. minutulus*, which in the Manual are immediately followed by *F. bryoides*, thus indicating its relative position. I append a fuller description, based on the collection from Lockport, which I identify with those from San Marcos, and on those in the Herb. Sulliv. It is illustrated by Plate IX. Figs. 1-7 and Fig. 11. These are made from the Lockport moss.

FISSIDENS SYNOICUS Sulliv. Cespitose, stems mostly simple, erect or inclined at base, 6-12 mm. high. Leaves pale green, 8-20 pairs (mostly 10-15 pairs), oblong-lanceolate to linear-lanceolate, short acuminate or acute and apiculate, 1.1-1.8 \times 0.3-0.45 mm., the lower shorter; erose denticulate near the point, somewhat wavy-sinuolate below: costa subpercurrent, occasionally forming the point. Border 1-3 cells wide, or on vaginant lamina four cells, frequently indistinct or absent, especially on one side, usually ceas-

*New York, George P. Putnam & Co. Whether the additions and corrections were inserted in subsequent editions of Gray's Manual is doubtful. My copy with the imprint of Ivison and Phinney, 1858, with the copyright of George P. Putnam & Co., 1857, does not contain them. The citation is always from the separate, a very rare book.

ing below the point and on the very narrow base of the dorsal lamella. Vaginant lamina rather more than half the length of the leaf-complex. Cells of middle and upper part roundish hexagonal to polygonal, 6-11 μ in diameter, often quite variable; basal cells rather hyaline, quadrangular, some nearly square, 13-27 \times 6-10 μ . Synoicous or dioicous, the flowers terminal or sometimes in a bud near the base. Antheridia 1-5 (1-7) large, subclavate, the slender archegonia more numerous, sometimes 18-20, without paraphyses. Seta reddish, 3-4 mm. long. Capsule erect, green, oval-oblong to subcylindrical, 0.5-0.7 mm. long, the mouth purplish. Operculum conic-rostrate, long-beaked, $\frac{1}{2}$ - $\frac{3}{4}$ the length of the capsule, straight or slightly oblique, brownish. Teeth russet-brown, broad, rather short, not deeply divided, smooth or little papillose, the broad cross-bars horizontal. Spores globular, green, pitted, 13-16 μ in diameter.

Moist and shaded calcareous rocks. Fraction Run (now Dellwood Park), Lockport, Ill., June, 1905, E. J. Hill; San Marcos, Texas, Charles Wright, 1847. At Lockport it is associated with *Gymnostomum calcareum* Br. Germ. and *Amblystegium varium* (Hedw.) Lindb.

The chief difference between *F. inconstans* and *F. synoicus* is in the inflorescence and the time of maturing the spores, winter or early spring in one, early or midsummer in the other. This would of itself suffice to differentiate them specifically. The teeth of the former are slender and quite long, divided below the middle, the parts very papillose and spirally thickened. In *F. synoicus* the teeth are not deeply divided, smooth or smoothish, the parts not spirally thickened. In *F. inconstans* the thickened leaf-border is generally confluent with the costa at the point and readily separates from the cells of the body of the leaf; in *F. synoicus* the border is less developed or more interrupted, not thickened or cord-like, and usually ceases below the point. Its spores are green and pitted, those of *F. inconstans* are yellow or brownish yellow.

In its inflorescence *F. synoicus* is nearest to *F. Bambergeri*. Schimper described this as dioicous, (Syn. Ed. 11, p. 115). Roth, Boulay, Husnot and Milde give it variously as polygamous, synoicous, dioicous. I have found it both synoicous and dioicous. Of twelve stems examined eight had floral organs, two of them synoicous, two had archegonia only, four antheridia, or with buds having the short leaves of the perigonial form. In synoicous flowers the leaves were the larger, perichaetial form, with 2-5 archegonia, and one or more but few large antheridia, all kinds without paraphyses, or rarely with some. In the case of stems without fruit my experience is similar to that of Milde, who says: "I always found the fruiting plants without male flowers. The plant is also dioicous. The sterile plants bear *either* a single female terminal flower, which consists of 5-12 archegonia without paraphyses, *or* a single terminal hermaphrodite flower in which I found 1-3 antheridia and 3-5 archegonia without paraphyses. Since the antheridia were always very large an error is not possible. The archegonia on the other hand were always very long and slender." (Zur Kryp. Flora sud. Tirol. Bot. Zeit. 22: 12, 1864.) Milde considers it similar to *F. incurvus*; Schimper as

nearest *F. minutulus*, its time of fruiting "early spring." Roth says "late autumn and winter." In this character it is allied to *F. bryoides*, *inconstans* and *incurvus*.

F. Bambergeri is in almost all respects smaller than *F. synoicus*. The stems are 1-3 mm. high, with 4-12 pairs of leaves, those of the middle part of the stem, 0.6-0.8 × 0.2-0.27 mm., the cells 4-8 μ in diameter. The seta is relatively long, 2.5-5 mm., the pale capsule 0.4-0.6 mm., the yellow-brown spores 12-15 μ . The teeth are split about $\frac{2}{3}$ their length, slightly papillose, the parts spirally thickened. The leaves are rather obscurely margined, generally by a single row of cells often broken or interrupted, absent from some part or wholly gone. When absent the margin becomes a row of quadrate, nearly square pellucid cells similar to the margin of the leaves of *F. exiguus*. The habitat of *F. Bambergeri* in Tirol is given by Roth as "sandy loam in little hollows of rocks on hot slopes," thus pointing to a xerophytic nature, while *F. synoicus* at Lockport is mesophytic.

F. synoicus should also be compared with *F. incurvus*. The inflorescence of this is autoïcous, the antheridia terminal on short branches near the base of the fertile stems. The sharp pointed leaves are not bordered quite to the denticulate apex, the costa ceases just below the point, or becomes protuberant in the upper leaves. The border of the vaginant lamina is quite characteristic. It is 4-5 cells wide, but ceases properly somewhat above the base, gradually merging in the long quadrangular or polygonal cells of the leaf base. The teeth are quite long and slender, rather deeply divided, resembling those of *F. minutulus*. They are very papillose, the trabeculae prominent, the parts spirally thickened above the middle. The capsule of *F. incurvus* is not always curved, it may be erect as in *F. synoicus*. I find it thus in a collection made at Savanna, Ill. The two collections of P. Reinsch cited above differ from each other in this respect. Both have the same kind of habitat, moist places in the forests of the Vosges. One collection has the typical curved or horizontal capsule, the other the erect. All three have the same structure of leaf cells, the latter 8-15 μ in diameter, the average 11 or 12 μ .*

The other species to be considered are *F. exiguus* and *F. minutulus*. They were described and figured by Sullivant in 1846. (Mem. Am. Acad. N. Ser. 3: 58-60. T. 2, 1846. Also Icon. Mus. Part 1, 36, 37, T. 23, 24, 1864.) As such they were retained in Gray's Manual and so appear in that of Lesquereux and James. Austin made them varieties of *F. incurvus*. Barnes and Grout made the same disposition of them, but the latter with a reservation that the later maturing of the spores in August rather indicates a specific rank. By European bryologists one or both have been regarded as species or been considered the equivalent of other species or varieties. Thus both have been referred to *F. pusillus* Wils., and *F. exiguus* to *F. viridulus* Wahl. *F. minutulus* has been made *F. pusillus* var. *madius* Spruce, *F.*

*The name *F. synoicus* n. sp. appears a second time in bryological literature, having been used by C. Müller for a species collected in Argentina, South America, in 1873, and published in *Linnaea*, 42: 240, 1878, 1879. From the reading of the description I hardly take it to be the same as Sullivant's moss. If not a homonym of *F. synoicus* Sulliv. (1856), it is invalidated by priority, and the one from Argentina should be given another name if on comparison it is found to be distinct.

exiguus the same as *F. pusillus* var. *Lylei* Wils., or *F. viridulus* var. *Lylei* (Wils.) Dixon. This reference to at least three species and two varieties, along with specific rank besides, shows much diversity of opinion, and that it may be less confusing to leave them as Sullivant had them.

Both are quite similar in habitat, the most common the dry channels of brooks and rills as I have seen them. *F. minutulus* I have also collected on stones in damp places of woods or on ledges of rock by larger streams. The desiccated condition of the more common habitat favors their fruiting in mid-summer, since the stream beds are without running water, though it may remain in pools; the localities are therefore moist and commonly shaded. *F. minutulus* is apt to adhere very closely to a rock substratum. There may be no more appearance of a soil beneath it other than of the disintegrated rock than in some crustaceous lichens, or some species of *Orthotrichum* and *Grimmia*. There seems to be no choice of mineral constituents, for the stones and pebbles are of the various kinds washed from the drift in which the channels are cut. When on ledges they have been calcareous, which may be because the localities commonly accessible to me are of limestone formation. It is also apt to be unassociated with other mosses. *F. exiguus* I have found associated on clay with *Amblystegium varium*.

Both species are dioicous, the male flowers mostly on shorter plants, which are sometimes little more than buds provided with rhizoids and concealed in the rhizoids of the larger fertile or sterile stems. In this they differ from *F. incurvus*, of which they have been made a variety, and which is described by most authors as autoicous, though Roth makes it dioicous. Warnstorf gives it as both dioicous and autoicous. They may be deceptive in this respect. The male flowers on the short basal branches may be well furnished with rhizoids and easily detached by the slightest force. When this happens accidentally or spontaneously the male flowers will appear as little stems among the rhizoids of the fertile plants, as in the case of *F. minutulus*. When well advanced in growth there is apparently no vital connection with the parent plants even when remaining in place. From this experience with them I have been led to infer that the male organs may start as buds in the axils of leaves of fertile stems and become independent actually or apparently, or show a pseudo-dioicous inflorescence, which may account for some of the discrepancies.

The principal distinction between *F. minutulus* and *F. exiguus* has been found in the character of the leaf-margin. It is called immarginate in the latter; I have not found this quite exact. There are two types of border in *Fissidens*, one of linear cells that may be cord-like and not always firmly united to the cells of the body of the leaf. *F. bryoides* is one of the best examples. With it are classed *minutulus*, *incurvus* and *inconstans*. The other type has a row or band of cells less or but slightly chlorophyllose and consequently less deeply colored and more translucent than the remaining cells of the leaf, or they may be differently colored with some tinge as of yellow. They are also in general more uniform in size and shape. This kind of margin varies from a single row of cells to a band or zone four or five cells wide. The wide yellowish form is seen in *F. cristatus* and *F. adiantoides*;

while in *F. taxifolius* and *F. osmundoides* it is of less thickened cells and but one or two cells wide. *F. exiguus* can be placed in this class though not always so closely and uniformly defined. It has a marginal row of cells lighter and more pellucid as well as more nearly square or less irregular than the remaining leaf-cells. I had made a note of this when first finding the species several years ago, and have used it since as a help in distinguishing the two closely allied species. It is just as apparent in the example from the Musci Alleghanienses. In the drawing of the leaf *F. exiguus* in Sullivan's *Icones Muscorum*, Pl. 23, Fig. 9, this feature is not clearly brought out, and the margin does not differ essentially from the remaining cells of the leaf, only slightly more uniform perhaps. The squarish and more uniform size of the marginal row is more apparent in the plate accompanying the original description in the *Memoirs of the American Academy*, n. ser. iii, Tab. 11, B Fig. 2, though as Sullivan viewed it, it was with "foliis immarginatis," as compared with the "lamina limbata" of *F. minutulus* figured on the same plate. Leaves with a border row of pellucid cells of this character, whether called immarginate or marginate, are readily distinguished from those with the margin of *F. minutulus*. As remarked above on the leaf of *F. Bambergeri*, where the border with the linear type of cells was absent, there was an appearance of the other type.

Comparing the two in other respects the leaves of *F. exiguus* are more shortly and abruptly pointed, maintaining their width more fully to near the apex, making a shortly acuminate or acute leaf. Its capsule is commonly thicker in proportion to its length, the operculum with a shorter and stouter beak. In both the teeth are very papillose but in *minutulus* they are exceedingly long and slender, more so than in any considered in this paper, and so deeply cleft that one or both parts, though apt to be unequal, may be four times the length of the basal portion. In *exiguus* they are about twice the length, appearing less deeply divided though the basal part may be as broad as in *minutulus*. The trabeculae in *F. minutulus* are mainly horizontal but vary to oblique; or the projections may even take the spiral and somewhat thickened forms, the latter features quite exceptional as I have found them. In *F. exiguus* the spirally thickened form becomes more obvious, but as it is an inconstant character in both its value is not great in distinguishing them from each other, though on account of its quite uniform presence in *bryoides*, *inconstans* and *incurvus*, it is useful in separating the two from these.

In conclusion I wish to acknowledge my indebtedness to Mrs. Agnes Chase, of Washington, D. C., for the drawings and for copies of descriptions, and to Mrs. Elizabeth G. Britton and Prof. W. G. Farlow for the gift or loan of specimens.

Chicago, Ill.

February, 1907.

CATHARINEA CRISPA IN MAINE.

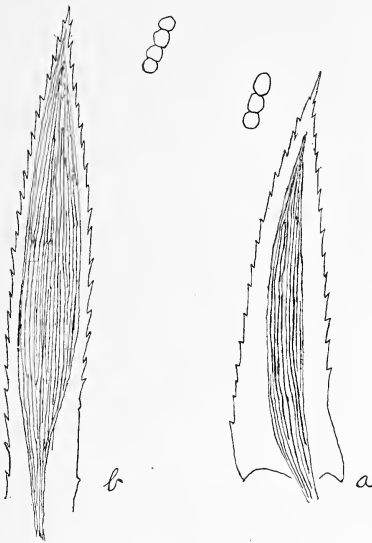
ALICE L. CROCKETT.

It is a pleasure to announce the discovery of a station for *Catharinea crispa* James, in Maine, it not having been reported before from this State, nor so far northeasterly as this. It was found in fruit in Camden, Maine, 44° N. lat. 69° W. long., in a pasture near the bank of a large brook, on knolls where six years ago a growth of alders had been cleared away. The altitude is about 200 feet. For its determination I am indebted to Mr. E. B. Chamberlain. Prof. J. Franklin Collins, in his list of New England plants, *Rhodora* 8: 131, 1906, gives only Massachusetts as definitely possessing it. See also *Rhodora* 9: 74, 1907.

Camden, Maine.

POLYTRICHUM GRACILE IN MAINE.

ELIZABETH MARIE DUNHAM.



Among the mosses collected in September at Middle Dam, Rangeley Lakes, Maine, there was one strange Polytrichum which Prof. J. Franklin Collins has determined *Polytrichum gracile* Dicks, and he speaks of it as a form with low lamellae and wide leaf margins. (Fig. a.) This variation is noted in fine print after the description of the species in Dixon and Jameson's "Hand-book of British Mosses." In comparison with a specimen (Fig. b.) collected by Mrs. Annie Morrill Smith in the Adirondack Mts., the Maine specimen shows leaf margins about three times wider, and the lamellae only three cells high instead of four or five as in the New York specimen. There was only one small patch of the moss, growing on the

ground in a woody swamp. Upon first examination with hand lens, the leaves closely resembled *Catharinea augustata*, although the growth as a whole was plainly that of a Polytrichum. It is the first record of its occurrence in Maine, as far as Prof. Collins can learn. Auburndale, Mass.

SULLIVANT MOSS CHAPTER NOTES.

Mr. E. B. Chamberlain's address after June 15 to September 15 will be Cumberland Center, Maine.

Since May 1st the following persons have qualified as Chapter members:
No. 179. Prof. C. F. Baker. Estacion Central Agronomica, Santiago de las Vegas, Cuba. No. 180. Mons. I. Thériot, 1 Rue Diquemare, Havre, France. No. 181. Mr. H. N. Dixon, 23 East Park Parade, Northampton, England. No. 182. Miss Emily L. Crosswell, 20 St. James Avenue, Boston, Mass. No. 183. Mr. E. J. Winslow, 523½ West Fourth street, Elmira, New York. No. 184. Max Fleischer, Potsdamerstrasse 105 A, Berlin, Germany. No. 185. Wilhelm Moñkemeyer, Inspector Royal Botanic Gardens, Leipzig, Germany. No. 186. Mons. Jules Cardot, Square du Petit Bois, Charleville, Ardennes, France.

SULLIVANT MOSS CHAPTER NOTES.

We record with sorrow the death on Monday evening, June 3d (1907), at his home at Clayville, Oneida Co., New York, of Mr. Benjamin Davis Gilbert. He suffered not long ago a paralytic stroke, and has since been in feeble health so that his death was not entirely unexpected. As a young man Mr. Gilbert took up the study of botany, giving attention especially to the ferns and later to cryptogams. In his death the Chapter loses a devoted friend.

We have received from Burroughs Wellcome & Co., a copy of "Wellcome's Photographic Exposure Record and Diary" for 1907 (United States Edition), and on reading it can do no less than advise our readers to send for a copy. Address as above, 45 Lafayette street, New York City, enclosing fifty-cents. We intend to use the "Exposure Calculator" and other rules, etc., during this summer, and will report later on our success.

Owing to illness Miss C. C. Haynes has been obliged to delay her series on Lophozia species, but we hope to publish the conclusion in the September number. This also explains her failure to answer correspondence more promptly.

OFFERINGS.

[To Chapter Members only. For postage.]

- Mr. Charles C. Plitt, 1706 Hanover street, Baltimore, Md. *Physcomitrium turbinatum* (Rich.) C. M. c.fr. Collected near Baltimore.
- Rev. H. Dupret, Seminary of Philosophy, Montreal, Canada. *Dicranum flagellare* Hedw.; *Hypnum stellatum* Schreb.
- Mr. George E. Nichols, 569 Yale P. O., New Haven, Conn. *Amphalanthus filiformis* (Swartz.) Nees. Collected in Jamaica. *Tortula papillosa* Wils. Collected in Maryland.
- Mr. Edward B. Chamberlain, Cumberland Center, Maine. (After Sept. 15, No. 38 West 59th street, New York City). *Eurhynchium megapolitanum* Milde, collected W. E. Nicholson, Sussex, England, c.fr.; *Fissidens decipiens* DeNot., collected in Maine, c.fr.; *Swartzia capillacea* Hedw., collected in Maine. c.fr.
- Dr. John W. Bailey, 4541 Fourteenth Avenue, N. E., Seattle, Wash. *Dicranum scoparium curvulum* Brid.

VOLUME X

NUMBER 5



SEPTEMBER, 1907



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
NORTH AMERICAN MOSSES
HEPATICS AND LICHENS

EDITOR
ANNIE MORRILL SMITH

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ALSO OFFICIAL ORGAN OF
THE SULLIVANT MOSS CHAPTER

EDITOR

MRS. ANNIE MORRILL SMITH

ASSISTED BY

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THE SULLIVANT MOSS CHAPTER

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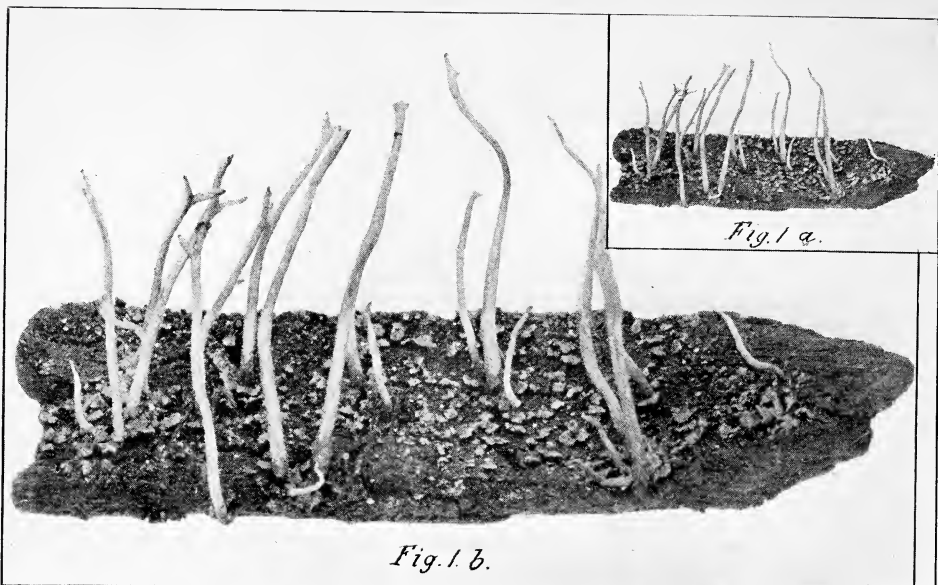


Fig. 1. b.

Fig. 1. a.

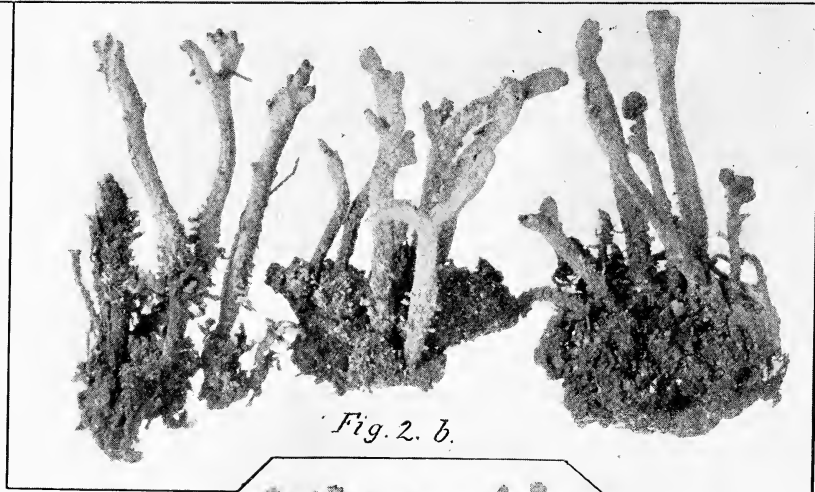


Fig. 2. b.

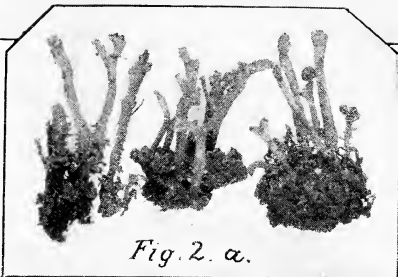


Fig. 2. a.

PLATE X—*Cladonia bacillaris*. Fig. 1a Nat. Size, Fig. 1b $\times 3$
Cladonia macilenta. Fig. 2a Nat. Size, Fig. 2b $\times 2$

THE BRYOLOGIST.

VOL. X.

SEPTEMBER, 1907

No. 5.

FURTHER NOTES ON CLADONIAS. XII.

Cladonia bacillaris, Cladonia macilenta and Cladonia didyma.

BRUCE FINK.

With this number of the series we pass from the brown fruited Cladonias to those commonly having scarlet apothecia. Of the three considered in this paper, the first two are so closely related as to render their separation most difficult and uncertain. The difficulties to be encountered are discussed at length under the description of the second species. The third of the three lichens is closely related to the other two, but the character of the squamules, especially the minute ones of the podetia when present, usually will serve to differentiate sufficiently. Tuckerman has referred to this plant as "Not a little resembling *C. bellidiflora* in miniature," but none of the specimens known to the writer need be mistaken for this species.

All three of the plants considered resemble *Cladonia cristatella* in general form, but that species has the podetia uniformly corticate.

To illustrate the first two species, we have chosen for *Cladonia bacillaris* a specimen from northern Minnesota, and for *Cladonia macilenta* one of L. Scriba's plants, collected in Germany.

CLADONIA BACILLARIS (Del.) Nyl. Lich. Lapp. Cr. 179. 1866. Primary thallus persistent or finally dying, composed of lacinate, lobate or crenate squamules, which are 1-3 mm. long, and about 1 mm. wide, flat or somewhat involute, scattered or clustered, sea-green or varying toward whitish or olivaceous above, and wholly white below or darker toward the base of the squamules, sometimes sorediate along the margin and below. Podetia arising from the surface of the squamules: quite slender, subcylindrical, rarely enlarged toward the apex; 5-55 mm. long and 0.5-2 mm. in diameter or even 4 mm. at the apex; cupless or rarely with very poorly developed cups; simple or rarely branched; often sterile and the apex obtuse or rarely subulate, or terminated by imperforate clustered or solitary apothecia; erect, the greater part or entirely sorediate, sometimes squamulose toward the base, and the squamules frequently occurring half way up or rarely even to the top, often corticate toward the base and below the apothecia, ashy, sea-green or olivaceous or a mixture of these colors. Apothecia medium sized, 1-5 mm. in diameter, solitary or clustered, immarginate or rarely margined, usually convex, scarlet. Hypothecium pale. Hymenium reddish toward the top and paler toward the lower part. Paraphyses simple or branched toward the thickened and reddish apex. Asci cylindrico-clavate. Spores obliquely disposed. Plate X. Figs. 1a and 1b.

On earth, old logs or stumps, found usually in rather open and dry places.

Examined by the writer from New Hampshire (R. H. Howe, Jr.), Illinois (C. P. Clinton, for whom determined originally by the writer as *Cladonia macilenta*), Iowa, Minnesota and Washington (Bruce Fink), Tennessee (W. W. Calkins, who determined as *Cladonia macilenta*), New York (Carolyn W. Harris), Mexico (J. G. Smith and named *Cladonia mitrula* by T. A. Williams), Newfoundland (A. C. Waghorne and called *Cladonia macilenta* by Dr. F. Arnold). H. Willey lists the species from Massachusetts, and Wainio's distribution adds Ohio, New Mexico and Jamaica. The above lists of localities would indicate quite a general North American distribution, but the plant is little known since it is generally confused with the next. Known in all the grand divisions.

Dr. Wainio gives three forms, of which only the first, *a clavata* (Ach.) Wainio, is at all common. Ours all seem to belong to this form, which should stand for the species

CLADONIA MACILENTA Hoffm. Deutschl. Fl. 126. 1796. Primary thallus persistent or finally dying, composed of lacinate, lobate-lacinate, crenate or rarely subentire, small or medium sized squamules, which are 1-4 mm. long and 1-3 mm wide, flat or somewhat involute, scattered or clustered: sea-green, whitish sea-green or olivaceous above, white below or darker or rarely yellow toward the base of the squamules; the margin and lower side sometimes sorediate. Podetia arising from the surface of the primary thallus, short or elongated, rather slender, subcylindrical or clavate, 5-42 mm. long and 0.5-3 mm. in diameter, cupless, simple or sparsely branched; apices obtuse or impressed, sterile or terminated by imperforate, clustered or scattered apothecia: erect, esquamulose, squamulose toward the base or rarely entirely squamulose; often corticate toward the base and below the apothecia, white or sea-green. Apothecia small or more commonly middling sized, 0.5-2.5 mm. in diameter, solitary or somewhat densely clustered, convex, immarginate or having a thin margin, scarlet. Hypothecium pale. Hymenium red above and pale yellowish below. Paraphyses usually simple, more or less thickened at the pale or reddish apex. Asci clavate or cylindrico-clavate. Spores irregularly arranged. Plate X. Figs. 2a and 2b.

On earth, dead wood, and on soil over rocks. Found especially in rather dry, open places. Examined by the writer from Newfoundland (A. C. Waghorne), Canada (J. Macoun), Iowa and Massachusetts (Bruce Fink). In all these the spores were irregularly arranged, though some of the plants were unbranched forms, otherwise appearing more like *Cladonia bacillaris*. J. Macoun gives many localities in British American, but doubtless part of the material is *Cladonia bacillaris* instead. T. A. Williams lists from Nebraska and the Black Hills. Whether he studied the spore arrangement sufficiently, I am not able to say, but suspect not, as American workers have not usually recognized *Cladonia bacillaris*. H. Willey records from Massachusetts, and says "We have also *C. bacillaris* Nyl. differing only in yielding no reaction with iodine." This statement follows after saying of *C. macilenta*, "podetia yellow with iodine." Willey is here following

Nylander's view of the difference in the two species. H. Willey and W. W. Calkins both record from Illinois, but we have no means of knowing whether the two species were differentiated or not. *Cladonia bacillaris* and *Cladonia macilenta* seem to be scarcely distinct, but herbarium specimens indicate that the latter plant is more robust and more commonly branched. The spore arrangement is not easy to make out and is not always to be depended upon, as the spores may be obliquely arranged in certain asci and irregularly in others of the same plant. Tuckerman recognized only *Cladonia macilenta*, which he gave a wide North American distribution. Judgment as to whether *Cladonia bacillaris* and *Cladonia macilenta* are distinct species must finally be based upon wide study of specimens by the statistical method, taking account of centres and ranges of variation and degree of isolation of various forms encountered. For the present, we can find no better way than to attempt to follow Dr. Wainio, who records the present species from all the grand divisions. It is reasonable to suppose that chemical tests may have some value in differentiating these two closely related species.

Dr. Wainio gives five forms, of which only the first and most common one has been noticed in North America. This we would regard as the species.

CLADONIA DIDYMA (Fee) Wainio Mon. Clad. Univ. 1:137. 1887. Primary thallus disappearing or rarely persistent, composed of minute or medium sized, laciniate or incised crenate squamules, which are 0.5-3 mm. long and 0.12-0.15 mm. in diameter; somewhat involute or nearly flat, scattered or clustered; without soredia, sea green above, varying toward olivaceous or rarely toward whitish, below whitish, or yellowish toward the base of the squamules. Podetia arising from the surface of the primary thallus; short or somewhat elongated, 1-45 mm. in length and 0.5-3 mm. in diameter; cylindrical and without cups; simple or with erect or divergent branches; erect, clustered or subsolitary; decorticate, or more or less corticate at the base, whitish-sea-green, varying toward whitish or brownish; squamules for most part toward the base or absent; squamules, verrucae, granules or soredia minute. Apothecia medium sized, or rather small, 0.3-2.5 mm. in diameter, solitary or more or less clustered; convex and immarginate, scarlet. Hypothecium pale or cloudy. Hymenium deep red above and pale below. Paraphyses simple, more slightly thickened toward the apex. Asci cylindrico-clavate. Spores irregularly arranged.

On old trunks, earth or rocks. Examined by the writer from Virginia (A. B. Seymour), Louisiana (A. B. Langlois), Florida (W. W. Calkins). The specimens of Calkins and Langlois were submitted to Dr. Wainio. *Cladonia pulchella*, to which these men had referred their specimens, is a synonym. Wainio cites the species from Massachusetts, Alabama, Mexico, Guadeloupe, St. Domingo, Cuba and Martinique. Dr. J. W. Eckfeldt referred one of A. C. Waghorne's plants from Newfoundland here, otherwise our distribution is confined to the United States and the islands. Common also in South America and known in Asia, Africa and Australia.

Dr. Wainio referred the specimens submitted to him to his first form, *Muscigena* (Nyl.) Wainio. Mon. Clad. Univ. 1:141. 1887, which is the common form which may well stand for the species, the only one thus far noted in North America. Miami University, Oxford, Ohio.

SPECIES OF HEPATICAE KNOWN TO OCCUR IN WEST VIRGINIA.

JOHN L. SHELDON.

In so far as I have been able to find out, no one has made an intensive and systematic study of the bryophytic flora of West Virginia. Several persons have collected a number of species, for the most part at odd times or while engaged in regular duties. This State ought to be, and probably is, very rich in species of this group of plants. The variation in altitudes, the different geological formations, the abundance of springs and small streams, and the extent of virgin forest make conditions favorable for the growth of hepatics.

In several parts of the State that I have visited, they were abundant. Even on the campus at the university there are a number of species. Just under the windows on the north side of Woodburn Hall there is a large patch of *Marchantia polymorpha*, possibly introduced in waste material from the biological laboratories. In the ravine are *Frullania Asagrayana*, *Porella platyphylla*, and other species less abundant. *Conocephalum conicum* grows in large mats under the falls of Falling Run, a small stream passing through the campus. These plants of *Conocephalum* have the odor referred to by Dr. Grout in a recent number of the BRYOLOGIST. (Grout, A. J. Notes on Recent Literature. BRYOLOGIST, 10: 3. 47. May, 1907.) It was the odor and the prominent stomata that interested me most when I first found this species growing on stones and earth along the edge of a little brook in Connecticut. Later, when I found it fruiting in the ravines along the Missouri River in Nebraska, the fruits added new interest. Since then, I have found it many times, but the odor was always the same, the one peculiar to *Conocephalum conicum*. Often the odor has been mixed with the odor of mud and decaying vegetables, but I have not yet had the pleasure of associating it with brook trout.

And not only are there several species of hepatics on the university campus, but in the vicinity of Morgantown, where the university is located, there are many others. To the east, within walking distance, up Decker's Creek, "over Cheat," in the Tibb's Run region, and on to Pisgah and Cranesville there are still others, so that botany students in the university can study a fairly good number of species of hepatics in their habitats without much trouble. Professor Andrews (A. LeRoy Andrews, Additions to the bryophytic flora of West Virginia. BRYOLOGIST, 8: 4. 63. July 1905.) has already reported a number of species from some of these localities and donated specimens to the Agricultural Experiment Station.

It is a common practice among farmers in the limestone districts to burn the lime they use for fertilizing purposes. At Pisgah, *Marchantia polymorpha* and *Funaria hygrometrica* were found growing around the edge of the refuse from one of these lime-piles. The luxuriant growth of the plants and the abundance of fruit suggests that they are both lime lovers. This may be a hint to those who have tried to grow *Marchantia* for laboratory use. At Cranesville, a few miles east of Pisgah, *Marchantia* grew so

thickly in a black spruce swamp, from which much of the timber had been removed, that an ecologist might well call it a *Marchantia* formation instead of a black spruce formation. Several species of hepatics have been collected at Cranésville on the border line between West Virginia and Maryland at an elevation of about 2500 feet. The meadows around Cranésville reminded me at the time I was there of the meadows of New England, except that there were no plants of *Ranunculus bulbosus*.

The best place to collect hepatics that I have found is at Cheat Bridge in Randolph County. Last summer a party of us camped there for a week. We certainly landed in the rainy season, for the sun did not shine for more than a half a day while we were there, and rain fell the remainder of the time. But what a place for mosses, hepatics and lichens, and how they were growing and fruiting! The rocks and decaying tree trunks were covered with a thick carpet of mosses and hepatics and the tree trunks with lichens. Specimens collected here have already found their resting place in the herbaria of several members of the Sullivant Moss Chapter.

The places that I have named are probably no richer in species of hepatics than many others in the State. The broad strip of mountains to the east and southeast, where nearly all of the larger streams have their origin, and where there is still much timber, should furnish many species not yet reported for the State. While the number of species of hepatics reported for West Virginia is not large, I have thought it worth while to bring such records as I have been able to secure together adding the new ones that I have collected.

The following list is compiled from the Flora of West Virginia (Millspaugh, C. F. and Nuttall, L. W. Flora of West Virginia. Pub. Field Columbian Museum, 9: Bot. Ser. 1. 3, 65-276. Jan. 1896.), the *BRYOLOGIST* (l. c.), The Proceedings of the Biological Society of Washington, D. C. (Morris, E. L.) Some Plants of West Virginia, Proc. Biol. Soc. Wash. 13: 171-182. Oct. 31, 1900. (Pollard, Charles L. and Maxon, William R.) Some new and additional records on the flora of West Virginia, Proc. Biol. Soc. Wash. 14: 160-163. Aug. 9, 1901, the specimens in the herbarium of the West Virginia Agricultural Experiment Station, and from specimens in my own herbarium. In so far as possible, habitat and locality is given. I have not had access to the reports on the floras of the State, published before Millspaugh and Nuttall's Flora of West Virginia, so that the habitat, locality and name of the collector can not be given for a number of species. Miss C. C. Haynes has examined duplicates of nearly all the specimens in the herbaria referred to and some of the originals; she has also given much valuable assistance in revising the nomenclature.

MARCHANTIACEAE.

CONOCEPHALUM CONICUM (L.) Dumont. On rocks beside stream, Randall, Monongalia County (Sheldon, 177). Cooper's Rock, Monongalia County (Post, 1669). On rock beside stream, north of Morgantown, Monongalia County (Sheldon, 1308). Below falls of Falling Run, University

campus, Morgantown. Common in several other localities but no specimens collected.

MARCHANTIA POLYMORPHA L. On brick wall in Experiment Station greenhouse, Morgantown (Sheldon, 537). Around edge of lime-pile, Pisgah, Preston County (Sheldon, 1531). Very abundant on earth in spruce swamp, Cranesville, Preston County (Sheldon, 1462). On earth near mouth of coal mine, Richards, Monongalia County. Near Nuttallburg, Fayette County (Nuttall).

LUNULARIA CRUCIATA (L.) Dumort. In greenhouse, Morgantown (Sheldon, 2941).

METZGERIACEAE.

RICCARDIA LATIFRONS Lindb. A few plants growing with *Scapania nemorosa* (L.) Dumort. on the north side of a bank at Sabraton, Monongalia County (Sheldon, 2302).

RICCARDIA MULTIFIDA (L.) S. F. Gray.

“ PINGUIS (L.) S. F. Gray. Near Nuttallburg, Fayette County (Nuttall).

METZGERIA CONJUGATA Lindb. Near Nuttallburg (Nuttall). On tree trunks with mosses, Cheat Bridge, Randolph County (Sheldon, 2531). Tibb's Run, Monongalia County (Andrews).

PELLIA EPIPHYLLA (L.) Corda. On earth and rocks around a spring, Morgantown (Sheldon, 768, 1280). Between stones along roadside, Cheat Bridge (Sheldon, 2523).

FOSSOMBRONIA FAVEOLATA Lindb. Growing on the north side of a bank with *Calyptogeia trichomantis* (L.) Corda, and along the roadside with *Anthoceros laevis* L. at Morgantown (Sheldon, 2764).

JUNGERMANNIACEAE.

MARSUPELLA EMARGINATA (Ehrh.) Dumort. “Randolph County, at Pickens, on clay bank of a small spring” (Millsbaugh), Masontown, Preston County (Andrews).

NARDIA CRENULATA (Smith) Lindb. “Springy place near Easton,” Monongalia County (Andrews). Growing with *Pellia epiphylla* (L.) Corda at Cheat Bridge (Sheldon).

NARDIA CRENUIFORMIS (Aust.) Lindb. “Few specimens from rocks in Tibb's Run” (Andrews).

JUNGERMANNIA LANCEOLATA L. “Rocks in Tibb's Run” (Andrews).

“ SCHRADERI Mart. “Quinnimont [Fayette County] Aug. 22 No. 113” (Pollard & Maxon).

JAMESONIELLA AUTUMNALIS (DC.) Steph. Tibb's Run (Andrews). On decaying logs, Cheat Bridge (Sheldon, 2517).

LOPHOZIA MARCHICA (Nees) Steph. “Specimens from wet place by road near Easton, are so named by Dr. Evans” (Andrews).

SPHENOLOBUS MICHAUXII (Web.) Steph. “Vertical rocks at Cheat View,” Monongalia County (Andrews).

- SPHENOLOBUS EXSECTUS (Schmid.) Steph.
PLAGIOCHILA PORELLOIDES Lindb.
“ SULLIVANTII Gotsche. “Earth in vicinity of Quarry Run,”
Monongalia County (Andrews).
PLAGIOCHILA VIRGINICA Evans. “Mercer: on walls of dry limestone cave,
Beaver Springs (1550).”
LOPHOCOLEA BIDENTATA (L.) Dumort. “Rocks with mosses, by Quarry
Run” (Andrews).
LOPHOCOLEA HETEROPHYLLA (Schrad.) Dumort. Easton (Andrews). On
rocks and earth, Fettermann, Taylor County (Sheldon 2535). On earth,
Morgantown (Sheldon, 2846).
HARPANTHUS SCUTATUS (Web. & Mohr) Spruce.
GEOCALYX GRAVEOLENS (Schrad.) Nees. Tibb's Run (Andrews).
CEPHALOZIA CURVIFOLIA (Dicks.) Dumort. Near Nuttallburg (Nuttall).
Quinnimont (Pollard & Maxon). On decaying wood, Tibb's Run
(Andrews). On decaying log, French Creek, Upshur County (Sheldon,
2095). On decaying logs, Cheat Bridge (Sheldon, 2532).
CEPHALOZIA LUNULAEFOLIA Dumort. On decaying log with *C. curvifolia*
and *C. serriflora*, Cheat Bridge (Sheldon).
CEPHALOZIA SERRIFLORA Lindb. “Rotten wood, near Tibb's Run. This is
possibly the same as *C. Virginiana* reported by Pollard and Maxon”
(Andrews). Growing with *Jamesoniella autumnalis* on decaying log,
Cheat Bridge (Sheldon, 2530).
CEPHALOZIA VIRGINIANA Spruce. “Quinnimont, Aug. 22, (No. 115a in part,
which is mostly *C. curvifolia*). (Pollard & Maxon). See note under *C.*
serriflora.
ODONTOSCHISMA DENUDATUM (Mart.) Dumort. “Decaying stumps and logs
by Tibb's Run” (Andrews).
ODONTOSCHISMA PROSTRATUM (Schwartz) Trevis. “Rocks beside Tibb's Run.
O. Sphagni listed by Millspaugh and Nuttall is evidently referable to
one or the other of these species” (Andrews).
ODONTOSCHISMA SPHAGNI (Dicks.) Dumort. Near Nuttallburg (Nuttall).
See note under *O. prostratum*.
CALYPOGEIA TRICHOMANIS (L.) Corda. On earth, Morgantown (Sheldon, 2765).
On earth, Fort Spring, Greenbrier County (Sheldon, 2728).
BAZZANIA TRIANGULARIS (Schleich.) Lindb. On rocks by brook, Tibb's Run
(Andrews). On decaying logs, Cheat Bridge (Sheldon, 2518).
BAZZANIA TRILOBATA (L.) S. F. Gray. On rocks among mosses. Dellslow
(Sheldon, 2282). Abundant on earth and decaying logs at Cheat Bridge
(Sheldon, 2534). Tibb's Run (Sheldon, 630). Cranesville (Sheldon, 1565).
LEPIDOZIA SYLVATICA Evans. “Ground near Tibb's Run” (Andrews).
BLEPHAROSTOMA TRICHOPHYLLUM (L.) Dumort. Tibb's Run (Andrews).
HERBERTA ADUNCA (Dicks.) S. F. Gray.
TRICHOCOLEA TOMENTELLA (Ehrh.) Dumort. Rocks in Brooks, Tibb's Run
(Andrews).
PTILIDIUM PULCHERRIMUM (Web.) Hampe. On decaying log, Cranesville

- (Sheldon, 1536). Cheat Bridge (Sheldon, 2515, 2520, 2521). On fence rail, Morgantown (Sheldon, 2830).
- DIPLOPHYLLA TAXIFOLIA* (Wahl.) Trevis.
- SCAPANIA NEMOROSA* (L.) Dumort. On rocks in stream, Cheat Bridge (Sheldon, 2516). On rocks along stream. Fort Spring (Sheldon, 2726). On ledge of lime stone, Durbin, Pocahontas County (Sheldon, 2526). Small-celled form determined by Mueller. On north side of bank, Sabraton (Sheldon, 2318).
- SCAPANIA UNDULATA* (L.) Dumort. "Randolph County, at Pickens, on clay bank of a spring" (Millsbaugh). On stones in brook by roadside between Cranesville and Albrightville (Sheldon, 1512). On stones in spring, Cranesville (Sheldon, 1524).
- RADULA COMPLANATA* (L.) Dumort. On tree trunk, Cheat Bridge (Sheldon, 2527).
- RADULA TENAX* Lindb.
" XALPENSIS Mont.
- PORELLA PINNATA* L.
" PLATYPHYLLA (L.) Lindb. Common on tree trunks and decaying logs. West of Morgantown (Sheldon, 1260). French Creek (Sheldon, 2069). Cranesville (Sheldon, 1546). Durbin (Sheldon, 2264). Cheat Bridge (Sheldon, 2519).
- LEJEUNEA CAVIFOLIA* (Ehrh.) Lindb. "A small form growing on rocks in Tibb's Run is referred by Dr. Evans to this species" (Andrews).
- LEJEUNEA LUCENS* Tayl. "On dripping limestone along Horsepen Creek. McDowell County, West Virginia, and Tazewell County, Virginia, altitude 1850 ft., July 31, 1900 (Morris, 116b)."
- ARCHILEJEUNEA CLYPEATA* (Schwein.) Schiffn. Near Nuttallburg (Nuttall), On rock and base of tree along stream, Fort Spring (Sheldon, 2720).
- JUBULA PENNSYLVANICA* (Steph.) Evans.
- FRULLANIA ASAGRAYANA* Mont. Rather common on trees and rocks. Cranesville (Sheldon, 1564). Cheat Bridge (Sheldon, 2524). Durbin (Sheldon, 2262). Lick Run, Preston County, (Sheldon, 1214). Ronceverte, Greenbrier County (Sheldon, 1076).
- FRULLANIA BRITTONIAE* Evans. "Trees near Cheat River, by Ice's Ferry Monongalia County. Also near Masontown" (Andrews).
- FRULLANIA EBORACENSIS* Gottsche. "Trees by Decker's Creek, near Morgantown" (Andrews). On tree trunks, Durbin (Sheldon, 1074).
- FRULLANIA PLANA* Sulliv. Near Nuttallburg (Nuttall).
" SQUARROSA (R. Bl. & N.) Dumort. "Trees by Decker's Creek, near Morgantown" (Andrews). West of Morgantown (Sheldon, 1259). French Creek (Sheldon, 2094).

ANTHOCEROTACEAE.

- ANTHOCEROS LAEVIS* L. "On dripping limestone along the Guyandot River below Baileyville, Wyoming County. Altitude 1200 ft., Aug. 15, 1900" (Morris, 1221). Aundant along side of road and bank. Morgantown (Sheldon, 67). On rocks along stream, Fort Spring (Sheldon, 2725).
- ANTHOCEROS PUNCTATUS* L. In gutter along roadside, Morgantown (Sheldon, 2577).
Morgantown, W. Va.
- West Virginia University.

MUSCI AND HEPATICAE OF WASHINGTON, D. C., AND VICINITY.

JOHN M. HOLZINGER.

It was the writer's fortune to work for three years, from 1891 to 1893, in the Agricultural Department at our national capital, as an assistant botanist. During that time I spent most of my leisure hours in exploring the vicinity of Washington for mosses, and, incidentally also for Hepaticae. The determination of the Hepaticae was entrusted entirely to Dr. A. W. Evans. The mosses I tried to work out myself, but, being a novice, I encountered many difficulties, so I sent my determinations and doubtful materials to my friend Mr. Jules Cardot, who has thus seen and corrected practically all the species recorded below. Besides, in the fifteen years that have elapsed, special students have studied the material collected by me; Mr. Cheney, the genus *Amblystegium*; Dr. Best, *Leskea* and *Thuidium*; Dr. Grout, *Eurhynchium* and *Brachythecium*; Mrs. Britton, *Sematophyllum*, *Orthotrichum*, etc. So that now, as a matter of fact, I can claim only the collecting and final recording of most species, for future reference.

During my study in Washington I endeavored, naturally, to make use of previous work of moss students. Only two persons seemed then to have worked on mosses, and to have left a record; the first was Mr. Rudolph Oldberg, a young druggist, a Scandinavian; the other, a Rev. E. Lehnert. Mr. Oldberg's work was recorded in "The Guide to the Flora of Washington," published by Prof. F. L. Ward as Bulletin No. 26 of the U. S. National Museum, in 1881. In this Guide ninety-eight Musci and twenty-nine Hepaticae are listed. Mr. Lehnert's work is recorded in Prof. B. F. Knowlton's "Additions to the Flora of Washington and Vicinity, from April 1, 1884, to April 1, 1886," published in the proceedings of the Biological Society of Washington, Vol. III, 1884-1886. Here one hundred and seventy-nine Musci and fifty-seven Hepaticae are listed. This second list is called a "revision," "so kindly placed" at Prof. Knowlton's disposal by Mr. Lehnert, and the author proudly points out that Mr. Oldberg's list is here augmented "by the addition of one hundred and eleven species, of which eighty-three are Frondosi and twenty-eight Hepaticae, making a total of two hundred and thirty-eight species."

Naturally I made use also of the collection of mosses in the National Herbarium, for purposes of comparison. So generally did I miss here the species recorded in the two lists named above that I made a systematic comparison between these lists and the species actually represented. After thus looking for the first forty-five species listed in Mr. Lehnert's "Revision" I confess I lost patience; for in this number I found only twelve of Mr. Oldberg's collection and none at all of Mr. Lehnert's. I then searched for Mr. Oldberg himself, and found he had died some years before. Mr. Lehnert, however, was alive, over in Philadelphia. With him I had some correspondence, without definite result; for he could never furnish me material of species he had reported. My friend Knowlton doubtless was serious—he was a serious man—when he published "Additions from April 1, 1884, to April 1, 1886;" as regards this revision of the District mosses, it proved to be a real April first

joke, without any scientific basis whatever. Even Mr. Oldberg's report was supported in so meager a way, by only about one-fourth of the species listed, that I decided then and there on supplying as a first foundation for future work on the District mosses, a *list accompanied by specimens* deposited in the National Herbarium. For only on this basis can rational work be done in the future.

The preparation of this list has been long delayed, owing to bread-winning duties. The great distance at which I live from Washington since 1893 (at Winona, Minn.) has been one serious drawback. Fortunately Prof. Edward B. Chamberlain, for some years till recently a teacher in one of the Washington schools, has taken much interest in the District mosses, and has with much sacrifice of time, collected for my use data from the National Herbarium which I could not otherwise have obtained. To him and all my other bryological friends who have in one way or another aided in determining and elaborating this collection, I wish here to express my heartfelt gratitude.

The list here offered for publication, is supported by material deposited in the National Herbarium and mostly also in my private herbarium, for every species cited. It is dedicated to future moss students with the earnest wish that in their study they may experience the same humble joy felt by the author in preparing it.

ALPHABETICAL LIST OF SPECIES OF MUSCI.

1. AMBLYSTEGIUM ADNATUM (Hedw.) Aust. Banks of Potomac.
2. " JURATZKANUM Sch. Agricultural Department grounds; Bladensburg Road.
3. AMBLYSTEGIUM KOCHII B. & S. Agricultural Department grounds.
4. " LESCURI (Sulliv.) Aust. Banks of Potomac.
5. " ORTHOCLADON L. & J. Rock Creek; Fourteenth street extended; Glen Echo; Cabin John's; road to Sligo.
6. AMBLYSTEGIUM RIPARUM (Hedw.) B. & S. Great Falls of the Potomac.
7. " SERPENS (Hedw.) B. & S. Rock Creek; Bladensburg Road.
8. " VARIUM Lindb., represented by various forms. Agricultural Department grounds; Glen Echo; Kendall Green; Rock Creek; Soldiers' Home grounds.
9. ANACAMPTODON SPLACHNOIDES (Froehl.) Brid. Spencerville, Maryland.
10. ANOMODON ATTENUATUS (Schreb.) Huebn. Glen Echo.
11. " MINOR Fuernr. Rock Creek.
12. " ROSTRATUS (Hedw.) Sch. Rock Creek.
13. " TRISTIS (Ces.) Sulliv. (*Leskea tristis*) Rock Creek.
14. AULACOMNIUM HETEROSTICHUM (Hedw.) B. & S. Arlington.
15. BARBULA CAESPITOSA (Schwaegr.) Schultz. Rock Creek; Glen Echo; Mt. Vernon; Ingleside; Brightwood; Spencerville, Maryland.
16. BARBULA UNGUICULATA Hedw. Rock Creek (a form); Arlington.
17. BARTRAMIA POMIFORMIS Hedw. Rock Creek.
18. BRACHYTHECIUM ACUMINATUM (Hedw.) Kindb. Rock Creek; Spencerville, Maryland.

19. BRACHYTHECIUM ACUTUM (Mitt.) Sulliv. Rock Creek.
20. " OYXCLADON (Brid.) Jaeg. & Sauerb. (*Brachythecium laetum* Brid.) Arlington; Rock Creek; Soldiers' Home grounds.
21. BRACHYTHECIUM PLUMOSUM (Sw.) B. & S. Rock Creek; banks of the Potomac.
22. BRACHYTHECIUM RUTABULUM (L.) B. & S. Glen Echo; Cabin John's.
23. BRUCHIA FLEXUOSA (Schwaegr.) C. M. Spencerville, Maryland.
24. BRYHNA NOVAE-ANGLIAE (Sulliv. & Lesq.) Grout in Bull. Torr. Bot. Club, May, 1898 p. 229. (*Brachythecium Novae-Angliae*; *Eurhynchium Novae-Angliae*). The tenability of this genus has been questioned. Rock Creek; District of Columbia (collected Coville).
25. BRYUM ARGENTEUM L. Arlington.
26. " CAESPITICIMUM L. Agricultural Department grounds.
27. " CIRRATUM Hoppe & Hornsch. Bladensburg Road.
28. CATHARINEA ANGUSTATA Brid. (*Atrichum angustatum* (Brid.) B. & S.) Rock Creek.
29. CATHARINEA UNDULATA W. & M. (*Atrichum undulatum* (L.) P. B.) Rock Creek.
30. CERATODON MINOR Aust. (Det. Mrs. E. G. Britton). Rock Creek.
31. CERATODON PURPUREUS (L.) Brid. Rock Creek; Bladensburg Road.
32. CIRRHYPHYLLUM BOSCH (Schwaegr.) Grout in Bull. Torr. Bot. Club, 1898, p. 226. (*Eurhynchium Boscii* (Schwaegr.) Jaeg.). Rock Creek.
33. CLIMACIUM AMERICANUM Brid. Rock Creek.
34. CLIMACIUM AMERICANUM KINDBERGII R. & C. in Bot. Gaz., 1890, p. 59. See also THE BRYOLOGIST, 1901, p. 54, and 1906, p. 8. Rock Creek.
35. CRYPHEA GLOMERATA B. & S. Rock Creek.
36. DICRANELLA HETEROMALLA (L.) Sch. Ingleside; Catholic University grounds; Rock Creek.
37. DICRANELLA HETEROMALLA ORTHOCARPA (Hedw.) L. & J. (= *Dicranella Fitzgeraldii* R. & C., fide Cardot in Bull. Herb. Boiss. Vol. 7, No. 4, and *Dicranella Fitzgeraldi* R. & C. in Bot. Gaz. 1888, p. 197). Rock Creek.
38. DICRANELLA RUFESCENS (Turn.) Sch. Mixed with *Ditrichum tortile*. Rock Creek.
39. DICRANELLA VARIA (Hedw.) Sch. Glen Echo.
40. DICRANUM FLAGELLARE Hedw. Rock Creek.
41. DICRANUM FULVUM Hook. Rock Creek.
42. DICRANUM SABULETORUM R. & C. in Bot. Gaz. 1889, p. 91, T. 12 A. Rock Creek.
43. DICRANUM SCOPARIUM (L.) Hedw. Spencerville, Maryland.
44. DICRANUM SCOPARIUM PALLIDUM (Müll.) L. & J. Rock Creek.
45. DITRICHUM PALLIDUM (Schrad.) Hpe. Rock Creek.
46. DITRICHUM TORTILE (Schreb.) Brockm. Rock Creek.
47. DITRICHUM TORTILE PUSILLUM (Timm) Brock. Rock Creek.
48. DITRICHUM TORTILE var. A peculiar variety with leaf margins of two cell

- layers and strongly serrate. The costa also is toothed toward the apex. Rock Creek.
49. DITRICHUM VAGINANS (Sulliv.) Hpe. Cabin John's; Glen Echo; Rock Creek.
 50. DIPHYSCIUM SESSILE (Schmid) Lindb. (*Diphyscium foliosum*) Rock Creek; Fourteenth street.
 51. DRUMMONDIA CLAVELLATA (Dill.) Hook. Rock Creek.
 52. ENTODON CLADORHIZANS (Hedw.) Par. (*Cylindrothecium cladorhizans*) Glen Echo.
 53. ENTODON COMPRESSUS C. M. in Linn. 1844, p. 707. (*Cylindrothecium compressum*). Arlington.
 54. ENTODON SEDUCTRIX (Hedw.) C. M. in Linn, 1847, p. 214. (*Cylindrothecium seductrix*). Rock Creek.
 55. EURHYNCHIUM GRAMINICOLOR (Brid.) Par. Index ed. 1. 1894, R. & C. in Bull. Herb. Boiss. 1899, p. 325. *Bryhnia graminicolor* (Brid.) Grout in Bull. Torr. Club, 1898, May, p. 231. (*Hypnum Sullivantii* Spruce). Rock Creek.
 56. EURHYNCHIUM GRAMINICOLOR HOLZINGERI (R. & C.) Par. Index ed. 1, 1804. *Bryhnia graminicolor Holzingeri* (R. & C.) Grout in Bull. Torr. Bot. Club, 1898, May, p. 232. District of Columbia (collected Coville).
 57. EURHYNCHIUM HIANS (Hedw.) Lindb. 1871. Rock Creek Park.
 58. EURHYNCHIUM PRAELONGUM (Dill. L.) Bryhn. A pale pinnate form. Dr. Grout has pencilled "No" on the pocket, but does not say what it is. Arlington; District of Columbia.
 59. EURHYNCHIUM STRIGOSUM ROBUSTUM Roell in Hedwigia, 36: 52, 1897. Rock Creek.
 60. EURHYNCHIUM STRIGOSUM SCABRISETUM Grout. Bull. Torr. Club, May, 1898, p. 241. Along Potomac, Georgetown, D. C. (collected J. Blanchard).
 61. FISSIDENS DECIPIENS De Not. Spencerville, Maryland.
 62. FISSIDENS INCURVUS Starke. Near the greenhouse of the Department of Agriculture.
 63. FISSIDENS MINUTULUS Sulliv. Rock Creek Park.
 64. FISSIDENS PUSILLUS (Wils.) Milde. Rock Creek; Potomac valley; Glen Echo.
 65. FISSIDENS TAXIFOLIUS (L.) Hedw. Rock Creek; Soldiers' Home grounds; River View; Spencerville, Maryland.
 66. FONTINALIS BIFORMIS Sulliv. Rock Creek; Blagden's Run; Creek near Arlington.
 67. FONTINALIS NOVAE-ANGLIAE Sulliv. Creek near Arlington.
 68. FORSSTROEMIA TRICHOMITRIA (Hedw.) Lindb. (*Leptodon trichomitrium*). Ingleside.
 69. FUNARIA HYGROMETRICA (L.) Hedw. Arlington.
 70. GRIMMIA OLNEYI Sulliv. Great Falls, Maryland.
 71. GRIMMIA PILIFERA P. B. (*Grimmia pennsilvanica* Schwaegr.) Glen Echo (collected E. B. Chamberlain).

72. HEDWIGIA ALBICANS VIRIDIS (B. & S.) Limpr. (*Hedwigia ciliata viridis*).
Rock Creek.
73. HOMALOTHECIELLA SUBCAPILLATA (Hedw.) Card. in THE BRYOLOGIST,
March, 1904, p. 31. *Homalotheciella* * Card. in Bull. Herb. Boiss.
Vol. 7, p. 374, 1890. *Burnettia* Grout in THE BRYOLOGIST, July, 1903,
p. 65. (*Homalothecium subcapillatum*) Rock Creek; Brightwood;
Arlington; Great Falls, Maryland.
74. HYPNUM ARCUATUM Lindb. (*Hypnum patientiae*). Road to Sligo.
75. HYPNUM CHRYSOPHYLLUM Brid. Rock Creek.
76. HYPNUM (LIMNOBIUM) CLOSTERI Aust. See Cheney, N. Am. Species of
Amblystegium in Bot. Gaz. Oct., 1897, p. 241, where *Amblystegium*
Holzingeri R. & C. is reduced to *Hypnum Closteri*. In a ravine on
the Virginia side of the Potomac, above the Georgetown Bridge.
77. HYPNUM CURVIFOLIUM Hedw. Rock Creek; Arlington; Blagden's Run.
78. HYPNUM FERTILE Sendt. Rock Creek.
79. HYPNUM HISPIDULUM Brid. Road to Sligo; Mt. Pleasant; Arlington.
(On this plant there are papillae on the under surface of the leaves.)
80. HYPNUM POLYGAMUM Sch. Arlington.
81. HYPNUM REPTILE Rich. Rock Creek.
82. ISOPTERYGIUM MICANS (Sw.) E. G. Britton in THE BRYOLOGIST, July, 1902,
p. 67. (*Raphidostegium micans*; *Plagiothecium micans*) Rock
Creek.
83. LEPTOBRYUM PYRIFORME (L.) Sch. Rock Creek.
84. LESKEA ARENICOLA Best in THE BRYOLOGIST, Nov., 1903, p. 97, reprinted
from Bull. Torr. Bot. Club, Sept., 1903. Spencerville, Maryland.
85. LESKEA GRACILESCENS Hedw. Arlington.
86. LESKEA OBSCURA Hedw. Rock Creek.
87. LESKEA POLYCARPA Ehrh. Banks of the Potomac.
88. LEUCOBRYUM GLAUCUM (L.) Sch. Catholic University grounds. L
89. LEUCOBRYUM MINUS Hpe. Rock Creek; Bladensburg Road.
90. LEUCODON JULACEUS (L.) Sulliv. Rock Creek; Spencerville, Maryland.
91. MNIUM AFFINE Bland. Glen Echo; Road to Sligo.
92. MNIUM CUSPIDATUM (L. ex. p., Schreb.) Leyss. Arlington; Rock Creek;
Cabin John's.
93. MNIUM PUNCTATUM (L., Schreb.) Hedw. Rock Creek; Banks of the
Potomac.
94. MNIUM STELLARE Reich. Rock Creek.
95. NECKERA PENNATA (L.) Hedw. Spencerville, Maryland.
96. ORTHOTRICHUM BRAUNII B. & S. Rock Creek.
97. ORTHOTRICHUM SCHIMPERI Hamm. (*Orthotrichum fallax* Sch.): Sol-
diers' Home grounds.
98. ORTHOTRICHUM CUPULATUM Hoffm. (*Orthotrichum strangulatum* P.
B.). Spencerville, Maryland.
99. ORTHOTRICHUM OHIOENSE Sulliv. Rock Creek.
100. PHASCUM CUSPIDATUM Schreb. var. Agricultural Department grounds.

*See Note Page 91.

101. PHILONOTIS FONTANA (L.) Brid., "a lax form," Card. Rock Creek.
102. PHYSCOMITRIUM TURBINATUM (Rich.) C. M. Agricultural grounds.
103. PLAGIOTHECIUM DENTICULATUM (L.) B. & S. Alexandria, Virginia.
104. PLAGIOTHECIUM ROESEANUM (Hpe.) B. & S. (*Plagiothecium Sullivantiae* B. & S.) Rock Creek; Banks of the Potomac; Fourteenth Street extended.
105. PLAGIOTHECIUM REPENS (Brid.) B. & S. Rock Creek.
106. PLEURIDIUM ALTERNIFOLIUM (Dicks., Kaulf.) Brid. Agricultural Department grounds; Arlington Road.
107. PLEURIDIUM SUBULATUM (Huds.) Rabenh. Rock Creek; Tenallytown.
108. POGONATUM BREVICAULE (Brid.) P. B. East Washington Electric Railway Line.
109. POLYTRICHUM COMMUNE L. Rock Creek.
110. POLYTRICHUM OHIOENSE R. & C. Rock Creek; Spencerville, Maryland.
111. "POTTIA TRUNCATA"—a doubtful reference. Rock Creek Park.
112. PTYCHOMITRIUM INCURVUM (Schwaegr.) Sulliv. Rock Creek.
113. PYLAISIA INTRICATA (Hedw.) Card. (non Sch.) in Bull. Herb. Boiss. Vol. 7, No. 4, 1899, p. 373. (*Pylaisia velutina* Sch.). Spencerville, Maryland.
114. PYLAISIA SCHIMPERI Card. in loc. cit. (*Pylaisia intricata* Sch.). Rock Creek; Arlington; Fourteenth Street extended.
115. PYLAISIA SUBDENTICULATA B. & S. Rock Creek; Spencerville, Maryland.
116. RHYNCHOSTEGIUM DEPLANATUM Sch. Banks of the Potomac.
117. RHYNCHOSTEGIUM GEOPHILUM Aust. Rock Creek.
118. RHYNCHOSTEGIUM RUSCIFORME (Weiss) B. & S. Broad Branch of Rock Creek.
119. RHYNCHOSTEGIUM SERRULATUM (Hedw.) Jaeg. Rock Creek; Bay Ridge, River View; Banks of the Potomac; Soldiers' Home grounds; Sligo; Agricultural Department grounds.
120. SCHISTIDIUM APOCARPUM (L.) B. & S. District of Columbia (collected Coville).
121. SEMATOPHYLLUM ADNATUM (Mx.) E. G. Britton in THE BRYOLOGIST, July, 1902, p. 65 (*Rhaphidostegium microcarpon*). Bay Ridge.
122. SEMATOPHYLLUM CAROLINIANUM (C. M.) E. G. B., in loc. cit. (*Rhaphidostegium demissum Carolinianum*). Rock Creek.
123. SEMATOPHYLLUM MARYLANDICUM (C. M.) E. G. B., in loc. cit. (*Rhaphidostegium demissum Marylandicum*). Rock Creek; Virginia side of the Potomac.
124. SPHAGNUM CYMBIFOLIUM LAEVE Warnst. (*Sphagnum cymbifolium* forma *glaucescens*). Rock Creek Park.
125. SYSTEGIUM CRISPUM (Hédw.) Sch. (*Astomum crispum*). Soldiers' Home grounds.
126. SYSTEGIUM SULLIVANTH (B. & S.) Jaeg. (*Astomum Sullivantii*). Agricultural Department grounds.
127. THELIA ASPRELLA Sulliv. Rock Creek; River View; Spencerville, Maryland.

128. *THELIA HIRTELLA* (Hedw.) Sulliv. Arlington.
129. *THUIDIUM DELICATULUM* (L.) Mitt. Banks of the Potomac.
130. *THUIDIUM MICROPHYLLUM* (Sw.) Best in Bull. Torr. Bot. Club, March 1896, p. 88. (*Thuidium gracile*). Agricultural Department grounds; Rock Creek; Ingleside; Mt. Pleasant; Spencerville, Maryland.
131. *THUIDIUM RECOGNITUM* (Hedw.) Lindb. Rock Creek; Cabin John's.
132. *THUIDIUM SCITUM* (P. B.) Aust. Glen Echo; Rock Creek.
133. *THUIDIUM VIRGINIANUM* (Brid.) Lindb. (*Thuidium gracile Lancastrinense*). See THE BRYOLOGIST, Oct., 1901, p. 73, and Bull. Torr. Bot. Club, March, 1896. Rock Creek.
134. *TORTULA MURALIS* (L.) Hedw. Georgetown; grounds around Washington's Church, Alexandria, Virginia.
135. *ULOTA CRISPULA* Bruch. in Brid, Bryol. Univ. Spencerville, Maryland.
136. *ULOTA AMERICANA* (P. B.) Mitt. (*Ulota Hutchinsiae*). North Washington, D. C.; Spencerville, Maryland.
137. *WEBERA LESCURIANA* L. & J. Rock Creek.
138. *WEBERA NUTANS* (Schreb.) Hedw. Rock Creek; Glen Echo; Arlington.
139. *WEISIA VIRIDULA* (L.) Hedw. Arlington; Glen Echo; Fourteenth Street extended; Agricultural Department grounds.

*Dr. George B. Sudworth, to whom I referred this nomenclature problem for verification, disposed of it as follows: "If Homalothecium is untenable, then Cardot's so-called sections, Euhomalothecium and Homalotheciella, are valid; and in casting Homalothecium sp. into synonymy, the section name Euhomalothecium must stand *first*, and Homalotheciella *second*, should the former ever have to be replaced on account of any invalidity shown to exist. This is so, because a section name is, in fact, a sub-generic name, and like a sub-specific name, is raised to specific rank, and may at any time of necessity (and if Homalothecium be untenable, this is a case of necessity) be raised to generic rank. This cuts out a section name, but if the latter is really wanted a new one may be created. Grout's position in passing over these two section names of Cardot's is unsupported by any authority I know. His *Burnettia* must certainly fall before either of Cardot's section names."

ALPHABETICAL LIST OF SPECIES OF HEPATICAE.

The following species of Hepatics were collected by me in and near the District of Columbia and were determined by Dr. Alexander W. Evans.

1. *ARCHILEJEUNIA CLYPEATA* (Schwein.) Schiffn. District of Columbia.
2. *BAZZANIA TRILOBATA* (L.) S. F. Gray. Rock Creek.
3. *CEPHALOZIA CURVIFOLIA* (Dicks) Dumort. Spencerville, Maryland.
4. *FRULLANIA EBORACENSIS* Gottsche. Banks of the Potomac opposite Georgetown; Rock Creek; Spencerville, Maryland.
5. *FRULLANIA ASAGRAYANA* Mont. Blagden's Run.
6. *FRULLANIA SQUARROSA* (R. Bl. & Nees) Dumort. Rock Creek.
7. *JUNGERMANNIA PUMILA* With. Banks of the Potomac opposite Georgetown.
8. *KANTIA* sp. Rock Creek.

9. LEJEUNIA CALCAREA Libert. Rock Creek.
10. LOPHOCOLEA HETEROPHYLLA (Schrad.) Dumort. Rock Creek.
11. METZGERIA CONJUGATA Lindb. Rock Creek.
12. NARDIA CRENULATA (Smith) Lindb. Rock Creek.
13. NARDIA HYALINA (Lyell.) Carringt. Banks of the Potomac opposite Georgetown.
14. ODONTOSCHISMA DENUDATUM (Mart.) Dumort. Rock Creek.
15. ODONTOSCHISMA SPHAGNI (Dicks.) Dumort. District of Columbia: Spencerville, Maryland.
16. RADULA OBCONICA Sulliv. Rock Creek.
17. RADULA TENAX Lindb. Rock Creek.
18. SCAPANIA EVANSII Bryhn. Rock Creek.
19. SCAPANIA NEMOROSA (L.) Dumort. Arlington; East Washington; Rock Creek. Winona, Minn.

**BOOKS AND EXSICCATI FROM PROF. CUMMINGS' ESTATE
FOR SALE.**

The following named books, from the library of the late Prof. Clara E. Cummings, are offered for sale. The prices are net:

1	Lichens Exotici. A. M. Hue. Paris. 1892.....	\$10 00
2	Lichenographia Scandinavica. T. M. Fries	3 00
3	Die Bedingungen der Fortpflanzung bei Einigen Algen und Pilzen. Dr. Geo. Klebs. Jena, 1896.....	3 50
4	A Preliminary Catalogue of the Plants Growing on Mount Desert and the Adjacent Islands. E. L. Rand and J. H. Redfield. 1894....	25
5	Lehrbuch der Botanik für Hochschulen. By Strasburger, Noll, Schenck, Schimper. Jena, 1895.....	2 00
6	Handbuch der Systematischen Botanik. Dr. Chas. Luerssen. 1879.	3 00
7	Illustriertes Pflanzenleben. Dr. Arnold Dodel-Port. Zurich, 1883.	1 00
8	Monographia Roccelleorum. Ein Beitrag zur Flechtensystematik. Otto Vernon Darbishire. Stuttgart, 1898.....	10 00
9	Flechtenstudien. Hugo Zukal, 1884.....	1 50
10	British Lichens. Part I. Rev. James M. Crombie, 1861.....	4 00
11	Geschichte und Litteratur der Lichenologie. 2 Vols. August von Krempellhuber. München, 1867.....	2 00
12	Lichenum Helveticorum. L. E. Schaerer. Bernae, 1823-1838....	3 00
13	Enumeratio Critica Lichenum Europaeorum. L. E. Schaerer. Bernae, 1850	1 50
14	Systema Lichenum Germaniae. Dr. S. W. Koerber. Breslau, 1855..	2 00
15	Methodus qua Omnes Detectos Lichenes. Erick Acharius. 1803..	2 00
16	Flora Cestrica. An Herborizing Companion for the Young Botan- ists of Chester County, Pa. Wm. Darlington. 1853.....	3 00
17	Introduction to Elementary Practical Biology. Chas. W. Dodge. Harper Bros., 1894.	1 00
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19	A Laboratory Course in Plant Physiology. Wm. F. Ganong. Henry Holt Co. New York, 1901.....	75
20	The Teaching Botanist. Wm. F. Ganong. The McMillan Co. New York, 1899.....	75
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23	Bergen's Foundations of Botany. J. F. Bergen. Ginn & Co. 1901.	50
24	The Evolution of Plant Life Lower Forms. G. Masee. Methuen & Co. London, 1891.....	75
25	The Lichen Flora of Great Britain, Ireland and the Channel Islands. Rev. W. A. Leighton. 1879.....	3 75
26	A General History of Rome. Chas. Merivale, D.D. Harper Bros. 1876.....	1 00
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37	Outlines of Classification and Special Morphology of Plants. D. K. Goebel. Clarendon Press. Oxford, 1887.....	3 00
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MR. WALTER C. WHITNEY,

10 Maple Street,
Newton, Mass.

SULLIVANT MOSS CHAPTER NOTES.

One new member only to report this time. No. 187. Superintendent H. C. Sanborne, Franklin, New Hampshire.

OFFERINGS.

[To Chapter Members only. For postage.]

Mr. E. B. Chamberlain, 38 West 59th street, New York City. *Fissidens Japonicus* Doz. & Molk.; *Fissidens perdecurrens* Besch. Collected by Prof. Shutai Okamura, in the province of Tosa, Japan. Both fruiting.

Miss Alice C. Kendall, Holden, Mass. *Mnium hornum* L. Collected in Holden, c.fr.

Mr. F. E. McDonald, 417 California avenue, Peoria, Ill. *Ceratodon purpureus* (L.) Brid.; *Physcomitrium turbinatum* (Rich.) C. M.; *Ditrichum pallidum* (Schreb.) Hpe. All c.fr. Collected in Illinois.

Prof. C. F. Baker, Santiago de las Vegas, Cuba, offers in exchange a limited number of specimens of the following Hepaticae: *Aneura multifida* Dum.; *Bryopteris diffusa* Nees; *Bryopteris tenuicaulis* Taylor; *Frullania atrata* Nees; *Leptolejeunea elliptica* Nees; *Madotheca* sp. (So. Cal.); *Marchantia polymorpha* L. (So. Cal.); *Peltolejeunea Jackii* Sz.; *Plagiochila dubia* L. & G.; *Plagiochila zacuapana* G.; and *Taxilejeunea erosifolia* W.

List of northern hepatics which I desire in return for the above will be given on application.

HERBARIUM FOR SALE.

The moss collection of K. A. T. Seth, Conservator of the Botanical Museum, Upsala, Sweden, is offered for sale: it contains the following sets:

A. T. Seth (Sweden; representing over forty years work).

W. P. Schimper (Abyssinia, Guadeloupe, Europe).

J. Z. Zetterstedt (Sweden, Norway, Pyrenees).

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E. Nyman (Sweden, Norway, Java, New Guinea).

P. Dusén (Sweden, Kamarum, Chili, Terra del Fuego, Patagonia).

Besides these it contains specimens secured by exchanges from C. Muel-ler, Lorentz, Spruce, L'Herminier, Breidler, Geheeb, Milde, Ruthe, Juratzka, Fred. v. Mueller, Weber, F. Winter, C. J. Hartman, C. Hartman, R. Hartman, Arnell, Kindberg, Hagen, Bryhn, Kaaloos, Wulfsberg, Kaurin, Warns-torf, Cobrier, Levier, Molendo, Wood, Booth, Blytt, Brotherus, C. Jensen, Wahlenberg, Cleve, Bomanson, and Lindberg.

Further information may be had by addressing Dr. P. A. Rydberg, New York Botanical Garden, who has the list of species.



NOVEMBER, 1907



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO
 NORTH AMERICAN MOSSES
 HEPATICS AND LICHENS

EDITOR
 ANNIE MORRILL SMITH

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ALSO OFFICIAL ORGAN OF
THE SULLIVANT MOSS CHAPTER

EDITOR

MRS ANNIE MORRILL SMITH

ASSISTED BY

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THE SULLIVANT MOSS CHAPTER

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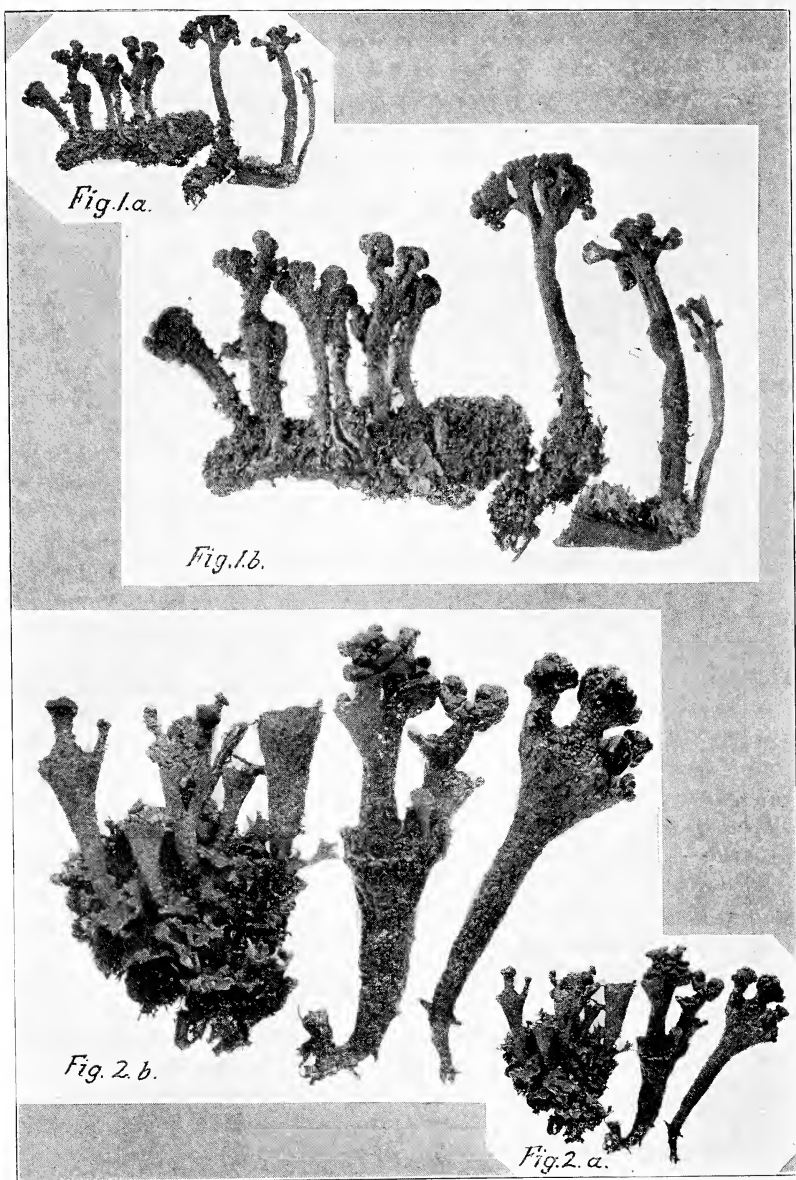


PLATE XI—*Cladonia cristatella*. Fig. 1a Nat. Size, Fig. 1b $\times 2$.
Cladonia coccifera. Fig. 2a Nat. Size, 2b $\times 2$.

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FURTHER NOTES ON CLADONIAS. XIII. *Cladonia cristatella* and *Cladonia coccifera*.

BRUCE FINK.

In the two species considered in this second paper on the scarlet-fruited Cladonias, we seem to be perhaps nearer certain of the brown-fruited Cladonias than we were in the three species considered in the last paper of the series. In confirmation of this view, it may be stated that both *Cladonia cristatella* and *Cladonia coccifera* have pale-fruited varieties, which may easily be confused with such species as *Cladonia mitrula*, *Cladonia botrytes*, *Cladonia pyxidata* and *Cladonia carneola*. Even so good a lichenist as Nylander seems to have confused Tuckerman's *Cladonia cristatella ochrocarpia* with specimens of some pale-fruited American Cladonia, constructing therefrom his species, *Cladonia substraminea*, with two varieties, one from North America and one from South America. This illustrates the dangers of making species from a few specimens submitted, Tuckerman knowing well that his plants grew with the ordinary scarlet-fruited plants in the White Mountains. Again, the resemblance of certain forms of *Cladonia pityrea* to *Cladonia cristatella* was noted in a former paper of this series, and the former species rarely shows a tendency toward scarlet-fruited conditions as in some specimens collected by the writer in Iowa and determined by Dr. Wainio.

The resemblance of a pale-fruited variety of *Cladonia coccifera* to *Cladonia pyxidata* and *Cladonia carneola* is noted below, and it need only be added here that the variety of *Cladonia coccifera* often shows fruits variegated with yellow and scarlet.

The two species considered in the present paper are somewhat closely related and have been confused. But *Cladonia incrassata* Flk. is an intermediate species, sometimes scyphiform and sometimes without cups, and our constantly scyphiform *Cladonia coccifera* need not be confused with the cupless *Cladonia cristatella*.

The specimens used to illustrate this paper were both collected in Minnesota by the writer.

CLADONIA CRISTATELLA Tuck. Syn. Lich. New Eng. 55. 1848. Primary thallus usually persistent, composed of incised or crenate, small squamules, which are 2-3 mm. long and wide, commonly flat but sometimes involute, scattered or clustered, sea-green or straw-yellow above and whitish below, sometimes sorediate above. Podetia arising from the surface of the squamules; usually of moderate length, 4-35 mm. long and 0.5-2.5 mm. in diameter; subcylindrical or somewhat enlarged toward the apex, without cups; simple, or more or less fasciculately or digitately branched toward the apex, the

branches short and obtuse, and the apex or apices commonly terminated by apothecia: the axils sometimes perforate, clustered or subsolitary; erect and rarely squamulose; cortex continuous or areolate, smooth or roughened; sea-green or straw-yellow. Apothecia medium sized or small, 0.3–3 mm. in diameter, solitary or clustered, convex, immarginate, scarlet. Hypothecium pale or pale yellowish. Hymenium pale reddish above and pale or pale yellowish below. Paraphyses commonly simple, the apices only slightly thickened or colored. Asci cylindrico-clavate. Plate XI. Fig. 1a and 1b.

On dead wood and rarely on earth, especially in rather dry woods. Examined by the writer from Maine (F. L. Harvey), Massachusetts (Clara E. Cummings), New York (E. A. Burt and Carolyn W. Harris), Long Island (H. von Schrenk), Ohio (E. E. Bogue, M. Foltz and Bruce Fink), Missouri (C. H. Demetrio and Colton Russell), South Carolina (H. A. Green), Illinois (G. P. Clinton and Bruce Fink), North Carolina (Colton Russell), Wisconsin, Iowa and Minnesota (Bruce Fink), Ontario (J. Macoun), Newfoundland (A. C. Waghorne, and labeled *Cladonia coccifera*), Tennessee (W. W. Calkins and referred to *Cladonia pulchella*). H. Willey records from Massachusetts and Illinois, W. W. Calkins from Illinois, J. W. Eckfeldt and W. W. Calkins from Florida, Charles Mohr from Alabama and C. H. Peck from New York. Wainio's distribution adds Virginia, New Jersey, Indiana, Georgia and Texas. J. Macoun finds the plant widely distributed in British America, but neither he, Dr. H. E. Hasse, nor any other collector seems to have found it along the Pacific coast. Otherwise, widely distributed in North America. A distinctly North American lichen.

CLADONIA CRISTATELLA RAMOSA Tuck. Obs. North Amer. Lich. 395. 1862. Podetia spreading, branched below and dichotomously much-divided above.

On sterile earth in the White Mountains, and also in Illinois according to H. Willey.

CLADONIA CRISTATELLA VESTITA Tuck. Syn. North Amer. Lich. 255. 1882. Podetia densely squamulose, and often much like *Cladonia pulchella*.

From Massachusetts and New Jersey. Also a specimen sent Dr. Wainio, collected by the writer at Tower, Minnesota, was placed here.

CLADONIA CRISTATELLA PALUDICOLA Tuck. Syn. North Amer. Lich. 255. 1882. Podetia very short and the apothecia almost sessile. The squamules of the primary thallus squamulose.

In Cypress and other swamps, indefinitely reported by Tuckerman. The writer has referred here a specimen collected on a log at Mankato, Minnesota. But the squamules are scarcely sorediate, and the determination is doubtful. H. Willey records for Massachusetts.

CLADONIA CRISTATELLA OCHROCARPIA Tuck. Syn. North Amer. Lich. 255. 1882. Apothecia sometimes yellow. Tuckerman first called this *Cladonia floerkeana ochrocarpia* Tuck. Lich. Amer. Excic. no. 133. 1854. *Cladonia substraminea* Nyl. Syn. Lich. 204. 1860, seems to be the same in part.

Reported as frequent on sterile soil in the White Mountains, where it is frequent and mixed with the ordinary form of the species. Also said to occur in New York and Massachusetts, H. Willey recording from latter State.

CLADONIA COCCIFERA (L.) Willd. Fl. Berol. Prod. 361. 1787. Primary thallus usually persistent, composed of irregularly or flabellately incised, crenate or lobate, small or larger squamules, which are 1-4 mm. long and 1-3 mm. wide (foreign measurements more than twice as large): flat or somewhat involute, the lower side often more or less distinctly nervose; clustered, or scattered, light to reddish sea-green above and white below or yellowish toward the base, the base and the nerves yellow or red; rarely sorediate above and at the margins. Podetia arising from the surface of the primary thallus, 4-50 mm. long and 1-4 mm. in diameter at the base, cup-bearing, cylindrical or turbinate, erect, corticate, the cortex subcontinuous toward the base and areolate-verrucose toward the top; sea-green, frequently yellowish or reddish tinged; the decorticate areas between the areoles are frequently white or yellowish; rarely more or less squamulose. Cups gradually or abruptly dilated, sometimes becoming oblique, subentire, dentate, radiate or proliferate, one to four proliferations from cup-bearing cups or apothecia, proliferations arising from the margins of the cups or rarely from within, the lower rank 4-30 mm. long, the upper one or more formed by proliferation usually shorter. Apothecia varying much in size, 1-8 mm. in diameter in ours (and frequently twice as large in foreign specimens); clustered or solitary, at the dilate apices of the proliferations or sessile on the margins of the cups: convex or depressed convex; thinly margined or more commonly immarginate, scarlet in ours. Hypothecium pale. Hymenium pale red above and pale below. Paraphyses usually simple, somewhat enlarged at the apex. Asci cylindrico-clavate. Plate XI. Fig. 2a and 2b.

On earth and on humus over rocks. Examined by the writer from New Hampshire (Clara E. Cummings, G. K. Merrill and R. H. Howe, Jr.), Massachusetts (Clara E. Cummings), Connecticut (H. A. Green), New York (Carolyn W. Harris), Iowa, Minnesota, Washington, British Columbia, Alberta (Bruce Fink), Montana (R. S. Williams), Ontario (J. Macoun), Alaska (Wm. Trelease). Chas. Mohr records from Alabama, C. H. Peck from New York, H. Willey from Massachusetts and J. Macoun from many localities in British America. Dr. Wainio's distribution adds only Gautemala. A large part of specimens are recorded under the synonym, *Cladonia cornucopioides* (L.) Fr. These forms fall mainly at least under *Cladonia coccifera stematina* (Ach.) Wainio Mon. Clad. Univ. 1: 158. 1887, which is the normal form and which we prefer to let stand with the species. Widely distributed in northern United States, British America and southward in the mountains. Tuckerman records from Oregon by Hall, otherwise the collections of the writer from Washington seem to be the only ones from the west coast, within the United States. Known in all the grand divisions except Africa.

CLADONIA COCCIFERA PLEUROTA (Flk.) Schear. Lich. Helv. Spic. 25, 1823. Podetia corticate below and more or less sorediate above. Squamules usually sorediate below and along the margins.

Examined by the writer from New England (Clara E. Cummings), New Hampshire (R. H. Howe, Jr.), Massachusetts (H. Willey), Iowa, Minnesota and British Columbia (Bruce Fink), Nova Scotia and Newfoundland (A. C.

Waghorne), Alaska (Wm. Trelease). Recorded from Montana by Carolyn W. Harris. Dr. Wainio's distribution adds Greenland, North Carolina and California. Thus the variety seems to be as widely distributed in North America as the species, but it is much less common in most localities. Its foreign distribution is also the same as the species.

CLADONIA COCCIFERA OCHROCARPIA Flk. in Sommerf. Suppl. Fl. Lapp. 128. 1826. Apothecia yellow, the podetia without soredia.

Recorded by H. Willey from Massachusetts. Found also in Europe.

The plant is little known and is easily confused with *Cladonia pyxidata* on account of its yellow apothecia. Also easily mistaken for *Cladonia carneola*, but this always has podetia sorediate toward the top. The plant may be distinguished from *Cladonia pyxidata* by a careful comparison of the primary thallus. Doubtless to be found elsewhere in North America
Miami University Oxford, Ohio.

NOTES ON NOMENCLATURE VIII.

ELIZABETH G. BRITTON.

Parts 227 and 228 of Engler and Prantl, Die natürlichen Pflanzenfamilien by Brotherus were received in April, 1907. They include the *Lembohyllaceae*, *Entodontaceae*, *Fabroniaceae*, *Pilotrichaceae*, *Nematoceae* and *Hookeriaceae*. Thirty-five genera known to occur in North America, Central America and the West Indies, with one hundred and ninety-nine species, are listed

Isothecium Brid. includes four North American species following Cardot and Grout. *Orthothecium* Br. & Sch., three species. *Entodon*, twenty-seven species, eight North American. *Platygyrium* Br. & Sch., one species, *P. repens*. *Pylaisia* Br. & Sch., six species, four North American. *Tripterocladium* (C. M.) Kindb. with three species. *Pterygynandrum* Hedw. with two species. *Stereophyllum* Mitt. with nine species, only one North American. *S. Donnellii* (Aust.) R. & C. is omitted, probably by mistake.

Austinia C. M., dedicated to Coe Finch Austin, is included with one Cuban species. *Fabronia* Raddi includes nine species of which four are North American. *Anacamptodon* Brid., two species, one West Indian. *Schwetschkea* C. Mull., one species, *S. denticulata* (Sull.) Card. *Helicodontium* Schwaegr. 1824. (*Myrinia* Schimp. 1866) to include *H. Dieckii* (Ren. & Card.) Broth. from Oregon and three other American species. *Clasmatodon* Hook. & Wils. with one species. *C. parvulus* (Hpe.) Sull. *Habrodon* Schimp. with *H. perpusillus* (De Not.) Lindb. (*H. Notarisii* Schimp.

The greatest number of changes occur in the *Hookeriaceae*, which are split up into thirteen genera, only three of which contain North American species: *Cyclodictyon varians* (Sull.) Broth. replaces *H. varians* Sull. *Callicostella cruceana* (Dub.) Jaeg. replaces *H. cruceana* Duby. *Hookeria* Sm. is restricted to five species, and *Pterygophyllum lucens* is replaced by *H. lucens* (L.) Sm., which is congeneric with *H. Sullivantii* from North America

and *H. acutifolia* Hook. from "Nepal and Sikkim, Ceylon and Java, Guadeloupe, Ecuador and Brazil." We have three sets of specimens of this species from Jamaica in fruit and careful comparisons recently made with the type from Nepal, India, and with other specimens and exsiccatae cited below, have forced a conviction that *H. Sullivantii* C. M. is identical with it. Fruiting specimens were collected in Virginia and figured in the Memoirs of the Torrey Botanical Club for 1894. Sullivant issued his Nos. 270 and 401 of the Musci bor. Am. as *H. acutifolia*? and this query proves to be true.

Hookeria acutifolia Hook.; Schwaegr. Suppl. 2. 2: 36. pl. 163. 1826.

Hookeria Grevilleana Griff. Not. Pl. Asiat. 473. 1849.

Hookeria lucens acuminata C. Müll. Syn. 2: 202. 1850.

Pterygophyllum acutifolium Schimp, Syn. 2; 583. 1876.

Hookeria (?) *Sullivantii* C. Müll.: Lesq. & James, Man. 293. 1884.

Pterygophyllum acuminatum Par. 4: 1051. 1898.

Plants light yellowish green, forming glossy luminous tufts in wet places; stems 2-4 cm. high; leaves 5-7 mm. long x 1.5-2 mm. broad, ovate to lanceolate, acuminate, ecostate; cells rhomboidal, the apical smaller, often rooting at apex; marginal cells larger, entire. Perichetial leaves smaller, narrower, acuminate. Dioicous; antheridia in small buds at base of stems. Seta stout, erect or curved, 1-2 cm. long; capsule horizontal, 2-3 mm.; lid long-rostrate equalling the urn; annulus none; cells of walls dark red, thick; peristome dark red; teeth brittle, slender and papillose at apex; endostome yellow, smooth, not perforate, without cilia, but with 1-2 intermediate rows of cells; spores green with large chlorophyll grains, .013-.021 mm., smooth, maturing in winter:

Habitat: In damp woods, under dripping ledges and along banks of streams in mountains.

TYPE LOCALITY: Nepal, India. W. J. Hooker.

DISTRIBUTION: India, Nepal, Sikkim, Ceylon and Java; North America, Ohio, Virginia, West Virginia, North Carolina and Georgia; South America, Ecuador and Brazil; West Indies, Jamaica and Guadeloupe.

EXSICCATAE: Sullivant Musci Alleghanienses No. 58. 1845 as *Hookeria lucens* Smith; Sullivant & Lesquereux Musci Boreali-Americani 270. 1856, 401. 1865, as *H. acutifolia* Hook.? No. 39. Fleischer Musci Frond. Archipelagi Indici, 1898.

ILLUSTRATIONS: Schwaegr. Suppl. 2. 2: pl. 163. 1826; Griffith Ic. Pl. Asiat. pl. 99. f. 4. 1849; Mem. Torrey Club 4: 189. pl. 80. 1894.

New York Botanical Garden.

SOME BRITISH COLUMBIA LICHENS.

THOMAS HEBDEN.

Mr. John Hooson, Mining Recorder's Office, Rossland, B. C., having made a collection of Lichens of the district has forwarded the same for verification which I have the pleasure of reporting as under:

Chlorea vulpina Nyl. Syn. 1, p. 274.—*Evernia vulpina* (L.) Ach. Tuckerm. Syn. p. 38.

Phacopsis vulpina Tulasne, parasitic on above. Parerga Lich. Koerber, 1865, p. 459.

Alectoria jubata (L.) Tuckerm. See Syn. Tuckerm. p. 44.

Umbilicaria proboscidea (L.) Stenh. See Syn. Tuckerm. p. 44.

“ *vellea* (L.) Nyl. See Syn. Tuckerm. p. 44.

Lecidella interiecta (Bgl. et Cost An. 272.) Sylloge Lichenum Italicorum, A. Jatta, 1900.

Lecidea geographica (L.) Leight. Lich. Flora, Great Brit. p. 373.

“ *disciformis* (Fr.) Leight. Lich. Flora, Great Brit. p. 373.

“ *albilabra* (Psora) Duf. Systema Lichenum Germaniae, Koerber 1855, p. 178.

Lecidea petraeae (Rhizocarpon) Ach. See Leighton. Lich. Fl. G. B. p. 378.

Lecidea atro-alba Ach. See Tuckerm. Syn. p. 76, and Leighton, p. 317.

Lecanora caesio-cinerea Nyl. See Leighton, p. 194.

“ *alpina* Th. Fr. See Tuckerm. Syn. p. 199.

“ *cinereo-rufescans* Nyl. See Tuckerm. Syn. p. 199; also Leight. Lich. Fl. G. B. p. 197.

Cullingworth, near Bradford, England.

NOTES FROM WATERVILLE, NEW HAMPSHIRE. II.

ANNIE LORENZ.

In the *BRYOLOGIST* for November, 1906, the writer published some notes on the bryophytes of Waterville, N. H. A more critical inspection of Waterville during the past August, together with the examination of specimens collected in 1906, has resulted in some further species of interest.

The prolonged cold of the previous winter has not only made everything noticeable behindhand, but has badly winter-killed many of the rock-growing mosses. Also, as the early part of the summer was extremely wet, there are abundant young sporophytes for next year.

MARSUPELLA EMARGINATA (Ehrh.) Dum. is common in every available situation, even among the stones in a sandy pitcher-plant bog. The water was very low on account of the August drought, and these plants had young perianths. At the Cascades station, where it grows on the western faces of the granite rocks, there had been abundant capsules, but they were nearly withered away by early August.

Further exploration of the neighboring summits produced *Fruillania Oakesiana* Aust. and *Hypnum Jamesii* (Sull.) L. & J. all over the balsam scrub. On Osceola were *Lophozia lycopodioides* (Wall.) Cogn. rather small, but adequately spinulose, and *Sphenolobus minutus* (Crantz) St. which is abundant on the ledges below the summit.

At the “V,” the curious ravine to which reference was made in the

former notes, are *Jungermannia sphaerocarpa* Hook., *Lophozia alpestris* (Schleich) Evans and *Tetraplodon mnioides* B. & S. Fertile *Blindia* is unusually abundant this year.

ANACAMPTODON SPLACHNOIDES (Froel.) Brid. occurred at two stations, both on yellow birch. The larger patch was on a big birch hanging out over a gully, nevertheless the writer did not find it inaccessible. In the writer's opinion *Anacamptodon* is overlooked rather than rare. It evidently grows about holes on any kind of broad-leaf, and facing in any direction, although fruiting more heavily with a southern exposure. A more or less permanent supply of moisture is necessary for the production of capsules. The writer has it from two stations in Massachusetts, one in Deerfield, a three-foot strip solid with fruit. Both of these were upon sugar-maple.

Only *Bryum argenteum* L. and *B. bimum* Schreb. are noted, the latter on wet corduroy in company with *Riccardia pinguis* (L.) S. F. G. *Thuidium Blandovii* (W. & M.) B. & S. appeared in the cranberry bog, *Fontinalis anti-pyretica* L. *gigantea* Sull. in a little brook on the A. M. C. path, and *F. Dalecarlica* B. & S. on rocks in Mad River at Tyler's Spring.

Dicranodontium also lives on an old root at a cold spring on the trail up Osceola, at about 2500 ft. alt.

No part of the White Mountain territory has been as yet explored with absolute minuteness, and Waterville is no exception to the rule.

Hartford, Conn.

A LIST OF THE MOSSES COLLECTED IN VARIOUS PARTS OF MISSOURI.

BY C. H. DEMETRIO.

[This list was prepared by the Rev. Mr. Demetrio for the December 1906, meeting of the Sullivant Moss Chapter, and is printed here without change save in the matter of a few names. The list of course does not pretend to be exhaustive. In each case the name of the person who has determined the species is given, and the localities from which it is represented in the collection of Rev. Mr. Demetrio. For all matter of the names and the authorities, the undersigned assumes full responsibility.

EDWARD B. CHAMBERLAIN.]

- EPHEMERUM CRASSINERVIUM* Hampe. Dry ditches, Davis Creek Bottom, near Emma, det. Rau.
- SPHAERANGIUM MUTICUM* Schimp. Clover field near Perryville, det. Rau.
- “ *TRIQUETRUM* Schimp. Old fields near Emma, det. Cardot.
- PHASCUM PILIFERUM* Schreb. Pastures, Emma, det. Cardot.
- “ *BRYOIDES* Dicks., var. *PILIFERA* Schultz, Emma, det. Cardot.
- PLEURIDIUM ALTERNIFOLIUM* Rabenh. Old fields, Perryville and Emma, det. Rau.
- MICROBRYUM FLOERKIANUM* Schimp. Pastures, Emma, det. Cardot.
- BRUCHIA FLEXUOSA* C. Muell. Old fields, Perryville and Emma, det. Rau.
- ASTOMUM CRISPUM* Hampe. Pastures, Emma, det. Cardot.

- ASTOMUM NITIDULUM Schimp. Old fields near Perryville, det. Rau.
" SULLIVANTII Schimp. Pastures, Emma, det. Cardot.
GYMNOSTOMUM CURVIROSTRE Hedw. var. SCABRUM Lindb. Moist rocks, Benton Co., det. Cardot.
" RUPESTRE Schwaegr. Moist rocks in woods, Benton Co., det. Cardot.
WEISSIA VIRIDULA Hedw. Roadside, Emma, det. Cardot.
DICRANELLA HETEROMALLA Schimp. On ground in oak woods, det. Geheeb.
" " forma COMPACTA, on sandstone, near Perryville, det. Cardot.
" VARIA Schimp. Claybanks, New Malle; and on gravel, Perryville, det. Rau.
DICRANUM FULVUM Hook. Rocky cliffs, Cinque Hommes Creek, near Perryville, det. Cardot.
" SCOPARIUM Hedw. In oak woods, near Perryville, det. Rau.
" " var. ORTHOPHYLLUM Brid. New Malle, det. True.
✓ LEUCOBRYUM GLAUCUM Schimp. In Woods, Benton Co., det. Rau.
FISSIDENS INCURVUS Starke. Claybanks near Emma, det. Cardot.
" JULIANUS Schimp. Inundated rocks, Perryville, det. Rau.
" OBTUSIFOLIUS Wilson. Moist shady rocks, Emma, det. Rau.
" PUSILLUS Wilson. On limestone, Honey Creek, Cole Co., det. Cardot.
" VIRIDULUS Wilson. Banks of Davis Creek, near Emma, det. Cardot.
CERATODON PURPUREUS Brid. Roadside, Emma.
" " var. ARISTATUS Austin. On an old stump, Davis Creek Bottoms, near Emma.
DITRICHUM PALLIDUM Hampe. Oak woods, Perryville, det. Rau.
DESMATODON ARENACEUS Sull. & Lesqr. Limestone, Concordia, det. Cardot.
" PLINTHOBIUS Sull. & Lesqr. On bricks in a garden, Emma, det. Cardot.
BARBULA CAESPITOSA Schwaegr. Bases of trees, Benton Co., det. Cardot.
" UNGUICULATA Hedw. Moist banks, Emma, det. Cardot.
GRIMMIA APOCARPA Hedw. On rocks near Perryville, det. Rau.
" " forma ROBUSTA Ren. & Card. Sandstone, Cooper Co., det. Cardot.
" LEUCOPHAEA Grev. On rocks, Pettis Co., det. Cardot.
HEDWIGIA CILIATA Ehrh. On rocks, Emma, det. Cardot.
ORTHOTRICHUM CUPULATUM Hoffm. Limestone, Sarcxie, det. Mrs. Britton.
" STRANGULATUM Sull. Tree trunks, Benton Co., det. Cardot.
DRUMMONDIA CLAVELLATA Hook. Tree trunks, Benton Co., det. Cardot.
TETRAPHIS PELLUCIDA Hedw. Sandstone, Perryville, det. Cardot.
APHANORRHAGMA SERRATUM Sull. Dry sloughs, Emma, det. Mrs. Britton.
PHYSCOMITRIUM TURBINATUM Brid. Roadsides, Emma, det. Mrs. Britton.
FUNARIA FLAVICANS Michx. In woods, Benton Co., det. Cardot.
" HYGROMETRICA Sibth. Moist shady places, Emma, det. Cardot.
WEBERA ALBICANS Schimp. Banks of Davis Creek, Emma, det. Mrs. Britton.
BRYUM ARGENTEUM Br. & Sch. Rocky ledges near Perryville, det. Rau.

- BRYUM ARGENTEUM, var. LANATUM Br. & Sch. Old fields and pastures, Emma, det. Mrs. Britton.
- “ ATROPURPUREUM Br. & Sch. Old fields, Emma, det. Cardot.
- “ “ var. CUBICUM Ren. & Card. Old fields, Emma, det. Cardot.
- “ CAESPITICIMUM L. Sides of a dam, Emma, det. Cardot.
- BRYUM ONTARIENSE Kindb. Rocky woods, Benton Co., det. Cardot.
- MNIUM CUSPIDATUM Leyss. Moist thickets, Emma, det. Rau.
- AULACOMNIUM HETEROSTICHUM Br. & Sch. Near Perryville, det. Rau.
- CATHARINAEA ANGUSTATA Brid. Oak woods, Emma, det. Cardot.
- “ MACMILLANI Holzr. Saline Co., det. E. B. Chamberlain.
- “ UNDULATA Web. & Mohr., var. ALTECRISTATA Ren. & Card. Roadsides, Emma, det. Cardot.
- POGONATUM BREVICAULE Beauv. Banks in woods, Emma, det. Rau.
- POLYTRICHUM OHIOENSE Ren. & Card. Sterile ground in woods, Benton Co., det. Cardot.
- DIPHYSCIUM FOLIOSUM Mohr. On sand rocks in woods, Perryville, det. Geheeb.
- FONTINALIS FILIFORMIS Sull. & Lesqr. On trunks in a slough, Perry Co., det. Rau.
- “ FLACCIDA Ren. & Card. On roots in a rivulet, Perryville, det. Cardot.
- “ MISSOURICA Ren. & Card. On roots in a spring, Benton Co., det. Cardot.
- LEUCODON BRACHYPUS Brid. On trees, Perryville, det. Cardot.
- “ JULACEUS Sull. On trees, Cape Girardeau, det. Cardot.
- FABRONIA PUSILLA Raddi. On limestone, Spring River, Lawrence Co., det. Raddi.
- LESKEA POLYCARPA Ehrh. Base of trees, Emma, det. Rau.
- THELIA ASPRELLA Sull. Base young trees, Emma, det. Cardot.
- “ HIRTELLA Sull. On beech trees, Benton Co., det. Cardot.
- “ LESCURII Sull. On rocks, Sarcoxie, det. Mrs. Britton.
- ANOMADON OBTUSIFOLIUS Br. & Sch. On logs, near Emma, det. Rau.
- PLATYGYRIUM REPENS Br. & Sch. On logs, near Emma, det. Rau.
- PYLAISSIA INTRICATA Br. & Sch. On tree near Perryville, det. Cardot.
- CYLINDROTHECIUM COMPRESSUM Br. & Sch. Bases of trees, Davis Creek, near Emma, det. Mrs. Britton.
- “ DEMETRII Ren. & Card. In a well, Emma, det. Cardot.
- “ SEDUCTRIX Sull. On base of a sycamore, Altenburg, det. Cardot.
- CLIMACEUM DENDROIDES Web. & Mohr. Bluffs of Cinque Hommes Creek, near Perryville, det. Rau.
- THUIDIUM DELICATULUM Mitt. On old logs, Perryville, det. Rau.
- “ SCITUM Aust. var. AESTIVALE Aust. On old logs, Davis Creek, near Emma, det. Rau.
- BRACHYTHECIUM ACUMINATUM Kindb. Bases of trees, Emma, det. Cardot;

and B. Sarcoxie, det. Mrs. Britton. (This last is the form known as *HYPNUM SETOSUM* Hedw.)

- BRACHYTHECIUM NOVAE-ANGLIAE* Jaegr. & Sauerb. Moist rocks, Houston, Texas Co., det. Rau.
- “ *OXYCLADON* Jaegr. & Sauerb. Roadside, Emma, det. Renauld.
- “ *RIVULARE* Br. & Sch. Big Springs, Sarcoxie, det. Rau.
- “ *RUTABULUM* Br. & Sch. Moist ledges, Benton Co., det. Cardot.
- “ *SALEBROSUM* Br. & Sch. Banks of Davis Creek, near Emma, det. Mrs. Britton.
- CIRRHYPHYLLUM BOSCHII* Grout. In woods, Benton Co., det. Cardot.
- EURHYNCHIUM PRAELONGUM* Bryhn. Moist places, Emma, det. Cardot.
- RHYNOSTEGIUM SERRULATUM* Jaegr. & Sauerb. Fence corners and thickets, Emma, det. Cardot.
- PLAGIOTHECIUM DENTICULATUM* B. & S. var. *LAETUM* Aust. Moist ledges, Benton Co., det. Cardot.
- “ *DEPLANATUM* Grout. Woods, Emma, det. Cardot.
- AMBLYSTEGIUM FLUVIATILE* Br. & Sch. On logs in swamps, Forest Green, Chariton Co., det. Cardot.
- “ *IRRIGUUM* Br. & Sch. Wet soil, Perry Co., det. Cardot.
- “ *KOCHII* Br. & Sch. In a well, Emma, det. Cardot.
- “ *RIPARIUM* Br. & Sch. In a well, Emma, det. Cardot.
- “ “ *forma MINOR*. On old logs, Davis Creek, near Emma, det. Cardot
- HYPNUM CHRYSOPHYLLUM* Brid. On the ground near Dykes, Texas Co., det. Rau.
- “ *CUPRESSIFORME* L. Bluffs of Cinque Hommes Creek near Perryville, det. Rau.
- “ *CURVIFOLIUM* Hedw. In woods along the Black Water Run, near Sweet Springs, Saline Co., det. Rau.
- “ *HISPIDULUM* Brid. Thickets and roadsides, Emma, det. Cardot.
Emma, Mo.

MRS. MARY L. STEVENS.

Our readers will learn with regret of the death, on September 17th, 1907, of a charter member of the Sullivant Moss Chapter, Mrs. Mary L. Stevens. Her active interest in the Chapter caused her to be well known to many, and those whom she could help she served well and faithfully. She was ever as eager to find material to offer as she was to accept what others offered.

Her interest in botany dates back many years, and her herbarium shows great painstaking, and contains beautiful specimens of ferns, mosses and lichens. She showed unusual talent in painting flowers, and among her numerous sketches are two sets of mushrooms and orchids that are exceptionally well handled. She was careful to keep all interesting notes on mosses that she learned either from her own observation or from those who kindly helped her to determine specimens. These notes she neatly arranged and bound together, with an accompanying colored sketch of each moss, making a valuable note book for beginners.

Those who knew her personally found her always ready to share her specimens, and glad if she could pass along any bit of information. As one friend has said, we all have had a big slice of pleasant and helpful friendship taken out of our lives.

ELIZABETH MARIE DUNHAM.

1 mm



-107-
 $\frac{1}{10}$ mm

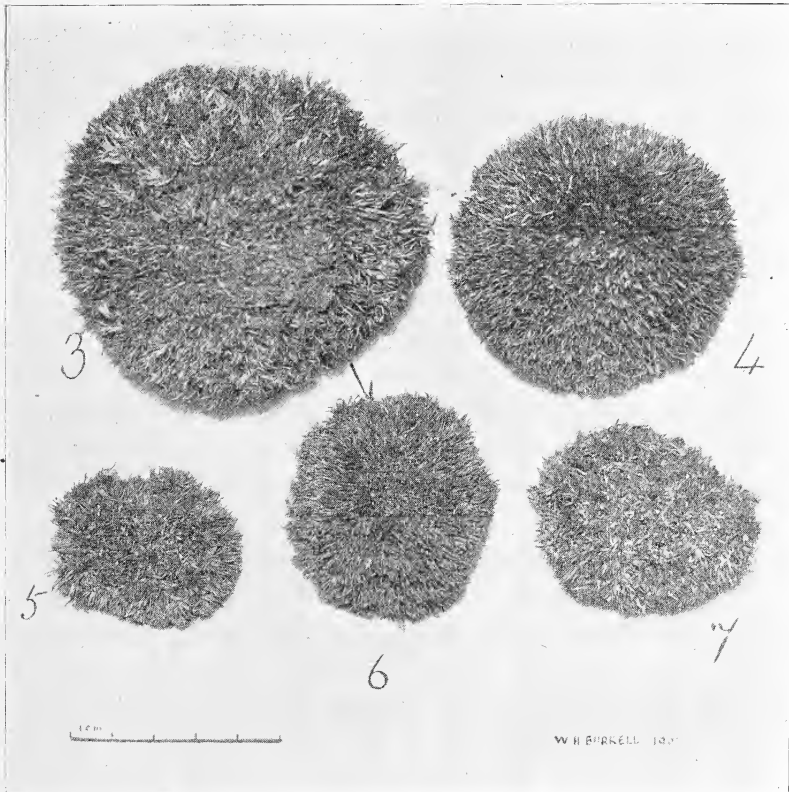
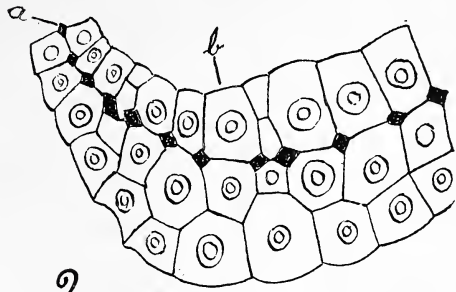


PLATE XII - *Leucobryum glaucum* Schimp.

LEUCOBRYUM GLAUCUM SCHP.

By W. H. BURRELL, F.L.S.

Leucobryum glaucum Schp., in unattached double convex discs, has recently been detected in Norfolk, England, enabling me to take an active interest in the two previous records, published in Dixon's "Handbook of British Mosses," and in THE BRYOLOGIST, Vol. IX, No. 4, July, 1906. The former describes spheroidal balls or cushions from Hedsor, Bucks, entirely unattached, consisting of stems radiating outwards from a central point. The latter refers to an apparently similiar cushion found by B. D. Gilbert in hemlock woods in Otsego Co., New York, which was observed to be resting in a matrix, of its own diameter, and about half an inch deep. Mr. Gilbert offers no explanation as to how the cushion separated itself and developed its radiate growth, neither does he state what the underlying cup was composed of; if it consisted of the older portions of *Leucobryum* stems, from which the cushion had separated, there is no analogy between the Otsego and Norfolk examples; if, however, the cup was composed of earthy matter, similar causes may have originated the cushions, heavy rain or flood causing it in this instance to become embedded.

A careful study of the large quantity of material at hand leads me to expect this form of *Leucobryum* to be wide spread and frequent; it is with the object of stimulating observation that this note is prepared.

In the parish of Aylmerton, Norfolk, on the slope of a hill, under the shade of beech trees, several hundreds of small cushions of *Leucobryum* are growing, a series of intermediates showing the connection between normal plano-convex tufts firmly attached to the forest soil and double convex unattached discs exhibiting no distinction between base and summit. Some are resting on fallen leaves of the previous autumn to which they are attached by radicals and mycelium; others are resting on their convex surface with the plane earth-covered base directed skyward through inversion: one fine tuft four inches (10 cm.) in diameter, with a clean base devoid of earthy matter was resting on a bed of *Mnium hornum* L.; it had been there long enough for the base to conform to the inequalities of the underlying moss and the latter was slightly discolored; others had in varying degrees pushed out new growth, illustrating stage by stage the gradual formation of the double convex cushion. Perfect cushions are the exception, rather than the rule, though many occur.

The rigid habit of the plant, its method of vegetative reproduction and the structure of the leaves are important factors in the development of the

EXPLANATION PLATE XII. *Leucobryum glaucum* Schimp.

Fig. 1. Portion of leaf with bud developing from rhizoids $\times 15$ diam.

Fig. 2. Transverse section of portion of leaf showing a single layer of chlorophyllose cells (a) embedded in 2-4 layers of hyaline cells with bordered pores (b) $\times 170$ diam.

Figs. 3, 5, 7. Cushions, lower surface, reduced to one-half diam.

Figs. 4, 6. Cushions, upper surface, reduced to one-half diam.

form under discussion. The leaves of most mosses are built up of a single layer of cells which quickly part with their moisture in dry air and as readily re-absorb it from damp air. The leaves of *Leucobryum*, however, have a remarkable cell structure allied to that of *Sphagnum*, consisting of a single layer of chlorophyllose cells (Fig. 2a) embedded in 2-8 layers of empty hyaline cells whose adjoining walls are perforated with bordered pores (Fig. 2b). When the hyaline cells are filled with water the green color of the embedded chlorophyllose cells is seen; when water is displaced by air the plant assumes a dirty white color suggestive of the name *leucobryum*—white moss. The water held by these cells after rainfall can be squeezed out as from a sponge and renders unattached tufts self-sustaining on the same principle that camels can exist for considerable periods in arid deserts—they carry their own supply. In Braithwaite's British Moss Flora reference is made to the abnormal vitality of the genus, and persistent growth even in the drying press: dipping in boiling water before pressing is recommended to prevent dehiscence of the capsule.

Leucobryum is not a frequent fruiter; in compensation for the rarity of spore formation new growth proceeds from buds developed from radicals which are freely formed on the surface of the leaves. (Fig. 1). Regardless of the position of the parent tuft these buds develop geotropically at whichever surface happens to be uppermost at the time. The double convex form assumed by the most perfect tufts, and to which all conform more or less, is favored by the rigid habit of the plant and by its squat growth in the locality referred to. In its most luxuriant form *Leucobryum* is a denizen of swamps where it forms large bosses 6-8 inches high, but at Aylmerton the average height is $1\frac{1}{2}$ inches (3-4 cm.). A tuft torn from a deep boss, would lie prostate; but the short tuft when disturbed has a tendency to come to rest either in its normal position or completely inverted, alternating growth taking place in two definite directions; too much stress must not be laid on this because many examples occur of single stems lying prostrate and producing plano-convex cushions half an inch (12 mm.) in diameter, by the development of buds from the apical leaves. Displaced plants do not to any great extent appear to recover an erect position by curvature of the stem; they remain in the position accident assigns them and form a frame work to which the new growth from buds conforms.

Assuming that I am correct in attributing the unattached state to accidental and repeated disturbance, which brings into play the natural vitality of the plant, and stimulates bud formation, it is not difficult to suggest a cause for the disturbance. The tread of woodmen and sportsmen and the removal of timber play their part, but in well stocked game preserves I have long been familiar with displaced moss, especially *Dicranum scoparium* Hedw., and I have attributed this to the scrapping of pheasants. In open moorland, where *Dicranium* forms dense masses, the ground is often littered with small tufts which apparently depend upon chance conveyance to a congenial spot for continued existence. In woodland, similar displacement takes place with a slightly different result; in the cool shade *Dicranum*

forms lank lax tufts; when disturbed the stems lie prostrate but growth is hardly arrested: by an exaggeration of the geniculate curve which is a feature of several species, the apices recover a vertical position and re-establish themselves: in this case balls are not formed but vitality is preserved by a curvature of the stem.

In large game birds may be found, I believe, an ever present and ever active agency for the periodical disturbance necessary.

The activity of these birds may be gauged by an examination of a chestnut grove in winter, when not a nut will be found; hundreds of torn and empty husks will show that birds have fed there. The *Leucobryum* site at Aylmerton is under beech trees, and the fallen nuts give a direct reason for special attention from birds.

It will not be out of place to refer to another roving moss mentioned by H. N. Dixon, in a paper on the moss flora of Northamptonshire, published in *Journ. of Northamptonshire Nat. Hist. Soc.* Vol. X. 1899. The author says: "A remarkable form of *Porotrichum alopecurum* Mitt. occurs in Weldon Quarries, which I have not found, or seen noticed, elsewhere. On a recent visit in the spring of 1898, the bottoms of some low depressions under trees were carpeted with globular mosses, which were found to consist of living 'balls' of this moss, entirely detached from the soil and without rootlets, and from two to four or five inches in diameter. The interior of the 'balls' consisted of the rigid, wiry stems proper to the species, which had branched profusely in all directions, and so produced this peculiar form. The branches were extremely dense and numerous, many hundreds of secondary stems going to make up a single tuft or 'ball,' and entirely hiding the central stem or stems. From this, as well as from the size of the tufts, it was clear that they must represent the growth of many months, probably of several years, and this without connection of any kind with the soil or other matrix; so that the nutriment must have been obtained entirely from atmospheric moisture; they were, however, perfectly fresh and vigorous. No doubt detached stems of this moss, the ordinary form of which was growing in close proximity, has been carried at various times by the wind into the hollows, where the moisture of the air, together with the natural vitality, apparently a marked character of the species, combined not only to resist decay, but even to promote growth, resulting in the very unusual phenomenon described."

In a later note Mr. Dixon records a similar growth of *Porotrichum alopecurum* in Ireland, reported by the Curator of the Fernery, Botanic Park, Belfast, who called it "the rolling moss," and described how it grew without roots and was blown about from place to place by the wind; he kept it as a curiosity among his ferns.

The unattached state of *Leucobryum* and *Porotrichum* bears no relation to the Wind Witches described by Kerner in *Nat. Hist. of Plants*, Vol. II, page 850. According to the author a number of herbaceous plants, inhabiting the Steppes of southern Russia, contract into flattened balls at maturity, and, becoming detached from the soil, are rolled along by gusts of wind. The

object achieved here is the distribution of seeds: the withered plants lie in sheltered nooks to which they have been blown until the rainy season, when, under the influence of moisture, the seed vessels open and the seeds are washed out. The plants themselves are dead, but in the case of the mosses vitality is maintained for a succession of years.

Sheringham, Norfolk, England.

NOTES ON SPORE DISPERAL IN SPHAGNUM.

E. J. WINSLOW.

On August 9th of the present year, while botanizing in a swamp near Lake Willoughby, Westmore, Vt., my attention was attracted by the frequent recurrence of a snapping sound like the breaking of a wheat straw. Upon investigation I found that the Sphagnum, which grew abundantly all around, was heavily fruited, and the strongly inflated capsules as they dried out in the mid-forenoon sun, were expelling their spores with the little explosion that I had noticed. I was never able to catch a capsule in the act, but by following the sound quickly I could catch a glimpse of a tiny and very transient cloud of reddish brown spores two or three inches from the top of a bunch of capsules.

I tried unsuccessfully to procure the effect by squeezing the capsules between the thumb and finger, but from a bunch which I gathered and carried in my hand the popping continued until most of the ripe capsules were exploded. As far as I could see there was no breeze or other disturbance to aid in producing the explosion, but the plants were exposed to the direct rays of the sun, and it was the time of day (about 10 a. m.) when the last of the dew was disappearing from the ground. So it would seem that perfect dryness is the only condition necessary to produce the discharge in a ripe capsule.

Elmira, New York.

SULLIVANT MOSS CHAPTER NOTES.

New Members: No. 188—Clarence A. Cheever, M.D., 1531 Blue Hill Ave., Mattapan, Mass. No. 186—Mr. George M. Pendleton, Sisson, California. No. 190—Mrs. Clara Anderson Groves, Thorsby Institute, Thorsby, Alabama.

NOTICE—ELECTION OF OFFICERS FOR 1908.

Members of the Sullivant Moss Chapter are requested to forward ballots AT ONCE to the Judge of Election, Miss Lydia Pritchett Borden, Manoa, Delaware Co., Pa. Polls close November 30th. The following candidates have signified their willingness to serve, if elected. Members, however, are at liberty to vote for any other candidate, should they prefer to do so.

- FOR PRESIDENT—Dr. T. C. Frye, University of Washington, Seattle, Wash.
FOR VICE-PRESIDENT—Miss C. C. Haynes, New York City and Highlands,
New Jersey.
FOR SECRETARY—Mr. N. L. T. Nelson, St. Louis, Mo.
FOR TREASURER—Mrs. Annie Morrill Smith, 78 Orange Street, Brooklyn, N. Y.
-

OFFERINGS.

(To Chapter Members only. For postage.)

- Miss Annie Lorenz, 96 Garden St., Hartford, Conn. *Blindia acuta* (Huds.)
B. & S., c.fr. Collected at Waterville, N. H.
Miss Mary F. Miller, 1109 M. Street, N. W., Washington, D. C. *Asterella*
tenella (L.) Nees.; *Cephalozia curvifolia* (Dicks.) Dumort, (showing
antheridia). Collected at Great Falls, Va.
Mr. E. B. Chamberlain, 38 West 59th Street, New York City. *Ulota curvi-*
folia (Wahl.) Brid., c.fr.; *Didymodon rufus* Lov. str. Collected by Dr.
I. Hagen in Norway.
Dr. J. W. Bailey, 4541 Fourteenth Ave., N. E., Seattle, Wash. *Sphag-*
num recurvum var. *mucronatum* (Russ.) Warnst.; *S. acutifolium* var.
rubrum (Brid.) Warnst. Collected by Mr. Foster at Hamilton, Wash.
Dr. J. F. Brenckle, Kulm, North Dakota. *Leskea polycarpa* var. *paludosa*
(Hedw.) Schimp.; *Urceolaria scruposa* (L.) Nyl. var. *parasitica* Som-
merf. Collected in North Dakota.

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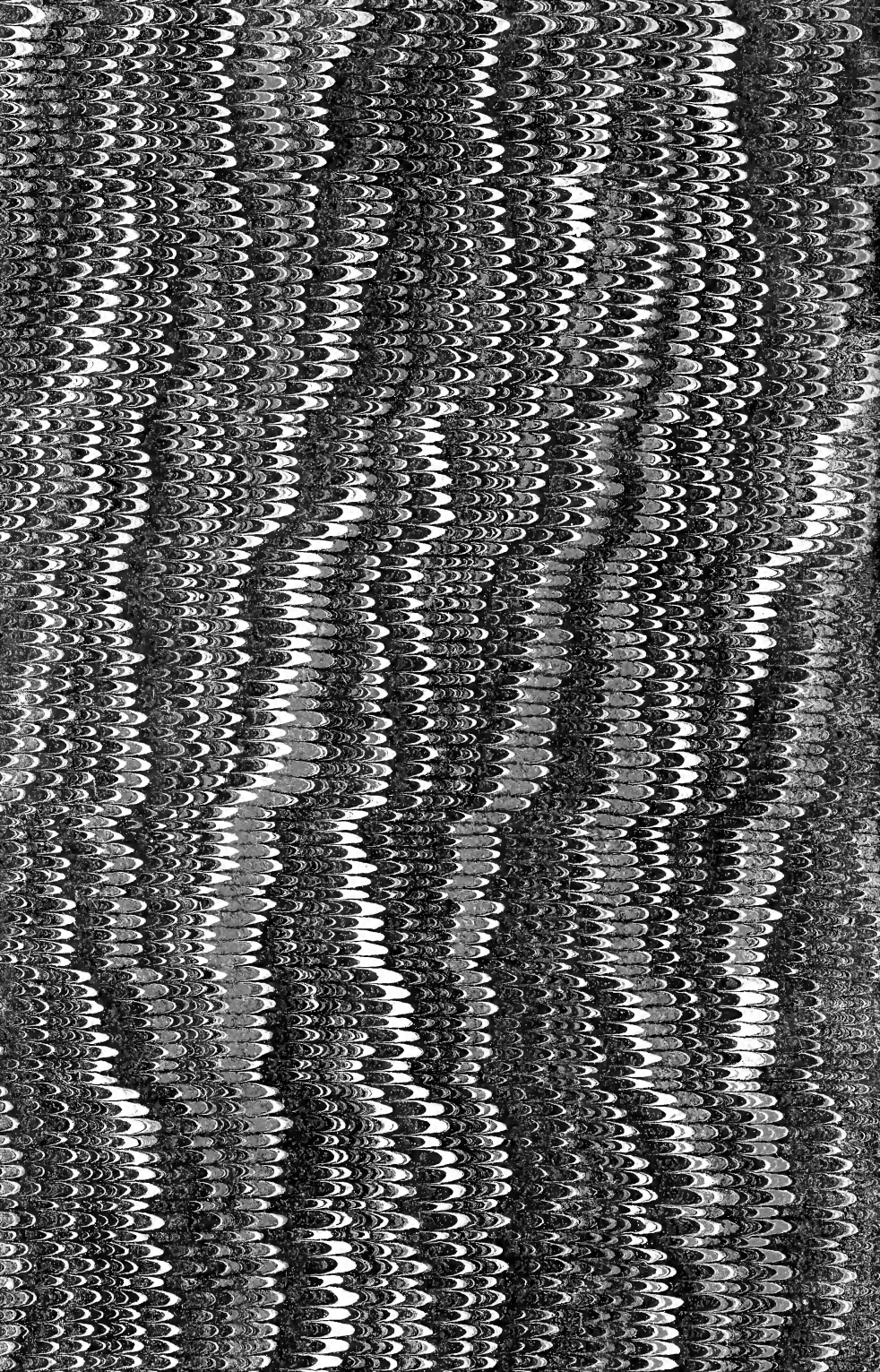
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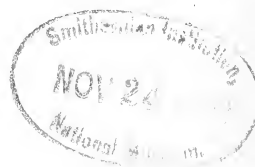
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ERRATA.

- Page 6, line 24, for 5-5 read 3-5.
 Page 6, line 34, for Lindb. read Kindb.
 Page 8, line 12, for SUBASPARRIMUM read SUBASPERRIMUM.
 Page 21, line 1, for 8: 3, 1905, read 8: 37, 1905.
 Page 26, line 9 from below, for *Spagna* read *Sphagni*.
 Page 30, line 18, for *leucopheae* read *leucophaca*.
 Page 32, lines 19 and 22, for *Selwini* read *Selwyni*.
 Page 41, line 31, for Bottiaceae read Pottiaceae.
 Page 42, line 9, for 1894 read 1904.
 Page 42, line 13, for A. J. G., type read A. J. G.; and type.
 Page 44, line 13, for *Tyloriae* read *Tayloriae*.
 Page 45, line 22, for 41 read 141.
 Page 49, line 6, for *furfuraceae* read *furfuracea*.
 Page 51, line 7, for AUEANTIACUM read AURANTIACUM.
 Page 58, line 39, for contex read cortex.
 Page 58, line 45, for Asi read Asci.
 Page 61, line 8, for I 6 read I:6.
 Page 63, line 17, for *Lapidozia* read *Lepidozia*.
 Page 64, line 4, for *acuminatum* read *acuminatum*.
 Page 64, line 25, for *flagallare* read *flagellare*.
 Page 64, line 32, for *scoparoides* read *scoparioides*.
 Page 65, line 33, for *urnigarum* read *urnigerum*.
 Page 65, line 38, for *piliferum* read *piliferum*.
 Page 65, line 40, for *recurvens* read *recurvans*.
 Page 66, line 7, for *quinquefarinum* read *quinquefarium*. Also same error page 72, line 25.
 Page 72, line 32, insert are, before several.
 Page 77, line 5, for *setacca* read *setacea*.
 Page 80, line 21, for John F. Leiberg read John B. Leiberg.
 Page 81, line 31, for *Physia* read *Physcia*.
 Pages 84-86 for Li. Um. read Li. Un., *passim*.
 Page 84, line 22, for margin read margine.
 Page 86, line 25, for Luec. read Suec.
 Page 86, line 33, for Scharer's read Schaerer's.
 Page 86 line 35, for *valleus* read *velleus*.
 Page 86, line 37, for U. vellea read U. vellea.
 Page 91, last line, for page 60 read page 80.
 Page 92, line 14; for Splachnae read Splachneae.
 Page 102, line 3 from below, for S. C. Horrell read C. S. Horrell.
 Page 103, line 12 from below, for spores read pores.



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